

# Environmental Impact Assessment Report

## *For Proposed Apartment Project At No 106/106a Galle Road, Colombo 03*

*Submitted to  
Coast Conservation and Coastal Resources Management  
Department*

*On behalf of  
Capital & Asset Investment (Pvt) Ltd.*

*Prepared by  
Green Planet Eco consultant (Pvt) Ltd.*



*July 2025*

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**for**  
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**Colombo 03**

**Prepared by**  
**Green Planet Eco consultant (Pvt) Ltd**



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**Department**

**July 2025**

## Executive Summary

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The proposed Apartment Project at No. 106/106a Galle Road, Colombo 03, was the subject of an Environmental Impact Assessment (EIA), the specifics of which are included in this report. The Coast Conservation and Coastal Resources Management Department, which served as the project approving agency, supplied the Terms of Reference, and the EIA was conducted in compliance with those guidelines.

In recent years, Colombo and its surrounding suburbs cities, as well as other Sri Lankan metropolitan centers, in Trincomalee, and Hambantota, have seen an upsurge in demand for real estate. In many areas of the nation with appealing natural elements, there are now several residential apartment buildings under construction. The preservation of the current environment, which is necessary for the success of such project developments, is given top attention in many of these projects since it blends well with natural settings. Thus, compared to other forms of development in similar areas, developments of this nature are anticipated to have far lower levels of negative consequences on the local urban ecosystem. The project proponent's surveys have amply demonstrated the tremendous potential of such a development at the project site in Colombo, Sri Lanka, on the Western shore, with its lovely coastline environment nearby.

The development of 220 apartment units and related facilities in Colombo, on the western coast, is the main goal of the planned project. The project proponent owns the land block where the projects will take place.

In order to protect the environmental status and values of the project site, where the development will take place, efforts must be made to implement the project in a safe environment. The project won't significantly contribute to any environmental damage, according to the study's consideration of the project's location and environmental significance. The assessment has taken into account the potential environmental effects throughout the project, particularly in both phases of the construction and operational, and relevant mitigation methods have been proposed.

Sand, coarse aggregates, rubble, and wood are the primary natural resources that are anticipated to be used for building construction. All such items must be bought from vendors that hold legitimate licenses for resource extraction, processing, and trading. Water use will be the other primary method of natural resource utilization. The National Water Supply and Drainage Board's pipe-borne water supply will serve as the primary water source. If necessary, deliveries from bowzers may also be employed to fulfill the water need. During the operating stage, it is also anticipated that rainwater collected from the roof would fulfill a portion of the overall water need.

The management of solid waste created includes separate collection using the provided color-coded containers, separate temporary storage of solid waste, and disposal of the collected solid trash using services offered by the Colombo Municipal Council.

The project site mostly consists of a modified urban environment that has no native plants or habitats. Most of the animal and plant species that were seen in the ecological assessment area are common or have the capacity to survive in such settings. Any landscaping that is done

will only employ non-invasive plant species. Thus, no significant ecological effects from project operations are anticipated.

Many of the negative environmental impacts identified will not be significant and can be rated as either moderate or low, and potential mitigation measures have been proposed. This is due to the nature of the proposed development – residential as opposed to industrial – and the study area's predominately commercial environment. It has also been determined how often monitoring will take place, what indicators will be used to gauge the project's impact, and how mitigating measures will be put in place.

The EIA has determined that there are no significant environmental impacts related to the development and operation of the proposed Apartment Project in Colombo 03 on the West coast based on the analysis of these components and the assumption that the recommendations for the mitigation of identified impacts are adopted and adequately implemented.

EIA presents a well-formulated Environmental Monitoring Plan which includes two aspects, namely impacts monitoring and Compliance Monitoring. The land is currently not being used for any development activities. Hence the proposed project will not have a significant impact on the fauna and flora since the site is located in an urban built environment of the area that has to manage by implementing all the mitigation measures stipulate

This Report has emphasized the introduction of s a sustainable institutional mechanism to ensure the reliability of monitoring programs giving due recognition to public concerns of the EIA process. The strong linkages between society and the environment have been given high consideration and specific measures have been included to maintain a continuous dialogue with stakeholders if and when necessary. This approach enables the Environmental Monitoring Committee to take into account the importance of stakeholder participation in both Compliance Monitoring and Impacts Monitoring.

The EIA assessment has considered the following key elements;

- The existing environmental conditions of the area
- The strategic national development policies for western Province and Colombo Metropolitan.
- The aspiration of the local community
- The significant impacts of the project
- The scale of environmental impacts caused by the proposed development
- The ability to minimize and/or eliminate the negative impacts effectively with mitigation measures

On the basis of the analysis of these elements, and the assumption that the recommendation for the mitigation of the identified impacts is adopted and adequately implemented. The EIA assessment has concluded that there are no severe insurmountable environmental impacts associated with the construction and operation of the proposed Capital asset and investment apartment building project.

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## Abbreviations and Acronyms

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|                 |                                                             |
|-----------------|-------------------------------------------------------------|
| BH              | Borehole                                                    |
| CC & CRMD       | Coast Conservation & Coastal Resource Management Department |
| CEB             | Ceylon Electricity Board                                    |
| CZ              | Coastal Zone                                                |
| CZMP            | Coastal Zone Management Plan                                |
| CEA             | Central Environmental Authority                             |
| CO <sub>2</sub> | Carbon dioxide                                              |
| DFAR            | Department of Fisheries and Aquatic Resources               |
| DSD             | Divisional Secretary Division                               |
| DST             | Divisional Secretariat, Thimbirigasyaya                     |
| DMP             | Disaster Management Plan                                    |
| DMC             | Disaster Management Centre                                  |
| DWC             | Department of Wild Life Conservation                        |
| DSAS            | Digital Shoreline Analysis System                           |
| EIA             | Environmental Impact Assessment                             |
| ETS             | Environmental Tobacco Smoke                                 |
| EMC             | Environmental Monitoring Committee                          |
| EMP             | Environmental Management Plan                               |
| EPR             | End Point Rate                                              |
| EGL             | Existing Ground Level                                       |
| FD              | Forest Department                                           |
| FSD             | Fire Services Department                                    |
| GN              | Grama Niladic                                               |
| GND             | Grama Niladic Division                                      |
| GIS             | Geographical Information System                             |
| LEED            | Leadership in Energy and Environmental Design               |
| LEC             | Local Exchange Carrier                                      |
| LAN             | Local Area Network                                          |
| MSWL            | Mean Sea Water Line                                         |
| MoD             | Ministry of Defense                                         |

|        |                                          |
|--------|------------------------------------------|
| MPPA   | Marine Pollution Prevention Authority    |
| NWS&DB | National Water Supply and Drainage Board |
| NEA    | National Environmental Act               |
| NSM    | Net Shoreline Movement                   |
| PPA    | Project Approving Agency                 |
| PP     | Project Proponent                        |
| SIA    | Social Impacts Assessment                |
| SCE    | Shoreline Change Envelop                 |
| SPT    | Standard Penetration Test                |
| SWMP   | Solid Waste Management Plan              |
| ToR    | Terms of Reference                       |
| TSPM   | Total Suspended Particular Matter        |
| UDA    | Urban Development Authority              |
| USGBC  | The United States Green Building Council |
| VES    | Visual Encounter Survey                  |
| VU     | Vulnerable (Species)                     |

## Chapter 01 : Introduction

---

Kollupitiya, often known as Colpetty, is a significant Colombo satellite city, which has a long history. It is currently a bustling business sector with numerous high-end retail centers. A newly growing firm known as Capital & Asset Investment (Pvt) Ltd., undertook a cost-benefit analysis to determine the best possibilities for increasing income for their company by focusing on socio-economic aspects and, as a consequence, proposed an apartment project.

For the construction of the planned apartment development project, a thorough Scoping and Environmental Impact Assessment (EIA) Process is necessary. The Applicant has appointed Green Planet Eco Consultant (Pvt) Ltd (GPEC) to conduct the EIA Processes to establish the biophysical, Environmental and social-economic consequences of the proposed project. Evaluating the Environmental Impact (EIA). Environmental Impact Assessment (EIA) is a system for identifying and implementing steps to mitigate the environmental implications of a development project.

EIA is a useful tool in achieving sustainable development for the region as well as for the country in the respective sectors considered. Because the project location is in the Coastal Zone, clearance is necessary from the Coast Conservation and Coastal Resources Management Department (CC & CRMD) as per the National Environment Act. The CC & CRMD has asked that the project proponent provide a report based on an Environmental Impact Assessment (EIA) completed for the proposed project in order for the CC & CRMD to consider granting permission in response to the project proponent's application for permission. This report covers the project's EIA results and the report is prepared under the guidelines and requirements given by the Terms of Reference (ToR) by CC & CRMD (Annex I – ToR). The following information is relevant to the project: Name, location, and proponents:

|                                |   |                                                        |
|--------------------------------|---|--------------------------------------------------------|
| <b>Project Name</b>            | - | Capital & Asset Investment (Pvt) Ltd Apartment Project |
| <b>Project Location</b>        | - | No 106/106A, Galle Road, Colombo 03.                   |
| <b>Project Proponent</b>       | - | Capital & Asset Investment (Pvt), Ltd.                 |
| <b>Province</b>                | - | Western Province.                                      |
| <b>District</b>                | - | Colombo.                                               |
| <b>Local Authority</b>         | - | Colombo Municipal Council.                             |
| <b>Secretarial Division</b>    | - | Thibirigasyaya Divisional Secretariat                  |
| <b>Grama Niladari Division</b> | - | Kollupitiya                                            |

The proposed apartment project will be built on a property owned by Capital & Asset Investment Pvt. Ltd, according to the survey No. 3064 made by Mr. S. Krishnapillai, a qualified surveyor, and leveler in the area (Annex V.a -Survey Plan). The area is 2205.54 Sq.m (0.220554 hectares) in size and is situated at Kollupitiya in the coastal segment of Galle face to Wallewatta Railway Station as per the CZMP. The Administratively site is located in the Kollupitiya Grama Niladari Division of Thibirigasyaha DSD of Colombo District of Western Province of Sri Lanka (Figure 01-1).

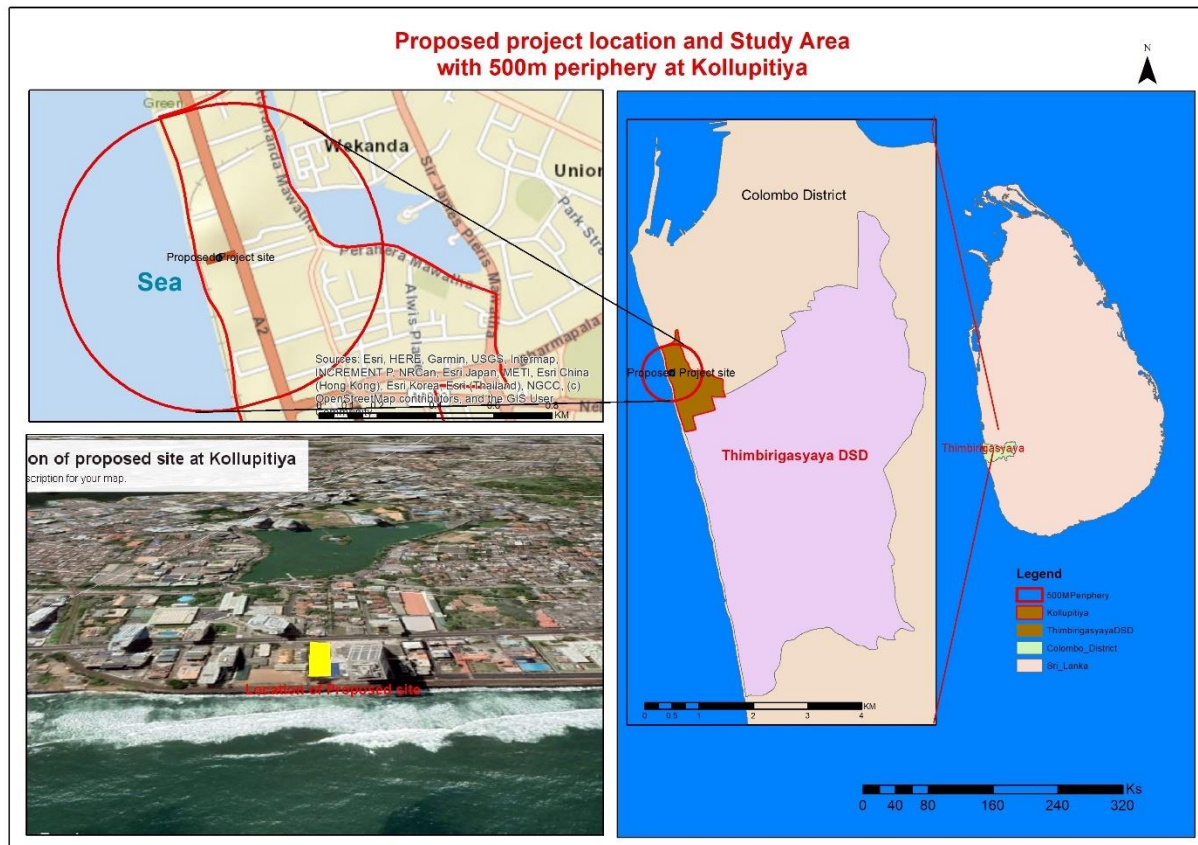


Figure 01-1 Location of the proposed project

## 1.1. Aim and Scope of the EIA study

The goal of environmental impact assessment is to provide decision-makers with information regarding issues that may arise as a result of decisions pertaining to a new project, program, plan, or policy. Environmental impact assessment must result in decision-making based on inputted information, including potentially significant aspects, and it must benefit both the proponent and the public. Furthermore, environmental impact assessment is a process that gives in a systematic manner a technical evaluation of environmental consequences that the project is anticipated to generate and explains the importance of predicted impacts, indicating the scope for modification or mitigation.

Finally, it requires the relevant ministries/agencies to examine the project's prospective outcomes before making a decision. Environmental impact assessment techniques can be used by project developers and administrative agencies with a duty for environmental consideration to improve the quality of both the project plan and decision-making by detecting potential consequences in the early phases. The following are the particular compliances with the environmental impact assessment system:

- To inform decision-makers and the public about the serious environmental impacts of planned developments.
- To find strategies to avoid or minimize harmful environmental impact.

- To avoid negative environmental consequences by mandating the deployment of viable alternatives or mitigation measures.
- To make public the reasons for approvals for projects with major environmental implications.
- To improve inter-agency coordination in decision-making.
- Increasing public engagement in business and decision-making.

Considering the environment and reducing the consequences of changes brought about by the execution of development projects changes may have long-term negative implications and damages that much surpass the economic gains of the progress. It is hard to envisage a project that does not produce environmental harm; nevertheless, if such damages are detected early, during the project planning stage, solutions and means to reduce the negative impacts can be discovered.

As a result, an Environmental Impact Assessment (EIA) is the methodology used to objectively examine the possible adverse environmental implications (physical, biological, and socioeconomic) of project implementation and to identify solutions to minimize such impacts during the project's design stage. An Environmental Management Plan (EMP) is prepared and included in the EIA report based on the results and projections gained from the EIA exercise. This management plan includes mitigation measures and methods for applying them.

### 1.1.1 Aim of the EIA

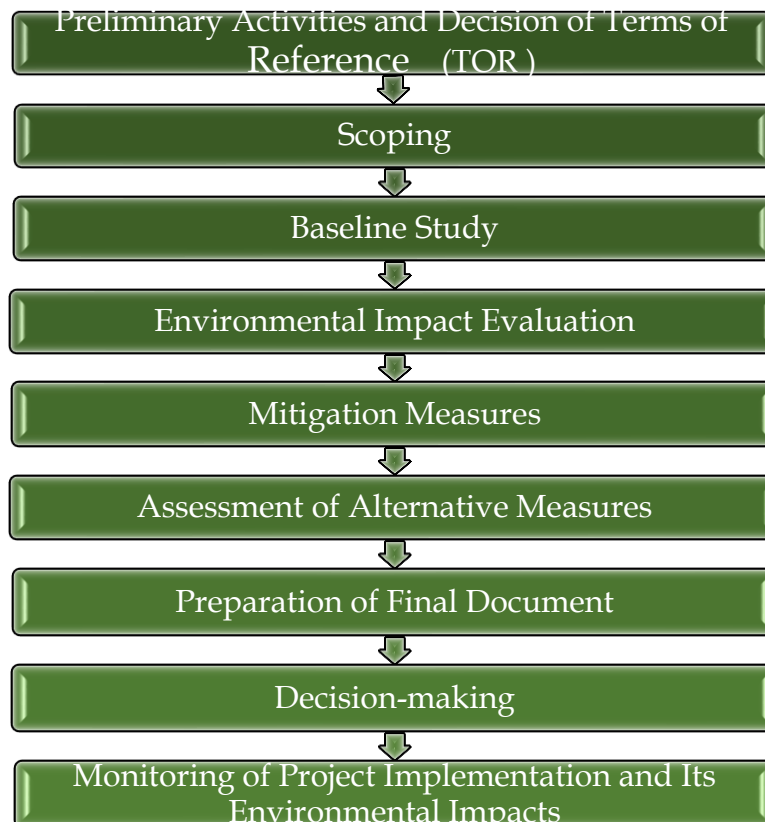
The primary aim of the EIA for the development of the **Capital Asset & Investment Apartment** project is to provide environmental information to decision-makers with respect to the environmental acceptability and sustainability of the proposed project in accordance with the ToR issued by the CC & CRMD in consultation with other relevant agencies through a series of discussions and field visits. In meeting this primary aim, the EIA is defined as having the following objectives for this specific assessment;

- To describe the proposed project and the key activities associated with the construction and operational phases.
- To identify existing and future sensitive receivers, resources, activities, and land use that may be adversely or beneficially affected by the project.
- To identify, predict and evaluate the potential impacts of the project on sensitive receivers, resources, activities, and land uses.
- To propose appropriate mitigation measures to reduce or minimize any adverse impacts that have been identified, taking into account any associated constraints or consequential environmental or social implications of such measures.
- To identify, predict and evaluate the acceptability of the residual impacts of the project during and after the implementation of selected mitigation measures and to evaluate any cumulative environmental impacts to which the project may contribute.

- To identify, develop and specify methods, measures, and standards to be included in the detailed design, construction and operational phases of the project in order to reduce environmental impacts to acceptable levels.
- To specify appropriate environmental monitoring and audit requirements for the implementation of the project activities.

### 1.1.2 Methodology of the EIA

After determining the needs of the proposed project, the EIA process requires screening to establish the necessity for EIA and how far each assessment should go. When these degrees are determined, the procedure moves on to the scoping phase, which identifies environmental characteristics that are thought to be substantially impacted and distills them down to the core components for evaluation. Public consultation is essential at this point. Simultaneously, analyze the predicted consequences, research mitigation measures, and complete the EIA report. Hold another public consultation based on this EIA assessment, and then submit the final report to decision-makers. It is suggested that a public survey on needs be placed. Following approval of the decision, the planned projects will be implemented with environmental monitoring. Figure 01-2 shows the whole EIA process. The EIA process may be decomposed into the nine steps listed below. (In reference to Ahmad and Sammy's model) Public disclosure and involvement are critical components of the EIA system and should be applied at the appropriate time at each stage. However, the timing of implementation varies depending on the systems used by each country/organization.



**Figure 01-2 Environmental Impact Assessment process**

## Base Line Study

The EIA primarily involved the collection of baseline data on the existing environment and, in this respect, various studies were undertaken in order to gather relevant data as appropriately as possible. During the EIA process, primary data on the existing environment is obtained and compared with predicted changes to identify potential environmental impacts in considering the nature of the business and surrounding environmental and social settings (01.3). Such impacts are then weighed against the anticipated benefits in order to assist planners and decision-makers. The entire movement was conducted in accordance with the Terms of Reference (TOR) issued by the Project Approving Agency. The studies included literature surveys, field observations, field investigations, discussions with relevant stakeholders, and personal/professional experiences related to EIA s.



Figure 01-3 Field visits and surveys conducted for the EIA

The analysis of primary and secondary data was used to carry out the research. A series of field studies were used to collect primary data such as water quality assessment, and geotechnical investigation. Experts conducted these field studies to ensure the accuracy of the data collected. Secondary data were gathered from relevant Government agencies and environmental data providers, including the Survey Department and other mapping agencies, the Divisional Secretariat, Grama Niladhari, and other relevant Government/local Government agencies, as well as other related publications.

### **Impact Evaluation and Mitigation**

The methodology used to assess the significance of both planned and unplanned events considered forms of mitigation as well as the probability of an event occurring in the case of unplanned events. The significance of interactions was determined using available knowledge, professional judgment, and prior experience.

The technical scope of the EIA is clearly defined in the TOR and covers in detail the physical, ecological, environmental cultural, and socio-economic aspects that need to be considered. It is recognized that the project itself comprises the development of a luxury apartment facility that promotes comfortable living and leisure activities with a high priority given to the preservation of the existing environment which itself is mandatory for the success of the project.

The information gathered was critically evaluated and the ones that are likely to give rise to adverse impacts were studied in detail and mitigation measures to lessen such impacts were proposed. An impact matrix method and checklist method were adopted when analyzing the impacts and mitigations.

### **Environmental Management Plan ( EMP)**

The Environmental Management Plan (EMP) is essential for maintaining a healthy environment. Without a management plan to carry them out, even if the project has identified the right mitigation measures, the expected results might not be realized. The current chapter of the environment management plan calls for the effective execution of mitigation strategies to lessen the negative effects of the project's activities.

In this EMP, the following problems have been addressed:

1. Reducing the negative effects brought on by construction and operation through mitigation measures.
2. Specifics of management strategies.
3. Institutional setup for the EMP Post project environmental monitoring program that will be carried out once the project is commissioned.

Impact assessment aids in identifying components of a project proposal that could be harmful. Based on the results of the impact assessment, an environmental management plan was developed to reduce negative effects and included numerous actions that might be implemented to enhance the environment.

However, because the project won't have a significant negative impact on the air, water, land, or biological environment, the environment management plan won't be overly complicated;

instead, it will only call for routine monitoring of the ambient air and water quality, noise levels, and soil quality.

The project site and the area within 500 m of its boundaries are specified in the TOR as the proposed area of study for the EIA (Figure 01-4). However, a wider area was considered where necessary to present representative information related to the EIA.



Figure 01-4 The Area of The Study (500m boundary).

## 1.2 Approvals and permits are required to implement the proposed project.

Before the building can begin, the project must pass several inspections. The CC & CRMD's approval is one of them and is the major approval. The result of the EIA will determine everything about this choice. Other clearances are also required at the same time. With due respect, all clearances obtained from the pertinent agencies are discussed here, along with their requirements.

The CC & CRMD is the Project Approving Authority (PAA), and this EIA report is required to obtain approval for the proposed project. It is necessary to obtain clearance for the proposed apartment project from the following agencies, and Table 01-1 shows the current status of the clearances.

**Table 01-1 Summary of the clearances obtained so far for the proposed project.**

| Clearance/Approval/Permit |                                                                                                     | Current Status |
|---------------------------|-----------------------------------------------------------------------------------------------------|----------------|
| 1.                        | Preliminary Planning Clearance from the Urban Development Authority (UDA).                          | Annex Vi.a     |
| 2.                        | Consent for electricity supply from the Ceylon Electricity Board (CEB).                             | Annex Vi.b     |
| 3.                        | Clearance from the Civil Aviation Authority (CAA) of Sri Lanka.                                     | Annex Vi.c     |
| 4.                        | Clearance from the Fire Services Department (FSD).                                                  | Annex Vi.d     |
| 5.                        | Clarence from the CMC for Planning and development                                                  | Annex Vi.e     |
| 6.                        | Clearance from the Colombo Municipal Council (CMC) for Storm water drainage and Rainwater Disposal. | Annex Vi.f     |
| 7.                        | Clarence from the CMC for Solid Waste Management                                                    | Annex Vi.g     |
| 8.                        | Clearance from NWS&DB for water sup.                                                                | Annex Vi.h     |
| 9.                        | Clearance from NBRO                                                                                 | Annex Vi.i     |
| 10.                       | Clearance for TIA from UDA.                                                                         | Annex Vi.j     |
| 11.                       | Clearance from the Ministry of Defense (MoD).                                                       | Annex Vi.k     |
| 12.                       | Clearance from Sri Lanka Railway Department (SLRD)                                                  | Annex Vi.l     |
| 13.                       | Clearance from Road Development Authority (RDA). Covered by TIA                                     | Annex Vi.j     |
| 14.                       | Clearance from Condominium Management Authority (CMA)                                               | Pending        |

Refer to Annex VII. for all Preliminary clearances.

### **1.2.1 Laws and Regulations on the EIA process.**

Given the nature and location of the proposed project, its activities must adhere to the relevant conditions specified in various Acts, Regulations, Standards, and management plans, which are implemented through various agencies.

#### **National Environment Act No. 47 of 1980 and its Amendments (section 23 AA / 23BB).**

Despite the fact that several other statutes also apply to certain parts of development activities, the National Environmental Act (NEA), 1980 is the most significant piece of environmental law in the nation. The project might get the other requisite permissions from several state agencies with an interest in the project region provided it received the appropriate environmental approval. The NEA established the Central Environmental Authority (CEA), which has extensive regulatory authority. The CEA is in charge of overseeing the nation's natural resources, among other things. In this particular case, the power of the NEA has been given to the Coast Conservation and Coastal Resources Management Department as per the

Coast Conservation Act which gave power to the DG of CC & CRMD to attend to activities in the defined coastal zone. Hence it is not necessary to take separate Clearance from the CEA

### **Environmental Impact Assessment (EIA)**

The requirement for Environmental Assessment (EA) of projects was established by the 1988 NEA. EIA regulations were originally gazetted in 1993 (Gazette (Extraordinary) No. 772/22 of June 24) and updated in 1995 (859/14 of Feb. 23). The gazettes list development activities requiring approval under the Act ("Prescribed Projects"). Following the submission of preliminary information to a PAA, in this case to the CC & CRMD, the PAA (CC & CRMD) has to decide whether an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) is required, based on the likely significance of the proposed project's impacts on the environment. The PAA issues terms of reference for the IEE or EIA which is then carried out by the proponent following normal methodologies including public consultation with formal hearings after the completion of the IEE or EIA report.

### **Coast Conservation and Coastal Resources Management Act No. 57 of 1981 and Amendment of Act No. 49 of 2011.**

It is important to comply with the Coast Conservation and Coastal Resources Management Act as the final decision of the EIA report is made by the Director General of the Coast Conservation and Coastal Resources Management Department. The DG/CC & CRMD can call for an IEE/EIA report for any development activity in the Coastal Zone if they have located in a sensitive area or have significant impacts on the environment, social and cultural status of the location. It is with full authority that DG/CC & CRMD cancels the permit issued by the department if the proponents are not complying with the regulations and decisions made on the EIA.

### **Municipal Council Ordinance No. 29 of 1947 (Chapter 252) (As amended)**

Any construction activities within the administrative limits of the Municipality should obtain prior approval from the relevant local authority of the area. According to the MC Acts proposed site falls in the jurisdiction authority of the Colombo Municipal Council and is required to get its approval in order to ensure that these activities conform to the services provided by the act and amendment. Once the construction is completed, the MC will check and issue the Certificate of Conformity of Construction. Since this project comes under the Colombo Municipal Council (CMC), the approval of the CMC is required and has been obtained.

### **Urban Development Authority Act No. 41 of 1978 has gone for several amendments No. 41 of 1988.**

As specified in the Urban Development Authority Act No. 41 of 1978 and Amendments act on. 41 of 1978, the clearance of the UDA has to be taken as required for any development in an area in the declared urban areas and 1 km buffer zone of Coastal Zone. As the project site

is located in such an area, clearance from the UDA would be a prime requirement for the proposed development.

### **National Building Research Organization (NBRO)**

National Building Research Organization (NBRO) is a leading research and development institution in the country and a reputed technical service provider in the field of geotechnical engineering, landslide risk management, human settlement planning, environmental monitoring, building material research, and engineering project management. NBRO functions under the purview of the Ministry of Disaster Management and Urban Development Authority. Any building falls in an area where UDA approval is needed to be required to get preliminary clearance NBRO.

### **National Water Supply and Drainage Board**

The project utilizes a major proportion of the total water requirement during the construction and Operational phase from the city water. Therefore, clearance from the National Water Supply and Drainage Board is required.

### **Fauna and Flora Protection Ordinance (1937 and its Revision of 1993)**

The oldest piece of legislation that protects Sri Lankan species is the Fauna and Flora Protection Ordinance (1937, and its revision of 1993). This was followed by several other policies and legislation on forests and aquatic habitats that provide for the protection of species implicitly by virtue of the protection of habitats and ecosystems. The Ordinance provides details on protecting flora and fauna species.

### **National environmental protection and quality regulation No 1 of 2008**

The main objective of the Environmental Protection License is to prevent or minimize environmental pollution because of industrial work and development projects. EPL provides standards for the discharge of wastewater into the environment (published in the Gazette Notification No. 1534/18 dated 01/02/2008 termed as the National Environmental (Protection & Quality) Regulations No01 of 2008); and noise emissions from industries (Gazette Notification no. 924/12 dated 23.05.1996 termed as National Environmental (Noise Control) Regulations No. 01 of 1996). According to water discharge standards at present, gazette standards cover (i) discharges to inland surface waters, (ii) discharges to marine coastal waters, (iii) discharges on land for irrigation purposes, and (iv) discharges to sewers with central treatment plants.

### **National Environmental (Protection & Quality) Regulations No. 01 1990 (Gazette 595/16, 1990)**

Discharge of waste to the environment is controlled by the National Environmental (Protection & Quality) Regulations No. 01 1990 (Gazette 595/16, 1990) and the amendments

published in Gazette 1159/22 of 2000, under the NEA. These regulations establish the need for any person discharging waste to do so only under a license (Environmental Protection License or EPL) issued by the CEA, and in accordance with the gazette discharge standards and criteria. The EPL can be issued for any period of up to three years (Gazette 1159/22). 1159/22). The list includes (no. 65) “Any common wastewater (industrial or sewage) treatment plants” and (no. 67) “All hazardous waste disposal areas”.

### **National Policy on Solid Waste Management**

According to National Policy on solid waste management, all street refuse, house refuse, and other similar wastes collected by Local Authorities under the provisions of this part shall be the property of the council, and the council shall have full power to sell or dispose of all such matter. Therefore, solid waste management during the construction period should follow ordinances such as Municipal Council Ordinance-No. 16 of 1947 - Sections 129,130,131; Urban Council Ordinance-No 61 of 1939 - Sections 118, 119, 120; and Pradeshiya Saba Act No: 15 of 1987, Section 93, 94, 95.

## Chapter 02 : Description of the Project

### 2.1 Nature and the Scope of the Project.

Colombo is a constantly changing city that offers plenty of excitement, adventure, convenience, enjoyment, and elegance. It is the country's business center, employs the majority of its citizens. It also has the greatest restaurants, hotels, shopping malls, and clubs in Sri Lanka, all of which contribute to the city's counterculture. It also has some of the greatest schools and hospitals, making it a wonderful neighborhood. With the goal of delivering excellent amenities and comfort to residents Capital & Asset Investment (Pvt) Ltd suggested 220 apartment facilities at Kollupitiya on Sri Lanka's western coast using a cost-benefit analysis completed prior to the design stage. This apartment is mostly made up of residential units for local and foreign investors who come to Sri Lanka to stay longer than usual visitors and are encouraged to engage in long-term business. It is a high-rise apartment building with high-end amenities. The initiative will address numerous markets demands and people's requirements. This initiative prioritizes safety, comfort, health, entertainment, education, and convenience. This apartment complex has stunning views of the ocean. The proposed development will take place on property held by the project proponent (Annex V.b-Ownership confirmation). Capital Investment, at No. 106/106A Galle Road, Colombo 03, Sri Lanka. (Figure 02-1, location map). Geographical location of the project is 6°54'27.90"N, 79°51'3.90"E



**Figure 02-1 location of the proposed Apartment Complex.**

Survey plan No. 3064, prepared by licensed surveyor S. Krishnapillai is shown in figure 02-2(Annex V.a). The survey plan shows the Streamline of 60 m as well as two building lines from the road 32 m and from the railway line 24 m as approved by the road development authority and UDA.

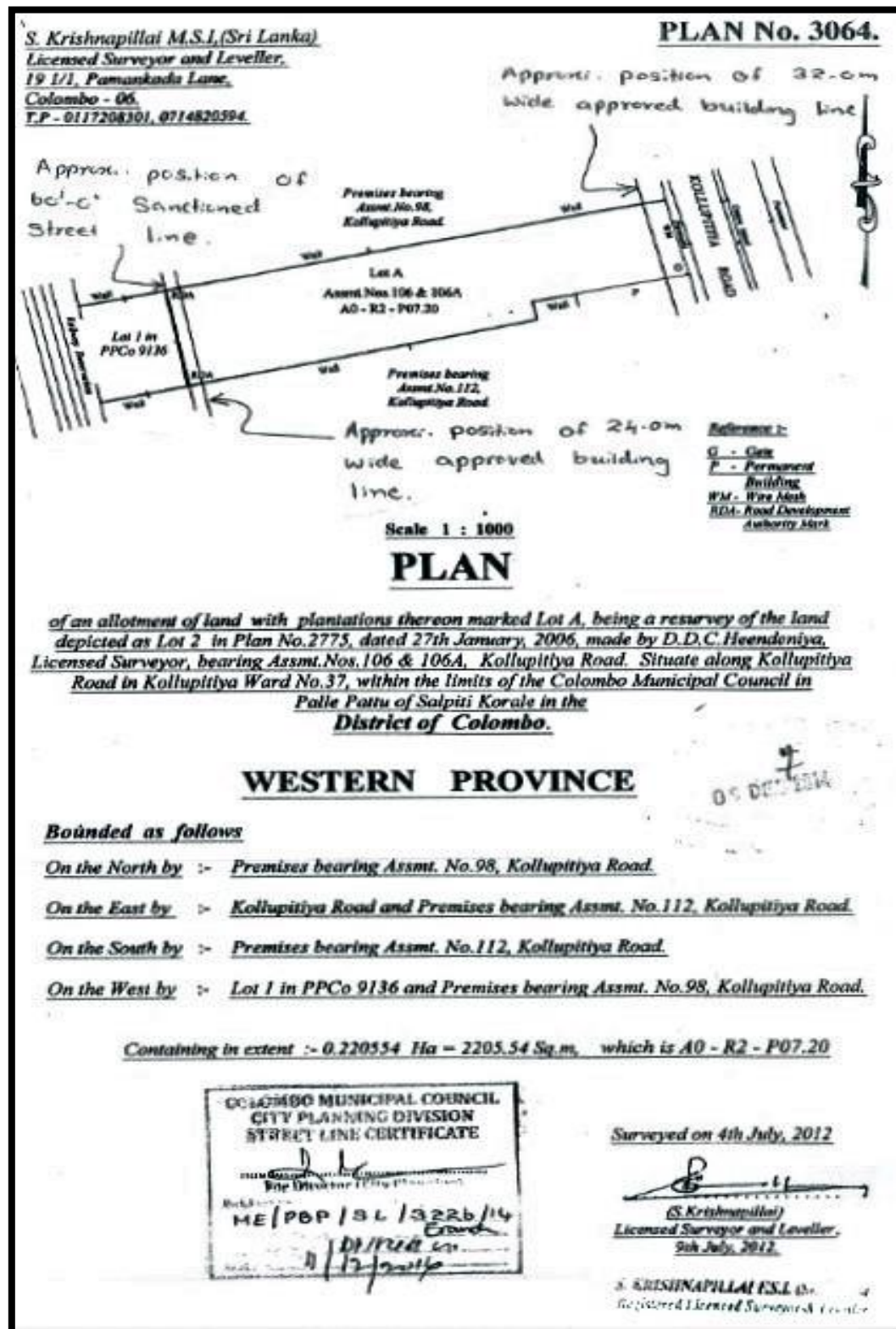


Figure 02-2 Survey plan of the site.

### 2.1.1 Main Components and Features of the Project

The project will be built on property owned by the PP. The entire structure is classified as high-rise construction. The design of the building will span a total area of 2,061.3 sq.m. from a total land area of 0.220554 Ha (2205.54 sqm., R2, P07.20) with a total high of 115.563 meters. Figure 02.3 depicts the layout Plan (Annex V.c). The total floor area of the building will be 22041 sq.m exclusive of parking facilities. with the available parking facilities, the floor area will be 29009.5 sq.m.

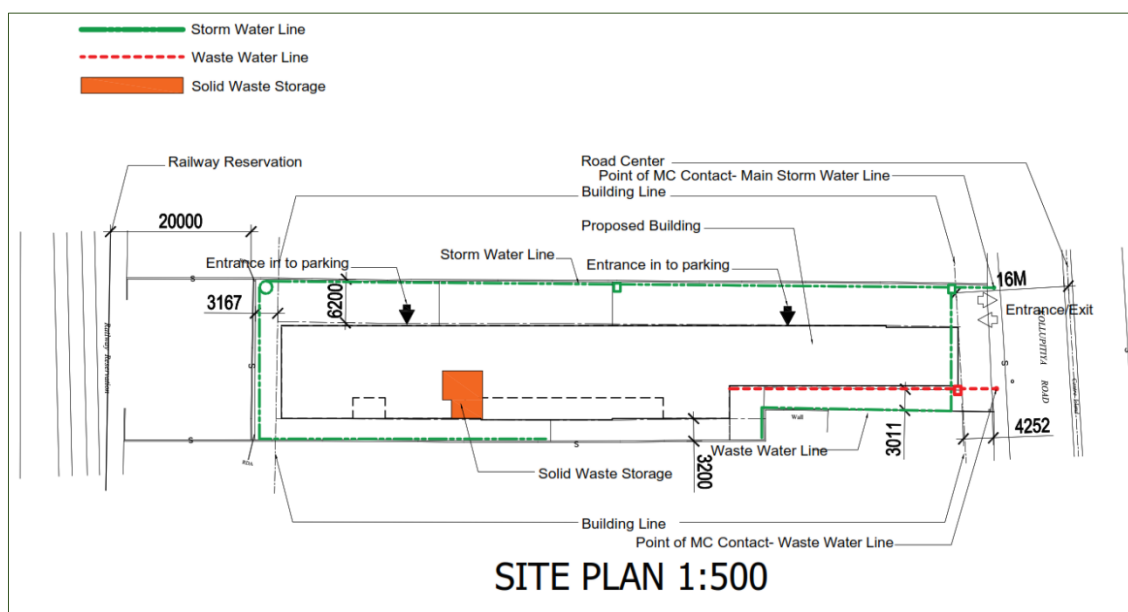


Figure 02-3 Layout Plan of the Site.

Table 02.1 has the area calculation. The building has 27 levels, 22 apartment floors, and 220 residential apartments divided into fourteen types. There are five levels of parking. The space is utilized as efficiently as possible. Five (5) stories are allocated to parking, while the remaining two (2) floors, semi-basement and ground floor, and are dedicated to commercial activities. The absence of vegetation in Colombo is a big concern due to the city's excessive urbanization. To bring natural vegetation and fresh air to the dwelling, the project's proponents have designed two inside gardens, and a natural garden will span two-thirds of the rooftop. All the architectural drawings are provided in annex V.d

Table 02-1 Breakdown of floor areas of main components

| Area Calculation                                                      |               |         |           |                                      |
|-----------------------------------------------------------------------|---------------|---------|-----------|--------------------------------------|
| Floor                                                                 | Description   | Parking | Apartment | Extent Sq. m.<br>including balconies |
|                                                                       |               | Cars    | Units     |                                      |
| Semi Basement                                                         | Commercial    |         |           | 403 sqm                              |
| Ground Floor                                                          | Commercial    | 10      |           | 412 sqm                              |
| 1 <sup>st</sup> to 5 level is dedicated for parking 29 cars per Level | 7 Mesh Levels | 203     |           | 985 sqm                              |
| 1st Floor                                                             | Parking       |         | 10        | 985 sqm                              |
| 2nd Floor                                                             | Parking       |         | 10        | 985 sqm                              |
| 3rd Floor                                                             | Duplex        |         | 10        | 985 sqm                              |
| 4th Floor                                                             | Apartment     |         | 10        | 985 sqm                              |
| 5th Floor                                                             | Duplex        |         | 10        | 985 sqm                              |
| 6th Floor                                                             | Apartment     |         | 10        | 985 sqm                              |
| 7th Floor                                                             |               |         | 10        | 985 sqm                              |
| 8th Floor                                                             |               |         | 10        | 985 sqm                              |
| 9th Floor                                                             |               |         | 10        | 985 sqm                              |
| 10th Floor                                                            |               |         | 10        | 985 sqm                              |
| 11th Floor                                                            |               |         | 10        | 985 sqm                              |
| 12th Floor                                                            |               |         | 10        | 985 sqm                              |
| 13th Floor                                                            |               |         | 10        | 985 sqm                              |
| 14th Floor                                                            |               |         | 10        | 985 sqm                              |
| 15th Floor                                                            |               |         | 10        | 985 sqm                              |
| 16th Floor                                                            |               |         | 10        | 985 sqm                              |
| 17th Floor                                                            |               |         | 10        | 985 sqm                              |
| 18th Floor                                                            |               |         | 10        | 985 sqm                              |
| 19th Floor                                                            |               |         | 10        | 985 sqm                              |
| 20th Floor                                                            |               |         | 10        | 985 sqm                              |
| 21 <sup>st</sup> Floor                                                |               |         | 10        | 985 sqm                              |
| 22 <sup>nd</sup> Floor (Duplex Lower level)                           |               |         | 10        | 985 sqm                              |
| 22 <sup>nd</sup> (Duplex upper Level)                                 |               |         |           | 491 sqm                              |
| Roof Terrace                                                          |               |         |           | 985 sqm                              |
| Total                                                                 |               | 213     | 220       | 22,059 sqm                           |

Figures 2.4 to 2.9 shows the drawings of the main components of the building.

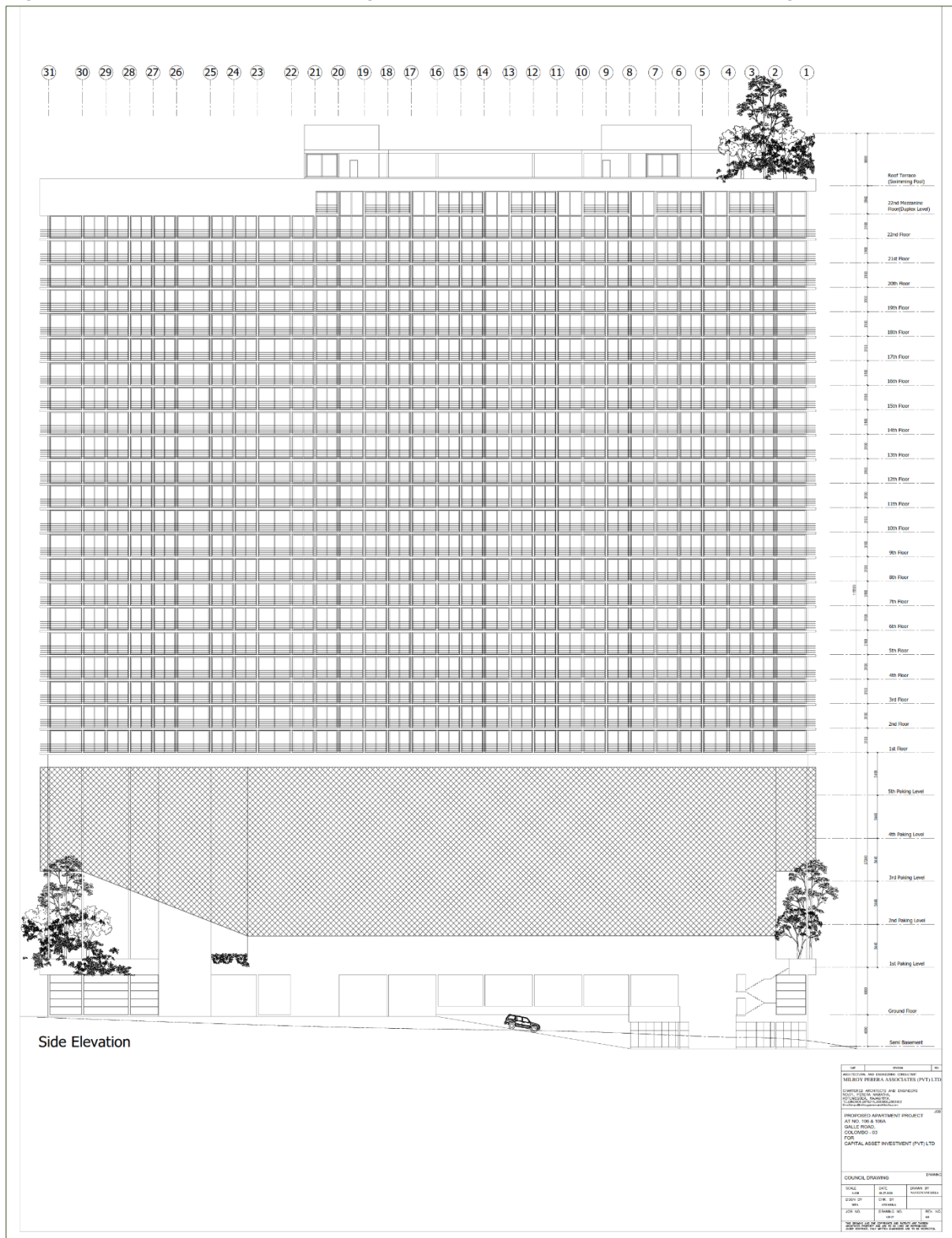
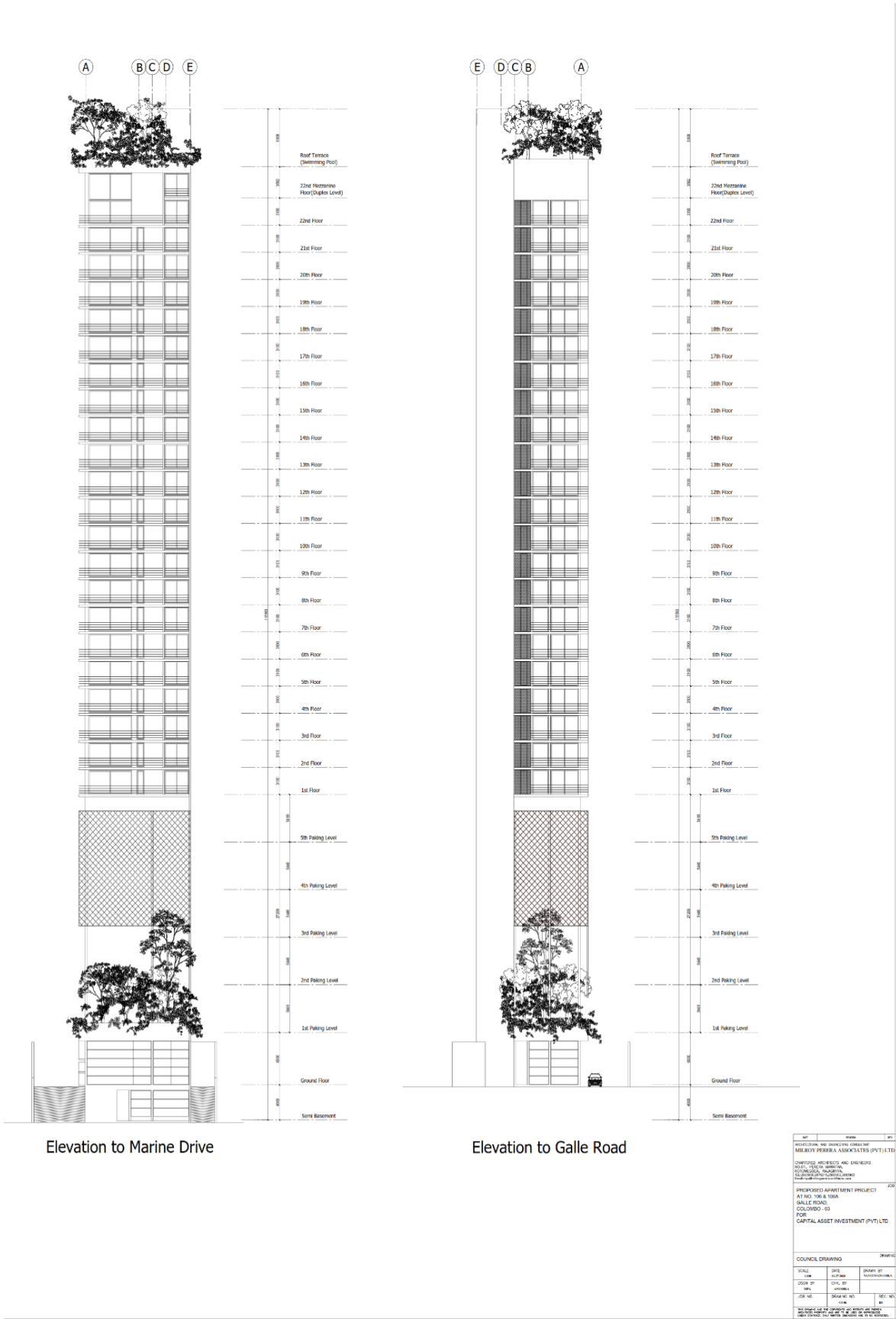


Figure 02-4 Front Elevation of the proposed building



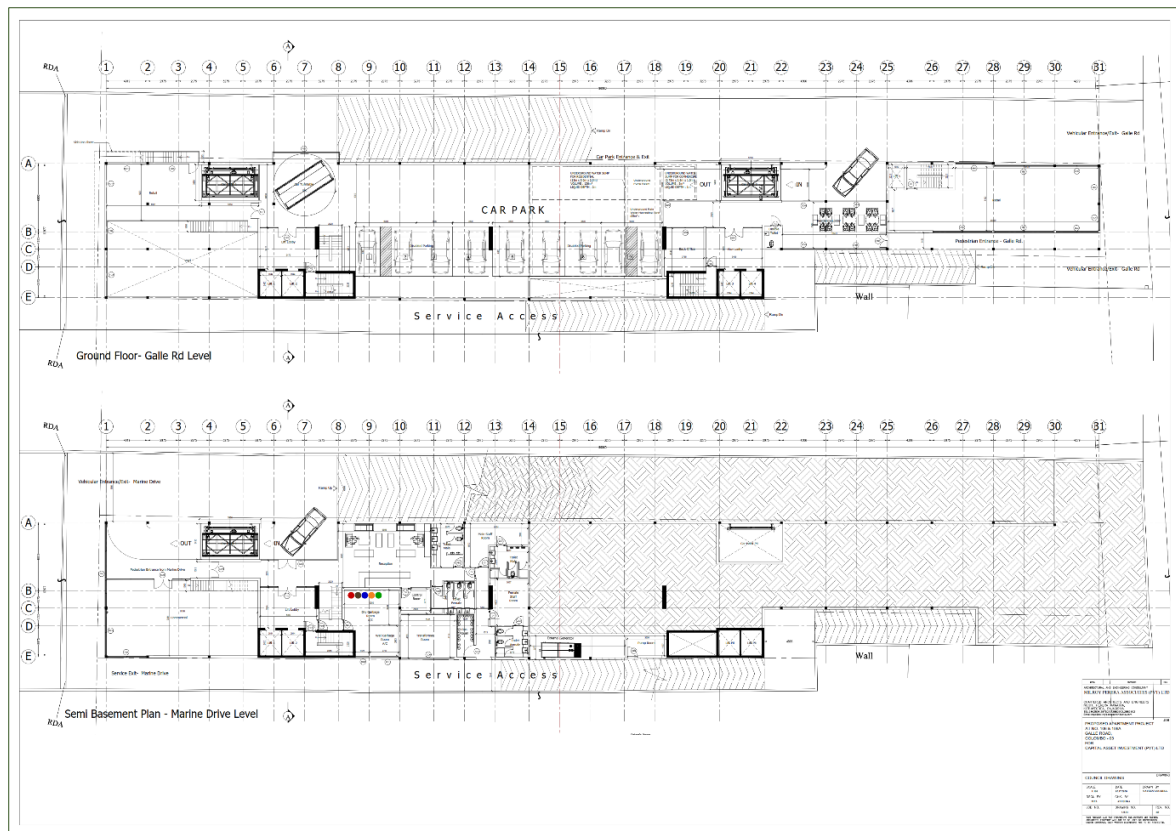


Figure 02-6 Ground Floor and Semi Basement plan of the proposed site

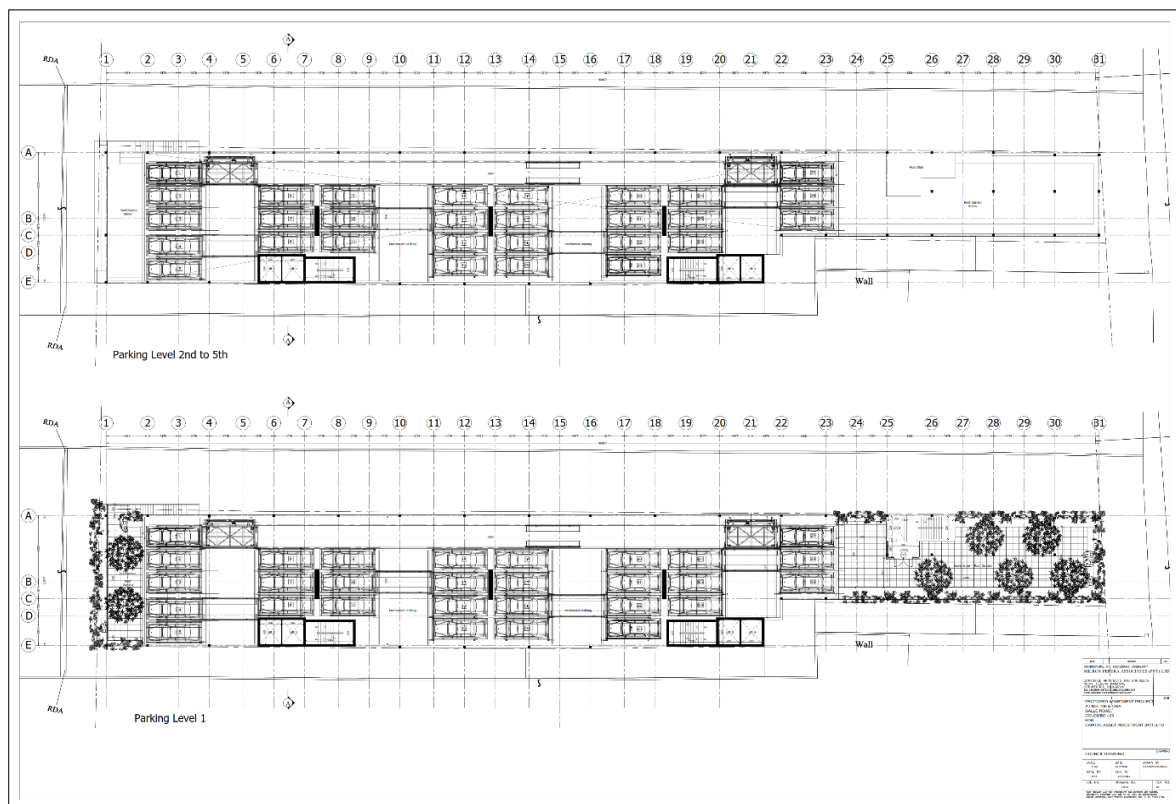


Figure 02-7 Parking floors from 1 to 5 are shown

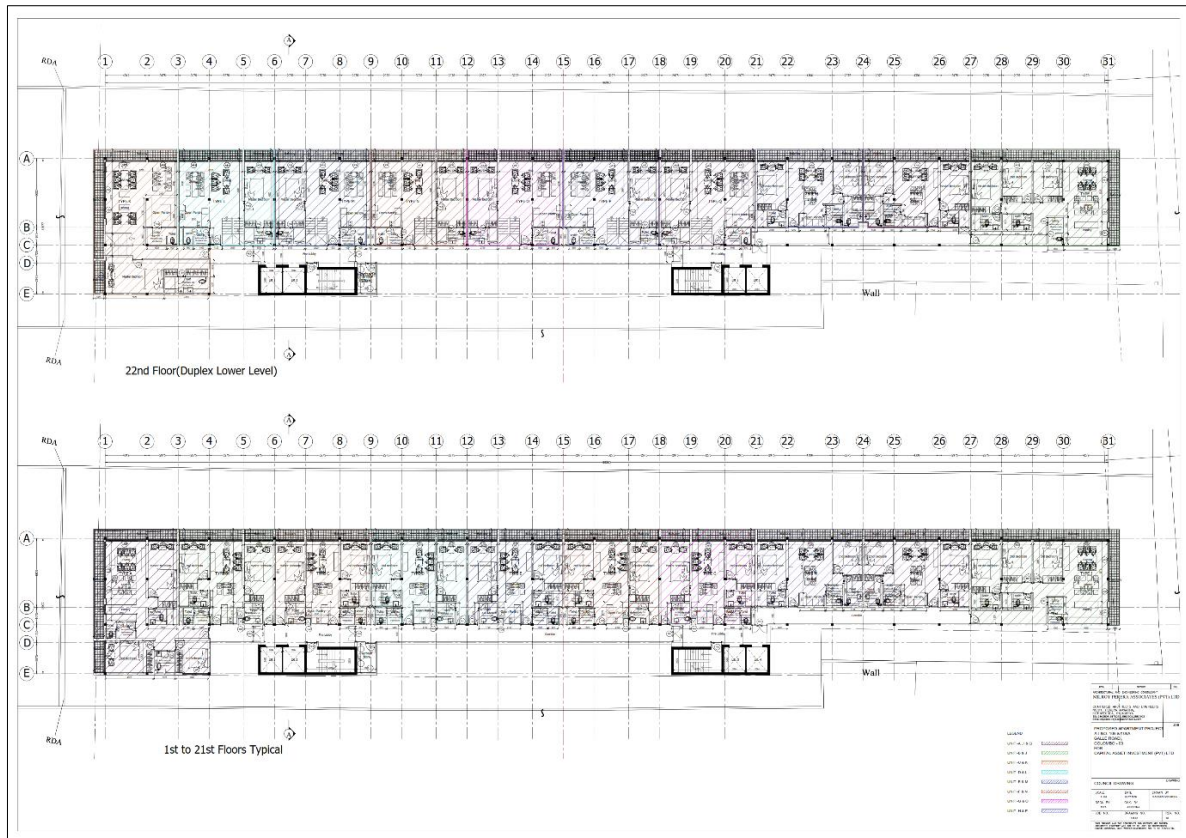
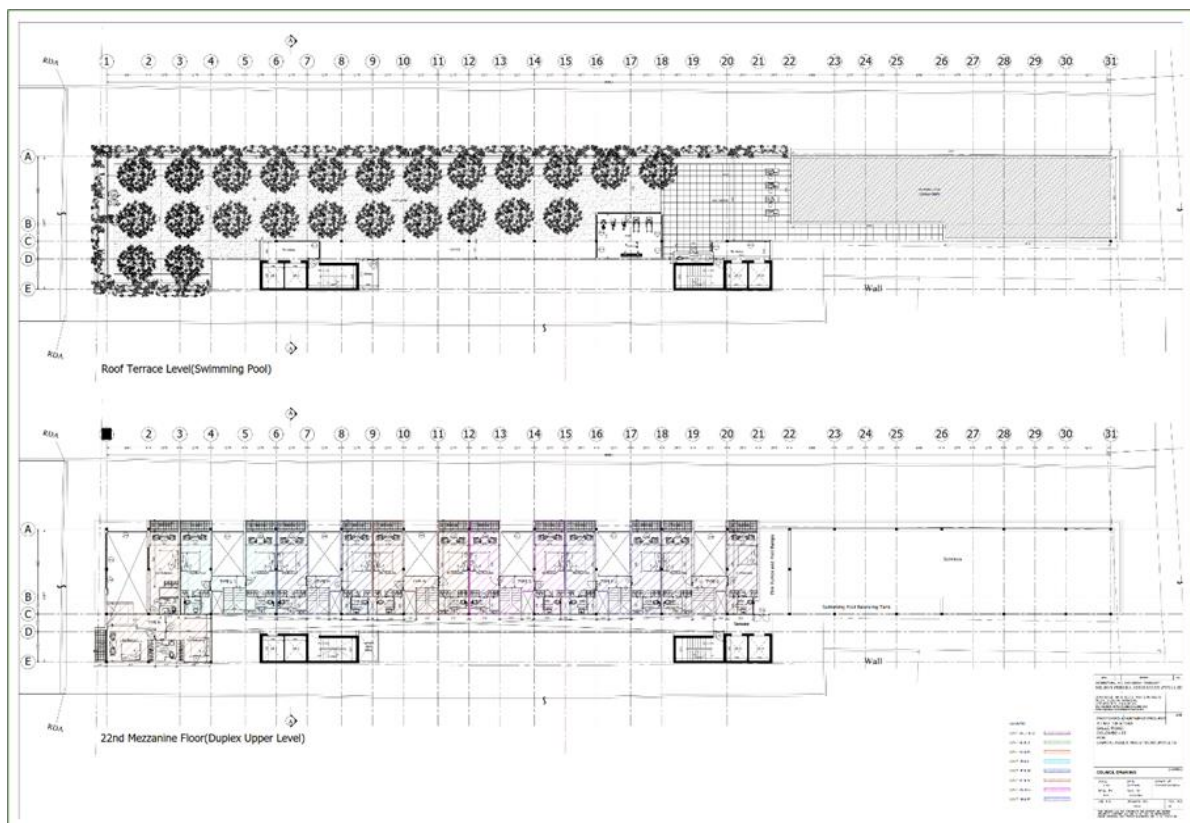


Figure 02-8 typical Floor layout of floors 1 to 21st floor shows in and 22



**Figure 02-9 Roof Terence and Mezzanine floor**

## 2.1.2 Major features of the project

The proposed construction would have 220 luxury apartments with all the facilities necessary for the upper-level business people, who can afford to stay in the heart of Colombo, Sri Lanka's capital. The complete structure rises to 115.563 meters. This property has three gardens, a swimming pool, a contemporary gym, and leisure rooms. It also has four passenger lifts and one service lift. There are 5 floors allocated to parking space, with a total capacity of 250 vehicles. Table 02.2 illustrates the whole building breakdown along with its essential elements.

**Table 02-2 Main components and their key features**

| Component      | Key features                                                                                                                                                                                                                                                                                                                          | Area (Sq.M) | Drawing No. |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| Semi Basement  | <ul style="list-style-type: none"> <li>Office area including male and female separate staff rooms</li> <li>reception</li> <li>Entrance to the car park</li> <li>Controlling room</li> <li>Garbage rooms (A/C Dry and wet garbage rooms</li> <li>4 lifts up to the roof terrace</li> <li>transformer room</li> <li>gas room</li> </ul> | 985         | 01          |
| Ground Floor   | <ul style="list-style-type: none"> <li>Entrance to the car park from gall road</li> <li>Back office</li> <li>Rain water harvesting tank</li> <li>Underground pump room</li> <li>Fire lobby</li> <li>Residence lobby</li> </ul>                                                                                                        | 985         | 02          |
| Parking Levels | <ul style="list-style-type: none"> <li>5 parking levels with 29 vehicles parking facility in each level</li> <li>1<sup>st</sup> parking level consist of 02 gardens with relaxing area</li> </ul>                                                                                                                                     | 985         | 03          |
| 1st Floor      | <ul style="list-style-type: none"> <li>10 types of apartments type A to J</li> <li>Balconies for each apartment</li> <li>Garbage store</li> </ul>                                                                                                                                                                                     | 985         | 04          |
| 2nd Floor      | <ul style="list-style-type: none"> <li>10 types of apartments type A to J</li> <li>Balconies for each apartment</li> <li>Garbage store</li> </ul>                                                                                                                                                                                     | 985         | 04          |
| 3rd Floor      | <ul style="list-style-type: none"> <li>10 types of apartments type A to J</li> <li>Balconies for each apartment</li> <li>Garbage store</li> </ul>                                                                                                                                                                                     | 985         | 04          |
| 4th Floor      | <ul style="list-style-type: none"> <li>10 types of apartments type A to J</li> <li>Balconies for each apartment</li> <li>Garbage store</li> </ul>                                                                                                                                                                                     | 985         | 04          |
| 5th Floor      | <ul style="list-style-type: none"> <li>10 types of apartments type A to J</li> <li>Balconies for each apartment</li> <li>Garbage store</li> </ul>                                                                                                                                                                                     | 985         | 04          |

|            |                                                                                                                                                         |     |    |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
|            |                                                                                                                                                         |     |    |
| 6th Floor  | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 7th Floor  | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 8th Floor  | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 9th Floor  | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 10th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 11th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 12th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 13th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 14th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 15th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 16th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 17th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 18th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 19th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |
| 20th Floor | <ul style="list-style-type: none"> <li>• 10 types of apartments type A to J</li> <li>• Balconies for each apartment</li> <li>• Garbage store</li> </ul> | 985 | 04 |

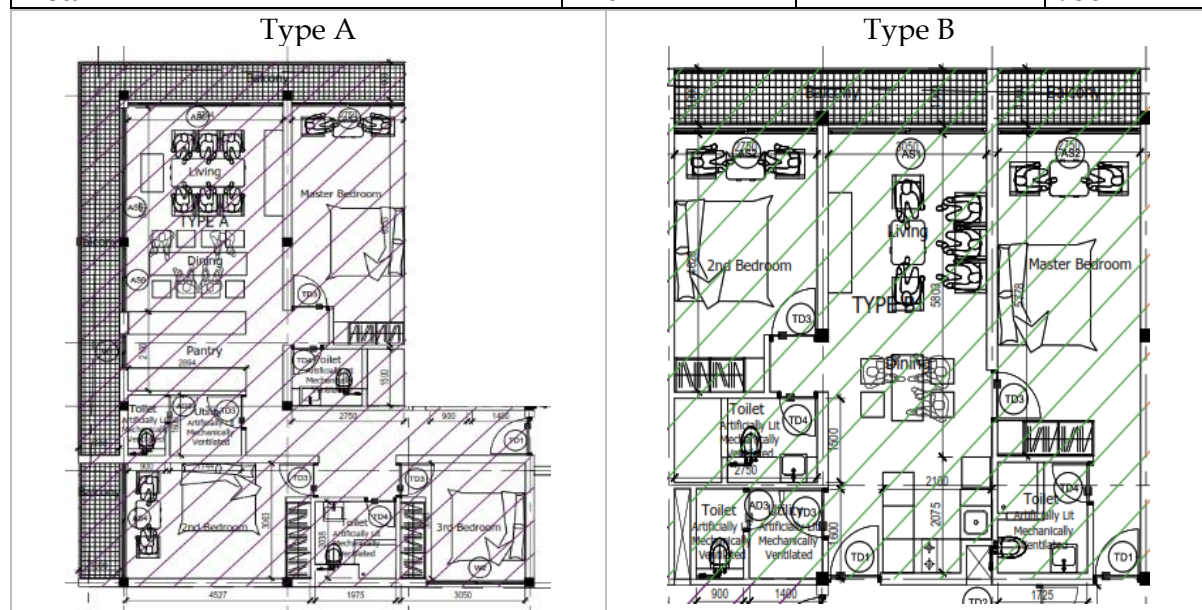
|                                                 |                                                                                                                                                                                                    |       |    |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----|
| 21st Floor                                      | <ul style="list-style-type: none"> <li>10 types of apartments type A to J</li> <li>Balconies for each apartment</li> <li>Garbage store</li> </ul>                                                  | 985   | 04 |
| 22nd Floor<br>(Duplex lower level)              | <ul style="list-style-type: none"> <li>7 types of apartments type K to Q</li> <li>Balconies for each apartment</li> <li>Garbage store</li> </ul>                                                   | 985   | 04 |
| 22nd Floor<br>Mezzanine<br>(Duplex upper level) | <ul style="list-style-type: none"> <li>7 types of apartments type K to Q upper level</li> <li>Balconies for each apartment</li> <li>Garbage store</li> <li>Swimming pool balancing tank</li> </ul> | 444.5 | 05 |
| Roof Terrace                                    | <ul style="list-style-type: none"> <li>Gymnasium</li> <li>Swimming Pool</li> <li>Roof top garden</li> <li>Relaxing area</li> </ul>                                                                 | 985   | 05 |

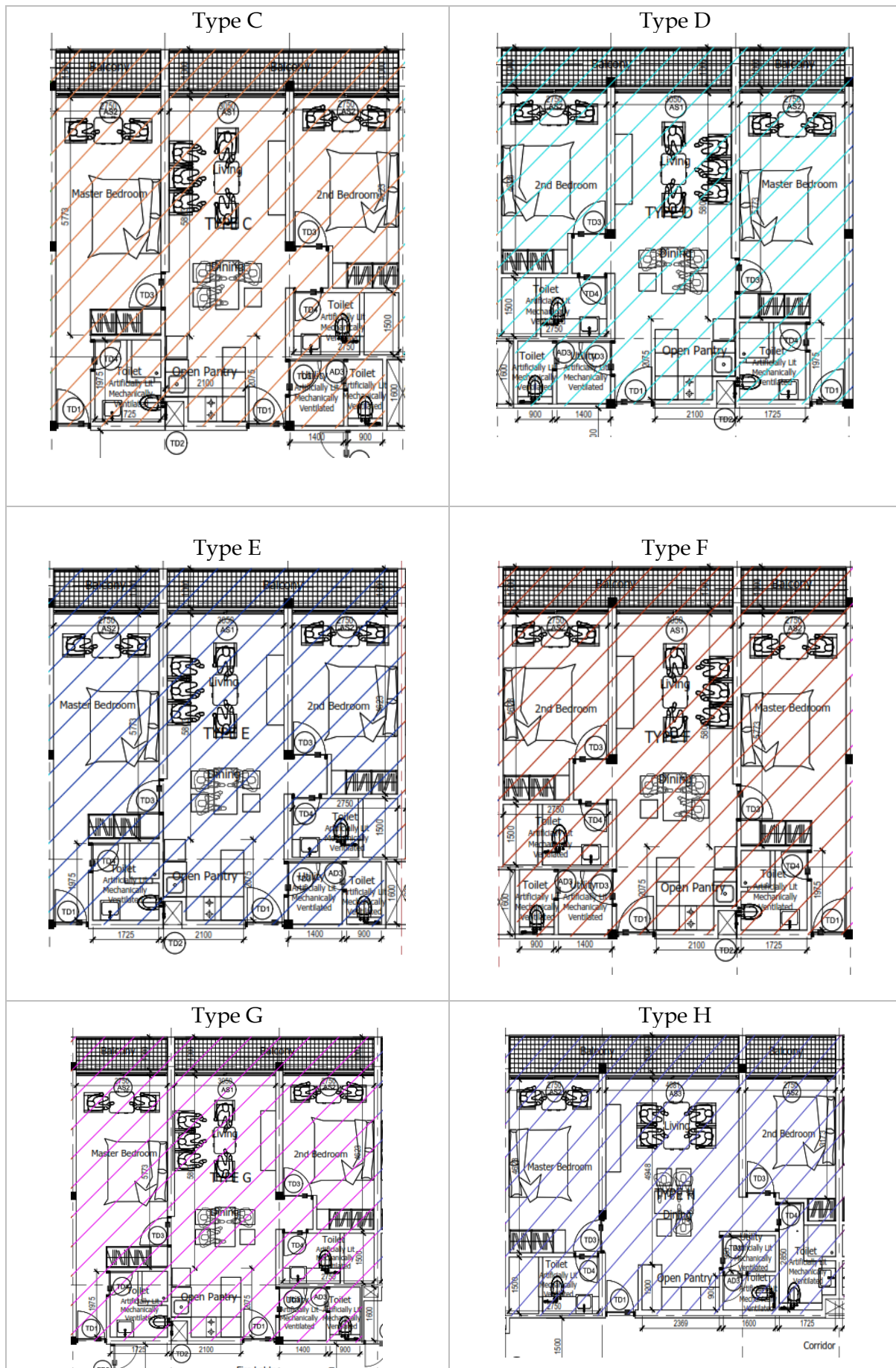
All these building features and main components are shown in Annex V.d with detailed drawings. Each apartment floor consists of 10 types of apartment units shown as follows in Figure 2.10 (Annex V.d). They are typically named from A to J starting from the 1<sup>st</sup> floor to 21<sup>st</sup> floor.

The total occupancy of the apartment is given in table 02.3.

**Table 02-3 Total estimated occupancy**

| Type of units    | Apartment Type         | No. units  | Occupancy per unit | Total occupancy |
|------------------|------------------------|------------|--------------------|-----------------|
| 2 bed room units | B, C, D, E, F, G, H, I | 171        | 4                  | 684             |
| 3 bed room units | A, J, L, M N O P Q     | 48         | 5                  | 240             |
| 4 bed room units | K                      | 1          | 6                  | 6               |
| <b>Total</b>     |                        | <b>220</b> |                    | <b>930</b>      |





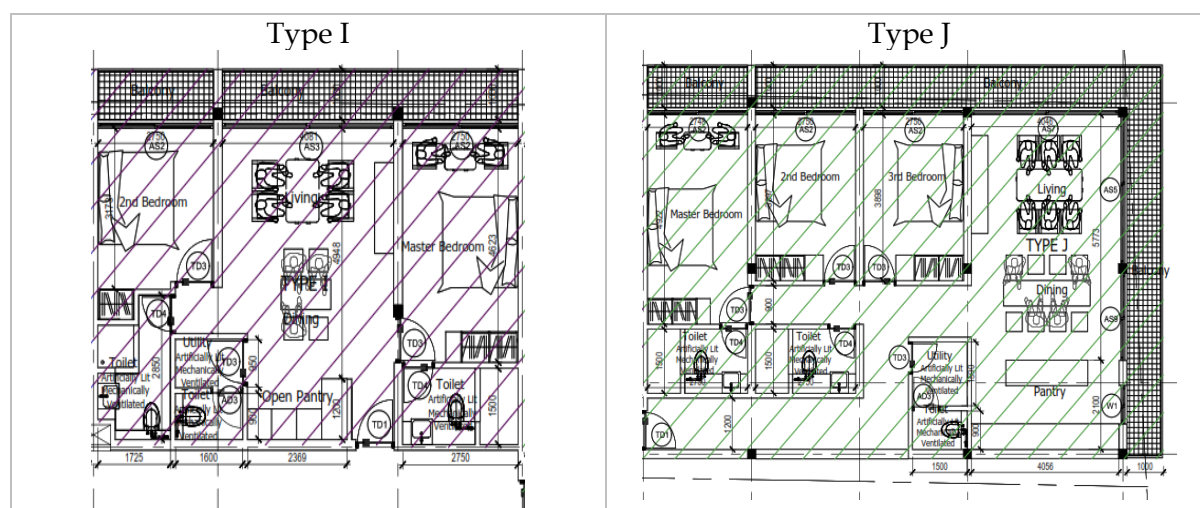


Figure 02-10 Various types of residential units from type A to Type J

Location of the Water Sump, Overhead Tank, and Pump House, the water sump and the pump house are located in basement 2 with the approximate size of the water sump being 8 m X 15 m. Locations of the overhead tank, sump, and pump house are attached as, Annex V.d, of the set of drawings

### 2.1.3 The time period of the project

It is envisaged that a total of 24 months period would be required from the planning stage to the completion of the project. The construction is estimated to be 720 days and will be commenced once all the key permissions obtain.

### 2.1.4 Financial Allocation and investment

The total estimated budget is Rs. 1,531,422,226.40 Funding sources are Capital investment, after-sale, and Bank loan.

### 2.1.5 Details of the all-recreational and expected conservation activities

The Kollupitiya neighborhood of Colombo has grown from a colonial brewery to one of the city's most famous commercial zones, including some of the city's best restaurants, hotels, and retailers. The multi-cultural neighborhood offers a unique opportunity to feel the moods of the city as a whole. Residents near this neighbor can engage in a variety of leisure activities. Kollupitiya is a collection of historic sites and structures. It is possible to see recently constructed high-end shopping malls, movie theaters, parks, restaurants, and so on.

Because Colombo is a strongly built and commercial metropolis, natural reserves, natural settings, and animals are few. An aquatic environment, on the other hand, may be found along the beach. Throughout the duration of this project, developers took every measure to protect

the coastal environment, including minimizing the use of chemicals and creating protocols for appropriate waste disposal, among other things. They have also conducted coastal protection awareness initiatives for the community.



**Figure 02-11 Recreational places in Kollupitiya.**

### **2.1.6 All other natural resources consumptions**

Water will be the most important natural resource consumed. Until the main supply system is completed in the region, water will be acquired from the National Water Supply and Drainage Board (NWS & DB) via bourses. This is the primary practice that is currently being planned in the region. The site's total water requirement is 60389.731 ga.

Sand, coarse aggregates, rubble, and lumber are among the main natural resources projected to be utilized in buildings. All such materials shall be bought from registered suppliers who have the necessary permissions for processing and trade.

### **2.1.7 Green Building Design on natural resource conservation and greener production methodologies.**

People are becoming increasingly aware of the environment and its protection as awareness of the climate change caused by global warming, greenhouse gases, carbon footprints, and associated issues rises. The developer is well aware of the advantages of green designs in this

situation from the perspectives of the tourism industry, marketing, and corporate responsibility. The significantly lower operating expenses of this green building design, despite greater startup costs, are one of its key advantages. Green buildings are made to achieve a number of goals, including safeguarding the health of their occupants, enhancing worker productivity, making better use of energy, water, and other resources, and lessening their total environmental effect.

According to estimates, green infrastructure and buildings can decrease energy use by 24–50%, water usage by 40%, CO<sub>2</sub> emissions by 22–39%, and solid waste creation by 70%. The primary design of this structure makes compromises so as not to overwhelm the surrounding landscape and environment. The ecological philosophy followed here is not only effective but also blends in with the surrounding natural environment.

The project will adhere to the Silver LEED Certification Standards for "leadership in Energy and Environmental Design." The United States Green Building Council (USGBC) developed this grading system to assess a building's environmental performance and promote market change toward sustainable design. The credit-based approach enables projects to gain points for eco-friendly acts made during a building's development and use. Efforts to create a consensus-based, market-driven rating system, such as LEED, were made in an effort to hasten the development and adoption of green building practices, such as,

- Construction activities pollution prevention
- Water use Reduction
- Fundamental Commissioning of Building Energy Systems.
- Minimum Energy Performance
- Fundamental Refrigerants Management
- Storage and Collection of Recyclables
- Minimum Indoor Air Quality Performance
- Environmental Tobacco Smoke (ETS) Control

The use of solar power to provide hot water services, recovery of heat from plants and machinery for useful purposes, composting of bio-degradable solid waste, and use in the gardens, the use of low electricity consuming devices and the use of less water consuming system in the facility (Ex.in toilets/ bathrooms) are among the greener production methodologies that will be incorporated into the proposed development.

The project areas are under high solar radiation throughout the year and the annual average daily global horizontal radiation is 5155 wh/m<sup>2</sup> with a high potential of using on-site solar energy. The location provides a high solar angle at noon most of the year. The sun rises and sets in the north during the April-September period and in the south during the October-March -period (Winter Solstice: 59.30s, Summer Solstice: 70.50). Sun shading devices will be used to reduce the excessive solar heat gain.

- The following energy-efficient design strategies will be implemented:

- Minimizing west-facing glazing to reduce summer and fall afternoon heat gain
- Installing horizontal shading devices on both north and south facades or the use of internal blinds
- Usage of light-colored building materials to minimize conducted heat gain
- Provision of windows, well shaded and oriented to prevailing breeze to improve natural ventilation to reduce the air conditioning requirement
- Improving the efficiency of the air conditioning system.

### **2.1.8 Employment generation by the project**

The employment potential during the construction phase is 300, while many others would also find indirect employment (equipment and material suppliers). The employment potential during the occupation phase is 100 while the indirect employment potential is for watchmen, maids, etc. in the occupied plots. The proponent envisages employing women from local areas to ensure gender equity.

The work force requirement for the construction varies with the activity, and techniques adopted. Activity schedule, total duration allocated, etc. At this stage of the project, the construction details have not been fully worked out and only the total labor requirements have been estimated. It is estimated that on average, 200 employment opportunities over the anticipated period of 24 months would be created. At peak time the number will increase approximately to 250.

The positive impact on employment and occupation is envisaged on account of the Better economic status of the community due to better earnings. Direct and indirect employment of residents in activities like housekeeping, security, office staff, etc.

### **2.1.9 Mode of transport for Residence and staff**

The residents are encouraged to visit the facility by road as it is easily accessible from Colombo Galle main road. It is expected that most of the guests would use personal vehicles or motor coach services. The staff will be using staff transports. The staff may also use private and public transport services when the service is limited.

### **2.1.10 Safety and disaster risk reduction**

The facility and its operations will incorporate the safety systems and practices needed for a project of this kind. The employees will receive training on safety issues, and residents will receive safety advice.

A fire detection system will be installed throughout the entire structure. There will be sprinkler protection in every apartment and function space. There will be first aid stations and firefighting supplies available throughout the entire structure. Emergency exits will have

well-marked routes, and there will be signs that comply with global standards. Drills will be conducted often.

To ensure the security of the swimming pool and seaside recreation areas, lifeguard services will be offered.

Disasters are typically defined by their negative effects and the unavoidable need for exceptional levels of involvement. A proper response, early warning, and disaster responses can significantly lessen the impact. Risk analysis, vulnerability reduction (preparedness), prevention, mitigation, response, recovery, and rehabilitation are all included in disaster management, which includes all aspects of preparing for and responding to risks and disasters.

The DMS and/or the Department of Meteorology will issue an early warning in the case of cyclones and tsunamis. Tsunamis typically have a warning period of more than 90 minutes, giving people plenty of time to find safety elsewhere. All guests will receive cyclone warnings well in advance of their departure, and there will be ongoing contact with them regarding this subject. The visitor will be evacuated using a high lead time to designated safe locations even though the apartment has enough space for vertical evasion.

### **Need for Disaster Management Measures**

Disaster disrupts everyday human existence and established social and economic structures, causing sudden and severe suffering for humanity. It has the ability to significantly harm people. To handle the aforementioned emergencies in the metro system, an effective disaster management plan is required. The following are the primary goals of disaster management measures:

- Lay down the steps that staff members must take in the case of a tragedy to ensure fast and well-coordinated crisis management.
- To make sure that everyone in charge of handling the scenario is well-versed in their roles and obligations in advance. In order to prevent any form of confusion and turmoil during the actual scenario and to provide them the ability to carry out their duties with alertness and promptness, it is crucial that these officials and employees receive proper training beforehand.
- Preserve life and alleviate the pain.
- Assist those who are stuck and set up their swift evacuation.
- Create a feeling of security among everyone involved by giving them reliable information.
- Preserve project assets.
- Quickly expedite the return of business as usual.

### **Various Scenarios of Risks and Disaster in The Project**

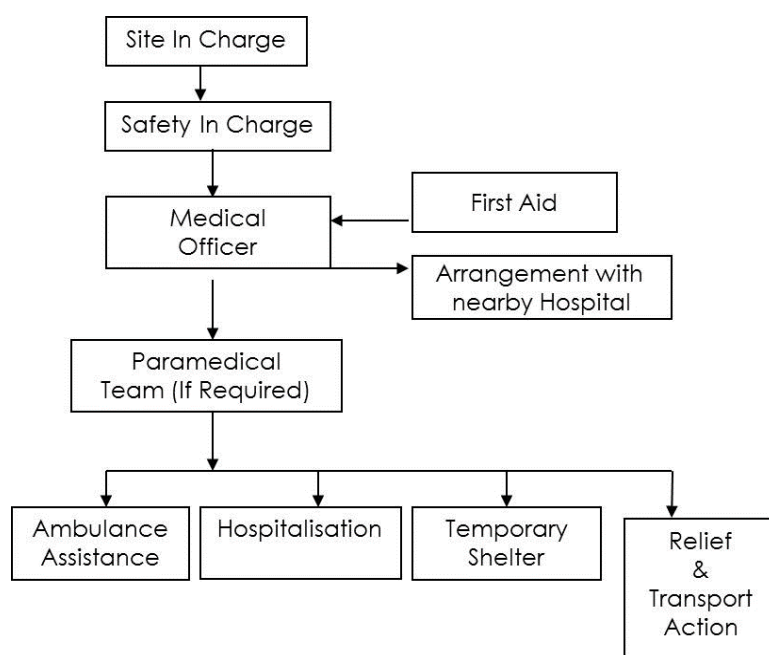
#### **Scenario 1: Evacuation of People**

An essential component is the communication system, which will be present throughout the resort. It is predicted that an urgent early response, such as rescue and relief efforts by the rescue team using a lifesaving boat, will take place. To prevent further effects, these rescued

passengers will be transferred to a neighboring hospital after receiving first aid on the creek from paramedics.

## Scenario 2: Accidents

The main danger in this kind of disaster is death or serious harm. A paramedical team and a well-equipped ambulance will arrive on the scene as part of an early response. This will assist in removing workers from the scene of the accident and transporting them to the closest hospital. The patient can be transported to one of the major, super-specialty hospitals in the vicinity if the necessity arises.



**Figure 02-12 DMP for Medical Safety Scenario**

## 2.2 Justification of the Project.

The importance of living spaces in urban areas increased as populations grew and living conditions worsened. The demand for living space is high in Colombo. Therefore, the demand for apartment development projects is high. Apartment development is a real estate trend that is quickly catching on in many cities and urban centers around the country. Basically, development involves acquiring run-down, dilapidated apartment buildings and restoring them to their former glory. Investors and real estate agencies find apartment redevelopment to be a lucrative business opportunity. On a larger scale of things, however, apartment redevelopment has more profound benefits for the broader community. Infrastructure, housing, and amenities fuel urban development. Here are three ways in which apartment redevelopment contributes to the welfare of urban communities:

Many cities all over the world struggle with meeting the housing demands of their residents. Apartment redevelopment opens up new housing facilities for city dwellers by restoring old

and unused buildings. A previously misused apartment building gets a new landlord and new tenants through rehabilitation and renovation.

Population increase in cities and towns is not necessarily a bad thing. More city residents mean more laborers in industries and offices. A growing population can increase the productivity of a city significantly. Increasing the availability of housing units through redevelopment encourages population growth, which is vital in securing a city's prosperous future. The demand for living space in Colombo is higher than in other cities in Sri Lanka. According to the Housing and Land Research Institute (HLRI), the total population of the Colombo metropolitan area is approximately 6.5 million, making it one of the most densely populated areas in Sri Lanka. The population of Colombo is expected to increase to 7.5 million by 2025. The population of the city is expected to grow by 1.5 million in the next 15 years.

City planners and authorities usually adjust city borders and outskirts, depending on the population figures. A densely populated city requires more infrastructure and amenities than a sparsely populated town. A high population motivates development in an urban center, which results in growth and expansion. In many ways, apartment redevelopment presents various benefits to a growing city or town. It may seem like redevelopment only favors the investors, but that is a false assumption. Redevelopment inspires urban development, growth, and expansion. It is a win-win situation for everyone involved. The city or town benefits from the increased tax revenue, and the investors benefit from the increased property value. The majority of Colombo's high-end office spaces are concentrated in the Colombo Fort area. High office space demand has been experienced in recent years as a result of the development of the service sector, and pressure for office space requirements is building up in the city center. As a result, the trend is for office spaces to be relocated to Galle Road, Union Place, and Duplication Road, and the Nawam Mawatha Urban Development Authority has designated these areas as high-density mixed development zones.

The goal of this project is to capitalize on the growing market demand for living space in a convenient location closer to Colombo's city center. The location will be in high demand because it is easily accessible via Marine Drive Galle Road and Duplication Road. Because Galle Road is a major thoroughfare, the proposed location is in high demand for office space. Galle Road is ideal for office activity, especially related to international trade and the service sector. Because of the high-end residential surroundings and high-end hotels, the location is more justified. Local branches of international brand names, IT sector offices, hotel administrative offices, banking, and other services trade offices are all possible.

The project is to be implemented in an attractive coastal environment and efforts are to be made to preserve the environmental qualities of the project area in which the development is to take place. It is recognized that the project itself comprises the development of a residential facility that promotes leisure activities with a high priority given to the preservation of the existing environment which itself is mandatory for the success of the project. The proposed constructions are located beyond the reservations specified and the project designs have also been developed to achieve minimum interaction with the natural coastal environment in the area.

Appropriate 'Green Practices' are also to be adopted, leading to the conservation of natural resources and reduction in environmental pollution

## 2.3 Details of the Construction and Operational Activities.

### 2.3.1 Details of Construction activities of the Project.

#### 2.3.1.1 Site Preparation Activities: Removal of Vegetation, Methods of Cutting, Filling, Levelling, Piling, Grading, Excavation, Removal of Debris

The project site is shown in figure 2.13 and as indicated in the figure the site-clearing activities are already completed. The site had been used as a car park; therefore, the brisk rendering of the existing car park has to be closed. The removed brick could be reused for their other construction works and other debris will be removed from the site. According to the Geo-Technical Report (Annex VI.a) following results were obtained.

- The investigated area is a flat area
- Existing multi-story buildings could be seen near the investigated area
- Groundwater level was encountered nearly at 4.0 m – 4.6 m depth below the EGL
- during the investigated period
- The rock level was varied from 23.50 m to 26.00 m depth from the existing ground level

There are no major excavation done in the construction phase due the structures will be built on the ground level. Few amounts of filling take place at only the front entrance car porch area. No filling material is required from the outside. All the materials transported to the site will be the contractor's responsibility and will do as a typical construction project following relevant rules and regulations. All the excavated material will be deposited outside the site by using trucks to the approved place by the UDA and CMC.





Figure 02-13 Existing condition of the project site

#### 2.3.1.2 Details of pre-crack survey study (as per NBRO standard/guideline)

The current site is bare land. But there is a High-rise building in the neighboring land. Therefore, it is a necessity to have done a Pre-crack survey and that has been carried out and attached in annex Vi.i

#### 2.3.1.3 Demolition plan of existing buildings.

There are no existing buildings, permanent or temporary structures on the site and no such a need arise.

#### 2.3.1.4 Method of construction

##### **Detail report on foundation, excavation method, and excavation supported system, pilling process, dewatering system**

According to the Geo technical Report (Annex VI.a) 8 positions were investigated namely BH1 to BH8. The significant factors affecting the selection of the foundations are:

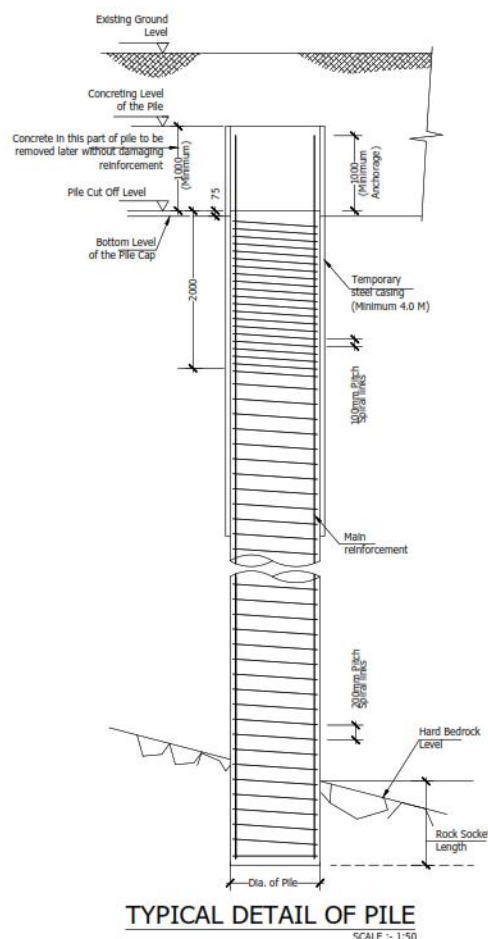
- a) Twenty two floors with roof top.
- b) The groundwater level was varied from 0.90 m to 1.0 m depth from the EGL during the investigation period;

- c) In BH-06 overburden from 17.0 m to 21.0 m (approximately 4 m) from EGL consisted of a very soft sandy clay layer;
- d) In BH-08 overburden from 19.0 m to 21.0 m (approximately 2 m) from EGL consisted of a soft sandy clay layer;
- e) The basement rock level was varied from 23.50 to 24.75 m depth from the existing ground level;

As a result, foundations must be drilled and socketed into basement rock with in-situ piles. Because of the presence of a very soft sandy clay layer right above the basement rock, the frictional contribution of overburden to pile capacity is recommended to be ignored. The top layer of bedrock is heavily or moderately worn at the drill sites. As a result, the allowed end-bearing capacity of a bedrock-socketed pile is 2 m or twice the pile diameter, whichever is larger.

The details of the piling are shown in the following figure 2-14 and Annex V.e and the bottom pile cap will be near to 4 m in depth where above the ground water level which is 4.80 m. There won't be any dewatering process as the pile cap is above the ground water level.

For the pile caps Timber Shoring method will be used.



**Figure 02-14 Details of piling.**

Timber shoring is a method employed for this construction. Timber shoring for pile caps is a construction technique used to support and stabilize the excavation area around the pile caps

during the construction of foundations or other structures.. As the building is at the ground level (semi basement will be developed from the ground floor) no excavations are done except for foundations and the piling.

The CMC drainage system will be used to regulate wastewater during the Operational phase. All wastewater will be collected during the construction phase and removed periodically to a safer place by an authorized contractor. All storm water and surface drainage will be routed through the CMC drains. Water browsers, on the other hand, would be kept available during the construction period to collect excess water such as groundwater and storm water if CMC drains became clogged.

The layout and details of proposed permanent constructions are given in Annex V.c possibility of preparation of temporary construction during the contraction period for the dwelling works and office will be demolished.

The land is located with natural drainage patterns towards the sea. There are no surface or groundwater sources on the premises. Therefore, there are no significant impacts to surface drainage patterns due to the construction of temporary structures during the construction phase and permanent construction during the operation phase.

### **Construction materials requirement. Transportation and traffic management plan**

At the current stage of project activities, the quantities of construction materials required have not been calculated. However, in view of the scale of construction (a building high-rise building) proposed, large quantities of construction materials would be required for construction. Basically except for the concrete and brick/cement blocks, all other materials will be purchased from the Local Manufacturers and/or Importers. Some items such as electrical equipment, Barth room fittings, etc. will be directly imported for the project itself.

Ready-mix concrete will be used for the construction. This will be transported from the nearest batching plant of the contractor. Cement blocks will be ordered from reputed manufacturers. However, the brick will have to be purchased from the areas where those are manufacturing close by the district to Colombo.

Accordingly, there is no impact due to construction materials as those are from regular sources.

At this stage of the project, only the initial construction details have been worked out and the total materials requirements have not been estimated. Considering construction similar to the proposed development, the following materials requirements can be identified;

- Concrete: Cement, Sand, Aggregate
- Rubble
- Bricks, cement blocks
- Steel
- Timber
- Formwork Materials
- Plumbing items: PVC pipes

- Steel Pipes
- Tiles
- Aluminum items
- Glass
- Paints

Materials will be purchased from the local suppliers, wherever possible, and transported to the site. Cement, sand graded, and rubble will be transported under the covered conditions. In view of the traffic volumes on the roads approaching the site, congested traffic conditions envisage during project activities. A traffic management plan may be required as the site is located in an urbanized area, and concerns of local communities will be taken into account in conducting transport activities associated with the project. More details on the traffic impact assessment will be discussed in section 2.3.3

#### **If any filling materials are to be used - the source and amounts**

Excavation will be limited to building foundations, waste sumps, septic tanks, storm water drainage systems, underground pipes, and electricity cables laying and landscaping purposes only. The generated quantity of excavated solid will be unfiltered for the improvement of the site and filling operation if any.

#### **Types of machinery to be used during construction**

The machinery and earthmoving equipment required will be brought to the site for construction, excavation, transportation, and land formation work. Considering construction similar to the proposed development, the following machinery can be identified as required during the construction phase of the project.

- |                                                                         |                              |
|-------------------------------------------------------------------------|------------------------------|
| • Excavators, Piling Machines                                           | • Breakers for Pile Hacking, |
| • Concrete Mixers, Vibrators/Porkers                                    | • Compactors                 |
| • Air Compressors                                                       | • Power Tools                |
| • Delivery Vehicles, Generators                                         | • Drilling Equipment         |
| • Tower Cranes                                                          | • Labour Hoists              |
| • Material Hoists                                                       | • Wood Working Machinery     |
| • Machinery/Equipment for<br>fixing/installation of various<br>fixtures |                              |

### 2.3.1.5 Proposed landscaping plan or native plants or other measures to preserve or enhance vegetation of the site

When it comes to the project site, there is very limited existing natural vegetation cover has seen. The greenery was cleared with the construction of railway tracks and other buildings surrounding the location. This initiative will result in the creation of new vegetation. Many trees and plants have been proposed to be planted around the building, and three gardens have been placed within the structure. The largest garden will consist of an area of 900 sq.m as shown in Figure 2-15.

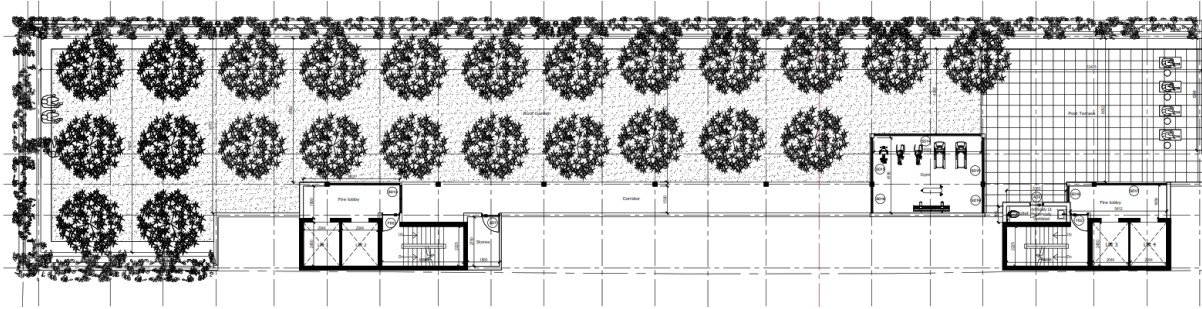


Figure 02-15 Roof Top garden

It is suggested that plants be chosen with the ecological report in mind and that Green Planet eco-environmental specialists be consulted to improve the eco-friendly building. Some of the plants to be used are given in Figure 2-16.



*filicium-decapiens* (Pihibiya)



*Dracaena trifasciata*(snake plant)



*Clitoria ternatea*



*Bambusa vulgaris*



*Rubiaceae (Ixora coccinea)*



*Costus speciosus (Koenig) Smith*

**Figure 02-16 ecologically valuable plants to be used.**

## 2.3.2 Details of construction and operational activities under the following aspects.

### 1. Water

#### Water requirements Water Supply system

##### Construction phase

The water requirement during the construction phase would be that for the workforce and construction activities. Considering the workforce of 250 and assuming 50 residing workers and 200 day-time workers and consumption rates of 60 liters/person/day and 120 liters/person/day respectively for such workers, the water requirement for the workforce is given in Table 02-4 and can be estimated 21 m<sup>3</sup>/day. The water requirement for construction activities depends on a number of aspects such as the type of activities, techniques/methods used for such activities, number of simultaneous activities, etc. Assuming a requirement of 02 times that of the workforce requirement, the water requirement for construction activities could be estimated as 42 m<sup>3</sup>/day. The total water requirement during the construction phase could thus be estimated as up to 63 m<sup>3</sup>/day.

**Table 02-4 Workforce water requirement during the construction phase.**

| Type of workers  | Number of workers | water requirement (Ltr/Day) | Total water requirement (Ltr/day) | Total water requirement (m <sup>3</sup> /day) |
|------------------|-------------------|-----------------------------|-----------------------------------|-----------------------------------------------|
| Day time workers | 250               | 60                          | 15000                             | 15                                            |
| Residing workers | 50                | 120                         | 6000                              | 6                                             |
| Total            |                   |                             | 21000                             | 21                                            |

**Operational Phase**

During the operational phase, the total water requirement is calculated as follows

**Table 02-5 Total water Requirement during operational Activities**

| Building Type    | Description                                                         | Number of units | Water requirement per unit (Ltr/day) | Total water Requirement (Ltr/day) | Total water Requirement (m <sup>3</sup> /day) |
|------------------|---------------------------------------------------------------------|-----------------|--------------------------------------|-----------------------------------|-----------------------------------------------|
| semi-basement    | Office space /reception                                             | 1               | 500                                  | 500                               | 0.5                                           |
| Ground Floor     | Lobby                                                               | 1               | 600                                  | 600                               | 0.6                                           |
| parking levels   | five parking floors                                                 | 5               | 500                                  | 2500                              | 2.5                                           |
| apartment floors | 10 types of apartments (5 people per apartment)<br>domestic laundry | 220             | 1000                                 | 220,000                           | 220                                           |
| terrace          | pool /gym                                                           | 1               | 5000                                 | 5000                              | 5                                             |
|                  |                                                                     |                 |                                      |                                   |                                               |
|                  | Total                                                               |                 |                                      | 228,600                           | 228.6                                         |

**Water Source and Supply Location**

Currently, there is no proper water line going through the proposed site. Therefore, until the general water supply system is established in the area by the National Water Supply and Drainage Board, total water requirements will be supplied via a 4" service connection for the residential and ¾ " connection for commercial activities (Annex VI.f). It has decided that the requirements to get water through the pipeline. The requirement for water will be fulfilled by the National Water Supply and Drainage Board (NWS&DB) once the new system is established in the area.

Clearance letters from NWS&DB are attached for both the clearance of the availability of water and the clearance for the non-availability of waterlines within the premises in Annex no VII.g

## Detail on Rainwater Harvesting System

It is proposed to carry out rainwater harvesting as per regulations. The location of the rainwater storage tank is shown in the Ground Floor Plan (Figure 02-17). It is proposed to have a rainwater harvesting system to collect the rooftop rainwater and distribute it to the toilet flushing system. Also, it is planned to improve water usage by low discharge showers, taps, etc. The designed rainwater tank holds 25m<sup>3</sup>.

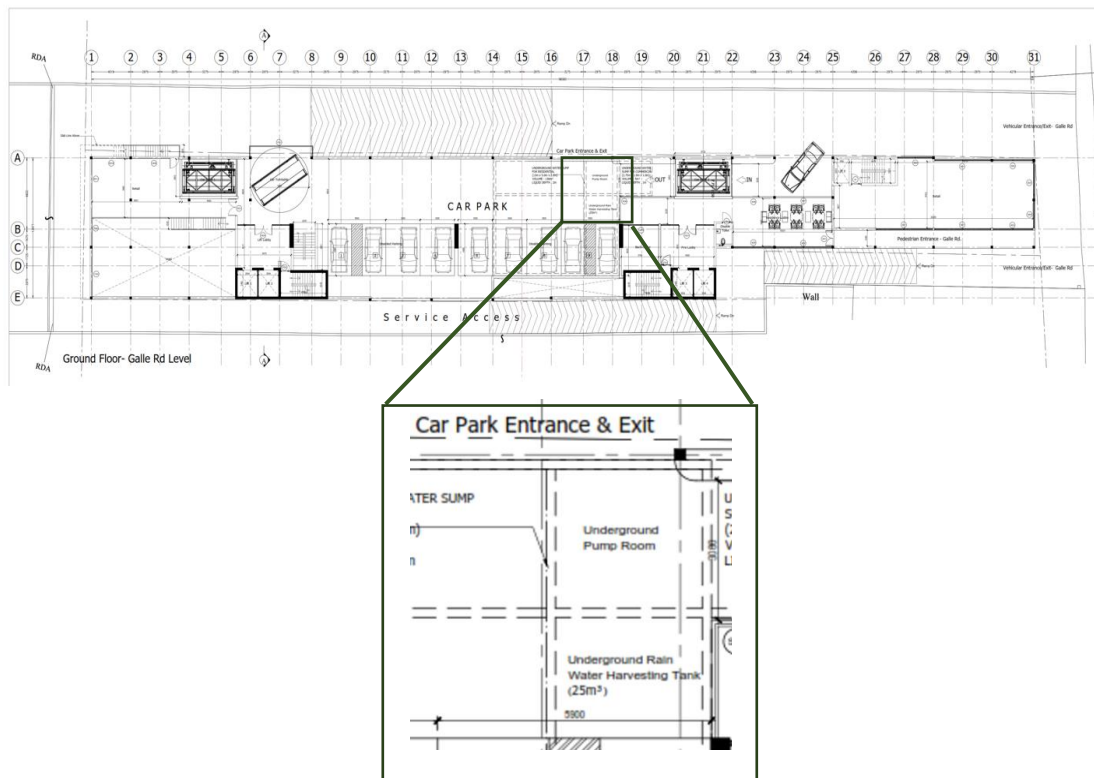


Figure 02-17 Rain water harvesting plan

## 2. Wastewater

### (a) Quantity and Quality of Waste Water Generated

#### Construction Phase:

The wastewater generated during the construction period will mainly be the water used by the workforce, sewage, and wastewater generated from construction-related activities. Considering wastewater generation rates of 90 % and 20 % for that from the workforce and construction activities respectively, the anticipated quantity of wastewater during the construction period is estimated at up to 28 m<sup>3</sup>/day.

### Operational Phase:

In the operational phase, the wastewater generation will be mainly from the toilets and bathrooms, kitchens, laundry, swimming pools, common areas, etc., and includes both 'Black' and 'Gray' wastewater. Considering a wastewater generation rate of 90 %, the estimated quantity of such wastewater can be estimated as up to 396 m<sup>3</sup>/day during the operational phase. (Refer to Annex VI.e)

### (b) Arrangement for Disposal of Sewage and Waste Water

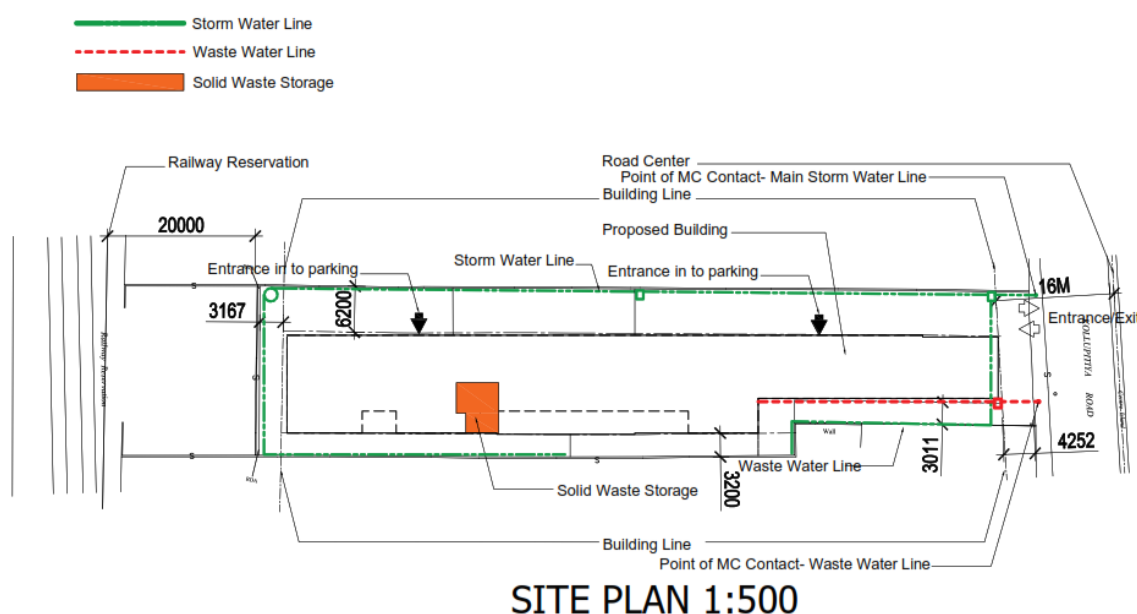
#### Construction Phase:

Temporary water-sealed latrines with plastic septic tanks will be provided for the disposal of sewage during the construction phase by the contractor. These pits will be constructed within the site sufficiently away from the coastline and maintained with high sanitary facilities.

#### Operational Phase:

The wastewater system will be connected to the Colombo central treatment system therefore pretreatment won't be necessary. Approval has been sought by the client and No waste will be disposed from the complex. Sewage discharge from the building will be connected through 160 mm diameter pipes and main discharge will be through 200 mm diameter pipe to the CMC sewer Manhole. Storm water discharge pipe network will be connected to the nearest main CMC storm water line.

Following figure 02-18 indicate the point where the waste water line will be connected to the CMC main line. (Annex V.f)



**Figure 02-18 Location at which the wastewater connected to the CMC waste water line**

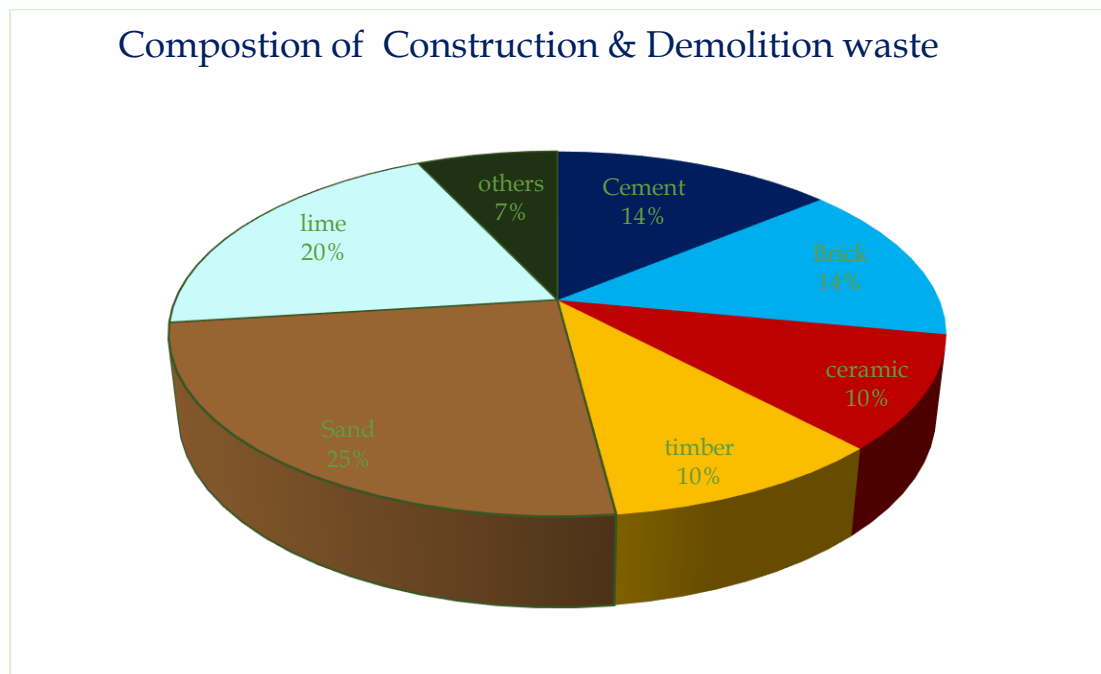
### 3. Solid Waste

#### Construction Phase:

##### (a) Type and Quantity of Solid Waste Generated

Construction and demolition (C&D) waste is the most prevalent sort of solid waste created during construction or demolition. These wastes are generally composed of inert and non-biodegradable elements such as concrete, tile aggregates, plaster, wood, plastics, gypsum, glass, metals, Solvents, Asphalt, Asbestos, Excavated Soil, and rock particles, among others, many of which may be repurposed. When discarded without processing, these wastes are heavy, bulky, and take up a lot of space. Traditionally, these wastes, barring metals and wood, are seen as having low economic value; nonetheless, these wastes present a perfect answer to the problem of virgin material exhaustion (e.g.: Sand, aggregates, etc.,)

Rameezdeen, Kulatunga, and Amaratunga (2004) conducted a study in Sri Lanka to estimate building material waste in Sri Lankan sites. According to the findings, sand is the substance with the largest waste on Sri Lankan building sites, accounting for 25% of the total garbage collected. Lime waste (20%), cement waste (14%), brick waste (14%), ceramic tile waste (10%), and timber waste (10%) are created in that order. According to the report, the biggest sources of waste formation are material-cutting operations and poor management (Figure 02-19). A detailed Solid Management Plan has been prepared and submitted to the Colombo MC and approval obtained (Annex VII.d)



**Figure 02-19 Composition of Construction waste**

**(b) The proposed method of disposal of solid waste**

Disposal of construction waste will be the responsibility of the contractor. The service provider will be identified through the registered collector through CMC and CEA. Large separate bins will be placed in order to collect construction waste separately on daily basis. Debris and spoiled material generated in the construction stage will be collected separately in separate containers at the working site (figure 02-20). None of the municipal sites are qualified to be proper landfills in Colombo and therefore the contractors will strongly be advised to dispose of these debris and spoiled materials in an environmentally safe and accepted way outside the premises most can be used for safe filling of the burrow pits used for soil extraction for deferent development projects in the vicinity of Colombo.



**Figure 02-20 Construction waste collection**

Initially, waste will be collected in separate bins. All the workers, during the construction periods, will be trained to follow the color code system given below

| <b>Waste category</b>   | <b>Color code</b> |
|-------------------------|-------------------|
| Paper                   | Blue              |
| Plastic/Polythene       | Orange            |
| Metals, Coconuts shells | Brown             |
| Glass                   | Red               |
| Organic Matters         | Green             |
| Other                   | Black             |

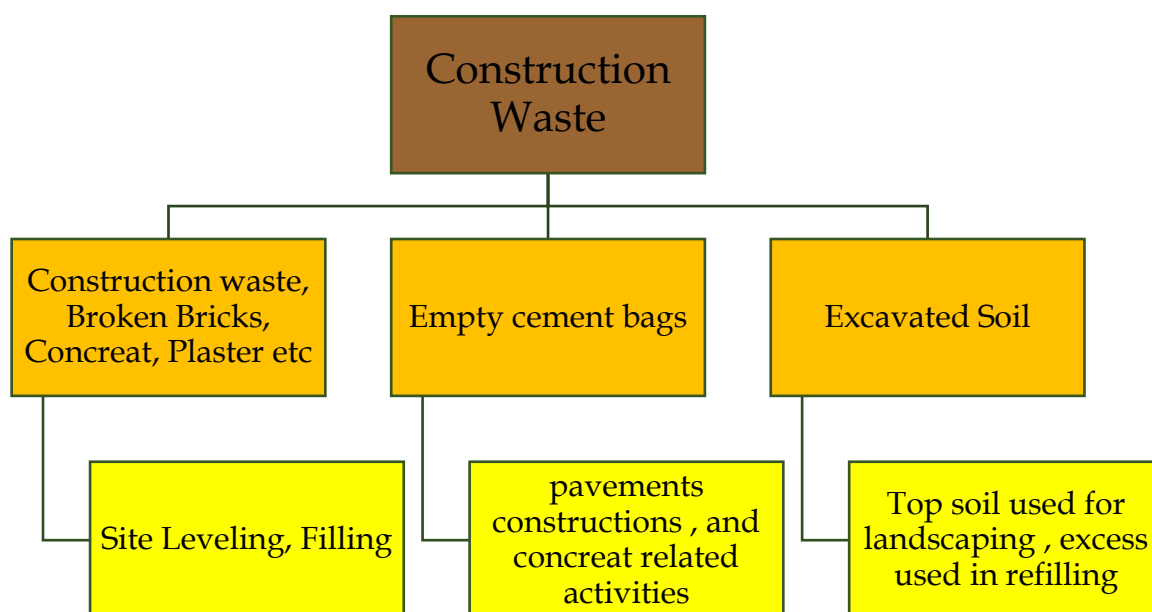
**(c) Any proposal for reducing, recycling, or reuse of solid waste**

Reuse and recycling of construction and demolition (C&D) waste is one of the main components of a larger holistic practice called sustainability or green building construction

being practiced in most developed countries. Re-utilization or recycling is an important strategy for the management of such waste.

Construction and demolition waste can be used in the following manner:

- Reuse (onsite) the bricks, stones lab, timber, conduits, and Piping railing sets to the extent possible and depending upon their condition.
- Sale/auction of material that cannot be used at the site due to design constraints or changes in design.
- Plastics, broken glass, scrap metals, etc. can be used by recycling industries.
- Rubble, brickbats, broken plasters/concrete pieces, etc. can be used for building activity, such as leveling, and undercoating of lanes, where the traffic does not constitute heavy moving loads.
- Larger unusable pieces can be sent for filling up low-lying areas.
- Fine materials, such as sand, dust, etc. can be used as cover material over a sanitary landfill.
- Use as a granular sub-base (the layer above compacted earthen subgrade) in road construction. Sub-base is generally constructed using a non-plastic forum.
- Proceed C and D waste (after sizing and sieving) can be used in road pavement for sub-base construction.



**Figure 02-21 Construction solid waste reusing options**

### **Operational Phase:**

#### **(a) Type and Quantity of Solid Waste Generated**

A comprehensive solid waste management plan has been prepared and details of the waste generated during the operation have been calculated. (Annex VI.c). According to the SWMP, the computation of waste generation be as follows.

- a) Bio-degradable components suitable for composting
- b) Non-biodegradable components consisting of materials having a commercial value will be calculated using,
  - (i) Average per capita values for domestic waste generation and
  - (ii) floor area rates applicable for commercial and institutional and common area waste generation. Volume calculations for containerization will be based on the known average densities.

The intervals of collection by the Colombo Municipal Council will be:

- Bio-degradable waste - 3 collections per week
- Recyclable waste -1 collection per week

However, in order to allow for the unexpected breakdown of the collection by the council, one collection per week will be considered for bio-degradable waste too. The total calculation is given as follows.

|                                                                                                                  |   |                              |   |                       |   |             |
|------------------------------------------------------------------------------------------------------------------|---|------------------------------|---|-----------------------|---|-------------|
| The total quantity of Solid waste generated per day from part of the entire tower building                       | = | 859.325 kg/day               |   |                       |   |             |
| To allow for disruption of collection due to problems at the final disposal site, Allow for generation in 7 days | = | 6015.275 kg                  |   |                       |   |             |
|                                                                                                                  |   |                              |   |                       |   |             |
| For 7-day generation                                                                                             |   |                              |   |                       |   |             |
| The volume of solid waste for one week @ 300 kg/m <sup>3</sup>                                                   | = | 20.05 m <sup>3</sup>         |   |                       |   |             |
| The volume of bio-degradable component of 63% @ 300kg/ m <sup>3</sup>                                            | = | 12.631 m <sup>3</sup>        | = | 12631.0Ltr            |   |             |
| Volume of Non-bio-degradable component of 37%@ 300kg/ m <sup>3</sup>                                             | = | 7.4185 m <sup>3</sup>        | = | 7418.5 Ltr.           |   |             |
|                                                                                                                  |   |                              |   |                       |   |             |
| Volume needed for Plastic, Polythene waste                                                                       | = | 0.20 x 20.05 m <sup>3</sup>  | = | 4.01 m <sup>3</sup>   | = | 4010.0 Ltr. |
| Volume needed for Paper/ cardboard                                                                               | = | 0.055 x 20.05 m <sup>3</sup> | = | 1.102 m <sup>3</sup>  | = | 1102.0 Ltr. |
| Volume needed for Metal                                                                                          | = | 0.005 x 20.05 m <sup>3</sup> | = | 0.1002 m <sup>3</sup> | = | 100.2 Ltr.  |
| Volume needed for glass and bottles                                                                              | = | 0.01 x 20.05 m <sup>3</sup>  | = | 0.2005 m <sup>3</sup> | = | 200.5 Ltr.  |
| Volume needed for other wastes                                                                                   | = | 0.1 x 20.05 m <sup>3</sup>   | = | 2.005 m <sup>3</sup>  | = | 2005.0 Ltr. |

**(b) The proposed method of disposal of solid waste****In-house Disposal and collection method.**

The waste stream will be operated by competent janitorial staff appointed by Capital and Asset Investment (Pvt) Ltd. Solid waste awareness program consisting of regular meetings of the stakeholders, notice boards, and leaflets to each premise/unit, etc. The need u for source separation color-coded storage in bins/ sacks or bags will be given constant attention and necessary monitoring procedure attention and necessary monitoring procedure will be taken as follows.

1. Provide 01 No 40-liter Green. Color bin inside the kitchen for collection of solid waste in each apartment unit for bio-degradable waste.
2. Provide 01 No. x 20 Liter Orange color bins on for Plastic/Polythene waste for each apartment unit+ 01 No. 20 Liter PP sack for paper/cardboard waste (blue color) + 1 No. 20 Lit. PP sack for Glass/Bottles waste (red color) and 1 No. 20 Lit. Brown color PP sack for Metal waste.
3. Provide 1 No. 6.0m x 4.0m x 3.0m High Air-conditioned space (10C) with slide openings sufficient for more than 7 days of storage of bio- degradable Organic waste with easy access to the solid waste compactor truck.
4. Provide public areas with 4 Lit. Colored bins as shown in plans.
5. Provide 1 No. cubicle of 4.0m x 3.0mx 3.0m high spaces for non-biodegradable apartment tower waste on the ground floor level sufficient for more than 7 days of storage with easy access to the collection truck.
6. A required number of 20 Lit. Capacity green color bins for bio-degradable waste will be provided in Semi- The basement, Ground floor, First, Second, Third, Fourth, Fifth and Rooftop floors.
7. Required No. of 20 Lit. Capacity bins for the non-biodegradable waste will be provided in Semi- Basement, Ground, First, Second, Third, Fourth, Fifth and Rooftop floors.

**Table 02-6 Waste type and color collection**

| Type of Waste         | Color of Collection Bin |
|-----------------------|-------------------------|
| Biodegradable waste   | Green                   |
| Paper                 | Blue                    |
| Polythene and Plastic | Orange                  |
| Metal                 | Brown                   |
| Glass                 | Red                     |
| Other                 | Black/ Green            |



Figure 02-22 Collection bin color code

The following storage will be provided for the entire collection of solid waste in the complex.

- The total volume provided in the Semi-Basement for 7days of storage for Bio-degradable waste
  - a) 53 Nos. plastic wheeled bin of green color (240 Liter capacity) of size 450 x 450 x 1200 mm area provided to place above bins will be in a chamber of 6m x 4m x 3m height.
- The total volume provided in the Semi-Basement for 7days of storage of Non-Bio-degradable waste
  - b) The volume of Plastic/Polythene - 17 Nos. A plastic bin of Orange Color (240 Liter capacity) of size 450 x 450x 1200 mm.
  - c) The volume of Paper/ cardboard -05 Nos. Plastic bins of Blue color ( 240 Liter capacity) of size 450 x 450 x 1200 mm
  - d) The volume of Glass/ Bottles -01 Nos. Plastic bins of red color (240 Liter capacity) of size 450' 450x 1200 mm.
  - e) The volume of Metal --01 No Plastic bin of Brown color (120 Lit. capacity) of size 450 x 450 x 1200 mm.
  - f) The volume of other waste -- 09 Nos. Plastic bins of Black color (240 Liter capacity) of size 450 x 450x 1200 mm. Storage area for non-biodegradable waste in l No. 4m x 3.0m x 3.0m space in size.

The location of the garbage room is given in the figure 02.-23

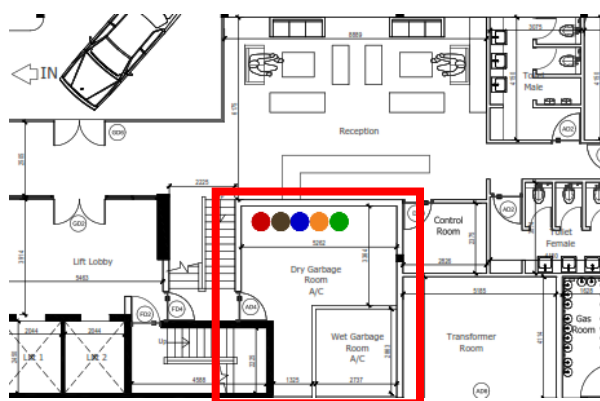


Figure 02-23 Location of the garbage room

Since the new building is located on expensive land in the city, the possibility of on-site treatment of solid waste will be minimal & it is expected to utilize the services of the Municipal Waste Collection Division for the final removal of waste to the dump site from the premises. The following aspects will be ensured, with respect to the solid waste that originates in the location, in order to confirm it to the above-mentioned overall national requirements.

The Bio-degradable and Recycle waste from this complex will be removed from the collection cubicles weekly and will transport them using their own compactor trucks with consultation from the solid waste management depot of CMC to the final disposal location.

### **(c) Any proposal for reducing, recycling, or reuse of solid waste**

Segregation of waste is a mandatory event in solid waste management particularly in the Colombo Municipal Council area. Recycling, Reuse and Reducing, are referred to as 'RRR', 'triple R', or 'three Rs' in SWM. According to a special regulation issued by the CMC, all premises are required to undertake the segregation of waste into two parts such as biodegradable (compostable) and none biodegradables.

The environmental protection requirement has been addressed though;

- a) Practice source separation with awareness building.
- b) Re-use of waste containers and use of degradable plastic green bags.
- c) Providing conformity to municipal recyclable waste collection exercise.

The environment and public health good practices will be ensured through the close dialog that is expected to be maintained by the management with proper coordination with the area Solid Waste division of Colombo Municipal Council, in transporting Bio- degradable waste to the final dump yard and Recycle waste to respective collection centers. Awareness of reusing and recycling programs will be an important aspect of achieving efficient waste management and the management company shall keep all the occupants constantly addressed of this by holding monthly meetings. Notices shall be displayed at all collection areas and notice boards to keep the employees and residents to aware of the practices. The management will be informed regarding any lapses on the part of the staff.

## **4. Air Emission**

### **Use of Generator/boilers or any other machinery which generates emissions**

The main emission source is the use of a standby diesel generator. Use of the diesel generator is only at the times of the interruption of the main electricity supply. Hence the usage of the generator is minimal and no significant emissions are anticipated.

During the construction phase air pollution due to dust emission while excavation and land clearing under windy and dry weather conditions as well as the open stockpiles, transport of the materials, vehicles moving on unpaved areas of the land, etc. such emissions will be

minimized by providing proper practices such as providing proper covers, regular wetting of the surfaces, washing the tires at the exit from the site.

### Emission management and Control facilities

This is residential complex and no special emission control facilities are required in this project.

## 5. Provision of Infrastructure

### (i) Electricity

The supply from the Ceylon Electricity Board (CEB) is to be the main source of electricity for the proposed development. A copy of the letter from the CEB indicating the consent for electricity supply is attached in Annex VII.b. The location of the transformer room is shown in the Ground Floor Plan (Figure 02-24). The total electricity requirement is 1600 kVA (Annex VI.d)

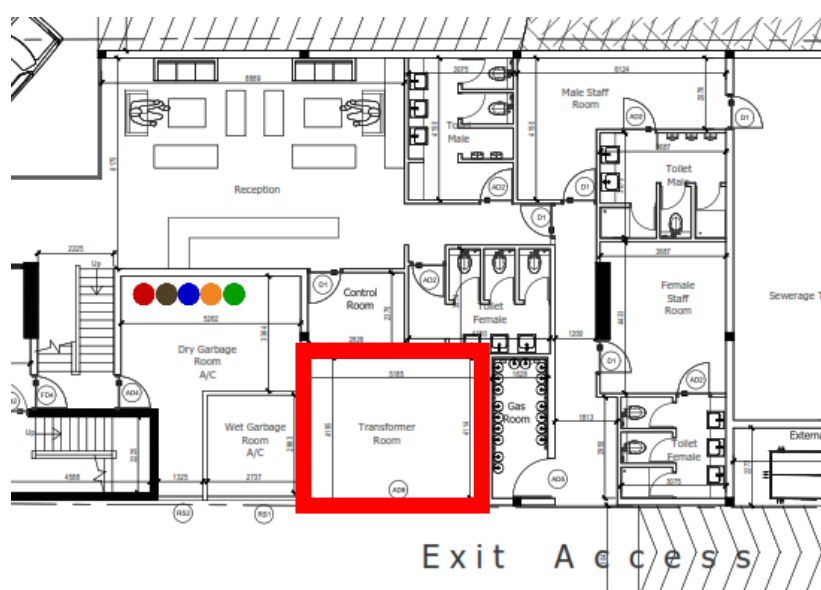


Figure 02-24 Transformer room on the ground floor

Standby generators of adequate capacity are to be used during interruptions of electricity supply from the CEB. The location of the generator room is shown in the ground floor plan

### (ii) Storm Water Drainage Plan

There are no major issues related to surface drainage currently experienced at the site. Although no significant changes in terrain are anticipated due to proposed developments, a possibility exists for the alteration of some of the natural drainage paths. Storm water discharge pipe network will be connected to the nearest main CMC storm water line.

### (iii) Soil erosion-preventing measures

In view of the flat/gently sloping terrain in the project site, no significant soil erosion is envisaged. If necessary, a surface water drainage system with silt traps is to be put in place to facilitate drainage and reduce soil erosion.

### (iv) Access and Parking Facilities

The project site is directly accessible from Galle Road as indicated in Figure 02.-25. No new road constructions are required to provide access to the project site.

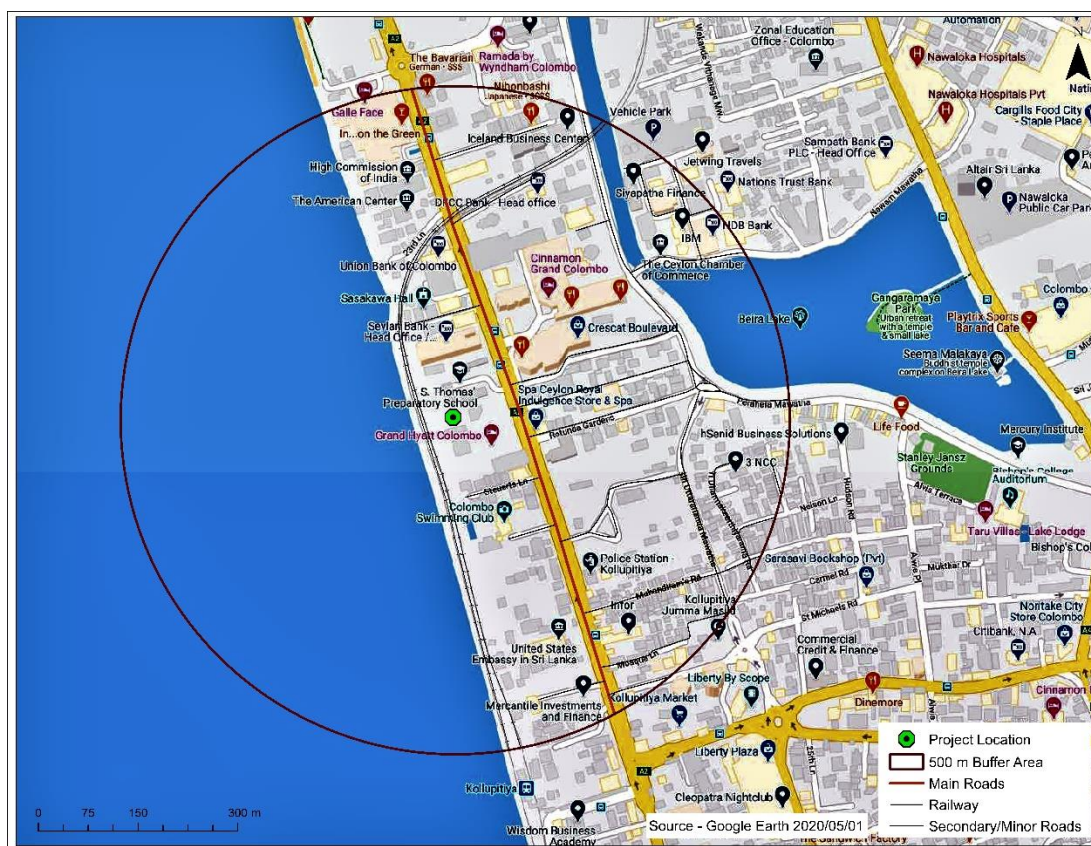
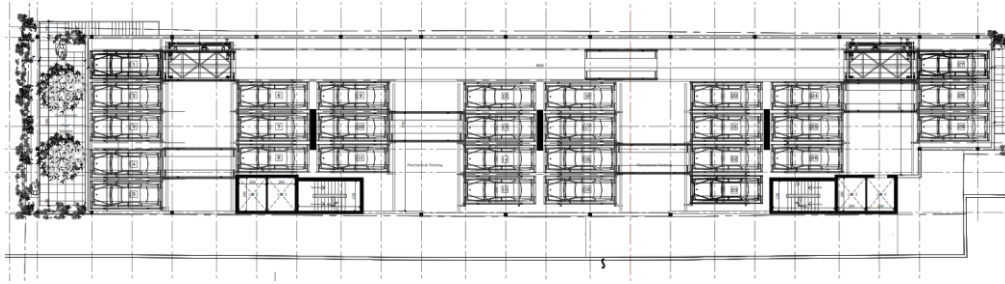


Figure 02-25 Access road to the site.

Parking facilities of the complex are allocated for the residents as well as staff. Five parking floors are dedicated to parking space. 232 vehicles can be parked within the five levels. within 5 levels there are 8 mechanical parking floors. A separate disabled parking area is allocated at the ground level with 9 parking spaces. A total of 241 parking spaces are allocated inside the premises. the parking area layout plan is given in Figure 02-26



**Figure 02-26 Parking Layout plan for 1 to 5<sup>th</sup> floor**

#### **(v) Fire Safety**

It is proposed that a fire safety system that consists of

- Structural elements with adequate fire resistance periods
- Refuge floor(s)
- fire/smoke detectors
- Fire alarms
- Fire sprinkler system
- Emergency exit signs
- Fire extinguishers
- Fire hose reels

As per relevant regulations be provided/installed prior to the commencement of the operations. The proposed fire safety details have been submitted to the Fire Services Department (FSD) and the recommendations for the fire protection system obtained. A copy of the clearance letter from the FSD is attached in Annex VII.e. Further before the facility is opened for occupants, it is proposed that the fire protection system be fully operated and tested under simulated conditions to demonstrate compliance with the relevant standards, codes, and/or guidelines.

#### **(vi) Safety Standards for Buildings and Accessibility for Disabled**

Access and facilities for differently-abled personnel are provided as per regulations. Such facilities would include parking, access, room, and common facilities for differently-abled personnel. Some of the facilities to be provided are indicated in the architectural drawings attached in **Annex V**.

#### **(vii) No of Lifts**

Four lifts for residents and 1 service lift are to be provided. The locations of the lifts are indicated in the architectural drawings attached in Annex V

### 2.3.3 Traffic Impact Assessment

To forecast traffic congestion, a thorough traffic impact study was performed (Annex VI.f). The road portion where access is provided is a four-lane, median-separated road. As a result, only left-turning movements are permitted from the development, and the relevant traffic flow is that towards Colombo. The present morning peak flow towards Colombo is 2400 veh/h, implying a v/c ratio of roughly 0.8. As illustrated in the figure below, traffic flow conditions are high but do not indicate serious congestion. The addition of around 80-90 cars would not cause serious capacity concerns for the road stretch. Furthermore, because they are left-turning maneuvers, the delays will be small.

In the future, the property will be linked to the anticipated Marine Drive expansion towards Fort, reducing traffic on Galle Road even further. Increased traffic volumes are expected as a result of project operations throughout both the construction and operating periods.

The development has 220 residential units. This development will create 880 vehicle trips per day, assuming an average of 4 vehicular trips per day for each apartment. This assumes that all apartment units are fully occupied. The peak generation would be roughly 10%, implying that 88 vehicular trips would be created during the peak time, which would be between 7.00 and 9.00 AM. A lower peak flow would occur in the evening, accounting for approximately 8% of the daily flow between 6.00 and 7.00 PM. It is also anticipated that around 20% of the journeys will be taxi trips. This would imply that the parking system's vehicle traffic demand would be around 70 veh/h in the morning peak hour and 50 veh/h in the evening peak hour.

There is a chance of disruptions to the present urban environment in the region owing to increasing traffic levels caused by the planned development activities and the presence of a greater number of inhabitants in the area. However, because the proposed facility is residential in character, the parking supplied is enough in accordance with the laws. Because parking is provided via a mechanical parking system, the important considerations would be the parking system's capacity and operating performance, as well as the geometric features of the access points. TIA contains the requirements for the automated parking system. It can store a total of 232 automobiles. This is served by two lifts and has two levels of parking.

The afternoon peak hour, when vehicles will be entering the facility, will be essential for the parking system. According to the trip generation estimate, the peak demand would be roughly 50 vehicles per hour. That means the inter-arrival time is 1.2 minutes (assuming uniform dispersion of the incoming flow). According to the standards, the processing time per car is around 3.0 minutes (the waiting time and the parking time per vehicle when there is no queue is used, as per the specification given by the client). As a result, the capacity of each elevator is 20 vehicles per hour, and the capacity of the parking system is 40 vehicles per hour (arrivals). Because the peak hour arrival volume is 50 cars per hour, a maximum of 10 vehicles must wait in the queue in the worst-case scenario. During the operating phase, no major increases in the area's present traffic levels are expected.

### 2.3.4 Availability of local Labor force, Employment of local people, method of training and enhancement of required skills

Over the predicted 24-month construction phase, an average of 300 job opportunities are expected to be produced. At peak times, the number will rise to 350, while many others will find indirect work (equipment and material suppliers).

The total employment generated by the facility in the operational phase will be estimated at 20 staff members. Whenever possible, the staff is to be recruited from the area and be given comprehensive training before employment. In addition, due to regular activities related to the proposed development, it is likely that other income-generating opportunities would also be created in the area. Better markets created for local produce, mainly due to purchasing by the occupants of the proposed development, would also likely provide economic opportunities for the local community.

### 2.3.5 Aesthetic & Visual Environment

The name Kollupitiya is derived from the name of a Kandy chief who unsuccessfully sought to dethrone Kandy's last monarch. During the British and Dutch administrations, a brewery in Kollupitiya began producing liquor from coconut treacle. The suburb is now a bustling business district with attractive high-end shopping centers. Kollupitiya is home to a few foreign embassies. The Prime Minister's House (Colombo) is situated in Colombo 3, two blocks south of Maha Nuge Gardens, a notable private alleyway.

As indicated in the architectural drawings attached in Annex V, the maximum height of the proposed structures is 115.563 m. The design of the apartment has concerned with providing a beautiful sea view to almost every apartment unit as well as a city view for the residents. However, most of the view has been obstacles by several high-rise buildings around the area and there will be no effective damage to the visual environment due to the building structure.

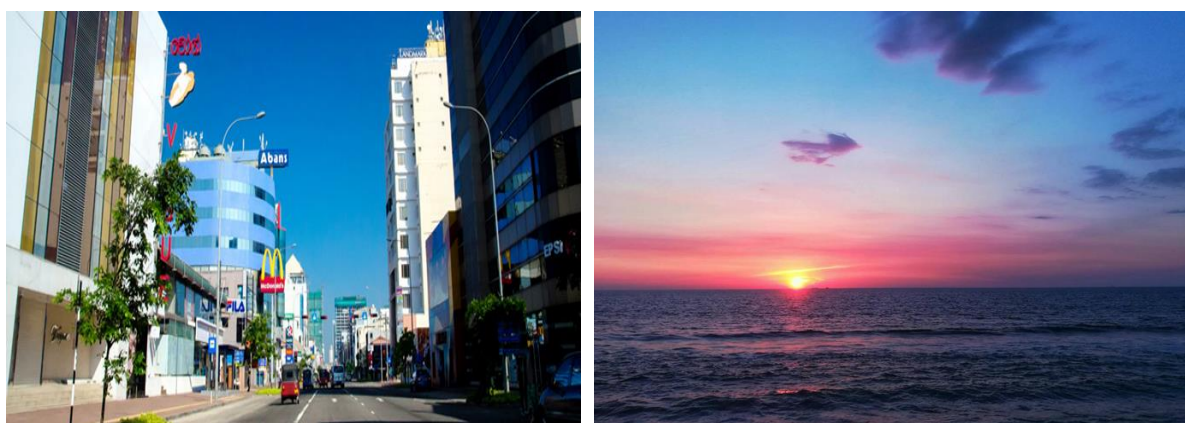


Figure 02-27 Visual environments in Kollupitiya (Colombo 03).

### **2.3.6 Details of Phase Implementation Plan**

The proposed developments are to be carried out as a single-phase development. No further expansions, to be implemented in phases, are currently envisaged.

## **2.4 Evaluation of reasonable alternatives**

The proposed development was identified by a comparative study of several types of developments, which include commercial, tourism sector (hotel) and residential developments. Market survey and trade-off analysis carried out by the project proponent indicated that residential development would be more appropriate in comparison with the other alternatives. A high-rise development, as opposed to a low-rise development, would lead to more efficient use of valuable urban land for productive purposes.

### **2.4.1 Design Project Alternatives**

For the alternatives, five options were considered: hotel development/low-rise residential apartment/high rise residential apartment / commercial complex/office complex

#### **Option 01 – Hotel Development**

A five-star luxury hotel was considered. Because the project proponents' site is near the coastal line, there is a significant demand for a hotel with modern facilities. The guests might be accommodated in large numbers. When it comes to location, there are numerous high-end hotels in this region, all within 30m.

#### **Option 02 – Low Rise Residential Apartment.**

An apartment with a restricted number of residential units was examined. The demand for apartment complexes is great, and there are just a few flats nearby. When selecting a low-rise apartment complex, the size of the site was most important. The desired demand may not be met.

#### **Option 03 - High Rise Residential Apartment.**

In order to attract high-end residents, a high-rise apartment option was explored as a design alternative that would give a large capacity and luxurious experience. The demand for such a location is primarily from international visitors. There aren't many multistory apartment buildings nearby. This design necessitates greater resources and facilities. The capital investments for this type of project are significantly larger.

**Option 04 – Commercial Complex**

As a design alternative, a high-end commercial complex with high-end retailers was proposed. The design was focused on drawing international customers and brands to the complex. There are high-end shopping complexes nearby, and the country's present commercial environment was considered.

**Option 05 – Office Complex**

An office complex was explored as a design alternative since it provides the opportunity to rent out office space. Because of the project location on this option, the cost-benefit was examined.

The evaluation of the alternatives was analyzed using a Tradeoff analysis. From the trade of analysis, the best alternative for the project was discovered by weighting to 7 selected criteria such as,

1. Environmental Impacts
2. Materials
3. Economic Benefits
4. Sustainability
5. Capacity
6. Cultural Effect
7. Technical Functionality

The five options were ranked in accordance with the Tradeoff analysis ranking the options from 1 to 5. Refer to Annex VI.g. for the Tradeoff Analysis. The Summary of the tradeoff and the results are shown in Table 02.7

**Table 02-7 Summary of the Tradeoff Analysis.**

|   | Options                          | Ranking |
|---|----------------------------------|---------|
| 1 | Hotel Development                | 4       |
| 2 | Low Rise Residential Apartment.  | 2       |
| 3 | High Rise Residential Apartment. | 1       |
| 4 | Commercial Complex               | 3       |
| 5 | Office Complex                   | 5       |

According to the trade of Analysis, the most favorable design was Option 03 which is the High-Rise Residential Apartment. Therefore, the project will continue with the 03rd Option.

### **2.4.2 Site Alternatives**

As this project is conducted by a privately owned company and on fully owned land by the company (Annex V.b), the initiation of the project was considered after owning the land. Therefore, there are no site alternatives to the project.

### **2.4.3 No Action Alternative**

No action alternative is considered here under a situation where the project would not be undertaken. Without the introduction of the project, this would be bare land without any purpose. The demand for high-end accommodation would not be fulfilled.

## **2.5 Financial Commitments**

The total estimated budget is one billion five hundred thirty-one million four hundred twenty-two thousand two hundred twenty-six dollars and forty cents Sri Lankan Rupees (Rs. 1,531,422,226.40) (4,168,031.29 USD).

Funding sources are Capital investment, after-sale, and Bank loan

## Chapter 03 : Description of existing environment of the study area

### 3.1 Physical Features

The proposed project site area is located within the Colombo District, Western province of Sri Lanka, and adjacent to the Galle Road in Kollupitiya. The site area is reachable along the Colombo-Galle main road (A2). The project site belongs to Thibirigasyaya Divisional Secretariat Division (DSD). The physical features of the area are studied considering the Kollupitiya GN division in the Thibimrigasya DSD.

#### 3.1.1 Topography

Sri Lanka was divided into three zones that are distinguishable by elevation: The Central Highlands, the 2nd peneplain, and the coastal belt. Physiographical, the area covered by the proposed project belongs to the lowest peneplain in coastal lowlands that's below 100m. The general elevation of the area around the project site is about 3.0 - 4.0 m M.S.L. It is characterized by flat terrain topography with surrounding; whilst the land slightly slopes down from the eastern direction. The elevation of the project site is not much different from the neighboring lands.

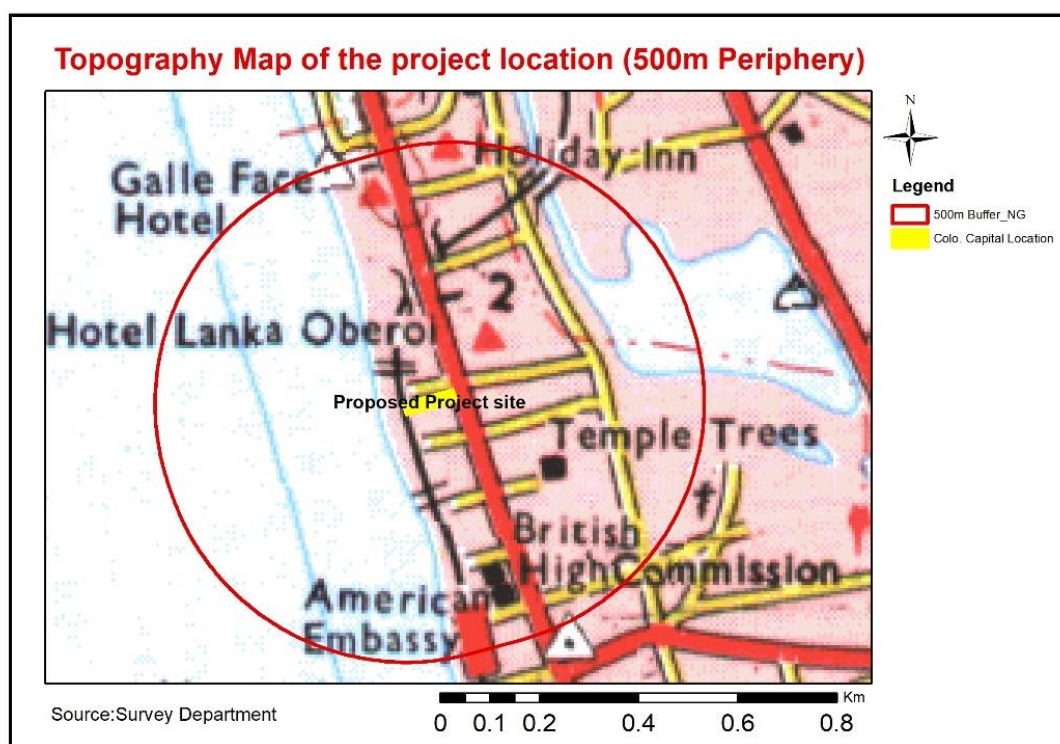


Figure 03-1 Topography map of the project site.

The plot area exposed as vacant ground with a parking park now belongs to the Hatton National Bank and covers around 80 perches. It runs roughly from northeast to southwest. The region is densely inhabited and surrounded by business buildings and banks, as well as SPA Ceylon, Grand Hyatt Colombo, and Cinnamon Grand Hotel. Due to the patterned topography, extremely deep overburden has been seen, and a minor degree of soil erosion can be predicted.

The survey site is located in Sri Lanka's wet zone, which sees precipitation from the northeast monsoon (December to early March), which is weaker and shorter-lived than the southwest monsoon (late May to early October). During inter-monsoonal seasons, the region also sees heavy rain and thunderstorms. Rainwater gathered on the property drains via a modest slope towards the west. The average annual rainfall in the region ranges from 2000 to 5500 mm. The average yearly temperature is around 27 degrees Celsius. The Indian Ocean is around 340 m away on the planned site's western side.

### 3.1.2 Geology/Soil

More than nine-tenths of the Sri Lankan basement is underlain by Late Proterozoic age high-grade gneissic rocks. Based on age determinations, it is subdivided into three major crustal units, namely, Highland Complex (HC), Wannai Complex (WC) and Vijayan Complex (VC). This proposed project site is fallen into the south part of the Wannai Complex of Sri Lanka, which comprises Precambrian metamorphic rocks generally metamorphosed under upper amphibolite to granulite facies conditions

The proposed project area falls within the center part of the west end of Colombo 1:50,000 topographic sheet (sheet No.66) published by the Survey Department. Site location is defined on Sri Lankan metric grid coordinates 098119E, 189817 N in the above topographic sheet.

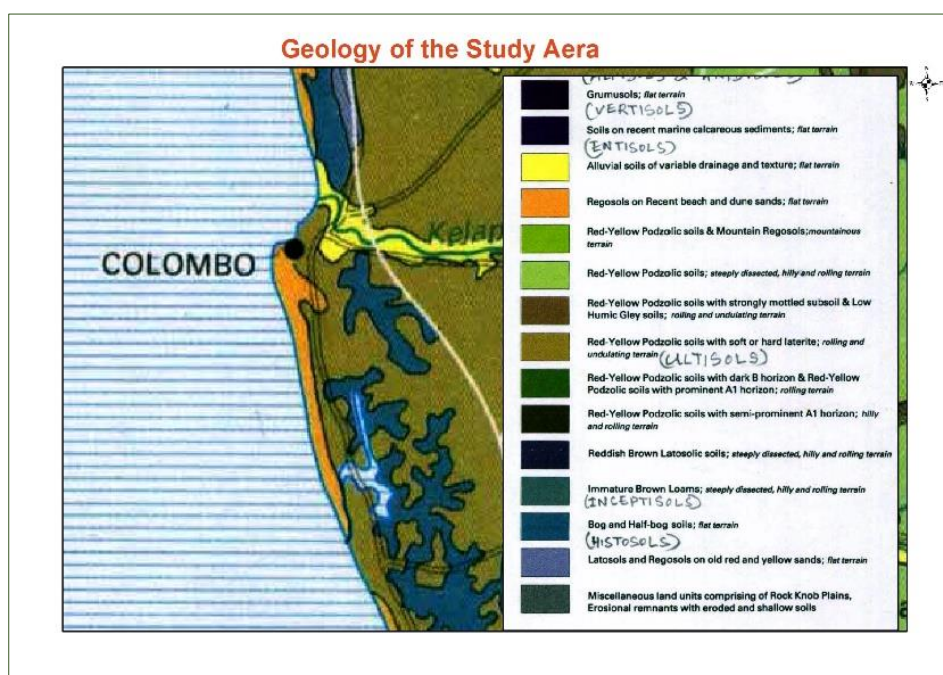


Figure 03-2 Geology map of the project site.

proposed project area towards the southern and eastern which are underlined rocks of the Wannu Complex covered by the deposit comprising unconsolidated brown and grey coastal sand and grey and white bleached sands. A special characteristic feature of the area is difficult to observe particular geological structures due to the area being mostly covered with above Quaternary-recent and Pleistocene deposits.

When considering the site, a geotechnical investigation has been conducted in order to identify the soil content of the site (Annex VI.a). Initially, 8 places have been selected for the study.

**Table 03-1 Study data of the geotechnical report**

| Borehole No  | Ground water Level (m) | Overburden Drilling Depth (m) | Rock Drilling Depth (m) | Total Depth of the Borehole (m) |
|--------------|------------------------|-------------------------------|-------------------------|---------------------------------|
| <b>BH-01</b> | 4.50                   | 24.20                         | 3.50                    | 27.70                           |
| <b>BH-02</b> | 4.60                   | 24.00                         | 3.00                    | 27.00                           |
| <b>BH-03</b> | 4.50                   | 24.75                         | 2.00                    | 26.75                           |
| <b>BH-04</b> | 4.60                   | 23.80                         | 3.00                    | 26.80                           |
| <b>BH-05</b> | 4.60                   | 23.50                         | 2.00                    | 25.50                           |
| <b>BH-06</b> | 4.80                   | 23.40                         | 2.00                    | 25.40                           |
| <b>BH-07</b> | 4.80                   | 23.50                         | 2.00                    | 25.50                           |
| <b>BH-08</b> | 4.50                   | 26.00                         | 2.00                    | 28.00                           |

When considering the successive layers most common layers were recorded as follows (Figure 03-3).

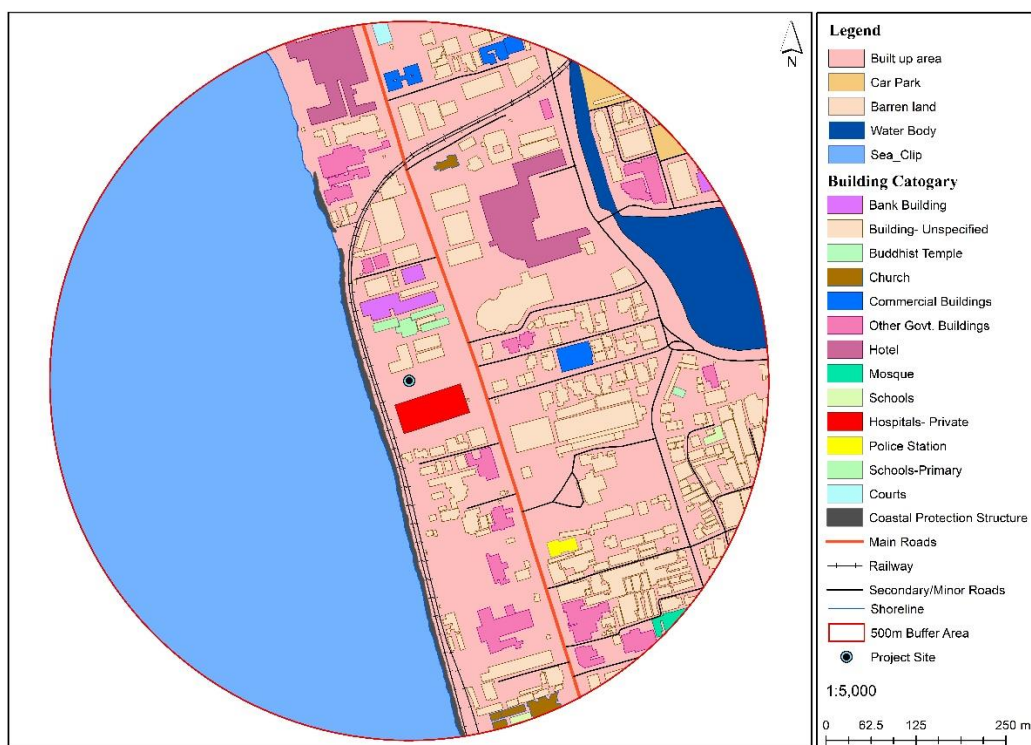


**Figure 03-3 General soil layer description of the site.**

According to the rock classification system, the most common rock type was Grade III which are moderately weathered rocks. More details are provided in the geology report.

### 3.1.3 Land Use

The land use pattern of the proposed project area is predominating with the existing building since the area is located in a mixed development area according to the UDA zoning. A digital map has been prepared through GIS (figure 03-4).



**Figure 03-4 Land use pattern of the project site.**

When it comes to green coverage/forest coverage, it is thought to be quite poor. According to the Global Forest Watch, Kollupitya has a relatively very low tree coverage of 1.7% of the total land area, and CO<sub>2</sub> emissions have grown from 2000 to 2020 to 78.0t of CO<sub>2</sub>.

According to the bellow table 03.2 and fig.03.5 more than 55% of the land use are commercial and Industrial sector while 23% recorded sea. The beach area of the proposed site is covered with revetment developed by Coast Conservation and Coastal Resources Management Department in order to protect the Southern Railway line.

The area is predominately commercial and industrial. Actually, there is no industries in the area (Table 03-2) and Figure.

Table 03-2 Land use specification

| Land use of the project area (under 500 periphery) |                         |              |             |
|----------------------------------------------------|-------------------------|--------------|-------------|
| No.                                                | Type of Land Use        | Extent Hect. | %           |
| 1                                                  | Commercial & Industrial | 0.47         | 54%         |
| 2                                                  | Sea                     | 0.2          | 23%         |
| 3                                                  | Open Land               | 0.05         | 6%          |
| 4                                                  | Residence               | 0.05         | 6%          |
| 5                                                  | Education               | 0.04         | 5%          |
| 6                                                  | Parking Place           | 0.03         | 3%          |
| 7                                                  | Rock                    | 0.02         | 2%          |
| 8                                                  | Play Ground             | 0.01         | 1%          |
| <b>Total</b>                                       |                         | <b>0.87</b>  | <b>100%</b> |

The majority of the land use in the area was covered with Commercial and Industrial, 54%, while Sea covered 23%. All other land use represents less than 10% of the total land cover (Figure 03.5).

Land use around the site can be considered predominantly commercial. Most of the office complexes and apartments are located around the site location. The development is located next to the upcoming development of Grand Hyatt Colombo.

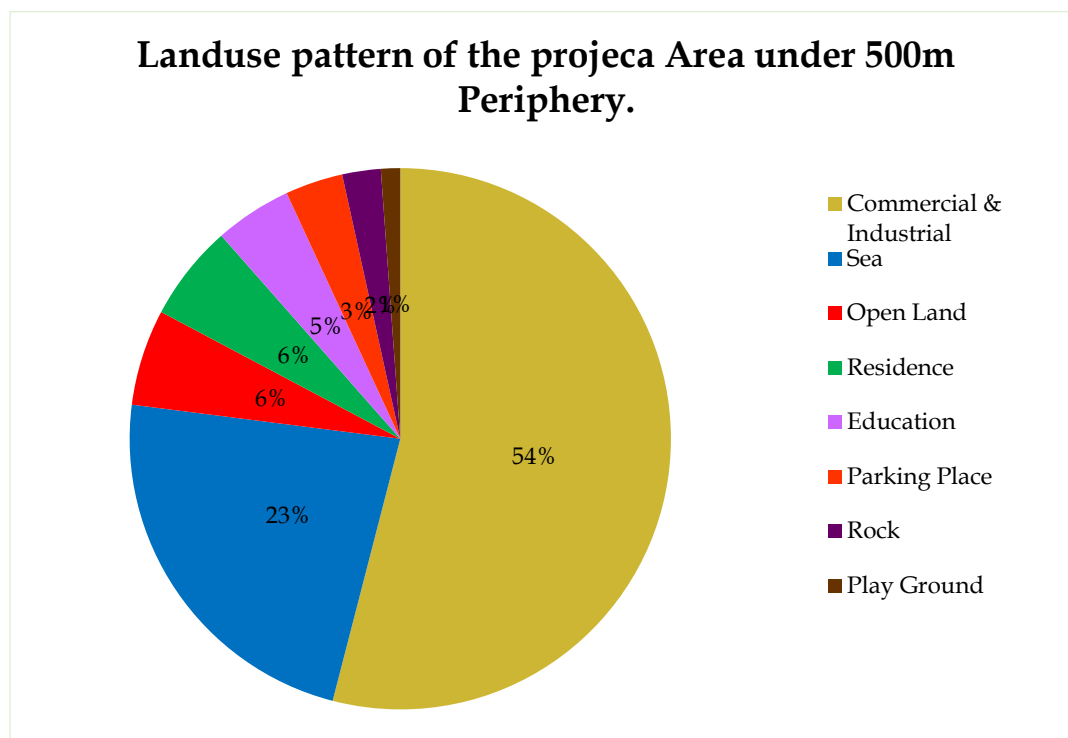


Figure 03-5 Land use percentage representation

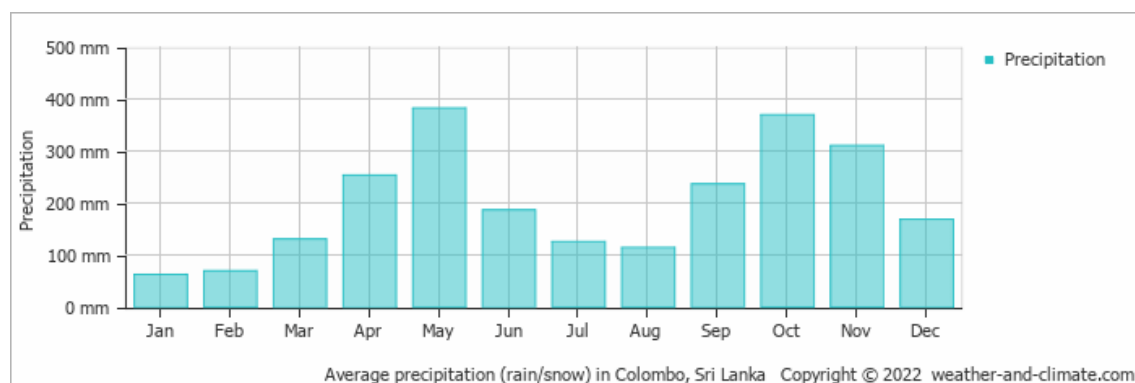
Also, blue ocean apartments 142/4 (130m), the secretariat of the governor- western province (110m), Samsung Sri Lanka branch office (150m), Spa Ceylon royal indulgence store & Spa (89m), St. Thomas' preparatory school (100m), Sugar bistro & wine bar (130m), reebok (160m), Nithya partners (190m), Department of the census and statistics (130m), Galle face, Taj hotel

(110m), Police station Kollupitiya (290m), Temple trees- Prime minister residence (170m), Colombo swimming club (200m), United States Embassy in Sri Lanka (350m), Kollupitiya market (650m), Liberty plaza (750m), Kollupitiya bus station (700m), Crescat residencies (850m), Monarch apartments (140m), Seylan Bank - Head Office / Millennium Branch (94m), Sri Lanka Tourism Promotion Bureau (160m), Cinnamon Grand Colombo (210m), Deutsche Bank (140m), are located within 1km boundary area.

As per the Colombo Commercial City development plan (2019-2030), the proposed projects coming under Kollupitiya Nodal Development will be carried out under the proposed Kollupitiya Junction Guide Plan. Also, Kollupitiya bus station road is identified as a promotion of Gateway Boulevards.

### 3.1.4 Hydrology

Sri Lanka can be divided into three main climate zones based on the pattern of rainfalls received. These zones are referred to as the Wet Zone (Usually over 2,000 mm annual rainfall), the Intermediate Zone, and the Dry Zone (below 1500 mm rainfall) in general. Rainfall on the island mainly occurs during the Southwest and Northeast Monsoons and the Inter-Monsoons get rain in between main seasons. The study area falls into the Wet Zone, where annual rainfall is over 2000 mm. The highest rainfalls occur from May to November and are on average around 400mm. In the month of January and February, the mean monthly rainfall is below 100mm. The temperature variation through the year is minimal being within the range of 22 to 32 C0. The lowest temperatures are recorded during the months of January and February (Figure 03-6).



**Figure 03-6 Rainfall pattern of Colombo district.**

#### i. Any surface water bodies in the study area

The proposed site is located in Kollupitiya, Colombo 03, Geographical location is 6°54'27.90"N, 79°51'3.90"E The site is located landward to the Galle road and there is no significant water bodies or natural water drain system visible in the area.

ii. Surface drainage pattern of the area.

The proposed site is located away from the beach but slopes are towards the beach and do not experience any surface drainage problems under normal rainfalls conditions. The surface drainage pattern is towards the coast and located westward to the site

iii. Surface water quality.

The proposed land is located in a highly developed area where surface water samples are not available. The area is fully covered by the water supply of NWS&DB. The nearest water body is Sea on the West, and Bere Lake is located 182m to the North of the site. The proposed apartment complex does not discharge any wastewater to the open water bodies or areas.

### **3.1.5 Noise Inventory of existing noise sources and noise levels**

#### **Inventory of Existing Noise and Ambient Noise Levels**

A noise level measurement was carried out in order to calculate the existing noise levels of the site in accordance with the methods laid down in International Organization for Standardization (ISO) 1996 and BS 4142; 2014, as stipulated in National Environmental Noise Control Regulations stipulated under the Extraordinary Gazette No.924/12 dated May 23, 1996. Comprehensive Noise and Dust measurement

The noise levels were measured by measuring the equivalent continuous A-weighted sound pressure level (LAeq, T) was measured for a period of T (01 hour) with the integrated time of one (01) second in the fast selection of the meter.

Noise Levels were measured by the Sound Level meter RION NL-42 Class 02. GPS coordinates of required Points and distances were taken by using Triton MAGELLAN Pro 10 GPS. The daytime baseline noise level measurements were carried out at the selected locations between 0900 hrs. to 1600 hrs. on 16th March 2022. The main objective of this Noise level measurement was to measure the condition of Noise levels before the construction starts.

Baseline Noise test is performed during day time at the Boundary of the Proposed site land.

08 Locations were selected to measure the Baseline Noise levels. The location description is given in the table below (Table 03-3).

Table 03-3 Noise levels sampling points its values.

| Measured Locations<br>(See Annexure) | GPS<br>Coordinates |        | Measured Baseline<br>Noise Level<br>LAeq, T (dB(A)) |
|--------------------------------------|--------------------|--------|-----------------------------------------------------|
|                                      | E                  | N      |                                                     |
| A                                    | 097615             | 190761 | 58                                                  |
| B                                    | 097620             | 190742 | 55                                                  |
| C                                    | 097641             | 190753 | 58                                                  |
| D                                    | 097660             | 190754 | 56                                                  |
| E                                    | 097684             | 190765 | 67                                                  |
| F                                    | 097680             | 190779 | 67                                                  |
| G                                    | 097655             | 190773 | 61                                                  |
| H                                    | 097634             | 190767 | 64                                                  |

Daytime Baseline Noise test is performed at the boundary of the locations A, B, C, D, E, F, G & H.

- Baseline TSPM Measurement is performed at the center of the proposed project land.
- The boundary of the land & the required noise level measuring locations along the boundary were notified by a Representative from the Project proponent.

Comprehensive Noise level assessment carried out by the GSMB Technical Services (Pvt)., Ltd (Annex VI.h).

### 3.1.6 Air Quality

The air quality of Colombo district has been subjected to various changes and within the past two decades, the condition of the air quality has become a health problem. According to NBRO the air quality of Colombo is given a fair status but it will affect on high sensory people.

Table 03-4 Air quality levels sampling points.

| Location | GPS Coordinates |        |
|----------|-----------------|--------|
|          | E               | N      |
| A        | 097615          | 190761 |
| B        | 097620          | 190742 |
| C        | 097641          | 190753 |
| D        | 097660          | 190754 |
| E        | 097684          | 190765 |
| F        | 097680          | 190779 |
| G        | 097655          | 190773 |
| H        | 097634          | 190767 |

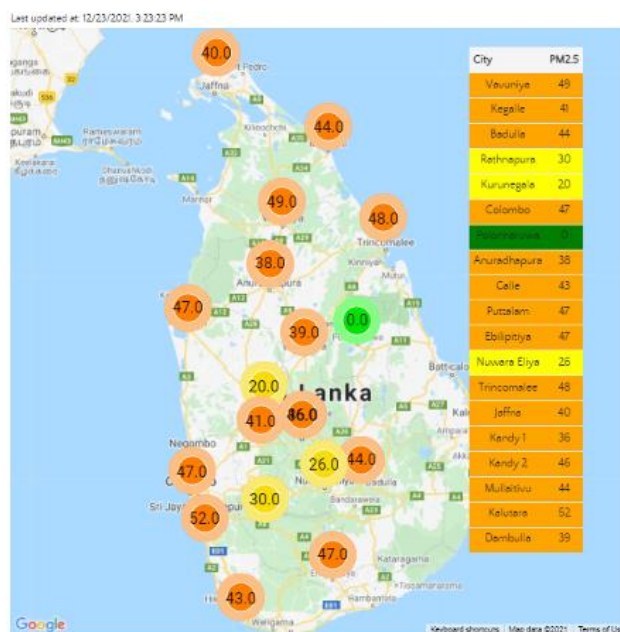


Figure 03-7 Air quality index as per NBRO

Measurement of the Total suspended Particular matter was executed in order to check the air quality of the site (Annex VI.h) noise & dust level report). The results were as follows (Table03-5).

Table 03-5 TSPM results.

| Sampling location GPS coordinates | Sampling Period        | Time Average | TSPM Concentration ( $\mu\text{g}/\text{m}$ ) |
|-----------------------------------|------------------------|--------------|-----------------------------------------------|
| 097633 E<br>190757 N              | 9.30 a.m. to 12. 30p.m | 03 hrs.      | 72                                            |

## 3.2 Coastal Features

### i. Coastal Features including beach profile.

The proposed land is located in the coastal segment of Colombo Galle face to Wellawatta Bridge Railway Station Coastal segments, almost 4.75 k.m (4750m), where the coastal setback is 35m, 10m +15m, for residence and commercial. The following images witness that the area is heavily involved in coastal protection projects and the site is fully protected by revetment built by the CC & CRMD to prevent coastal erosion existing in the area. The coastline extends from the Sea outlet that falls off the Wellawatta Canal to the location of the proposed site (located 4.25 km to the South, 4250m) (figure 03-8). Galle Face Hotel (Approximately 3km). The project site is located 35m from the revetment, which is almost covered with Coastal Borders. According to the CZMP of 2018 the area has been recognized as a low-risk area in consideration of the coastal erosion impacts.



**Figure 03-8 Coastal line in the vicinity of the project site**

Source: google image.

The coastal stretch is fully protected and undergoing massive landfilling under the Colombo Port expansion project. Figures 03-9 and 03-10



**Figure 03-9 Coastal feature of the beach in front of the project location**



**Figure 03-10 Revetment at the front of the proposed development project.**

(Source: Google image).

## ii. Relevant Oceanographic Conditions in the study area.

The nearshore region in the area is mainly exposed to South West Monsoon sea wave during the period of May to September and the persistent swell from the South throughout the year. In addition, it is also exposed to the refracted northeast monsoonal sea waves approaching from the Northwest direction. A reef formation exists close (Approximately 100-125m) and parallel to the coastline in the study area. Wave breaking at the reef is evident, mainly during the Southwest Monsoon as indicated in Figure 03-11 shows the aerial photo of the beach behavior in the monsoon period and calm season (Figure 03-11).

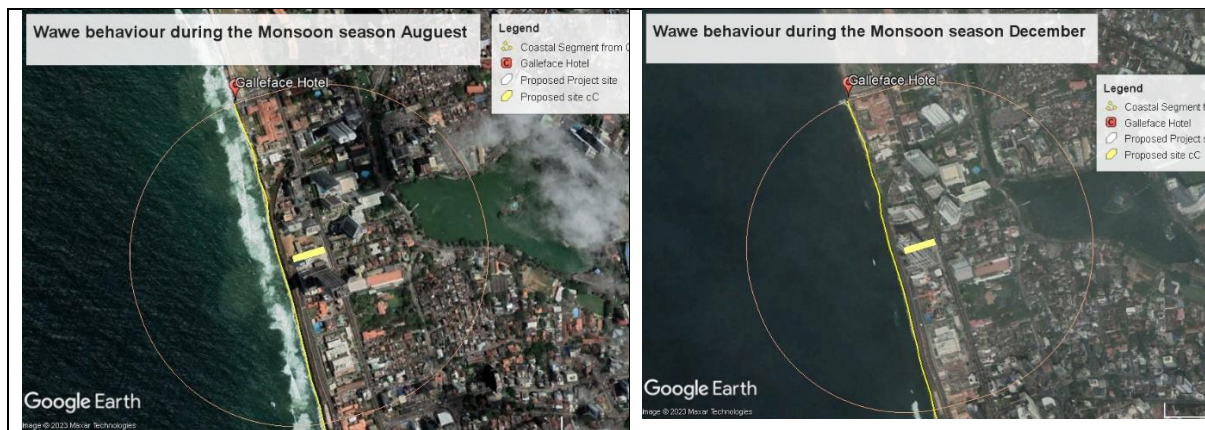


Figure 03-11 Wave and tidal effects in the monsoon and calm season in the area.

Source: Google image

The tides in the study area on the Western Coast of Sri Lanka are mixed, predominately semi-diurnal with pronounced diurnal inequality. A mean high Water (spring) Tide level of 0.7m above the datum and a Mean High Water (Neap) Tidal Level of 0.5 m are given in the Hydrographic Chart for the area.

It is also indicated in the Hydrographic Chart for the area that the currents are subject to large changes in speed and direction during the course of the year, due to the seasonal reversals of the Monsoonal system of wind.

## iii. Sea Erosion Records in the area

The area has been protected by permanent rocks and erosion has been able to manage in the area. This is mainly to protect the railway line that falls along the beach.

## iv. Existing Coastal Protection Measures were taken by the CC & CRMD

The rock revetment along with the coastline is the main form of coastal protection in the area. In view of the proximity of the southern railway to the coast. Even minor seasonal variations in the coastline would lead to severe adverse consequences. Partial protection of the site is also provided by the reef formation in the nearshore area.

The project area lies in the low-intensity zone of cyclone/extreme events. However, the historical records show that after coastal protection is done no erosion has been recorded.

### 3.3 Details of Disaster and their Frequency

The site is located towards the sea side of Galle Road but landwards to the existing railway line and proposed Marine Drive. The area is not exposed to any type of natural disaster. No major natural disasters have affected the project site or the surrounding areas in the recent past apart from Ocean Tsunami in 2004, which also not affected much compared to other areas of the country.

Flooding has occurred in the Colombo Metropolitan Area several times in the recent past, notably in 2010 and May 2016. Intense rainfall coupled with the obstruction of the flow of rainwater to drainage systems, ditches, and canals by garbage and unauthorized constructions on the sides of the canals has been identified as possible reasons. However, no flooding was recorded in the project site or the surrounding areas. The area is not exposed to any significant disasters but lightning and Thunder along with cyclones may be the main disaster that can be expected in general. Since the land is located away from the Coastal Zone (300m landwards) there is little possibility to have an impact on Tsunami. So, the proposed site is not exposed to any significant disasters.

The project area lies in the low-intensity zone of cyclonic/extreme wind-related events. However, according to the historical records, a few cyclones have passed the project area (Lightning could also be a potential hazard) (Figure03-12)

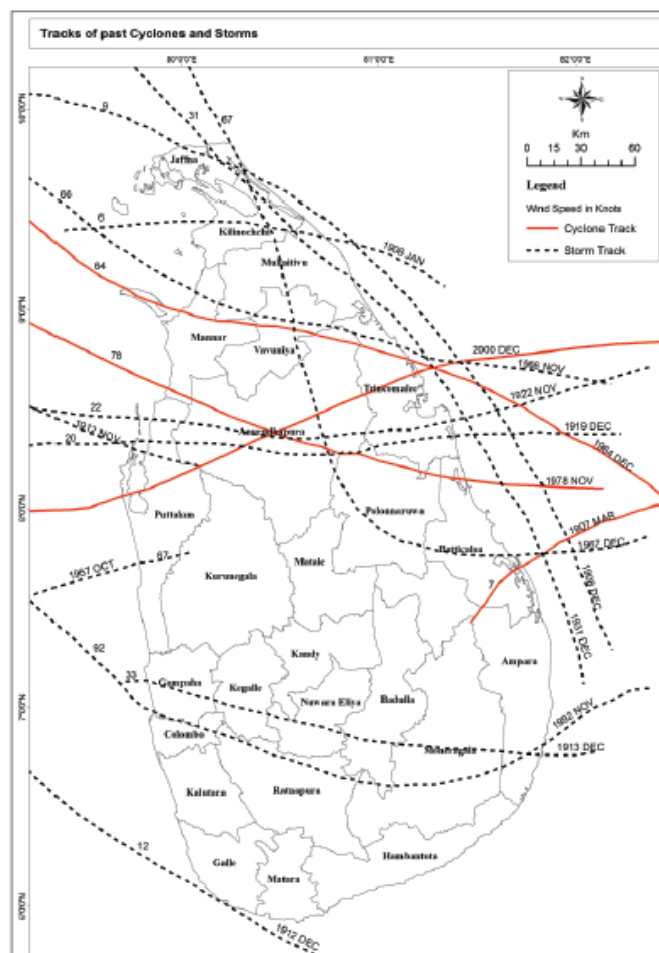


Figure 03-12 Tracks of past cyclones

### 3.4 Ecological Resources

The ecological assessment was carried out for the project site and the surrounding area in a 500m radius. Marine, beach, and terrestrial ecosystems were highlighted. There were very limited numbers of floral species recorded since the area is highly populated and built up. Introduced floral species for gardening and landscaping are comparatively high in the study area.

During this rapid assessment event, the Visual Encounter Survey (VES) method was used to document fauna and flora in different habitat types. There are three standard sampling designs for visual encounter surveys: opportunistic or randomized walk transects, or a quadrat design (Crump and Scott, 1994), and the present survey was carried out through opportunistic or randomized walks in different uniform vegetation blocks. Visual encounter surveys can determine species richness; be applied in long-term monitoring projects; provide information for the compilation of a species list; and provide data used to estimate the proportion of the area surveyed that is occupied by target species. Photographic records were made to identify fewer familiar plants and animals, and standard taxonomic keys and other scientific literature mentioned in the list of references were used in the process of species identification. Enumeration of trees, tree saplings, and tree seedlings vulnerable to clearance was done through direct measurements and counting within areas earmarked for clearance.

#### Flora of the Project Area

At the time of the study conducted the project site was a bare land with a very limited number of home garden floral species. It could be observed limited numbers of native species within the study area. Home garden species and introduced ornamental plant species dominant in the area. There was almost no greenery in the beach area included in the study area of the project.

The flora within the study area of 500m from the proposed site and immediate surroundings were surveyed and identified 41 plant species. The beachfront natural vegetation was disturbed by the many development activities, railway track and roads, several patches of *Ipomoea pes-caprae* (Bimthamburu), *Scaevola taccada* (Thakkada), *Pandanus odorifer* (Wetekeiya) and several plants of *Terminalia catappa* (Kottamba) could be identified. As there were many building within the study area there were very limited number of terrestrial plants, most of them were home garden species, *Cocos nucifera* (Pol), *Mangifera indica* (Amba), *Psidium guajava* (Pera), *Artocarpus heterophyllus* (Kos). As a sub category of terrestrial plant, it could be listed the undergrowth vegetation such as creepers/ diffused herbs, grass species of the site, *Vernonia cinerea* (Monarakudumbiya), *Aerva lanata* (Polpala), *Acalypha indica* (Kuppamenia). None of the plants observed were endemic or threatened. Table 3.6 gives the list of plants observed on the site.

## Floral Species Recorded from the study area

Table 03-6 Floral Species Observed, Conservation Status and Commercial Values

| Family         | Scientific Name                             | Common Name    | NCS | Commercial Values |
|----------------|---------------------------------------------|----------------|-----|-------------------|
| Amaranthaceae  | <i>Achyranthes aspera</i> L.                | Karalsebo      | LC  |                   |
| Amaranthaceae  | <i>Aerva lanata</i> (L.) Juss. Ex Schult.   | Polpala        | LC  |                   |
| Amaranthaceae  | <i>Amaranthus viridis</i> L.                | Kurathampala   | LC  | Edible            |
| Anacardiaceae  | <i>Mangifera indica</i> L.                  | Amba           | NE  |                   |
| Apocynaceae    | <i>Plumeria rubra</i>                       | Araliya        | LC  |                   |
| Arecaceae      | <i>Cocos nucifera</i> L.                    | Coconut        | NE  | Edible products   |
| Asteraceae     | <i>Emilia sonchifolia</i> (L.) DC.          | Kadupahara     | LC  |                   |
| Calophyllaceae | <i>Mesua ferrea</i> L.                      | Naa            | LC  | Timber            |
| Caricaceae     | <i>Carica papaya</i> L.                     | Pepol          | NE  | Fruit             |
| Convolvulaceae | <i>Ipomoea pes-caprae</i>                   | Bimthamburu    |     |                   |
| Combretaceae   | <i>Terminalia catappa</i> L.                | Kottamba       | NE  |                   |
| Costaceae      | <i>Costus speciosus</i> (Koenig) Smith      | Thebu          | LC  |                   |
| Compositae     | <i>Tridax procumbens</i> L.                 | Tridax         | NE  |                   |
| Cyperaceae     | <i>Cyperus rotundus</i> L.                  | Kalanduru      | LC  |                   |
| Euphorbiaceae  | <i>Acalypha indica</i> L.                   | Kuppameniya    | LC  |                   |
| Euphorbiaceae  | <i>Ricinus communis</i> L.                  | Edaru          | NE  |                   |
| Fabaceae       | <i>Clitoria ternatea</i> L.                 | Katarodu       | LC  |                   |
| Fabaceae       | <i>Desmodium heterophyllum</i> (Willd.) DC. | Undupiyali     | LC  |                   |
| Fabaceae       | <i>Desmodium triflorum</i> (L.) DC.         | Mahaundupiyali | LC  |                   |
| Fabaceae       | <i>Mimosa pudica</i> L.                     | Nidikumba      | NE  |                   |
| Goodeniaceae   | <i>Scaevola taccada</i>                     | Takkada        |     |                   |
| Malvaceae      | <i>Hibiscus rosa-sinensis</i> L.            | wada           | NE  |                   |
| Moraceae       | <i>Artocarpus heterophyllus</i> Lam.        | Kos            | NE  | Edible products   |
| Moraceae       | <i>Ficus religiosa</i>                      | Bo             | NE  |                   |
| Moraceae       | <i>Ficus racemosa</i> L.                    | Atikka         | LC  |                   |
| Myrtaceae      | <i>Psidium guajava</i> L.                   | Pera           | NE  | Fruit             |
| Musaceae       | <i>Musa x paradisiaca</i> L.                | Kesel          | NE  | Fruit             |
| Pandanaceae    | <i>Pandanus odoratissimus</i>               | Wetakeiya      |     |                   |
| Poaceae        | <i>Chrysopogon aciculatus</i> (Retz.) Trin. | Thuththiri     | LC  |                   |

|             |                                               |               |    |              |
|-------------|-----------------------------------------------|---------------|----|--------------|
| Poaceae     | <i>Eleusine indica</i> (L.) Gaertn.           | Belathana     | LC |              |
| Poaceae     | <i>Axonopus compressus</i> (Sw.) P. Beauv.    | Lamasooriya   | NE |              |
| Poaceae     | <i>Bambusa vulgaris</i> Schrader ex Wendl.    | Una           | LC | Minor timber |
| Poaceae     | <i>Panicum maximum</i> Jacq.                  | Ratathanakola | NE |              |
| Rubiaceae   | <i>Ixora coccinea</i> L.                      | Rathmal       | LC |              |
| Sapindaceae | <i>Cardiospermum halicacabum</i> L.           | Penela        | LC |              |
| Sapindaceae | <i>Filicium decipiens</i> (Wight & Arn.) Thw. | Pihimbiya     | LC |              |
| Tiliaceae   | <i>Muntingia calabura</i> L.                  | Jam           | NE |              |
| Verbanaceae | <i>Tectona grandis</i>                        | Tekka         | NE | Timber       |
| Verbenaceae | <i>Stachytarpheta jamaicensis</i> (L.) Vahl   | Balunaguta    | NE |              |
| Verbenaceae | <i>Duranta erecta</i> L.                      |               | NE |              |

### Faunal Species Recorded from the study area

#### Inland Species

A total number of 40 land fauna species (20 Birds, 2 Dragonflies, 8 Butterflies, 5 Mammals, 4 Reptiles, and 1 Amphibian) and there were no endemic or threatened animal species were recorded among them. According to the fauna species recorded they are not unique or restricted to the project area. The species were recorded during the rapid screening survey and it's listed in the following tables (Table 03.7-12). There were no threatened species were identified according to the Red list 2012.

**Table 03-7 Summary of Faunal Species Recorded**

| Faunal Group | Total Number of Species | Endemic Species | Threatened Species |
|--------------|-------------------------|-----------------|--------------------|
| Birds        | 20                      | -               | -                  |
| Butterfly    | 8                       | -               | -                  |
| Dragonfly    | 2                       | -               | -                  |
| Mammals      | 5                       | -               | -                  |
| Reptiles     | 4                       | -               | -                  |
| Amphibians   | 1                       | -               | -                  |
| <b>Total</b> | <b>40</b>               | <b>-</b>        | <b>-</b>           |

**Table 03-8 Birds Species**

| Family   | Species                             | Common Name       | Presence Status | Conservation Status |
|----------|-------------------------------------|-------------------|-----------------|---------------------|
| Ardeidae | <i>Ardeola grayii</i> (Sykes, 1832) | Indian Pond-heron | BR              | LC                  |

|               |                                                 |                           |        |    |
|---------------|-------------------------------------------------|---------------------------|--------|----|
| Ardeidae      | <i>Bubulcus ibis</i><br>(Linnaeus, 1758)        | Cattle Egret              | BR     | LC |
| Ardeidae      | <i>Egretta garzetta</i><br>(Linnaeus, 1766)     | Little Egret              | BR     | LC |
| Accipitridae  | <i>Haliastur indus</i><br>(Boddaert, 1783)      | Brahminy Kite             | BR     | LC |
| Accipitridae  | <i>Accipiter badius</i><br>(Gmelin, 1788)       | Shikra                    | BR     | LC |
| Scolopacidae  | <i>Actitis hypoleucos</i><br>Linnaeus, 1758     | Common Sandpiper          | M      | LC |
| Columbidae    | <i>Spilopelia suratensis</i><br>(Gmelin, 1789)  | Western Spotted Dove      | BR     | LC |
| Psittacidae   | <i>Psittacula krameri</i><br>(Scopoli, 1769)    | Rose-ringed Parakeet      | BR     | LC |
| Cuculidae     | <i>Eudynamis scolopacea</i><br>(Linnaeus, 1758) | Western Koel              | BR     | LC |
| Strigidae     | <i>Otus bakkamoena</i><br>Pennant, 1769         | Collared Scops-owl        | BR     | LC |
| Alcedinidae   | <i>Halcyon smyrnensis</i><br>(Linnaeus, 1758)   | White-throated Kingfisher | BR     | LC |
| Meropidae     | <i>Merops philippinus</i><br>Linnaeus, 1766     | Blue-tailed Bee-eater     | BR & M | CR |
| Corvidae      | <i>Corvus splendens</i><br>Vieillot, 1817       | House Crow                | BR     | LC |
| Hirundinidae  | <i>Hirundo rustica</i><br>Linnaeus, 1758        | Barn Swallow              | M      | LC |
| Pycnonotidae  | <i>Pycnonotus cafer</i><br>(Linnaeus, 1766)     | Red-vented Bulbul         | BR     | LC |
| Sylviidae     | <i>Orthotomus sutorius</i><br>(Pennant, 1769)   | Common Tailorbird         | BR     | LC |
| Timaliidae    | <i>Turdoides affinis</i><br>(Jerdon, 1845)      | Yellow-billed Babbler     | BR     | LC |
| Sturnidae     | <i>Acridotheres tristis</i><br>(Linnaeus, 1766) | Common Myna               | BR     | LC |
| Nectariniidae | <i>Nectarinia zeylonica</i><br>(Linnaeus, 1766) | Purple-rumped Sunbird     | BR     | LC |
| Passeridae    | <i>Passer domesticus</i><br>(Linnaeus, 1758)    | House Sparrow             | BR     | LC |

Table 03-9 Dragonflies

| Family       | Scientific Name             | Common Name   | Status | NCS-2012 |
|--------------|-----------------------------|---------------|--------|----------|
| Libellulidae | <i>Orthetrum sabina</i>     | Green Skimmer | R      | LC       |
| Libellulidae | <i>Diplacodes trivialis</i> | Blue Percher  | R      | LC       |

**Table 03-10 Mammals species****Table 03-10**

| Family   | Scientific Name            | Common Name      | Status | NCS-2012 |
|----------|----------------------------|------------------|--------|----------|
| Scuridae | <i>Funambulus palmarum</i> | Palm Squirrel    | BR     | LC       |
| Muridae  | <i>Rattus rattus</i>       | Common House Rat | I      | LC       |
| Muridae  | <i>Rattus norvegicus</i>   | Brown Rat        | I      | NE       |
| Canidae  | <i>Canis familiaris</i>    | Domestic Dog     | I      | NE       |
| Felidae  | <i>Felis catus</i>         | Domestic Cat     | I      | NE       |

**Table 03-11 Reptiles species**

| Family     | Scientific Name                             | Common Name          | Presence Status | Conservation Status |
|------------|---------------------------------------------|----------------------|-----------------|---------------------|
| Agamidae   | <i>Calotes versicolor</i> (Doudin, 1802)    | Garden Lizard        | BR              | LC                  |
| Gekkonidae | <i>Gehyra mutilata</i> (Wiegmann, 1834)     | Four-clawed Gecko    | BR              | LC                  |
| Gekkonidae | <i>Hemidactylus frenatus</i> Schlegel, 1836 | Asian House Gecko    | BR              | LC                  |
| Colubridae | <i>Ptyas mucosa</i> (Linnaeus, 1758)        | Sri Lankan Rat Snake | BR              | LC                  |

**Table 03-12 Amphibians species**

| Family    | Scientific Name                                   | Common Name | Presence Status | Conservation Status |
|-----------|---------------------------------------------------|-------------|-----------------|---------------------|
| Bufonidae | <i>Duttaphrynus melanostictus</i> Schneider, 1799 | Common toad | BR              | LC                  |

**Marine species**

During this rapid assessment event, field sampling techniques, direct observation methods, literature surveys and interviews by fisherman were used to document fauna in different habitat types such as rocky shore environment, intertidal zone, and shallow marine habitat (Table 03-13-16).

**Table 03-13 Fish species**

| Family       | Scientific Name            | Common Name            | Commercial Importance |
|--------------|----------------------------|------------------------|-----------------------|
| Siganidae    | <i>Siganus lineatus</i>    | Golden-lined spinefoot | Food source           |
| Siganidae    | <i>Siganus javus</i>       | Streaked spinefoot     | Food source           |
| Sphyraenidae | <i>Sphyraena jello</i>     | Pickhandle barracuda   | Food source           |
| Sphyraenidae | <i>Sphyraena barracuda</i> | Great barracuda        | Food source           |

|               |                                |                                 |             |
|---------------|--------------------------------|---------------------------------|-------------|
| Haemulidae    | <i>Plectrohinchus vittatus</i> | Indian Ocean oriental sweetlips |             |
| Gerreidae     | <i>Gerres acinaces</i>         | Smallscale Pursemouth           |             |
| Hemiramphidae | <i>Hyporhamphus dussumieri</i> | Dussumier's halfbeak            |             |
| Hemiramphidae | <i>Hyporhamphus limbatus</i>   | Congaturi Halfbeak              | Food source |
| Engraulidae   | <i>Stolephorus indicus</i>     | Indian anchovy                  |             |
| Engraulidae   | <i>Stolephorus bataviensis</i> | Spotfaced anchovy               |             |
| Scorpaenidae  | <i>Pterois volitans</i>        | Red lionfish                    |             |

Table 03-14 Mollusk species

| Family            | Scientific Name                 | Common Name   | Commercial Importance |
|-------------------|---------------------------------|---------------|-----------------------|
| <u>Mytilidae</u>  | <i>Perna viridis</i>            | Green mussel  | None                  |
| Arcidae           | <i>Arca boucardi</i>            |               | -do-                  |
| Architectonicidae | <i>Architectonica laevigata</i> |               | -do-                  |
| Cypraeidae        | <i>Erronea erronea</i>          |               | -do-                  |
| Ostreidae         | <i>Saccostrea cucullata</i>     | Hooded oyster | -do-                  |
| Arcidae           | <i>Barbatia bicolorata</i>      |               | -do-                  |

Table 03-15 Crab Species

| Family         | Scientific Name                | Common Name        | Commercial Importance |
|----------------|--------------------------------|--------------------|-----------------------|
| Portunidae     | <i>Portunus pelagicus</i>      | Flower crab        | None                  |
| Carangidae     | <i>Carangoides gymnotethus</i> | Jack, Trevallies   | Food source           |
| Tetraodontidae | <i>Arothron meleagris</i>      | Guinea fowl puffer | Food source           |

Table 03-16 Summary of Marine Faunal Species Recorded

| Faunal Group | Total Number of Species | Endemic Species | Threatened Species |
|--------------|-------------------------|-----------------|--------------------|
| Fish         | 13                      | -               | -                  |
| Mollusks     | 6                       |                 |                    |
| Crabs        | 1                       | -               | -                  |
| <b>Total</b> | <b>20</b>               | <b>-</b>        | <b>-</b>           |

### 3.5 Historical and archeological significant sites

Colombo 03 begins with Galle facing south of Colombo Fort (Colombo 01). Originally a vast swamp, the Portuguese and Dutch used this piece of land as a strategic defense. It was the British who developed the Green into a leisure ground. The 19th-century paintings of John Deschamps, show the Galle-Face esplanade with a high road running through the center of it. Added later was a promenade by the sea and a driveway bordering the lake where the Dutch Military cemetery was located. Deschamps describes it as forming not only the principal exercising ground of the garrison, but also the general promenade of the inhabitants of

Colombo and its vicinity. "On foot, on horseback, or in carriages, people flocked to this salubrious setting to inhale the delicious breeze which is almost always to be found by the seaside of this part of the Island". The Galle Face esplanade or Green was established by Governor Ward in 1859. An inscription reads "in the interest of the ladies and children of Colombo ". Kollupitiya Walukarama Buddhist Temple is said to be the oldest temple in Colombo. It was founded in the 1800s by Ven. Panditha Valane Sri Siddhahatta Maha Nayake Thera, who was also the founder member of the Maha Sangha Saba of the Siyam Nikaya of the Kotte Chapter. The land for the construction of the temple was donated by a famous indigenous medicine physician of Kollupitiya, Arnolis Silva. St. Andrew s Scots Kirk founded in 1842 as a Church of Scotland by Scots living in Ceylon, has today become the International Church in Colombo welcoming into its fellowship people of all nations and denominations of the Christian faith.

Victory Silk Store was established in 1947 and is the oldest Textile shop in Kollupitiya. The founder, C Parsram, was a highly honored and respected Sindhi who had come to settle permanently in Ceylon from India in 1914.

Perera & Sons originated with K. A. Charles Perera who came to Colombo from a village called Kodagoda near Galle. He arrived in Colombo in 1888, with only 50 cents. He began his career as a cook in colonial mansions and then joined the Grand Oriental Hotel as a kitchen helper where subsequently he took up the responsibility of the hotel's bakery. Perera commenced his own bakery in 1902 by renting two houses at Steuart Place, Kollupitiya. Today Perera & Sons, are perhaps the largest bakers in the country.

Temple Trees was purchased by the Government in November 1903, for the use of the Governor and other high-ranking British government officials. After Independence was granted in 1948, it was declared the official residence of the Prime Minister. Today, it is the official residence of the President of Sri Lanka.

There are several other historic archeological valued places near Kollupitiya such as the old parliament, independence square, etc. the new proposed project does not affect any of these places and they will be of great value to the residents who living in the new premises to explore and learn the history of these resources (Figure 03-11).





Figure 03-11 Historical and archeological places near Kollupitiya.

### 3.6 Social and Economic Environment

The project's location falls in the Thibirigasyaya divisional secretariate and kollupitiya GN division. Thibirigasyaya DS is bounded by Colombo DS from the North, Orlanda Lake (Dehiwala Lake) from the South, Siri jayawardanapura Kotte DS and kolonnawa DS from the East and coastline from the West. Kollupitiya GND covers an area of 79 Ha (Figure 03-13).

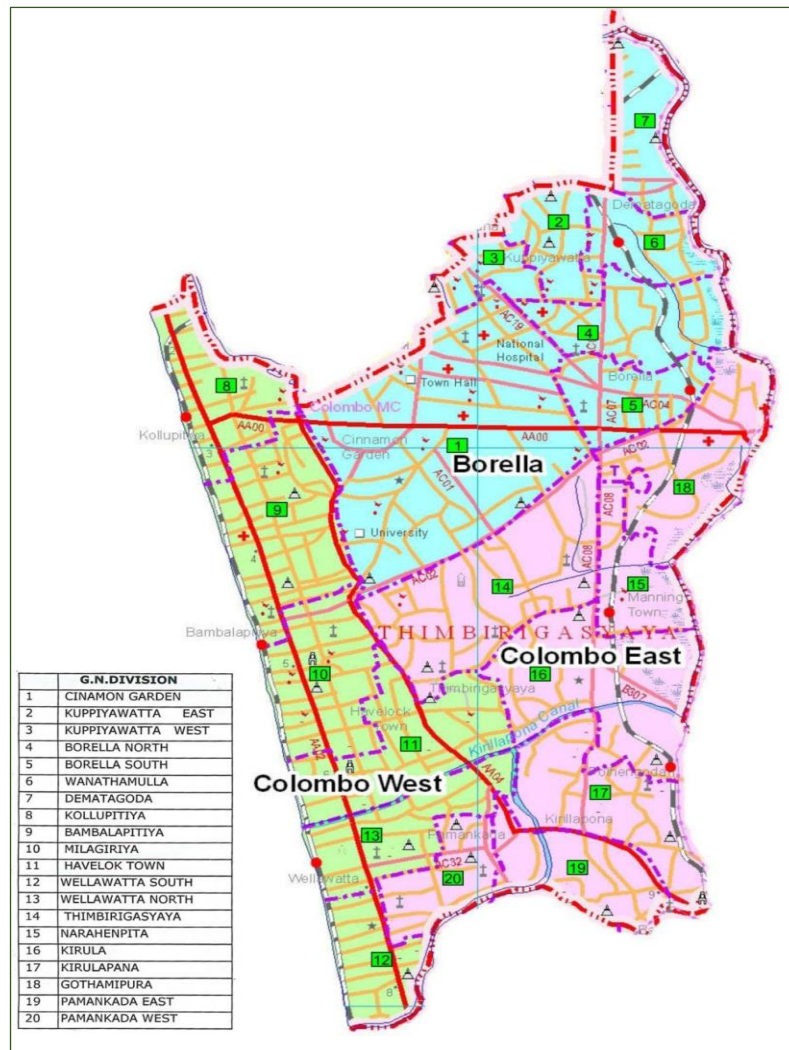


Figure 03-13 Divisional Map.

### 3.6.1. General socio-economic aspects of the study area.

#### Population.

According to the survey conducted by Thibirigasyaya DS in 2020, there is a total population of 250,683 in Thibirigasyaya DS among 62,671 families. There are 1767 families in Kollupitiya GN and the total population is 7067. Gender wise population is distributed as 3330 females and 3737 males. The following charts represent the population of Kollupitiya GN religion-wise and age-wise (Figure 03-14).

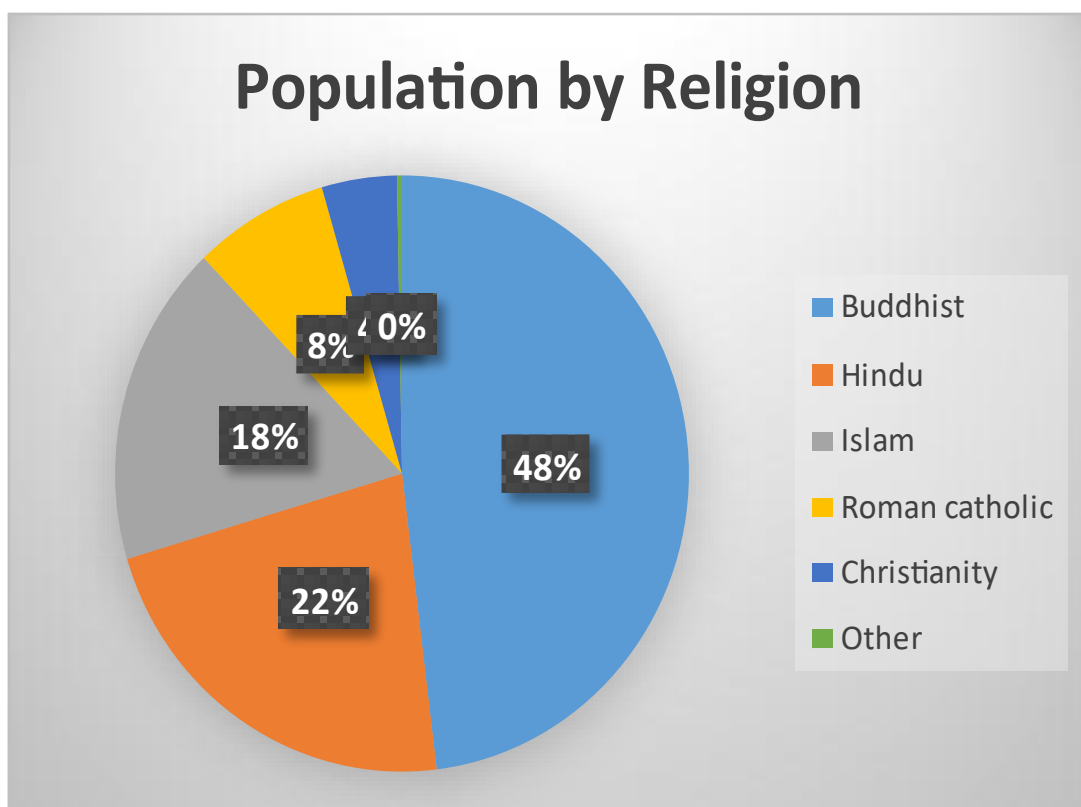


Figure 03-14 Population by religion

The age category of the population shows in the following figure 03-14 over sixty population category shows very high while 24-25 and 25-29 are at a healthy level in comparison to other categories (Figure 03-15).

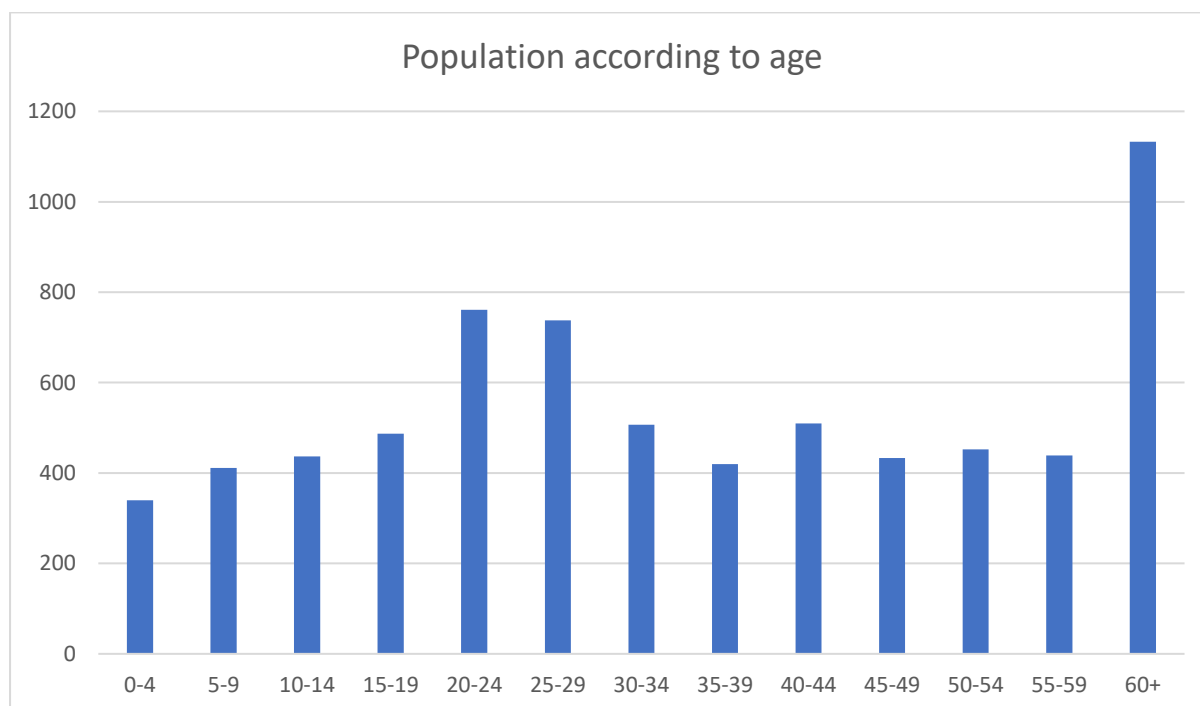


Figure 03-15 Population according to age category

### Employment Status

Kollupitiya is a highly commercial area and the competition for employment is rising daily. However, the socio-economic survey of the DSD found that there is a considerable amount of unemployment still can be seen in the Kollupitiya area. A significant factor is Female unemployment overweighs male unemployment. The following chart represents the data about the employment status of Kollupitiya (Figure 03-16).

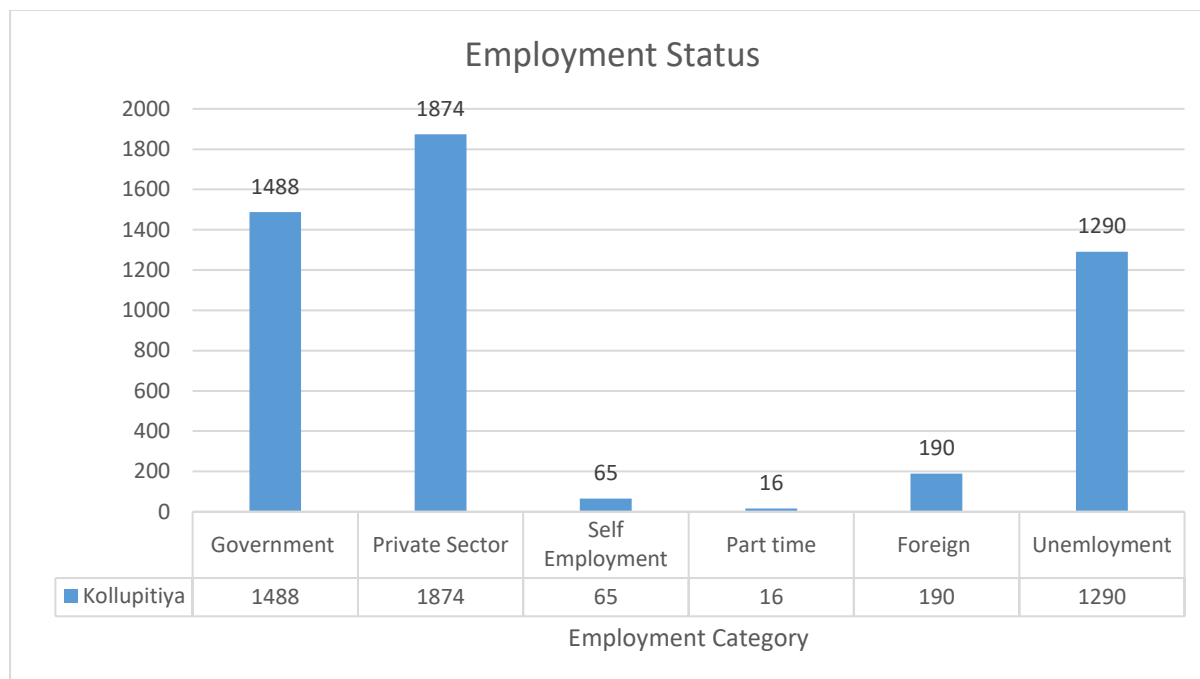


Figure 03-16 Employment statistics of Kollupitiya

### 3.6.2. Urban /commercial /residential /tourism activities.

Kollupitiya is located within the core of the Colombo metropolitan and comes within the broader definition of the Central Business District. This in fact is the best area within the core and accounts for;

- the Highest land value for both commerce and high-income residence.
- Relatively high environmental quality with ample water bodies.
- High potential for development as higher order commercial center.

### 3.6.3. Existing infrastructure facilities

Domestic demand is driven by ongoing economic development and intensified attempts to boost regional economic growth. Globalization and fast expansion in the South Asian area have raised worldwide demand for Sri Lanka's high-quality infrastructure services. Furthermore, the progressive deepening of globalization has increased demand for further

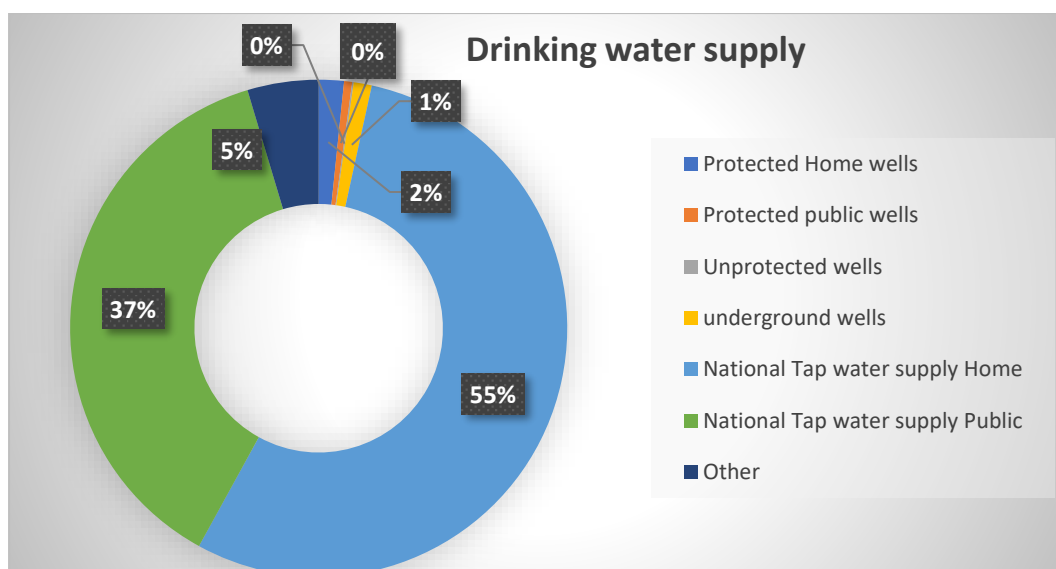
service liberalization, particularly from nations wanting broader market access for the delivery of services such as Business Process Outsourcing (BPOs), health, education, and professional services. Colombo 03 (Colpetty) is densely populated, and as part of the Colombo development project, this region is completely equipped with every infrastructural facility. Because the project location is located along Colombo's coastline line, along the Colombo Galle road, which is a popular tourist attraction, roads, health care, power, and stores are well developed and can compete with world standards. The following charts represent the existing infrastructure facilities in the area (Table 03-16).

**Table 03-17 Housing Facilities.**

| No | Division          | Quantity | With Electricity | With Water | With Telephone | Gas use | Private Vehicle | Motor cycle | Bicycle |
|----|-------------------|----------|------------------|------------|----------------|---------|-----------------|-------------|---------|
| 01 | Permanent housing | 1,602    | 1,602            | 1,602      | 700            | 1300    | 850             | 1000        | 300     |
| 02 | Temporary Houses  | 25       | 10               | 8          | -              | 4       | -               | -           | -       |
| 03 | Rentals           | 800      | 800              | 800        | 250            | 750     | 280             | 160         | 4       |
| 04 | apartments        | 220      | 220              | 220        | 220            | 220     | 195             | 120         | 25      |
| 05 | Quarters          | 3        | 3                | 3          | 3              | 3       | 3               | -           | 3       |

(Source: Sampath Ppathikada Thibirigasyaya DSD 2020)

One of the main infrastructure facilities in urban environments is the water supply, which shows that more than 87% of the water demand is supplied by the National Water Supply and Drainage Board in two ways, one is a home supply which accounts for 55% and public supply accounts for 37% while protected well account for less than 5%. All other categories become fewer values, unprotected wells and underground wells (Figure03-14).



**Figure 03-17 Drinking water Supply.**

## Road facilities

Except for Galle Road, R.A. De Mel Mawatha, St. Michael's Road, Perahera Mawatha, and Alvis Place, the region is served by a number of public roads. The Colombo Municipal Council has allocated 9.0-meter sanctioned street lines (area defined for future road enlargement on both sides of a road) to most of the tiny roads and has even sanctioned a street 9.0 meters wide from R.a.de Mel Mawatha to Hudson Road passing in front of the Buddhist Temple. The approved street lines aid in the development of the area's traffic and transit systems.

## Electricity

In terms of electricity, the area is adequately serviced by a solid network of electricity lines, however, capacity varies from area to area. Perahera Mawatha is bordered by an electrical switching station.

### 3.6.4. Socioeconomic sensitive areas – schools, hospitals, residential areas, offices, and commercial structures.

Kollupitya is a densely populated region with the necessary facilities. There are various socioeconomic sensitive locations nearby, which are shown below along with their proximity data.

**Table 03-18 Socio-Economic sensitive areas**

| Category       | Description                              | Distance |
|----------------|------------------------------------------|----------|
| Schools        | St. Thomas' preparatory school           | 100m     |
|                | Methodist College                        | 550m     |
|                | Bishops College                          | 2.2km    |
| residentials   | Cre<br>scat residencies                  | 850m     |
|                | Monarch apartments                       | 140m     |
|                | blue ocean apartments                    | 130m     |
| Hospitals      | Nawaloka Hospital PLC                    | 1.1km    |
| Hotels         | Taj Samudra hotel                        | 110      |
|                | Cinnamon Grand Colombo                   | 210      |
|                | Grand Hyatt Colombo                      | 20       |
| Shopping Malls | Reebok                                   | 160      |
|                | Crescat Boulevard                        | 250m     |
|                | Nithya partners                          | 190m     |
|                | Kollupitiya market                       | 650m     |
|                | Liberty plaza                            | 750m     |
| Recreational   | Galle face                               | 800m     |
|                | Colombo swimming club                    | 200m     |
|                | Spa Ceylon royal indulgence store & spa  | 89m      |
|                | Temple trees- Prime minister's residence | 170m     |

|                      |                                                                        |      |
|----------------------|------------------------------------------------------------------------|------|
| Government offices   | Lanka Tourism Promotion Bureau                                         | 160m |
|                      | secretariat of the governor- western province                          | 110m |
|                      | Department of Census and Statistics                                    | 130m |
|                      | Police station Kollupitiya (290m)                                      | 290m |
|                      | Ministry of Rehabilitation, Resettlement, and Hindu Religious Affairs, | 220m |
| Foreign Offices      | United States Embassy in Sri Lanka                                     | 350m |
|                      | American Center                                                        | 300m |
|                      | High Commission of India                                               | 400m |
| Private offices      | Samsung Sri Lanka branch office                                        | 150m |
| Banks                | Seylan Bank - Head Office / Millennium Branch                          | 94m  |
|                      | Deutsche Bank                                                          | 140m |
| Restaurants and bars | Sugar Bistro & wine bar                                                | 130m |

### **3.6.5. Security sensitive area close to the proposed site.**

There is no security-sensitive area near the project sites other than the Prime minister' house. Clearance from the Ministry of Defense has been obtained for this (Annex VII.h).

### **3.6.6. Existing environmental problems and issues and any social-cultural conflicts that may have bearing on the project.**

There are no significant environmental, social, or cultural issues that may have a bearing on the projects that were evident in the study area. The land is located landward to Marine Drive and West of Galle Road. The land is located in a plain area but no vegetation is visible at the site. The ecological value of the site is very low and only bare land is available currently in the area. Therefore, impacts on the environmental, social and cultural aspects is not significant.

### **3.6.7. Main economic activities in the area.**

The main economic activities in the area are Tourism sector. 80% of the income is from Hotels and Restaurants.

The area is providing tourist accommodations healthier than other GNDs. There are only 32 hotel facilities available with many other economic activities such as garments shops, retail shops, banks, and various types of business and service centers. Like fuel stations, printing shops provide labor and employment facilities to the local community.

There are two Vocational training centers located in the area, one is in Wellawatta and the other is in Narahenpita. These two agencies provide training for the youth to engage in positive employment locally as well as internationally. There are about 847 total students and 60 teachers in these two schools' 46 students in Wellawatta and 801 in Narahenpita.



## Chapter 04 : Assessment of Anticipated Environmental Impacts

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The potential environmental impacts arising from activities of the proposed development were identified based on the results of the studies conducted. A relative qualitative classification of these impacts as 'low', 'moderate' and 'high' was made mainly based on criteria such as magnitude, spatial extent, duration, reversibility, positive and negative, etc. In addition, professional opinion, referencing environmental criteria such as standards and threshold values, where applicable, were also considered in the classification.

### 4.1 Constructional Impacts

#### 4.1.1 Impacts due to Land Preparation Activities (Land Clearing, Cutting, Filling, Dredging, Piling, Levelling, Road Construction, Residue Disposal)

Land preparation activities are to be confined to the project site with no activities carried out in the areas bordering the project site.

As indicated in Figure 04-1, the project site is a complete bare land currently used as a car park. There are no existing temporary or permanent structures or any kind of vegetative area. There will be no major clearing activities on the site. Also, no relocation/resettlement of communities or production facilities would be required due to land clearing. A **low level** of impact is thus envisaged due to land clearing during the construction phase.



**Figure 04-1 Existing condition of the site.**

A gently sloping terrain exists in the site and hence no large-scale cutting and filling in the site is envisaged, except for the filling and leveling of any slight undulations, prior to the construction activities. However, excavations on the site would be required for the construction of an underground fire sump, water sump, rainwater storage tank, pile caps, and pipe and/or cable laying. Excavated soil is to be utilized for any filling/leveling to be carried

out at the site. The piles are to be of 'Bored Cast-in-Place Piles' and the 'Rotary Boring Method' is to be used. No pile driving which is likely to generate higher levels of vibrations would thus be required. In view of the close proximity of densely built-up areas, a possibility exists for adverse impacts associated with vibrations and noise due to piling operations. The impact due to piling can thus be rated as '**High**' during the construction phase. The impacts due to cutting, filling, and leveling can thus be rated as **Moderate** during the construction phase.

The project site is directly accessible from the Colombo-Galle Road and no new road construction would be required. **No impact** related to road construction is thus envisaged during the construction phase.

The residue from the cleared areas is to be removed from the project site. In view of the absence of any large buildings to be demolished and dense vegetation to be removed, no large quantities of residue are envisaged. As there is no adequate space in the site, the debris/residue is to be removed by the contractor(s) appointed for the proposed development and disposed of at sites approved by the Local Authority of the area of disposal. The required approvals for the transport and disposal of such materials are to be obtained from relevant authorities by the contractor(s) prior to such activities. In view of these considerations, the impacts due to the disposal of residue can be rated as **low** during the construction phase.

## **4.1.2 Impacts on Natural Drainage Pattern and Hydrology of the Study Area**

### **4.1.2.1 Impacts on Existing Drainage Pattern**

No permanent drainage paths from the surrounding areas pass through the project site. Also, no rainwater drainage lines or sewer lines are located throughout the project site. No major changes in drainage patterns will thus be caused by the proposed constructions. Prior to the proposed development, the project site was mainly a built-up/paved area and thus no significant increase in the quantity of surface runoff from the project site is envisaged. The impact on the existing drainage patterns and hydrology of the area can thus be rated as '**Low**' during the construction phase.

### **4.1.2.2 Soil Erosion/Siltation etc.**

In view of the flat/gently sloping terrain in the project site, no significant soil erosion is envisaged. If necessary, a surface water drainage system with silt traps is to be put in place to facilitate drainage and reduce soil erosion. The impacts associated with soil erosion and siltation can thus be rated as 'Low' during the construction phase.

During the excavations, the dewatering process will take place as according to the geotechnical report excavations will be below 4 m where the groundwater exists. When releasing the collected groundwater, it should be according to relevant local authorities' laws and regulations and environmental consciences. Even though the project site is directly near the sea, because of the railway tracks a direct pump cannot be sent outwards to the sea. When

releasing a large amount of water into the sea it will lead to soil erosion. From that perspective, the impact will be rated as “High”.

#### **4.1.2.3 Impacts on Water Quality (ground/surface) due to wastewater discharge/ solid waste disposal.**

When considering the water bodies available in the project site, there will be no surface water bodies. Therefore, the impact on surface water bodies will be Low. Also, there are no available groundwater resources. In view of the solid waste disposal methods to be adopted during the construction phase, as presented in Section 2.3.2 the resulting impact on water quality can be rated as 'Low' during the construction phase.

Wastewater generation during the construction periods will mainly be sewage, water used by the workforce, and wastewater generated from construction-related activities. The generation of construction wastewater can be reduced by avoiding the washing/leaning of vehicles at the site. Temporary pits and water-sealed latrines with septic tanks will be provided at the site for the disposal of water used by the workforce and sewage. These will be constructed sufficiently away from the coast, other water bodies, and site boundaries. Wastewater from construction sites will be directed to sedimentation tanks and once settled, the supernatant can be recycled for construction purposes.

#### **4.1.3 Impacts on Fauna and Flora of the Study Area**

There is no natural vegetation or habitats present in the area. Many of the floral species in the project site are common species used for landscaping purposes with a very low level of biodiversity. Also, only the common faunal species adapted to live in an urban environment inhabit the project site and the study area. Although the noise, vibration, dust, and lighting (at night) due to construction activities will temporally disturb the ecological environment of the study area, such disturbances will be naturalized soon after such activities. In view of these considerations, a low level of impact on existing natural habitats/ecosystems is envisaged during the construction phase.

#### **4.1.4 Impacts on neighboring schools, residents/commercial and other types of buildings.**

According to the baseline studies, there are several buildings within the proximity of the project site. The development is located next to the upcoming development of Grand Hyatt Colombo. Also, as a highly sensitive place, St. Thomas' preparatory school is located 100m from the project site. During the construction phase, there will be a high impact on buildings near 100m proximity. These impacts will be short-term.

#### 4.1.5 Impacts of Noise, Vibration, Dust and Air Quality due to Construction Activities

Both fixed and mobile noise, vibration and dust/gaseous pollutant emission (exhaust) sources are involved with construction and related activities. These sources include vehicles/vehicular movement, material unloading, plant and machinery used in construction and related activities. In addition, dust emission sources include exposed surfaces, uncovered material transportation activities and stockpiles. The noise, vibration and dust/air quality levels resulting from these sources depend on the type of activity, number of simultaneous activities, type of vehicles/plant and machinery operated, etc. The dust emission levels also depend on climatic conditions (wind, humidity). The resulting impacts will depend on the type, level and duration of the noise, vibration and dust/gaseous pollutant emission, time of generation (daytime or night) as well as the type, proximity and sensitivity of the receivers.

The typical noise levels associated with vehicles/plant/machinery commonly associated with construction activities are given in Table 04.1.

**Table 04-1 Typical Noise Levels of construction equipment**

| Construction Equipment                           |                    |                              | NOISE LEVEL (dBA) AT 50 FEET |    |    |    |    |    |    |     |     |  |  |
|--------------------------------------------------|--------------------|------------------------------|------------------------------|----|----|----|----|----|----|-----|-----|--|--|
|                                                  |                    |                              | 65                           | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 |  |  |
| Equipment Powered by Internal Combustion Engines | Earth Moving       | Compactors (Rollers)         | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Front Loaders                | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Backhoes                     | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Tractors                     | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Scrapers, Graders            | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Pavers                       | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Trucks                       | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  | Materials Handling | Concrete Mixers              | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Concrete Pumps               | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Cranes (Movable)             | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Cranes (Derrick)             | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  | Stationary         | Pumps                        | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Generators                   | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Compressors                  | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  | Impact Equipment   | Pneumatic Wrenches           | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Jack Hammers and Rock Drills | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Pile Drivers (Peaks)         | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  | Other              | Vibrator                     | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |
|                                                  |                    | Saws                         | <div><div></div></div>       |    |    |    |    |    |    |     |     |  |  |

Source: EPA PB 206717, Environmental Protection Agency, Dec. 31, 1971, "Noise from Construction Equipment & Operations".

A comparison of these levels with the anticipated construction noise levels indicates that the noise levels during the construction phase could exceed the permissible levels in the vicinity of the project site, although decay in noise levels occurs with the distance from the source of the noise. Excessive vibrations could cause structural damage to nearby buildings/structures and inconvenience occupants. The level of impact depends on the intensity of the vibration as well as the type of structure.

Construction activities could cause ground vibrations to vary in degrees, depending on the equipment and methods used. The ground vibrations spread through the ground and diminish with the distance. Buildings founded on soil in the vicinity of a construction site could respond to such vibrations, to varying extents ranging from no perceptible effects at the lowest level, low rumbling sounds and feelable vibrations at moderate levels and slight damage, mainly in the form of cracking at the highest level. Ground vibrations from construction activities very rarely reach levels that can damage structures. However, such vibrations could cause damage to fragile historic buildings. Blasting and impact pile driving are among the construction activities that could generate relatively high levels of ground vibrations. The vibration levels associated with various types of construction equipment, in terms of Peak Particle Velocity (PPV) are given in Table 04.2.

**Table 04-2 Vibration Levels of Construction Equipment**

| Equipment                      |             | PPV at 7.5 m (25 feet)<br>(mm/s) |
|--------------------------------|-------------|----------------------------------|
| Pile Driver (Impact)           | Upper Range | 39                               |
|                                | Typical     | 17                               |
| Pile Driver (Impact)           | Upper Range | 19                               |
|                                | Typical     | 5                                |
| Clam Shovel Drop (Slurry wall) |             | 5                                |
| Hydromill (Slurry Wall)        | In Soil     | 0.2                              |
|                                | In Rock     | 0.5                              |
| Bulldozer (Large)              |             | 3                                |
| Bulldozer (Small)              |             | 0.1                              |
| Caisson Drilling               |             | 2                                |
| Loaded Trucks                  |             | 2                                |
| Jackhammer                     |             | 1                                |

The maximum permissible vibration levels, as specified by the CEA in the relevant Gazette Notification, are as follows

| $L_{a_{eq}, T}$ |            |
|-----------------|------------|
| Day Time        | Night Time |
| 75              | 50         |

A comparison of these levels with the anticipated construction vibration levels indicates that the vibration levels during the construction phase could exceed the permissible levels in the vicinity of the project site, although decay in vibration levels occurs with the distance from the source of vibration. According to the amended Interim ABOP and Vibration Standards, Pollution Control Division, Central Environmental Authority the following table shows the permissible vibration levels permitted to reach during the construction period (Table 04-3).

**Table 04-3 Maximum Permissible Vibration Levels**

| Category of the structure as given in Table 1.1 | Type of Vibration | Frequency of Vibration (Hz) | Vibration in PPV (mm/Sec.) |
|-------------------------------------------------|-------------------|-----------------------------|----------------------------|
| Type 1                                          | Continuous        | 0 –10                       | 5.0                        |
|                                                 |                   | 10-50                       | 7.5                        |
|                                                 |                   | Over 50                     | 15.0                       |
|                                                 | Intermittent      | 0 –10                       | 10.0                       |
|                                                 |                   | 10 –50                      | 15.0                       |
|                                                 |                   | Over 50                     | 30.0                       |
| Type 2                                          | Continuous        | 0 -10                       | 2.0                        |
|                                                 |                   | 10-50                       | 4.0                        |
|                                                 |                   | Over 50                     | 8.0                        |
|                                                 | Intermittent      | 0 –10                       | 4.0                        |
|                                                 |                   | 10 –50                      | 8.0                        |
|                                                 |                   | Over 50                     | 16.0                       |
| Type 3                                          | Continuous        | 0 -10                       | 1.0                        |
|                                                 |                   | 10 - 50                     | 2.0                        |
|                                                 |                   | Over 50                     | 4.0                        |
|                                                 | Intermittent      | 0 - 10                      | 2.0                        |
|                                                 |                   | 10 – 50                     | 4.0                        |
|                                                 |                   | Over 50                     | 8.0                        |
| Type 4                                          | Continuous        | 0 - 10                      | 0.25                       |
|                                                 |                   | 10 – 50                     | 0.5                        |
|                                                 |                   | Over 50                     | 1.0                        |
|                                                 | Intermittent      | 0 – 10                      | 0.5                        |
|                                                 |                   | 10 - 50                     | 1.0                        |
|                                                 |                   | Over 50                     | 2.0                        |

Though the noise levels presented for the various construction activities far exceed the permissible standards, it is important to note that the construction noise is generally intermittent and depends on the type of operation, location and function of the equipment. Proper mitigation measures to regulate the timings of construction, employing noise protection measures, etc. need to be worked out (Table 04-4).

When considering the air quality Suspended particulate matter from dust emissions, gaseous pollutants in the form of Sulphur Dioxide (SO<sub>2</sub>), Carbon Monoxide (CO), Oxides of Nitrogen (NO<sub>x</sub>), etc. are among the exhausts from plant/machinery involved in construction and related activities. The generation of dust is the most likely impact during these stages due to: Site clearance and use of heavy vehicles and machinery; Procurement and transport of raw

materials; construction activity, while the impacts are mostly concentrated in the project site. It is likely that impacts due to dust generation are felt upwind of the site along with the site.

Construction stage impacts will be short-term and have adverse impacts on the construction workers as well as inhabitant adjacent to the project, especially those in the upwind direction.

**Table 04-4 Sources of Dust Generation during the construction stage**

| Vehicle and Equipment Use                                      | Exposed Areas                                                                | Contractor Activities                                                        |
|----------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Vehicle and equipment entering and leaving the project site    | Areas of exposed soil that have been cleared and grubbed                     | Land clearing and grubbing                                                   |
| Vehicle and equipment movement and use within the project site | Areas of exposed soil that have been excavated, filled, compacted, or graded | Earthwork including soil compaction, rough grading and final grading.        |
| Sediment tracking off-site                                     | Construction staging areas                                                   | Drilling                                                                     |
| Temporary parking lots and staging areas                       | Vehicle and equipment storage and service areas                              | Materials handling, including material stockpiling, transfer, and processing |
| Onsite Construction traffic                                    | Material processing areas and transfer points                                | Batch dropping, dumping                                                      |
|                                                                | Bare ground areas of construction site                                       | Conveyor transfer and stacking                                               |
|                                                                | Spilled materials                                                            | Material transferring                                                        |
|                                                                | Construction stockpiles                                                      | Milling and screening operations                                             |
|                                                                | Soil and debris piles                                                        | Demolition and debris disposal                                               |
|                                                                |                                                                              | Tilling                                                                      |

Even though it is difficult to estimate the probable noise and dust levels to be generated by the construction activities, based on the anticipated levels of noise to be generated by construction activities and the distance between noise/vibration/dust sources and the sensitive receivers, the overall impacts could be rated as moderate/high during the construction phase.

#### **4.1.6 Impacts due to Transportation of Construction Materials and traffic impacts**

The scale of development would involve high levels of transportation of construction materials. Different types of heavy vehicles will be used for the delivery/transport of building materials, building components, machinery, etc. These mainly include trucks of different categories and capacities, as required by the type of deliveries. In addition, light vehicles will also be used for small-scale deliveries and transport activities of the site staff. Access to the project site is provided by the Colombo-Galle A2 Road, where high traffic levels are frequently experienced. A possibility exists for traffic congestion due to waiting of material transport vehicles on the A2 Road and, in and out movements such vehicles to and from the project site.

A 'High' level of impact is thus envisaged due to the transportation of construction materials during the construction phase.

The difficulties caused to the existing road users and the possible deterioration of the road conditions, particularly at the entrance to the project site, during the construction phase are among the negative impacts that could arise from the transportation activities associated with the project.

#### **4.1.7 Impacts on the development activities in the vicinity including marine drive expansion project, suburban railway development project, etc.**

In addition to the project site, the proposed development will not require any land or resources used for other purposes and hence other development activities in the vicinity will not be directly affected. Except for the inconvenience caused by the increased traffic associated with the proposed development during the construction stage, no significant impact on other developments in the vicinity is thus envisaged. The overall impact on the development activities in the vicinity could thus be rated as low during the construction phase.

The project site and the study area are located beyond the area considered for the marine drive expansion project and no impact on it is thus envisaged during the construction phase of the proposed development.

#### **4.1.8 Impacts Due to Changes in Land Use**

As presented earlier no productive land use is currently made on the site. As there is no permanently residing community on the site, no issues associated with relocation and/or resettlement are anticipated due to the proposed development. Also, the eco-system in the project site is highly man modified and no destruction of sensitive ecological habitats would be required for construction activities. No adverse impact due to changes in land use can thus be envisaged during the construction phase.

#### **4.1.9 Other Socio-Economic Impacts (if any)**

One of the important social aspects is the creation of direct and indirect employment/income-generating opportunities for the community in the area during the construction phase. This could be a positive impact on the project. There is a very limited population living in close proximity to the site. Therefore, impacts on socio-economic aspects are very low.

## 4.2 Operational Impacts

### 4.2.1 Water

#### 4.2.1.1 Impacts on the surface/groundwater due to extraction for project activities

During the operational period, the water requirement will be fulfilled by the national supply of NWS & DB. Also, a rainwater harvesting system is available for excess water consumption. Therefore, there won't be any extraction of ground or surface water and 'No' impact is thus envisaged.

##### 4.2.1.1 Salinity Intrusion due to Water Extraction (If any)

No extraction of groundwater is to be carried out for project activities and no salinity intrusion in the area due to project activities is thus envisaged. This also has **No** impact on the environment.

### 4.2.2 Wastewater

#### 4.2.1.2 Anticipated Problems of Waste Water Disposal

There are usually significant effects on water quality and on marine life arising from sewage disposal. Water quality deterioration is one of the most important water resource issues of the 21st century. Therefore, the quality status of coastal surface water is very important and would always be under public scrutiny because of the health risk associated with sewage contamination. Due to improper wastewater management, the impact will be "**High**".

In view of the wastewater disposal practices to be adopted, as presented in Section 2.3.2 'No' significant adverse impact on the environment is envisaged because waste [water discharge is connected with the central waste management system in Colombo](#).

#### 4.2.1.3 Impacts on Surface/Ground Water due to Waste Water Discharge, Surface Runoff and Usage of Pesticides/Fertilizer and any other Chemicals

As the proposed development is residential as opposed to agricultural or industrial, no large quantities of chemicals, pesticides, or fertilizer, except for landscaping purposes, are to be used. No chemicals and detergents, except mainly chlorine, are to be used for water purification in swimming pools. The adverse impacts associated with storage, leakage, or discharges of pesticides or fertilizer can thus be rated as low during the operational stage

### 4.2.3 Solid Waste

#### 4.2.3.1 Anticipated Problems of Solid Waste Disposal

Around 80 percent of sea pollution around the world is from land sources, the other 20 percent is from sea sources. This is a widespread problem that affects large areas like harbors, River mouths and coastal towns. Waste in coastal areas deforms beautiful seaside landscapes moreover the degradation rate of wastes such as plastic is slow because of high levels of groundwater and humidity, and it may take over 300 years. The lack of an efficient waste management system can bring irreversible damage to the health of society and the environment. Following are some of the anticipated major environmental problems due to improper solid waste management.

- Air pollution and unpleasant odor impede local recreational and tourism facilities and endanger public health, particularly during the hot season.
- The fire is triggered by methane emissions from garbage degradation (there is no gas-collecting mechanism at these dumping sites) or by individuals who segregate the rubbish. Fire also emits foul odors and pollutes the air.
- Livestock enters dumping areas and consumes trash, spreading infections.

Without proper solid waste management, the impacts will be “**High**”.

#### 4.2.3.2 Impacts of the Proposed Method of Solid Waste Disposal on Surface/Groundwater and/or Air

In view of the above-mentioned circumstances, following the solid waste management plan provided in Annex VI.c no significant problems/impacts due to solid waste disposal are anticipated during the operational phase. Issues pertaining to the disposal of hazardous waste materials generated would require suitable arrangements. However, as the proposed facility is mainly a residential facility as opposed to an industrial facility, no significant quantities of hazardous waste are expected to be generated. Any such waste is expected to be either stored in a suitable place for future disposal or may be traded off with authorized agencies. In view of these arrangements, no major issues related to solid waste disposal are anticipated and any resulting impact can be rated as low during the operational phase.

### 4.2.4 Air

#### 4.2.4.1 Analysis of Gaseous Emissions Due to Operations

One of the most significant potential emission sources is standby electrical generators. However, because the facility's power is provided by the national grid, the generator's use will be low, and no emissions over extended periods are expected. However, due to the current economic situation and continuous power outages, the usage of generators will continue. Because of the high Sulphur content in Sri Lanka's imported diesel fuel, large

quantities of PM1, PM2.5, and PM10 are discharged, as are significant levels of pollutants such as SO<sub>2</sub>, H<sub>2</sub>S, NO<sub>x</sub>, and volatile organic compounds. Currently, roughly 2 hours of power outages are experienced daily, and using generators for 2 hours every day will have a moderate impact on the environment. It also has an irreversible effect.

#### **4.2.4.2 Envisaged Odor Problems**

Section 4.2.4-1 discusses gaseous emissions as potential sources of odor concerns. Furthermore, solid waste in temporary storage and discharged wastewater are potential sources of unpleasant odors that might have a negative influence on the surrounding neighborhood. Given the nature of the proposed facility – primarily residential rather than industrial – no substantial amounts of gaseous emissions/exhausts are anticipated. Furthermore, due to the waste storage, wastewater treatment, and disposal procedures that will be used, no disagreeable odors are expected. However, because the proposed projects are in a densely inhabited region rather than a sparsely populated area, a moderate degree of olfactory effect is anticipated throughout the operating period.

### **4.2.5 Noise and Vibration**

#### **4.2.5.1 Sources of Noise and Vibration**

Noise pollution is as harmful to the ecosystem as air pollution, water pollution, and other types of pollution. Numerous noise measurement units have been developed to express, in a single number, the typical human's response to a complex sound composed of various frequencies at varying loudness levels. The influence of noise is determined by its features (whether it is immediate, intermittent, or continuous), the time of day (day or night), and the location of the noise source.

During the operating phase, the major sources of noise and vibration are the plant and machinery utilized to deliver various services at the planned facility. Pumps, motors, generators, compressors, and, in general, any plant/machinery with moving/rotating mechanical elements fall under this category. Furthermore, devices/processes that generate direct disturbance of air, such as blowers/fans, are sources of aerodynamic noise.

#### **4.2.5.2 Predicted Noise Levels at the Treatment Plant and Impacts**

The noise generation by plants and machinery depends on a number of factors such as type, level of operation, built-in noise control measures, and the number of machines operating simultaneously. These conditions are to be managed as the proposed site is located next to the primary schools.

When focusing on this particular project there are no any treatment plants which generate sound sources. Therefore the impact of such activities are negligible.

#### **4.2.6 Ecological Resources**

As presented in Chapter 3 there is no important ecological habitat exists at the site. Construction and related activities are to be confined to the project site and all measures will be applied to prevent any harmful impacts to the existing urban environment. Therefore, a low level of impact on the existing vegetation in the project site is thus envisaged during the operational stage.

##### **4.2.6.1 Impacts on Existing Vegetation in the Project Site**

Any removal of the flora in the project site for construction purposes will result in the loss of ecological habitats. However, as presented in Section 3.4, no natural vegetation and habitats are present in the area. Many of the floral species in the study areas are common species used for landscaping purposes.

Only small-scale landscaping is involved with the proposed development for which only noninvasive floral species are to be used. The overall impact on the vegetation would thus be rated as 'Low' during the operational stage

##### **4.2.6.2 Impacts on Fauna, Flora, Natural Habitats/Eco-Systems in the Study Area**

In view of the absence of any natural habitats of flora in the study area, 'No' significant impact on natural habitats/ecosystems in the area is envisaged. As the fauna in the project site is adapted to living in an urban environment, in view of their ability to move to other nearby areas, 'No' significant impact on fauna in the area is envisaged.

#### **4.2.7 Human and Social Culture Impacts**

##### **4.2.7.1 Impact on residential, commercial, tourism and security-sensitive areas**

There will be no relocation of a residential population on the project site or in the surrounding regions. Some of the residential properties around the project site have been (or are being) converted to commercial properties. At the operational stage, the projected development will have 'no' substantial impact on residential neighborhoods.

There is a chance of disruptions to the present urban/commercial ambiance in the region as a result of higher traffic levels caused by the planned facility's activities and the presence of a considerable number of inhabitants. The planned facility's operations, however, do not anticipate a major proportionate rise in such activities relative to the present levels in the surrounding urban/commercial environment. During the operational period, the impact on residential areas can thus be assessed as modest.

#### **4.2.7.2 Impacts Due to Changes in Land Use**

No productive land use is currently made on the site. As there is no permanently residing community no issues associated with relocation and/or resettlement are anticipated due to the proposed development. Also, the eco-system in the project site is man modified and no significant destruction of sensitive ecological habitats would be required for construction activities. No adverse impact due to changes in land use can thus be envisaged during the operational stage.

#### **4.2.7.3 Impacts on Other Economic Activities**

There are no beach landings of fishing boats or beach seine activities carried out along the coastline in front of the project site or its immediate vicinity. The proposed developments are located away from the beach area and no dumping of solid waste or discharge of wastewater will be carried out in the beach area. Irrigation activities are not carried out in the study area. The wastewater disposal in the sea is to be carried out as per national regulations under authorized conditions. No fishing or irrigation activities are carried out in the study area and 'No' impact on such activities is envisaged. In view of the creation of increased commercial space, a 'Positive' impact on economic activities is envisaged in the area.

#### **4.2.7.4 Impacts on Cultural/Archaeological Values**

No places of cultural or archaeological significance are located in the immediate vicinity of the project site. 'No' impact on cultural/archaeological values is thus envisaged.

#### **4.2.7.5 Project Benefits to Local Community and Socio-Economic and Employment Benefits**

The local community may get a variety of socio-economic benefits which include access to direct and indirect employment opportunities and enhancement of socio-economic conditions.

### **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 the proposed structures**

As indicated in the architectural drawings attached in Annex V, the maximum height of the proposed structures is 115.563. several high-rise buildings are located in the vicinity of the project site and a possibility exists for further high-rise developments in the future. Although alteration of the existing view in the vicinity will be caused by the proposed development, a high priority has been given by the architects to the aesthetic and visual environment and the high-rise tower of the proposed development has been designed to create an attractive skyline in the 'Mixed Development Zone' in which the project site is located.

No significant adverse impact on the aesthetic and visual environment is thus envisaged.

#### **4.2.8.2 Positive or Negative Impacts**

As presented in Section 4.2.8, no significant adverse impact on the aesthetic and visual environment is envisaged.

### **4.2.9 Contingency plan for emergency situations**

Contingency planning relates to events, in which major may not occur and potential responses put in place to prevent or respond to an emergency situation. It applies to the management of both risks and consequences of disasters.

The proposed project is located close to the coastal beach. The area was devastated by the Indian Ocean Tsunami of 2004 and various cyclone effects that occurred in the past. Therefore, it is important to have a proper contingency plan for emergency situations that may arise. Evacuation places will be prepared considering the Tsunami, storm surge, and cyclone situation in the area. An early warning system will be established in collaboration with relevant agencies, disaster Management Centers, and Police in the area.

All staff, during the construction phase as well as the operational phase, will be trained to manage emergency situations and safe places, and safety measures will be kept informed of the visitors. This will be discussed in Chapter 6.2 under Disaster Management Plan.

#### **4.2.10 Impacts on the proposed or planned government/private sector development activities in the vicinity including Marine Drive Expansion Project, Suburban Development Project, etc.**

The project is carried out on private land owned by the project proponent. There will be no impact of the proposed project on any upcoming development activities.

#### **4.2.11 Any other Impacts are both listed here but may be significant in view of the Project.**

The possibility exists of adverse impacts resulting from increased traffic levels generated by the proposed development. A Traffic Impact Assessment (TIA) has been carried out and measures recommended to mitigate any adverse impacts are to be incorporated into the plans/designs. These measures include providing adequate parking spaces, access ways, circulation patterns, etc. The TIA report is attached in Annex VI.f.

### 4.3 Impact Analysis

A project development alternative's conformity with current norms and laws is determined by the impact evaluation. It makes use of approved practices and makes an effort to create a numerical estimate of the overall environmental impact. The final phase in impact assessment involves condensing the evaluation of several environmental objectives into a single value or a rating of projects. A hundred or so impact assessment techniques exist, and they fall into the following categories:

- Ad-hoc method,
- Checklist,
- Matrix,
- Network,
- Overlays,
- Environmental Index and
- Cost-Benefit analysis.

#### 4.3.1 Checklist of Impacts

None of the methods are universally applicable because they are all subjective in nature. The checklist and matrix approach has been used and provided in the seven ways mentioned above. An environmentalist is encouraged to think about and identify potential effects by using a checklist, which is a collection of environmental characteristics or impact indicators

**Table 04-5 A typical checklist identifying anticipated environmental impacts**

| Sr. No.   | Parameter                                 | Negative Impact | No Impact | Positive Impact |
|-----------|-------------------------------------------|-----------------|-----------|-----------------|
| <b>A.</b> | <b>Impacts due to Project Location</b>    |                 |           |                 |
| i.        | Displacement of People                    |                 | √         |                 |
| ii.       | Hydrology Impact                          |                 | √         |                 |
| iii.      | Change of Land use and Ecology            |                 | √         |                 |
| iv.       | Loss of Cultural and Religious Structures |                 | √         |                 |
| v.        | Socio-economic Impacts                    |                 | √         | √               |
| vi.       | Loss of Trees                             |                 | √         |                 |

|           |                                                 |   |   |   |
|-----------|-------------------------------------------------|---|---|---|
| vii.      | Drainage & Utility Problems                     |   | √ |   |
| <b>B.</b> | <b>Impact due to Project Design</b>             |   |   |   |
| i.        | Platforms - Inlets and Outlets                  |   | √ |   |
| ii.       | Ventilation and Lighting                        |   | √ |   |
| iii.      | Risk due to Floods                              |   | √ |   |
| <b>C.</b> | <b>Impact due to Project Construction</b>       |   |   |   |
| i.        | Loss of trees and Natural Vegetation            |   | √ |   |
| ii.       | Impacts on Fauna and Flora                      |   | √ |   |
| iii.      | Soil Erosion & Siltation                        | √ |   |   |
| iv.       | Impacts on Existing Hydrology                   |   | √ |   |
| v.        | Traffic Diversions                              | √ |   |   |
| vi.       | Risk to Existing Buildings                      | √ |   |   |
| vii.      | Excavated soil and muck disposal                | √ |   |   |
| viii.     | Air pollution due to dust emission              | √ |   |   |
| ix.       | Increased Water Demand                          | √ |   |   |
| x.        | Supply of Construction Material                 | √ |   |   |
| xi.       | Generation of Construction and Demolition Waste | √ |   |   |
| xii.      | Air & Noise                                     | √ |   |   |
| xiii.     | Loss of Historical & Cultural Monument          |   | √ |   |
| xiv.      | Impact of labour camp                           |   |   | √ |
| xv.       | Socio-Economic impact                           |   |   | √ |
| <b>D.</b> | <b>Impact due to Project Operation</b>          |   |   |   |
| i.        | Noise pollution at stations and depot           | √ |   |   |
| ii.       | Water supply and sanitation                     |   | √ |   |
| iii.      | Solid waste generation at stations and depot    | √ |   |   |
| iv.       | Generation of Hazardous waste at Depot          | √ |   |   |
| v.        | Pedestrian Issues                               |   | √ |   |
| vi.       | Visual Impacts                                  |   | √ |   |
| vii.      | Station Illumination                            |   | √ |   |
| viii.     | Increase of Greenery                            |   |   | √ |
| ix.       | Employment Opportunities                        |   |   | √ |
| x.        | Enhancement of Economy                          |   |   | √ |
| xi.       | Mobility                                        |   |   | √ |
| xii.      | Safety and reduced accidents                    |   |   | √ |
| xiii.     | Traffic Congestion                              | √ |   |   |

|        |                                |   |  |   |
|--------|--------------------------------|---|--|---|
| xvi.   | Air Pollution                  | √ |  |   |
| xvii.  | Carbon dioxide                 | √ |  |   |
| xviii. | Improvement of Quality of Life |   |  | √ |

Each of the negative impacts on the environment requires consideration of mitigative measures. Some of these measures require the judicious application of road engineering design and construction methodology while others require special techniques. An attempt has been made to indicate the required mitigative measures for each type of identified negative impacts

### 4.3.2 Impact Matrix

In order to provide a brief but full-fledged quantification of environmental impacts on the project alignment the interactive impact matrix is provided. The evaluation of the impact matrix is provided as follows.

| Risk Assessment Matrix |        |        |      |
|------------------------|--------|--------|------|
|                        | Impact |        |      |
| Probability            | Low    | Medium | High |
| Low                    | 1      | 2      | 3    |
| Medium                 | 2      | 3      | 4    |
| High                   | 3      | 4      | 5    |

Table 04-6 The evaluation of the impact matrix

|                             |                  |                                                                                                                                                                                                                                                 | Risk Evaluation     |                  |                    |
|-----------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------------|--------------------|
| Project Activities          | Impact Type      | Description of the Impact                                                                                                                                                                                                                       | Probability (L/M/H) | Impact (L/ M/ H) | Risk rating (1..5) |
| <b>Project Design Stage</b> |                  |                                                                                                                                                                                                                                                 |                     |                  |                    |
| Feasibility Studies         | Physical Impacts | The movement of people and vehicles for field research during project design can disturb the natural environment through noise pollution, disruptive vibrations, and unrestrained human activity that can harm the local water and air quality. | L                   | L                | 1                  |

|                                                                                               |                           |                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
|-----------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
|                                                                                               | <b>Biological Impacts</b> | Most delicate natural habitats, including terrestrial and aquatic species, are initially damaged by a vehicle and human movement for field investigations during project planning. The second most sensitive species migrate in response to strange noises and disruptive vehicle vibrations. According to studies, unchecked human activity can harm the aquatic environment and water bodies. | L | L | 1 |
|                                                                                               | <b>Social Impacts</b>     | Field investigators and their vehicles moving throughout the neighbourhood disrupt local residents' daily lives. Unchecked behaviour by participants in field research might lead to social unrest in the local community.                                                                                                                                                                      | L | L | 1 |
| <b>Project Construction Stage</b>                                                             |                           |                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
| <b>Land Clearing</b>                                                                          | <b>Physical Impacts</b>   | Eliminating soil will cause erosions                                                                                                                                                                                                                                                                                                                                                            | L | M | 2 |
|                                                                                               |                           | Landslides will occur if natural terrain is removed.                                                                                                                                                                                                                                                                                                                                            | L | L | 1 |
|                                                                                               |                           | weathering of rocks can be observed                                                                                                                                                                                                                                                                                                                                                             | L | L | 1 |
|                                                                                               |                           | sedimentation will be high                                                                                                                                                                                                                                                                                                                                                                      | L | L | 1 |
|                                                                                               |                           | effects on surface and groundwater quality                                                                                                                                                                                                                                                                                                                                                      | L | H | 3 |
|                                                                                               |                           | consequences of machinery use-related noise and vibration                                                                                                                                                                                                                                                                                                                                       | H | H | 5 |
|                                                                                               |                           |                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
|                                                                                               | <b>Biological Impacts</b> | Loss of aquatic fauna and flora                                                                                                                                                                                                                                                                                                                                                                 | L | H | 3 |
|                                                                                               |                           | impacts on fauna movement patterns                                                                                                                                                                                                                                                                                                                                                              | L | H | 3 |
|                                                                                               |                           |                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
|                                                                                               | <b>Social Impacts</b>     | conflicts during the resettlements                                                                                                                                                                                                                                                                                                                                                              | L | L | 1 |
|                                                                                               |                           | Loss of houses and agricultural lands.                                                                                                                                                                                                                                                                                                                                                          | L | L | 1 |
|                                                                                               |                           | loss of income sources of livelihoods                                                                                                                                                                                                                                                                                                                                                           | L | L | 1 |
|                                                                                               |                           |                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
| <b>Transportation of Heavy Vehicles and Machinery into The Site and Excavation Activities</b> | <b>Physical Impacts</b>   | air pollution and sound pollution                                                                                                                                                                                                                                                                                                                                                               | H | H | 5 |
|                                                                                               |                           | dust pollution from moving large vehicles and loading machinery                                                                                                                                                                                                                                                                                                                                 | H | H | 5 |
|                                                                                               |                           | moving large vehicles will lead to instability of existing pathways.                                                                                                                                                                                                                                                                                                                            | L | M | 2 |
|                                                                                               |                           |                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
|                                                                                               | <b>Biological Impacts</b> | deterioration of biodiversity loss of natural ecosystems                                                                                                                                                                                                                                                                                                                                        | L | H | 3 |

|                                                       |                           |                                                                                                                                                                                                                                                                                      |   |   |   |
|-------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
|                                                       | <b>Social Impacts</b>     | noise and air and vibration conditions will affect nearby livelihoods                                                                                                                                                                                                                | M | H | 4 |
|                                                       |                           | traffics due to the continuous transportation of materials                                                                                                                                                                                                                           | L | M | 2 |
|                                                       |                           |                                                                                                                                                                                                                                                                                      |   |   |   |
| <b>Construction of Temporary Structures and Roads</b> | <b>Physical Impacts</b>   | air and noise pollution                                                                                                                                                                                                                                                              | L | H | 3 |
|                                                       |                           | Damages to the ground and surface water bodies                                                                                                                                                                                                                                       | L | L | 1 |
|                                                       |                           | unchecked human behaviour, such as the pointless clearing of vegetation                                                                                                                                                                                                              | L | M | 2 |
|                                                       | <b>Biological Impacts</b> | degradation of the natural environment still present                                                                                                                                                                                                                                 | L | H | 3 |
|                                                       | <b>Social Impacts</b>     | conflicts with the local community due to traffic jams and alternative routes                                                                                                                                                                                                        | L | M | 2 |
| <b>General Construction Work</b>                      | <b>Physical Impacts</b>   | Construction activities that harm trees and the topsoil can result in severe soil erosion and landslides.                                                                                                                                                                            | L | H | 3 |
|                                                       |                           | Obstruction to Natural Drainage system and Hydrology                                                                                                                                                                                                                                 | L | H | 3 |
|                                                       |                           | Obstruction of existing Drainage System.                                                                                                                                                                                                                                             | L | H | 3 |
|                                                       |                           | allowing the release of hazardous substances into the environment, causing severe harm to water supplies and other natural resources                                                                                                                                                 | M | H | 4 |
|                                                       |                           | Construction-related operations will alter the environment's temperature and humidity as well as cause noise, water, air, and land pollution.                                                                                                                                        | H | H | 5 |
|                                                       |                           | When construction waste is dumped directly into water bodies, the BOD and COD levels of the water can rise and the water will become contaminated. Additionally, poor hygiene habits and health issues might result in bacterial and viral illnesses.                                | M | H | 4 |
|                                                       |                           | Construction site runoff combined with rainwater draining into the natural body of water can contaminate it. Additionally, operational activities can generate waste such as wood, metal, and polyethylene, as well as dirt, sand, and stone particles that can end up in the water. | L | H | 3 |

|                                                               |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
|---------------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
|                                                               |                    | Disturbance to the prevailing railway due to project activities                                                                                                                                                                                                                                                                                                                                                                                                                 | L | H | 3 |
|                                                               | Biological Impacts | Natural environmental conditions are harmed by construction stage activities such as vehicle movement, heavy machinery operation, metal working machines, and blasts of shattered rocks. It causes harm to the local water bodies, soil, and tree layers. All stationary aquatic and terrestrial habitats are destroyed as a result of these extensive alterations. Additionally, one can see every scale that migratory species utilize to leave a region in search of safety. | L | H | 3 |
|                                                               |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
|                                                               | Social impacts     | increase in noise and dust levels affecting the local community                                                                                                                                                                                                                                                                                                                                                                                                                 | H | H | 5 |
| social disturbance from the labors/workers on the workstation |                    | L                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | M | 2 |   |
| Tunnelling Blasting and Drilling Works                        | Physical impacts   | Tunneling is one type of construction activity that can have an impact on both the reduction of surface and groundwater supplies.                                                                                                                                                                                                                                                                                                                                               | L | H | 3 |
|                                                               |                    | due to prevailing fracture systems collapses in steep slopes can occur with more vibration increasing the risk. Also, erosion risk will be high                                                                                                                                                                                                                                                                                                                                 | L | H | 3 |
|                                                               |                    | emissions of greenhouse gases as a result of organic debris blocking or sedimentation in the building zone on the sea floor                                                                                                                                                                                                                                                                                                                                                     | L | H | 3 |
|                                                               | Biological Impacts | Disturbance to the fauna and flora                                                                                                                                                                                                                                                                                                                                                                                                                                              | L | H | 3 |
|                                                               |                    | reduction of endemic and threatened spices                                                                                                                                                                                                                                                                                                                                                                                                                                      | L | H | 3 |
|                                                               | Social Impacts     | ground vibrations can damage surface community properties.                                                                                                                                                                                                                                                                                                                                                                                                                      | L | H | 1 |
|                                                               |                    | the local community will be affected by noise and dust levels.                                                                                                                                                                                                                                                                                                                                                                                                                  | H | H | 5 |
|                                                               | Operational Stage  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |   |
| Operational Activities                                        | Physical Impacts   | Disposal of wastewater and solid waste                                                                                                                                                                                                                                                                                                                                                                                                                                          | M | H | 4 |
|                                                               |                    | Air and Noise Pollution due to guests’ vehicles.                                                                                                                                                                                                                                                                                                                                                                                                                                | L | L | 1 |
|                                                               |                    | Water movement can change in the rainy season than previously and may cause floods in extreme weather conditions.                                                                                                                                                                                                                                                                                                                                                               | L | L | 1 |
|                                                               |                    | changes to the water quality can be seen                                                                                                                                                                                                                                                                                                                                                                                                                                        | L | L | 1 |

|  |                           |                                                                         |   |   |   |
|--|---------------------------|-------------------------------------------------------------------------|---|---|---|
|  | <b>Biological Impacts</b> | Natural migration pathways of terrestrial animal species get disturbed. | L | H | 3 |
|  |                           | impacts on aquatic species near the shore                               | L | H | 3 |
|  | <b>Social Impacts</b>     | Disturbance to the neighbourhood due to frequent resident appearances.  | L | M | 2 |

The major impacts due to different project activities have been identified from the impact matrix. These measures together constitute part of the Environmental Management Plan (EMP). The following table shows high-impact areas found from the above analysis. (Table 4.5).

**Table 04-7 High Impact areas from the impact analysis.**

| Sr. No | Issues              | Description                                                                                                                                                                                            |
|--------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.     | Ambient Air Quality | During construction air and noise pollution may increase and would require mitigation.                                                                                                                 |
| 2.     | Ambient Noise Level | In the operation stage air quality and noise levels are Generally expected to improve. However, measures would be taken to contain pollution due to increased vehicular traffic near the project area. |
| 3.     | Water Quality       | During construction, all care will be taken to avoid Contamination of any water bodies.                                                                                                                |
| 4.     | Socio-Economic      | Disturbances to the nearby communities due to dust, noise, and vibrations.                                                                                                                             |
| 5.     | Environmental       | Disposal of wastewater and solid waste                                                                                                                                                                 |

## Chapter 05 : Proposed Mitigatory Measures

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The potential environmental impacts associated with the construction and operation of the proposed facility were identified in Chapter 4. The mitigation and best practice measures that should be developed in order to avoid or minimize any such adverse impacts are presented in this Chapter.

### 5.1 Soil conservation measures /Sea erosion preventive measures

#### (a) Mitigatory Measures: Construction phase

- Excavation, stockpiling, and filling are to be carried out considering minimum disturbances to the natural drainage system of the proposed area.
- Whenever possible, the timing of the construction activities should be scheduled according to the weather pattern.
- Whenever possible, cover the stockpiles with suitable types of sheets to prevent erosion and
- Provision of silt traps and drains to prevent erosion of the materials
- The dewatering process should be carried out under proper technical guidance.

#### (b) Mitigatory Measures: Operational Phase

- Provision of a suitable drainage system to reduce surface runoff during the rainy season.

#### (c) Sea Erosion Prevention

All activities are to be carried out away from the coastal reservation line demarcated, 30 m from the coastal vegetation line in both faces of the project, construction, and operation.

### 5.2 Waste management techniques both wastewater and solid waste and alternative ways of disposal of waste

Detailed Waste Management Plans, Waste Water Management, and Solid Waste Management have been prepared and presented in chapter 2 and attached as Annex VI.c Responsible management of waste is an essential aspect of [sustainable development](#). In this context managing waste mean eliminating waste where possible, minimizing waste where feasible; and reusing materials that might otherwise become waste. Solid waste management practices have identified the reduction, recycling, and reuse of waste as essential for the sustainable management of resources. [Waste water will be connected to the CMC line hence , the CM will carryout the treatment process. As the project propornent should responsible not to send hazardous chemicals with the wastewater.](#)

### **5.2.1 Waste management during the construction phase & operational phase.**

- Eliminating waste

Some waste generated in the process of construction can be eliminated. For example, durable modular metal from a system for use in concrete construction may be selected on the basis of being readily demonstrated of plywood and dimensional lumber. Eliminating waste can be beneficial to reduce impacts on human and environmental health.

- Minimizing Waste

Some building-related waste can be minimized. For example, construction products can be selected on the basis of their being designed and manufactured to be shipped with minimal packaging. Also, consider that selection and use of recyclable materials and products offer the potential to minimize waste.

- Reusing Waste

Some materials can be reused. For example, doors and windows in good, resalable condition might substitute for new products, or be donated and or sold for use on another project. A form of beneficial reuse.

- Materials and products which cannot efficiently and effectively be eliminated, minimized, or reused ultimately are collected and unless managed, will probably be disposed to the site recognized by the CMC.
- A proper litter management program should be carried out to collect floating refuse and litter and aligns the shoreline within the project site.
- It's the responsibility of the contractor to manage all the refusals generated during the construction phase of the project as per the solid waste management plan in collaboration with the local authority.
- It is proposed that sites suitable for the disposal of construction waste be identified by the contractors and approvals from the relevant state authorities, Central Environmental Authority (CEA), Marine Pollution Prevention Authority (MEEPA), and Local Authority, CMC.
- Land clearance for the construction activities is to be carried out with the presence of the local authority and relevant state agencies and local community representatives.
- Training to be provided to the workers on the need for site cleanliness and appropriate waste management procedures at the commencement of construction of the proposed project.

### **5.2.2 Solid Waste Management during the operational Phase**

- Color-coded bins needed to be placed in every floor of solid waste in a shorted manner and shall be placed at a convenient location and they must be emptied as per a routine program.
- The waste collection and handling process would be done by the janitor staff under the supervision of the waste management team.

- Waste separated at the source will be daily transferred to the garbage storage room. The waste management team needs to be carried out shorted wastes to the garbage room and stored them separately.
- Waste garbage will be handed over to the CMC. A tractor from the CMC will be permitted to drive into the premises and collect the waste on specified dates.

### 5.2.3 Noise and vibration Management during the operational Phase

The noise levels increase due to the project will be negligible in the Project impact area, however, the project site after occupation may have higher noise levels due to human activity, transport, etc. However, housing areas are enclosed and the compound walls also act as a barrier. The noise reduction levels due to these construction materials and enclosures are presented in table 05.1

Table 05-1 Noise reduction due to Barriers

| Transmission loss value for common barrier materials |                     |                               |
|------------------------------------------------------|---------------------|-------------------------------|
| Material                                             | Thickness, (inches) | Transmission LOSS, dBA<br>(1) |
| <b>WOOD</b>                                          |                     |                               |
| Fir                                                  | 1/2                 | 17                            |
|                                                      | 1                   | 20                            |
|                                                      | 2                   | 24                            |
| Pine                                                 | 1/2                 | 16                            |
|                                                      | 1                   | 19                            |
|                                                      | 2                   | 23                            |
| Red Wood                                             | 1/2                 | 16                            |
|                                                      | 1                   | 19                            |
|                                                      | 2                   | 23                            |
| Cedar                                                | 1/2                 | 15                            |
|                                                      | 1                   | 18                            |
|                                                      | 2                   | 22                            |
| Ply Wood                                             | 1/2                 | 20                            |
|                                                      | 1                   | 23                            |
| Plastic Boards                                       | 1/2                 | 20                            |
| <b>METALS</b>                                        |                     |                               |
| Aluminum                                             | 1/16                | 23                            |
|                                                      | 1/8                 | 25                            |
|                                                      | 1/4                 | 27                            |
| Steel                                                | 24 ga               | 18                            |
|                                                      | 20 ga               | 22                            |
|                                                      | 16 ga               | 15                            |
| Lead                                                 | 1/16                | 28                            |
| <b>CONCRETE, MASONRY, etc.</b>                       |                     |                               |
| Light Concrete                                       | 4                   | 36                            |
|                                                      | 6                   | 39                            |
| Dense Concrete                                       | 4                   | 40                            |
| Concrete Block                                       | 4                   | 32                            |

|                                       |               |       |
|---------------------------------------|---------------|-------|
|                                       | 6             | 36    |
| Cinder Block (Hollow Core)            | 6             | 28    |
| Brick                                 | 4             | 33    |
| Granite                               | 4             | 40    |
| <b>COMPOSITES</b>                     |               |       |
| Aluminum faced plywood                | $\frac{3}{4}$ | 21-23 |
| Aluminum-faced particle Board Plastic | $\frac{3}{4}$ | 21-23 |
| Lamina on plywood plastic             | $\frac{3}{4}$ | 21-23 |
| Lamina on Particle Board              | $\frac{3}{4}$ | 21-23 |
| <b>MISCELLANEOUS</b>                  |               |       |
| Glass (Safety glass)                  | $\frac{1}{8}$ | 22    |
|                                       | $\frac{1}{4}$ | 26    |
| Plexiglass (Shatterproof)             |               | 22-25 |
| Masonite                              | $\frac{1}{2}$ | 20    |
| Fiberglass/ Resin                     | $\frac{1}{8}$ | 20    |
| Stucco on Metal Lath                  | 1             | 32    |
| Polyester with an aggregate surface   | 3             | 20-30 |

### 5.3 Proposed measures to avoid/minimize negative social and cultural responses to the project and socio-economic benefits (other than employees to be provided to the local people).

The mitigatory measures proposed are summarized in Table 05.1. These measures are based on the various suggestions made by the local community, other stakeholders, and the consultant who carried out the social impact assessment in the EIA.

**Table 05-2 Socio-economic impacts and migratory measures.**

| Summary of the Impacts                                                              | Migratory Measures                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Disposal of waste and litter to the beach and sea in a nearby area                  | The Apartment management will have to take all possible measures to manage all kinds of waste dumping on the beach or reservation and remove those regularly if there is waste or litter scattered. Maintaining the cleanliness of the beach and nearby water area will be the responsibility of the apartment complex.                                             |
| Potential implication on local youth due to drugs and other unacceptable practices. | This high-end apartment and all visitors are to confirm their identity before arriving at the site. Close coordination with environmental police of the area to prevent such misconduct during operation.<br>Security surveillance cameras will be placed covering the entire building.<br>Separate security will be provided to ensure the safety of the residents |

|                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential conflicts with local communities and local political authorities                                       | Only qualified personnel will be absorbed into the relevant position of management. More priorities are given to the applicants from the local area where local people will feel the benefit of having this type of project in the area. A constant communication system will be established with the local community and community leaders along with relevant stakeholders in the area.                                                                                |
| Possible damage to the existing road due to heavy vehicle movement during the construction phase of the project. | The current road does not have Weight limits and construction materials would be transported to the site through the existing business community in the area. They may use ordinary vehicles to transport building materials which would not create additional pressure on the existing road system. In case any part of the road is damaged due to transporting materials to the site that will be immediately repaired with the supervision of the relevant authority. |

## **5.4 Proposed measures to avoid/minimize constructional impacts.**

Proper management of the construction site will be necessary to create a harmonious environment to carry out construction activities without getting into conflicts. All potential measures are required to carry out construction activities when transporting construction materials to the site. It is essential to provide all possible opportunities for local communities to get employment in construction sites. It is also necessary to raise awareness of the construction crew on potential conflicts with local communities. All possible measures are to be taken by the managers of the site to avoid conflicts between the construction crew with local communities

### **5.4.1 Proposed measures to minimize, problems due to increased traffic. Dust. Noise, vibration, and air pollution at the construction stage.**

#### **5.4.1.1 Mitigation methods of Traffic congestion.**

According to the requirements, the parking offered is enough. Because parking is provided via a mechanical parking system, the important considerations would be the parking system's capacity and operating performance, as well as the geometric features of the access points. The automated parking system requirements are provided in TIA. It can store a total of 232 automobiles. This is served by two lifts and has two levels of parking. The afternoon peak hour, when vehicles will be entering the facility, will be essential for the parking system. According to the trip generation estimate, the peak demand would be

roughly 50 vehicles per hour. That means the inter-arrival time is 1.2 minutes (assuming uniform dispersion of the incoming flow).

According to the standards, the processing time per car is around 3.0 minutes (the waiting time and the parking time per vehicle when there is no queue is used, as per the specification given by the client). As a result, the capacity of each elevator is 20 vehicles per hour, and the capacity of the parking system is 40 vehicles per hour (arrivals). Because the peak hour arrival volume is 50 cars per hour, a maximum of 10 vehicles must wait in the queue in the worst-case scenario.

#### **5.4.1.2 Mitigation methods of Dust and air pollution.**

- Spraying the areas of high dust emissions with water so as to maintain a sufficiently wet surface.
- Enforcing vehicle speed limits to minimize dust generation and the safety of workers and road users
- Providing covers in vehicles carrying dust-emitting materials to minimize dust emission
- Providing a vehicle washing facility at the site's existing points, to be used if necessary, to ensure that vehicles leaving the site are free from dust that may spill onto the public roads.

When it comes to air pollution, the odor issues outlined in section 4.2.4.2 will have a bigger impact unless effectively addressed. To solve this issue, the project has designated a separate rubbish room with two compartments, one dry and one air-conditioned. The entire chamber must be kept at a regulated room temperature of 100 degrees Celsius, with sliding apertures large enough to store biodegradable organic waste for more than 7 days with easy access.

#### **5.4.1.3 Mitigation methods of Noise and vibrations.**

Without mitigation, construction equipment such as cranes, trucks, and vehicle activity at the site and along the haulage route emits 60 to 80db (A), which may cause noise pollution in neighboring communities. This may pose health risks as well as distress and inconvenience to the workers. The planned construction would use mitigation measures to minimize noise below the approved level of 75db (A) in the area of the site, with the goal of ensuring that nearby residents and persons working on the site are not negatively impacted by noise caused by construction operations.

Therefore, the following measures are deemed to mitigate the impact of noise on the surrounding environment.

- Fitting proper mufflers (Noise barriers) to vehicles and construction equipment which produce noise more than the accepted level (75db (A)) to minimize noise pollution
- Sensitization and discussion with workers on the site and surrounding inhabitants about the working hours and the impact of noise

- The use of hearing protection gears by workers when exposed to noise levels above 75db(A)
- Construction and haulage activities are to be limited to daytime
- Increasing the distance between noise sources and sensitive receivers
- Operating well maintain plants at the site and regular servicing of such plants during the construction period
- Shutting down and /or slowing down of the machines and plants that may be in intermittent use, between work periods
- Providing mobile/temporary noise barriers on the site to control noise from particularly noisy operations.
- Limiting the project activities and vehicular movement during certain periods of the night
- The vehicular noise emission levels significantly vary with vehicle speed. It is therefore necessary that the speed dependency of noise emissions for various categories of vehicles is taken into account while using the model for noise prediction due to the roadway.

#### Vibration

The proposed site is located in the middle of the existing building it is necessary to have controlled possible vibration that can be occurred during the excavation of the existing site. In the process of excavation, it is required to manage possible vibration and used advanced technology to prevent any damage to the building located adjacent to the proposed land.

### **5.5 Proposed measures to avoid and minimize ecological impacts.**

- Proper solid waste management measures are to be adopted with no dumping in open areas
- Proper wastewater management measures are to be adopted with no direct discharge of wastewater into the environment

### **5.6 Recommended Disaster Mitigation Measures.**

In accordance with the National Policy on Disaster Management, which, at present is in draft form, it has been identified that all EIA reports should cover the relevant issues on disaster risk management and mitigation pertaining to the project. Apart from environmental impacts, disaster risk reduction and minimizing the impacts of disasters is a fundamental feature of the design process. Any such incident can be critical infrastructure. Therefore, the design should include a comprehensive state of the methods to identify, assess, and minimize the impacts arising from such regents.

The potential disasters in the area during the construction and operation phase include;

- Cyclones
- Tsunamis
- Fires
- Transport and stockpiling of construction materials (Construction phase)

The potential impacts arising from these hazards are presented in Chapter 4 and can be mitigated by planning and design and the adoption of best practices.

A two-pronged approach is recommended for the mitigation of the impacts of these hazards. In the case of building design, due attention should be focused on the design measures to minimize the impacts of cycles and tsunamis. Given the frequency of occurrence of extreme hazards events, which is not very high, it is not economical to adopt a disaster-proof design. However, sufficient structural engineering measures have to be incorporated to develop hazards resilient buildings and infrastructure, thereby minimizing potential impacts.

In the case of both cyclones and tsunamis, the DMC and the Meteorological Department provide warnings well in advance of the events. Tsunamis arise from earthquakes in the Eastern coastal countries that fall near the ridge of the plate, which is vulnerable to tsunamis like in 2004. In case of a tsunami, a warning time is about 90 minutes, which is issued by DMC by providing sufficient time for evacuation to a safer place recognized. In the same way, cyclone warnings also can be assured in well advance given sufficient time for the evacuation to a safer place. As the office complex is facing the western coastal segment that is not exposed to such hazards as Tsunamis and cyclones therebefore.

Accidents arising from the transport and stockpiling of construction materials can be best mitigated by good practices which include;

- The speed of the delivery vehicles is limited and the materials are transported in a properly secured manner, with adequate protection, to prevent the materials from falling down.
- The load must be properly covered to minimize the emission of dust due to the vibration of the vehicle.

In order 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 with red flags and barricaded to prevent unauthorized entry. The workers should be provided with safety equipment.

## 5.7 Summary of Major impacts and their mitigatory measures.

The following table provides the summary of noticeable impacts and their mitigatory measures under fields such as Land Environment/ Ecology /Air /noise & vibrations/ Socioeconomic /hydrology /traffic and Disasters.

**Table 05-3 Anticipated impacts and mitigation measures during the construction and operation phase of the project**

|                           | Environmental Component | Anticipated impacts                                                                                                     | Proposed Mitigation Measures.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Construction Phase</b> |                         |                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                           | Land Environment        | Generation of solid waste                                                                                               | <ul style="list-style-type: none"> <li>Construction debris (about 2% of total construction material) is utilized for internal paving/backfilling. Recyclable waste is sorted and sent for recycling through scrap dealers</li> <li>Reusing waste like cement bags for other activities.</li> <li>Adequate covered facilities were provided for the storage of waste materials.</li> <li>Refer to the methodologies provided in the solid waste management plan.</li> </ul> |
|                           |                         | Soil erosion excavations and during dewatering                                                                          | <ul style="list-style-type: none"> <li>Provision of silt traps and drains to prevent erosion of the materials</li> </ul>                                                                                                                                                                                                                                                                                                                                                   |
|                           | Ecology                 | No impact due unavailability of a vegetative area on the site.                                                          | <ul style="list-style-type: none"> <li>More use of plants is recommended to increase the vegetative area.</li> </ul>                                                                                                                                                                                                                                                                                                                                                       |
|                           | Ambient Air Quality     | Increase in air pollution (Increase in levels of NO <sub>x</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> , Dust hazards) | <ul style="list-style-type: none"> <li>Use of dust covers over construction material during transportation.</li> <li>A sprinkling of water, on-site to minimize</li> </ul>                                                                                                                                                                                                                                                                                                 |

|  |                    |                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                    |                                                                                                                                                                                                | <p>fugitive dust emissions.</p> <ul style="list-style-type: none"> <li>• Barricading of construction and the dumping area was done.</li> <li>• Enforcing vehicle speed limits to minimize dust generation and the safety of workers and road users</li> </ul>                                                                                                                                                                                                                                                                                                                                                              |
|  | Noise & Vibrations | <p>High noise and vibrations during the pre-construction and construction stage might cause a nuisance in the locality. (sound and vibration might be reduced due to the sound of the sea)</p> | <ul style="list-style-type: none"> <li>• Providing mobile/temporary noise barriers on the site to control noise from particularly noisy operations.</li> <li>• Use of well-maintained equipment.</li> <li>• Use of ear muffs/ear plugs by a construction worker in high-noise areas.</li> <li>• Construction equipment generating less noise and vibration was chosen</li> <li>• Use of low vibration-causing machinery/techniques for construction purposes, regular monitoring of vibration levels, and providing compensation to the parties affected by vibration-related damages due to project activities</li> </ul> |
|  | Hydrology          | <p>Sewage and wastewater generation due to labor activities</p>                                                                                                                                | <ul style="list-style-type: none"> <li>• Domestic waste was treated in a septic tank without causing any impact on the environment.</li> <li>• Releasing wastewater via an authorized collector such as CMC</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                     |

|                          |                     |                                                                               |                                                                                                                                                                                                                                    |
|--------------------------|---------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                     |                                                                               | under CEA rules and regulations.                                                                                                                                                                                                   |
|                          | Socio-economic      | Existing socioeconomic Conditions such as unemployment.                       | <ul style="list-style-type: none"> <li>• Construction will provide employment opportunities for residents.</li> <li>• Raw materials and supplies will be arranged in local areas.</li> </ul>                                       |
|                          |                     | Health and safety aspects of construction workers.                            | <ul style="list-style-type: none"> <li>• Occupational health and safety officers will be hired.</li> <li>• All the safety equipment and notices and prior awareness programs will be conducted.</li> </ul>                         |
|                          |                     | Disturbances to nearby sensitive areas such as schools                        | <ul style="list-style-type: none"> <li>• Minimizing sound effects during school times and using soundproof and dust proofing options.</li> </ul>                                                                                   |
|                          | Traffic             | Increase in traffic congestion.                                               | <ul style="list-style-type: none"> <li>• The material will be brought in batches so that there is no sudden increase in traffic volume at one particular time.</li> </ul>                                                          |
| <b>Operational Stage</b> |                     |                                                                               |                                                                                                                                                                                                                                    |
|                          | Land Environment    | There will be a change in land use patterns. Increased solid waste generation | <ul style="list-style-type: none"> <li>• Follow the methodologies provided in the solid waste management plan.</li> <li>• Waste management practices like the 3 R'S principle (reduce, reuse, recycle) will be adopted.</li> </ul> |
|                          | Ecology             | Positive impact                                                               | <ul style="list-style-type: none"> <li>• Increasing landscaping by a small amount will help with air quality and noise quality.</li> </ul>                                                                                         |
|                          | Ambient Air Quality | Particulate and gaseous emissions from vehicle movement                       | <ul style="list-style-type: none"> <li>• Green Belt Development on the</li> </ul>                                                                                                                                                  |

|  |                                |                                                                      |                                                                                                                                                                                                                                                                                  |
|--|--------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |                                |                                                                      | Periphery and open areas                                                                                                                                                                                                                                                         |
|  |                                | Running generators will lead emission of high-pollutant gases        | <ul style="list-style-type: none"> <li>Using solar panels or other renewable energy sources.</li> </ul>                                                                                                                                                                          |
|  | Noise & Vibrations             | Minor impact                                                         | <ul style="list-style-type: none"> <li>Using soundproofing techniques will minimize the sound impacts.</li> </ul>                                                                                                                                                                |
|  | Hydrology                      | Increased demand & pressure on water resources.                      | <ul style="list-style-type: none"> <li>Rainwater harvesting/storage pond for RWH plan</li> </ul>                                                                                                                                                                                 |
|  |                                | Drainage blocking and flooding.                                      | <ul style="list-style-type: none"> <li>Provision of a suitable drainage system in the areas within the site where the natural drainage paths are obstructed by construction and related activities</li> <li>Regular maintenance of drainage paths in the project site</li> </ul> |
|  |                                | Sewage generation.                                                   | <ul style="list-style-type: none"> <li>treat generated sewage and use treated sewage water for flushing and gardening purpose.</li> </ul>                                                                                                                                        |
|  | Socio-economic                 | Positive impact                                                      | <ul style="list-style-type: none"> <li>Development of physical and social infrastructure.</li> <li>Increased job opportunities in operation and maintenance work.</li> </ul>                                                                                                     |
|  | Natural Hazards and Disasters. | Natural hazards such as cyclones, tsunamis, Floods, and Earthquakes. | <ul style="list-style-type: none"> <li>Development of evacuation plans and establishment of a Crisis Response Team (CRT) to implement evacuation plans under emergency situations</li> </ul>                                                                                     |
|  |                                | Fire accidents.                                                      | <ul style="list-style-type: none"> <li>Implementation of an approved fire protection system for the proposed development</li> </ul>                                                                                                                                              |

|  |         |                   |                                                                                                                                     |
|--|---------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------|
|  | Traffic | No adverse impact | <ul style="list-style-type: none"><li>• A sufficient Parking facility will be provided in the mainland for guests/ staff.</li></ul> |
|--|---------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------|

## Chapter 06 : Environment Management Plan, Monitoring Program and Disaster Management Plan.

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### 6.1 Environmental Management and Monitoring Plan

Impact assessment aids in identifying components of a project proposal that could be harmful. Based on the results of the impact assessment, an environmental management plan was developed to reduce negative effects and included numerous actions that might be implemented to enhance the environment.

However, because the project won't have a significant negative impact on the air, water, land, or biological environment, the environment management plan won't be overly complicated; instead, it will only call for routine monitoring of the ambient air and water quality, noise levels, and soil quality.

The Environmental Management Plan (EMP) is essential for maintaining a healthy environment. Without a management plan to carry them out, even if the project has identified the right mitigation measures, the expected results might not be realized. The current chapter of the environment management plan calls for the effective execution of mitigation strategies to lessen the negative effects of the project's activities.

The following issues have been addressed in this EMP:

1. Mitigation techniques for reducing the negative consequences created throughout the development and operation stages
2. Management strategy specifics
3. Institutional structures will be established for the implementation of the EMP's post-project environmental monitoring program, which will begin when the project is completed.
4. Expenditures for environmental safeguards.

The EMP is proactive in nature and should be upgraded if new facilities or changes to existing facilities with environmental issues arise at a later stage.

EMP included four major elements:

1. Commitment and policy: The project will endeavor to produce and implement an Environmental Management Plan that addresses all air, land, and water issues.
2. Planning entails identifying environmental impacts, meeting legal requirements, and establishing environmental objectives.
3. The different potential implications are described in Chapter 4 Implementation, which includes developer resources, contractor accountability, operational staff training linked with environmental control facilities, and documentation of steps to be taken.

4. Monitoring, corrective measures, and record keeping are all part of measurement and evaluation.

The EMPs that will be implemented include those used during the building and operation stages of the project and contain the following elements:

1. Management of Hazardous and Solid Waste
2. Management and Control of Air Pollution
3. Noise Management and Control
4. Landscaping, Plantation, and Land Management
5. Workplace, Safety, and Health Concerns
6. Monitoring of the Environment
7. Emergency Response Plans for Disasters
8. System of Environmental Management

This chapter also describes the monitoring that will be done during the project's development and operation phases. Based on the results of the EIA, a monitoring plan has been created.

Two principal types of monitoring can be identified, namely

- a) Compliance Monitoring
- b) Impacts confirmation Monitoring (Impacts Monitoring)

### **6.1.1 Compliance Monitoring**

The purpose of compliance Monitoring is to confirm the effective implementation of the mitigation measures.

During the construction, the implementation of the mitigatory measures will be the responsibility of the relevant contractor who will be overseen by the project proponent, project design consultant, and /or an official representative from the Environmental Monitoring Committee (EMC).

The CC & CRMD will evaluate and make necessary modifications to the proposed Compliance Monitoring Plan (CMP) in consultation with relevant institutions. Compliance Monitoring during construction should be facilitated by routine site inspection as part of the contract to ensure mitigation measures are implemented correctly and efficiently.

The implementation of the impact mitigation measures and the management of potential environmental impacts are the responsibilities of the project proponent (and the contractor during the construction phase) under the supervision of the relevant authorities. The process

of Compliance Monitoring essentially includes third-party verification and therefore, Compliance Monitoring facilitates the audit of the Environmental Management Plan (EMP) prepared by the contractor, approved and agreed upon by all parties. The EMP will form part of the relevant contract.

### 6.1.2 Impacts Confirmation Monitoring

The purpose of impacts Confirmation Monitoring is two folds;

- a) To ascertain the effectiveness of the mitigation measures proposed for construction and operation
- b) to validate and confirm the assumptions made in the EIA process

Impact monitoring primarily includes the measurements of environmental media to determine the influence, if any of the works.

Impact confirmation monitoring should ideally be carried out by a party independent of the contractors. But in consultation with the contractor, taking into account all concurrent works contracts. Therefore, there will be several specialist agencies, working in coordination with the contractor for impact confirmation monitoring.

If a component of impact confirmation monitoring is to be carried out by the contractor, it has to be under the supervision of a representative of the EMC. The impacts confirmation monitoring program is a vital component of the environmental management of the project and due attention has to be focused on developing a coherent program that is able to identify the outcomes of wider interactions arising from a range of activities.

The impact mitigation measures proposed in **Chapter 5** are incorporated to form an Environmental Monitoring Plan given in (Table 6.1). It is similar in nature to a quality plan and provides details of the means by which the project proponent (and the contractor(s)) implements the recommended mitigation measures and achieves the environmental performance standards presented in the EIA and recommended by the environmental legislation of the country.

It is proposed that an Environmental Officer (EO) be appointed by the project proponent to monitor the implementation of the impact mitigation measures, who will also liaise with the Environmental Monitoring Committee (EMC), details of which are presented in **Section 6.1**, as required. The funding required to implement the impact mitigation measures and to carry out any monitoring is to be provided by the project proponent. Any expertise and facilities not available with the project proponent for such activities are to be obtained by other parties/agencies with expertise and authority (where necessary).

(PP: Project Proponent, CON: Contractor(s), EO: Environmental Officer)

**Table 06-1 Environmental Monitoring Plan**

| Proposed Activity/<br>Anticipated Environmental Impact                                                             | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Parameters to be Monitored                                                                                                                                                                                                                                                                                                                                                                | Proposed Locations of Monitoring and Sampling (If Any)                                                                    | Frequency of Monitoring                                                                                                                                                                                                                | Agencies Responsible for<br>(i) Implementation<br>(ii) Monitoring |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Construction Phase</b>                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                           |                                                                                                                                                                                                                                        |                                                                   |
| <b>1 Impacts due to Land Preparation Activities</b>                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                           |                                                                                                                                                                                                                                        |                                                                   |
| <b>1.1 Impacts due to Land Clearing, Cutting, Filling, Piling, Levelling, Road Construction, Residue Disposal.</b> | <ul style="list-style-type: none"> <li>• Confining the land preparation activities within the project site.</li> <li>• Carrying out the land preparation activities beyond the reservations specified.</li> <li>• Carrying out the land preparation activities in favourable weather conditions, whenever possible.</li> <li>• Regular disposal of residue and disposal at sites approved by the relevant authorities.</li> <li>• Transport of residue to be disposed of under approved conditions, including the transport of dust-emitting materials under covered conditions.</li> </ul> | <ul style="list-style-type: none"> <li>• Areas of land clearing</li> <li>• Clearing within the reservations.</li> <li>• Construction activities during adverse weather conditions.</li> <li>• Residue storage in the project site and disposal frequencies.</li> <li>• Residue transport practices (whether dust-emitting materials are transported under covered conditions).</li> </ul> | <ul style="list-style-type: none"> <li>• Project site and the vicinity.</li> <li>• Residue transport vehicles.</li> </ul> | <ul style="list-style-type: none"> <li>• At the commencement of construction.</li> <li>• At the early stages of construction.</li> <li>• Biweekly during construction</li> <li>• In addition, when complaints are received.</li> </ul> | (i) PP, CON<br><br>(ii) EO                                        |

| Proposed Activity/<br>Anticipated Environmental Impact                         | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                  | Parameters to be Monitored                                                                                                                                                | Proposed Locations of Monitoring and Sampling (If Any)                           | Frequency of Monitoring | Agencies Responsible for (i) Implementation (ii) Monitoring |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------|-------------------------------------------------------------|
| <b>2. Impacts on Natural Drainage Pattern and Hydrology of the Study Area.</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                           |                                                                                  |                         |                                                             |
| <b>2.1 Impacts on Existing Drainage Pattern.</b>                               | <ul style="list-style-type: none"> <li>Locating stockpiles, site offices and other facilities supporting the construction activities away from natural drainage paths whenever possible.</li> <li>Provision of a suitable drainage system in the areas within the site where the natural drainage paths are obstructed by construction and related activities.</li> <li>Regular maintenance of drainage paths in the project site.</li> </ul> | <ul style="list-style-type: none"> <li>Obstructions caused to natural drainage paths.</li> <li>Drainage system provided (Adequacy and condition).</li> </ul>              | <ul style="list-style-type: none"> <li>Project site and the vicinity.</li> </ul> | "                       | "                                                           |
| <b>2.2 Soil Erosion/Siltation etc.</b>                                         | <ul style="list-style-type: none"> <li>Carrying out excavation, stockpiling and filling with minimum disturbance to the existing drainage pattern of the project site.</li> <li>Carrying out construction activities under favourable weather conditions, whenever possible.</li> <li>Provision of silt traps and drainage systems to prevent soil erosion and siltation.</li> </ul>                                                          | <ul style="list-style-type: none"> <li>Obstructions caused to natural drainage paths</li> <li>Drainage system and silt traps provided (Adequacy and condition)</li> </ul> | "                                                                                | "                       | "                                                           |

| Proposed Activity/<br>Anticipated Environmental Impact | Mitigation Measures Proposed                                                                                             | Parameters to be Monitored                                                                                                                                                                                                                                             | Proposed Locations of Monitoring and Sampling (If Any)                          | Frequency of Monitoring                                                                                                                                                                                                         | Agencies Responsible for<br>(i) Implementation<br>(ii) Monitoring |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>2.3 Impacts on Ground Water Table</b>               | <ul style="list-style-type: none"> <li>Non-extraction of groundwater for construction and related activities.</li> </ul> | <ul style="list-style-type: none"> <li>Sources of water for construction and related activities.</li> <li>Wells/tube wells in the project site and the vicinity (if any).</li> <li>Water levels in the wells (if any) in the project site and the vicinity.</li> </ul> | <ul style="list-style-type: none"> <li>Project site and the vicinity</li> </ul> | <ul style="list-style-type: none"> <li>At the commencement of construction.</li> <li>At the early stages of construction.</li> <li>Biweekly during construction.</li> <li>In addition, when complaints are received.</li> </ul> | (i) PP, CON<br><br>(ii) EO                                        |

| Proposed Activity/<br>Anticipated Environmental Impact   | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Parameters to be Monitored                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Proposed Locations of Monitoring and Sampling (If Any) | Frequency of Monitoring | Agencies Responsible for (i) Implementation (ii) Monitoring |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------|-------------------------------------------------------------|
| <b>2.4 Impacts on Water Quality (Ground and Surface)</b> | <ul style="list-style-type: none"> <li>Storage of general refuse generated on-site in enclosed bins and/or appropriate locations and regular disposal by contractors at sites approved by the relevant authorities.</li> <li>Locating the soakage pits and septic tanks away from the reservations specified.</li> <li>Providing training to workers on the need for site cleanliness and on appropriate waste management procedures at the commencement of construction.</li> <li>Provision of silt traps and drainage systems to prevent soil erosion and siltation.</li> </ul> | <ul style="list-style-type: none"> <li>Locations and number of enclosed bins provided for waste storage.</li> <li>Presence of open dumps of waste.</li> <li>Frequency of waste disposal.</li> <li>Locations and number of toilets, septic tanks and soakage pits provided</li> <li>Presence of overflowing toilets, septic tanks and soakage pits.</li> <li>Awareness of workforce on-site cleanliness and site waste management procedures.</li> <li>Drainage system and silt traps provided (Adequacy and condition).</li> </ul> | "                                                      | "                       | "                                                           |

| Proposed Activity/<br>Anticipated Environmental Impact      | Mitigation Measures Proposed                                                                                                                                                                                                                                                               | Parameters to be Monitored                                                                                                                                                                                                                                                                                                                                                             | Proposed Locations of Monitoring and Sampling (If Any)                                                                                           | Frequency of Monitoring                                                                                                                                                                                                                 | Agencies Responsible for<br>(i) Implementation<br>(ii) Monitoring |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>3. Impacts on the Beach, Shoreline in the Study Area</b> |                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                  |                                                                                                                                                                                                                                         |                                                                   |
|                                                             | <ul style="list-style-type: none"> <li>• Not to carry out any construction and related activities in the beach area</li> <li>• Not to dispose of wastewater or solid waste in the beach area</li> <li>• Not to extract sand or reef material from the beach and nearshore areas</li> </ul> | <ul style="list-style-type: none"> <li>• Areas of construction</li> <li>• Construction activities in the beach area.</li> <li>• Wastewater and solid waste disposal practices adopted on the site.</li> <li>• Sources of sand, and rubble in the project site.</li> <li>• Presence of beach sand (except natural sandy formations), and reef materials in the project site.</li> </ul> | <ul style="list-style-type: none"> <li>• Project site and the vicinity</li> <li>• Beach area</li> <li>• Areas of rock/reef formations</li> </ul> | <ul style="list-style-type: none"> <li>• At the commencement of construction.</li> <li>• At the early stages of construction.</li> <li>• Biweekly during construction.</li> <li>• In addition, when complaints are received.</li> </ul> | <p>(i) PP, CON</p> <p>(ii) EO</p>                                 |

| Proposed Activity/<br>Anticipated Environmental Impact                                         | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Parameters to be Monitored                                                                                                                                                                                                                                                                                                                            | Proposed Locations of Monitoring and Sampling (If Any)                                                                                             | Frequency of Monitoring                                                                                                                | Agencies Responsible for<br>(i) Implementation<br>(ii) Monitoring |
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| <b>4. Impacts on the Fauna and Flora in the Study Area</b>                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                    |                                                                                                                                        |                                                                   |
| <b>4.1 Impacts on the Natural Habitats/Eco-Systems</b>                                         | <ul style="list-style-type: none"> <li>• Due to the lack of fauna and flora, no special mitigation is needed.</li> <li>• Adopting proper solid waste management measures with no dumping in open areas.</li> <li>• Adopting proper wastewater management measures with no direct discharge of untreated wastewater into the environment.</li> <li>• Not to dispose of wastewater or solid waste in the beach and nearshore areas</li> <li>• Not to extract sand or reef material from the beach and nearshore areas.</li> </ul> | <ul style="list-style-type: none"> <li>• Noise, vibration and dust emission levels.</li> <li>• Wastewater and solid waste disposal practices adopted on the site.</li> <li>• Sources of sand, and rubble in the project site.</li> <li>• Presence of beach sand (except natural sandy formations), and reef materials in the project site.</li> </ul> | <ul style="list-style-type: none"> <li>• Project site and the vicinity.</li> <li>• Beach area</li> <li>• Areas of rock/reef formations.</li> </ul> | <ul style="list-style-type: none"> <li>• At the commencement of construction.</li> <li>• Biweekly during construction.</li> </ul>      | (i) PP, CON<br><br>(ii) EO                                        |
| <b>5. Impacts due to Traffic, Noise, Vibration, Dust Emissions and Construction Activities</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                    |                                                                                                                                        |                                                                   |
| <b>5.1 Impacts due to increased traffic.</b>                                                   | <ul style="list-style-type: none"> <li>• Scheduling material transport activities to avoid daily peak traffic hours and days of high traffic levels.</li> <li>• Providing warning/safety signs/lights on possible traffic congestions near the entrance to the access road.</li> <li>• Providing entrance facilities of adequate capacity to the project site directly from the access road(s) to minimize heavy vehicles</li> </ul>                                                                                            | <ul style="list-style-type: none"> <li>• Times of transport activities.</li> <li>• Traffic safety measures implemented</li> <li>• Entry conditions to the site.</li> <li>• Number of heavy vehicles waiting on the</li> </ul>                                                                                                                         | <ul style="list-style-type: none"> <li>• Project site and the vicinity.</li> <li>• A2 Road in the vicinity of the site entrance.</li> </ul>        | <ul style="list-style-type: none"> <li>• At the commencement of construction</li> <li>• At the early stages of construction</li> </ul> | (i) PP, CON<br><br>(ii) EO                                        |

| Proposed Activity/<br>Anticipated Environmental Impact                                        | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Parameters to be Monitored                                                                                                                                                                                                                                                                                                                                                                                                                                              | Proposed Locations of Monitoring and Sampling (If Any)                                                                          | Frequency of Monitoring                                                                                                                                                                                                             | Agencies Responsible for<br>(i) Implementation<br>(ii) Monitoring |
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|                                                                                               | <p>waiting on the A2 Road prior to entry to the project site.</p> <ul style="list-style-type: none"> <li>• Providing adequate turning and parking space in the project site for transport vehicles</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>A2 Road prior to entering the site.</p> <ul style="list-style-type: none"> <li>• Turning and parking spaces on the site</li> </ul>                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                 | <ul style="list-style-type: none"> <li>• Biweekly during construction</li> <li>• In addition, when complaints are received</li> </ul>                                                                                               |                                                                   |
| <b>5.2 Impacts relating to noise, vibration and dust from construction-related activities</b> | <p>For noise and vibration, mitigation measures include:</p> <ul style="list-style-type: none"> <li>• Operating well-maintained plants at the site and regular servicing of such plants during the construction period</li> <li>• Shutting down and/or throttling down of machines and plants that may be in intermittent use, between work periods</li> <li>• If necessary, providing temporary noise barriers on site to control noise from particularly noisy operations</li> <li>• Limiting the project activities and vehicular movement during certain periods of the day and at the night</li> <li>• Use of low vibration-causing machinery/techniques for construction purposes, regular monitoring of vibration</li> </ul> | <ul style="list-style-type: none"> <li>• Noise levels of plants/machinery</li> <li>• Maintenance records of plants/machinery</li> <li>• Operational practices of plants/machinery</li> <li>• Temporary noise barriers provided</li> <li>• Times of project activities during the day and night and on the days of religious/cultural activities/festivals in the area</li> <li>• Dust emission levels</li> <li>• Water spraying carried out in exposed areas</li> </ul> | <ul style="list-style-type: none"> <li>• Project site and the vicinity</li> <li>• Approach roads to the project site</li> </ul> | <ul style="list-style-type: none"> <li>• At the commencement of construction</li> <li>• At the early stages of construction</li> <li>• Biweekly during construction</li> <li>• In addition, when complaints are received</li> </ul> | <p>(i) PP, CON</p> <p>(ii) EO</p>                                 |

| Proposed Activity/<br>Anticipated Environmental Impact | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Parameters to be Monitored                                                                                                                                                                                                                                                                  | Proposed Locations of Monitoring and Sampling (If Any) | Frequency of Monitoring | Agencies Responsible for (i) Implementation (ii) Monitoring |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------|-------------------------------------------------------------|
|                                                        | <p>levels and providing compensation to the parties affected by vibration-related damages due to project activities</p> <ul style="list-style-type: none"> <li>Restricting noise/dust/vibration generating construction activities during religious/cultural activities/festivals in the area</li> <li>Carrying out a pre-crack survey if required, monitoring the vibration levels and paying compensations to the parties affected due to excessive disturbances</li> </ul> <p>For dust emissions and air quality, mitigation measures include:</p> <ul style="list-style-type: none"> <li>Spraying the areas of high dust emissions with water so as to maintain a sufficiently wet surface.</li> <li>Enforcing vehicle speed limits to minimize dust generation and the safety of workers and road users.</li> <li>Providing covers in vehicles carrying dust-emitting materials to minimize dust emissions.</li> </ul> | <ul style="list-style-type: none"> <li>Speed limit signs provided in the vicinity of the project site</li> <li>Awareness of the drivers on vehicle speed limits</li> <li>Material transport practices (whether dust-emitting materials are transported under covered conditions)</li> </ul> |                                                        |                         |                                                             |
|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                             |                                                        |                         |                                                             |

| Proposed Activity/<br>Anticipated Environmental Impact                                                                                  | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                     | Parameters to be Monitored                                                                                                                                                                      | Proposed Locations of Monitoring and Sampling (If Any)                                                            | Frequency of Monitoring                                                                                                                                                                                                     | Agencies Responsible for<br>(i) Implementation<br>(ii) Monitoring |
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| <b>6. Impacts on Existing Roads, Pavements and Other Properties in the Project Area during Transportation of Construction Materials</b> |                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                 |                                                                                                                   |                                                                                                                                                                                                                             |                                                                   |
|                                                                                                                                         | <p>In addition to the mitigation measures presented in C.6.1, for potential impacts due to increased traffic.</p> <ul style="list-style-type: none"> <li>Regular repairing of affected road stretches and pavements, mainly in the vicinity of the project site entrance, under the guidance of relevant authorities.</li> </ul> | <ul style="list-style-type: none"> <li>Road conditions in the vicinity of the project site entrance.</li> <li>Road repairs carried out in the vicinity of the project site entrance.</li> </ul> | <ul style="list-style-type: none"> <li>Approach roads to the project site in the vicinity of the site.</li> </ul> | <ul style="list-style-type: none"> <li>At the commencement of construction</li> <li>At the early stages of construction</li> <li>Biweekly during construction</li> <li>In addition, when complaints are received</li> </ul> | <p>(i) PP, CON</p> <p>(ii) EO</p>                                 |
| <b>7. Impacts due to any Exotic Species introduced for Landscaping and Impacts on Indigenous Species</b>                                | <ul style="list-style-type: none"> <li>Carrying out any enhancement of vegetation and landscape management expert guidance and steps taken to introduce indigenous plant species and/or species that do not cause any adverse effects to the existing plant species with no invasive exotic species introduced</li> </ul>        | <ul style="list-style-type: none"> <li>Floral species introduced for landscaping</li> </ul>                                                                                                     | <ul style="list-style-type: none"> <li>Project site</li> </ul>                                                    | <ul style="list-style-type: none"> <li>Prior to and after landscaping</li> </ul>                                                                                                                                            | "                                                                 |

| Proposed Activity/<br>Anticipated Environmental Impact                                                 | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                   | Parameters to be Monitored                                                                                                                                                                                     | Proposed Locations of Monitoring and Sampling (If Any)                                 | Frequency of Monitoring                                                                                                                                                                                                             | Agencies Responsible for (i) Implementation (ii) Monitoring |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| <b>8. Impacts on Proposed/Planned Government/Private Sector Development Activities in the Vicinity</b> | <ul style="list-style-type: none"> <li>• Confining the construction and related activities within the project site</li> <li>• Not to use other spaces, resources allocated for planned government/private sector development activities in the vicinity</li> <li>• Adopting the impact mitigation measures presented in C.5 and C.6</li> </ul> | <ul style="list-style-type: none"> <li>• Locations of the project and related activities</li> <li>• Locations of Government/Private Sector Development Activities in the Vicinity</li> </ul>                   | <ul style="list-style-type: none"> <li>• Study area</li> </ul>                         | <ul style="list-style-type: none"> <li>• At the commencement of construction</li> <li>• At the early stages of construction</li> <li>• Biweekly during construction</li> <li>• In addition, when complaints are received</li> </ul> | "                                                           |
| <b>9. Impacts on Socio-Economic Aspects.</b>                                                           | <ul style="list-style-type: none"> <li>• Providing employment and income-generating opportunities to the local community during the construction phase</li> <li>• Providing assistance to those, if any, affected by construction and related activities</li> </ul>                                                                            | <ul style="list-style-type: none"> <li>• Number of employment opportunities provided to the local community</li> <li>• Compensations paid for those affected by construction and related activities</li> </ul> | <ul style="list-style-type: none"> <li>• Project site</li> <li>• Study area</li> </ul> | "                                                                                                                                                                                                                                   | "                                                           |

| Proposed Activity/<br>Anticipated Environmental Impact                     | Mitigation Measures Proposed                                                                                                                                                                                                                               | Parameters to be Monitored                                                                                                                                                                                                                                             | Proposed Locations of Monitoring and Sampling (If Any)               | Frequency of Monitoring                                                                                                                                                    | Agencies Responsible for (i) Implementation (ii) Monitoring |
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| <b>Operational Phase</b>                                                   |                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                        |                                                                      |                                                                                                                                                                            |                                                             |
| <b>10. Water-related Impacts</b>                                           |                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                        |                                                                      |                                                                                                                                                                            |                                                             |
| <b>10.1 Impacts due to Effluents Generated and Spillages</b>               | <ul style="list-style-type: none"> <li>Provision of a pipe/drain system to direct the wastewater to the treatment plant from the sources of generation</li> <li>Regular maintenance of the pipe/drain system to prevent blockages and spillages</li> </ul> | <ul style="list-style-type: none"> <li>Adequacy of the pipe/drain system to direct the wastewater to the treatment plant from the sources of generation</li> <li>Records of blockages and spillages</li> <li>Maintenance practices of the pipe/drain system</li> </ul> | <ul style="list-style-type: none"> <li>Apartment facility</li> </ul> | <ul style="list-style-type: none"> <li>At the commencement of operations</li> <li>Annually during operations</li> <li>In addition, when complaints are received</li> </ul> | (i) PP<br><br>(ii) EO                                       |
| <b>10.2 Impacts due to Disposal of Effluents/Spillages</b>                 | <ul style="list-style-type: none"> <li>Wastewater will be connected to the central treatment system of CMC,</li> </ul>                                                                                                                                     | <ul style="list-style-type: none"> <li></li> </ul>                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li></li> </ul>                   | "                                                                                                                                                                          | "                                                           |
| <b>10.3 Impacts due to Possible Contamination of Surface/ Ground Water</b> | <ul style="list-style-type: none"> <li>Implementing the mitigation measures presented in O.1.1 and O.1.2</li> </ul>                                                                                                                                        | <ul style="list-style-type: none"> <li>Parameters measures presented in O.1.1 and O.1.2</li> </ul>                                                                                                                                                                     | "                                                                    | "                                                                                                                                                                          | "                                                           |

| Proposed Activity/<br>Anticipated Environmental Impact                        | Mitigation Measures Proposed                                                                                         | Parameters to be Monitored                                                                                                                                               | Proposed Locations of Monitoring and Sampling (If Any)                                                      | Frequency of Monitoring | Agencies Responsible for (i) Implementation (ii) Monitoring |
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| due to Effluents/ Spillages                                                   |                                                                                                                      |                                                                                                                                                                          |                                                                                                             |                         |                                                             |
| 10.4 Impacts on Surface/Ground Water Due to Extraction for Project Activities | <ul style="list-style-type: none"> <li>Non-extraction of surface and groundwater for operational purposes</li> </ul> | <ul style="list-style-type: none"> <li>Sources of water to the apartment facility</li> </ul>                                                                             | <ul style="list-style-type: none"> <li>Apartment facility</li> </ul>                                        | "                       | "                                                           |
| 10.5 Impacts due to Salinity Intrusion due to Water Extraction (If any)       | <ul style="list-style-type: none"> <li>Non-extraction of groundwater for operational purposes</li> </ul>             | <ul style="list-style-type: none"> <li>Sources of water to the apartment facility</li> <li>Salinity levels of groundwater in the vicinity of the project site</li> </ul> | <ul style="list-style-type: none"> <li>Apartment facility</li> <li>Project site and the vicinity</li> </ul> | "                       | "                                                           |
| <b>11. Waste Water-related Impacts</b>                                        |                                                                                                                      |                                                                                                                                                                          |                                                                                                             |                         |                                                             |

| Proposed Activity/<br>Anticipated Environmental Impact                                                                                              | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                    | Parameters to be Monitored                                                                                                                                                                                                                                                                                                     | Proposed Locations of Monitoring and Sampling (If Any)                                                      | Frequency of Monitoring                                                                                                                                                    | Agencies Responsible for<br>(i) Implementation<br>(ii) Monitoring |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>11.1 Impacts Due to Waste Water Disposal</b>                                                                                                     | <ul style="list-style-type: none"> <li>Implementing the mitigation measures presented in 5.2.1</li> </ul>                                                                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>CMC monitoring parameters</li> </ul>                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Apartment facility</li> <li>Project site and the vicinity</li> </ul> | <ul style="list-style-type: none"> <li>At the commencement of operations</li> <li>Annually during operations</li> <li>In addition, when complaints are received</li> </ul> | (i) PP<br>(ii) EO                                                 |
| <b>11.2 Impacts on Surface/Ground Water due to Waste Water Discharge, Surface Runoff and Usage of Pesticides/Fertilizer and any other Chemicals</b> | In addition to the mitigation measures presented in 5.2, <ul style="list-style-type: none"> <li>Usage of chemicals, pesticides, or fertilizer approved for the relevant operational purposes (cleaning, landscaping)</li> <li>Minimal usage of chemicals, pesticides, or fertilizer as per specifications</li> <li>Storage of chemicals, pesticides, or fertilizer as per relevant specifications/standards at appropriate locations</li> </ul> | <ul style="list-style-type: none"> <li>Types of chemicals, pesticides, or fertilizers used</li> <li>Quantities of chemicals, pesticides, or fertilizer and the recommended levels</li> <li>Storage facilities provided for chemicals, pesticides, or fertilizer</li> <li>Awareness of the staff handling chemicals,</li> </ul> | "                                                                                                           | "                                                                                                                                                                          | "                                                                 |

| Proposed Activity/<br>Anticipated Environmental Impact       | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                      | Parameters to be Monitored                                                                                                                                                                                                                                           | Proposed Locations of Monitoring and Sampling (If Any)                                                      | Frequency of Monitoring                                                                                                                                                    | Agencies Responsible for<br>(i) Implementation<br>(ii) Monitoring |
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|                                                              | <ul style="list-style-type: none"> <li>Providing training for the staff handling chemicals, pesticides or fertilizer on appropriate safety measures/standards</li> <li>Provision of safety gear for the staff handling chemicals, pesticides or fertilizer</li> </ul>                                                                                                                                             | <ul style="list-style-type: none"> <li>pesticides, or fertilizer on the risks and safety measures</li> <li>Safety gear provided to the staff handling chemicals, pesticides, or fertilizer</li> </ul>                                                                |                                                                                                             |                                                                                                                                                                            |                                                                   |
| <b>12. Solid Waste-related Impacts</b>                       |                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                      |                                                                                                             |                                                                                                                                                                            |                                                                   |
| <b>12.1 Anticipated Problems Due to Solid Waste Disposal</b> | <ul style="list-style-type: none"> <li>Separate collection of solid waste generated by color-coded bins.</li> <li>The separate temporary storage of solid waste.</li> <li>Storage of food waste in refrigerated conditions.</li> <li>Sorting of non-organic waste for reuse, recycling and selling to (authorized) dealers.</li> <li>Sorting and selling of organic waste (food waste) as animal feed.</li> </ul> | <ul style="list-style-type: none"> <li>Adequacy of the bins provided.</li> <li>Adequacy of temporary storage facilities for solid waste.</li> <li>Adequacy and performance of the refrigerated storage facilities.</li> <li>Sorting practices implemented</li> </ul> | <ul style="list-style-type: none"> <li>Apartment facility</li> <li>Project site and the vicinity</li> </ul> | <ul style="list-style-type: none"> <li>At the commencement of operations</li> <li>Annually during operations</li> <li>In addition, when complaints are received</li> </ul> | (i) PP<br>(ii) EO                                                 |

| Proposed Activity/<br>Anticipated Environmental Impact                                                | Mitigation Measures Proposed                                                                                                                                                                                                                                                           | Parameters to be Monitored                                                                                                                                                                           | Proposed Locations of Monitoring and Sampling (If Any) | Frequency of Monitoring | Agencies Responsible for (i) Implementation (ii) Monitoring |
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|                                                                                                       | <ul style="list-style-type: none"> <li>Disposal of remaining waste through the services by the local authority-Weligama Pradeshiya Sabha</li> <li>Separate collection and storage of any hazardous waste generated and disposal with the assistance of authorized agencies.</li> </ul> | <ul style="list-style-type: none"> <li>Disposal practices adopted</li> <li>Adequacy of the storage facilities for hazardous waste</li> <li>Disposal practices adopted for hazardous waste</li> </ul> |                                                        |                         |                                                             |
| <b>12.2 Impacts of the Proposed Method of Solid Waste Disposal on Surface/Ground water and/or Air</b> | <p>In addition to the mitigation measures presented in O.3.1,</p> <ul style="list-style-type: none"> <li>Transport of organic waste under covered conditions for disposal</li> </ul>                                                                                                   | <ul style="list-style-type: none"> <li>Waste transport practices (whether the organic waste is transported under covered conditions)</li> </ul>                                                      | "                                                      | "                       | "                                                           |
| <b>14. Impacts related to Air Quality (Impacts due to Gaseous Emissions)</b>                          |                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                      |                                                        |                         |                                                             |
| <b>14.1 Impacts Due to Gaseous Emissions by Operational Activities</b>                                | <ul style="list-style-type: none"> <li>Minimal use of exhaust emitting plant/machinery (such as generators)</li> <li>Operating well-maintained plant/machinery and regular servicing of such plant/machinery as per relevant standards</li> </ul>                                      | <ul style="list-style-type: none"> <li>Number and types of exhaust emitting plant/machinery (such as generators)</li> <li>Exhaust levels of exhaust emitting plant/machinery</li> </ul>              | "                                                      | "                       | "                                                           |

| Proposed Activity/<br>Anticipated Environmental Impact | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                         | Parameters to be Monitored                                                                                                                                                                                                                                                                                                                                                                                       | Proposed Locations of Monitoring and Sampling (If Any)                                                      | Frequency of Monitoring                                                                                                                                                    | Agencies Responsible for (i) Implementation (ii) Monitoring |
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|                                                        | <ul style="list-style-type: none"> <li>Shutting down and/or throttling down of machines and plant/machinery that may be in intermittent use, between operational periods</li> </ul>                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>Maintenance records of exhaust emitting plant/machinery</li> <li>Operational practices exhaust emitting plant/machinery</li> </ul>                                                                                                                                                                                                                                        |                                                                                                             |                                                                                                                                                                            |                                                             |
| <b>14.2 Envisaged Odour Problems</b>                   | <p>In addition to the mitigation measures presented in O.4.1,</p> <ul style="list-style-type: none"> <li>Storage of food/organic waste in refrigerated conditions</li> <li>Regular removal of food/organic waste</li> <li>Transport of food/organic waste under covered conditions for disposal</li> <li>Installation of deodorizers/exhaust stacks for kitchens, wastewater treatment plant for the emission of exhausts</li> </ul> | <ul style="list-style-type: none"> <li>Adequacy and performance of the refrigerated storage facilities</li> <li>Frequency of disposals</li> <li>Waste transport practices (whether the organic waste is transported under covered conditions)</li> <li>Adequacy and performance of the deodorizers/exhaust stacks installed in kitchens, and wastewater treatment plants for the emission of exhausts</li> </ul> | <ul style="list-style-type: none"> <li>Apartment facility</li> <li>Project site and the vicinity</li> </ul> | <ul style="list-style-type: none"> <li>At the commencement of operations</li> <li>Annually during operations</li> <li>In addition, when complaints are received</li> </ul> | <p>(i) PP</p> <p>(ii) EO</p>                                |
|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                             |                                                                                                                                                                            |                                                             |

| Proposed Activity/<br>Anticipated Environmental Impact         | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Parameters to be Monitored                                                                                                                                                                                                                     | Proposed Locations of Monitoring and Sampling (If Any) | Frequency of Monitoring | Agencies Responsible for (i) Implementation (ii) Monitoring |
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| <b>15. Impacts due to Noise and Vibrations</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                |                                                        |                         |                                                             |
|                                                                | <ul style="list-style-type: none"> <li>Noise control at source: engineering modifications that alter the process of noise generation</li> <li>Silencing: provision of silencers for aerodynamic sources of noise</li> <li>Vibration isolation: introduction of a vibration break to prevent the transmission of mechanical energy</li> <li>Vibration damping: extraction and dissipation of the energy in vibrating surfaces</li> <li>Enclosure: prevention of the transmission of sound by introducing a cover</li> <li>Barriers: provision of a barrier between the source and receiver</li> </ul> | <ul style="list-style-type: none"> <li>Noise control measures implemented</li> <li>Vibration control measures implemented</li> <li>Noise levels (Measurements, if necessary)</li> <li>Vibration levels (Measurements, if necessary)</li> </ul> | "                                                      | "                       | "                                                           |
| <b>16. Impacts on Ecological Resources</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                |                                                        |                         |                                                             |
| <b>16.1 Impacts on Existing Vegetation in the Project Site</b> | <ul style="list-style-type: none"> <li>Carrying out any enhancement of vegetation and landscape management expert guidance and steps taken to introduce indigenous plant species and/or species that do not cause any adverse effects</li> </ul>                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Landscaped areas</li> <li>Species used for landscaping</li> </ul>                                                                                                                                       | "                                                      | "                       | "                                                           |

| Proposed Activity/<br>Anticipated Environmental Impact                                                                | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Parameters to be Monitored                                                                                                                                                                                                                                                                                                                                                                                                                                  | Proposed Locations of Monitoring and Sampling (If Any)                                                                                | Frequency of Monitoring                                                                                                                                                    | Agencies Responsible for<br>(i) Implementation<br>(ii) Monitoring |
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|                                                                                                                       | to the existing plant species with no invasive exotic species introduced                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                       |                                                                                                                                                                            |                                                                   |
| <b>16.2 Impacts on Fauna, Flora, Natural Habitats/Eco-Systems in the Study Area including Coral Reefs in the Area</b> | <ul style="list-style-type: none"> <li>Minimizing the disturbance to vegetation within the reservations specified</li> <li>Carrying out operational activities in a controlled manner to minimize the disturbances such as noise, vibrations, dust emissions, and lighting to the fauna and flora in the area</li> <li>Adopting proper solid waste management measures with no dumping in open areas</li> <li>Adopting proper wastewater management measures with no direct discharge of untreated wastewater into the environment</li> </ul> | <ul style="list-style-type: none"> <li>Areas of land clearing</li> <li>Clearing within the reservations</li> <li>Barriers and other protection measures provided to protect rare, nationally threatened and vulnerable floral species</li> <li>Awareness of staff on rare, nationally threatened and vulnerable floral species</li> <li>Noise, vibration and dust emission levels</li> <li>Wastewater and solid waste disposal practices adopted</li> </ul> | <ul style="list-style-type: none"> <li>Project site and the vicinity</li> <li>Beach area</li> <li>Areas of reef formations</li> </ul> | <ul style="list-style-type: none"> <li>At the commencement of operations</li> <li>Annually during operations</li> <li>In addition, when complaints are received</li> </ul> | (i) PP<br><br>(ii) EO                                             |
|                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                       |                                                                                                                                                                            |                                                                   |

| Proposed Activity/<br>Anticipated Environmental Impact | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                                                 | Parameters to be Monitored                                                                                                                                                                                                                                                                                                   | Proposed Locations of Monitoring and Sampling (If Any)                                                                                                                                        | Frequency of Monitoring                                                                                                                                                    | Agencies Responsible for (i) Implementation (ii) Monitoring |
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| <b>17. Human and Social, Cultural Impacts</b>          |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                               |                                                                                                                                                                            |                                                             |
| <b>17.1 Impacts on Other Residential Areas</b>         | <ul style="list-style-type: none"> <li>Minimizing the disturbance to any local communities by the activities of the proposed facility-transport, noise, lighting, etc by conducting these activities in a controlled manner</li> <li>Providing adequate turning and parking space in the project site for transport vehicles to minimize traffic congestion in the vicinity of the apartment facility</li> </ul>                                             | <ul style="list-style-type: none"> <li>Noise, vibration, and lighting levels due to operational activities</li> <li>Parking spaces are provided on the premises</li> </ul>                                                                                                                                                   | <ul style="list-style-type: none"> <li>Apartment facility</li> <li>Project site and the vicinity</li> </ul>                                                                                   | "                                                                                                                                                                          | "                                                           |
| <b>17.2 Impacts/ Disturbances to Existing Services</b> | <ul style="list-style-type: none"> <li>Obtaining services (water, electricity, telecommunication) for the proposed facility with the approval of the relevant agencies (without disturbing the existing services)</li> <li>Implementing the solid waste disposal methods presented in O.3.</li> <li>Providing assistance to the local authority for the maintenance/improvement of the services (garbage collection, street lighting) in the area</li> </ul> | <ul style="list-style-type: none"> <li>Approvals granted to obtain the services from relevant agencies</li> <li>Issues related to services experienced by the neighbouring community</li> <li>Assistance provided by the project proponent to the local authority for the maintenance/improvement of the services</li> </ul> | <ul style="list-style-type: none"> <li>Apartment facility</li> <li>Study area or a wider area as required</li> <li>Offices of relevant government agencies and the local authority</li> </ul> | <ul style="list-style-type: none"> <li>At the commencement of operations</li> <li>Annually during operations</li> <li>In addition, when complaints are received</li> </ul> | (i) PP<br><br>(ii) EO                                       |

| Proposed Activity/<br>Anticipated Environmental Impact | Mitigation Measures Proposed                                                                                                                                                                                                                                                                 | Parameters to be Monitored                                                                                                                                                     | Proposed Locations of Monitoring and Sampling (If Any)                                     | Frequency of Monitoring                                                                                                                                                                                   | Agencies Responsible for (i) Implementation (ii) Monitoring |
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| <b>17.3 Impacts Due to Changes in Land Use</b>         | <ul style="list-style-type: none"> <li>Implementation of the mitigation measures presented in 5.7 and to minimize the impacts on residential areas and existing services respectively</li> <li>Provision of employment and income generation opportunities to the local community</li> </ul> | <ul style="list-style-type: none"> <li>Urban Drainage and Flood Risk</li> <li>Coastal Zone and Environmental Regulations</li> <li>Traffic and Infrastructure Impact</li> </ul> | "                                                                                          | "                                                                                                                                                                                                         | "                                                           |
| <b>18. Impacts on Aesthetic and Visual Environment</b> | <ul style="list-style-type: none"> <li>Carrying out architectural designs to create an attractive appearance for the proposed development</li> <li>Carrying out landscaping to transform the site into an aesthetically pleasing landscape</li> </ul>                                        | <ul style="list-style-type: none"> <li>Architectural designs and certification by qualified architects</li> <li>Landscape designs</li> <li>Landscaping carried out</li> </ul>  | <ul style="list-style-type: none"> <li>Apartment facility</li> <li>Project site</li> </ul> | <ul style="list-style-type: none"> <li>Prior to construction</li> <li>At the commencement of operations</li> <li>Annually during operations</li> <li>In addition, when complaints are received</li> </ul> | "                                                           |
| <b>19. Impacts Due to Emergency Situations</b>         | <ul style="list-style-type: none"> <li>Incorporation of appropriate safeguards against damages by hazards such as tsunamis, and cyclones into the structural designs of the proposed constructions.</li> </ul>                                                                               | <ul style="list-style-type: none"> <li>Structural designs and certification by qualified structural engineers</li> </ul>                                                       | <ul style="list-style-type: none"> <li>Apartment facility</li> <li>Project site</li> </ul> | "                                                                                                                                                                                                         | "                                                           |

| Proposed Activity/<br>Anticipated Environmental Impact | Mitigation Measures Proposed                                                                                                                                                                                                                                                                                                                                                                                                | Parameters to be Monitored                                                                                                                                                                                                                                             | Proposed Locations of Monitoring and Sampling (If Any)                       | Frequency of Monitoring | Agencies Responsible for (i) Implementation (ii) Monitoring |
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|                                                        | <ul style="list-style-type: none"> <li>• Implementation of an approved fire protection system for the proposed development</li> <li>• Provision of a lifeguard service for the safety of recreational activities in the swimming pool, sea and beach area.</li> <li>• Development of evacuation plans and establishment of a Crisis Response Team (CRT) to implement evacuation plans under emergency situations</li> </ul> | <ul style="list-style-type: none"> <li>• Fire protection system and the certification by the relevant authority</li> <li>• Records of evacuation drills conducted</li> <li>• Number and the locations of lifeguards provided</li> <li>• Presence of the CRT</li> </ul> | <ul style="list-style-type: none"> <li>• Beach and nearshore area</li> </ul> |                         |                                                             |

## 6.2 Disaster Management Plan.

Disasters are typically defined by their negative effects and the unavoidable need for exceptional levels of involvement. A proper response, early warning, and disaster responses can significantly lessen the impact. Planning for and responding to risks and catastrophes, including hazard analysis vulnerability reduction (preparedness), prevention, mitigation, response, recovery, and rehabilitation, are all included in disaster management. Planning for contingencies is putting emergency preparedness and response measures in place for situations that may or may not happen. It applies to the control of disaster risks and their effects.

Action taken to lessen the effects of disasters is known as mitigation. Disasters may not be able to be prevented, but if the right efforts are taken, their impacts can be changed or lessened. There are early and late periods of responses. Rescue and relief are early responses, whereas rehabilitation and reconstruction are late replies. When a disaster strikes, communities, and institutions are the first to act. The secret to preventing disasters is their creativity.

Therefore, disaster management and sustainable development are interconnected. While effective disaster preparation minimizes development disruption, ineffective responses can divert scarce resources, create dependency, and even increase vulnerability to subsequent disasters.

### 6.2.1 Disaster Management

A disaster is an unforeseen occurrence brought on by internal or external threats, earthquakes, fires, accidents, or internal upheavals. Finding the root causes that develop or represent an unexpected threat to the structural integrity of pier construction is the first stage. Excessive load, cracks, failure, malfunction of sensing devices, accidents, etc. are possible causes. These need to be carefully investigated.

- Establishment of a senior post-designated permanent Disaster Management line role
- Establish a "Disaster Unit" with full-time duties for planning and managing disasters, including:
  - Create and keep a written, routinely updated disaster plan
  - Establishing and running a disaster operation center and a team that can be established quickly
  - Creates a working communication network and a central administrative data facility.
  - Network and communicate with significant government figures, other agencies, non-profit organizations, and disaster response organizations.
  - Prepare a health and welfare plan for a disaster that is foreseeable or predictable.
  - Prepare for disasters by training, assessing, and advocating for prevention, particularly risk and vulnerability reduction.

### 6.2.2 Preparedness for Disaster Management

Being a technologically advanced system with a new set of employees, rigorous mock drills for the staff involved are highly important to train them to fully understand the measures that must be taken to handle emergencies. They will receive training in effective communication techniques so that they may approach passengers during incident management and solicit their cooperation while assuring them of their safety. Since practicing the following Mock Drills will help you learn better:

- i. Fire Drill
- ii. Drill for use of rescue & relief
- iii. Hot line telephone communication with state disaster management authority.

### 6.2.3 Need for Disaster Management Measures

Disaster disrupts everyday human existence and established social and economic structures, causing sudden and severe suffering for humanity. It has the ability to significantly harm people. To handle the aforementioned emergencies in the metro system, an effective disaster management plan is required. The following are the primary goals of disaster management measures:

- i. Save a life and alleviate suffering.
- ii. Provide help to stranded people and arrange their prompt evacuation.
- iii. Install a sense of security amongst all concerned by providing accurate information.
- iv. Protect project property.
- v. Expedite restoration of operations as early as possible.
- vi. Lay down the actions required to be taken by staff in the event of a disaster in order to ensure prompt handling of the crisis situation in a coordinated manner.
- vii. Ensure that all officials who are responsible to deal with the situation are thoroughly conversant with their duties and responsibilities in advance. It is important that these officials and workers are adequately trained in anticipation to avoid any kind of confusion and chaos at the time of the actual situation and to enable them to discharge their responsibilities with alertness and promptness.

### 6.2.4 Identification and Assessment of Hazards

This stage is extremely important for both on-site and off-site emergency preparedness and calls for works management to methodically identify potential emergencies in their plant. These could be anything from little occurrences that work staff can handle on their own to the biggest occurrences for which it is practical to have a strategy.

The assessment of possible incidents should produce a report indicating:

- The worst events considered;
- The route to those worst events;
- The time scale to lesser events along the way;
- The size of lesser events if their development is halted;
- The relative likelihood of events;
- The consequences of such events

### **6.2.5 Planning During the Conceptual Stage**

Although each sector is equally responsible for this, proper DMP planning from the conceptual stage aids in improving worker and equipment safety. In the long run, this aids in reducing the destruction of property and the loss of life, both of which are direct results of accidents. The following factors must be taken into consideration in order to achieve this goal.

- Risk associated with the proposed facility
- Safety measures
- Siting of facility
- Layout of the facility
- Emergency preparedness
- Compliance with the regulatory requirements
- Centralized control room
- LAN connecting to all safety concerns

### **6.2.6 Emergency planning and response procedures**

Emergencies are infrequent. As a result, coordination during emergencies is more complex than coordination during scheduled operations that take place on a regular basis, according to a set timetable. An organized approach to planning is necessary to efficiently coordinate emergency response actions. Organization, Responsibilities, Procedures, Communication and Transport, Resource Requirements, and Control Center are crucial components of emergency preparation. Additional preparation beyond what is taken into account in the aforementioned plans is necessary for the developer-level emergency plan, which should be effectively integrated to ensure better coordination.

Emergency readiness maintenance, streamlining, and the capability of swiftly mobilizing all troops in response to any crisis are all included in emergency planning.

### 6.2.7 Serious Incidents Requiring Disaster Management Measures

Disasters that affect a metro area can be divided into two main kinds, such as natural and man-made.

#### A. Man Made Disaster

- i. Terrorist attack
- ii. Bomb threat/ Bomb blast
- iii. Hostage Situations
- iv. Release of Chemical or biological gas in trains, stations, or tunnels
- v. Fire in depot and yard, underground/ elevated infrastructures, power stations, etc.

#### B. Natural Disaster

Floods- Due to high rains during the monsoon season, flooding is a possibility and has happened in this region.

Tsunami- The proposed property is situated not far from a beach on the coast. The area was ravaged by the 2004 Indian Ocean Tsunami, and there have also been previous cyclone effects. Therefore, it is crucial to have a suitable backup plan in place for any potential emergencies.

### 6.2.8 Provisions at Metro Stations/Other Installations

To prevent the emergency effectively, an effective system will be provided which will include Fire Detection and Suppression System, Smoke Management, Environmental Control System (ECS), Lighting System, Station Power Supply System, DG Sets & UPS, Seepage system, Water Supply, and Drainage System, Sewage System, Station Area Lights and other facilities which may be deemed necessary.

The above-said provisions are suggestive and an exhaustive set of facilities will be provided based on on-site conditions, location, and other internal and external factors. The details of these activities will be taken up at the project implementation stage.

The following recommendations under a series of headings:

#### 1. Preventive Action

Action will be taken to avoid a failure once it is known that a disaster is likely. Engineers in charge of preventive action must locate resources for repair tools, supplies, labor, and knowledge that can be used in an emergency.

#### 2. Reporting Procedures

It must be stated at what point a situation qualifies as a disaster. This will include the point at which the frequency and specificity of the surveillance requirements should be raised. The Engineer-in-Chief will notify the officer of the following information:

- Exit points for the public,
- Safety areas in the tunnel/overhead rail, and
- Nearest medical facility

### 3. Communication System

An effective communication system is critical to the success of any disaster management plan. This will be worked out in collaboration with local governments. When a calamity strikes, the entire communication system is frequently affected. The damaged sites will be clearly labeled, and a temporary and foolproof communication system will be installed.

There are four communication systems in the operation building;

- Voice:** The voice communication system will include telephone service from a Local Exchange Carrier (LEC) for operation personnel, as well as emergency telephone contact between Engineers and operation workers.
- Data:** Data connections will take place via a local area network (LAN), which will connect the various computer systems in the control room and the remainder of the operation center.
- Video:** Video communication will take place via a TV network, which will broadcast the appropriate action in the event of an emergency.
- Radio:** Radio communication will take place via a radio frequency network, which will transmit the essential action in the event of an emergency.

### 4. Emergency Action Committee

An Emergency Action Committee will be formed to ensure coordinated action. The committee will be made up of the following individuals:

- Work Station Manager concerned,
- Police Officer of the area,
- Representative of the transport department,
- Home Guard representative,
- Fire Brigade representative,
- Health Department representative,
- Department of Information and Publicity, and
- Non-Governmental Organizations in the area

Based on local needs and available facilities, the Emergency Action Committee will develop an evacuation strategy and procedures for implementation. The strategy will include:

- Priorities are assigned to the locations to be evacuated.
- Use of a safe route, adequate transportation for evacuation, and traffic control
- Safe zones and shelters

- Protection of property left behind in evacuated locations
- The roles and responsibilities of various members of evacuation teams, as well as
- Establishment of a joint control room

All individuals involved in the Emergency Action Plan shall be well-versed in all aspects of the plan and their respective duties. They will be trained for the Emergency Action Plan through drills. The site's personnel will be trained in problem detection, evaluation, and emergency response. Individual accountability for handling the parts of the emergency plan will be assigned.

The success of an emergency plan depends on public participation, response to warning notifications, and timely action. The public shall be educated on the hazards and key role in disaster mitigation by helping in the planned evacuation and rescue operations.

It is essential to communicate by whom and how a declared emergency will be terminated. There should be proper notification to the public on de-alert signals regarding the termination of the emergency. The notification shall be clear so that the evacuees know precisely what to do when re-entering or approaching the affected areas.

### **6.2.9 Emergency Measures**

Emergency measures, such as lighting, fire, and means of escape, are implemented to avoid system failure. The purpose of an Emergency Action Plan is to identify locations, populations, and structures that are likely to be impacted by a catastrophic event or catastrophe. Preventive action, communication, warning procedures, and coordination among multiple relief authorities should all be included in the action plan. These are covered in the sections that follow.

#### **1. Ventilation system**

An appropriate ventilation system will be installed in the building structures. The windows will be opened in tandem using a remote device. This is suggested to ensure that any smoke or filthy air that accumulates inside the Depot may be swiftly eliminated.

#### **2. Fire Protection**

The building materials will meet the necessary fire resistance standards. For surface or above structures, the fire resistance duration will be at least 2 hours. Materials with no surface-burning characteristics will be employed. The electrical systems will be outfitted with automatic circuit breakers that will be activated by rising current as well as overcurrent. The depot and yard will be designed with the following features in mind:

1. Fire prevention measures
2. Safety and Security Systems

## **Fire Prevention and Safety Measures**

Fire prevention measures will be devised and implemented to reduce the danger of a fire outbreak through the appropriate selection, placement, and installation of various materials and equipment. Potential fire sources can be reduced in station planning by:

### **i. Fire Prevention**

- Where practical, use non-combustible or smoke-retardant materials.
- Fire retardant materials will be used on rolling stock, as well as low smoke zero halogen type electric wiring.
- Provision of a layout that allows for easy maintenance of equipment and cleaning of the premises,
- Special storage places for combustible goods such as paint and oil;
- No smoking in fire-prone areas;

### **ii. Safety**

- If the floor space exceeds 750 square meters, an automatic sprinkler/detection system will be installed.
- One wet riser-cum-down comer per 1000 sq. m floor space will be provided, as will a static subterranean storage tank, overhead tanks, and pumps of adequate capacity with hydrants, first-aid reels, and so on.
- Portable fire non-aqueous extinguishers of carbon dioxide, chemical dry powder, and so on.
- Automatic smoke venting systems will be installed.
- Where escape is possible in more than one direction, the travel distance for a fire escape shall not exceed 20 m; nevertheless, the distance may be up to 40 m.

## **Safety & Security Systems:**

The system will be created and installed to ensure the safe mobility of people and the security of the premises.

Requirements:

- The system must safeguard vulnerable buildings from fire.
- The system must be able to detect unauthorized access and exit at designated locations.
- The system must contain
  1. Fire alarm system.
  2. Fire Hydrant and Sprinkler System.
  3. Fire Extinguishers.

**A. Fire Alarm System:**

The Fire Alarm System is a complete fire detection and alarm system. Alarm starting devices, alarm notification appliances, control panels, auxiliary control devices, power supply, and wiring are all part of it. Its installation is limited to specific areas in the following locations:

1. In the depot controller room.
2. Routes of evacuation
3. The equipment rooms.
4. Storage space
5. Is any other location required?

**B. Fire Hydrant System:**

The entire pipeline must be kept under water pressure. The pressure in the pipeline drops dramatically when any of the hydrant valves open. The Jockey pump set generally keeps the entire system pressurized and allows it to meet system demand, resulting in a further drop in pressure. The specified pressure switch detects the drop in pressure and activates the primary fire pump set.

Depending on the type and degree of the danger, a diesel-engine power pump set with 100% standby capacity should be fitted.

Fire Hydrant System comprises the following:

- Sufficiently large water reservoir
- Fire pump sets (Main and Standby)
- Jockey pump set
- Hydrant valves
- Firefighting hoses
- Branch pipe with nozzles

**C. Fire Brigade Connector:**

Approved fire brigade connection shall consist of four 63 mm instantaneous inlets housed in a glass-fronted wall box at a suitable location on the street in a convenient location to provide access to the inlets. The wall box must be large enough to allow hoses to connect to the inlets after smashing the glass cover if necessary.

Sprinkler System: is proposed to be installed at the following places

- Equipment room.
- Store room.

**D. Fire Extinguishers:**

Fire extinguishers provide first aid against tiny and incipient fires before they become a serious problem. These extinguishers must be deployed in all public areas as well as service

areas where security is required. These appliances should be scattered around the area so that consumers do not have to go more than 15 meters to reach them. These appliances can be installed or hung on the wall in any area chosen.

#### **E. Access for Fireman**

If the need arises, firemen will have access to a separate entrance to the station that is not utilized by passengers for evacuation. The entrance will be plainly visible from the road. All levels of the station will be accessible. The minimum width of the stairs is 1.0 m, and the maximum height is 25 cm.

### **6.3 Institutional Arrangements to Oversee the Implementation of the Monitoring Plan**

It is recommended that an Environmental Monitoring Committee (EMC) be appointed to oversee the implementation of the Monitoring Plan. It is proposed to be chaired by the Coast Conservation and Coastal Resource Management Department (CC & CRMD). The appointees to the EMC are proposed to be approved by the CC & CRMD and to include representatives from key stakeholders.

The following membership is recommended:

- i. Coast Conservation and Coastal Resource Management Department (CC & CRMD )
- ii. Central Environmental Authority (CEA)
- iii. Condominium Management Authority (CMA)
- iv. Marine Environment Protection Authority (MEPA)
- v. Urban Development Authority (UDA)
- vii. Road Development Authority (RDA)
- viii. Colombo Municipal Council (CMC)
- ix. Department of Rail Way (DRW)
- ix. Office of the Divisional Secretary/Local Authority
- x. Project Consultant and Contractor(s)

The CMC, which is an inter-institutional executive-level monitoring committee, as indicated above, is to work in close consultation with the CC & CRMD , project proponent, consultant, and contractor(s), on all matters relating to monitoring. It is proposed that the CMC conduct regular meetings in order to review the monitoring and, in areas of potential conflict, take the required action to resolve any arising issues.

It is recognized that monitoring activities are required to ensure that the project includes the satisfactory implementation of the EIA recommendations and to confirm that no potential adverse impacts have been excluded from the assessment process. A wider participation of all stakeholders is important to achieve this objective. For this purpose, it is important to develop and implement a formal mechanism for such participation and dissemination of information to the general public. If necessary, technical assistance needs to be provided for an adequate understanding of project interactions with the environmental components and mitigation actions.

Arising from such activity, it is proposed that the EMC in consultation with the project proponent, consultant and contractor(s) develop a mechanism to manage, investigate, respond and act upon, any issues raised by the public during the construction and operation of the proposed facility.

## Chapter 07: Conclusion and Recommendations.

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The EIA Report provides a thorough examination of the probable environmental consequences of the proposed Capital & Asset Investment (Pvt) Ltd Apartment Project at Colombo 03 on the Western coast. The EIA was completed in compliance with the TOR established by the CC & CRMD. The study also includes information on the planned mitigating actions for the observed negative outcomes.

The following key elements have been considered in the EIA study:

- The existing environment of the study area
- The potential impacts, including their level of magnitude and significance
- The ability to eliminate and/or minimize negative impacts effectively through 'Mitigation by Planning and Design'
- To recognize potential hazards and investigate the impacts of potential disasters and develop mitigation measures and be fully aware of the likely response to be adopted for such extreme events
- The development of an effective Monitoring Program and its implementation

In Chapter 4, a full impact matrix was provided to identify the major influencing factors. These impacts are quantified in order to assess their magnitude. According to the research, project activities will have a "**Low-Moderate**" impact with few serious consequences. Proper mitigation strategies were advised to address these consequences. Taking into account all aspects of the consequences, the mitigation methods cover the following critical areas:

- Reviewing and reporting particular characteristics in detecting possible environmental concerns during the planning/design stage, as well as their integration at the relevant phases of design development, and, if necessary, providing further recommendations to alter the design.
- Identifying mitigation and best practices that should be created to avoid or reduce any such negative impacts during the building and operation stages.
- Recognizing the significance of possible disaster circumstances and understanding that such consequences may be of a severe scale and effective in a short period of time with little notice. Such scenarios may result in catastrophic circumstances; thus, they should be reviewed as part of risk management and disaster mitigation.

The potential impacts associated with both construction and operational phases have been assessed, and mitigation measures presented in accordance with the strategic approach described above. Where necessary, mitigation measures and the requirements for developing monitoring plans have been recommended.

Based on the analysis of these elements and on the assumption that the recommendations for the mitigation of identified impacts are adopted and adequately implemented

The following water conservation measures were evaluated and finalized for implementation during the construction phase: the use of gunny cloth to reduce curing water consumption, the use of construction chemicals to reduce curing time, the use of ready-mix concrete, rainwater harvesting, the use of low-flow showerheads, faucets, and other fixtures, and the exploration of the possibility of using treated wastewater for construction.

Following a review of various measures to reduce air and noise pollution during construction, the following measures were finalized for implementation: barricading the site, which acts as a mitigation measure for dust transport, tire wash facility at the entrance, water sprinkling of roads, wheel wash facility, acoustic enclosure for DG sets, work practices to reduce noise impact on the surroundings by avoiding noise generating works during night time, and regulated traffic into and out of the site.

It is recommended that all solid waste management/wastewater management standards be followed, as well as all rules, terms, and conditions imposed by the authorities that issue clearances.

Other measures identified as recommendations to ensure sustainable construction and energy efficiency include the use of nontoxic paints, nontoxic construction materials, recycled construction materials, on-site reuse of construction and demolition wastes, use of energy-efficient equipment, use of solar-based energy for lighting and water heating, use of native plants for greenery development, use of LED lighting in common areas, and use of pavers.

The project will be implemented in the vicinity of a coastal aquatic environment and efforts have been taken to preserve the environmental qualities of the study area in which the development will take place. The study has given attention to the environmental aspects of the study area and ensured that the project will not contribute to environmental degradation. The study has proposed an Environmental Monitoring Plan for sustaining multiple uses of the study area.

The EIA study has given emphasis to the establishment of an institutional mechanism to ensure the reliability of monitoring programs giving due recognition to any local community/public concerns. The linkage between society and environment has been given consideration and measures have been included to maintain a dialogue with the stakeholders. This approach enables the Environmental Monitoring Committee (EMC) to take into account the importance of stakeholder participation in monitoring activities

## Declaration

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The above information is correct and true to the best of my knowledge. I am aware that this information will be utilized in decision-making by the relevant authorities.

08/06/2025

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Date

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Signature of Applicant

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## Report preparers

| Activity No | Position in the IEE                 | Name of the Consultant                                                               | Job description                                                                                                               |
|-------------|-------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 01.         | Team Leader, Mapping expert         | Kapila Gunarathne,                                                                   | Overall responsibility for compiling reports and technical writing and GIS mapping                                            |
| 02.         | Engineer                            | Eng. Leel Senadheera, Chartered Civil Engineer.                                      | Building design, construction work, waste management (Wastewater and Solid Waste)                                             |
| 03.         | Geology and Hydrology               | Engineering and Laboratory Services, Eng. Mahinda Ranasingha, Geotechnical Engineer. | Geology of the site and hydrology                                                                                             |
| 04          | Architecture                        | Milroy Perera Associate (Pvt, Ltd., Mr. Aroshana Perera                              | All designs and drawings of the project                                                                                       |
| 05.         | Sociologist                         | Mr. Mahinda Ranasingha                                                               | Socio-ecological impacts on the project and possible companion.                                                               |
| 06.         | Water Quality Assessment Specialist | Environmental Management Services, Mr. Banuka                                        | Assessment of water quality in the area.                                                                                      |
| 07.         | Terrestrial Ecologist               | Mr. Upul Jayathilaka                                                                 | Terrestrial ecosystem services, possible impacts, and proposed mitigatory works and compiling all the sections of the report. |
| 08          | Solid Waste Management              | Eng. N.T. Padmadasa, Waste management specialist                                     | Preparation of comprehensive solid waste management proposal.                                                                 |
| 09.         | Marine Ecologist                    | Mr. Arjan Rajasuriya                                                                 | Marine ecology of the study area and possible impacts and mitigation if there are any.                                        |
| 10.         | Compiling, Editing and Formatting   | Kasun Dissanayaka                                                                    | Editing and formatting                                                                                                        |