ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

SEA FRONT

RESIDENTIAL BUILDING PROJECT



OCTOBER 2022

EMC Pakistan
Private Limited

JUBILEE BUILDERS & DEVELOPERS

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

SEA FRONT

Residential Building Project

Final Report
October 2022
Ref: EIA/12/10/22

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EXECUTIVE SUMMARY

Presented in this report are the findings of the Environmental Impact Assessment (EIA) study submitted to the Sindh Environmental Protection Agency for its approval for construction of residential building project, namely “Sea Front”, consisting of 2B+G+45 floors at Plot No. FL-11, Block-1, KDA Scheme-5, Clifton, Karachi, having total covered area of 462,660.13 SQ FT and plot area of about 5815.00 SQ YDS. The assessment was conducted with the following objectives:

- Identify the regulatory requirements that apply to project activities in the proposed area, in the context of environmental, health and safety protection;
- Assess proposed project activities in terms of their likely impacts on the environment during the construction & operation phases of the project, in order to identify issues of environmental concern; and
- Recommend appropriate mitigation measures that can be incorporated into the design of the project to minimize any adverse environmental impacts identified.

M/s. Jubilee Builders and Developers have successfully executed numerous development projects of similar nature and magnitude with a strong track record of putting together a state-of-the-art building and construction technologies. They have, in their business of construction, employed modern management tools and work methodology to implement the project on a fast and right track. With professionally qualified and competent staff, efficient work force, flexible organization and a large pool of modern construction equipment & machinery. The proponent has the capability to undertake development projects. The design of the proposed project has been undertaken by a multidisciplinary team of consultants to address the aspects of building stability, energy needs, resource management, sustainability, safety & security and compliance of environmental standards. Following are the salient features of the project;

Table ES.1: Project Details	
Project Name	Sea Front
Proponent	M/s Jubilee Builders and Developers
Project Nature	Residential Building Project
Plot Area	5815.00 SQ YD
Covered Area	462660.13 SQ FT
Storeys	2B+G+45
Address	Plot No. FL-11, Block-1, KDA Scheme-5, Clifton, Karachi.
Basement-2 (Parking + Services)	Parking (84 cars and 94 motorcycles), underground water tank for potable, non-potable, firefighting and septic water, and other services.

Basement-1 (ARS + Parking + Services)	Air Raid Shelter (ARS), Parking (79 cars and 81 motorcycles), and other services.
Ground Floor (Parking + Services)	Parking (21 cars and 64 motorcycles), landscaping, reception, waiting area, recycling plant, wastewater treatment plant, generator space, meter room, funeral parlor, and other services.
1st Floor (Parking + Services)	Parking (52 cars and 92 motorcycles)
2nd and 3rd Floor (Parking + Services)	Parking (108 cars (54x2) and 188 (94x2) motorcycles)
4th Floor (Parking + Services)	Parking (53 cars and 98 motorcycles) and intermediate water tank
5th Floor (Recreational area)	Prayer hall, community hall, play area, library, first aid center, day care, games, gymnasium and other services
6th to 43rd Floor (Flats)	304 Flats (08x38)
44th Floor Plan (Flats)	02 LL Duplex
45th Floor Plan (Flats)	02 UL Duplex
Roof Plan (Solar Panels + Battery Room + Helipad + Services)	Helipad, solar panels, overhead water tanks for potable, non-potable and fire-fighting water, and others services
Total flats	308 flats
Height of the building	498'-6"
Total provided cars	397
Total provided motorcycles	617

Schedule of Area	
Project Allowable Details	
Plot Category	FL
Total Area of Plot	5815.00 Sq. Yds = 52335.00 Sq. Ft.
Floor Area Ratio (FAR)	1:9
Allowable Area as Per FAR =1: 9	471015.00 Sq. Ft.
Allowable Foot Print Typ. (30% to 40%)	15700.500 Sq. Ft. 20934.00 Sq.Ft.

Schedule of Area	
Proposed Area as Per FAR =1:9	462660.13 Sq. Ft.
Proposed Foot Print Typ. (30% to 40%)	17191.56 Sq. Ft. (Flats, Circulation & Services)
Total Proposed Area (Basement)	46031.71 Sq. Ft.
Total Proposed Area (Parking1st.to4th.)	142767.12 Sq. Ft.
Total Proposed Area (Recreation 5%)	23554.71 Sq. Ft.

The project site is planned in the environs of Block-1, Clifton, and neighbors 300 ft wide Marine Promenade in the immediate south. Towards north of the project site a 50 ft wide road lies, east of the project site is served by a 20 ft wide footpath and a vacant plot, whereas towards west, the proposed site is facilitated by a 50 ft wide road and a park. Currently, the proposed site is a vacant plot and free from encumbrances as shown in the Figure ES.1. The microenvironment of the project comprises of several high-rise residential buildings such as Chapal Resort, Ruby Beach Pride, some parks and playgrounds, community centers such as The Palm Banquet, and educational institutes, etc.

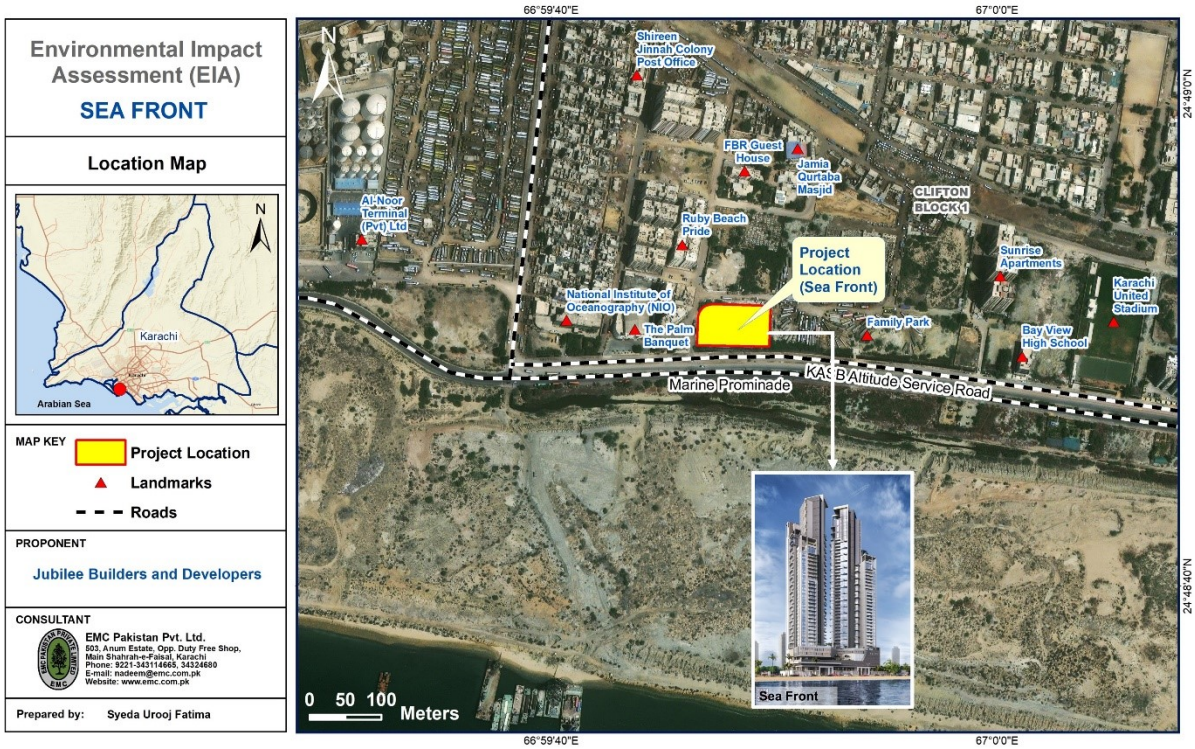


Fig ES.1: Project Location Map

- The proposed project falls under the jurisdiction of Civil Line sub division of District South, Karachi[1]. The district covers a total area of about 85 sq. km while Civil Line covers an area of about 18.6 sq. km. A total of 7 sub divisions fall under District South Karachi which

[1] Final results – 2017 Population Census

includes Saddar Sub-division, Garden sub-division, Lyari sub-division, Aram Bagh sub-division, Clifton Cantonment, Karachi Cantonment and Civil Line sub-division. District South is managed by the District Municipal Corporation South which is headed by a Chairman.

- The Project will be sited at Plot No. FL-11, Block-1, KDA Scheme-5, Clifton, Karachi. The Project site falls in the High-Density Zone that permits the designated land-use by the relevant authority i.e. SBCA. The site is thus the only and hence the preferred alternative for siting the Project.

- The ownership of the plot lies with the M/s Jubilee Builders and Developers. Since the proponent is the rightful owner of the Plot, there is no dispute with regard to siting of the project. To validate their claims on the site and on its being the only and hence the preferred alternative for establishment of their residential building project, the proponent has obtained NOCs from SBCA and other agencies.

- Being the integral part of the EIA study, detailed consultations were carried out with the stakeholders of the Project. In this regard, a Neighborhood Survey was conducted to identify residential and commercial interests in the area that may face direct impacts from the proposed development. Main concerns were related to high-rise buildings in the area potentially blocking the ambient air flow & causing wide-spread dust during construction phase, traffic congestion and parking issues and overburdened utilities in the area, particular water supply. They were generally receptive of the development activity which would bring employment opportunities. EIA study has in general addressed the concerns specific to the project and has proposed proportionate mitigation measures.





Consultation with the Residents of Ruby Beach Pride II

	
Consultation with Owner, Arshad Car Detailing	Handed over Project Brief to Security Guard, Sindh Bar Council
	
Consultation with Officer, Income Tax & FBR Office - Clifton	Consultation with Owner, Special Shinwari Salateen Hotel

- The site is free from encumbrances and therefore would least likely cause displacement of population, loss of business and annoyance to the living environment and disturbance to the area.

- The macroenvironment has no sensitive areas such as protected sites including wildlife sanctuaries, game reserves or national parks, or any archaeological, historical or cultural heritage in its immediate neighborhood; as such its siting would have no sensitivity in this regard. No significant flora and fauna will be disturbed, as the site is located in the commercialized area, where no flora and fauna of significance exist.

- Water supply will be obtained through RO plant, KW&SB system and through city water tankers. The proposed project plans back-up power generation, sewage treatment and disposal with Septic tank/package-type treatment plant and potential grey water recycling, in addition to provision of parking space. The relevant authorities have already received the due amount for provision of utility services and development of the area. They are

expected to plan and implement augmentation of the facilities in advance, otherwise plan for densification would, instead of facilitating improvement in quality of life, be a burden on the environment.

- Option for recycling of the wastewater and regeneration of the potable water from groundwater resources by adequate treatment may have to be explored since adequate water supply to the Karachi residents the core areas is not assured despite the fact that the authorities are aware that the needs remain unfulfilled while the taxes are to be paid.

- Vehicular traffic management will have to be undertaken seriously to restrain unnecessary traffic jams that may cause annoyance to the commuters travelling on the roads surrounding the project.

- The fire prevention and control systems will be provided in accordance with Pakistan Building Codes Fire Provisions 2016 and NFPA Codes.

- With 24-hour security system, the project designers have ensured that the concerns on safety are alleviated and eased. The Project would thus achieve its objective of providing a secure and safe building project at an attractive location. This being a positive impact would be an indicator of achievement of the objectives of the Project.

- Realizing that the city has overgrown its sustainability limits, it is imperative that the Builders and Developers take cognizance of the cumulative effect of the current pace of rapid development. Consequently, each project is required to keep the sustainability principles in view and go an extra mile beyond the present approach which is confined to bare survival. Their projects have so far been profit-oriented, now they will have to share the profit with net zero energy and net zero discharge approach in the project design.

Based on the findings of the environmental impact assessment it can be concluded that the environmental impacts of the construction and operation of the project are manageable and can be mitigated by implementing the Environmental Management and Monitoring Plan which forms an integral part of EIA document. The screening process has, through review of literature, primary as well as secondary baseline data, and expert judgment, made assessment of the potential impacts of said activities on the physical, biological, and socioeconomic environment of the Project. Mitigation measures have been proposed to reduce, minimize or compensate for the identified potential negative impacts and their adoption has been recommended. The study, therefore, recommends that the Environmental Impact Assessment (EIA) report should be approved with the provision that the suggested mitigation measures will be adopted and the Environmental Management Plan will be followed in letter and spirit.

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Chapter 1 INTRODUCTION

Name of the Project:	Sea Front
Location of the Project:	Plot No. FL-11, Block-1, KDA Scheme-5, Clifton, Karachi
Name of the Proponent:	Jubilee Builders & Developers
Name of Environmental Consultant:	EMC Pakistan Pvt. Ltd
Contact:	Syed Nadeem Arif Managing Director EMC Pakistan Private Limited Office # 503, Anum Estate Building, Main Shahrah-e-Faisal, Opp. Duty Free Shop, Karachi Tel: (+92-21) 34311466; Fax: (+92-21) 34311467 E-mail: nadeem@emc.com.pk

This report presents the findings of the Environmental Impact Assessment (EIA) study submitted to the Sindh Environmental Protection Agency for its approval of the proposed of high-rise residential building project, namely **Sea Front** (Figure 1.1, Conceptual View) located at Plot No. FL-11, Block-1, KDA Scheme-5, Clifton, Karachi (Figure 1.2, Project Location). The total area of the plot is 5815.00 SQ YDS.

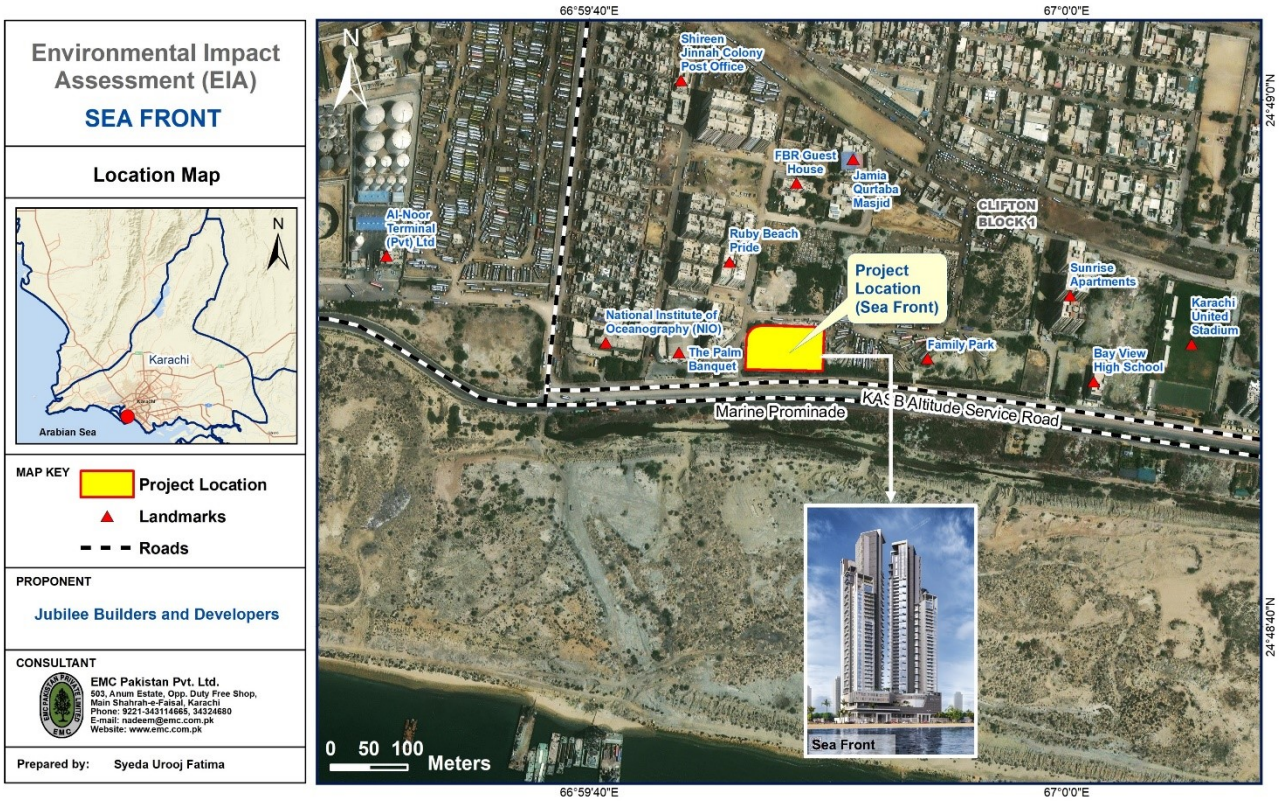


Figure 1.1: Location of the Project Site



Figure 1.2: Conceptual View

1.1 Project Overview

The proposed project is a 2B+G+45 floors residential building with the following facilities:

- **Basement-2** (Parking + Services)
- **Basement-1** (ARS + Parking + Services)
- **Ground to 4th Floor** (Parking + Services)
- **5th Floor** (Recreational area)
- **6th to 45th Floor** (Flats)
- **Roof Plan** (Solar Panels + Battery Room + Helipad + Services)

Sea Front is proposed to have a 2B+G+45 storey residential tower on 5815.00 SQ YDS having total covered area of about 462660.13 SQ FT on plot Plot No. FL-11, Block-1, KDA Scheme-5, Clifton, Karachi. According to the proposed architectural plan, the basement has space reserved for parking, underground water tanks, RO Plant.

The project site located in the microenvironment of 300 ft wide Marine Promenade in Block 1, Clifton. The proposed site can be located at satellite imagery at 24°48'50.52"N & 66°59'48.14"E. The location of the project and site plan are shown in figure 1.3 & 1.4. The nearby landmarks include Chapal Resort, Ruby Beach Pride, and The Palm Banquet.

1.2 Objectives of Project

In launching the Project, the proponent aims to achieve the following objectives:

- To promote development in the Housing Sector which at present is among the worthwhile contributors to the growth of GDP;
- Go beyond current concepts of building and construction in Pakistan in terms of lifestyle, comfort and pragmatism;
- Demonstrate environmental and social responsibility;
- Provide residential accommodation in a fast-growing environment that has attracted commercial activities, with security as its major component.

1.3 Need for EIA

Sindh Environmental Protection Act, 2014 ("2014 Act") under section 17 (1) mandatorily requires proponent of project to file an IEE or EIA, as the case may be, and obtain approval from the SEPA before commencing construction or operation of the project. Section 17 (1) of the 2014 Act is reproduced herein under for ready reference: "17. *(1) No proponent of a project shall commence construction or operation unless he has filed with the agency an initial environmental examination or environmental impact assessment, and has obtained from the Agency."*

Sindh Environmental Protection Agency (Environmental Assessment) Regulations 2021, revised from the preceding document introduced in 2014, made in exercise of powers

conferred under section 37 of the Act 2014 categorizes projects in three categories provided in Schedule I, II & III of the 2021 Regulations.

The **Sea Front** project falls in Category I (3) of the Schedule III (List of Projects requiring EIA) of the 2021 Regulations, which provides:

I. Urban development and tourism

(1) ……

(2) ……....

(3) All Projects located in High Density Zones notified by Government and relevant land controlling organization, irrespective of their size.

Since the project falls in the high-density zone of Block 1, Clifton, EIA study has been carried out.

It is therefore necessary to prepare a detailed account of environmental impact of the proposed development so that appropriate interventions could be taken. This assessment focuses on various parameters covering all environmental & social issues including building stability, water & waste water management, sewage treatment plant, source of water, depth of ground water, solid waste management, traffic management, adequacy of parking area, safety & security, nearest sensitive zones/receptors and overall settlement density. The plan seeks to define the project in a holistic manner and suggest possible mitigation measures for development. It has been learnt that through early planning before the start of the project as well as through all phases of the project's development, if environmental concerns are considered simultaneously with other technical and economic criteria, it may be possible to develop the housing projects with the safeguard of environmental & socioeconomic resources of the area.

The assessment was conducted with the following objectives:

- Identify the regulatory requirements that apply to project activities in the proposed area, in the context of environmental protection, health and safety;
- Assess proposed project activities in terms of their likely impacts on the environment during the construction & operation phases of the project, in order to identify issues of environmental concern; and
- Recommend appropriate mitigation measures that can be incorporated into the design of the project to minimize any adverse environmental impacts identified.

1.4 Methodology Adopted for EIA

This environmental impact assessment was conducted in the following manner:

1. Scoping

A scoping exercise was undertaken to identify the potential issues that are to be considered in the environmental impact assessment.

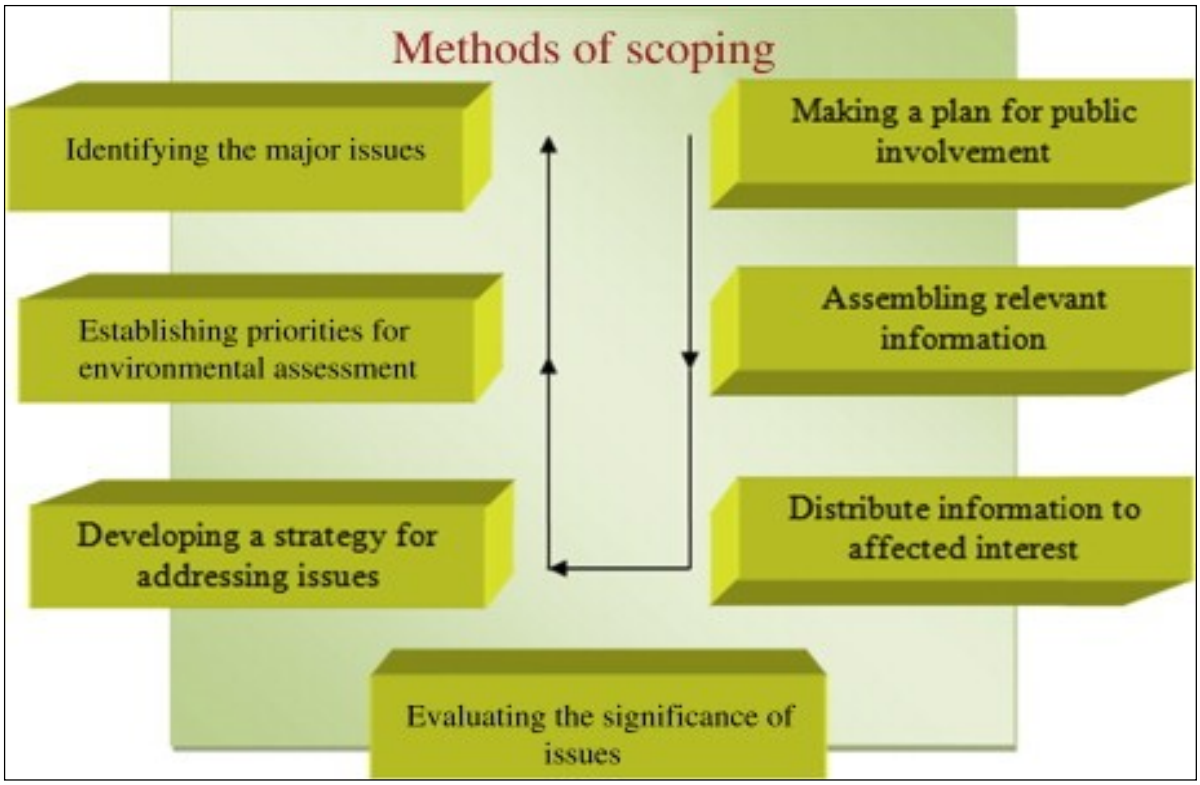


Figure 1.3: Methods of Scoping

The scoping exercise included the following tasks:

- **Data Compilation:** A generic description of the proposed activities relevant to this environmental assessment was compiled with the help of the Project Proponent.
- **Review of Published literature:** All available published and unpublished information pertaining to the micro and macro environment of the study area was obtained and reviewed. It included the earlier studies conducted in the study area, environmental & social baseline and impact assessment studies conducted by different consultants in past. Secondary data was very helpful in understanding the issues that were identified by other consultants.
- **Review of applicable Legislation:** Information on relevant legislation, regulations, guidelines, and standards was reviewed and compiled.
- **Identification of potential impacts:** The information collected in the above procedures was reviewed and potential environmental issues identified.
- **Initial site visit:** An initial site visit was conducted to get an overview of site conditions and the surrounding areas.
- **Stakeholder consultation:** A stakeholder consultation was undertaken to document the concerns of the local community & other (secondary) stakeholders, and to identify issues that may require additional assessment in order to address these concerns

2. Review of Legislation and Guidelines

National & Provincial legislations, environmental guidelines, and best industry practices were reviewed to set environmental standards that the project will be required to follow during different stages of the project. Sindh Environmental Protection Act 2014, Sindh Environmental

Protection Agency (Environmental Assessment) Regulations 2021 and Sectoral Guidelines were the basic guiding documents followed during the study.

3. Site Visits

EIA Report is based on the findings of the visits by the team organized by EMC Team members visited the site and its vicinity to conduct reconnaissance survey and to collect primary baseline data with reference to environmental and social aspects.

4. Literature Review / Baseline

Available published literature and previous IEE/EIA studies on the subject besides legislation relevant to this project were reviewed to compile information in respect of baseline of physical features, drainage and sewage systems as well as social aspects.

5. Identification of Aspects

Identification of environmental aspects and their significance is fundamentally important for determination of severity of incidence of impacts at different stages of the project. This step is aimed at obtaining an inventory of the aspects. The aspects identified during this step cover all activities during construction and operation, in order to determine those which, have or can have significant impact on the environment.

6. Impact Assessment & EMP

Environmental experts at EMC analyzed and assessed the anticipated impacts that are likely to arise due to the identified aspects. Each of the potential impacts identified during the scoping session was evaluated using the environmental, socioeconomic, & project information collected. In general, the impact assessment discussion covers the following aspects:

- Present baseline conditions
- Potential change in environmental parameters likely to be affected by Project related activities
- Prediction of potential impacts
- Evaluation of the likelihood and significance of potential impacts
- Defining of mitigation measures to reduce impacts to as low as practicable
- Prediction of any residual impacts, including all long and short-term, direct and indirect, and beneficial and adverse impacts
- Monitoring of residual impacts.

Environmental Management Plan (EMP) was compiled and included in the environmental assessment report to make it more comprehensive & self-sustaining with the specific purpose of providing working guidelines for the project Proponent and Management personnel who shall be responsible for the construction and operations of the project, so as to enable them to maintain the environmental and social conditions in conformity with the SEPA regulations.

The management plan outlines the details required to manage environmental, safety and community risks arising from the project activities as well as social issues. It also gives the

details of monitoring that would be required during the operation phase of the project in order to comply with the requirements of sustainable development.

7. Preparation of Report

This EIA report has been prepared in accordance with the guidelines of the Pakistan Environmental Protection Agency (PEPA) and Sindh Environmental Protection Agency (SEPA). All pre-requisites of report writing in structural format, contents and presentation have been considered and met as per the standard format of the EIA document.

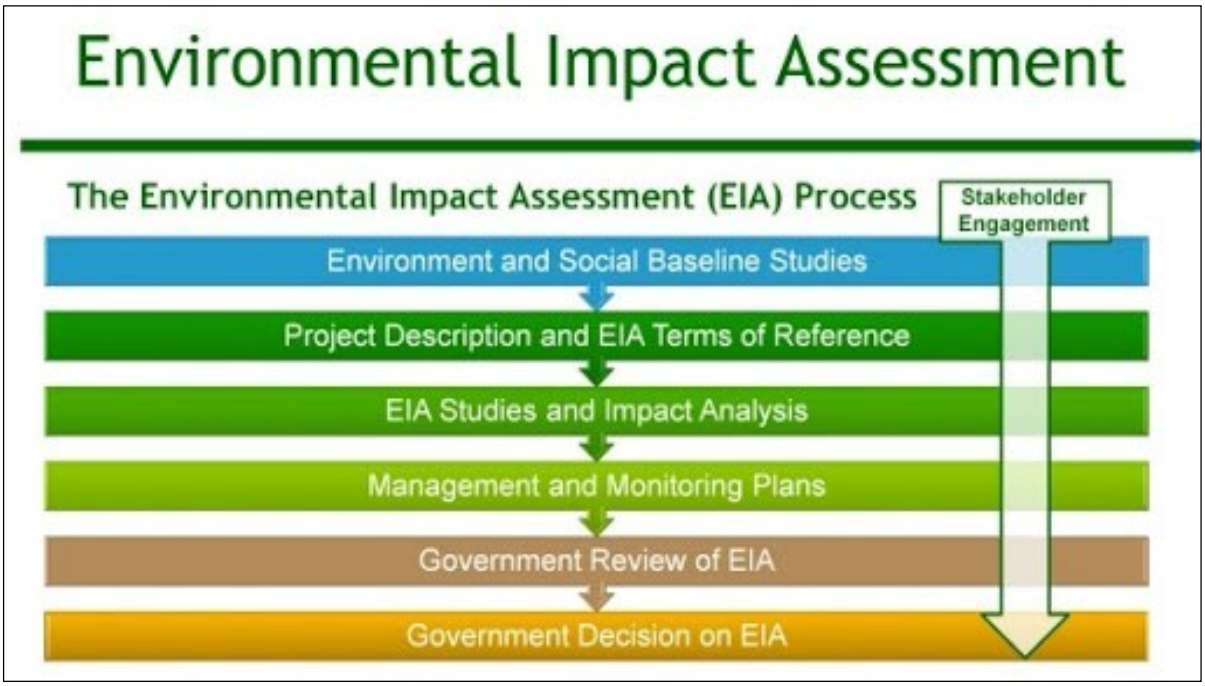


Figure 1.4: Environmental Impact Assessment (EIA) Process

1.5 Structure of EIA Report

The EIA report has been structured on the standard format, prescribed by the Sindh Environmental Protection Agency (SEPA). The report has been presented in the following sections:

Section 1 - Introduction to Project and EIA Processes

Section 2 - Overview of National and Provincial Legislation & Guidelines relevant to the Project

Section 3 - Description of Project

Section 4 - Description of Environment

Section 5 - Stakeholders Consultation

Section 6 - Potential Impacts and Mitigation Measures

Section 7 - Environmental Management Plan (EMP)

Section 8 - Conclusion

1.6 EIA Study Team

The study was assigned to Environmental Management Consultants (EMC) Pakistan Private Limited. EMC organized the following team to carry out the study:

Table 1.2: EIA Study Team

S.#	Name	Position
1.	Engr. Syed Nadeem Arif	Managing Director/Team Lead
2.	Mr. Muhammad Haseeb	Director / Environmental Specialist
3.	Engr. Ahmed Zohair	Environmental Engineer
4.	Ms. Samita Nadeem	Senior Environmental Engineer
5.	Engr. Sohaib Tariq	Environmental Engineer
6.	Mr. Syed Muhammad Omar Arif	Environmental Engineer
7.	Mr. Tanveer Arif	Head of Social Department
8.	Mr. Fahad Afzal	Environmentalist
9.	Ms. Syeda Urooj Fatima	Environmentalist
10.	Mr. Muhammad Muddasir	Environmentalist
11.	Mr. Wajai Kumar	Sociologist

Chapter 2 POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

The Constitution of Pakistan contains provisions for environmental protection & resource conservation. There are two fundamental rights that are directly relevant for environmental issues.

The first is Article 9 of the Constitution, which provides:

> ***"No person shall be deprived of life or liberty save in accordance with law".***

The second is Article 14, which makes the dignity of a man a fundamental right.

The Supreme Court in landmark judgment in the case of *Shehla Zia and others vs WAPDA (1994)* referred to both these Articles and laid down the foundation of modern environmental law in Pakistan in the following terms:

> ***"The word 'life' in the constitution has not been used in a limited manner. A wide meaning should be given to enable a man not only to sustain life but to enjoy it. Under our Constitution, Article 14 provides that the dignity of man and subject to law the privacy of home shall be inviolable. The fundamental right to preserve and protect the dignity of man under Article 14 is unparalleled and could be found only in few Constitutions of the world. The Constitution guarantees dignity of man and also right to 'life' under Article 9 and if both are read together, question will arise whether a person can be said to have dignity of man if his right to life below bare necessity is like without proper food, clothing, shelter, education, health care, clean atmosphere and unpolluted environment."***

This Chapter provides synopsis of policies, legislation, and guidelines that may have relevance to the proposed project & administrative framework as well as institutional set-up relevant to the environmental assessment of the proposed project.

After the Eighteenth amendment in the constitution of Pakistan, 1973 many federal subjects devolved to provincial legislation. The Concurrent List in fourth schedule of the constitution containing entries of subjects wherein federal and provincial legislation could legislate has been abolished. The subject of "Environmental Pollution and Ecology" the entry No.24 of the concurrent legislative list has also devolved to provincial legislations. Since project is in province of Sindh; therefore, only those national laws, rules and regulations are discussed here which have application in the project. Between 1993 and 2010, the Pak-EPA promulgated several rules, regulations, standards, and guidelines to implement the provisions of the PEPA 1997. The provincial government has yet to draft its own complete instruments, for instance, sectorial guidelines; therefore, as provided under Article 270A of the Constitution, rules,

regulations, standards, and guidelines made under PEPA 1997 can still be benefited from where these are not made under the provincial law. SEPA has, however, notified the Sindh Provincial rules, regulations and standards. The discussion on regulatory requirements applicable to this Project is, therefore, based on the Sindh law, the SEPA 2014, the Regulations; and, the rules, regulations, standards, and guidelines developed under the SEPA 2014. There are provincial laws which come under the umbrella of environmental protection; for instance, Forest Act 1927, but due to irrelevance with the project setting such laws are not reviewed here.

The Sindh Environmental Protection Act 2014 requires proponents to follow the rules, regulations, guidelines and standards pertaining to the objectives of the development initiative. The proponent: **M/s Jubilee Builders and Developers** are required to follow all applicable policy, legal and administrative frameworks. These include legal provisions relevant to environmental & social protection applicable to the planning, construction & operation phases, which must be considered as well to ensure that the activities of the proposed project are aligned with sustainability principles.

The laws and regulations relevant to the proposed project are briefly reviewed below.

2.1 Sindh Environmental Protection Act, 2014

The Sindh Environmental Protection Act, 2014 (2014 Act) was passed by the Sindh Assembly on February 24, 2014. The 2014 Act is the basic legislative tool empowering the provincial government to frame regulations for the protection of the environment. The 2014 Act envisages protection, improvement, conservation & rehabilitation of environment of Sindh with the help of legal action against polluters and green awakening of communities. It equally lays emphasis for the preservation of the natural resources of Sindh and to adopt ways and means for restoring the balance in its eco-system by avoiding all types of environmental hazards. The 2014 Act is applicable to a broad range of issues and extends to air, water, industrial liquid effluent, marine, and noise pollution, as well as to the handling of hazardous wastes.

The following provisions of the SEPA 2014 have a direct bearing on the proposed Project:

- Section 11(1): 'Subject to the provisions of this Act and the rules and regulations therein, no person shall discharge or emit or allow the discharge or emission of any effluent, waste, pollutant, noise or any other matter that may cause or likely cause pollution or adverse environmental effects, as defined in Section 2 of this Act, in an amount, concentration or level which is in excess to that specified in Sindh Environmental Quality Standards…'
- Section 11(2): 'All persons, in industrial or commercial or other operations, shall ensure compliance with the Environmental Quality Standards for ambient air, drinking water, noise or any other Standards established under section 6(1)(g)(i); shall maintain monitoring records for such compliances; shall make available these records to the authorized person for inspection; and shall report or communicate the record to the Agency as required under any directions issued, notified or required under any rules and regulations.'

- Section 14 (1): 'Subject to the provisions of this Act and the rules and regulations, no person shall cause any act, deed or any activity', including;
  - (b) disposal of solid and hazardous wastes at unauthorized places as prescribed;
  - (c) dumping of wastes or hazardous substances into coastal waters and inland water bodies; and
  - (d) release of emissions or discharges from industrial or commercial operations as prescribed.
- Section 15 (1): 'Subject to the provisions of this Act, no person shall operate or manufacture a motor vehicle or class of vehicles from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the Sindh Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6'.
- Section 17(1): 'No proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment, and has obtained from the Agency approval in respect thereof'
- Section 17(2): The agency shall;
  - a) review the initial environmental examination and accord its approval, subject to such terms and conditions as it may prescribe, or require submission of an environmental impact assessment by the proponent; or
  - (b) review the environmental impact assessment and accord its approval subject to such terms and conditions as it may deem fit to impose or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or decline approval of the environmental impact assessment as being contrary to environmental objectives.
- Section 17(3): 'Every review of an environment impact assessment shall be carried out with public participation and, subject to the provisions of this Act, after full disclosure of the particulars of the project'.
- Section 17(4): 'The Agency shall communicate its approval or otherwise within a period of two months from the date that the initial environmental examination is filed, and within a period of four months from the date that the environmental impact assessment is filed complete in all respects in accordance with the regulations, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations'.
- Section 20(1): 'The Agency shall from time to time require the person in charge of a project to furnish, within such period as may be specified, an environmental audit or environmental review report or environmental management plan containing a comprehensive appraisal of the environmental aspects of the project'.
- Section 20(2): The report of a project prepared under sub-section (1) shall include:
- (a) analysis of the predicted qualitative and quantitative impact of the project as compared to the actual impact;
- (b) evaluation of the efficacy of the preventive, mitigation & compensatory measures taken with respect to the project; and

- (c) recommendations for further minimizing or mitigating the adverse environmental impact of the project.
- Section 20(3): 'Based on its review of the environmental audit report, the Agency may, after giving the person in charge of the project an opportunity of being heard, direct that specified mitigation and compensatory measures be adopted within a specified time period and may also, where necessary, modify the approval granted by it under section 17'.
- Section 31(1): 'The Agency shall cause relevant details of any proposed project regarding which an Environmental Impact Assessment has been received to be published, along with an invitation to the publish to furnish their comments thereon within a specified period'.
- Section 31(3): ''All comments received under sub-section (1) and (2) shall be duly considered by the Agency while reviewing the environmental impact assessment or strategic impact assessment, and decision or action taken thereon shall be communicated to the persons who have furnished the said comments.

2.2 Sindh Environmental Protection Agency (Environmental Assessment) Regulations 2021

The Sindh Environmental Protection Agency (Environmental Assessment) Regulations 2021, revised from the preceding document introduced in 2014, define Schedules (I, II, & III) of projects falling under the requirement of an Environmental Checklist, IEE, or EIA respectively.

Schedule I: A project falls into Schedule I if it is considered as having minimal environmental impact, and the screening of the project through a checklist, documents its environmental compliance.

Schedule II: A project falls in Schedule II if it is likely to have adverse environmental impacts, but of lesser degree or significance and all the mitigation measures to handle the impact is manageable. Such types of projects need IEE report inducing EMP.

Schedule III: Projects are categorized in Schedule III if they generate significant adverse environmental impacts that require a comprehensive management plan, or if the project is located within or passes through: a) Areas declared by the Government of Pakistan as environmentally sensitive (National Parks/Sanctuaries/Game Reserve), b) Areas of international significance (e.g. protected wetland as designated by the RAMSAR Convention), or c) Areas designated by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as cultural heritage sites.

According to Sindh Environmental Protection Agency Environmental Assessment Regulations, 2021, a project falling in any category listed in Schedule III shall file an EIA with the Sindh Environmental Protection Agency (SEPA). This specific project can be categorized as:

Schedule III: Projects Requiring an EIA

Category (I) Urban development and tourism

(3) All Projects located in High Density Zones notified by Government and relevant land controlling organization, irrespective of their size

Filing: Regulation 9 requires submission of two hardcopies and two electronic copies accompanied by an application form (schedule-V), copy of receipt of payment of review fee, NOC from relevant departments (where applicable).

Preliminary scrutiny: Regulation 10 states that at any time after the submission of the report, the agency shall review the report and inform the proponent for submission of the need for any additional information at any time.

Review: The agency shall review the report after issuing confirmation of completeness as per Regulation 9.

Validity: Regulation 15 defines the validity period of approval of an IEE or EIA to be three years from date of construction and must start within three years of report approval. A three-year extension at a time may be granted upon the agency's discretion with or without the submission of a fresh IEE or EIA.

2.3 Guidelines for Public Consultation

Public consultation is mandated under 2014 Act. Regulation 11 of the 2014 Regulations provides the general requirements whereas the sectoral guidelines indicating specific assessment requirements are provided in the Guidelines for Public Consultation 1997 (the 'Guidelines'). These are summarized below:

Objectives of Public Involvement: 'To inform stakeholders about the proposed project, to provide an opportunity for those otherwise unrepresented to present their views and values, providing better transparency and accountability in decision making, creating a sense of ownership with the stakeholders';

Stakeholders: 'People who may be directly or indirectly affected by a proposal will clearly be the focus of public involvement. Those who are directly affected may be project beneficiaries, those likely to be adversely affected, or other stakeholders. The identification of those indirectly affected is more difficult, and to some extent it will be a subjective judgment. For this reason, it is good practice to have a very wide definition of who should be involved and to include any person or group who thinks that they have an interest. Sometimes it may be necessary to consult with a representative from a particular interest group. In such cases the choice of representative should be left to the group itself. Consultation should include not only those likely to be affected, positively or negatively, by the outcome of a proposal, but should also include those who can affect the outcome of a proposal';

Mechanism of consultations: 'Provide sufficient relevant information in a form that is easily understood by non-experts (without being simplistic or insulting), allow sufficient time for stakeholders to read, discuss, consider the information and its implications and to present their views, responses should be provided to issues and problems raised or comments made by

stakeholders, selection of venues and timings of events should encourage maximum attendance';

Timing and Frequency: Planning for the public consultation program needs to begin at a very early stage; ideally it should commence at the screening stage of the proposal and continue throughout the EIA process;

Consultation Tools: Some specific consultation tools that can be used for conducting consultations include; focus group meetings, needs assessment, semi-structured interviews; village meetings & workshops;

Other Important Considerations: The development of a public involvement program would typically involve consideration of the following issues; objectives of the proposal and the study; identification of stakeholders; identification of appropriate techniques to consult with the stakeholders; identification of approaches to ensure feedback to involve stakeholders; and mechanisms to ensure stakeholders' consideration are taken into account'.

As above, the Guidelines for Public Consultation introduces effective ways to inform the contents of the project to the general public during the planning stage and that eventually consensus building toward the implementation of project is reached. However, there are instances where in middle of a project on direction of tribunal or court environmental assessment carried out with public consultation.

Incorporating public involvement into the stages of environmental assessment is explained in the guidelines that public consultation meeting has to be carried out after the works on "developing options and assessing and mitigating impacts" for comments and assessment.

2.4 Sindh Environmental Quality Standards

On January 28, 2016, the Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Air, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015 have been notified by Sindh EPA.

Table 2.1 shows SEQS for ambient air.

Table 2.1: Sindh Environmental Quality Standard for Ambient Air

Pollutant	Time-weighted average	Concentration in Ambient Air	Method of Measurement
Sulfur Dioxide (SO_2)	Annual Average*	80 µg/m^3	Ultraviolet Fluorescence Method
	24 hours**	120 µg/m^3	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m^3	Gas Phase Chemiluminescence
	24 hours**	40 µg/m^3	
	Annual Average*	40 µg/m^3	Gas Phase

Table 2.1: Sindh Environmental Quality Standard for Ambient Air			
Pollutant	**Time-weighted average**	**Concentration in Ambient Air**	**Method of Measurement**
Oxides of Nitrogen as (NO_2)	24 hours**	80 µg/m^3	Chemiluminescence
O_3	1 hour	130 µg/m^3	Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	360 µg/m^3	High volume Sampling, (Average flow rate not less than 1.1m^3/minute)
	24 hours**	500 µg/m^3	
Respirable Particulate Matter (PM_{10})	Annual Average*	120 µg/m^3	B Ray absorption method
	24 hours**	150 µg/m^3	
Respirable Particulate Matter ($PM_{2.5}$)	Annual Average*	40 µg/m^3 ***	B Ray absorption method
	24 hours**	75 µg/m^3	
	1 hour	15 µg/m^3	
Lead (Pb)	Annual Average*	1 µg/m^3	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	1.5 µg/m^3	
Carbon Monoxide (CO)	8hours**	5 mg/m^3	Non Dispersive Infra Red (NDIR) method
	1hours	10 mg/m^3	
*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.			
**24 hourly / 8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.			
*** or 9 µg/m^3 plus baseline, whichever is low			

Table 2.2 shows the standards for motor vehicle noise.

Table 2.2: The Motor Vehicle Ordinance (1965) and Rules (1969)		
Parameter	**Standards (maximum permissible limit)**	**Measuring method**
Noise	85dB(A)	Sound-meter at 7.5meter from the source

Table 2.3 shows the Sindh environmental quality standard for noise.

Table 2.3: Sindh Environmental Quality Standard for Noise			
S. No.	**Category of Area / Zone**	**Effective from 1st January, 2015**	
		Limit it in dB(A) Leq*	
		Day Time	**Night Time**
1	Residential area (A)	55	45
2	Commercial area (B)	65	55
3	Industrial area (C)	75	65

4	Silence Zone (D)	50	45
Note: 1	Day time hours: 6.00 a. m to 10.00 p. m		
2	Night time hours: 10.00 p. m to 6.00p. m		
3	Silence zone; Zone which are declared as such by competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.		
4	Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.		
***dB(A)Leq**	Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.		

The SEQS for effluents are shown in Table 2.4.

Table 2.4: Sindh Environmental Quality Standard for Municipal & Liquid Industrial Effluents

S. #	Parameter	Into Inland Waters	Into Sewage Treatment	Into Sea	unit
1	Temperature or Temp. increase	<3	<3	<3	^oC
2	pH value (H^+)	6-9	6-9	6-9	
3	Biological Oxygen Demand $(BOD)_5$ at 20^oC	80	250	80	mg/l
4	Chemical Oxygen Demand (COD)	150	400	400	mg/l
5	Total Suspended Solids (TSS)	200	400	200	mg/l
6	Total Dissolved Solids (TDS)	3500	3500	3500	mg/l
7	Oil and Grease	10	10	10	mg/l
8	Phenolic Compounds (as Phenol)	0.1	0.3	0.3	mg/l
9	Chloride (as Cl^-)	1000	1000	SC	mg/l
10	Fluoride (as F^-)	10	10	10	mg/l
11	Cyanide (as CN^-) total	1.0	1.0	1.0	mg/l
12	An-ionic detergents (as MBAS)	20	20	20	mg/l
13	Sulphate (SO_4^{2-})	600	1000	SC	mg/l
14	Sulphide (S^{2-})	1.0	1.0	1.0	mg/l
15	Ammonia (NH_3)	40	40	40	mg/l
16	Pesticides	0.15	0.15	0.15	mg/l
17	Cadmium	0.1	0.1	0.1	mg/l
18	Chromium (trivalent and hexavalent)	1.0	1.0	1.0	mg/l
19	Copper	1.0	1.0	1.0	mg/l
20	Lead	0.5	0.5	0.5	mg/l
21	Mercury	0.01	0.01	0.01	mg/l
22	Selenium	0.5	0.5	0.5	mg/l
23	Nickel	1.0	1.0	1.0	mg/l
24	Silver	1.0	1.0	1.0	mg/l
25	Total toxic metals	2.0	2.0	2.0	mg/l

26	Zinc	5.0	5.0	5.0	mg/l
27	Arsenic	1.0	1.0	1.0	mg/l
28	Barium	1.5	1.5	1.5	mg/l
29	Iron	8.0	8.0	8.0	mg/l
30	Manganese	1.5	1.5	1.5	mg/l
31	Boron	6.0	6.0	6.0	mg/l
32	Chlorine	1.0	1.0	1.0	mg/l

The SEQS for drinking water are shown in Table 2.5.

Table 2.5: Sindh Environmental Quality Standards for Drinking Waters (mg/l)

S.#	Properties / Parameters	Standard Values for Pakistan	S.#	Properties / Parameters	Standard Values for Pakistan
Bacterial			Chemical		
1	All water intended for drinking (E.Coli or Thermo tolerant Coliform bacteria)	Must not be detectable in any 100-ml sample	Essential Inorganics (mg/liter)		
			13	Aluminum (Al) mg/l	≤ 0.2
			14	Antimony (Sb)	≤ 0.005
2	Treated water entering the distribution system (Ecoli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100-ml sample	15	Arsenic (As)	≤ 0.05
			16	Barium (Ba)	0.7
			17	Boron (B)	0.3
3	Treated water in the distribution system (E.coli or thermo tolerant coliform and total coliform bacteria)	Must not be Detectable in any 100-ml sample. In case of large supplies, where sufficient samples are examined, must not be resent in 95% of the samples taken throughout any 12-month period.	18	Cadmium (Cd)	0.01
			19	Chloride (Cl-)	< 250
			20	Chromium (Cr)	≤ 0.05
			21	Copper (Cu)	2
			Organic (mg/L)		
			22	Phenolic compounds	<0.0002
			Toxic Inorganics (mg/liter)		
			23	Cyanide (CN)-	≤ 0.05
			24	Fluoride (F)	≤ 1.5
			25	Lead (Pb)	≤ 0.05
			26	Manganese (Mn)	≤ 0.5
Physical			27	Mercury (Hg)	≤ 0.001
4	Color	< 15 TCU	28	Nickel (Ni)	≤ 0.02
5	Taste	Non-objectionable/ Acceptable	29	Nitrate (NO_3)-	≤ 50
6	Odor	Non-objectionable/ Acceptable	30	Nitrite (NO_2)-	≤ 3
7	Turbidity	< 5 NTU	31	Selenium (Se)	≤ 0.01

8	Total Hardness as $CaCO_3$	< 500 mg/l	32	Residual Chlorine	0.2-0.5 At consumer end 0.5-1.5 at source
9	TDS	<1000			
10	pH	6.5-8.5			
Radioactive					
11	Alpha Emitters bq/L	0.1	33	Zinc (Zn)	5.0
12	Beta emitters	1			

2.5 Sindh Prohibition of Child Employment Act, 2017

Article 11(3) of the Constitution of Pakistan prohibits employment of children below the age of 14 years in any factory, mines or any other hazardous employment. In accordance with this Article, the Prohibition of Child Employment Act (PCEA) 2017 disallows the child labor in Sindh. The PCEA defines a child as a person who has not completed his/her fourteenth years of age, and an adolescent means a person who has completed fourteenth year of age but has not completed eighteenth years of his age. No child shall be employed or permitted to work in any establishment including construction but an adolescent can be employed or permitted to work under strict guidelines provided in the PCEA and rules. An adolescent shall not be employed in any hazardous work included in the schedule to the PCEA.

2.6 Archaeological Relics

After the Eighteenth amendment in the constitution the subject of “Ancient and historical monuments, archaeological sites and remains” the entry No.37 of the concurrent legislative list has also devolved to provincial legislations. There are two laws that are directly relevant for archaeological relics. The first is The Antiquities Act, 1975, which ensures the protection of Pakistan’s cultural resources. The Act defines “antiquities” as ancient products of human activity, historical sites or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the GoP to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the Project proponents are obligated to ensure that no activity is undertaken within 61 m (200 ft.) of a protected antiquity, and to report to the GoP’s Department of Archaeology any archaeological discovery made during the course of the project. The second is The Sindh Cultural Heritage (Preservation) Act, 1994, which is the provincial law for the protection of cultural assets. Its objectives are similar to those of the Antiquity Act. Heritage Foundation has catalogued 600 historic buildings declared heritage sites under the Sindh Cultural Heritage (Preservation) Act, 1994. No such sites exist in the vicinity of project.

2.7 Pakistan Penal Code, 1860 (PPC)

Chapter XIV of the PPC deals with the offences affecting the public health, safety, convenience, decency and morals. Person may be guilty of public nuisance if his act or

omission causes common injury, danger or annoyance to the public or results in spread of infection of disease dangerous to life. The chapter also deals with environmental pollution.

2.8 Sindh Solid Waste Management Board Act, 2014

The SSWMB Act, 2014 was enacted to establish a Board for collection and disposal of all solid waste, to arrange effective delivery of sanitation services, to provide pollution free environment and to deal with other relevant matters. The Board established under the Act headed by the Chief Minister or his nominee and constitutes of thirteen other ex officio members of other relevant departments. Some of the salient features and functions of the Board are; it has the right over the solid waste related issues, assets, funds and liabilities of the Councils and shall possess sole rights on all kinds of solid waste within the limits of all Councils established under the Local Government Act 2013, it has the authority to grant permission to individuals, institutions industries, factories, workshops, furnaces, compost making and power generation from the solid waste, for segregation of the recyclable material from the waste, collection, treatment, sale and purchase, recycling or disposal of any kinds of waste.

2.9 Disaster Management Act, 2010

This Act was enacted to provide for the establishment of a National Disaster Management System for Pakistan. Sindh Disaster Management Authority enforces the Act. The Act defines 'disaster' as a catastrophe or a calamity in an affected area, arising from natural or man-made causes or by accident which results in a substantial loss of life or human suffering or damage to, and destruction of, property. Disaster management includes preparedness and response. The Act provides establishment of disaster management authorities at national, provincial and district levels. The authorities require preparing and implementing disaster management plan for their area.

2.10 Sindh Drinking Water Policy, 2017

Public Health Engineering & Rural Development Department, Government of Sindh, with the approval of Chief Minister Sindh issue the drinking water policy on 3rd May 2017.

Principles: The main principles of Sindh Drinking Water Policy, adopted from the National Drinking Water policy 2009, and aligned with the Sustainable Development Goals, are as follows:

- Access to safely managed drinking water is a fundamental right of every citizen and that it is the responsibility of the Government to ensure its provision to all citizens,
- Water allocation for drinking purpose shall be given priority over other uses,
- In order to ensure equitable access, special attention shall be given to removing the existing disparities in coverage of safe drinking water and for addressing the needs of the poor and the vulnerable on priority basis.
- Recognizing that inadequate and unsafe water supply and sanitation are a major cause of diarrhea and nutritional deficiency in children, which as a consequence contribute towards

child mortality. Safely managed drinking water supply and sanitation shall be integrated in health, nutrition and school health programs.

- Access shall be increased to high quality nutrition-sensitive services, including access to water, sanitation facilities, and hygiene.
- Key hygiene actions (safe drinking water, hand washing with soap, safe disposal of excreta, food hygiene) shall be integrated as essential components in all nutrition programs.
- Realizing the fact that access and availability of safe drinking water affects all aspects of life of a citizen, a multi sectoral approach, involving different departments of the government, shall be adopted to address the issues related to safe drinking water.
- Being cognizant of the fact that women are the main providers of domestic water supply and maintainers of hygienic household environment, their participations in planning, implementation, monitoring and operation & maintenance of water supply systems shall be ensured, and WASH shall be integrated in maternal and neonatal health programs.
- Responsibilities and resources shall be delegated to local authorities to enable them to discharge their assigned functions with regard to provision of safe water supply.
- A supportive policy framework shall be developed that encourages alternate options through private provision, public private partnerships, the role of NGOs and community organizations
- The execution of component-sharing model for government programs and projects shall be promoted to ensure financial sustainability and community and private sector involvement in development and O&M.
- Low cost technologies in water and sanitation, that are easy and cost-effective to maintain shall be developed and used.

Goals and Objectives:

Overall Goal: The goal of the Sindh Drinking Water Policy is to improve the quality of life of people of Sindh by reducing morbidity and mortality caused by water-borne diseases through provision of safely managed and potable drinking water to the entire population that is located on premises, available when needed, and free from contamination, affordable and of sufficient quantity, and in a way, that is efficient, equitable and sustainable.

Objectives:

- Introduce legislative measures and regulations to create an enabling framework for safely managed drinking water supply, regulation of water usage, extraction, treatment, transportation and distribution.
- Ensure that all drinking water resources and supply systems are protected with community involvement.
- Develop district level drinking water availability plans for urban and rural areas to ensure improved planning for equitable access.
- Enhance the coverage of safely managed drinking water supply in the province to achieve the Sustainable Development Goals (SDGs) targets of universal access.

- Develop criteria for installation of new drinking water supply schemes and ensure that all new schemes are safely managed, rationalized and constructed through need-based criteria so that all areas and communities are served.
- Develop standardized service delivery models for both urban and rural drinking water supply schemes to improve efficiency, cost-effectiveness, monitoring & sustainability.
- Develop mechanisms for reuse, recycle and recharge of wastewater for other municipal and productive uses.
- Ensure that all drinking water supply systems are designed and constructed in line with the national drinking water quality standards and all municipal discharges comply with National Environment Quality Standards (NEQS).
- Install water treatment plants at existing drinking water supply schemes where required and incorporate water treatment facilities in all new drinking water supply schemes.
- Ensure development of water safety plans for all drinking water supply systems.
- Develop and sustain regular drinking water quality monitoring & surveillance, and institute mechanisms for remedial action.
- Increase public awareness about water borne and water related diseases (including polio), nutrition and hygiene, and enhance the role of communities for household water treatment/storage, water safety and conservation, and safe hygiene practices.
- Ensure that drinking water supply projects are nutrition sensitive and integrated in health, nutrition and school health programs.
- Institutionalize Water, Sanitation & Hygiene (WASH) in schools (infrastructure and 3 starts) and introduce curricular change to incorporate health, nutrition and hygiene and improve safe water and sanitation practices among school children.
- Institute adaptation measures and disaster risk reduction and mitigation strategies to minimize the impact of climate events on drinking water supply system.

The proponent shall ensure supply of clean drinking water to the construction staff.

2.11 Sindh Sanitation Policy, 2017

The goal of the Provincial Sanitation policy is to ensure that the entire population of Sindh has access to a safely managed sanitation service and sanitary environment that is also nutrition-sensitive and hygienic. The motto of the policy was ‘Saaf Suthro Sindh’ (Neat and Clean Sindh). The Policy sets targets to achieve its motto. For instance, eradication of Open Defecation from Sindh Province by 2025, while 70% villages of 13 high priority districts achieve the status of open defecation free by 2020; create and develop wastewater treatment mechanisms to cover 75% of urban areas and 40% in rural areas by 2025, and implement integrated solid waste management with 100% coverage in urban areas and 60% in rural areas of Sindh by 2025. A WASH behavior change and communication strategy has also been developed for sustainable and safe hygiene environment by 2025 to enhance the living standards of the people of Sindh.

2.12 Laws and Regulations on Urban Development

Sindh Government also has some laws and regulations for building control:

1) Buildings Control Ordinance, 1979
2) Karachi Building Control Licensing Regulations, 1982
3) Sindh Regulation & Control (Use of Plots & Construction of Buildings) Ordinance, 2002

Karachi Building Control Authority (KBCA) has been established under these ordinances, in order to implement and enforce the above regulations. The Government of Sindh on 14th February 2011 notified extension of the jurisdiction of KBCA to the whole of Sindh and renamed the KBCA to Sindh Building Control Authority (SBCA). The SBCA (Karachi region) is responsible to oversee that the land development process & construction activities do not violate the Karachi Building and Town Planning Regulations, 2002.

Karachi Building and Town Planning Regulations, 2002 is the fundamental regulation for 'Building & Town Planning' for the whole City District of Karachi, except for the cantonment areas and the projects of National Security declared by the Federal Government, which supersedes 'Karachi Building and Town Planning Regulations-1979'. Eight (8) public agencies are individually designated as 'Concerned Authorities for respective areas and purposes', following City District Government Karachi (CDGK), such as:

- Cantonment Boards of the Ministry of Defense
- Karachi Port Trust (KPT)
- Pakistan Railways (PR)
- Ministry of Works, Government of Pakistan (GOP)
- Sindh Industrial Trading Estates, Karachi (SITE)
- Sindh Katchi Abadis Authority
- Board of Revenue

For reference, there are many agencies holding lands in Karachi and no dominant ones. An outline of existing condition of land holdings in Karachi is illustrated as follows.

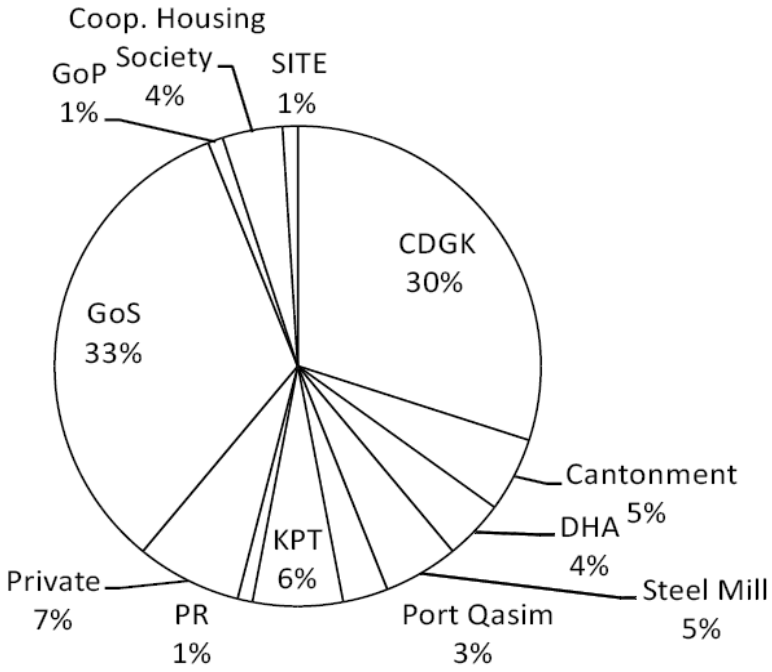


Figure 2.2: Land Holdings by Agency in Karachi
Source: KMP 2020

The above-mentioned regulations have been quite frequently amended as needs arose, since its commencement, especially among the detailed provisions.

2.13 Karachi Strategic Development Plan 2020

Karachi Strategic Development Plan (KSDP) 2020 was formulated in 2007 as the official development plan of the City District Government of Karachi (CDGK). This is the first ever approved development plan which has now a legal status under Section 40 of the Sindh Local Government Ordinance 2001 in contrast to the previous master plans. The contents of KSDP 2020 consist of following 7 chapters and they are summarized as follows:

A. Introduction/Outline

1) Coverage of the Plan: Whole City District of Karachi, consisting of 18 Towns, 6 cantonments, and Federal and provincial governments land-holding agencies; approximately 3,600 sq.km, of which 1,300 sq.km is urbanized (built-up) area.

2) Critical Issues in Land Planning and Municipal Control: The land planning and municipal control is fragmented into about twenty agencies, such as 6 Cantonment Boards, Karachi Port Trust, Port Qasim Authority, Defence Housing Authority, Pakistan Steel, Pakistan Railways, Export Processing Zone, Sindh Industrial Trading Estate, Government Sindh, City District Government Karachi, Lyari Development Authority, Malir Development Authority, cooperative housing societies and private owners, with overlapping powers/functions and utter lack of coordination. The share of CDGK is only 31% of the total area.

3) Vision for Karachi: "Transforming Karachi into a world class city, an attractive economic center with a decent life for Karachiites".

4) Plan Objectives: In order to achieve the vision, the Plan consists not only of physical renewal plans but equally invoking the spirit and commitment of both leaders and citizens to realize a more prosperous, secure and sustainable future.

A. Finding out Karachi's advantages/potential for future development
B. Promoting a holistic vision towards sustainable growth
C. Identifying and addressing key issues in social, economic, environment & urban infrastructure sectors
D. Setting out strategic framework against the backdrop of current conditions
E. Framing the development plans and programs
F. Putting in place an effective, collaborative institutional arrangement with participation of all stakeholders

5) Status and Role: KSDP 2020 has a legal status under SLGO for guiding city's growth in a planned and coordinated manner, and is mandatory for all agencies, stakeholders to follow the plan.

6) Time Span of the Plan: The operational time span for the plan extends to the year 2020 within the scope of Pakistan's Vision 2030. The plan will be further extended to 2030 to cover the city's region that includes part of surrounding districts of Thatta, Jamshoro and Lasbella.

B. (2) Summary of Land Use Plan, KSDP 2020

Major points of land use plan/strategy are:
Page 1-4 "The spatial needs for commerce, industry, housing and infrastructure development to cope with future population growth (15.2 million in 2005 to 27.6 million in 2020; 4% of AAGR) will be provided through a set of policies and programs, as follows":

1) Spatial Growth Strategy (Basic)

- Densification: Saddar, Jamshed, North Nazimabad, Gulberg, SITE and Shah Faisal Towns
- Densification & Infill: Gulshan-e-Iqbal, Landhi, Korangi, New Karachi Towns, DHA & Cantonments
- Infill and Expansion: Baldia, Malir, Orangi and Gadap Towns
- Status Quo: Lyari and Liaquatabad Towns

2) Various Land development policies and Strategies

In addition to the basic strategy (spatial growth), following several individual land development policies/strategies were considered and proposed in the plan.

- Regeneration of the Inner City
- Promotion of Mixed-Use Development
- Permit and Guide Vertical Development and Densification
- Enable Densification and Vertical Development of Existing Residential Areas
- Development of New Urban Centers

- Policy for Urban Renewal
- Integration of Civil Areas of Cantonment and other Land-Owning Agencies
- Incorporation of Existing Goths into the Urban Fabric
- Development of Industrial Zones
- Decentralization of financial districts
- Additional site for international airport
- Special Purpose Zone along Northern bye-pass
- Development of Education city
- Additional spaces for graveyards and landfill sites for garbage

2.14 Sindh High Density Development Act 2010

The Sindh Assembly passed a legislation titled 'Sindh High Density Development Board Act 2010' to ensure coordinated and integrated development of high-density zones in the urban centers of the province including Karachi. The Law empowered the board to identify and mark high density zones keeping in view the general principles of the KSDP 2020. Poor regulatory framework for development, fragmentation in land management control amongst various agencies and adverse impacts on city infrastructure were outlined as the main reasons.

2.15.1 The Sindh High Density Development Board (Rules & Procedure), 2011

These rules and procedure are known as the "Sindh High Density Development Board (Rules and Procedure), 2011". The rules relevant to the proposed project are presented hereunder:

Amalgamation of Plots: With the NOC of MPGO, CDGK, the Concerned Authority is competent to allow amalgamation of plots without any limitation of area. However, in case of different land use, conversion charges shall be payable to MPGO at the prevailing rate of the nearest declared commercial road and in other cases the rate to be decided by the High-Density Development Board.

Change of Land use: For Residential Plots: The Plot Ratio of High-Density Zone shall be allowed on payment of prescribed fee by the High-Density Development Board.

Recreational Spaces: For all public sale and commercial plots a minimum of 8% of the permissible floor area ratio/proposed covered area shall be provided for recreation facilities / children play area / prayer area. This area shall not be included in the total floor area.

Height related setbacks of buildings: The provisions of KB&TPR-2002(with upto date amendments) for the height related setback of buildings are not applicable in High Density Zone.

Commercial (Building Bulk Standards):

i) FAR	1:8 for plot size 3,000 to 4,999 Sq. Yds. 1:12 for plot size 5,000 Sq. Yds an above
ii) ARCADE	12'-0"
iii) FOOT PRINT	a). For shopping mall and parking floor 65%(Maximum). b). Typical floors 30 to 40%.

iv) COMPULSORY OPEN SPACE Sides and rear upto 30ft. 20'-0" and 10% of building height above 30 ft.
v) OTHER CONDITIONS. Shall be as per 25-3.2(all)

Residential/Flat Sites:

i) The provision of density (person per acre) is not applicable.
i) FAR 1:8 for plot size 3,000 to 4,999 Sq. Yds.
1:12 for plot size 5,000 Sq. Yds an above
ii) FOOT PRINT a) For ground floor and parking floor 65%.
b) Typical floors 30 to 40%.
iii) COMPULSORY OPEN SPACE Front, sides and rear 25ft.

Parking requirements:

i. Shops and offices 800 sq. Ft. per car.
ii. Apartments 1000 sq. Ft. per car.
iii. 16 ft. wide one-way ramp.
iv. 24 ft. wide two-way ramp.
v. Drive way 18 ft.
vi. Ramp gradient 1:7.5
vii. Transit space 8 ft. 6 inch shall be provided at the commencement and at the end of the ramp.
viii. Bays/car stall size 8 ft. x 16ft.
ix. Outer turning radius straight 36 ft.
x. Outer turning radius for helical 40ft.
xi. In addition to project parking 50% additional, separate parking space shall be reserved for public parking, whereas, 25% extra parking shall be provided for visitors.

Conditions to be fulfilled:

i. Minimum area of plot required shall be 3,000 sq. yards facing minimum 100'-0" vide road. For plots facing major road under widening scheme as per table 16-3 of KB &TPR-2002 (with upto date amendments) the minimum proposed road width shall be 80'- 0" or width of road as decided by the Sindh High Density Development Board.
ii. Environment Impact Assessment (EIA) of the project shall be mandatory.
iii. Provision of firefighting as per international standard shall be provided.
iv. Mechanical, Electrical, Plumbing (MEP) details shall be provided as per International Standards
v. Owner/Sponsor of the Project shall be required to submit details of Consulting Firms and Contractors to be engaged for the Project having International/National experience of such High-Rise Buildings/ Projects along with the availability of modern technology/equipments to be used for the execution of the project.
vi. For General Standards with regards to spaces in and about building, height and ventilation etc. provisions as contained in KB&TPR- 2002 (with upto date amendments) shall be followed.

2.15 Civil Aviation Rules, 1994

The Civil Aviation Rules 1994 has mandated it for all the builders and developers to obtain No Objection Certificate (NOC) from Civil Aviation Authority (CAA) under rule 68, section-3 of Civil Aviation Rules, 1994 for "Height Clearance" for projects/buildings within the radius of 25km of all airports. The rule 68, section 3 (Safe Guarding at Aerodromes (68) Limitation of obstructions) reads as under: "No person shall erect any temporary or permanent structure, nor position a vehicle or other mobile object on or in the vicinity of any aerodrome to which these rules are applicable, that will be within the clearance area, or will protrude through an obstacle limitation surface, at that aerodrome". NOC from CAA for the project has been mentioned in the SBCA approval.

2.16 Building Code of Pakistan, Fire Safety Provisions 2016

The Building Code of Pakistan-Fire Safety Provisions-2016 provide rules for fire prevention, life safety in relation to fire and fire protection of building and structures as prescribed. All the federal and provincial governments, organizations, authorities, both public and private are mandated to adopt and implement Building Code of Pakistan-Fire Safety Provisions-2016, as notified. Any construction and modification of buildings in violation of Building Code of Pakistan (Fire Safety Provisions-2016) shall be considered as violation of professional engineering works as specified under clause (xxv) of section 2 of the Act.

The implementation and enforcement of this bye-law shall vest with the Authority Having Jurisdiction (AHJ) within their respective jurisdictions and circles as follow:

1) Building Control, Housing and Development Authorities
2) District Administration
3) Tehsil or Town Administration
4) Municipal Administration
5) Station Headquarters (Army, Air Force and Navy)
6) Cantonment Administration
7) Union Council Administration
8) Autonomous Bodies
9) Industrial Estates
10) Directorates of Civil Defense
11) Export Processing Zones
12) Other Federal/Provincial Authorities as and when notified

This Bye-law shall come into force upon being notified and all the concerned AHJs shall implement the same immediately in the prescribed manner.

All relevant AHJs shall ensure compliance and implementations of this Code and accordingly adopt or amend their relevant regulations, Bye-laws or rules as the need be.

This Bye-law shall apply to both new and existing buildings.

a. buildings permitted for construction after the adoption of these Provisions shall comply with the provisions stated herein for new buildings forthwith.
b. existing buildings constructed prior to adoption of these provisions shall comply with the provisions stated herein as soon as possible but not later than three years of notification of these provisions; and
c. minimum fire protection requirements such as provision of fire alarm and detection system, fire extinguishers, emergency response plans and fire drills shall however be in place as soon as possible but not later than one year of notification of these provisions.

Any person who fails to comply with this Bye-law or fails to carry out an order made pursuant to these provisions, or violates any condition attached to a permit, approval, or certificate shall be subject to the penalties in accordance with the regulations of AHJ.

2.17 The Sindh Occupational Safety and Health Act, 2017

The Sindh Occupational Safety and Health Bill 2017 has been approved by the Provincial Assembly of Sindh (Ref. Sindh Bill No. 27 of 2017) and enacted as the Sindh Occupational Safety and health Act, 2017. The Act makes provision for Occupational Safety and Health conditions at all workplaces for the protection of persons at work places against risk of injury arising out of the activities at work places and the promotion of safe, healthy and decent working environment adapted to the physical, physiological and psychological needs of all persons at work. Under the act, the Sindh Occupational Safety and Health Rules 2019 have been notified.

The proponent shall ensure the safety and health of workers working at the site by provision of safe working environment and Personal Protective Equipment.

2.18 IFC General EHS Guidelines

The EHS guidelines published by IFC are technical reference documents that address IFC's expectations regarding the industrial pollution management performance of its projects; however, these guidelines have been benefited from for other projects as well. They are designed to assist managers and decision makers with relevant industry background and technical information. This information supports actions aimed at avoiding, minimizing, and controlling EHS impacts during construction, operation, and decommissioning phase of a project or facility. Environmental issues associated with the construction and maintenance activities may include, among others, noise and vibration, soil erosion, and threats to biodiversity including habitat alteration and impacts to wildlife.

Examples of the impacts addressed in the General EHS Guidelines include:

- Construction site waste generation;

- Soil erosion and sediment control from materials sourcing areas and site preparation activities;
- Fugitive dust & other emissions (e.g. from vehicle traffic, land clearing activities, & materials stockpiles);
- Noise from heavy equipment and truck traffic;
- Potential for hazardous materials and oil spills associated with heavy equipment operation and fueling activities.

Chapter 3 DESCRIPTION OF PROJECT

3.1 The Project

The site of proposed **Sea Front** project is located at Plot No. FL-11, Block-1, KDA Scheme-5, Clifton, Karachi. The proposed site can be located at satellite imagery at 24°48'50.52"N & 66°59'48.14"E. The project falls in the High-density "ribbon" zone. The project aims at providing a landmark to the skyline of Clifton, and thus to meet the objectives and principles of sustainable development. The project design entails necessary features to address the important aspects relating to energy conservation, waste management, environmental resource management, firefighting & safety and compliance of environmental standards.

The salient features of the project are as under:

Table 3.1: Project Details	
Project Name	Sea Front
Proponent	M/s Jubilee Builders and Developers
Project Nature	Residential Building Project
Plot Area	5815.00 SQ YD
Covered Area	462660.13 SQ FT
Storeys	2B+G+45
Address	Plot No. FL-11, Block-1, KDA Scheme-5, Clifton, Karachi.
Basement-2 (Parking + Services)	Parking (84 cars and 94 motorcycles), underground water tank for potable, non-potable, firefighting and septic water, and other services.
Basement-1 (ARS + Parking + Services)	Parking (79 cars and 81 motorcycles), Air Raid Shelter and other services.
Ground Floor (Parking + Services)	Parking (21 cars and 64 motorcycles), landscaping, reception, waiting area, recycling plant, wastewater treatment plant, generator space, meter room, funeral parlor, and other services.
1st Floor (Parking + Services)	Parking (52 cars and 92 motorcycles)
2nd and 3rd Floor (Parking + Services)	Parking (108 cars (54x2) and 188 (94x2) motorcycles)
4th Floor (Parking + Services)	Parking (53 cars and 98 motorcycles) and intermediate water tank
5th Floor (Recreational area)	Prayer hall, community hall, play area, library, first aid center, day care, games, gymnasium and other services
6th to 43rd Floor (Flats)	304 Flats (08x38)
44th Floor Plan (Flats)	02 LL Duplex
45th Floor Plan (Flats)	02 UL Duplex

Roof Plan (Solar Panels + Battery Room + Helipad + Services)	Helipad, solar panels, overhead water tanks for potable, non-potable and fire-fighting water, and others services
Total flats	308 flats
Height of the building	498'-6"
Total provided cars	397
Total provided motorcycles	617

Table 3.2: Schedule of Area

Project Allowable Details	
Plot Category	FL
Total Area of Plot	5815.00 Sq. Yds = 52335.00 Sq. Ft.
Floor Area Ratio (FAR)	1:9
Allowable Area as Per FAR =1: 9	471015.00 Sq. Ft.
Allowable Foot Print Typ. (30% to 40%)	15700.500 Sq. Ft. 20934.00 Sq.Ft.
Proposed Area as Per FAR =1:9	462660.13 Sq. Ft.
Proposed Foot Print Typ. (30% to 40%)	17191.56 Sq. Ft. (Flats, Circulation & Services)
Total Proposed Area (Basement)	46031.71 Sq. Ft.
Total Proposed Area (Parking1st.to4th.)	142767.12 Sq. Ft.
Total Proposed Area (Recreation 5%)	23554.71 Sq. Ft.

3.2 Status of Approvals

Following NOCs/approvals have been obtained from respective authorities for project;

- Revised construction permit from SBCA
- Architectural concept plan approval from SBCA
- Possession order from KDA
- Allotment letter from KDA
- NOC for sale and advertisement from SBCA
- Transfer/Mutation from KDA
- NOC from CAA (No. HQCAA/1117/003/ARS/KHI-180/170, dated: 06.10.2017 (500 feet from AGL)

Environmental Impact Assessment (EIA)

SEA FRONT

Location Map



MAP KEY

- Project Location
- Landmarks
- Roads

PROPONENT

Jubilee Builders and Developers

CONSULTANT

EMC Pakistan Pvt. Ltd.
503, Anum Estate, Opp. Duty Free Shop,
Main Shahrah-e-Faisal, Karachi
Phone: 9221-343114665, 34324680
E-mail: nadeem@emc.com.pk
Website: www.emc.com.pk

Prepared by: Syeda Urooj Fatima



Figure 3.1: Project Location Map

3.3 Construction & Commissioning

3.3.1 Construction Schedule

The construction & commissioning phase will consist of following major activities:

- Construction of campsite including facilities and mobilization of contractors
- Construction of foundations and auxiliary structures (piling, civil works etc.)
- Internal and External finishing
- Mechanical, electrical and other works
- Demobilization and site restoration

3.3.2 Pre-Construction/Design Phase

This, the essential phase provides the basis for the construction program, the methodology to be adopted and the technologies to be involved. The project site has been assessed in terms of its geology, seismicity and seismo-tectonics. The pre-construction activities will involve earthworks & excavations.

3.3.3 Construction Activities

The sequence of construction should be as follows:

- Construction of earth retaining structure (secant pile wall, contiguous pile etc.)
- Drilling and installation of dewatering wells
- Excavation of plot upto groundwater level
- Dewatering
- Excavation upto Raft bottom level
- Construction of raft foundation followed by construction of substructure.

Standard and environmentally compatible construction materials (cement, sand, steel reinforcement, bricks etc.) & techniques/construction practices will be employed besides adopting Standard Operating Procedures (SOPs) set-out in the Environmental Management Plan.

3.3.3.1 Construction Office & Camp

The construction contractor will develop his own camp & offices for construction purposes within the project site. Development of campsite will include the following activities:

- Leveling and compaction of the area for office and campsite
- Provision of drainage works in and around the campsite
- Laying and compaction of the gravel topping in the office and campsite
- Construction of fuel storage tank area and water tank

- Provision of fence, access and emergency gates
- Construction of septic tanks
- Installation of membrane liner for fuel storage
- Installation of security guard cabins
- Installation of sewerage pipeline with manholes for the septic system & connecting it with Sewer line
- Provision of signage for each activity center

3.3.3.2 Foundations

Excavation for the foundations work will be made in accordance with the standards. Excavated material will be disposed of off-site via trucks and sent to approve sites. The excavated soil will be sent to road construction contractors for appropriate utilization.

Subsoil Investigation

The Subsoil investigation comprised drilling of 6 no. of bore holes. Drill was accomplished by Rotary method and the samples were recovered from Split Spoon Sampler in SPT. It was observed that the Groundwater fluctuates with tidal variation and it's found between 6 – 8 feet depth. The subsoil conditions are quite homogenous, as observed from 6 Bore Holes drilled at site up to maximum depth of 145 feet. The layers of stratum observed, is shown in the table below:

Table 3.3: Subsoil Investigation

Layer	Soil Type
Layer I	Grey / Brown, loose to medium dense, fine, Silty SAND, micaceous.
Layer II	Brownish Grey, medium dense, fine, Silty SAND, sea shells
Layer III	Brown / Grey / White, medium to dense, fine to medium grained, Silty SAND, sea shells
Layer IV	Brown / Grey, very dense, fine, Cemented Silty SAND
Layer V	Grey / Brown / Yellow, very stiff, thin bedded Sandy SHALE, gravel and sand layers, lenses of siltstone / conglomerate
Layer VI	Brown / Grey, highly compacted / hard SAND & GRAVELS, embedded in SHALE lenses of sandstone / conglomerate
Layer VII	Grey, medium hard, fractured, SILTSTONE, lenses of sandstone / shale
Layer VIII	Grey, very dense, fine, Cemented SAND, Lenses of shale / siltstone
Layer IX	Grey, hard, fractured, SILTSTONE, lenses of shale / limestone

3.3.3.3 Building Shell and Core Construction

Construction of the exterior enclosure or "shell" of the building include construction of the building's framework (installation of beams and columns), floor decks, facade (exterior walls and cladding), and roof construction. These activities require the use of, compressors, personnel and material hoists, front-end loaders, concrete pumps, on-site bending jigs and a variety of hand-held tools, in addition to the delivery trucks bringing construction materials to the site. At the same time, infrastructure connections are built. These include lines for water, sewer, storm water, electricity & telecommunications.

3.3.3.4 Interior Construction and Finishing

This stage includes the construction of interior walls, installation of lighting fixtures and interior finishes (flooring, painting, etc.), as well as mechanical & electrical works such as the:

- Internal and external pipe works
- Fire protection & Life safety systems
- Car Park Ventilation
- Electrical Distribution
- Emergency Lighting installations
- Lightning Protection

3.3.3.5 Civil Works

Civil works involves excavation, piling, formwork, reinforcement, concreting, masonry, plastering, painting, and also waterproofing work with gas-flame sticking, construction of light separating walls, hung ceilings, flooring, lining and facing.

3.3.3.6 Construction Equipment & Machinery

Conventional machinery and equipment will be used for construction activities. The equipment and machinery may include dozers, excavators, loaders, mobile crane, lorry, dump trucks, back hoe, bar bending machine, water bowzers, material hoist, passenger hoist, concrete placement booms & power generators.

3.3.3.7 Construction Material and other Supplies

Main construction material to be used during the construction phase will include ready mix concrete that will be sourced through reputable companies. Additionally, paints, glass, wood, tiles, aluminum, PVC/GI pipes, concrete/cement pipes, electric cables, etc. will be used during the different phases of construction. The materials will be transported by trucks to the project site, where they will be stored until moved to different locations as and when required. Materials including paving stone, crush, gravel and sand will be brought from commercial quarries located in the Sindh Province.

3.3.3.8 Site Restoration

On the completion of the construction phase, the entire site will be built-up thus no site restoration to original condition is required. External sites are not being used.

3.4 Utilities

3.4.1 Plumbing System

3.4.1.1 Design Codes & Standards:

The plumbing system is based on the following codes & standards:

- International Plumbing Code 2018.
- American Society for Plumbing Engineers (ASPE) Handbook – 2010.

3.4.1.2 Plumbing Fixtures Requirements:

The plumbing system has been designed to meet the minimum plumbing fixture requirements for space occupancy as per International Plumbing Code.

3.4.1.3 Scope of Plumbing System:

The scope of plumbing services is as follows:

- Domestic Water Supply
- Hot Water Supply
- Soil & Waste Water Drainage
- Storm Water Drainage
- Natural Gas Supply

The storm water drainage system shall be designed keeping in view the developed levels of the project area & shall be terminated from the building up to the road. Fire protection system shall comprise of building fire hydrants, Fire hose reels, Fire sprinkler and portable fire extinguishers of various type as per appropriate needs and requirements. The fire water shall be provided through a separate pressurized main. The relevant codes and standard have been being followed in calculation and design of various parameters of the water supply, selection of equipment for the water supply, sanitary / plumbing, sewage disposal and fire protection systems. The related sections of following codes and standards shall be followed in the design of the above stated works.

ASTM	American Society for Testing and Material
NFPA	National Fire Protection Association (USA)
NPC	National Plumbing Code
ANSI	American Plumbing Code.
ASME	American Society of Mechanical Engineer
AWWA	American Water Works Association
BCP	Building Code of Pakistan

3.4.2 Water Supply

Water supply system shall consist of underground water storage tanks, water supply network & the internal plumbing works.

3.4.2.1 Source of Water

- Water will be provided from city supply connection. In case of water supply shortage, options to use groundwater and water tankers will be utilized.

3.4.2.2 Design of Water Supply System

- Pipe material used for water shall be of PPRc for internal plumbing works & G.I for external water supply network, pipe sizes shall be designed on the basis of total fixture units connected to the section.
- Table used to ascertain maximum numbers of fixture units that can pass through a pipe are adopted from National Plumbing Code USA.
- Conversion of plumbing fixture unit's ratings applicable to building units is adopted from Fundamental of Plumbing Design Volume.

3.4.2.3 Water Requirement

The estimated water demand for the entire project is 54,050 Gallons/day.

Water consumption				
S. #	**Nature of Use**	**Minimum Quantity of Water Per User (US Gallons/day)**	**No. of Users/unit**	**Total Quantity of Water (US Gallons/day)**
For Residential Units				
1	Residential Units 308 Nos.	35	5	53,900
For Recreational Area				
2	Recreational Area (Community Hall / others)	15	10	150
Total				**54,050**

3.4.2.4 Sewerage System:

Estimated sewage water generation from project is 45,940 Gallons/day.

- Two-Stack drainage system.
- Separate soil stack– direct to main sewer after septic tank.
- Separate waste stack – to in-house treatment plant for re-cycling.
- Separate drainage lines for kitchen.

3.4.2.5 Storm Water Drainage:

The storm water drainage shall be achieved through purpose made built-in slopes in the ground all around the structures and shall be terminated on gravity towards the Storm Water catchments / gully's at the road side.

- ✧ Gravity drainage from building roofs to septic tank.
- ✧ Discharge of septic sank into nearby drain / *nallah*.

Following design criteria shall be adopted in his design of storm water drainage system.

- ✧ Local climate i.e., rainfall rate.
- ✧ Site conditions, elevation, water level and location of other utilities etc.

3.4.3 Fire Detection & Protection Systems

Fire protection system shall comprise of building fire hydrants, fire hose reels, fire sprinkler and portable fire extinguishers of various kind/types. The fire water shall be fed through a pressurized main to be installed all around the individual building/ block. Fire hydrant system including fire hose connection point hoses and nozzles to provide a readily accessible water supply for fire department or occupants of the project area to combat fire instantly.

3.4.3.1 Fire Detection & Alarm System:

Fire detection & alarm system shall be designed as per scope of works & in line with the design requirements and is covered in the electrical system design.

3.4.3.2 Fire Protection Systems:

- ✧ Fixed Fire Protection System
- ✧ Portable Fire Protection System
- ✧ Fire sprinkler system

3.4.3.3 Design Codes & Standards

The following standards have been followed in the design of fire suppression system.

- ✧ NFPA-10 – Standard for Portable Fire Extinguisher.
- ✧ NFPA-13 – Standard for the Installation of Sprinkler Systems.
- ✧ NFPA-14 – Standard for the Installation of Stand Pipe, Private Hydrant, & Hose Systems.
- ✧ NFPA-20 – Standard for the installation of Stationary Pumps for Fire Protection.
- ✧ Building Code of Pakistan – BCP 2016

3.4.4 Electrical & Allied Works

The electrical design development of the Project has been carried out in accordance with the prevailing international standards and local regulatory authorities to ensure the ease of maintenance, economy and safety from shock and fire hazards.

3.4.4.1 Scope of Services

- Utility Power Supply from K.E
- Backup Generator Supply
- Power Distribution including Small Wiring and accessories
- UPS / Emergency Supply
- Lighting and Controls
- Earthing & Grounding
- Lightning Protection System
- Fire Alarm and Detection System
- CCTV Surveillance System
- Audio / Audio-Video Intercom System

3.5 Solid Waste Generation

The solid waste generate on site will be collected daily by a solid waste contractor who will dispose it off in a responsible manner. The estimated amount of solid waste generation from the proposed residential building project is 850 kg per day at full occupancy. Numbers of trash bins and garbage chutes will be located inside the building and people will be appointed for collection of solid waste. Provision of garbage chute system is built in the project design.

Chapter 4 DESCRIPTION OF ENVIRONMENT

4.1 Micro Environment

Presented in this chapter of the EIA study are the findings of environmental and social baseline conditions of the project area in terms of its macroenvironment and microenvironment. Information available from literature relevant to baseline of the area, surroundings and the city was collected at the outset and reviewed subsequently. This was followed by surveys conducted by experts to investigate and describe the existing status and scenario.

The project falls in "FL" Category as per SBCA. The Project falls in to the appropriate category that permits the designated land-use by the SBCA. Siting of the project at Plot No. FL-11, Block-1, KDA Scheme-5, Clifton, is therefore duly authorized.

The project site is planned in the environs of Block-1, Clifton, and neighbors 300 ft wide Marine Promenade in the immediate south. Towards north of the project site a 50 ft wide road lies, east of the project site is served by a 20 ft wide footpath and a vacant plot, whereas towards west, the proposed site is facilitated by a 50 ft wide road and a park. Currently, the proposed site is a vacant plot and free from encumbrances as shown in the figure 4.1. The microenvironment of the project comprises of several high-rise residential buildings such as Chapal Resort, Ruby Beach Pride, some parks and playgrounds, community centers such as The Palm Banquet, and educational institutes, etc.

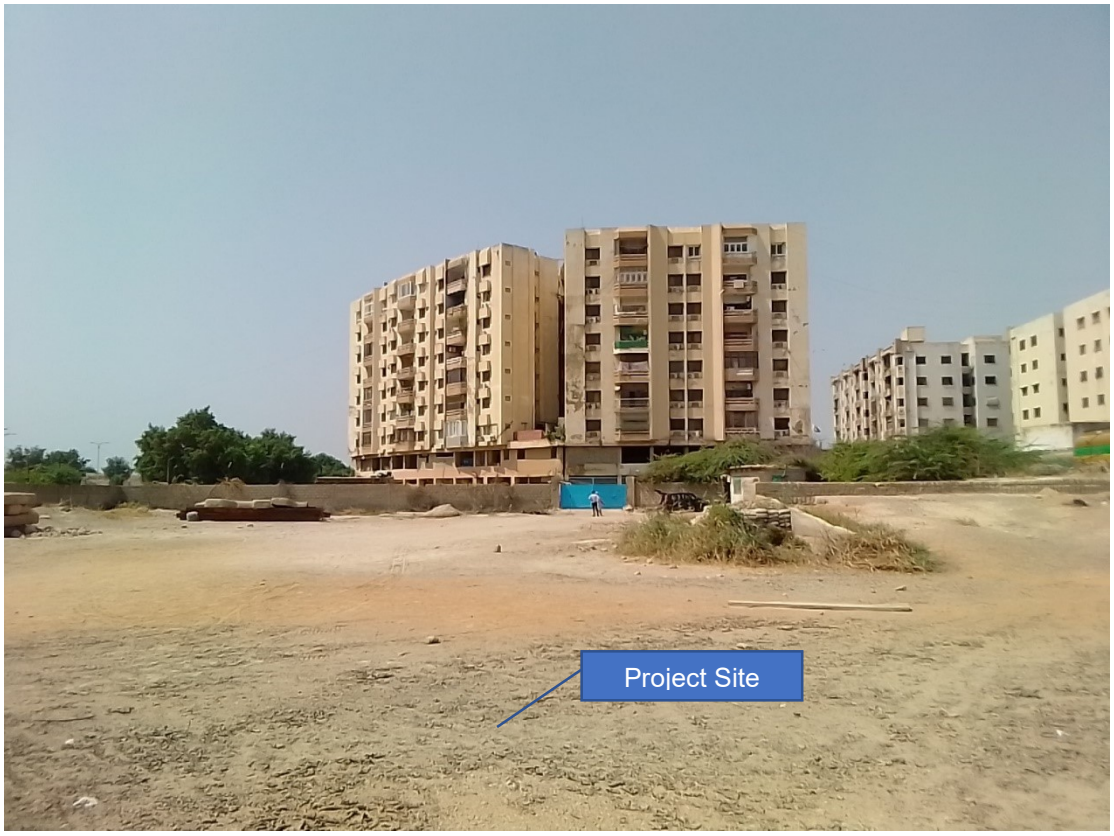


Figure 4.1: Present view of Project Site



Figure 4.2: Microenvironment of Project Site

Pictorial views of project surroundings	
	
5-meter-wide road on North of the Project	Chapal Resort Apartments on the West of Project
	
Open drains along Marine Promenade	Entry gate of Project Site
	
Guard Room at Project Site	Small Plants and Bushes at Site

	
Marine Promenade on South	Immediate East of the Project

4.2 Macro Environment

As of 2017 Census, the proposed project falls under the jurisdiction of Civil Line sub division of District South, Karachi. The macro environment has number of low-rise to mid-rise residential apartment buildings. Additionally, there are quite a few projects that have commenced following the declaration of ribbon along Marine Promenade under High Density Zone. The built environment of the macro environment is served by a road network comprising Shahrah e Ghalib on the north, Marine Promenade on the south, and Khayaban-e-Bedil on the east which separates Clifton Block 1&2.

The macroenvironment on the west and southwest comprises the recreation area of Manora Beach, Manora Ferry Stop and Sir Guru Nanak Darbar. The Karachi harbor is located at about 2 km on the west of the project site. The coastline along the Marine Promenade on the entire south of Ribbon High Density Zone has been reclaimed no too long ago.

4.3 Description of Physical Environment

4.3.1 Geology and Geomorphology

Geology: Karachi is the part of major synclinorium stretching from Ranpathani River in the east to Cape Monze in the west, Mehar and Mole Jabal (Mountains) in the north. Within the synclinorium a number of structures such as Pipri, Gulistan-e-Jauhar, Pir Mango and Cape Monze are exposed. The presence of concealed structures under the Malir River valley, Gadap and Maripur plains can fairly be deduced.

Rock aggregates, sand, limestone and clay are some of the potentials for gainful utilization. Gulistan-e-Jauhar member of the Gaj formation offers groundwater potential for limited use. The area is underlain by rocks of sedimentary origin ranging in age from Eocene to Recent. Major structural trends and the basin axis strike generally south but with a “bulge” to the east also called Karachi Arc (Bender and Raza 1995).

Subsoil Investigation: The Subsoil investigation comprised drilling of 6 no. of bore holes. Drill was accomplished by Rotary method and the samples were recovered from Split Spoon

Sampler in SPT. The subsoil conditions are quite homogenous, as observed from 6 Bore Holes drilled at site up to maximum depth of 145 feet. The layers of stratum observed, is shown in the table below:

Table 4.1: Subsoil Investigation

Layer	Soil Type
Layer I	Grey / Brown, loose to medium dense, fine, Silty SAND, micaceous.
Layer II	Brownish Grey, medium dense, fine, Silty SAND, sea shells
Layer III	Brown / Grey / White, medium to dense, fine to medium grained, Silty SAND, sea shells
Layer IV	Brown / Grey, very dense, fine, Cemented Silty SAND
Layer V	Grey / Brown / Yellow, very stiff, thin bedded Sandy SHALE, gravel and sand layers, lenses of siltstone / conglomerate
Layer VI	Brown / Grey, highly compacted / hard SAND & GRAVELS, embedded in SHALE lenses of sandstone / conglomerate
Layer VII	Grey, medium hard, fractured, SILTSTONE, lenses of sandstone / shale
Layer VIII	Grey, very dense, fine, Cemented SAND, Lenses of shale / siltstone
Layer IX	Grey, hard, fractured, SILTSTONE, lenses of shale / limestone

Groundwater was encountered at an average depth of 6-8 feet below ground level but it may undergo seasonal and tidal fluctuations.

Geomorphology of Karachi*:* Karachi is located in the south of Sindh, on the coast of the Arabian Sea. It covers an area of approximately 3,600 km^2, comprised largely of flat or rolling plains, with hills on the western and northern boundaries of the urban sprawl. The city represents quite a variety of habitats such as the sea coast, islands, sand dunes, swamps, semi-arid regions, cultivated fields, dry stream beds, sandy plains, hillocks. Classified according to physiographic features, Karachi City District can be divided into three broad categories: Hilly Region (Mountain Highland), Alluvial Plain (Piedmont Plain) and Coastal Areas (Valley Floor). The metropolitan area is divided by two non-perennial river streams namely Lyari and Malir Rivers. The Malir River flows from the east towards the south and centre, and the Lyari River flows from north to the south west. Gujjar and Orangi are the two main tributaries of the Lyari River while Thaddo and Chakalo are the main tributaries of the Malir River. The dry weather flow of both rivers carries urban sewage that is ultimately drained in the Arabian Sea. Among the various physiographic features, low flat-topped parallel hills devoid of vegetation,

interspersed with widespread plains and dry riverbeds are the main topographic characteristics of the city.

The greatest height of the region is 250 ft. that gradually decreases to 5 ft. above mean sea level along the coastline. The Karachi Harbour is a sheltered bay to the south-west of the city, protected from storms by the Sandspit Beach, the Manora Island and the Oyster Rocks.

The Arabian Sea beach lines the southern coastline of Karachi. Dense mangroves and creeks of the Indus delta can be found towards the south east side of the city. Towards the west and the north is Cape Monze, an area marked with projecting sea cliffs and rocky sandstone promontories.

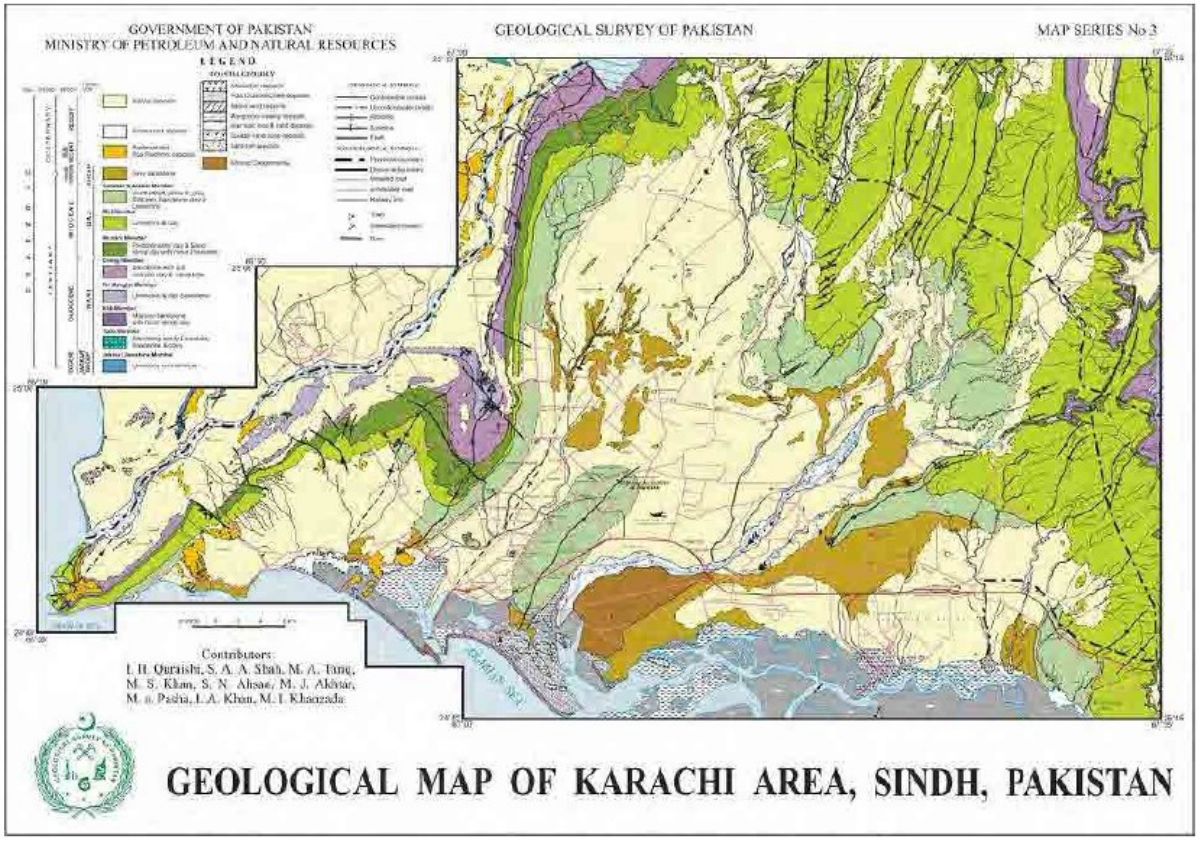


Figure 4.3: Geological Map of Karachi

***Soil*:** Generally, the thickness of the soil layer Karachi city region increases in the south-east direction. The maximum thickness of soils was noted in the towns of Shah Faisal, Malir, Landhi and Korangi, which are developed on alluvial deposits and dissected plateau (Pithawala and martin-kaye, 1946). In the other towns like North Nazimabad, New Karachi, Liaquatabad, Gulberg and Gulshan-e-Iqbal, the thickness of soil column were not uniform due to presence of structurally controlled anticlinorium and synclinorium under the soil cover. The subsurface rock structures have north-east and south-west orientations and are of variable sizes.

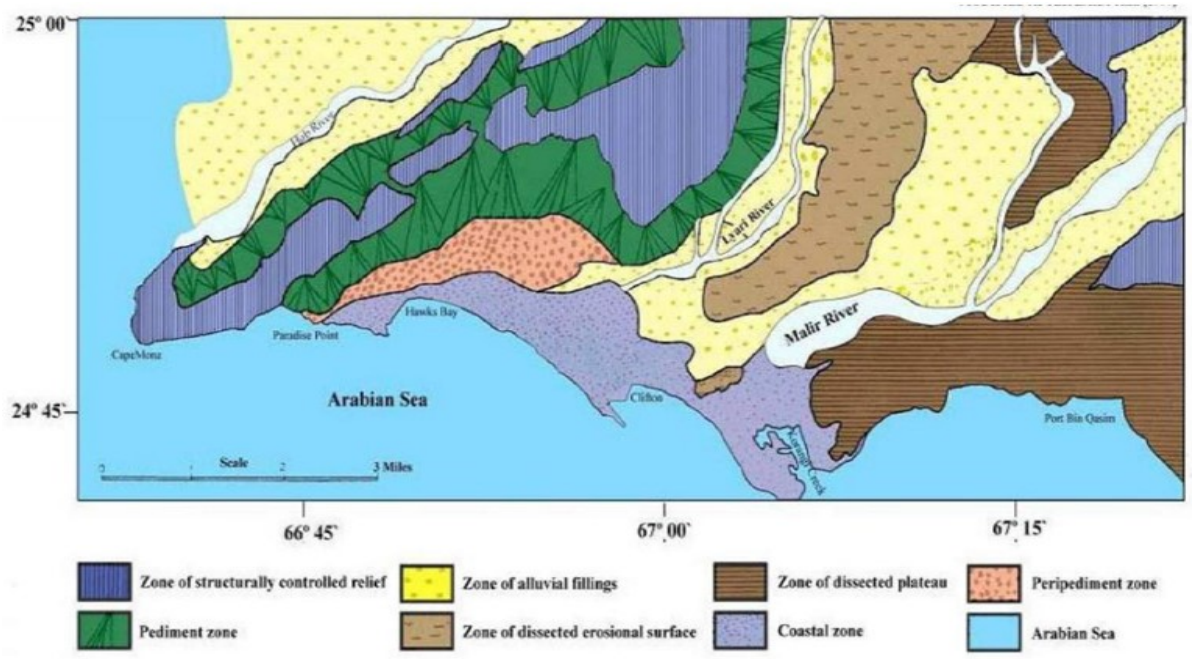


Figure 4.4: Map showing Geomorphological Zones of Karachi region[2]

4.3.2 Seismicity

Seismotectonic Study for macro environment of Project site aims at elucidating the impact of tectonic movement induced seismicity on the microenvironment. Seismicity in the Karachi region is related to the pressure potential being built at the convergence of the three lithospheric plates: Indian, Arabian, and Eurasian at the Triple Junction (Figure 4.5 & 4.6) formed by the intersection of Owen fracture zone, the Makran subduction zone and the Ornach-Nal fault. The Murray Ridge extends northward into Pakistan, to unite the Ornach-Nal-Chaman Fault system onshore, displaying a strike-slip boundary between the major tectonic plates of India and Eurasia[3].

Karachi and its environs fall in the synclinorium, described earlier as being part of Indus deltaic region. Recession of the delta and its retreat towards the southeast dried up its numerous channels, estuaries and creeks that characterize the synclines and are part of the active faults. Tectonic instability of this region can be attributed to this large number of reverse and tear faults and the recently described wrench faults.[4]

[2] Gulraiz Hamid, et al. Soil Classification as a Tool for Evaluating Soil Behavior as Foundation Materials. Int. j. econ. Environ. Geo. Vol 5 (1) 41-46, 2014.
[3] (Baloch, S.M. & Quirk, D.G., Mesozoic to Neogene Tectonism and Evolution of Murray Ridge, Pak. Jour. of Hydrocarbon Research, Islamabad, 13).
[4] (Riding the mobile Karachi arc, Pakistan: Understanding tectonic threats Ghulam Sarwar and Anwar Alizai, Journal of Himalayan Earth Sciences 46(2) (2013) 9-24).

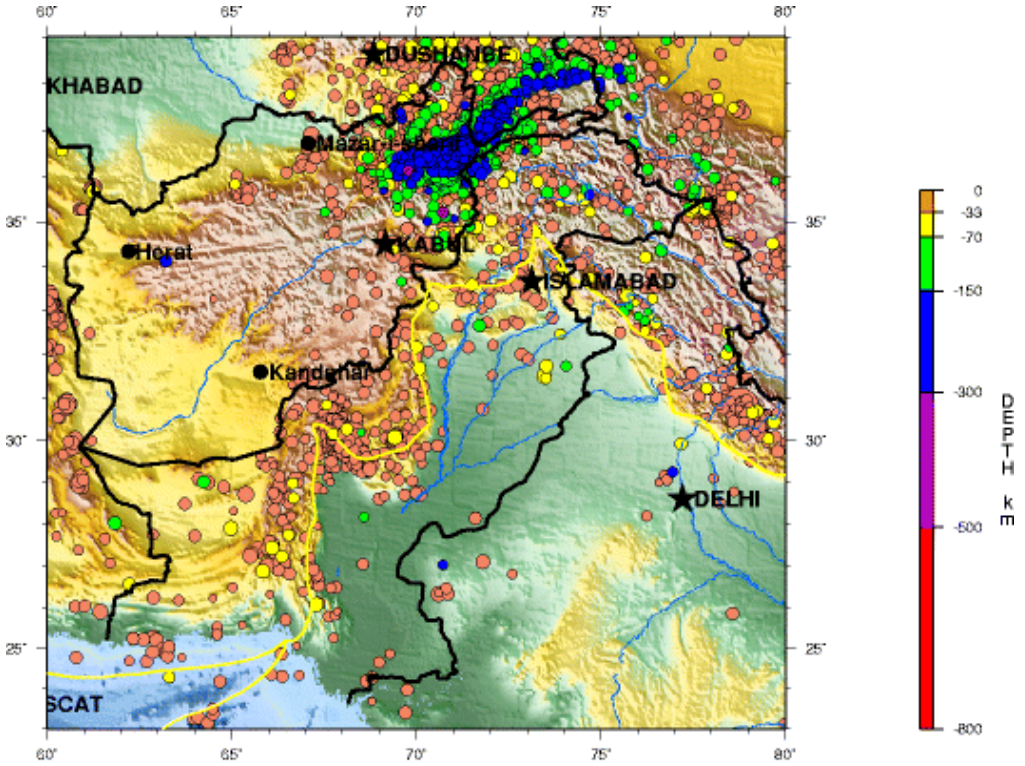


Figure 4.5: Seismicity & Natural Disasters - Pakistan, 1990-2000.

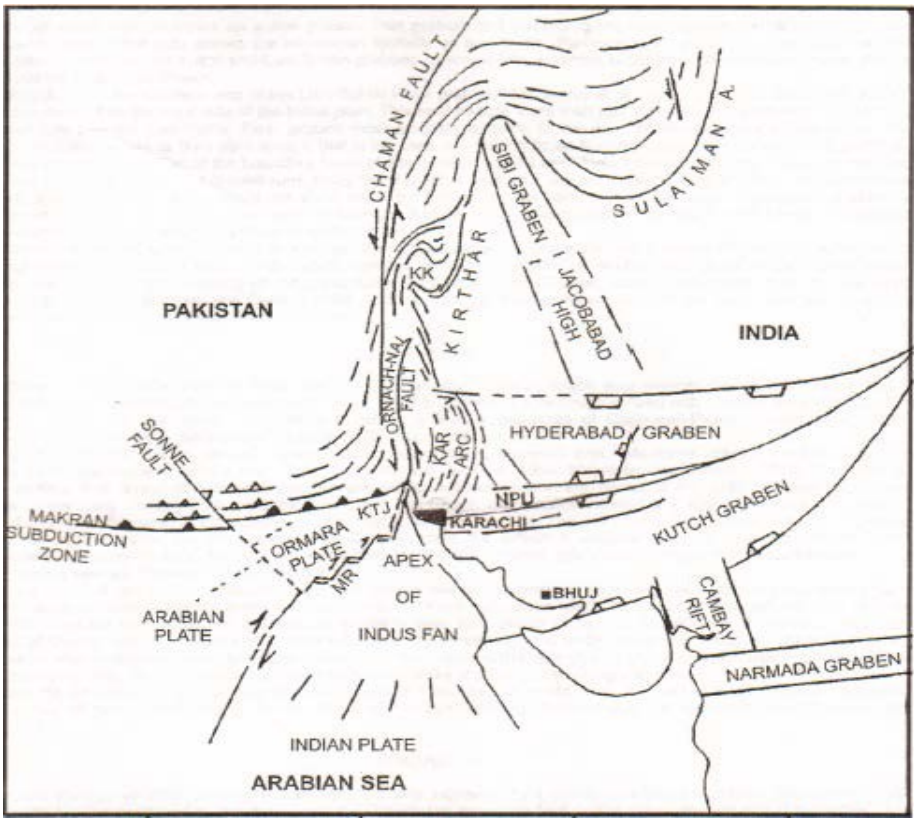


Figure 4.6: Schematic plate tectonic sketch map showing the Karachi Arc and its regional tectonic framework.

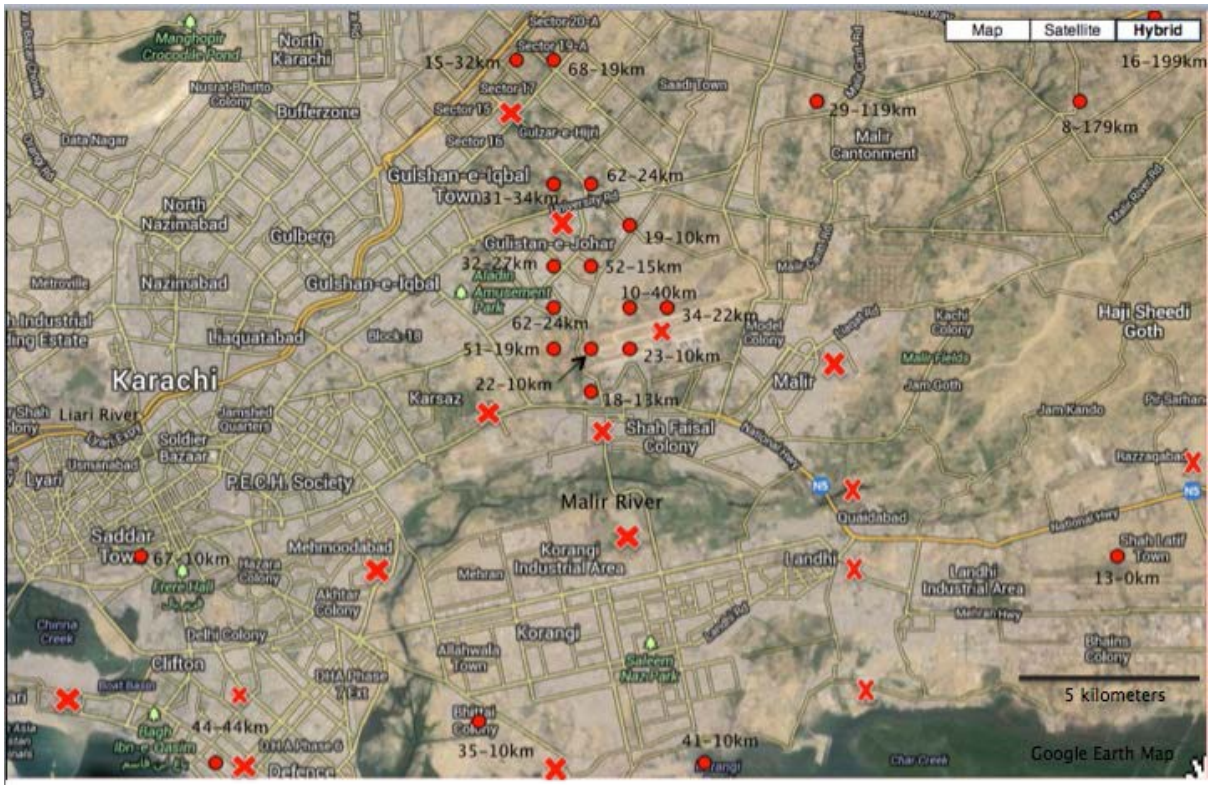


Figure 4.7: Earthquake epicenter plots for the time period 1902-2013.

The first number refers to the list numbers whereas the second number represents depth of hypocenter in kilometers. The Red Crosses represent neighborhoods plagued by recurrent seismic activity, usually of low magnitude[5]

Sarwar and Alizai have compiled a list of earthquakes during the 1902-2013 period and also produced the above map that gives a distribution of hypocenters of earthquakes during the same period. From the distribution of hypocenters, it has been inferred that the entire Karachi Arc and surrounding areas are seismically active with hypocenters ranging in depth from 0-500 kilometers. From the depth of hypocenters, it is inferred that active deformation has taken place at multi-levels ranging from shallow to deep in the basement. Quite a few of the recent epicenters are found within or in close proximity to parts of Karachi that have faced recurrent earthquake activity.

Seismic activity in the region is the result of the triple junction as well as the Karachi Arc, located in southeastern Pakistan, as a large fold and thrust belt that shows Neogene thin-skinned eastward movement (Sarwar and DeJong, 1979; Schelling, 1999). Seismic activity in and around the region shows that the Karachi Arc has been active since long in prompting the eastward movement of the delta. It is possible that the movement is related to the rebound that takes place after mass shift. Sarwar has suggested that the eastward creep of Karachi

[5] (Source: Pakistan Meteorological Department, June 2013 & Ghulam Sarwar and Anwar Alizai, Journal of Himalayan Earth Sciences 46(2) (2013) 9-24)

Arc is directly related to active subsidence of the Hyderabad graben that underlies it and also defines the northern and southern limits of the Karachi Arc.[6]

It may be added that subsidence such as that on Southern coast of Sindh, occurs naturally as a result of plate tectonic activity above active faults, and in places where fluid is expelled from underlying sediments and is common at river deltas that may have receded. Earthquakes arise and result from the release of the force along the growth fault plane. As a result, many different growth faults are created as sediment loads shift basinward and landward.

Earthquakes: Historically the coastal region has suffered a number of earthquakes. A list of earthquakes that have affected Karachi and its vicinity has been compiled by the Meteorological Department and listed by Sarwar and Alizai.

Some of the events are listed in Table-4.2.

Table 4.2: List of Earthquake in Indus Deltaic Region and surrounding within Latitude 23.0-25.0N and Longitude 67.5-71.0E

Date	Lat-N	Lat-E	Magnitude	
			Depth (km)	Richter Scale
26-09-1977	25.4	68.2	33	4.5
25-11-1982	25.6	67.9	33	4.9
17-12-1985	24.9	67.4	33	4.9
24-12-1985	24.8	67.6	33	4.7
10-09-1991	24.4	67.7	33	4.8
19-09-1991	24.3	68.7	33	4.7
23-04-1992	24.3	68.8	33	3.7
24-12-1992	25.2	67.7	33	3.6
05-02-1993	24.6	68.9	33	4.3
26-01-2001	23.4	70.3	17	7.6

The largest earthquake that was incident in 1819, had a magnitude of 8.0; it was felt over almost all over the Indian sub-continent. Eastern branch of the Indus River was blocked, long tract of alluvial land was uplifted, and there was surface faulting and subsequent subsidence in the epicentre area. This fault produced a scarp called “The Allah Bund”.

Seismicity of the Site: According to the Uniform Building Code (1997), Karachi and its adjoining areas fall in Seismic Zone-2B.

[6] (Sarwar, G., 2004. Earthquakes and the Neo-Tectonic Framework of the Kutch-Hyderabad-Karachi Triple Junction Area, Indo-Pakistan. Pakistan Journal of Hydrocarbon Research, 14, 35-40).

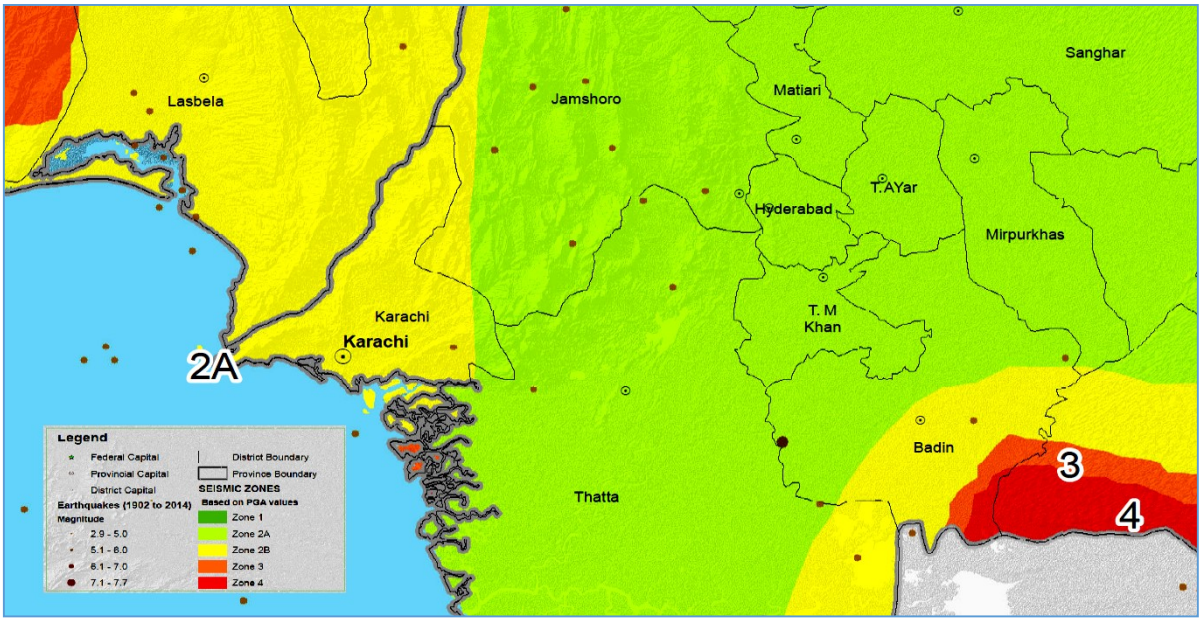


Figure 4.8: Seismic Zones in Karachi[7]

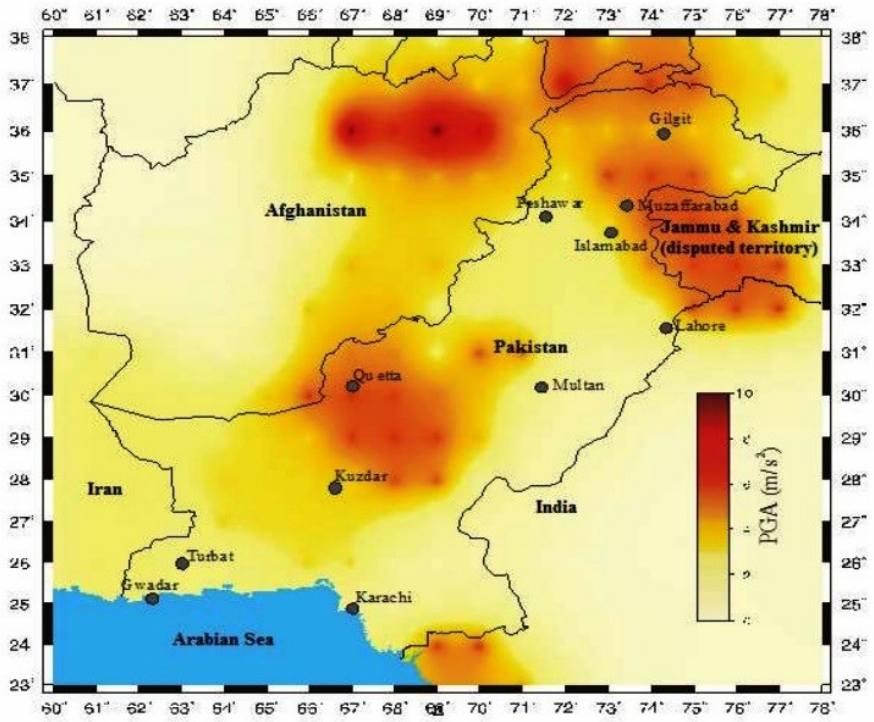


Figure 4.9: Seismic Hazard for Pakistan in terms of Peak Ground Acceleration (PGA)[8]

4.3.3 Liquefaction Features Caused by Earthquake

Liquefaction is a total loss of strength due to undrained restructuring. Disturbance, by shearing or vibration, destroys soil skeleton, with loss of grain contact and decrease of porosity, soil load is transferred to pore water, water pressure>normal stress=0, and soil acts as a liquid.

[7] Map data source(s): PMD, GSP, Pakistan Engineering Council – Prepared by Al hasan Systems Private Limited
[8] PMD Seismic Monitoring and Early Tsunami Warning Centre - http://seismic.pmd.gov.pk/seismicnew/map2.html

Drainage reduces pore water pressure, allows grain contact and thixotropic recovery of strength (Waltham, 2002). Strong shaking produces liquefaction in the fine sands and silts during the earthquake. This causes the mineral grains to settle and expel their interstitial water to the surface. If the pore-water pressure rises to a level approaching the weight of overlying soil, the granular layer behaves as a viscous liquid rather than a solid and leads to collapse of even engineered structures. Liquefaction has been abundant in areas, where groundwater lies within 10 meters of the ground surface (Husain et al., 2004). Investigators typically have designated sites as “Liquefied” on the basis of the presence of surficial liquefaction features, such as venting of sediment to the surface (i.e., sand boils), ground cracking associated with liquefaction (e.g., lateral spreading), or surface settlements. Other evidence of liquefaction includes tilting or settling of overlying structures and floating of underground structures (Olson et al., 2002). Mahmood and Shaikh (2008) investigated the “sinking” of a water tower in 2006 near Clifton area and speculated about liquefaction due to mild earthquakes.

4.4 Meteorology and Climate

The climate of the macroenvironment can be characterized by dry, hot and humid conditions and in general terms it is moderate, sunny and humid. Climatic conditions of the whole region are influenced in summer by the monsoon winds from the West and in winter by winds from North (Quetta). There is a minor seasonal intervention of a mild winter from mid-December to mid-February followed by a long hot and humid summer extending from April to September, with monsoon rains from July to mid- September. The average annual rainfall is about 160 mm, of which 70% to 80% falls during the monsoon months of July, August and September. The annual maximum rainfall varies from 2.5 mm to 487 mm. The maximum rainfall recorded in one day is 205 mm in July 2009 and maximum annual rainfall is 487 mm in 1994. The summer temperatures are high, rising to over 46°C on some days. The winters are mild, although the night temperatures are quite low (up to 1.3°C) when the northern winds invade the area. The mean sea level (MSL) average atmospheric pressure during June to August is around 1000 mbar. From Nov to Feb average MSL pressure rises up to 1018 mbar. The relative humidity ranges from about 90% in the morning during May-September to 24% in the evening during December-January.

4.4.1 Temperature

The air temperature in Karachi Division and its coastal areas are generally moderate throughout the year due to presence of sea. Climate data generated by the meteorological station at Karachi Air Port represents climatic conditions for the region. The mean monthly maximum and minimum temperatures, recorded during 2001-2021 in Karachi to describe the weather conditions are shown in tables below. The Tables indicate that the mean monthly maximum temperature in Karachi ranged between 26.8°C and 36.8°C during the 2001-2021 periods, while the mean monthly minimum temperature ranged between 12.9ºC and 29.8°C. The annual mean maximum and mean minimum temperatures during 2001-21 periods were 33.0°C and 21.0°C respectively, which indicates that there has been a slight but significant rise in the mean minimum temperature during the last 21 years.

Table 4.3: Mean Monthly Maximum Temperature °C

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	27.2	29.6	33.1	34.6	35.1	34.9	32.2	32.3	33.1	36.0	33.5	30.4	32.7
2002	27.0	28.2	33.3	35.4	35.6	35.1	32.2	31.6	31.4	36.5	32.7	28.1	32.3
2003	27.6	28.5	32.4	36.6	35.7	34.9	34.1	32.6	32.5	37.0	32.2	28.3	32.7
2004	26.6	29.9	36.2	35.4	36.8	35.6	33.8	32.7	32.8	33.7	33.1	29.4	33.0
2005	24.9	26.3	31.5	35.3	35.4	36.0	33.2	32.2	34.2	35.2	33.1	28.4	32.1
2006	26.0	31.3	31.8	34.0	34.6	35.3	33.8	31.0	34.2	35.0	33.4	26.3	32.2
2007	26.9	29.4	31.4	37.7	36.0	36.4	N/A	N/A	N/A	N/A	N/A	N/A	33.0
2008	24.4	26.9	34.3	34.4	33.9	35.1	33.5	31.9	34.7	35.5	32.5	27.2	32.0
2009	26.2	29.8	33.0	36.0	36.8	35.7	34.5	33.0	32.8	35.9	33.0	28.6	32.9
2010	27.5	29.2	34	35.7	36.5	34.7	34.6	33.2	34.5	35.9	32.7	28	33.0
2011	26.9	28.5	33.2	35.8	35.3	35.3	34.2	32.8	32.9	N/A	N/A	N/A	N/A
2012	25.7	26.9	31.7	35.1	35.5	34.6	33.2	32.7	33.2	35.0	32.7	28.2	32.0
2013	26.7	28.0	33.3	34.0	35.1	36.5	33.8	32.1	33.0	35.7	32.3	28.3	32.4
2014	25.5	28.0	31.7	35.1	35.9	36.5	34.0	33.7	33.8	36.3	32.9	28.7	32.7
2015	26.3	28.9	31.5	35.9	36.0	37.7	34.1	32.3	34.6	35.8	33.0	28.6	32.9
2016	27.8	30.3	33.3	34.7	35.7	36.1	33.6	33.0	32.9	34.0	33.3	31.0	33.0
2017	25.4	30.2	32.8	35.5	36.2	36.3	33.1	33.8	33.4	36.6	32.3	28.2	32.8
2018	28.5	30.4	34.4	36.2	38.7	35.4	33.8	31.9	32.6	36.8	33.8	28.2	33.4
2019	26.3	26.8	31.3	35.4	36.0	37.2	34.7	32.5	35.7	35.8	31.5	27.1	32.5
2020	24.3	30.1	31.2	36.2	36.6	37.3	36.7	34.6	35.0	36.2	31.4	28.1	33.1
2021	26.6	31.3	34.6	37.3	37.5	36.1	34.5	32.6	36.3	34.8	34.0	27.6	33.6

Source: Pakistan Meteorological Department

Table 4.4: Mean Monthly Minimum Temperature °C

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	11.5	14.9	19.6	23.8	28.1	29.0	27.1	26.5	25.9	24.4	18.6	15.8	22.1
2002	12.8	13.8	19.5	23.9	27.0	28.2	29.6	25.6	24.8	22.5	17.7	14.9	21.7
2003	12.7	16.9	19.8	24.2	26.5	28.2	23.6	27.0	25.3	20.9	15.2	12.0	21.0
2004	12.9	14.5	19.1	24.8	27.3	28.8	27.5	26.3	25.3	22.4	18.0	15.4	21.9
2005	12.3	11.3	20.3	23.0	26.4	28.3	27.2	26.6	26.6	22.9	18.9	13.0	21.4
2006	11.7	18.1	19.6	24.5	27.5	28.5	28.3	26.3	26.8	25.7	19.4	14.0	22.5
2007	13.0	17.3	19.7	24.7	27.6	28.6	N/A	N/A	N/A	N/A	N/A	N/A	21.8
2008	10.1	11.1	19.6	24.0	27.3	29.1	27.9	26.8	26.6	23.8	17.6	14.9	21.6
2009	14.7	16.5	20.8	23.8	27.6	28.7	28.1	27.5	26.5	22.6	17.0	13.9	22.3
2010	12.2	14.7	21.3	25.1	28	28.2	28.3	27.2	25.8	23.9	17.4	11.1	21.9
2011	11	14.5	19.7	23.1	27.1	28.8	27.8	28.6	26.5	N/A	N/A	N/A	N/A
2012	11.2	11.9	19.1	24.5	27.2	28.0	27.9	26.9	26.4	22.7	18.6	14.2	21.5
2013	11.6	15.1	19.2	24.2	27.1	29.3	28.0	26.6	25.5	25.4	18.1	13.0	21.9
2014	9.9	13.1	18.9	24.4	27.0	29.2	28.3	27.1	26.8	23.3	19.5	13.1	21.7
2015	12.6	16.4	19.2	25.7	27.7	29.8	28.4	26.9	26.3	24.9	18.6	12.6	22.4
2016	14.8	14.9	21.7	24.6	27.9	27.9	28.1	27.1	26.4	24.0	17.1	15.5	22.5
2017	12.5	18.2	20.3	24.4	27.8	29.2	27.7	27.0	26.2	23.5	16.8	13.0	22.2
2018	12.9	15.8	20.9	25.3	27.7	28.8	28.1	26.3	25.5	23.0	19.3	13.1	22.2
2019	13.3	15.3	19.0	24.0	26.6	28.9	28.1	26.8	27.2	24.0	19.4	13.7	22.2
2020	10.8	15.3	19.1	24.7	27.7	29.7	29.4	28.1	27.3	22.7	16.0	12.5	21.9
2021	9.2	15.0	21.6	25.1	28.9	29.6	28.5	27.4	28.0	23.1	17.6	13.9	22.3

Source: Pakistan Meteorological Department

4.4.2 Precipitation

The main source of precipitation is rainfall which is received mostly in the months of July to September during SW Monsoon winds. It is very erratic as some years are very dry and there is no rain. The average rainfall is 217 mm and most of it is received in the month of July.

Occasional winter rains are also received in the months of December –February as result of NE winds which count 15-25% of total rainfall.

The record for rainfall of PMD at Karachi Airport (2001-2021) suggests that July and August are the wettest months and that the maximum rainfall recorded in Karachi during 2001-2021 period was 270.4 mm during the month of July 2003, while the maximum annual rainfall was 372.9 mm during the year 2010, followed by 367.3 mm in 2021.

Table 4.5: Monthly Amount of Precipitation (mm) at Karachi Airport

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	0.0	0.0	0.0	0.0	0.0	10.6	73.6	16.2	N/A	0.0	0.0	0.0	100.4
2002	0.0	2.4	0.0	0.0	0.0	N/A	N/A	52.2	N/A	0.0	0.5	0.4	55.5
2003	6.4	21.8	0.0	0.0	0.0	16.3	270.4	9.8	N/A	0.0	0.2	0.0	324.9
2004	13.7	0.0	0.0	0.0	0.0	N/A	3.0	5.6	N/A	39.3	0.0	4.3	65.9
2005	6.6	12.8	N/A	0.0	0.0	N/A	N/A	0.3	54.9	0.0	0.0	17.1	91.7
2006	N/A	0.0	N/A	0.0	0.0	0.0	66.2	148.6	21.9	0.0	3.1	61.3	301.1
2007	0.0	13.2	33.4	0.0	0.0	110.2	N/A	N/A	N/A	N/A	N/A	N/A	156.8
2008	8.0	Trace	1.1	0.0	0.0	0.0	54.0	37.5	Trace	0.0	0.0	21.0	121.6
2009	3.0	Trace	0.0	Trace	0.0	2.6	159.9	44.0	68.9	0.0	0.0	1.5	279.9
2012	0.2	0.0	0.0	0.0	0.0	Trace	Trace	8.1	121.0	0.0	0.0	22.8	152.1
2013	Trace	20.0	2.8	30.0	0.0	Trace	5.5	105.4	4.0	1.2	0.0	0.0	168.9
2014	Trace	0.0	12.4	0.0	1.3	Trace	1.1	9.9	1.4	0.0	4.6	0.0	30.7
2015	0.3	2.1	2.8	0.0	0.0	Trace	46.6	1.4	Trace	0.0	0.0	0.0	53.2
2016	3.1	0.0	Trace	0.0	0.0	65.8	1.9	96.9	Trace	0.0	0.0	0.0	167.7
2017	41.5	Trace	0.0	0.0	0.0	58.8	33.3	65.6	26.4	0.0	0.0	6.6	232.2
2018	Trace	Trace	0.0	0.0	0.0	Trace	Trace	0.8	Trace	0.0	0.0	Trace	0.8
2019	39.4	Trace	2.2	0.0	0.0	1.6	66.3	204	51.7	1.2	Trace	Trace	367.3
2020	Trace	2.6	0.5	0.0	0.0	Trace	101.2	366.8	Trace	0.0	3.1	0.0	474.2
2021	0.0	0.0	0.0	0.0	0.0	Trace	45.4	Trace	88.3	17.2	0.0	16.9	167.8

Source: Pakistan Meteorological Department

4.4.3 Humidity

The relative humidity typically ranges from 25% (dry) to 70% (humid) over the course of a year, rarely dropping below 20% (very dry) and reaching as high as 90% (very humid).

Table 4.6: Mean Monthly Relative Humidity (Mean) at 1200 UTC (%)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2014	25.0	27.0	35.0	47.0	57.0	61.0	64.0	61.0	60.0	36.0	36.0	31.0	45.0
2015	38.0	41.0	37.0	45.0	60.0	56.0	69.0	67.0	56.0	47.0	28.0	31.0	47.9
2016	46.0	25.0	41.0	47.0	60.0	60.0	68.0	70.0	63.0	57.0	34.0	38.0	50.8
2017	38.0	25.0	36.0	44.0	59.0	62.0	70.0	67.0	63.0	44.0	29.0	20.0	46.4
2018	36.0	37.0	33.0	45.0	46.0	65.0	65.0	68.0	63.0	40.0	32.0	30.0	46.7
2019	40.4	33.9	36.6	48.0	55.6	58.8	64.8	72.6	67.6	41.1	34.6	29.7	48.6
2020	29.9	28.1	34.2	44.4	57.1	56.8	65.0	74.8	62.4	38.1	32.9	29.1	46.1
2021	31.3	34.1	41.2	43.3	54.3	60.3	67.5	64.5	63.0	46.5	27.6	38.7	47.7

Source: Pakistan Meteorological Department

4.4.4 Wind Speed & Direction

The wind direction and speed between the summer and winter monsoon seasons are rather unsettled and large variations are noted both with respect to speed and direction.

The eleven years' wind velocity record (2001-2021) indicates that the velocity varies and ranges between 1.0 m/s to 13.7 m/s. The tables provided below show the wind speed and direction respectively.

Table 4.7: Wind Speed (m/s) at 12:00UTS

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2001	2.6	3.4	4.3	5.6	7.5	8.1	6.8	7.3	5.5	3.7	2.0	2.4	4.9
2002	3.6	3.9	4.0	6.5	8.5	8.2	9.8	7.3	7.7	3.3	2.9	3.2	5.7
2003	4.0	5.0	5.4	5.2	7.7	8.8	6.7	7.1	6.0	3.2	3.1	3.0	5.4
2004	3.4	3.7	4.0	6.0	8.0	9.0	10.0	9.5	7.3	3.8	1.0	2.5	5.7
2005	3.6	4.2	4.8	5.1	7.1	7.5	9.0	6.9	6.4	3.9	2.0	1.5	5.2
2006	2.0	3.0	3.0	6.2	8.0	7.7	8.3	6.2	4.7	4.2	2.2	3.0	4.9
2007	2.0	3.7	4.0	4.0	6.0	6.3	N/A	N/A	N/A	N/A	N/A	N/A	4.3
2008	4.3	7.6	8.2	10.5	12.6	7.6	11.0	9.3	8.7	6.6	5.1	3.9	7.9
2009	7.0	7.2	7.9	9.3	9.8	9.7	9.5	9.3	9.1	6.1	5.0	3.9	7.8
2012	5.8	6.6	9.3	9.8	12.3	12.8	13.1	11.2	8.4	7.1	5.7	5.8	9.0
2013	5.2	6.9	9.0	10.3	11.5	10.8	12.0	11.2	10.3	7.7	5.1	4.5	8.7
2014	5.9	8.9	8.6	11.5	12.4	13.4	12.8	11.6	11.7	8.3	6.0	4.5	9.6
2015	6.9	10.3	10.1	11.5	12.8	12.3	13.7	12.3	10.5	8.7	5.6	5.8	10.0
2016	7.5	8.7	4.8	1.1	13.0	11.7	11.8	10.5	12.1	9.2	5.5	5.2	8.4
2017	7.0	8.0	10.8	12.1	12.8	11.5	12.1	10.3	8.7	8.5	5.4	7.4	6.9
2018	6.3	7.0	9.5	10.2	10.8	11.1	12.3	12.4	12.2	8.7	6.1	6.8	9.4
2019	6.7	8.9	10.2	11.7	12.1	11.7	13.7	9.1	8.5	8.0	6.9	7.4	9.6
2020	9.0	9.4	9.0	10.5	13.3	10.9	10.1	8.9	9.4	7.3	6.2	5.5	9.1
2021	6.1	7.6	9.7	8.5	11.7	12.7	12.6	11.1	8.8	8.1	6.7	6.6	9.2

Source: Pakistan Meteorological Department

Table 4.8: Wind Direction at 12:00UTS

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2001	S54W	S43W	S42W	S45W	S46W	S45W	N52W	S59W	S44W	N56W	S45W	S06W
2002	S67W	S52W	S51W	S55W	S51W	S42W	S54W	S45W	S48W	S56W	N54W	S41W
2003	S60W	N50W	S45W	S48W	S45W	S68W	S60W	S47W	S43W	S54W	S50W	S27W
2004	N27E	S46W	S53W	S49W	S52W	S54W	S54W	S62W	S56W	S47W	S45W	N86E
2005	N63E	S51W	S50W	S52W	S63W	S48W	S54W	S49W	S87W	S54W	S52W	N23W
2006	S48W	S62W	S50W	S57W	S64W	S60W	S67W	S78W	S51W	S53W	S49W	N79E
2007	S30W	S62W	S47W	S55W	S58W	S47W	S41W	S55W	S60W	S48W	S48W	N45E
2008	N45E	S47W	S54W	S51W	S52W	S39W	S50W	S52W	S46W	S39W	S38W	N
2009	N45E	S45W	S41W	S58W	S46W	S46W	S56W	S49W	S56W	S42W	S39W	S45E
2012	S3E	N56E	S62W	S46W	S61W	S51W	S66W	S51W	S53W	S41W	S41W	N9W
2013	N39W	S54W	S56W	S54W	S61W	S40W	S53W	S52W	S55W	S47W	S17W	N50W
2014	S72E	S54W	S43W	S46W	S46W	S45W	S54W	S48W	S85W	S45W	S49W	S45E
2015	S72E	S54W	S43W	S48W	S50W	S40W	S54W	S55W	S50W	S41W	S	S58W

Table 4.8: Wind Direction at 12:00UTS												
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2016	S43W	S36W	S48W	S54W	S54W	S45W	S48W	S36W	S51W	S45W	S43W	S36W
2017	S83E	S56W	S51W	S45W	S45W	S44W	S66W	S57W	S48W	S51W	S59W	N45E
2018	S39W	S39W	S46W	S51W	S50W	S45W	S45W	S48W	S46W	S46W	S42W	S18W
2019	S24W	S65W	S45W	S44W	S42W	S37W	S48W	S46W	S53W	S35W	N59E	N55E
2020	N31E	S12W	S52W	S55W	S49W	S44W	S47W	S55W	S47W	S38W	S4E	N35E
2021	S21W	S38W	S44W	S42W	S52W	S53W	S55W	S48W	S40W	S41W	S22E	S40E
Source: Pakistan Meteorological Department												

4.4.5 Urban Heat Island (UHI) Effect

The term "heat island" describes built environment that are hotter than nearby natural areas. An urban heat island refers to a city or metropolitan area that is significantly warmer than its surrounding natural areas due to human activities. The temperature difference usually is larger at night than during the day and is most apparent when winds are weak. UHI is most noticeable during the summer and winter seasons. It is estimated that the annual mean air temperature of a city with 1 million or above inhabitants can be 1–3°C warmer than its surroundings. In the evening, the difference can be as high as 12°C. The heat island can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality.

The city of Karachi has been growing exponentially in terms of urbanization and population growth. The city hosts more than 22 million populations with a density of 4,115 persons per kilometer square (km^2). The urban area density has increased from 233 km^2 in 1947 with a population size of 0.4 million to 3,566 km^2 in 2004 with a population size of 14 million (Qureshi et al., 2008). Rapid urbanization and global warming have initiated UHI effect over the city. A strong incidence of UHI is generally associated with a severe heat wave hazard in terms of sensible temperature. UHI effect is the unique feature of the June 2015 heat wave in Karachi. It is expected that with growing global warming incidence and poor coping strategies, UHI would become a major health risk for the vulnerable segment of population in mega-cities around the globe such as Karachi.

Causes of Urban Heat Island Effect: The principal reason for the night time warming is the retention of short-wave solar radiation absorbed during the day time by the building material consisting of concrete and asphalt. These materials are commonly used in urban areas for pavement and roofs that have significantly different thermal and radiative properties compared to the surrounding rural areas. This causes a change in the energy balance of the metropolitan area, often leading to higher temperatures than surrounding rural areas. This energy is then slowly released during the night as a long wave radiation, making cooling a slow process. Because of this phenomenon, the minimum temperatures of Karachi remained extremely high during the heat-wave event.

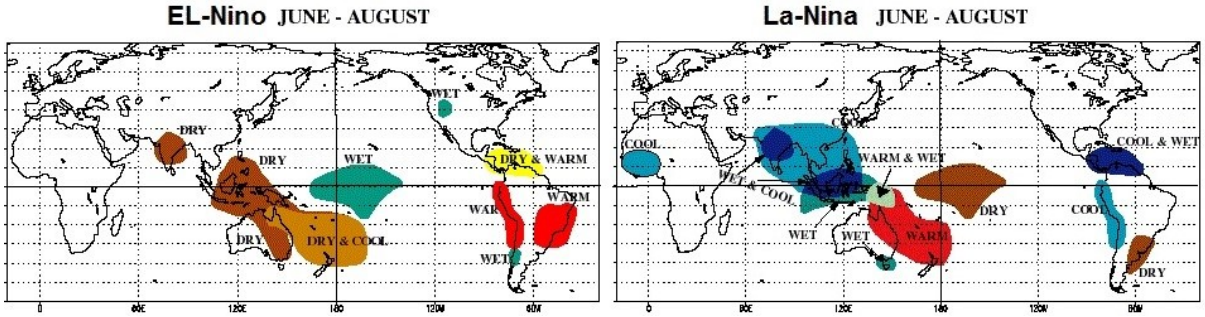
There are several causes of an urban heat island effect in Karachi.

- Reduced and slow process of evapotranspiration due to shrinking green areas and spaces in the city. With a decreased amount of vegetation, the city loses the shade, cooling effect of trees and the removal of carbon dioxide.
- Geometric effects in terms of rising number of tall buildings are a significant contributing factor to urban heat island effect. Over the years, the number of tall buildings within the city has increased that provide multiple surfaces for the reflection and absorption of sunlight, and thus increasing the efficiency with which the city is heated. This is called the "urban canyon effect". Another effect of increased number of buildings is the blockage of wind, which also inhibits cooling by convection and pollution from dissipating.
- Waste heat from automobiles, air conditioning, industry, and other sources also contributes to the UHI. High levels of pollution in urban areas can also increase the UHI, as many forms of pollution change the radiative properties of the atmosphere.

Aside from the effect on temperature, UHI can produce secondary effects on local meteorology, including the altering of local wind patterns and humidity, which have been discussed in the previous section. The UHI effect described above has been one of the major causes of unprecedented large number of heat related deaths in Karachi. Future climate scenarios suggest that the frequency of this kind of disasters may increase with the rise of temperature in future.

4.4.6 Impact of Climate Change - Karachi

Climate experts warn that there will be an exceptional change in the temperatures in Pakistan as a whole in the coming years. Karachi may however face the threat of rising sea levels by the year 2100, at about 8 feet below sea level. Climate experts indicate that climate change could influence monsoon dynamics and cause summer precipitation levels to drop, as well delays in the start of the monsoon season. While another report said that the impact of climate change in Karachi will deepen by 2030. Due to global warming the coastline of Karachi is likely to be flooded due to rising sea levels. Many seminars and public gathering are held in the city to make the government and public fully aware of global warming, speakers at the seminar have urged the government to prepare long and short-term plans to reduce the impact of global warming on natural resources. Karachi also faces the threat from super cyclones which are said to increase their intensity and momentum in years to come.



List of cyclones that affected Karachi and the Sindh coast: Cyclones that form in the Arabian Sea do not usually hit Karachi or the Sindh coast, during 1902, 1907, 1944, 1964,

1985, 1999, 2007 and 2010, cyclones made landfall in the Sindh coast including Karachi. Other cyclones that are listed below caused rains as remnants.

- In May 1902, a cyclonic storm struck the coast in the vicinity of Karachi.
- In June 1907, a tropical storm struck the coast near Karachi.
- On 27 July 1944, a cyclone left some 10,000-people homeless in Karachi.
- On 12 June 1964, a deadly cyclone made landfall near Karachi.
- On 15 December 1965, a powerful cyclone slammed the city with 10,000 casualties.
- In May 1985, a cyclonic storm made a landfall in the eastern direction of Karachi. The cyclonic storm in 1985 which was moving towards Karachi actually had weakened over the sea while still a few 100 Kilometers away south of Karachi.
- In November 1993, a category 1 cyclone approached the Sindh-Gujarat border but dissipated due to high vertical shear over open waters.
- In June 1998, remnants of the category 3 Gujarati cyclone (the 5th strongest cyclone of the Arabian Sea) killed 12 people near and in the city.
- In May 1999, again a category 3 major cyclone (the 4th strongest cyclone of Arabian Sea) hit near the city; this Cyclone killed 700 people in Sindh including Karachi. It is the strongest cyclone recorded in Pakistan.
- In May 2001, the powerful category 3 cyclone (the 3rd strongest cyclone of the Arabian Sea) hit the Indian border of Gujarat. It caused rain along the Sindh coast, but no damage was reported.
- In October 2004, a severe cyclonic storm, Cyclone Onil, approached the Sindh coast but later recurved back to the sea; it caused heavy rain that killed 9 people in Karachi.
- In early June 2007, Super cyclonic storm Gonu (the strongest cyclone in the Arabian sea) caused strong gusty winds in the metropolis with light rainfall as the storm was moving towards Oman.
- In June 2007, a cyclonic storm, Cyclone Yemyin, passed near the city and killed 200 people before moving towards Balochistan where it killed 380 people.
- In November 2009, remnants of Cyclone Phyan caused gusty winds along the Sindh coast including Karachi. However, six Pakistani fishermen were trapped in the storm later rescued by the Indian Navy.
- In June 2010, Cyclone Phet (the 2nd strongest cyclone in the Arabian Sea), once a powerful category 4 cyclone, made landfall near the city as a weak tropical depression, with a total 14 casualties in and near the city.
- In November 2010, remnants of Cyclone Jal caused drizzle with dusty winds in Karachi while it caused light to moderate rainfall in southeastern Sindh.
- In November 2011, the outerbands of cyclone Keila brought drizzle to the city while moderate showers to the Makran coast.
- Cyclone Vayu, June 2019, caused minor storm surges in coastal areas of Sindh, also exacerbated the heavy in Karachi.
- Cyclone Kyarr, October 2019, caused flooding in coastal areas of Karachi and Sindh.
- Cyclone Nisarga in June 2020 caused rough seas in Karachi and Sindh coastal areas.
- 18 May 2021, Cyclone Tauktae's landfall in Gujarat caused a roof to collapse in Karachi, killing four people.

- 30 September 2021, a developing depression, later named Shaheen, produced gusty winds and rainfall in Karachi. A person died in Orangi from electrocution

List of Notable floods in Karachi: Most of the flooding in Karachi occurs due to the monsoon season. But due to the enhancement of the city's infrastructure flooding has been controlled. But still excessive and irregular rains can lead to major flooding in the metropolis. Following are some of the major floods in the city;

- On 7 August 1953, the city received its record-breaking 24-hour rainfall causing widespread flooding about 278.1 millimetres (10.95 in) rain was recorded.
- On 1 July 1977, Karachi received its third highest rainfall of 207 millimetres (8.1 in) in 24 hours, it caused massive flooding in the city and killed 248 people in the city.
- In 2003, massive flooding during monsoon season devastated the Sindh, two days of rainfall of 284.5 millimetres (11.20 in) created havoc in the city.
- In 2006, after two year of drought period heavy rainfall lashed the city during the monsoon season, but the city came to standstill on 17 August when widespread rainfall of 77 millimetres (3.0 in) created flood-like situation in the city killing 13 people and submerging roads, low-lying areas and underpasses with rainwater.
- In 2007, almost all the rains that occurred in this monsoon season brought flooding with it, During the month of June Cyclone Yemyin created havoc in the city from 21 June to 26 June 2007 110.2 millimetres (4.34 in) of heavy downpour was recorded which killed 228 Karachiites on 23 June, then from 9 August to 11 August a strong tropical depression brought massive flooding in the city with 191 millimetres (7.5 in) of rain killing 21 people and submerging low-lying areas and underpasses. While on 22 August a monsoon depression once again flooded the city with 80 millimetres (3.1 in) of rainfall killing 10 people.
- On 18 July 2009, there was severe flooding due to a tropical depression, in which city's second highest rainfall of 245 mm (9.6 in) occurred in just 4 hours, killing 20 and injuring 150 people. Another flooding event occurred on August 31, 2009 when a well-marked low pressure was present over Sindh, the rainfall was recorded to be around 147 mm (5.7 in).
- On September 13, 2011, life was crippled in the city due heavy rainfall that caused urban flooding in the city. The rainfall was recorded to be around 145 mm (5.7 in).
- In Aug & Sep 2019, life in the city was crippled due to multiple spells of heavy rain that caused urban flooding and loss of life and property.
- On 6th Jul 2020, spell of heavy rain caused urban flooding in several areas of city, causing loss of life and property.
- The hours-long spell, which began before sunrise and continued till night, broke previous records of rainfall recorded in the city during August 2020. The Met department said that Karachi had received 345mm of rainfall so far in August, breaking the previous record of 298mm reported in August 1984.
- On September 23, 2021, heavy monsoon rains cause urban flooding in portions of Karachi, Pakistan's largest metropolis. Roads were inundated, and cars were stranded.



List of droughts in Karachi: Drought-like conditions in the city are not common but if the Monsoon season fails to deliver rains then drought emerges. Following are some of worst drought in Karachi city.

- The major drought in Karachi as well as for whole Pakistan was from 1996 till 2002, peaking from 1998 till 2001. While in 2002 drought conditions started to dissipate. The drought of 1998-2001 was considered worst in 50 years.
- In 2004, no rain occurred in the city as well as in Sindh province but during the month of October heavy downpour lashed different parts of Sindh due to Cyclone Onil.
- In 2005, the drought conditions continued, but a post-monsoon low pressure dumped heavy rains during 12 and 13 September.
- In 2009, drought conditions emerged during the summer season in suburban areas of Karachi, due to El Nino phenomenon and caused drought during the winter season but the monsoon rains of 2009 were above-normal.

List of dust storms in Karachi: Windstorms generally occur when a monsoon system or tropical storms is moving towards the city. However, dust storms sometimes occur in winter seasons due to Western Disturbance. Dust storms also occur before the onset of monsoon season, they are locally known as ‘Andhi’ in the country. Following is a list of windstorms as well as dust storms that occurred in the city, however windstorm generated by a tropical storm is not mentioned in this list.

- On September 1, 1926, A windstorm hit Karachi but not much is known about this storm.
- On May 31, 1986, A blinding dust storm hit the city for 15 minutes that toppled trees and advertising signs, overturned vehicles and tore down electrical wiring. It reduced visibility to near zero and blew down flimsy wood and bamboo shanties in Karachi, at least 11 persons were killed and more than 250 injured. The dust storm of 67 mph (108 km/h) occurred due to the interaction between the strong cold airflow and monsoon depression present over north-western Gujarat.

- On July 4, 1994, a windstorm generated by monsoon low pressure system killed 26 people in the city.
- On June 23, 2007, a massive dust storm hit the city followed by a heavy downpour, the interaction between a strong low-pressure system and the outer bands of Cyclone Yemyin which was still over western India as a tropical depression caused 69 mph (111 km/h) windstorm that uprooted billboards, trees, traffic signals and caused 200 deaths in the city due to the collapse of roofs of many houses in the port city.
- On February 22, 2008, a dust storm struck the city which reduced the visibility to merely 500 metres, the dust storm was due to the westerly winds that were coming from the desert regions of Balochistan.
- On March 19, 2012, a mild dust storm hit the city that caused 65 km/h winds to blow in the city while the visibility dropped to just 200 metre.
- On May 19, 2012, a weak dust storm gripped the metropolis with highest wind of 72 km/h.
- At least 4 killed as gusts, dust storm battered Karachi on June 3, 2020.
- Loss of property reported as dust storm battered parts of Karachi on Jul 5, 2020.
- Karachi faced the midst of a severe dust storm due to Cyclone Tauktae on May 18, 2021.

4.5 Ambient Air Quality & Noise

Transportation system and indiscriminate burning of garbage are the dominant sources of air pollution in Karachi. Operation of defective vehicles, use of low-quality fuel, and increase in the number of vehicles beyond the capacity of roads are the main reasons for deterioration of ambient air quality. However, the impact of air pollution emanating from transportation system has been found limited to the roadways and that too at traffic intersections and on the middle of the road. Emissions from stationary sources e.g., residential and business districts associated with fuel combustion for domestic use and power generation are significant but have limited extent.

The environmental impact from vehicular exhaust emission is often neglected in Pakistan due to the lack of awareness in our society, which is the major factor contributing to vehicle emission that includes NO2 (Nitrogen Oxide), Carbon dioxide (CO2), Carbon Monoxide (CO) and other pollutants. The implementation of CNG vehicles in Karachi must count as a significant achievement by any standards. It is perhaps the first instance, after Brazil and India, of alternative transport fuels being implemented on such a large scale in a low-income country. However due to adhoc attitude and lack of long-term policies, demand of natural gas including CNG outstripped supply, leading to curtailment of CNG supply in urban centers.

4.5.1 Ambient Air and Noise at Project Site

An ambient air monitoring study and noise monitoring was conducted at the proposed project site. The results of ambient air quality and noise monitoring are presented in tables below:

Ambient Air Quality						
Parameter	**Unit**	**Monitoring Duration**	**Average Obtained Concentration**	**SEQS**	**LDL Limits**	**Methodology**
Carbon Monoxide (CO)	mg/m^3	08 Hours	0.93	5.0	0.0	Non-Dispersive Intra Red (NDIR)
Nitrogen oxide (NO)	$\mu g/m^3$	24 Hours	21.3	40.0	0.0	Chemiluminescence
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	24 Hours	27.2	80.0	0.0	
Sulphur Dioxide (SO_2)	$\mu g/m^3$	24 Hours	31.4	120.0	0.0	Ultraviolet Fluorescence Method
Ozone (O_3)	$\mu g/m^3$	01 Hour	17.5	130.0	0.0	Non-Dispersive UV Absorption Method
Particulate Matter (PM10)	$\mu g/m^3$	24 Hours	109.5	150.0	10.0	β Ray Absorption Method
Particular Matter (PM2.5)	$\mu g/m^3$	24 Hours	38.0	75.0	2.5	
Suspended Particulate Matter (SPM)	$\mu g/m^3$	24 Hours	300.8	500.0	1.0	
Lead (Pb)	$\mu g/m^3$	24 Hours	BDL	1.5	-	ASS Method

NOISE TEST REPORT					
#	Location / Source	SEQS Limits: 65dB(A) *Leq			
		Noise Level Readings			
		Coordinates	Minimum	Maximum	Average
1	Front Side Right Corner Boundary	24°48'51.4"N 66°59'46.6"E	53.3	54.6	53.95
2	Front Side Left Corner Boundary	24°48'49.8"N 66°59'46.3"E	52.8	53.5	53.15
3	Back Side Right Corner Boundary	24°48'49.5"N 66°59'49.8"E	53.1	54.0	53.55
4	Back Side Left Corner Boundary	24°48'51.5"N 66°59'50.0"E	54.2	54.7	54.45

Ambient Air and Noise Monitoring – pictorial view






4.6 Water Resources, Water Quality and Drainage

Hydrogeologically, the city of Karachi lies in the Hub River Basin and the Malir River Basin. The Malir River Basin is drained by the Malir River and the Lyari River. The aquifer of Karachi is, therefore, mainly recharged by seepage from Hub River, Hub Dam as well as the Malir and the Lyari Rivers. The Hub River lies on the western frontier of Sindh and for some distance the boundary between Sindh and the Baluchistan provinces. It located about 30 km to the west of Karachi, along the Karachi- Lasbela boundary. It falls into the Arabian Sea near Cape Monze, with a total drainage course length of 336 km.

During the past several years, a number of pumping wells have been installed to meet requirements for the irrigation-water supply (to raise vegetables, fruits, dairy and poultry) and drinking-water supply for Karachi. Excessive pumping of groundwater and continuous lowering of water-table is likely to result in intrusion of seawater into the Malir Basin under natural seepage conditions and under artificially induced conditions of recharge of saline seawater in the coastal aquifer(s) of Karachi.

Five possible water-sources are contributing to the groundwater recharge in Karachi. The first possible source is the rainfall. As the city of Karachi suffers from deficit of precipitation (only rainfall), the contribution to shallow groundwater storage from rain is very little. However, rainfall in the hinterlands and other areas surrounding Karachi may significantly contribute to the groundwater flow-system. The two freshwater sources are the Hub Lake/Hub Dam and the

Indus River. Water from Hub Dam and the Indus River, through Keenjhar Lake, is piped to various residential zones in Karachi for drinking and irrigation purposes. The spring water discharges into Malir River and Lyari River and the municipal/industrial waste effluents added to these rivers are also contributing to groundwater storage as a fourth recharge source. Seawater intrusion along Karachi coast is the fifth possible source.

Unexpected and record-breaking rainfall caused unprecedented urban flooding in Karachi on Thursday (August 27, 2020). Heavy showers battered the metropolis for hours, completely submerging all major thoroughfares and the seven underpasses of the city.

Among the worst hit areas of the city were the upscale Defence Housing Authority (DHA), Clifton and PECHS, where were completely submerged by rainwater.[9]

Water Supply & Sewerage System: The water supply and sewerage system are managed by Karachi Water Supply & Sewerage Board (KW&SB). Present water supply system of Karachi City has a supply capacity of about 650 MGD.

As of 2019, Karachi receives about 580 MGD, well below the demand of over 1,100 MGD.

Table 4.9: Description of Water Supply Schemes for Karachi Bulk Water Supply

S. No	Description of Water Supply Schemes	Rated Supply (MGD)	Actual Supply (MGD)
1	Haleji Scheme	30	-
2	Greater Karachi (GK) Bulk Water Supply Scheme Stages I to IV	280	280
3	K-II Scheme	100	100
4	Additional Water Supply from GK BWS System	40	40
5	(To) Pakistan Steel	26	26
6	(To) Port Qasim Authority	7.5	7.5
7	K-III Scheme	100	100
8	Hub Dam	100[10]	70[11]
Total		683	623[12]

Source: EA/KW&SB, Express Tribune, Wapda

Karachi had been allotted 650 MGD from River Indus through Keenjhar-Gujjo Water Supply System. However, they actual supply is below 580 MGD. KW&SB had planned to revive Haleji Lake to supply 65 MGD to Karachi or to tap this capacity from Keenjhar-Gujjo canal system for supply to Karachi. So far no substantial work on either of the projects have been reported. To meet the Karachi water demand, K-IV project was conceived in 2007 to supply 650 MGD

[9] https://www.thenews.com.pk/
[10] http://www.wapda.gov.pk/index.php/projects/water-sector/o-m/hub-dam
[11] Perpetual issue: Leaks in the system create water crisis in Karachi By Syed Ashraf AliPublished: September 15, 2019 in Express Tribune. https://tribune.com.pk/story/2056804/1-perpetual-issue-leaks-system-create-water-crisis/
[12] Losses unaccounted for.

additional water to Karachi. The project has been delayed several times, and the Phase-I of the project which was to supply about 260 MGD water to Karachi is yet to be completed.

As mentioned in the table above, the given water supply of 653 MGD may further be curtailed to about 406 MGD due to considerable losses in the water supply system[13][14].

The sewerage catchment area which covers 18 towns in Karachi city is divided into three districts, namely: respective catchment area of T.P-1, T.P-2 and T.P-3. KW&SB formulated the Master Plan of the water supply and sewerage system in cooperation with JICA in 2008. However, most of the projects for rehabilitation and augmentation proposed in the Master Plan study, etc. have not been carried out due to financial constraint of KW&SB. Due its negligence to maintain and operationalize the treatment plants, not only municipal effluent but industrial effluent also is directly going into sea destroying marine life. It is estimated that the city's sewage (about 470MGD) and industrial waste (about 90MGD) are being dumped into the sea largely without treatment[15].

In January 2018, the Supreme Court appointed Honorable Justice Amir Hani Muslim, a retired Supreme Court judge, the new head of the water commission with a mandate to 'implement" the recommendations of the previous commission that the apex court had formed in December 2016 and which delivered its final report in February 2017 and was head by Justice Mohammad Iqbal Kalhoro. Treatment of sewage, a much-neglected issue, saw a revival under the commission. As of February 2017, all the three sewerage treatment plants of Karachi were dysfunctional, each had a capacity of about 50MGD. A fourth treatment plant has been planned to be set up in Korangi. Commission under Justice Amir Hani Muslim lasted till January 2019. In terms of sewage disposal and treatment, following achievements can be credited to the efforts of commission[16][17][18];

- Rehabilitation work on TP-1 (SITE) is likely to end in the first half of 2020 as the government is increasing its capacity to 150MGD.
- TP2 (Mehmoodabad) is permanently closed because of a land-related dispute, so the government is setting up a 180MGD plant in Korangi instead (TP4) which should be operational by late 2020.
- TP3 (Mauripur) became functional last year. The provincial government first increased its capacity to 73MGD and is now taking it to 180MGD. These three plants will do primary and

[13] Water woes: Karachi goes thirsty as its water goes to waste By Syed Ashraf AliPublished: July 29, 2019 Express Tribune. https://tribune.com.pk/story/2023808/1-water-woes-karachi-goes-thirsty-water-goes-waste/
[14] Perpetual issue: Leaks in the system create water crisis in Karachi By Syed Ashraf AliPublished: September 15, 2019 in Express Tribune. https://tribune.com.pk/story/2056804/1-perpetual-issue-leaks-system-create-water-crisis/
[15] Panacea for Karachi's water woes? By Kazim Alam. Published in Dawn on Sep 09, 2019. https://www.dawn.com/news/1504238/panacea-for-karachis-water-woes
[16] Ibid
[17] Judicial commission submits its fifth report in SC by Mohammad Hussain Khan. Published in Dawn 12, 2018. https://www.dawn.com/news/1450835
[18] Water commission records improvement, wants stakeholders to tap into its success. Express Tribune Dec 13, 2018. https://tribune.com.pk/story/1865552/1-water-commission-records-improvement-wants-stakeholders-tap-success/

secondary treatment of wastewater, which will let the KWSB discharge it into the sea in line with the National Environmental Quality Standards (NEQS)/SEQS.

- Five industrial effluent treatment plants are scheduled to be built in the SITE, Trans-Lyari, F.B, Landhi and Superhighway areas.

Private sector has also sprung into action, for instance, HUBCO has submitted an unsolicited proposal to the Sindh Public-Private Partnership Unit (PPPU) to set up a wastewater recycling plant at TP-1 (SITE) of 50MGD capacity[19].

KWSSIP has been conceived by GoS which has a bulk water supply component and K-IV augmentation component. The whole project aims to increase the water supplies to Karachi from Keenjhar lake.

Water Quality: Report of commission of inquiry of February 2017 indicated that all the 7 filter plants of KW&SB are malfunctioning. The clarifiers at all the Filter Plants, which were acting as circular sedimentation tanks are non-functional. The water which was full of all contamination that includes turbidity, color, odor & taste, TDS, Hardness, Calcium, Sodium, Potassium, Chloride, Sulfate, Fluoride, Nitrate and Iron etc. in high volume was being supplied to the people of Karachi.

The analytical data compared with WHO and NEQS water quality standards demonstrated that out of 84 drinking water samples, 08 (10%) water samples were found unsafe for drinking due to presence of turbidity values beyond the safe limits (5 NTU). The maximum value for turbidity was measured as 24.4 NTU. One sample (1.2%) was found unfit for drinking due to presence of color, 09(11%) water samples were found unsafe due to presence of Total Dissolved Solids (TDS) contents beyond permissible limit (1000mg/l). Maximum concentration for TDS was recorded 3846 mg/l. 07 water samples (8%) were found unsafe for drinking purpose due to presence of hardness values beyond WHO permissible limit (500mg/l). The highest value for hardness was measured as 1100mg/l whereas 30mg/l as lowest. Eleven water samples (13%) were found unfit for human consumption due to presence of sodium content beyond the maximum permissible limit (200mg/l) recommended by WHO for human consumption. The highest value for sodium was measured as 835mg/l. Seven samples (8%) were found unfit for human consumption due to presence of sulfate content beyond the safe limit recommended by WHO (250mg/l). The highest value for sulfate was measured 440mg/l. Eight water samples (10%) were found unfit for human consumption due to presence of chloride ion concentration beyond maximum permissible limit (250mg/l) recommended by WHO for human consumption. The highest value for chloride was measured as 1483mg/l.

Fluoride content was found exceeding WHO limit (1.5mg/l) in 03 (2%) water samples. The highest concentration for fluoride was measured as 2.23mg/l. Two water samples (2%) were found contaminated with nitrate–nitrogen content beyond the safe limit (10mg/l) recommended by WHO for safe drinking water. The highest concentration for nitrate nitrogen was recorded

[19] Panacea for Karachi's water woes? By Kazim Alam. Published in Dawn on Sep 09, 2019. https://www.dawn.com/news/1504238/panacea-for-karachis-water-woes

20.45mg/l. One sample (1.2%) was found polluted with iron content beyond the safe limit recommended by WHO (0.3mg/l).

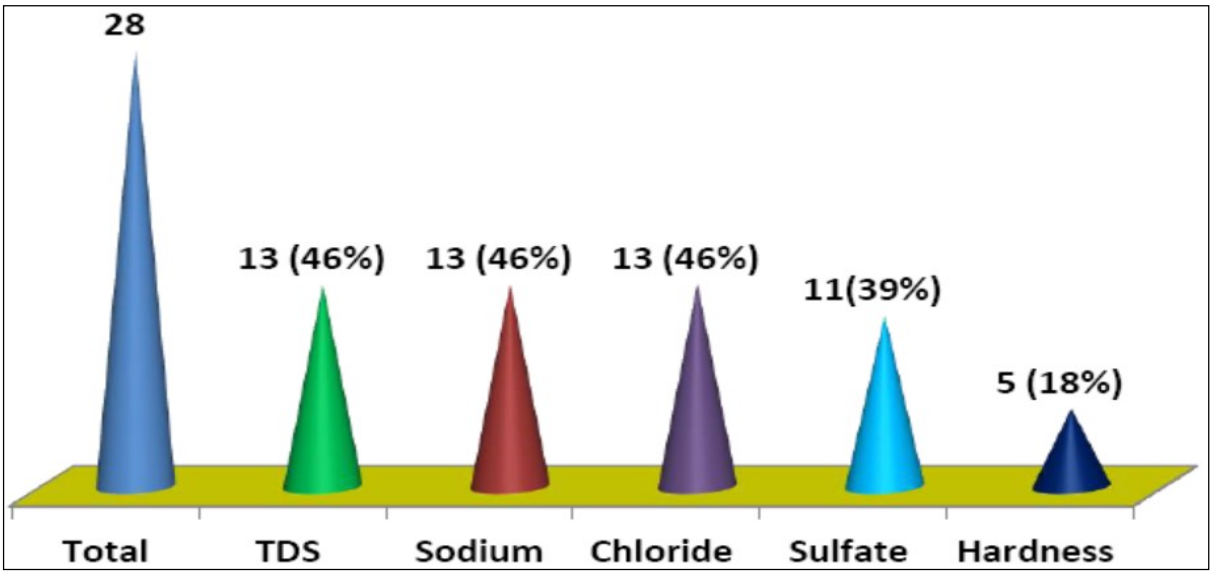


Figure 4.10: Percentage samples beyond permissible limit for different parameters in Karachi.

Sixty Seven out of 84(80%) drinking water samples collected from surface and subsurface (ground water sources) used for drinking purpose were found unsafe for human consumption due to presence of Total coliforms (bacteriological contamination) beyond the WHO recommended values (0/100ml). 30(36%) water samples were found fecal contaminated i.e. presence of *E.coli*. The *E.coli* concentration lies in the range of 01 too numerous to count cfu / ml exceeding WHO limit recommended for drinking water (0/100ml). While, only seventeen water samples (20%) were found bacteriological safe for drinking purpose.

Overall data shows that out of 84 samples 67(80%) were found unsafe for drinking purpose, while only 17(20%) samples were found fit for human consumption for analyzed parameters under prescribed standards.

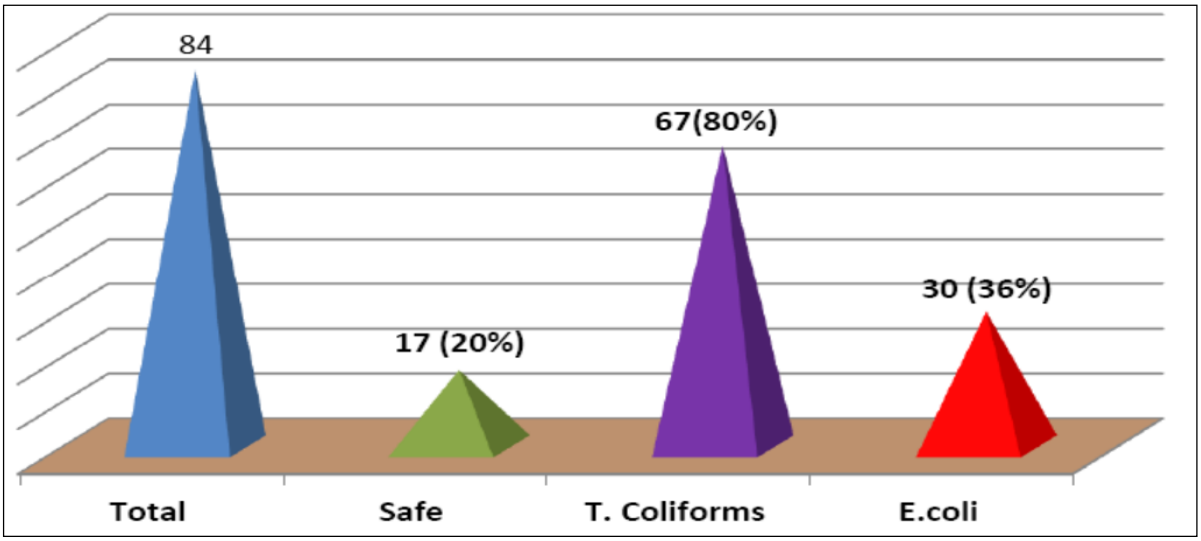


Figure 4.11: Percentage samples beyond permissible limits for bacteriological contamination in Karachi

As per the fifth interim report of implementation commission, rehabilitation of filter plants were at an advance stage of procurement and work orders were expected to be issued[20].

Water Quality at Project Site: Currently there is no water supply at the project site and the water requirements are being fulfilled by water tankers. Water quality tests, conducted at project site, have revealed following results;

ANALYTICAL TEST REPORT					
S.NO.	PARAMETERS TO BE ANALYZED	STANDARD NEQS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5-8.5	-	8.09	USEPA 150.1
2	Total Dissolved Solids (TDS)	<1000	mg/L	355	Hach 8160
3	Total Hardness (as $CaCO_3$)	<500	mg/L	114	Hach 8213
4	Turbidity	<5	NTU	0.89	Turbidity meter
5	Nitrate (NO_3)	≤50	mg/L	0.3	Hach 8039
6	Nitrite (NO_2)	≤3	mg/L	0.012	Hach 8153
7	Phenolic compounds (as phenol)	<0.002	mg/L	0.003	USEPA 420.1
8	Chloride (as Cl^-)	<250	mg/L	98	Hach 8206
9	Fluoride (as F^-)	≤1.5	mg/L	0.82	USEPA 340.1
10	Residual Chlorine	0.2-0.5	mg/L	0.02*	Hach 8167
11	Arsenic	≤ 0.05	mg/L	BDL	APHA-3120 B
MICROBIOLOGICAL TEST REPORT					
11	Total Coliform	0cfu/100ml	cfu	<210*	APHA-SM9221B
12	Fecal Coliform	0cfu/100ml	cfu	<90*	APHA-SM9221F
13	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	<80*	APHA-SM9221F

Flooding in Karachi: The problem of urban flooding is quite significant in Karachi which is the industrial and business hub of Pakistan. Karachi had experienced severe floods which occurred periodically. Urban flooding is caused by heavy rainfall overwhelming drainage capacity. The

[20] Judicial commission submits its fifth report in SC by Mohammad Hussain Khan. Published in Dawn 12, 2018. https://www.dawn.com/news/1450835

primary cause of flooding in Karachi city is torrential rainfall due to tropical storm and monsoon which saturate soil and create huge surface runoff. Floods in urban conditions are flashy in nature and occur both on built up surfaces like roads and streets, parking lots, yards, parks etc. and creeks of urban areas like the Lyari, the Gizri, and the Korangi creek.

Table 4.10: Drainage characteristics of River Basins of Karachi

River Basin	Length of Streams	Basin Area Sq.km	Branching Ratio	Drainage Density km/sq.km
Malir River Basin	725	2167	Dendritic	3.4
Lyari River Basin	180	578	Dendritic	5.6
Budnai Basin	46	95	Dendritic	5.7

4.6.1 Storm Water Drainage

Following Table outlines storm water drainages and nallahs under each township administration. Drainages are artificial water channels for storm water drainage; on the contrary, nallahs are natural water channels. Mostly drainages are connected to nallahs and some drainage is connected to river directly; Nallahs discharge into rivers such as Lyari River and Malir River receiving storm water. As sewage collection system in Karachi City is not enough and its maintenance is not satisfactory, storm water drainage and nallahs have to receive sewage all year long in addition to storm water in rainy season.

Table 4.11: Storm water Drainage/Nallah Length

Town	Depth (m)	Width (m)	Length (km)
1. Keamari Town	1.21	0.91~3.04	7.62
2. SITE Town	2.13	3.65	16.08
3. Baldia Town	1.22	2.43	11.77
4. Orangi Town	1.52	2.43~3.65	34.1
5. Lyari Town	1.37	0.6~13.7	19.4
6. Saddar Town	1.37	3.05	11.14
7. Jamshed Town	1.5	2.43	33.8
8. Gulshan -e- Iqbal Town	3.64	2.4~15.2	28.0
9. Faisal Town	1.22~4.57	1.52~24.0	20.1
10. Landhi Town	1.22	2.43	35.36
11. Korangi Town	1.52	2.74	36.4
12. North Nazimabad Town	1.22	2.4	30.7
13. North Karachi Town	1.22	2.4	45.1
14. Gulberg Town	1.37	2.4	22.1
15. Liaquatabad Town	1.52	3.65	19.5
16. Malir Town	1.22	3.04	6.15
17. Bin Qasim Town	1.22	3.64	14.63
18. Gadap Town	1.22	3.65	24.43
Total			416.38

Source: KWSB

At times roads are cleaned afterwards by town administration and silt/garbage is transferred to drains again. This is said to be how inundation is caused. In addition to the other mentioned issues in Karachi, many drains and nallahs have been already encroached on by illegal houses and buildings.

Another major issue with malfunctioned drains / nallahs is that garbage is easily and routinely dumped to these facilities, which leads to their reduced sections. Comprehensive solid waste management system has to be introduced. There are no exclusive pumping facilities for storm water drainage in Karachi. However, many pumping stations called “ejector”, which were constructed for sewage discharge to natural nallahs or rivers have worked as storm water pumping facilities in rainy season.

Roadside drains are cleaned by KMC/KWSB/SSWMB one to two months before monsoon season comes every year. Removed and collected silt/garbage is conveyed to designate solid waste disposal sites. However, roads are cleaned afterwards by town administration and silt/garbage is transferred to drains again. This is said to be how inundation is caused. In addition to above mentioned administrative issues, many drains and nallhas have been already encroached on by illegal houses and buildings. Strong enforcement of building code and other relevant laws is expected. Another major issue with malfunctioned drains/nallahs is that garbage is easily and routinely dumped to these facilities, which leads to their reduced sections. Comprehensive solid waste management system has to be introduced.

4.6.2 Solid Waste Management

Karachi city generates more than 10,000 ton / day of municipal solid waste and dumped at the landfill site without proper planning and segregation. Out of the total amount of municipal solid waste 60% of the total amount of municipal solid waste are dumped on the landfill site and rest of 40% remain on the street and did not collect from the towns.

Out of 18 former towns, only eleven towns such as, Gulshan, Gulberg, Gaddap, Korangi, Liaquatabad, Landhi, Malir, North-Nazimabad, North Karachi, Shah Faisal and Bin Qasim towns dumped their garbage at the Jam Chakro landfill site and too much without any proper planning and segregation of the garbage. Rest of four towns dumped their waste at the Gond Pass landfill town near Hub River due to its being much near to the town as compared to Jam Chakro landfill site. Three towns of them i.e., Jamshed town, Saddar town and S.I.T.E town are those that dumped their waste at both landfill sites.

Out of the total municipal solid waste generated, 80% contains recyclable material and the remaining 20% is organic type waste. On the basis of analysis of the municipal solid waste, the study reveals that pH is slightly alkaline, moisture content is less than 50% and the amount of heavy metal like, Lead, Cadmium, Chromium and Nickel are beyond the permissible limits. They are responsible for casting adverse impacts on the environment as well as for contaminating groundwater in the vicinity of the landfill site sites through leaching formation.

The existing system of solid waste management in the city is inefficient and inadequate to cope with the present and future need of increasing solid waste quantities. There are no planned disposal sites for the city. The current practice of the illegal dumping of solid waste in and around the city has created a serious environmental and public health problem. For sustainable development, it is essential to establish sound, economical and technical methods of solid waste management.

Sindh Solid Waste Management Board – SSWMB has been established under the Sindh Solid Waste Management Board Act 2014 for effective Integrated Solid Waste Management in Sindh including Karachi. SSWMB is embarking in garbage collection from door to door and construction of garbage transfer stations, material recovery facilities, construction of composting facilities and energy generation etc. SWEEP project is being implemented under SSWMB financed by Worldbank for the establishment of landfill cells and garbage transfer stations in Karachi.

4.7 Biological Environment

The proposed site is located in an already developed area of Karachi. The building and other structures including power-lines are roosting places for a number of birds, mainly the pigeons and kites. Except for these roosting places and old trees, there is hardly any place in the microenvironment where wildlife can prosper. The only vegetation left is the invasive species including *Prosopis juliflora, Calatropis procera, Conocarpus erectus* and *Eucalyptus*.

Natural vegetation is restricted all over the urban area to depression areas where moisture would be available for greater part of the year and longer period of time. The native vegetation is of the desert scrub type comprising a wide variety of bushes and shrubs.

The impoverished as well as degraded environment resulting from non-availability of surface as well as groundwater and discharge of untreated wastewater into Lyari and Malir River has irreversibly reduced the biodiversity of the indigenous as well as introduced vegetation and hence it offers very little chance for the survival/growth of fauna in the macro environment of Karachi City District. There are even otherwise no habitats of large and small animals, birds or reptiles within Karachi City District. Domestic livestock, particularly goats, sheep and camels, are found grazing in the suburban towns. Water availability is the main constraint for the distribution of many animal species.

Large wild mammals are virtually absent in the areas within Karachi. There are a number of characteristic bird species that have adapted to the agricultural environment in the outskirts and suburban areas. These include Indian Roller, common mynah, pigeon, and house sparrow. The areas are characterized by shrubs that are heavily browsed and by a network of livestock trails that provide ready access to practically all wildlife habitats.

4.8 Description of Socio-Economic Environment

The social baseline chapter provides a comprehensive review of the socio-economic conditions of the project area. This socio-economic profile is based on a literature review and several

primary data gathering activities including site visits, sample socio-economic survey of stakeholders in the area and consultations with primary and secondary stakeholders. This social baseline provides an overview of the socio-economic conditions of the people who reside and work in the project vicinity. It also includes an assessment of public utilities and social services (education and health facilities) in the area concerning the proposed construction and operation of the Sea Front building project.

International best practice for EIA studies demands an alignment of the proposed project components with the applicable Sustainable Development Goals (SDGs) adopted by all UN Member States in 2015. The SDGs provide broad universal targets for reducing poverty, environmental degradation, injustice and important pillars of social upheaval that must be achieved by 2030. In March 2017, the global indicator framework was developed and agreed upon by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) to monitor progress towards the achievement of these indicators. Moreover, all member states, including Pakistan have developed national indicators linked to the global targets that provide the basis for a national effort of monitoring progress towards fulfilment of the indicators. The proposed project should be aligned with Goal 11 of the SDGs that requires all essential steps be taken to ensure development that is socially acceptable and environmentally sound.

The socio-economic baseline data in this chapter identifies the existing socio-economic trends in the area and the potential impacts of the project providing the basis for the development of a Social Management Plan. The social baseline is divided into macro and microenvironment of the project area. The macro-environment encompasses District South. The discussion on macro environment covers the administrative setup, demography, education and health profile of the area. The immediate neighborhood of the project area is considered to be the micro-environment of the project and covers land use, education, health and utilities profile of the area.

4.8.1 Macro environment

Administrative Context

The proposed project Sea Front fall within the jurisdiction of Civil Line sub-division of District South Karachi. District South covers a total area of 122 sq. km while Civil Lines covers a total area of 73 sq. km, approximately one-third of the total district area. A total of five sub-divisions falls under District South which includes Aram Bagh sub-division, Civil Line sub-division, Garden sub-division, Lyari sub-division and Saddar sub-division.

Demography

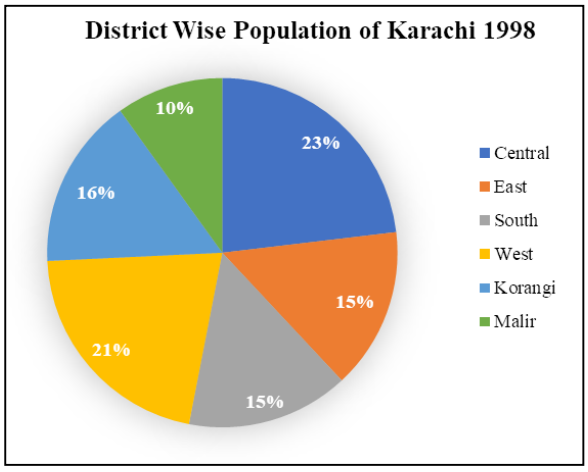
Civil Lines is an upmarket neighborhood in Karachi, Pakistan that was where much of Karachi's British officials and local elite resided during the colonial era. Numerous buildings of architectural significance are located in the locality, including civic administration buildings, churches, mansions, and social clubs. Civil Lines formed part of the "New Town" established during the colonial era, and developed shortly after the British gained control of Karachi from the Talpurs in 1839. It was built to the east of the densely-populated "Native Town" (made up of Mithadar

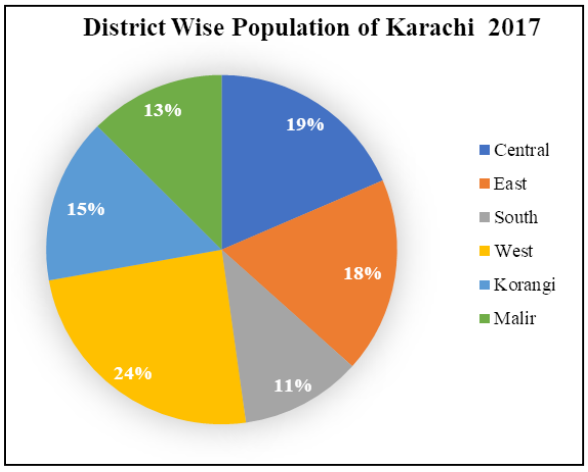
and Jodia Bazaar), and was specifically designed to be spacious area, in contrast to the densely populated Native Town. It was primarily residential, and was where much of the British officials and local elite resided in Karachi during the colonial era. To the north of Civil Lines was the European commercial district of Saddar, and to the south the affluent seaside municipality of Clifton.

Table 4.12: District and Sub Division Population		
1998 census population	**2017 census population**	**Change %**
DISTRICT SOUTH		
1,468,579	1,769,230	21
CIVIL LINE SUB-DIVISION		
281,590	473,119	68
Source: Pakistan Bureau of Stats		

According to the 1998 census, the total population of District South was 1,468,579 which, increased to 1,769,230 in the 2017 census, showing an increase of 21% or an average annual growth rate of 0.98% between the two censuses (nearly two decades). Similarly, the total population of Civil Lines Sub Division was 281,590 according to the 1998 census which, increased to 473,119 according to the 2017 census, showing an increase of 68% or an average annual growth rate of 2.8%. Several ethnic groups are residing in the area including, Urdu Speakers, Punjabis, Sindhis, Balochis, Bohras, Gilgitis, and Pashtons. The following table provides a comparison of the population between 1998 and 2017 census.

Comparative Analysis of Population (1998, 2017)





According to the 1998 census, District South comprised 15% of the entire city population. According to the latest census the population of District South comprises 11% of the city population making it the least populated district of Karachi. The population of District South is expected to increase in the coming years because there are many high-rise projects being planned in the area. Over time, many low-income settlements in the district that are now home to large pockets of residential and commercial establishments thriving with people from other parts of Sindh and the rest of Pakistan, that have made Karachi their second home and work

for the upper income-classes living in Clifton and DHA and other posh areas of the District South.

Transportation

As the cities grow, the requirement of civic facilities also increases requiring continuous development, technological advancement and efficient management. Karachi city is among the fastest growing mega port cities with very high rate of urbanization where the need of transport infrastructure and services is growing rapidly. It is also one of the oldest cities of the world due to which the old city areas do not have much provisions available to manage the rising traffic making it an even more challenging job for the authorities. Massive traffic jams on the roads have become a common feature of Karachi while the situation is getting worse day by day. It has turned into an alarming situation which if not handled on priority basis would soon turn in to a deadlock severely disrupting the economic activities in the city. The mushroom growth of vehicles is also a result of failure of the government in providing sufficient low-cost public transport facilities. Currently there are more than 4Mn registered vehicles on Karachi roads. The number of vehicles registered in Karachi has increased by 1.13Mn or 38% since 2013 with rickshaws rising sharply by 76% to 229,826, motorcycles by 50% to whopping 2.34Mn and private vehicles by 18% to 1.28Mn in 2016.

According to the Research Report of KCCI, August 2017, the ratio of the registered motorcycles is highest 57 % and private vehicles is 31 %, indicates that new public transport vehicles are not inducted to facilitate the citizens of the city and they have to resolve their transport problem themselves. Following graph shows the share of vehicles which have been registered in Karachi in 2017.

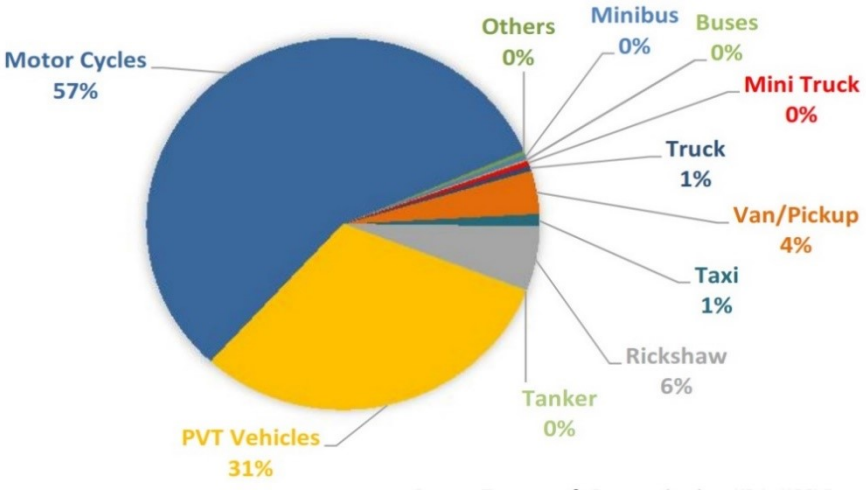


Figure 4.12: Registered Vehicles in Karachi by Vehicle-Type in 2017
Source: Transport & Communication, KDA; KCCI Research Report 2017

The impact of the transport crisis on people's lives is enormous. Travelling in environmentally degraded conditions for long-hours results in physical and mental health problems. This effects family and social life and limits people's choice of livelihoods (especially for women) since they

wish to work in areas that they can easily access through the existing transport system. Increasingly, transport availability and quality are also determining where they would like to live.

The district has an adequate communication network having metaled road. The increasing numbers of motorcycles, private vehicles put a lot of pressure on the roads of District South. The most important is Shahrah-e-Faisal Road that runs 18 kilometer and busiest of the city. Other roads like Club Road, MT Khan Road, Abdullah Haroon Road and Dr Ziauddin Road also have huge volumes of traffic in routine. Local Buses / Wagons running in the district provide the cheapest mode of conveyance and their drivers take the advantage and make their efforts to put on maximum passengers into their vehicles. They often violate traffic rules and their rush driving results in serious road accidents

Economy

Karachi South District is the economic backbone of the country. It has Head Offices of many Corporations, Companies and Banks. Governor House, Chief Minister House, Sindh Assembly, High Court, Embassies and Consulates of different countries and other government offices are also located there.

There are so many shopping malls, shopping markets and shops in the district which contribute their part in making economic situation better and providing employment to a large section of the population not only to the district South but also to the people of other districts of Karachi

Education Facilities

The educational infrastructure in Karachi South is well developed. The government is providing maximum possible educational facilities to provide a fair opportunity to the people of the district to enhance their human capital. There are several schools, colleges, and institutes in the district. Dubbed as the hub of education, District South is host to some of the city's highest public sector universities and higher educational institutions, such as the Jinnah Post Graduate Medical Centre, Preston Institute of Management Science and Technology, National Institute of Cardiovascular Diseases (NICVD), Institute of Chartered Accountants of Pakistan (ICAP) and Shaheed Zulfiqar Ali Bhutto University of Law (SZABUL).

Table 4.13: District-wise Number of Schools, Enrollment and Staff (2016-17)

District Name	No. of Schools				Enrollment			Teacher		
	Boys	Girls	Mixed	Total	Boys	Girls	Total	Male	Female	Total
Central Karachi	117	141	348	606	44,822	58,510	103,332	1,803	4,996	6,799
East Karachi	51	64	163	278	23,022	29,106	52,128	870	2,271	3,141
South Karachi	70	87	173	330	26,122	35,824	61,946	1,079	2,496	3,575
West Karachi	128	101	340	569	38,562	45,454	84,016	1,443	1,909	3,352
Malir Karachi	136	113	414	663	34,548	32,333	66,881	1,540	1,148	2,688
Korangi Karachi	97	94	220	411	35,192	46,918	82,110	1,025	3,082	4,107

Source: SEMIS Census 2016 - 2017

Sindh Education Management Information System (SEMIS)

The number of schools, enrollment and teachers shows here active involvement of the residents of the District South in the education sector. The following table illustrates that according to School Education Statistics 2016-17, District South Karachi has a large number of schools with electricity, washrooms, drinking water and boundary facilities. The data also shows that people of District South are more educated and well aware about the importance of education and are prepared to pay exorbitant school and college fees for the education of their children.

Table 4.14: District wise Basic and Advance Facilities in School

District	Schools	Electricity	Washroom	Drinking Water	Boundary Wall	Lab / Science Lab	Library	Play Ground	SMC
Central Karachi	607	447	484	507	529	121	56	370	591
East Karachi	264	223	241	219	238	59	25	84	259
South Karachi	482	383	426	356	432	49	49	180	465
West Karachi	363	232	301	256	340	82	27	173	359
Korangi Karachi	550	397	431	391	509	46	37	288	533
Malir Karachi	591	240	398	302	479	56	21	106	573

Source: SEMIS Census 2016 – 2017

Sindh Education Management Information System (SEMIS)

Health Facilities

District South provides health facilities not only for its inhabitants but also for the resident of its adjoining districts. Adding to the significance of the district is the presence of three major hospitals – PNS SHIFA, National Medical Centre (NMC) and Dow Hospital. In addition to this, the number of dispensaries is also functioning at different places in the district under the supervision and administrative control of K.M.C / D.M.C South.

Apart from the Government-run health institutions, dozens of private hospitals from the project. BHY Hospital, Kharadar General Hospital, Osmania General Hospital, Altamash General Hospital and Dr. Ruth K. M. Pfau - Civil Hospital Karachi are a few to be mentioned here along with many private clinics are also functioning in the district.

The following table shows the number of health practitioners and paramedical personnel in Karachi.

Table 4.15: District wise Government Medical and Paramedical Personnel in Karachi 2017

District	Doctors	Nurses	L.H. V	Dispensers/Dress	X-Ray	Lab Technicians	O.T Technicians	X-Ray Assistants	Lab. Assistants	O.T. Assistants	Midwives
Karachi Central	579	207	15	82	12	17	25	0	3	12	26
Karachi South	324	115	4	51	14	23	33	0	8	8	2
Karachi East	245	18	22	26	4	0	3	0	4	1	6
Karachi West	356	83	19	67	12	14	22	5	12	15	19
Karachi Malir	234	25	14	53	9	4	6	0	10	5	18
Karachi Korangi	252	90	38	-	-	-	-	0	8	8	25

Source: - BOS, Government of Sindh (Development Statistics of Sindh-2018).

Table 4.16: District wise Government Health Facilities with Bed Capacity in Karachi 2017

District	Hospital		Hospital Beds		Dispensaries		R.H Centers		T.B. Centre		B.H. Units		M.C.H.C.	
	Teaching	Civil, Specialized & Taluka	Teaching	Civil, Specialized & Taluka	No.	Beds	No.	Beds	No.	Beds	No.	Beds	No.	Beds
Karachi Central	-	-	3,150	-	5	-	-	-	8	-	2	-	3	6
Karachi South	2	4	-	960	5	-	-	-	10	5	-	-	-	-
Karachi East	-	-	361	-	5	-	-	-	5	97	4	-	4	-
Karachi West	1	1	-	248	14	15	4	20	8	-	7	14	5	6
Karachi Malir	-	1	-	48	7	-	2	8	4	-	14	22	6	-
Karachi Korangi	-	7	-	724	8	-	-	-	7	-	8	16	4	41

Source: - Directorate General of Health Services, Hyderabad.

Source: - BOS, Government of Sindh (Development Statistics of Sindh-2018).

The public health facilities in Karachi are highly centralized in a few locations and cannot cater to a large part of the population. The above-mentioned public health facilities data is not uploaded, in the government records, therefore subject to some shortcomings. The health care facilities of District South Karachi are better than other districts of Karachi division because there are a number of existing good government and private hospitals.

4.8.2 Microenvironment of Project

Land Use

The proposed site is located in a relatively developed area of Karachi, on Marine Promenade, Block 1, Clifton commonly known as Shireen Jinnah Colony having Chappal Resort Apartments in its immediate neighborhood followed by Ruby Beach Pride I, Ruby Beach Pride II and Sunrise Apartments. It is located in the midst of above-mentioned residential projects. The project is directly facing Clifton Beach and connects with Shahrah-e-Ghalib (Shireen Jinnah Road) on the opposite side.

Education Facilities

There are few governments owned and many private owned schools in the project area. The area residents have access to excellent educational facilities i.e., Montessori, primary, secondary level schools and intermediate colleges. The educational institutes include Bay View High School – Pre School (380m), Karachi United - Football Academy (440m), Pak Turk Maarif International School (349m), Government Boys & Girls Secondary School Shireen Jinnah Colony (721m), Wynwood College (790m), Memon Degree College (932m) and Ziauddin University (1.25km). National Institute of Oceanography (157m) is also located in the area which is a research Institution.

Healthcare Facilities

There are private and some government healthcare facilities in the area. The most common diseases symptoms reported in the area include fever, flu and blood pressure. The residents of the area mostly avail the facility of private hospitals and only due to lack of money, some go to government hospitals. The health facilities in the vicinity of project which include Altamash General Hospital (648m), Clifton Medical Center (522m), Shireen Jinnah Hospital (976m), Dr. Ziauddin Hospital Clifton Campus (1.18km) and National Aids Center (831m).

Water Management

Sindh Solid Waste Management Board (SSWMB) is responsible for the waste management in the nearby vicinity. The condition of solid waste in the project area is satisfactory. There is proper infrastructure for solid waste management, waste management of Civil Lines area falls under the jurisdiction of District South.

Water Supply and Drainage

The water supply in the area falls under the jurisdiction of the Karachi Water and Sewerage Board (KWSB). There is shortage of water supply in the area, residents are not satisfied with water condition and quality. Locals do not have water lines to meet household demands and the nearby residents rely on water tankers. It was observed that the functioning of the drainage system is also unsatisfactory in the project area. The residents shared that they face difficulties during heavy rains and they requested the officials and concerned departments to take notice and care of the underperforming drainage lines that are insufficient to fulfill the requirements of the neighborhood.

Electricity & Gas Supply

K-Electric supplies electricity for Civil Lines. Residents were mostly satisfied with the electricity supply in the area as load shedding is relatively infrequent in the neighborhood. The area suffers from gas load shedding during summer and heavily in the winter season as it happens in other parts of the city too.

Traffic Conditions

The traffic flow in the project area remains nominal throughout that day. The traffic in the project area stays-up during school and office timings. The residents were of the view that the construction activities may create some hindrance in traffic flow nearby roads. The project site is primarily served by KASB Altitude Service Road which connects the site with main Marine Promenade. Other roads leading towards the project site are Khayaban-e-Bedil and Shahrah-e-Ghalib.

Chapter 5 INFORMATION DISCLOSURE, CONSULTATION & PARTICIPATION

The participation of project stakeholders in project planning, design and implementation are now universally recognized as an integral part of environmental & social impact assessment. Local communities, their representatives, government departments, national and international NGOs and the civil society at large may all be able to contribute to and benefit from, the dialogue directed at identifying and resolving key project-related issues. Stakeholder consultation has become an important requirement of the EIA study after the enactment of the guidelines for public consultation under the Pakistan Environmental Protection Act (PEPA) 1997. After the 18th Amendment to the Constitution, the Government of Sindh passed the Sindh Environmental Protection Act 2014, which also stresses the importance of engaging with the concerned primary and secondary stakeholders during the EIA study.

While in the short-term, the impacts might be felt only in the microenvironment of the project, in the long-term, the impacts may also spread to other nearby neighborhoods and activities including traffic management, the swift passageway for fire tenders and ambulance and stress on existing utilities. Instead of these perceived impacts, meaningful engagement with the project stakeholders has been carried out to identify the potential positive and negative impacts, assess the magnitude of these impacts from a social perspective and prescribe solutions for the construction and operations phase of the proposed project.

5.1 Stakeholder Mapping

To better understand the different stakeholder groups for this project, a stakeholder mapping exercise has been carried out whereby the different stakeholder groups and their interests in the project are discussed in this section:

1. **Local People/Neighborhood:** Individuals or groups in the vicinity of the project site are informed regarding the project background and context. Due to their proximity to the project site, they are often the most vulnerable stakeholders and therefore, consultation with these stakeholders is carried out throughout the project life. The consultation exercise provides an opportunity to appraise the stakeholders regarding the consultation process, identify likely project impacts, and record concerns of local communities. Moreover, intensive stakeholder engagement during the planning stage of the project provides a basis for reducing the trust deficit and encourages confidence-building.
2. **Proponents:** The main aim of the project proponent is to accomplish the objectives of the project through cost-effective and sustainable project activities. To this end, the project proponent has to recognize that strong associations and responsive relations with stakeholders would go a long way to achieve the project objectives. Therefore, the proponent has to strive to engage stakeholders at all levels from the outset; inform them regarding project goals, design and alternatives. Moreover, they have to keep trying to create public understanding and acceptance of the proposal through a commitment to

implement the promised objectives. They have to accomplish the project through general acceptance of the design and keep improving through the use of public inputs on alternatives and mitigation measures.

3. **Government Agencies:** The government agencies involved in the EIA process is mandated to have their policy and regulatory responsibilities addressed in impact analysis and mitigation consideration. For the competent authority, an effective public involvement program will ensure a project proposal that effectively incorporates environmental and social concerns. During the EIA review, the most important concern for SEPA is a transparent public consultation process and a strong stakeholder engagement plan that can address the concerns and suggestions of all stakeholders.
4. **NGOs/Interest groups:** Comments from NGOs and specific interest groups often provide a useful policy perspective on the project's methodology and implementation mechanisms. For example, due to the vast exposure of certain NGOs and interests' groups, alternative measures for reaching the project goals may be advised that is more environmentally friendly and socially acceptable.

5.2 Primary and Secondary Stakeholders

Primary stakeholders are those who have a direct interest in the project which includes residents, commercial entities and institutions falling in the immediate environs of the project area. Secondary stakeholders include the relevant government agencies and public interest groups which may indirectly influence or be influenced by the project. The concerns and input from both primary and secondary stakeholders are important to identify the issues arising from the construction and/or operation phase of the project and propose mitigation measures that minimize the negative project impacts and enhance the positive ones.

Within the vicinity of the proposed project, there are primary stakeholders which were identified before conducting survey in the field. The primary stakeholders are the residents of Chapal Resort Apartments, Ruby Beach Pride I, Ruby Beach Pride II and Sunrise Apartments. The commercial interests in the immediate vicinity include Special Shinwari Salateen Hotel, Arshad Car Detailing and 3 Star General Store. The secondary stakeholders for this project include the utility companies that operate in the area including K-Electric, SSGC, as well as the regulatory authorities, mandated to ensure environmental protection in the city, which falls under the remit of SEPA and compliance with building and construction laws which is looked after by SBCA. The primary and secondary stakeholders for Sea Front have been identified in the table below:

Table 5.1: Stakeholders for Sea Front	
Neighborhood	*Residential Interests:* • Chapal Resort Apartments • Ruby Beach Pride I • Ruby Beach Pride II • Sunrise Apartments *Commercial Interests:* • Special Shinwari Salateen Hotel • Arshad Car Detailing • 3 Star General Store
Government Agencies & Other Service Providers	Sindh Environmental Protection Agency (SEPA) K-Electric Sui Sothern Gas Company (SSGC) DMC South Karachi Sindh Building & Control Authority (SBCA)
NGOs/Interest groups	Shehri-CBE National Forum for Environment & Health (NFEH) Citizens for Environment (NGO) Urban Resource Center (URC)

5.3 Consultation Approach & Methodology

5.3.1 Consultation with Primary Stakeholders

A Neighborhood Survey was conducted to identify the residential and commercial interests in the area that may face direct impacts from the proposed development. The survey was conducted in two stages. In the first stage, several site visits were carried out to identify all stakeholders that either reside or work in the project vicinity and conduct an initial identification of potential positive and negative impacts. Relevant public service institutions directly involved in service provision in the areas were also identified.

During the second stage, a social survey field team used a pre-designed semi-structured template to engage the area residents, commercial interests and public service institutions. Those stakeholders, who were not available at the first attempt, were re-visited on the same day or followed-up for their comments during the next few days. During each meeting, the project team introduced the project to the stakeholders, recorded their concerns, suggestions and provided contact details to enable stakeholders to share further comments over email or in writing. A 'Project Brief' providing the salient features of the project were also handed over to the available stakeholders as part of the information disclosure process.

Moreover, the team inquired about the current situation of the area such as the status of utilities, security and law and order situation in the project area from the residents near the project site. Several open-ended questions were also included in the questionnaire to ensure that the respondents could openly share their opinions and suggestions relevant to the study. The following table shows the stakeholders that were approached during the Neighborhood Survey.

Table 5.2: Consultation with Primary Stakeholders				
S. No	**Stakeholder Representative**	**Stakeholder**	**Stakeholder Type**	**Date**
1	Mr. Aizaz (Resident)	Chapal Resort Apartments	Residential	07-10-2022
2	Mr. Rashid (Resident)	Chapal Resort Apartments	Residential	07-10-2022
3	Mr. Ijaz (Resident)	Ruby Beach Pride I	Residential	07-10-2022
4	Mr. Shahid Khan (Resident)	Ruby Beach Pride I	Residential	07-10-2022
5	Mr. Rab Nawaz Jamali (Resident)	Ruby Beach Pride II	Residential	07-10-2022
6	Dr. Abid Khan Afridi (Resident & Govt. Health Officer)	Ruby Beach Pride II	Residential	07-10-2022
7	Mr. Jamil (Resident)	Sunrise Apartments	Residential	07-10-2022
8	Mr. Dilshan (Owner)	Special Shinwari Salateen Hotel	Commercial	07-10-2022
9	Mr. Arshad (Owner)	Arshad Car Detailing	Commercial	07-10-2022
10	Mr. Bilal (Worker)	3 Star General Store	Commercial	07-10-2022
11	Mr. Kursheed (Government Officer)	Income Tax & FBR Clifton Office (GoS)	Governmental	07-10-2022

5.4 Consultation Feedback

The comments, concerns and suggestions received from stakeholders during the neighborhood survey have been collated in this section. The comments solicited from stakeholders were helpful in the screening of the potential environmental & social aspects of the project.

5.4.1 Concerns & Suggestions: Neighbourhood Survey

The social team from EMC carried out consultations in the project area during the first week of October. The following major issues and concerns were raised by the primary stakeholders:

- Mr. Aizaz is a student as well as professor at Institute of Business Management (IoBM) took pleasure in the consultation process and mentioned his views that high rise

building right in front of sea view is an ideal plan which should be implemented. He then further shared his views that buildings as compared to high-rise housing schemes take less space and provide more accommodation for the city's bulging population.

- Mr. Ijaz and Mr. Shahid Khan, the residents of the neighborhood were concerned about the pressure on the amenities in the area, they said that there are a number of parks which are utilized for dumping of old cars by a Zonal Municipal Committee (ZMC), Government Department. Government should make efforts to restore these facilities into proper parks and playgrounds.
- The residents of the neighborhood frequently complained about the unavailability of freshwater supply from KWSB pipelines in the area and said that purchasing water from water tankers is expensive and burden on peoples' pocket.
- Similarly, a number of residents were complaining about the frequent load shedding of gas supply in the summer season and even more in the winter season. They have to keep gas cylinders at home as backup.
- Residents have mentioned their concern about the old sewerage line system in the area that is incapable of holding drainage. Construction of more buildings over the old sewerage lines will over burden the existing system.
- A security guard in the neighborhood has mentioned a few security concerns in the area. He said that gated buildings with security guards and CCTV monitoring are mandatory and people need to be watchful traveling alone at night time.
- Dr. Abid Khan Afradi is a Deputy District Health Officer as well as resident of Ruby Beach Pride II mentioned his views that the high-rise building will increase the property value of the area. However, he was concerned about the dumping of waste and cement and other building materials during the construction phase should not be indiscriminately dumped out of the building premises.

Table 5.4 Primary Stakeholder Consultations Pictures





Consultation with the Residents of Ruby Beach Pride II





Consultation with the Residents of Clifton Block 1





Consultation with a Resident, Ruby Beach Pride I	Consultation with the Residents of Chapal Resort Apartments





Handed over Project Brief to Security Guard, Sindh Bar Council





Consultation with Owner, Special Shinwari Salateen Hotel



Consultation with Owner, Arshad Car Detailing



Consultation with Officer, Income Tax & FBR Office - Clifton

Chapter 6 SCREENING OF POTENTIAL IMPACTS & PROPOSED MITIGATION MEASURES

This section presents the screening process that identifies the environmental aspects and makes assessment of impact of different activities on the physical, biological and social environment. The screening process has, through review of literature, primary as well as secondary baseline data, and expert judgment, made assessment of the potential impacts of said activities on the physical, biological, and socioeconomic environment of the Project. Mitigation measures have been proposed to reduce, minimize or compensate for the identified potential negative impacts and their adoption has been recommended. The report has taken cognizance of the deficiencies in infrastructure which has been overburdened as a result of increased demand of water supply, waste disposal and road congestion. The deficiencies having been created due to the non-sustainable development activities introduced in the megapolis for over two decades.

M/s Jubilee Builders and Developers has planned to construct a ground plus 45 storeys tower in Karachi. The environmental aspects of the project as identified by situation analysis are related to the following:

- Physical environment,
- Biological environment, and
- Socio-economic environment.

Description of microenvironment and macroenvironment in the previous chapters have provided a classification of the micro-site based on assessment of impact using both primary and secondary data on climate, air quality & noise, hydrology, geology, geomorphology, soil characteristics and seismicity, ecology, built environment including road network and traffic movement, and the socioeconomic aspects pertinent to siting of the project and its adaptation in the emerging situation of intense construction activity in Karachi. Mitigation measures have been proposed wherever required.

Screening of potential environmental impacts on the physical environment is related to:

- Siting of the Project
- Topography, Geology and Seismicity of the microenvironment
- Vulnerability of soil to liquefaction
- Availability of utilities in the area
- Air, water and noise pollution and other forms of nuisance during construction at site, and in the microenvironment (neighborhood) and macroenvironment of site
- Burden on Infrastructure
- Capacity of adjoining roads, traffic movement, and congestion

The phases of project are:

- Siting
- Construction
- Operation

6.1 Impact Assessment Methodology

Potential environmental impacts of the proposed Project on different features of micro and macro-environment pertain to construction and operation of residential building project.

The screening process proceeds by identifying the potential environmental aspects of siting the project, identifying the potential environmental impacts at pre-construction, construction and operational stages of the project and identifying the residual impacts after adoption of mitigation measures that may be needed at the outset of activities. The impacts on environmental resources from the proposed project will be short-term and temporary in nature.

Environmental impact of a project is worked out using various factors, so that an environmental management plan can be evolved to take mitigation measures.

Impacts assessment strategy at different stages of the project is summarized as per Fig. 6.1 below:

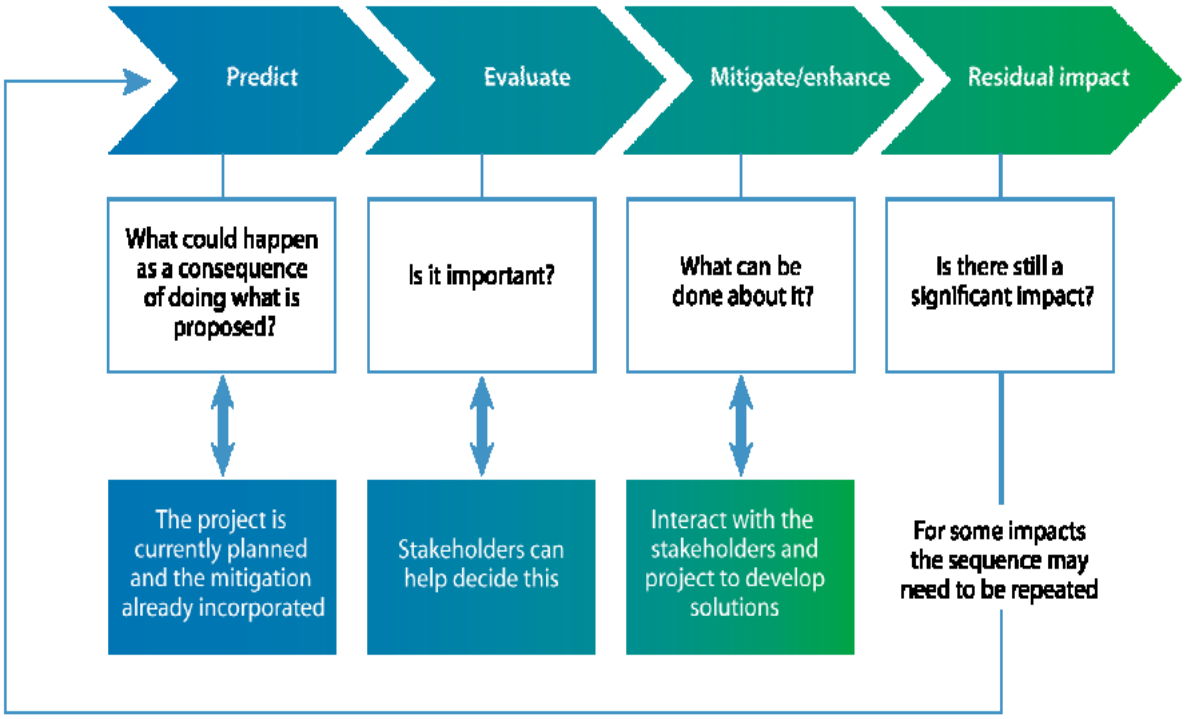


Figure 6.1: Impact Assessment Strategy

A systematic strategy was developed to provide an assessment of the likely impacts on the micro and macro-environment of the Project site. The strategy included:

6.2 Environmental Aspects of Sitting of Project

- Aspects related to the Siting of the proposed project and requirement of mitigation measures are as follows: Availability of infrastructure facilities for establishment of "Sea Front" a residential building, in Block-1, Scheme-5, Clifton. Advantage of this aspect has already been taken by other builders and developers who have gone ahead with the construction of residential and commerical ventures in the area.
- Approval from Sindh Environmental Protection Agency would also be sought through submission of this EIA report.
- The posh area of Clifton Block-1 i.e. the project's micro-environment already has a number of residential and residential cum commercial buildings. Siting of the project will therefore, would not add to the negative impacts such as water, air, and noise pollution, that may have already been incurred to some extent due to the said development, or to the existing level of pollution that has been allowed for densification.
- This Project would least likely cause any annoyance to the living environment, or disturb the peace and tranquility of its surroundings.
- The project site has no sensitive areas such as protected sites including wildlife sanctuaries, game reserves or national parks, or any archaeological, historical or cultural heritage within the zone of influence; as such its siting would have no impact in this regard. Removal of trees or greenery would not be involved as project site is a vacant plot.
- The air-shed of the site has, according to the assessment of ambient air quality been classified as rather unpolluted. The air quality of the air-shed of the macro-environment as well as that of the site itself will have no significant impact due to siting of the Project.
- Land acquisition for the project is not involved as the land is owned by the proponent.
- Proposed project would share the water resources available in the area.
- The project site is not close to polluting units of the industrial estates. The site is therefore not directly impacted by the emissions and discharges from the industrial units.

Mitigation measures

- The project shall be constructed strictly in accordance with the existing environmental legislations, NFPA codes and applicable building codes therefore, are not expected to contribute to pollution of the environment.

The following Checklist provides the screening of potential environmental impact on different components of ecosystem of the proposed project.

Table 6.1: Checklist provides the Screening of Potential Environmental impacts

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area……?			
Densely Populated?	√		The project is following the plan of densification by SBCA
Heavy Development Activities?	√		The densification has open doors for such development activities

Table 6.1: Checklist provides the Screening of Potential Environmental impacts			
Screening Questions	**Yes**	**No**	**Remarks**
Adjacent to or Within Any Environmentally Sensitive Areas?		√	Outside the corridor of impact
Cultural Heritage Site		√	Outside the corridor of impact
Protected Area		√	Outside the corridor of impact
Wetland		√	Outside the corridor of impact
Mangrove		√	Outside the corridor of impact
Estuarine		√	Outside the corridor of impact
Buffer Zone of Protected Area		√	Outside the corridor of impact
Special Area for Protecting Biodiversity		√	Outside the corridor of impact
Bay		√	Outside the corridor of impact
B. Potential Environmental Impacts Will The Project Cause…?			
Impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.		√	Taking cognizance of the situation, the proponent has already paid its share for the augmentation of utility services of the area concerned
Deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?	√		Densification of the roads and areas without a master plan has taken no cognizance of the centripetal force mentioned above. This omission is likely to result in catastrophes on road. The issue must be resolved through a strategic solution to a cumulative problem.
Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		√	Not envisaged
Dislocation or involuntary resettlement of people		√	Not envisaged
Dislocation of indigenous communities and Disadvantaged population		√	Not envisaged
Degradation of cultural property, and loss of cultural heritage and tourism revenues?		√	Not envisaged
Occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to polluting industries?		√	Not envisaged
Water resource problems (e.g. depletion/ degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?		√	Not envisaged, better management & conservation practices will be followed
Air pollution due to urban emissions?	√		Minor
Social conflicts between construction workers from other areas and local workers?		√	Not expected
Road blocking and temporary flooding due to land excavation during rainy season?		√	Not envisaged but will be mitigated, if such situation emerges, through better management practices

Table 6.1: Checklist provides the Screening of Potential Environmental impacts			
Screening Questions	**Yes**	**No**	**Remarks**
Noise and dust from construction activities?	√		Minor but will be minimized and localized into the microenvironment through best management practices
Traffic disturbances due to construction material transport and wastes?		√	The Project involves major construction activity. State of the art technology will be used. Construction material transportation to the site will be managed through recognized access roads and adoption of good management practices
Temporary silt runoff due to construction?		√	Not envisaged but will be mitigated, if such situation emerges, through better management practices
Hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		√	Not envisaged but will be mitigated, if such situation emerges, through better management practices and implementation of Environmental Management Plan
Water depletion and/or quality degradation?		√	Best management practices and conservation practices will be followed in view of constraints on availability
Over usage of ground water, leading to land subsidence, lowered ground water table, and salinization?		√	Conservation practices will be followed and excessive use will be avoided
Contamination of surface and ground waters due to improper waste disposal?		√	Solid and Liquid waste Disposal system will be in place to prevent possible contamination of water resources
Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		√	Solid and Liquid waste Disposal system will be in place to prevent possible contamination of receiving waters.

6.3 Screening of Environmental Aspects related to Siting of Project

- The Project will be sited at Plot No. FL-11, Block-1, KDA Scheme-5, Clifton; the site falls in the appropriate category that permits the designated land-use by the SBCA. The site is thus the only and hence the preferred alternative for siting the Project.
- The ownership of the plot lies with the M/s Jubilee Builders and Developers. Since the proponent is the rightful owner of the site, there is no dispute with regard to siting of the project. To validate their claims on the site and on its being the only and hence the preferred alternative for establishment of their project, the proponent, has so far obtained a No Objection Certificate (NOC) from SBCA and other agencies.
- The project when completed would require an estimated 54,050 gallons per day. The proposed project is a self-contained building having its own back-up power generation, water supply which can be supplemented by filtration system, potential grey water recycling, sewage treatment and disposal system through Septic Tank, in addition to provision of parking space. The relevant authorities have already received the due amount

for provision of utility services and development of the area. They are expected to plan and implement augmentation of the facilities in advance; otherwise plan for densification would, instead of facilitating improvement in quality of life, be a burden on the environment.

- With 24-hour security system all over the building the designers have ensured that the concerns on safety and security are alleviated and eased.

- The Project would thus achieve its objective of providing a secure and safe residential building at an attractive location. This being a positive impact would be an indicator of achievement of the objectives of the Project.

6.4 Screening of Potential Impacts at Planning and Designing (Pre – Construction Phase)

There are some of the environmental aspects which will be taken into account in the planning and designing phase of project so that these may not impact the environment in both construction and operational phase. These impacts are as follows:

6.4.1 Land Acquisition

Land is owned by project proponent and the necessary approvals have been obtained.

6.4.2 Structural Stability

The seismic zone map of Pakistan (fig. 6.2) has divided the country into 05 seismic zones ranging in term of Uniform Building Code (UBC) zones with respect to ground acceleration values.

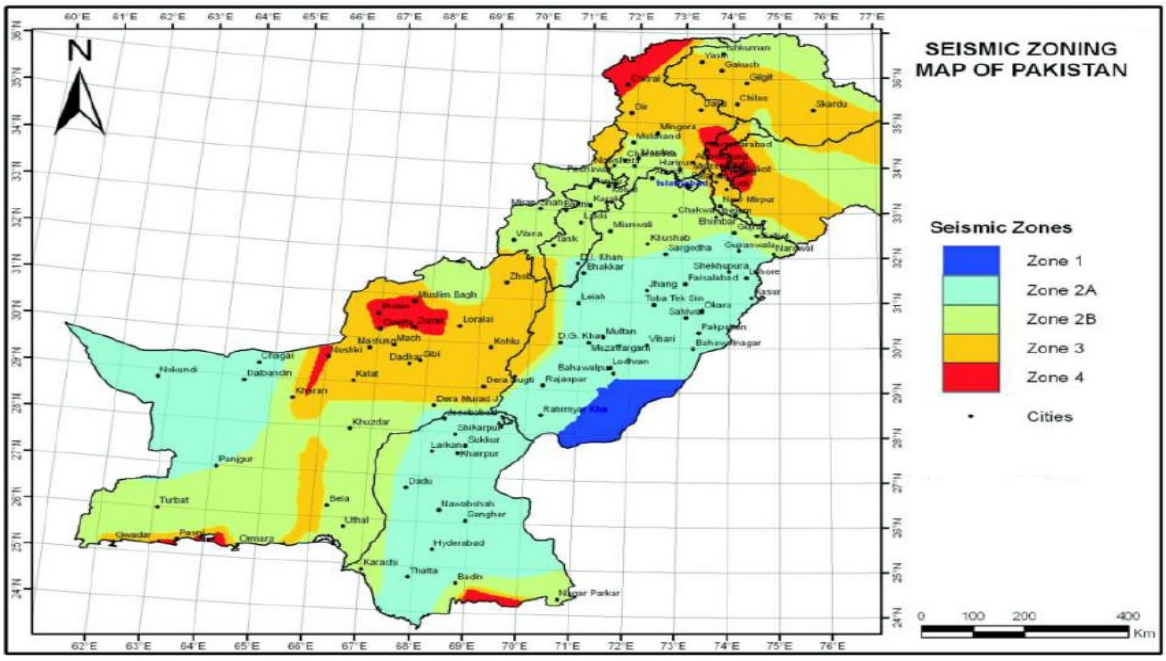


Figure 6.2: Seismic Zones of Pakistan

The recently developed guidelines for earthquake design of buildings in Karachi have assigned an expected Peak Ground Acceleration'(PGA) value of 0.20g for larger buildings such as the proposed project.

The project area lies into the Uniform Building Code (UBC) Zone 2B. The intensity which is estimated in accordance with the Modified Mercalli Scale (MM) will be VIII and higher. The building structure would be reinforced concrete. There are some mitigation measures which will be followed for further minimizing the risk involved in the stability of the building structure:

Mitigation measures

- During the construction, it will be important to maintain the stability of excavated area.
- However, during monsoons or in the case of ingress of ground water (due to inadequate dewatering) it will be essential to protect the excavation walls with shoring/bracing.

6.4.3 Reduction of Liquefaction Hazard

There are basically three possibilities to reduce liquefaction hazards when designing and constructing new buildings.

1. Avoid Liquefaction Susceptible Soils

The first possibility is to avoid construction on liquefaction susceptible soils. There are various criteria to determine the liquefaction susceptibility of a soil. By characterizing the soil at a particular building site according to these criteria one can decide if the site is susceptible to liquefaction and therefore unsuitable for the desired structure.

There are a number of different ways to evaluate the liquefaction susceptibility of a soil deposit.

a. Historical Criteria

Observations from earlier earthquakes provide a great deal of information about the liquefaction susceptibility of certain types of soils and sites.

Soils that have liquefied in the past can liquefy again in future earthquakes. First, investigation would be required for previous earthquakes to see if they caused liquefaction at the site.

b. Geological Criteria

The type of geologic process that created a soil deposit has a strong influence on its liquefaction susceptibility. Saturated soil deposits that have been created by sedimentation in rivers and lakes (fluvial or alluvial deposits), deposition of debris or eroded material (colluvial deposits), or deposits formed by wind action (aeolian deposits) can be very liquefaction susceptible.

These processes sort particles into uniform grain sizes and deposit them in loose state which tends to densify when shaken by earthquakes.

The tendency for densification leads to increasing pore water pressure and decreasing strength. Man-made soil deposits, particularly those created by the process of hydraulic filling, may also be susceptible to liquefaction as in case of reclaimed project site.

c. Compositional Criteria

Liquefaction susceptibility depends on the soil type. Clayey soil, particularly sensitive soils, may exhibit strain-softening behavior similar to that of liquefied soil, but do not liquefy in the same manner as sandy soils are.

Soils composed of particles that are all about the same size are more susceptible to liquefaction than soils with a wide range of particle sizes. In a soil with many different size particles, the small particles tend to fill in the voids between the bigger particles thereby reducing the tendency for densification and pore-water pressure development when shaken.

The geologic process described above produce rounded particles. The friction between angular particles is higher than between rounded particles, hence a soil deposit with angular particles is normally stronger and less susceptible to liquefaction.

d. State Criteria

The initial "state" of a soil is defined by its density and effective stress at the time it is subjected to rapid loading. At a given effective stress level, looser soils are more susceptible to liquefaction than dense soils. For a given density, soils at high effective stresses are generally more susceptible to liquefaction than soils at low effective stresses.

2. Build Liquefaction Resistant Structures

If it is necessary to construct on liquefaction susceptible soil because of space restrictions, favorable location, or other reasons, it may be possible to make the structure liquefaction resistant by designing the foundation elements to resist the effects of liquefaction.

A structure that possesses ductility, has the ability to accommodate large deformations, adjustable supports for correction of differential settlements, and having foundation design that can span soft spots can decrease the amount of damage a structure may suffer in case of liquefaction (Committee on Earthquake Engineering, NRC, 1985). To achieve these features in a building there are various aspects to consider:

a. Shallow foundation Aspects

It is important that all foundation elements in a shallow foundation is tied together to make the foundation move or settle uniformly, thus decreasing the amount of shear forces induced in the structural elements resting upon the foundation.

The well-reinforced perimeter and interior wall footings are tied together to enable them to bridge over areas of local settlement and provide better resistance against soil movements. A stiff foundation mat is a good type of shallow foundation, which can transfer loads from locally liquefied zones to adjacent stronger ground.

Buried utilities, such as sewage and water pipes, should have ductile connections to the structure to accommodate the large movements and settlements that can occur due to liquefaction.

b. Deep foundation Aspects

Liquefaction can cause large lateral loads on pile foundations. Piles driven through a weak, potentially liquefiable, soil layer to a stronger layer not only have to carry vertical loads from the superstructure, but must also be able to resist horizontal loads and bending moment induced deep foundation by lateral movements if the weak layer liquefies.

Sufficient resistance can be achieved by piles of larger dimensions and/or more reinforcement. It is important that the piles are connected to the cap in a ductile manner that allows some rotation to occur without a failure of the connection. If the pile connections fail, the cap cannot resist overturning moments from the superstructure by developing vertical loads in the piles.

3. Improve the Soil

The third option involves mitigation of the liquefaction hazards by improving the strength, density, and/or drainage characteristics of the soil. This can be done using a variety of soil improvement techniques.

The main goal of most soil improvement techniques used for reducing liquefaction hazards is to avoid large increases in pore water pressure during earthquake shaking. This can be achieved by densification of the soil and/or improvement of its drainage capacity.

a. Vibroflotation

Vibroflotation involves the use of a vibrating probe that can penetrate granular soil to depths of over 100 feet. The vibrations of the probe cause the grain structure to collapse thereby densifying the soil surrounding the probe. To treat an area of potentially liquefiable soil, the vibroflot is raised and lowered in a grid pattern.

Vibro Replacement is a combination of Vibroflotation with a gravel backfill resulting in stone columns, which not only increases the amount of densification, but provides a degree of reinforcement and a potentially effective means of drainage.

b. Dynamic Compaction

Densification by dynamic compaction is performed by dropping a heavy weight of steel or concrete in a grid pattern from heights of 30 to 100 ft. It provides an economical way of improving soil for mitigation of liquefaction hazards. Local liquefaction can be initiated beneath the drop point making it easier for the sand grains to densify. When the excess pore water pressure from the dynamic loading dissipates, additional densification occurs

c. Stone Columns

Stone columns are columns of gravel constructed in the ground. Stone columns can be constructed by the Vibroflotation method. They can also be installed in other ways, for example, with help of a steel casing and a drop hammer as in the Franki Method.

In this approach the steel casing is driven in to the soil and gravel is filled in from the top and tamped with a drop hammer as the steel casing is successively withdrawn.

d. Compaction Piles

Installing compaction piles is a very effective way of improving soil. Compaction piles are usually made of pre stressed concrete or timber. Installation of compaction piles both densify and reinforce the soil. The piles are generally installed in a grid pattern and are generally driven to depth of up to 60 ft.

e. Compaction Grouting

Compaction grouting is a technique whereby a slow-flowing water/sand/cement mix is injected under pressure into a granular soil. The grout forms a bulb that displaces and hence densifies, the surrounding soil. Compaction grouting is a good option if the foundation of an existing building requires improvement, since it is possible to inject the grout from the side or at an inclined angle to reach beneath the building.

f. Drainage techniques

Liquefaction hazards can be reduced by increasing the drainage ability of the soil. If the pore water within the soil can drain freely, the build-up of excess pore water pressure will be reduced. Drainage techniques include installation of drains of gravel, sand or synthetic materials. Synthetic wick drains can be installed at various angles, in contrast to gravel or sand drains that are usually installed vertically. Drainage techniques are often used in combination with other types of soil improvement techniques for more effective liquefaction hazard reduction.

6.4.4 Threat to Biodiversity

The site visit of the project area by the EMC team has revealed that there is no significant Terrestrial flora and fauna of biological importance present within the project site. Therefore, there are no major threats or will be imposed upon the Terrestrial flora and fauna of the proposed project area during construction and operational phase of the project.

6.4.5 Archaeological / Cultural / Protected Area

There are no protected or otherwise cultural or archaeological sites in the microenvironment of the project site and hence no impact of the project will occur on cultural or archaeological resources.

6.5 Screening of Potential Environmental Impacts at Construction Phase and their mitigation measures

The activities that take place during the construction phase of the project are leveling of site, construction and erection of building etc. and associated equipment's. The potential primary and secondary impacts on the environment due to these activities and their mitigation measures are discussed as under:

6.5.1 Site Clearance

Site preparation would include clearing, excavation, earth and fill movement, and transportation of machinery and associated equipment to the site. The said activities will not

lead to extensive soil erosion, or alteration of soil quality resulting from removal of topsoil at the site.

6.5.2 Soil Erosion

Generally, the exposed soil after excavation for foundations is vulnerable to erosions and runoffs by rains. Such a situation is of temporary nature and short duration. It lasts only during the landscaping and concreting phase of construction at the site. Standards operating procedures have to be adopted to minimize the impact.

Mitigation Measure

- Covering the open soil during the construction phase till the foundation is adequately concreted.
- Intensification in fugitive dust emission caused by erosion of soil will be mitigated by appropriate measures to reduce the level of impact to minor significance.
- Control of air emission during construction will be ensured by adopting sound operating procedures such as:
    - Exposed surface will be regularly wetted to effectively keep airborne dust levels to minimum
    - Stockpiles of fine material will be wetted or covered with tarpaulin especially during windy weather conditions.
    - Site workers will be mandated to wear dust masks especially during dry & windy weather conditions.

6.5.3 Contamination due to chemical / fuel spills

During the construction stage, the contamination of land occurs due to unchecked chemicals or fuel spillage through their improper handling, transportation and storage.

The sources of spills are:

- During refueling, the transfer of fuel from one container to the other;
- By the maintenance of vehicle and machinery;
- Leakage from the container or equipment's;
- Traffic Accident;

Mitigation measures

Actions necessary to manage the risk of contamination of land and water will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use. However, a basic management strategy will include:

- Fuel oils, lubricants, and chemicals will be stored in covered diked areas, underlain with impervious lining
- Vehicles and equipment's maintenance will be taken place at specified site.
- Washing of vehicles will be carried out in the designated areas.

- Construction vehicles and machinery will be examined on a regular basis for leakage prevention.
- Removal of oil and contaminated soil around the fuel and oil storage areas will be made possible by the availability of appropriate implements i.e. shovels, plastic bags and absorbent materials.
- Contaminated media will be managed with the objective of protecting the safety and health of laborer at the site, the surrounding residents, and the environment.
- Plans and procedures will be prepared, to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety, and the environment.

6.5.4 Construction Waste

Typical construction waste generated during construction activity includes wasted concrete, steel and wooden scaffolding, empty cement bags, excavated soil, wood remains etc. This waste has the potential to cause negative impact on the surroundings and especially marine environment if not properly managed and disposed to approved dumpsites. Irregular storage of this waste may have posed hazards to the workers at site, residents in the neighborhood and contamination of sea water and nearby beaches. Poor waste management practices may have short term as well as long term negative impact. The following measures will be adopted to manage the disposal of construction wastes:

- Unusable wastes will be transported to be approved dumpsites.
- Excavated soil will be disposed of through the regular channel of the waste contractor.
- Proper solid waste containers of adequate capacity will be provided to cater to daily waste generation.

Other Mitigation Measure

Some other mitigation measures laid down as under will help to mitigate the impacts posed due to the construction phase of the proposed project:

- A comprehensive waste disposal plan to be developed to effectively manage the waste in large quantities.
- The construction waste which will be sent for recycling or sold to waste collection vendors like damage pipes left over steel, wooden and plastic pieces. While, the rest of the left over waste will then be taken away to the dumping sites for disposal.
- The construction material will be kept in a covered area, especially during the rainy season.
- The excavated soil will be re-used by adopting different methods, which will be used as a filling material in other part of the project or in nearby development activities.
- Various waste containers for different types of waste will be deployed, in order to treat the waste in accordance with its nature.
- The waste bins will be properly marked for each type of waste produced during the constructional activities.
- The project area will contain the sewage and litter facility to overcome the problem of unchecked dumping of waste.

- Use of building materials that have minimal packaging to avoid the generation of excessive packaging waste.
- Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.

6.5.5 Ambient Air Quality

According to the ambient air quality assessment at the site, the site is unpolluted. The major source of air pollution during the construction phase will be dust emission due to earth works and gaseous emissions from construction equipment. Impacts from each source and proposed mitigation measures are as follows:

Dust Emissions:

Particulate matter emitted during construction activities results in deterioration of ambient air quality in the vicinity of the source and is usually a nuisance to the neighborhood and the communities in the neighborhood besides the construction workers. The main health hazards emanate from particles smaller than 10 microns (PM10) in particular PM2.5 as they are respirable. These particles are sufficiently charged to assume the properties of aerosols which on reaching the receptors have heavy impact on the respiratory system and on the surface of furnishings of the living environment. The impact on the environment would be considered significant if there is an increase in suspended particulate matter within and beyond the boundaries of the project site due to activities at the site, or if the dust affects local property or results in complaints from the community.

Potential sources of particulate matter emission during construction activities include earthworks (dirt or debris pushing and grading), exposed surfaces/storage piles, truck dumping, hauling, vehicle movement on unpaved roads, and concrete mixing and batching. The quantity of dust that is generated on a particular day depends on the magnitude and nature of activity and the atmospheric conditions prevailing on the day. Availability of Ready-mix on commercial scale has considerably reduced the level of emission of fugitive and construction sites are no longer required to have a batching plant.

Mitigation Measures

The following mitigation measures will be adopted during the earthwork and construction phase:

- Water will be sprinkled daily or when there is an obvious dust problem on all exposed surfaces to suppress emission of dust.
- Dust emission from soil piles and aggregate storage stockpiles will be reduced by appropriate measures. These include:
  i. Keeping the material moist by sprinkling of water at appropriate frequency
  ii. Erecting windshield walls on three sides of the piles such that the wall project 0.5 m above the pile, and covering the pile, for example with tarpaulin or thick plastic sheets, to prevent emissions.

- Construction materials that are fragile and vulnerable to raising visible dust will be transported only in securely covered trucks to prevent dust emission during transportation.
- The exposure of construction workers to dust will be minimized by provision of dust masks.

Vehicle and Equipment Exhaust:

Combustion exhaust from vehicles and construction equipment can affect the ambient air quality of the site surroundings. The impact would be potentially significant when the ambient air quality deteriorates due to emissions from construction equipment and machinery or the construction generators etc. beyond the guidelines especially at the environmental receptors in the neighborhood. The exhaust emissions will include particulate matter (PM), hydrocarbons, Oxides of Nitrogen, Sulphur, and Carbon (NOx, SO2, CO).

Mitigation Measures

The emissions from operation of construction equipment and machinery as well as generators are not expected to have been significant as to affect the ambient air quality of the area. The small amount of exhaust emissions from the operation of generators and equipment are expected to be dispersed with the prevailing wind and may not have any significant impact on the local air quality. Adoption of following mitigation measures will result in further reduction / prevention of these emissions.

- All vehicles, generators and other equipment used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants.
- The stack height of the generators during operation phase will be vented through vertical stacks to minimize exposure at ground level.

6.5.6 Impact of Ambient Noise Level

Depending on the construction equipment used and its distance from the receptors, the commuters and residents in the neighborhood may be exposed to intermittent and variable noise levels. During the day such noise results in general annoyance and can interfere with sleep during the night.

In general, human sound perception is such that a change in sound level of 3 dB is clearly noticeable, and a change of 10 dB is perceived as a doubling or halving of sound level. The noise in the project area will increase during construction and completion of the proposed project and may result in disturbance to the nearby receptors unless it is contained within the appropriately fenced and covered site of the Project.

Mitigation Measures

- Restraining the use of noisy equipment to suit to the standard of the living environment
- Reducing equipment noise at source by proper design, regular maintenance & repair of construction machinery and equipment.
- Minimizing noise from vehicles and back-up power generators by use of proper silencers and mufflers.

- Use noise-abating devices wherever needed and practicable.
- Project vehicles shall not be fitted with pressure horns.

6.5.7 Water Consumption

Water will be required during the construction activity for human consumption at the construction stage as well as for the construction activities including sprinkling of water for dust suppression.

Mitigation Measures

Adherence to the following measures will ensure efficient use of water during the subsequent stage of construction:

- A complete record of water consumption during the construction phase will be maintained.
- Water conservation practices will be adopted to prevent wastage of water.
- The water supply lines will be checked and repaired for leaks, if any, in order to reduce wastage of water.
- Use of water efficient sanitary fittings such as low flush toilets, water efficient shower heads, and aerators on faucets will be ensured throughout the Project cycle.

6.5.8 Impacts of Wastewater Generation

During the construction phase, the wastewater is generated from the project site is due to the project activities, run-off from the project site during the season of precipitation, washing of the construction vehicles etc. It will mainly include the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved. The untreated wastewater disposal may deteriorate the water quality of the surface and groundwater resources as well as contaminate the soil quality near the project site.

The source of wastewater includes toilets, washrooms, and kitchen. The wastewater would be routed to the existing municipal drain/sewerage system after be treated in septic pits. This wastewater would comply with the SEQS values provided that other hazardous wastes (i.e. paints etc.) are not mixed with it.

The impact of disposal of such wastewater would not be significant since it is expected to comply with the Sindh Environmental Quality Standards (SEQS) for municipal effluent.

Mitigation Measures

The following are the recommendations to reduce and control the wastewater generated during the construction activities:

- Maintenance of vehicles and equipment's used in the construction phase of the proposed project, in order to overcome the generation of wastewater at large scale.
- Washing of vehicles and construction machinery will be restricted to a designated area.
- Wastewater will not be disposed of directly into any water body, but first be treated and then the effluent will be disposed of in a proper manner.

- Development of wastewater treatment facility i.e. septic tank, at the site of the proposed project area.
- Wastewater generation will be minimized by controlling the pollutant at the source.
- The oily waste will be contained before disposing the wastewater into the sewer.
- Regular monitoring of the wastewater generation will be taken into consideration.
- Adequate portable or permanent sanitation facilities serving all workers will be provided at all construction sites.
- Sewage will not be mixed with any other waste.

6.5.9 Operation of Vehicular Traffic

It is envisaged that there would be substantial increase in the traffic volume during the construction and operation / completion of Project. Vehicular traffic management will have to be undertaken seriously to restrain unnecessary traffic jams that may cause annoyance to the commuters.

Mitigation Measures

The following mitigation measures are being adopted to remove the constraints to smooth flow of traffic:

- Heavy traffic during construction phase will come to the project site during late night hours.
- Speed of vehicles will be regulated during construction phase.
- Traffic management plan will be introduced to manage smooth flow of vehicular traffic and to avoid traffic jam and long queues.
- Traffic management plan will be implemented and monitored.
- Parking of vehicles alongside the road would be prohibited at all time.
- Car parking at grade allows for free flow of cars with minimum waiting time.

6.5.10 Material Selection

General specification/details have been worked out in respect of type of structures, concrete, and all other materials required for the construction of the Project. The following measures will be adopted to ensure sustainable development of the Project:

Mitigation Measures

- The structures and materials will, in the subsequent construction stage, conform to recommended standards and follow standard practice of civil works.
- Materials including paving stones, crush, gravel and sand will be brought from commercial quarries located in Sindh province. Environmentally sound materials and goods will be selected, with priority being accorded to products meeting national and international standards.
- Traditionally well-tried materials and components will be selected and selection of construction materials would be based on sustainable source.

- Construction site will be adequately isolated to prevent entry of public and general safety measures will be evocatively imposed throughout the construction period.
- Temporary inconveniences due to construction works will be minimized through planning and coordination with civic authorities.
- The production, use and disposal of building materials during the construction stage of Project will utilize considerable amount of energy and resources; all attempts will be made towards efficient consumption and minimization of wastage of water, energy and materials.
- Best practice of energy efficiency will be adopted in the building design. The Project building would be constructed with adequate level of thermal insulation.
- The environmental impacts arising from selection of building materials and components would take account of the environmental issues during the materials selection process, and introduce Recycling strategies such as Reuse and Reduction of Wastewater.
- The design of concrete building structure with use of low energy glass on windows and doors to reduce carbon footprint.

6.5.11 Community Health and Safety

General Site Hazards

Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction.

Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are under construction or excavations and structures which may pose falling and entrapment hazards.

Mitigation Measures

Risk management strategies may include:

- Access to the site will be restricted through a combination of institutional and administrative controls.
- Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials.

Disease Prevention

Increased incidence of communicable and vector-borne diseases attributable to construction activities represents a potentially serious health threat to project personnel and residents of local communities.

Mitigation Measures

- The mobility of the community living in the area will be restricted from the project site in order to prevent from catching any type of communicable diseases.

- Any labor found to catch any type of disease will leave the site immediately; and would be given proper medical facilities.

Traffic Safety

Construction activities may result in significant increase in the movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities.

Mitigation Measures

- The incidence of road accidents involving project vehicles during construction will be minimized through a combination of education and awareness-raising, and the adoption of procedures.

Occupational Health and Safety

Site-specific occupational health and safety hazards are also critical to be identified based on job safety analysis or comprehensive hazard or risk assessment. Health and safety management planning should include the adoption of a systematic and structured approach for prevention and control of physical, chemical, and biological health and safety hazards. Contractor shall ensure that Job Hazard Analysis (JHA) is performed prior to commencing jobs. It shall also be ensured that the JHA is reviewed after the following:

- Whenever work is stopped
- Every time work conditions or the job scope changes
- Persons working or visiting the job shall review and acknowledge the JHA by their signature

Crane and Lifting Operations

For all Crane & Lifting Operations Contractor shall ensure full compliance with standard operating procedures. Contractor shall develop a site-specific pre-lift checklist which includes the following at minimum:

- Crane rigging capacity adequately for load
- Condition of slings
- Rigging condition adequate for load
- Area of swing or travel unobstructed
- Multiple crane use
- Power line approach distance maintained
- Stability and footing
- Taglines and spotters
- Illumination and weather
- Signal operator
- Job hazard analysis and other permits

All lifting and rigging activities shall be supervised and conducted by a competent person or team, Contractor shall maintain a lifting gear registry for all lifting gear on-site inclusive of a listing of all lifting gear, copies of equipment certificates (manufacturer, safe working load, serial number) and the inspection/recertification frequency.

Forklifts and Non-Road Vehicles

Contractor should ensure forklift and non-road vehicles are fit for purpose and operated according to manufacturer's requirements. Only competent operators are permitted to operate forklifts and non-road vehicles.

At minimum, all forklifts and non-road vehicles shall be equipped with following equipment:

- Seat belts
- Horn
- Emergency Brake
- Wheel chock
- Labeled Controls
- Fire Extinguishers
- First Aid Kit
- Back-up Alarm

Annual inspection shall be completed by a qualified third party, records of which shall be readily available at site.

Hazardous Substance Handling and Storage

Contractor should ensure that chemicals are handled and stored in accordance with the manufacturer recommendations found in the MSDS. Chemicals should be stored in a manner which will minimize releases to soil, groundwater or the atmosphere.

Containers and tanks which are used to store hazardous substances shall be,

- In good conditions
- Compatible with the material stored inside
- Closed when material is not being transferred into or withdrawn from them
- Flammable or combustible liquids shall not be stored in areas used for exits, stairways, or normally used for safe passages.
- Flammable chemicals shall be stored in flammable storage cabinets, room or building when the volume stored exceeds 25 gallons (95 liters).

Electrical pumps shall not be used to transfer flammable or combustible liquids. Toxic chemicals shall be stored and handled as defined in the chemical MSDS. Explosive products should be handled and stored according to applicable regulations. Explosive storage shall be located away from corrosives, flammable, oxidizers, or acids.

Scaffolding

Contractor is responsible to establish periodic inspection, certification and recertification program for scaffold works. Only qualified worker is authorized to erect, inspect and certify scaffold. All scaffolds should have a guardrail system on each open side, up to the access point. It should be equipped with toe boards having suitable access ladder.

Over-exertion

Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries at construction site.

Mitigation Measures

Recommendations for their prevention and control include:

- Workers will be trained with lifting and materials handling techniques before the construction of the project, including the placement of weight limits above which mechanical assists or two-person lifts are necessary.
- Work site layout will be planned to minimize the need for manual transfer of heavy loads.
- Tools will be selected and work stations would be designed to reduce force requirements and holding times, which promote improved postures, including, where applicable, user adjustable work stations.
- Administrative controls, such as job rotations and rest or stretch breaks will be implemented into the work processes.

Slips and falls

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction site.

Mitigation Measures

Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Good house-keeping practices, such as the sorting and placing loose construction materials in established areas away from foot paths, would be implemented.
- Excessive waste debris and liquid spills will be cleaned up regularly.
- Electrical cords and ropes will be located in common areas and marked corridors.
- Slip retardant footwear will be used.

Work at Heights

Falls from elevation associated with working with ladders and scaffolding are among the most common cause of fatal or permanent disabling injury at construction site. If fall hazards exist, a fall protection plan will be in place which includes one or more of the following aspects, depending on the nature of the fall hazard.

Mitigation Measures

- Training and use of temporary fall prevention devices, such as rails or other barriers able to support a weight of 200 pounds, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface.
- Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards as well as fall rescue procedures to deal with workers whose fall has been successfully arrested.
- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labeling covers for openings in floors, roofs, or walking surfaces.

Struck by Objects

Construction activities of the project may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities.

Mitigation Measures

Techniques for the prevention and control of these hazards include:

- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap.
- Temporary fall protection measures in scaffolds and out edges of elevated work surfaces would be used, such as hand rails and toe boards to prevent materials from being dislodged.
- Appropriate PPE such as safety glasses with side shields, face shields, hard hats, and safety shoes, would be wore.

Moving Machinery

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazards, such as physical contact, spills, dust, emissions, and noise.

Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of a turn while moving.

Mitigation Measures

Techniques for the prevention and control of these impacts include:

- The location of vehicle traffic, machine operation, walking areas, and controlling vehicle traffic will be planned and segregated through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic.
- The visibility of personnel will be ensured through the use of high visibility vests when working in or walking through heavy equipment operating areas as well as training of

workers to verify eye contact with equipment operators before approaching the operating vehicle.

- Inspected and well-maintained lifting devices will be used that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

Other Site Hazards

Construction of site may pose a risk of exposure to dust, chemicals, hazardous or flammable materials, and wastes in a combination of liquid, solid, or gaseous forms.

Mitigation Measures

- It can be prevented through the implementation of project specific plans and other applicable management practices, including:
- Use of waste-specific PPE based on the results of an occupational health and safety assessment, including respirators, clothing/protective suits, gloves and eye protection.

6.5.12 Employment

The project is expected to generate employment of about 200 workers from the construction activity. It will have positive impact on the economy of Karachi as well as the population in Clifton area.

Table 6.2: Nature and Degree of Positive Socioeconomic Impacts

Nature of positive impact	Degree of impact	Description
I. Construction Phase:		
Job opportunity	Positive Impact	Generate unskilled, semi-skilled and skilled jobs as construction laborers and other service providers.
Wider economic impact	Positive Impact	Economic impact in terms of generating opportunities for other business-like sourcing of man and material supplies for specialized jobs.

6.6 Screening of Potential Impacts in Operational Phase

During operational phase of the project, various activities may have significant impact on some environmental parameters. Various environmental attributes are to be studied during this phase for their overall impact on the surrounding environment.

6.6.1 Solid Waste Generation and Disposal

There will be a considerably large quantity of solid waste generated from the residential units/apartments. The solid waste will mainly include food waste, paper, packaging material, plastic bottles and glass. If not properly managed and disposed of, these wastes can pose serious environmental hazard to the occupants and visitors of the proposed building project and also to the surrounding environment.

People will throw the waste until proper waste collection system is provided. It can pollute the marine waters and pose a threat to marine life and fishes.

The quantity of solid waste to be managed can be segregated at source into organic and recyclable components. Nearly half of the waste generated is expected to be of organic nature i.e. biodegradable and the remaining mostly recyclable. Therefore, waste segregation can solve much of the solid waste management problem. The viable options after storing, collecting and transportation of segregated waste components for its ultimate safe disposal are composting and recycling, respectively which need to be carefully designed and managed appropriately.

Mitigation Measures

The following mitigation measures would be adopted to combat from the impacts imposed upon the project site and immediate environs due to the solid waste generation activities in the operational phase:

- All solid waste shall be segregated into organic and recyclable waste at source and then collected, stored, and transported for recycling/sold to vendors for ultimate safe disposal.
- Handling and disposal of such waste shall be managed by a dedicated waste management contractor.
- The solid waste management plan will be developed and facilities for collection, storage and transportation will be established and organized.
- Appropriate waste signage will be used to increase awareness among users.
- Covered waste bins (different colors) will be provided to every building that will be ultimately collected in a storage area. This storage area will be covered so that pollutants and smell from the waste would not affect the surrounding.
- Residential units of the project will be provided different colored bins for different categories of waste.
- Storage facility for collecting waste bins will be created and established by taking into account quantities of waste generation.
- Handling and disposal of such waste will be managed by a dedicated waste managing contractor.
- Waste managing contractor should have binding to dispose the waste to official dumpsites of Karachi.

6.6.2 Waste Water Generation and Disposal

The project on becoming functional will generate wastewater which will be mainly sewage. Small quantities of hazardous waste may be produced during the maintenance activities in the building (such as oily waste etc.). The cleaning waste generated by the use of surfactant and cleaning agents used during the operational phase. The wastewater generated can be a potential source of pollution to the surface and ground water resources of the area.

All type of wastewater generated (i.e. drainage of sewage, showers and kitchen effluent etc.) will be directed to the wastewater treatment consisting of Septic Tank prior to disposal into a

allocated out fall sewer. This will ensure the specifications stipulated in SEQS will comply. A package-type wastewater recycling plant is also planned to installed in order to treat and reuse the wastewater, thereby reducing the overall water requirement.

Following additional mitigation measures will be adopted for effective management of wastewater during the operational phase of the project:

- Grease interceptor and/ or oil skimmer to be installed on kitchen effluent to maintain oil levels within SEQS limits.
- Waste segregation measures would be employed to minimize entry of solid waste into the wastewater stream.
- Water conservation strategies will be employed to avoid wastage of water.
- Periodic preventive maintenance of pumps, diffusers and other ancillary equipment's.
- Monitoring of wastewater to ensure compliance with SEQS.
- Provision of holding tank, so that the effluent is settled and then disposed of to the main sewer line.
- The cleaning agents used will be non-hazardous.
- If groundwater is used and desalinated water is required, RO reject water will be disposed in environmentally friendly manner.

6.6.3 Water Consumption and Quality Assurance

The water requirement for the project will mainly be catered through city water supply and through water tankers and/or borehole when required. Potable water may directly be supplied to apartments in bottles or after filtration. Water conversation measures will be applied in order to reduce the amount of wastewater generation in this phase. Additionally, relevant quality standards will be maintained to ensure that the water is fit for drinking purpose using guidelines of established SEQS water metrics.

Adherence to the following mitigation measures will ensure efficient use of water during the subsequent stage of operation:

- A complete record of water consumption during the operation phase will be maintained.
- The water supply lines will be checked and repaired for leaks, if any, in order to reduce wastage of water.
- Water filtration systems will be installed to keep water purity levels within acceptable SEQS parameters, especially coliform levels which indicate presence of harmful pathogens.
- All the main water inlets will be provided with water flow meters to record consumption of water.
- Drinking water and service water sources should be clearly labeled.
- Water conservation practices will be adopted to prevent wastage of water.
- The water supply lines will be checked and repaired for leaks, if any, in order to reduce wastage of water.
- Reuse and recycle water as much as possible for example by using grey water for flushing toilet. Grey water is the term used for the used water that goes down our sinks and shower

drains. Black water is another term for the water 'and stuff' that goes down from our toilets. The grey water from bathrooms sink can be reused to flush the toilets.

- Use of water efficient sanitary fittings such as low flush toilets will be ensured throughout the Project cycle.
- It will ensure that all activities executed must comply with all the environmental regulations as well as cooperation will be bridged with concerned regulatory authorities.

6.6.4 Energy Consumption

During operation phase, power supply from Karachi Electric (K-E) will be made available. A back up diesel operated generator will also be installed in case of emergency or suspension of power supply from the mains. Energy saving techniques such as Energy efficient mechanical systems and Passive ventilation/cooling by provision of natural lighting and ventilation will be employed to conserve energy.

Mitigation Measures

Following energy conservation measures are being adopted.

- The energy-efficient lighting system installed for the project will contribute immensely to energy saving during the operational phase of the project.
- Natural lighting and ventilation shall be preferred in the buildings.
- The energy-efficient lighting system installed for the project will contribute immensely to energy saving during the operational phase of the project.
- The energy usage during the operational phase will be monitored and targets would be set for efficient use of energy.

6.6.5 Air Emissions

During the operational phase, air emissions may come from backup generators. If vented at lower heights, the exhaust gases are likely to disperse locally and cause localized pollution to the working staff. Other emissions coming from this project will be from the exhausts of additional traffic movement related to proposed project activity.

Mitigation Measures

Impacts of Emissions may be reduced to prescribed level by attempting the following mitigation measures:

- Monitor all exhausts at regular frequency to meet SEQS exhaust emissions.
- Stack height of generators will be increased to ensure better dispersion and distance covered by the pollutants in air before reaching the ground.
- Carry out regular maintenance of generators.
- An awareness program will be organized for generator operators to regularly tune-up engines and ensure proper maintenance.

6.6.6 Traffic Flow

The project site is primarily served by KASB Altitude Service Road which connects the site with main Marine Promenade. Other roads leading towards the project site are Khayaban-e-Bedil and Shahrah-e-Ghalib. Traffic will be generated in the operational phase of the project due to the commute of residents to/from of the project site. With this project coming on stream, it is expected that the traffic flow is going to increase. Traffic congestion may increase during peak hours.

Mitigation Measures

Following mitigation measures will be adopted by to minimize the impacts of traffic flow.

- Traffic management plan will be monitored.
- Vehicles will be parked at designated parking areas / underground parking space provided in the building during operational phase.
- Parking of vehicles alongside the road would be prohibited at all times.
- Engineering design to examine vehicles exit and entry strategy so that it aligns with the traffic flow to cause minimum hindrance has already been conducted and measures are suggested and will follow during the operation phase.
- Ramp slopes and passage areas to cater for worst case scenarios traffic flow on the main and service roads.

6.6.7 Fire

Fire is one of the major safety hazard. Fires can cause loss of life and property. However, at the same time fires have the potential to severely harm the people in the vicinity and affect the environment.

Mitigation Measures

Risks involve with the fire hazard can be reduced by adopting following mitigation measures:

- For all engineering designs, IBC (International Building Control), EN 54 & NFPA codes will be followed.
- Standard fire and smoke detection and protection devices such as alarms, fire hoses and hydrants to be provided in all areas of the project.
- The facility will possess a detailed emergency and evacuation plan that will be regularly drilled to make sure that the responsible staff remains trained at all times.
- Firefighting equipment such as fire extinguishers and hydrant systems will be maintained at strategic locations within the proposed building.
- Regular inspection and servicing of the extinguishers will be undertaken by a reputable service provider and record of such inspections should be maintained.
- Fire safety signs will be prominently displayed within the floors.

6.6.8 Socioeconomic Impacts

Employment Opportunities

The labor force, whether skilled or unskilled, is the inhabitants of Karachi will be deployed at the project. This will provide them with the employment opportunities Some people will be employed by the project as management agents, caretakers, cleaners, security personnel and technicians.

Provision of Market for the Supply of Building Materials

The project will require the supply of large quantities of building materials which will be sourced locally. This provides ready market for building material suppliers such as quarrying companies, hardware shops and individuals with such materials.

Increased Business Opportunities

The large number of project staff required will provide ready market for various goods and services, leading to several business opportunities for small scale traders such as food vendors around the construction site.

Revenue to National and Provincial Government

Through payment of relevant taxes, rates and fees of the government and the local authorities, the proposed project will contribute towards the national and local revenue earning.

Table 6.3: Nature and Degree of Positive Socioeconomic Impacts

Nature of positive impact	Degree of impact	Description
II. Operation Phase		
Job opportunity	Major Positive Impact	Generate number of jobs in various positions both in managerial, supervisory and subordinate positions.
Improvement in quality of life	Major Positive Impact	Provide safe and secure environment for social, cultural, and commercial activity
Enhancement of quality of environment	Major Positive Impact	Benefit the macro environment by adopting Public park/greenbelt as a social responsibility

Chapter 7 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

7.1 Introduction

7.1.1 General

The Environmental Impact Assessment (EIA) for the proposed development activities of Sea Front Building Project has identified potential impacts that are likely to arise during the construction and operation phases. The EIA has examined in detail both negative and positive impacts of each stage of the operation. Where adverse impacts have been identified, the EIA has recommended mitigation measures; include management and monitoring practices, physical controls, or compensation in monetary terms. The mitigation measures proposed are based on a good understanding of the sensitivity and behavior of environmental receptors, past experience, case studies, legislative controls, guidelines, & expert advice. For the effective implementation and management of the mitigation measures and monitoring requirements an Environmental Managements Plan (EMP) has been prepared and presented in this section. For any residual impacts (impacts remaining after applying the recommended mitigation measures) or for impacts in which there has been a level of uncertainly in prediction, monitoring measures have been recommended. Advice on monitoring measures required was sought from experts involved in the EIA and case studies of similar development activates at international level.

7.1.2 Objectives

The EMP provides a delivery mechanism to address adverse impacts, to enhance project benefits and to introduce standards of good practice to be adopted for all project works.

The primary objectives of the EMP are to:

- Outline mitigation measures recommended in the EIA and define the responsibility and timing for the implementation of these measures;
- Develop monitoring mechanism & identify parameters that can confirm the implementation of the mitigation of these measures;
- Define roles and responsibilities of the project proponent for the implementation of EMP and identify areas where these roles & responsibilities can be shared with other stakeholders and
- Define the requirements necessary for documenting compliance with the EMP and communicating it to all concerned regulatory agencies.

For each impact, or activity, which could give rise to an impact, the following information is presented:

- Mitigation measure that will be implemented;
- The person(s) responsible for ensuring full implementation of the mitigation measure;

- The parameters that will be monitored to ensure effective implementation of the mitigation measure;
- The timing for the implementation of the action, to ensure that the objectives of the mitigation are fully met.

7.2 Structure of the EMP

The EMP consists of the following section.

- Legislation and guidelines.
- Organizational structure and roles and responsibilities;
- Mitigation management's matrix
- Environmental monitoring programme
- Change management plan
- Training Programme

7.3 Legislation and Guidelines

The EIA has discussed in detail all the legislation and guidelines (chapter 2) which has relevance to the project. Jubilee Builders & Developers shall ensure that the construction and operation of project is conducted in conformance to relevant legislations and guidelines and guidance is sought as and when required. Jubilee Builders & Developers shall also ensure that the key project management staff is aware of these legislations and guidelines. SEQS for municipal and industrial effluents, selected gaseous pollutants from industrial sources and motor vehicle exhaust and noise are provided in Chapter 2.

7.4 Organizational Structure and Roles and Responsibilities

7.4.1 Organizational Structure

The proposed project includes the following main organization:

- Jubilee Builders & Developers as the project proponent and owners of the EMP.
- The construction contractor as well as contractor required during the operational phase (e.g. waste contractor) as the executors of the EMP.

These organizations will have the following roles and responsibilities during the project activities.

7.4.2 Roles and Responsibilities

A. General

Jubilee Builders & Developers: As project proponents, Jubilee Builders & Developers will be responsible for ensuring the implementation of the EMP. A person holding a senior position will be responsible for the overall environmental performances during the proposed project.

The person will be responsible for ensuring the implementation of the EMP by Jubilee Builders & Developers and all project contractors. The proponent's Site Representative (SR) will be responsible of implementation of the EMP and liaison with project contractor and stakeholders at site regarding environmental issues during the construction phase. Further the person holding a senior position in Jubilee Builders & Developers will also be responsible for monitoring EMP's compliance and provided technical support in environmental issues.

Project Contractors: For the proposed project, Jubilee Builders & Developers will appoint construction contractor for different field operations. Various contractor will also be hired during the operation phase of the building (e.g. waste contractors) The contractors will be responsible for implementation of, or adherence to, all provisions of the EIA and the EMP and with any environmental and other codes of conduct required by Jubilee Builders & Developers. Overall responsibility of the contractor's environmental performances will rest with the person holding the highest management position within the contractor's organization reporting to their management. The contractor's site managers will be responsible for the effective implementation of the EIA and the EMP. The contractor's HSE officers will have functional responsibilities to ensure implementation of or adherence to the EMP.

B. Planning and Design of the Operations

Details of project Activities: Details of the project activities are provided in section 2 of the EIA report. Following approval of the EIA, any changes to the proposed activities will be handled through the change Management Plan provided in this EMP.

Approvals: No-objection Certificate (NOC)/Approval from SEPA will not relieve the proponent of other legal obligation and hence Jubilee Builders & Developers and project contractors will obtain all other relevant clearance and necessary approvals required by the Government of Sindh and Relevant departments prior to commencing the respective operations.

Contractual Provision: Adherence to the requirements of the EIA and EMP in terms of environmental mitigation will be required from all project contractors and thus EMP will form part of their contractor with Jubilee Builders & Developers.

C. Implementation of the Operation

Co-ordination with Stakeholders: Jubilee Builders & Developers will ensure that co-ordination with the regulators and other stakeholders on environmental & social matters is maintained throughout construction & operation phase of the project.

Monitoring: Jubilee Builders & Developers and the contractors will ensure that monitoring of the project activities is carried out throughout the project. The site representative will monitor all project activities during the construction and operation phase. He will keep a record of all non-conformances observed and report these along with actions to Jubilee Builders & Developers management in Karachi for further action. The site representative will also report any impacts anticipated along with his recommendation for further action.

Emergency Procedures: Jubilee Builders & Developers and the contractors will prepare contingency plans to deal with any emergency situation that may arise during the construction and operation e.g. major oil spills, medical evacuation & communicate these to the regulatory agencies if required by these agencies.

Approvals: The project contractor will be responsible for obtaining all relevant approvals such as approvals for waste contractors, water source & others as specified in Mitigation Management Matrix.

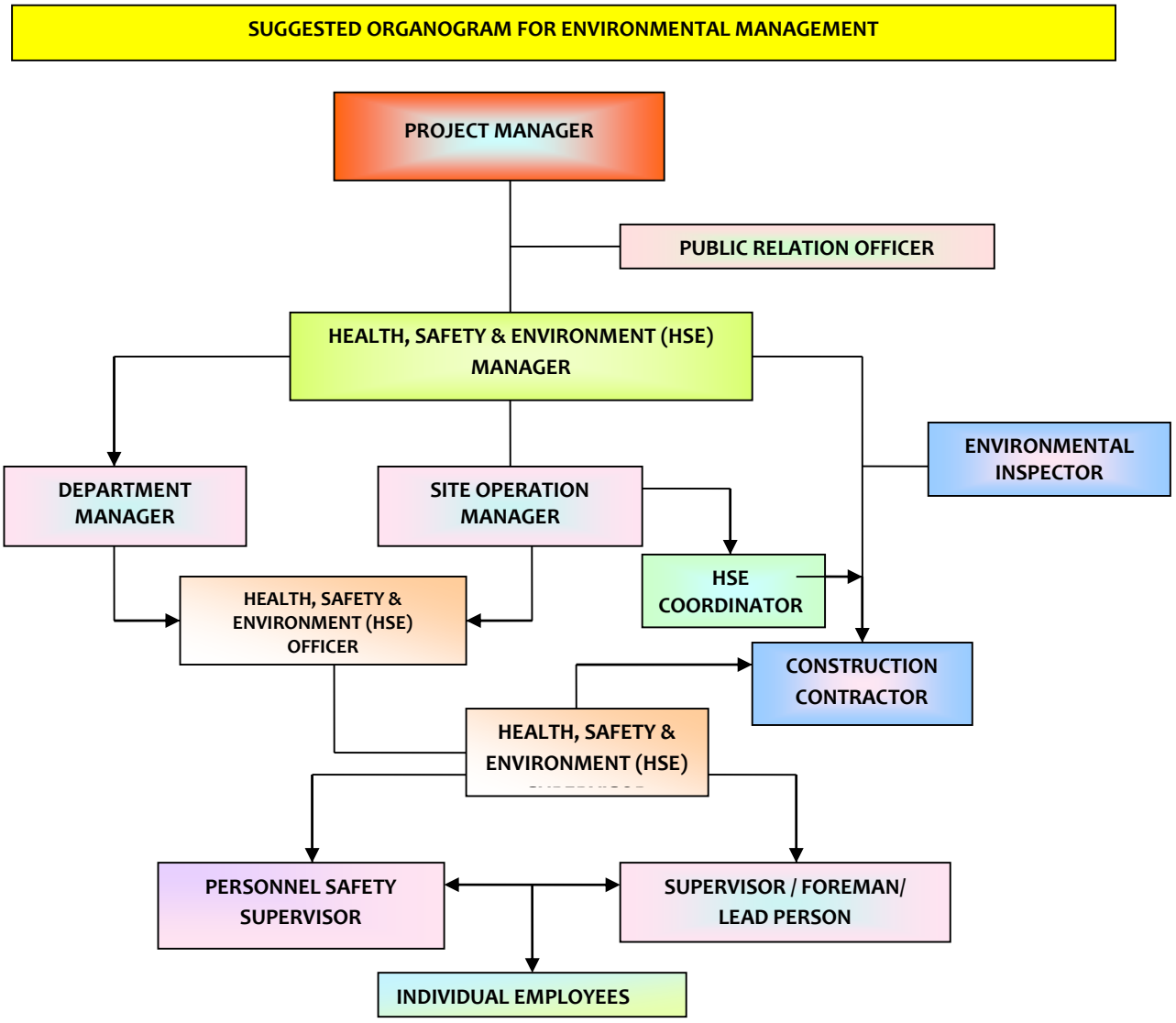
Trainings: The project contractors will be responsible for the selection and training of their staff capable of completing the project activities properly and efficiently. The contractors will be responsible for providing training to their staff members according to the training programme. The training programme is discussed briefly in section 7.7.3.

D. Communication and Documentation

Jubilee Builders & Developers and the contractor will ensure that the communication and documentation requirements specified in the EMP are fulfilled during the construction and operation phase.

Change Management: The EIA for the proposed project recognizes that changes in the operation or the EMP may be required during the project activities and therefore provides a Change Management Plan to manage such changes. Overall responsibility for the preparation of change management statements will be with Proponent's site representative.

Restoration: Jubilee Builders & Developers along with the construction contractor will be responsible for the final restoration of work areas.



7.5 Maintenance of the EMP

EMP needs to be revised on timely basis to keep up-to-date as per the requirements comes up regularly. Therefore, outlining the responsibilities and activities associated with the maintenance of the EMP is essential. The responsibilities of the Construction Contractor should be detailed and procedures for requesting EMP revisions should also be outlined. EMP revision procedures must include requirements for notification of the appropriate government and municipal agencies so that their role is also played in the overall management process.

7.6 Environmental Health and Safety Management System

Environmental, Health and Safety Management System is essential for the care of EHS issues which should outline mitigation measures and best management practices. This management system recommends carrying out a complete assessment, evaluating, monitoring, identifying

and control all potential hazards and risks arise during the construction and operation phases of the proposed project. It needs to ensure that the Health and Safety Plan (HSP) along with the Health and Safety Rules is established and enforced. The Plan should outline roles, responsibilities and expected outcomes with respect to the environmental health and safety management of the construction & operation phase of the Project. These measures should be implemented to ensure that no significant adverse environmental, health and safety impacts are created by activities associated with the construction of the project.

Protection of the public and workforce health and safety during both construction and operations is the prime responsibility of proponent. Utilizing expert personnel and the Environment, Health and Safety Management System (EHSMS), the potential health and safety hazards and risks will be identified and assessed, then the subject of substantial planning, organization, procedures for various facility are developed.

7.6.1 Health and Safety during Construction Phase

Worker Health & Safety Management Plan will also be outlined to implement mitigation measures and best management practices. The plan should be implemented to ensure that no significant adverse worker's health and safety issues arise from activities associated with the construction of the project.

Potential hazards for workers in construction include:

- Falls (from heights);
- Trench collapse;
- Scaffold collapse;
- Electric shock and arc flash/arc blast;
- Failure to use proper personal protective equipment; and
- Repetitive motion injuries.

7.7 Emergency Response Plan

Emergency may be defined as a sudden event causing or has the potential to cause serious human injury and/or environmental degradation of large magnitude. The best "cure'' for an emergency is, of course, "prevention". The probable emergency situation can be:

- Serious fire or explosion
- Major gas leakage.
- Major Spillage
- Natural calamity such as heavy rain, flooding, dust storm or earthquake, cyclone, etc.
- Bomb threat or any sabotage/terrorist activity
- Any other incident involving all or large part of the premises and its workers.

Emergency Response Management is provided by a small team of senior managers (the "Control Committee") who in turn will direct all response activities through the Emergency Response Unit.

7.7.1 Objectives

The main objective of this plan is to establish the general guidelines for the actions to be taken in the event of fires, explosion, emergencies, accidents, disasters and sabotage, aimed at minimizing their effects and consequences, in order to protect:

- The lives of own or third-party personnel present in the building's facilities.
- The lives of the occupants of the Project
- The lives of the nearby residents & communities coming into the direct influence of the building's area.
- The lives of the ecological systems located in the surroundings of the Project.

7.7.2 Emergency Response Manuals

Based on the Risk Assessment the proponent should prepare written emergency preparedness and response plans/procedures for the building to cover emergency situations that could occur. It may be required that Emergency Response Manuals will be developed for various situations arising.

7.8 Standard Operating Procedures (During Construction phase)

7.8.1 Wastewater/ Storm water management

(1) Purpose of Wastewater/storm water Management

The purpose of the adopted procedure is to provide guidelines and simplify the process of categorizing, quantifying, managing, and disposing of wastewater wherever and whenever arising during the project's construction phase. Wastewater management is a critical component of operating policies. Wastewater management includes the proper disposal/recycling and reuse of the wastewater generated during construction and operation phase.

(2) Scope

Wastewater as part of construction operation will be managed as per this procedure. An integrated wastewater management system for Sea Front project is essential to reduce wastewater.

Substitute techniques must be investigated, including source reduction, recycling and reuse wherever possible with a view towards maximizing the benefits and minimizing the cost of each method of wastewater management.

(3) Procedure

Main concern to manage the wastewater is listed below:

- Eliminate wastewater production wherever possible.
- Minimize wastewater production.
- Wastewater generated will be routed to the nearest drain / sewerage system.
- Sewage will not be mixed with any other waste.

a) Wastewater Minimization: Generation of wastewater will be minimized through the following steps taken by working personnel at the facility:

- Through efficient use of raw water (minimizing the wastewater).
- Reuse of wastewater after treatment.

b) Storage and Handling: Wastewater shall be stored/retained in specifically designed facility or storage tanks till proper treatment at sewage treatment plant is sought and subsequently disposed of.

c) Segregation: Wastewater used in construction will be segregated from wastewater originating from latrines used by construction staff.

d) Recycling: Reuse of wastewater is a best way to reduce the quantity of the wastewater that requires subsequent treatment and disposal. Construction wastewater may be reused in construction activity because it is generally Non-hazardous.

e) Treatment: Wastewater originates from latrines used by construction staff requires treatment through retention in septic tanks and through primary and secondary treatment processes.

f) Disposal: Proper disposal should be done following the treatment through discharge into water bodies or sewerage system where available.

(4) Wastewater Management Options

- All storm water run-off from construction sites will be inspected for the sediment load and may be directed to sedimentation basins to remove suspended solids (e.g., silt);
- Sewage may be collected and temporarily stored in tank(s) until it is transported to a designated wastewater treatment facility;
- Standard mobile sewage tankers may be engaged to collect and transport sewage from portable latrines and temporary storage tanks;
- Direct discharge will only be considered as a contingency option.

7.8.2 Solid Waste Management Plan

(1) Purpose

The purpose of this procedure is to provide guidelines and simplify the process of categorizing, managing and disposing of solid wastes. Waste management includes the proper handling, collection, storage, manifesting, transportation, and disposal/recycling of the solid waste

generated. The procedure is designed to assist in the management's wide effort to provide protection to the environment and to comply with company's corporate requirement, environmental laws and regulations regarding proper waste management.

(2) Scope

The waste management plan has been developed to ensure that the Management of solid waste generated as a result of the construction is consistent, efficient, and in conformance with the laws and regulations.

With respect to monitoring, the waste management sets out the following objective:

- To monitor and inspect waste management-related facilities and activities directly resulting from executing the scope of the contract in order to ensure compliance with the WMP. Guidelines for proper handling, categorization, recording, minimization, recycling and disposal of all types of waste associated with company operations and projects are part of this procedure.

(3) Definitions

a) Waste: Any material, for which no further use is intended, is considered a waste. It can be solid, semi-solid or liquid. Additionally, abandoned materials and materials intended to be recycled are considered wastes. It is very important to understand this concept, because even though something is going to be recycled, it must be managed as a waste until it is actually recycled.

b) Hazardous Waste: Waste is categorized as a hazardous waste if it has one or more of the following properties:

- Ignitability (flash point less than 60oC);
- Corrosivity (pH less than or equal to 2.0, or greater than or equal to 12.5);
- Reactivity (inherently unstable under ordinary conditions or when exposed to water);
- Irritability (when in contact with body causes inflammation)
- Toxicity (may cause risk of injury to health of organisms or the environment.)

c) Non-hazardous Waste: The wastes are categorized as non-hazardous wastes, if they do not possess any of the hazardous characteristics as defined above. However, non-hazardous waste may still present hazards to employees who handle them. All recommended safety and handling practices must be followed.

(4) Procedure

- A waste management plan will be developed for the construction stage of the project. The following will be the key elements of the waste management system:
- Separate bins will be placed for different type of wastes - plastic, paper, metal, glass, wood, and cotton.

- Recyclable material will be separated at source. The recyclable waste will be sold to EPA certified waste contractors for recycling.
- Non-hazardous non-recyclable wastes such as kitchen wastes will be disposed of in landfill site managed by municipal administration or approved waste manager/contractor.
- No wastes will be dumped at any location outside the site boundary.
- All hazardous waste will be separated from other wastes. Hazardous wastes will be stored in designated areas with restricted access and proper marking. Hazardous wastes will be disposed of through approved waste manager/contractor.
- Surplus construction materials including partially filled chemical and paint containers will be returned to suppliers. Inert construction wastes will be disposed of onsite as fill material or sold as scrap to contractors.
- Records of all waste generated during the construction period will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register.
- Training will be provided to personnel for identification, segregation, and management of waste.

a) Waste Minimization: To minimize waste, the following steps shall be taken by all personnel working on sites (during construction phase):

- Only the needed amount of materials shall be ordered. Before purchasing hazardous material, all alternatives for non-hazardous material should be explored.
- Prior consideration shall be given to the sizes of containers available when ordering products that could potentially generate waste. The intent is to avoid unused products and/or their containers from becoming wastes that require special handling.

b) Waste Categorization: All wastes generated at facilities shall be categorized in two major categories (i.e. Hazardous wastes and Non-hazardous wastes) as per the definitions in section above. Each category has different types of requirement for handling, storage and disposal.

c) Labelling

- Name of the waste (e.g., waste oil, solvents, paints).
- Waste category (e.g., toxic, ignitable).
- Facility name and address (disposal site, etc.).
- Date of waste accumulation: (date when waste was placed in drum).
- Wastes are segregated and located in designated areas to optimize control; storage areas.

d) Segregation: The scheme of segregation is as follow:

- All hazardous waste if found shall be segregated from other types of hazardous wastes as well as non-hazardous wastes at the point of generation of waste.
- Food waste shall be collected in separate containers.
- All containers must be clearly labeled. The label must clearly mention the name or type of waste. Also, if the waste is hazardous, it should be clearly labeled on the container along

with its hazardous characteristics (e.g. flammable, toxic, radioactive, etc.). This is important to workers and to emergency response teams, who need to know what they are dealing with.

- Missing or unreadable labels must be replaced.

e) Storage and Handling

- Waste shall be temporarily stored at waste storage facility that will be sent for recycling or off-site disposal shall be temporarily stored at designated site(s) within the building premises.
- The oily sludge, contaminated soil shall be stored in containers
- All other wastes awaiting disposal shall be kept in closed containers/boxes separately. Care must be taken to prevent wastes giving rise to secondary environmental problems, such as odors or soil and groundwater contamination through rainwater leaching.
- All stored wastes must be clearly labeled with type of waste and warning signs.
- Daily estimates of hazardous and non-hazardous waste and volumes generated on site.
- Waste segregation, waste storage containers, general housekeeping and the provision of adequate resources will be monitored.
- All workers handling wastes shall use proper PPE.

f) Reuse

Construction waste can be reused in other construction projects & excavated material can be reused in backfilling.

g) Disposal

Disposal becomes the only available alternatives, if reuse and recycling options are exhausted. A material should be classified as a waste for disposal only if no other useful purpose can be identified and if the material cannot be beneficially reused or recycled. The choice of a suitable disposal option for any waste depends on both environmental and economic considerations. The final disposal can only be off-site disposal facilities due to limited space available.

It requires properly designed and well-operated commercial waste disposal facilities such as sanitary landfill. All such facilities should be explored and evaluated for possible future use.

(5) Recording & Reporting

The management has to record the information about source, composition, quantity, and final disposal of the waste. This information is needed for regulatory compliance, risk assessment and setting reduction targets and objectives as well as corporate statistics. The routine track of waste shall be recorded.

7.8.3 Air and Noise Emissions

(1) Purpose

The purpose of this guideline is:

- To monitor contents of polluting substances in the atmospheric air;
- To control observance of approved limiting permissible emissions at man-made sources;
- To monitor natural sources and a number of man-made sources of emission at work sites at the construction phase;
- To identify sources of noise emissions and control noise pollution;
- To monitor noise emissions.

(2) Scope

Scope of work includes:

- Evaluation of present ambient air quality and noise level at existing area.
- Evaluation of impact of traffic movement at the proposed site and noise level.
- Evaluation of impacts on roads and in the adjacent area due to construction.
- Evaluation of impacts of air emissions and noise from various stationary sources.
- Recommendations for mitigation techniques to redress the expected impacts both for design phase.

(3) Definitions

Air pollution may be referred to as contamination of pollutants dispersed in air affecting ambient air quality that may be deleterious to life and property.

In common use the word noise means unwanted sound or noise pollution. Excessive noise permanently damages hearing, but a continuous low-level sound can be dangerous too.

(4) Procedure

Air emissions (continuous or non-continuous) from facilities such as power generators are comprising of principal gases (greenhouse gases) which typically include carbon monoxide (CO), carbon dioxide (CO_2), water vapors and other gases such as nitrogen oxides (NOx), and, in case of sour gases, sulphur dioxide (SO_2). Air quality impacts should be estimated by the use of baseline air quality assessments and atmospheric dispersion models to establish potential ground level ambient air concentrations during facility design and operations planning. These studies should ensure that no adverse impacts to human health and the environment result. All reasonable attempts should be made to maximize energy efficiency and design facilities to minimize energy use. The overall objective should be to reduce air emissions and evaluate cost-effective options for reducing emissions that are technically feasible.

Also, vehicular emissions and noise due to traffic movement in and around the complex facility may of concern to be mitigated and monitored. Atmospheric conditions that may affect noise levels include humidity, wind direction, and wind speed. Vegetation, such as trees, and walls can reduce noise levels. Installation of acoustic insulating barriers can be implemented, where necessary.

All vehicles, generators and other equipment used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants.

(5) Noise and Air Emissions Management Options

Noise and air emissions monitoring includes;

- Monitoring of air and noise emissions.
- Pollution control technology assessment,
- Emission inventory development,
- Development of parametric monitoring, periodic monitoring, and compliance assurance monitoring.

(6) Air and Noise Quality Monitoring

Refer attached Environmental Monitoring Plan for details of air and noise quality monitoring at the Sea Front project site during construction phase.

a) **Performance Indicator:** Monitoring results of ambient air shall show the concentration of pollutant in ambient air.
b) **Record and Comments:** Record would be kept with the laboratory report attached. A layout of record keeping format for monitoring results is attached in the annexure at the end of this EMP.

7.9 Standard Operating Procedures (During Operational Phase)

7.9.1 Wastewater Management

(1) Purpose of Wastewater Management

The purpose of this procedure is to provide guidelines and simplify the process of categorizing, managing, and disposing of wastewater wherever and whenever arising during the project's operational phase. Wastewater management includes the proper disposal/recycling and reuse of the wastewater generated during operation phase.

(2) Scope

Wastewater generation as part of operational activity will be managed as per this procedure. An effective wastewater management system for Sea Front project is essential to reduce wastewater. Substitute techniques must be investigated, including source reduction, recycling and reuse wherever possible with a view towards maximizing the benefits and minimizing the cost of each method of wastewater management.

(3) Definitions

a) Wastewater: All water arising after use/consumption from the Project which can encompass a wide range of potential contaminants and concentrations.

b) Hazardous Wastewater:

- All wastewater comes in the category of hazardous wastewater. If it has one or more of the following properties:
- Oily water
- Toxicity (wastewater containing laboratory testing chemicals, antibiotics etc.)
- Concentration of contaminants too high above safe acceptable limits

c) Non-hazardous Wastewater: All wastewaters are categorized as non-hazardous wastes, if they do not possess any of the hazardous contaminant mainly comprising of consumed water arising from washing area and sanitary wastewater.

(4) Procedure

Main concern to manage the wastewater is listed below:

- Waste water will be treated at source and the grey water will be separated from black and recycled into a separate channel for use in the washrooms. This is expected to substantially reduce the water footprint. The final discharge would be routed to the existing municipal drain/sewerage system.
- Waste segregation measures would be employed to minimize entry of solid waste into the wastewater stream.
- Water conservation strategies will be employed to avoid wastage of water.

a) Wastewater Minimization: Generation of wastewater will be minimized through the following steps taken by working personnel at the facility:

- Through efficient use of raw water (minimizing the wastewater).

b) Storage and Handling: Wastewater shall be stored/retained in specifically designed facility or storage tanks till appropriate treatment is sought and subsequently disposed off.

c) Segregation: Hazardous wastewater shall be segregated from Non-hazardous wastewater.

d) Recycling: Recycling of Non-hazardous wastewater is a best way to reduce the quantity of the total wastewater that requires subsequent treatment and disposal. Non-hazardous wastewater may be used in the cooling plants and for horticulture purposes.

e) Treatment

- Treatment of wastewater through retention in septic tanks and through primary and/or secondary treatment processes.
- Some of the wastewater may be reused as mentioned in recycling of wastewater. The treated water should comply with Sindh Environmental Quality Standards (SEQS).

f) Disposal

Proper disposal should be done following the treatment through discharge into water bodies or sewerage system where available.

(5) Drinking Water Quality and Wastewater Monitoring Plan

Refer attached Environmental Monitoring Plan for details of drinking water quality and wastewater monitoring plan.

a) Performance Indicator

Monitoring results of water quality shall show the extent of contamination in the drinking water and shall regulate and maintain the quality of potable water for establishing its suitability for human consumption as per SEQS for drinking water quality.

Monitoring results of wastewater quality shall show the concentration of pollutants in the sewage water and potential for contamination of ground water if not disposed of properly.

b) Record and Comments

Record of analysis reports shall be maintained.

7.9.2 Solid Waste Management Plan

(1) Purpose

The purpose of this procedure is to provide guidelines and simplify the process of categorizing, managing, and disposing of solid wastes. Waste management is a critical component of management's operating policies. Waste management includes the proper handling, collection, storage, manifesting, transportation, and disposal / recycling of the solid waste generated.

(2) Scope

The waste management plan has been developed to ensure that the Management of solid waste generated as a result of operation is consistent, efficient, and in conformance with the laws and regulations.

(3) Definitions

a) Waste: Any material, for which no further use is intended, is considered a waste. It can be solid, semi-solid or liquid. Additionally, abandoned materials and materials intended to be recycled are considered wastes. It is very important to understand this concept, because even though something is going to be recycled, it must be managed as a waste until it is actually recycled.

b) Hazardous Waste: Waste is categorized as a hazardous waste if it has one or more of the following properties:

- Ignitability (flash point less than 60oC);
- Corrosivity (pH less than or equal to 2.0, or greater than or equal to 12.5);

- Reactivity (inherently unstable under ordinary conditions or when exposed to water);
- Irritability (when in contact with body causes inflammation)
- Toxicity (may cause risk of injury to health of organisms or the environment.)

c) Non-hazardous Waste: The wastes are categorized as non-hazardous wastes, if they do not possess any of the hazardous characteristics as defined above. However, non-hazardous waste may still present hazards to employees who handle them. All recommended safety and handling practices must be followed.

(4) Procedure

- A waste management plan will be developed for the operational stage of the project. The following will be the key elements of the waste management system:
- The solid waste shall be collected through garbage chute at dedicated site.
- All solid waste shall be segregated into organic and recyclable waste at source and then collected, stored, and transported for ultimate safe disposal.
- Handling & disposal of solid waste shall be managed by a dedicated waste management contractor.
- The solid waste management plan developed will be implemented and facilities for collection, storage and transportation will be established and organized.
- Operation of Vehicular Traffic

a) Waste Minimization: To minimize waste, the following steps shall be taken by all personnel working on sites:

- Only the needed amount of materials shall be ordered. Before purchasing hazardous material, all alternatives for non-hazardous material should be explored.
- Prior consideration shall be given to the sizes of containers available when ordering products that could potentially generate waste. The intent is to avoid unused products and/or their containers from becoming wastes that require special handling.

b) Waste Categorization: All wastes generated at facilities shall be categorized in two major categories (i.e. Hazardous wastes and Non-hazardous wastes) as per the definitions in section above. Each category has different types of requirement for handling, storage and disposal.

c) Labelling

- Name of the waste (e.g., chemical waste, solvents, paints, biomedical etc.).
- Waste category (e.g., toxic, ignitable).
- Facility name and address (disposal site, etc.).
- Date of waste accumulation: (date when waste was placed in drum).
- Wastes are segregated and located in designated areas to optimize control; storage areas.

d) Segregation: As there are no hazardous wastes envisaged in the project therefore segregation among the waste will be done as per their matter.

The scheme of segregation is as follow:

- All hazardous waste if found shall be segregated from other types of hazardous wastes as well as non-hazardous wastes at the point of generation of waste.
- Laboratory chemical waste is also to be segregated into chlorinated and non-chlorinated solvents.
- Non- hazardous waste consists of containers, shipping cartons, bags, reject, broken bottles, rejected cartons, labels, strips, corrugated boxes, paper etc.

e) Storage and Handling

- All waste from floor and equipment is to be collected using vacuum cleaners.
- All containers must be properly and clearly labeled. The label must clearly mention the name or type of waste. Also, if the waste is hazardous, it should be clearly labeled on the container along with its hazardous characteristics (e.g. flammable, toxic, radioactive, etc.). This is important to workers and to emergency response teams, who need to know what they are dealing with. Missing or unreadable labels must be replaced.
- Non-hazardous waste shall be temporarily stored at waste storage facility that will be sent for recycling or off-site disposal shall be temporarily stored at waste storage facilities available at different sites such as junkyard, scrap yard, pits, etc.
- All other wastes awaiting disposal shall be kept in closed containers/boxes separately. Care must be taken to prevent wastes giving rise to secondary environmental problems, such as odors or soil and groundwater contamination through rainwater leaching.
- Daily estimates of hazardous and non-hazardous waste and volumes generated on site.
- Waste segregation, waste storage containers, general housekeeping and the provision of adequate resources will be monitored.
- All workers handling wastes shall use proper PPE.

f) Recycling: Non-hazardous waste can be recycled and reuse to minimize the quantity of waste requiring disposal. Some of the wastes (like one side printed paper) can be reused within the facilities while others can only be recycled at off-site recycling centers.

g) Disposal: Disposal becomes the only available alternatives, if reuse and recycling options are exhausted. Onsite burning or dumping of waste is strictly prohibited.

A material should be classified as a waste for disposal only if no other useful purpose can be identified and if the material cannot be beneficially reused or recycled. The choice of a suitable disposal option for any waste depends on both environmental and economic considerations. The final disposal can only be off-site disposal facilities due to limited space available.

The waste shall be disposed of through a contractor.

(5) Recording & Reporting

The management has to record the information about source, composition, quantity, and final disposal of the waste. This information is needed for regulatory compliance, risk assessment and setting reduction targets and objectives as well as corporate statistics.

The routine track of waste shall be recorded. It is the responsibility of the proponent to assign a suitable person to sign off the record of waste tracking before the waste is dispatched outside.

7.9.3 Air and Noise Emissions

(1) Purpose

The purpose of this guideline is:

- To monitor contents of polluting substances in the atmospheric air;
- To control observance of approved limiting permissible emissions at man-made sources;
- To monitor natural sources and a number of man-made sources of emission at work sites during operational phase;
- To identify sources of noise emissions and control noise pollution;
- To monitor noise emissions.
- The air emissions from cogeneration facility/backup generators should comply with the SEQS for air emissions and reported as per EPA reporting requirements.

(2) Scope

Scope of work include

- Evaluation of present ambient air quality and noise level at existing area.
- Evaluation of impact of traffic movement at the proposed site and noise level.
- Evaluation of impacts on roads and in the adjacent area during operational phase.
- Evaluation of impacts of air emissions and noise from various stationary sources.
- Recommendations for mitigation techniques to redress the expected impacts both for design phase and operational phase.

(3) Definitions

Air pollution may be referred to as contamination of pollutants dispersed in air affecting ambient air quality that may be deleterious to life and property.

In common use the word noise means unwanted sound or noise pollution. Excessive noise permanently damages hearing, but a continuous low-level sound can be dangerous too.

(4) Procedure

Air emissions (continuous or non-continuous) from facilities such as power generators, etc. are comprising of principal gases (greenhouse gases) which typically include carbon monoxide (CO), carbon dioxide (CO_2), water vapors and other gases such as nitrogen oxides (NOx), and, in case of sour gases, sulphur dioxide (SO_2). Air quality impacts should be estimated by the use of baseline air quality assessments and atmospheric dispersion models to establish potential ground level ambient air concentrations during facility design and operations planning. These studies should ensure that no adverse impacts to human health and the environment result. All reasonable attempts should be made to maximize energy efficiency and design facilities to minimize energy use. The overall objective should be to reduce air emissions and evaluate cost-effective options for reducing emissions that are technically feasible. Also, vehicular emissions and noise due to traffic movement in and around the plant is to be mitigated and monitored.

Atmospheric conditions that may affect noise levels include humidity, wind direction, and wind speed. Vegetation, such as trees, and walls can reduce noise levels. Installation of acoustic insulating barriers can be implemented, where necessary.

The stack height of the generators during operation phase will be vented through vertical stacks to minimize exposure at ground level.

(5) Noise and Air Emissions Management Options

Noise and air emissions monitoring includes;

- Air dispersion modeling and monitoring of air and noise emissions.
- Indoor air quality management
- Pollution control technology assessment,
- Emission inventory development,
- Development of parametric monitoring, periodic monitoring, and compliance assurance monitoring.
- Restraining the use of noisy equipment to suit to the conditions of the living environment namely 65 dB (A) during the day and 55 dB (A) during the night.
- Reducing equipment noise at source by proper design, regular maintenance & repair of construction machinery and equipment.
- Minimizing noise from vehicles and back-up power generators by use of proper silencers and mufflers.
- Use noise-abating devices wherever needed and practicable.

(6) Air and Noise Quality Monitoring

Refer attached Environmental Monitoring Plan for details of air and noise quality monitoring at the Sea Front Project site during operation phase.

a) **Performance Indicator:** Monitoring results of ambient air shall show the concentration of pollutant in ambient air.

b) **Records and Comments:** Records of monitoring reports shall be maintained.

7.9.4 Operation of Vehicular Traffic

i) (1) Purpose

Vehicular traffic management will have to be undertaken seriously to restrain unnecessary traffic jams that may cause annoyance to the commuters travelling on the roads surrounding the project.

ii) (2) Scope

The project nature will produce outward and inward traffic movement. Vehicular traffic management will have to be undertaken seriously to restrain unnecessary traffic jams that may cause annoyance to the commuters travelling on the roads surrounding the project.

iii) (3) Definition

The aggregation of vehicles is coming and going in a particular locality.

iv) (4) Procedure

The following measures will be adopted to remove the constraints to smooth flow of traffic:

- Traffic management plan will be introduced to manage smooth flow of vehicular traffic and to avoid traffic jam and long queues.
- Traffic management plan will be implemented and monitored.
- Parking of vehicles alongside the road would be prohibited at all time.
- Vehicles will be parked at designated parking areas during operational phase.

7.10 Environmental Compliance Reporting, Documentation and Trainings

The management will be responsible for the regular audit and review of the environmental management and monitoring plan. This will include both on-site auditing and review of performance reports. Additional onsite inspections and investigations will be undertaken in the event of significant environmental incidents. These will be undertaken in conjunction with the IMC. The management will participate in the audits and inspections and investigations. The management will also be responsible for regular review of the environmental performance of the site and site personnel, and for the reporting on the implementation of commitments made in the EMP.

In particular, there will be:

- Periodic audit reports.
- A review and improvement of the EMP.

Management recognizes that periodic external compliance audits and inspections will be made through a third-party consultant (IMC) to monitor, assess and validate the level of performance and compliance pursuant to the commitments made in the accepted Environmental Management Plan. The monitoring reports shall also be submitted to Sindh Environmental Protection Agency (SEPA) on regular intervals.

Training: It an important step for the implementation of the EMP. All the employees will require to be trained to work appropriately on EMP. EHS Manager will organize trainings in consultation with HSE Officer. It will make sure that employees understand the Environment, Health and Safety issues. Trainings should be arranged on regular basis with notification that it should be attended all respective employees.

HSE Officer will determine the training requirements during both phases. Induction will be the basis of all training courses for contractor & subcontractor during construction phase.

Trainings identified in EMP are given below:

- Site induction course
- Training for emergency response and preparedness
- Training for familiarization with site environmental controls

7.11 Mitigation Management Matrix

The Mitigation Management Matrix will be used as a management & monitoring tool for implementation of the mitigation measures required by the EIA. Mitigation management matrix for construction and operation is provided in the table 6.1. The matrix lists down the following:

- The mitigation measure recommended in the EIA.
- The person/organization directly responsible for adhering to or executing the required mitigation measures.
- The parameters which will be monitored to ensure compliance with the mitigation measures;
- The timing at which the mitigation or monitoring has to be carried out.

It is highlighted that although responsibilities for executing and monitoring mitigation measures have been delegated to different persons, Jubilee Builders & Developers will hold the primary and overall responsibility for ensuring full implementation of the EMP.

7.12 Environmental Monitoring Programme

The objective of the environmental monitoring during the construction & operation phase will be as follows:

- To check compliance of the contractors with the EMP by monitoring activities of the project on a daily basis. This will be called compliance monitoring.

- To monitor impacts of the operation in which there has been a level of uncertainty in prediction such as impacts of noise, water abstraction etc. and to recommend mitigation measures if the impacts are assessed to be in excess of or different from those assessed in the EIA. The aim will be attained through effects monitoring.
- To achieve these objectives, the following monitoring programme will be implemented.

7.12.1 Compliance Monitoring

Compliance monitoring will be carried out to ensure compliance with the requirements of the EIA and to document and report all non-compliances. The mitigation management matrix provided in the EMP will be used as a management and monitoring tool. The contractor's HSE Officer will be responsible for monitoring the compliance of their organization with the relevant EMP requirements. Proponent's site representative will monitor the contractor's compliance and will also ensure that during construction each activity system and plan is in place for effective compliance monitoring. The site representative will make regular checks on the contractor's works; keep records of all non-compliances observed during the execution of the project activities; & the details of all remedial actions taken to mitigate the project impacts.

7.12.2 Effects Monitoring

The effects monitoring requirements have been detailed in Table 7.2. An independent monitoring consultant (IMC) will be responsible to carry out the required effects monitoring during the construction and operation phase.

7.12.3 Environmental Reporting

A. Final Monitoring Report (Construction Phase)

After completion of construction phase, a final monitoring report will be prepared by Proponent's site representative. The report will include the following:

- Introduction.
- Details of the Project Activities.
- Natural Resource used during the Project.
- List of Non-compliances recorded.
- Effects of the Project on Communities and Physical Resources.
- Photographic Records
- Approvals provided during the project
- Change managements statements
- Trainings
- Conclusions

B. Annual Environmental Monitoring Reports (Operation Phase)

The project proponent shall prepare annual environmental monitoring reports describing the conduct of the operation phase for project along with details of the effects monitoring conducted annually during the operation phase of the project. The report shall be submitted

to the SEPA.

7.13 Change Management Plan

The EIA for the proposed project recognizes that changes in the operation or the EMP may be required during the construction and operation and therefore provides a Change Management Plan to manage such changes. The management of changes is discussed under two separate headings, Additions to the EMP and Changes to the Operation and the EMP.

7.13.1 Changes to the EMP

The EIA and the EMP have been developed based on the best possible information available at the time of the EIA study. However, it is possible that during the conduct of the proposed operation additional mitigation measures based on the findings of environmental monitoring during the operation may have to be included in the EMP. In such cases following actions will be taken:

- A meeting will be held between Jubilee Builders & Developers and the concerned project contractors. During the meeting, the proposed addition to the EMP will be discussed and agreed upon by all parties.
- Based on the discussion during the meeting, a change report will be produced collectively, which will include the additional EMP clause and the reasons for the addition.
- The report will be signed by all parties and will be filled at the site office: A copy of the report will be sent to Jubilee Builders & Developers and contractor head offices.
- All relevant project personnel will be informed of the addition.

7.13.2 Changes to the Operation

The change management system recognizes three orders of changes:

A. First Order:

A first order change is one that leads to a significant departure from the project described or the impacts assessed in the EIA and consequently require a reassessment of the environmental impacts associated with the change. Example of first order change includes change in location of proposed project. Action required in this case will be that the environmental impacts of the proposed change will be reassessed by Jubilee Builders & Developers and sent to the SEPA for approval.

B. Second Order

A second order change is one that does not result in the change in project description or impacts that are significantly different from those detailed in the EIA. Example of second order changes includes extension in the site area. Action required for such changes will be that Jubilee Builders & Developers will reassess the impact of the activity on the environment & specify additional mitigation measures if required and report the changes to SEPA.

C. Third Order

A third order change is one that does not result in impacts above those already assessed in the EIA, rather these may be made site to minimize the impact of an activity such as:

- Increase in project workforce;
- Change in layout plan.

The only action required for such changes will be to record the change in the Change Record Register.

7.14 Training Programme

Environmental training will form part of the environmental management system. The training will be directed towards all personnel for general environmental awareness.

7.14.1 Objectives

The key objective of training programme is to ensure that the requirements of the EMP are clearly understood and followed throughout the project. The trainings to the staff will help in communicating environmental related restrictions specified in the EIA and EMP.

7.14.2 Roles and Responsibilities

The contractors will be primarily responsible for providing environmental training to all project personnel on potential environmental issues of the project. The contractors will be responsible to arrange trainings and ensure the presence of targeted staff.

7.14.3 Training Programme

The environmental awareness, EIA and EMP training will be carried out during the project activities.

A. Training log

A training log will be maintained by tine contractors. The training log will include:

- Topic
- Date, time and location
- Trainer
- Participants

B. Training Needs Assessment

In addition to the training specified in the training log special/additional trainings will be provided during the project activity. The criteria to assess the need of training will be based on the following:

- When a specified percentage of staff is newly inducted in the project

- When any non-compliance is repeatedly reported refresher training will be provided regarding that issue.
- When any incident/accident of minor or major nature occurs. Arrival of new contractor/sub-contractor.
- Start of any new process/activity.

C. Training Material

The contractors will develop & prepare training material regarding environmental awareness, sensitivity of the area, EIA, EMP and restrictions to be followed during the project. Separate training material will be prepared for each targeted staff.

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
1	**Land Use and Soils**			
1.1	The construction activities will be planned to minimize disturbance to soil	Jubilee Builders & Developers, CC	Monitoring compliance	During construction phase
1.2	To the extent possible, equipment and materials would be staged in areas that have already been disturbed	Jubilee Builders & Developers, CC	Monitoring compliance	During construction phase
1.3	Movement of construction equipment will be restricted to work areas only to avoid unnecessary disturbance to soil	CC	Monitoring compliance	During construction phase
1.4	Routes of water tankers, dumper trucks and other project vehicles will be monitored for any signs of soil disturbance & road damage	CC	Monitoring compliance	During construction phase
1.5	Area showing signs of unstabilised soil conditions will be compacted and watered	Jubilee Builders & Developers, CC	Monitoring compliance	During construction phase
1.6	The assessment of settlement within affected zone due to dewatering will be conducted prior to dewatering	CC	Monitoring compliance	During construction phase
1.7	The affected zone of settlement, if identified will be monitored regularly during dewatering activity	Jubilee Builders & Developers, CC	Monitoring compliance	During construction phase
1.8	Proper drainage will be provided to construction camp, construction site, especially near excavations and around proposed facility	CC	Monitoring compliance	During construction phase
1.9	Vehicle speed will be regulated and monitored to avoid excessive dust emissions	CC	Monitoring compliance	During construction phase
1.10	Total land uptake by the project and associated facilities will be kept to the minimum	Jubilee Builders & Developers, CC	Monitoring compliance	During construction phase
1.11	Periodic trainings will be provided to drivers on mitigation measures related to off-road travel and speed limits	Jubilee Builders & Developers, CC	Check training records	During construction phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
1.12	The Project will have a storm water collection system so that the storm water effluent has minimal sediment load	Jubilee Builders & Developers, CC	Monitoring compliance	During design and construction phase
2	**Air Quality**			
2.1	**Dust Emissions**			
2.1.1	Water will be sprinkled daily or when there is an obvious dust problem on all exposed surfaces to suppress emission of dust. Frequency of Sprinklings will be kept such that the dust remains under control, particularly when wind is blowing towards the receptors	CC	Monitoring compliance	During construction phase
2.1.2	Dust emissions from soil piles and aggregate storage stockpiles will be reduced by appropriate measures. These may include: → Keeping the material moist by sprinkling of water at appropriate frequency → Erecting windshield walls on three sides of the piles such that the wall project 0.5m above the pile, or → Covering the pile, for example with tarpaulin or thick plastic sheets, to prevent emissions. → Locating stock piles out of the wind direction	CC	Monitoring compliance	During construction phase
2.1.3	All roads within the proposed Project will be paved as early as possible after the commencement of construction work. Until the roads are paved, they will be sprinkled regularly to prevent dust emission. Other temporary tracks within the site boundary will be compacted and sprinkled with water during the construction works.	Jubilee Builders & Developers, CC	Monitoring compliance	During construction phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
2.1.4	Project traffic will maintain a maximum speed limit of 20km/hr on all unpaved roads within the proposed site area.	Jubilee Builders & Developers, CC	Check speed of vehicles	During construction phase
2.1.5	Construction materials that are susceptible to dust formation will be transported only in securely covered trucks to prevent dust emission during transportation.	CC	Monitoring compliance	During construction phase
2.1.6	The exposure of construction workers to dust will be minimized by provision of dust masks.	CC	Check for dust masks	During construction phase
2.2	**Vehicle Equipment and Exhaust.**			
2.2.1	All vehicles, generators and other equipment used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants.	Jubilee Builders & Developers, CC	Maintenance records of vehicles and equipment	During construction phase
2.2.2	The stack height of the generators during operation phase will be vented through vertical stacks to minimize exposure at ground level	CC	Monitor compliance	During construction phase
2.3	**Generator Emissions**			
2.3.1	The option of using natural gas as fuel in the back-up generators should be explored.	Jubilee Builders & Developers, Generator Vendor	Monitor compliance	During design phase
2.3.2	The generator will be properly tuned and maintained in good working condition in order to minimize exhaust emissions	Jubilee Builders & Developers	Check maintenance records	During operation phase
2.3.3	The diesel generator should be used for a very short duration with the power switched back to the main power supply as quickly as possible.	Jubilee Builders & Developers	Monitoring compliance	During operation phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
2.3.4	NOx emission reduction techniques should be employed on a regular basis	Jubilee Builders & Developers	Monitor NOx emissions	During operation phase
3	**Construction Noise**			
3.1	Reduce equipment noise at source by proper design, maintenance and repair of construction machinery and equipment	Jubilee Builders & Developers, CC	Check maintenance records	During construction phase
3.2	Minimize noise from vehicles and power generators by use of proper silencers and mufflers.	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
3.3	Use noise-abating devices wherever needed and practicable.	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
4	**Water Sourcing**			
4.1	A complete record of water consumption during construction and operation phase will be maintained	Jubilee Builders & Developers, CC	Check water consumption records	During construction and operation phase
4.2	If a new water well is to be installed, it will be designed to abstract water preferably from deep aquifer not being used by local communities	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
4.3	Water conservation program will be initiated to prevent wastage of water.	Jubilee Builders & Developers, CC	Monitor compliance	During construction and operation phase
4.4	The water supply lines will be checked and repaired for leaks in order to reduce wastage of water.	Jubilee Builders & Developers, Maintenance Contractor	Check maintenance records	During operation phase
4.5	Recycle grey water for use for toilet flushing	Jubilee Builders & Developers	Monitor compliance	During operation phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
4.6	Ensure that water efficient sanitary fittings are used throughout the development e.g. low flush toilets, water efficient shower heads, and aerators on faucets	Jubilee Builders & Developers, CC	Monitor compliance	During construction and operation phase
5	**Soil Contamination**			
5.1	Fuels, lubricants, and chemical will be stored in covered bounded areas, underlain with impervious lining	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
5.2	Maintenance of vehicles and equipment will only be carried out designated areas. The area will be provided with hard surface or tarpaulin will be spread on the ground to prevent contamination of soil	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
5.3	Vehicles will only be washed at designated areas.	CC	Vehicle Inspection record	During construction phase
5.4	Regular inspections will be carried out to detect leakage in construction vehicles and equipment	Jubilee Builders & Developers, CC	Check inspection / maintenance records	During construction phase
5.5	Appropriate arrangements, including shovels, plastic bags and absorbent materials, will be available near fuel and oil storage areas	CC	Monitor compliance	During construction phase
5.6	Contaminated soil will be removed and properly disposed after treatment such as incineration etc.	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
6	**Traffic**			
6.1	Heavy traffic during construction phase will come to the project site during late night hours.	Jubilee Builders & Developers, CC	Traffic record	During construction phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
6.2	Project vehicles shall not be fitted with pressure horns	CC	Monitor compliance	During construction phase
6.3	During construction, regulate speed of vehicles	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
6.4	Designated parking areas will be provided for different type of project vehicles within and around the project site	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
6.5	Manage vehicle movement to avoid traffic jam and long queues	Jubilee Builders & Developers, CC	Monitor compliance	During construction and operation phase
6.6	Prepare, implement and monitor the traffic management plan	Jubilee Builders & Developers	Monitor compliance	During construction and operation phase
6.7	Vehicles to use designated parking areas during operational phase.	Jubilee Builders & Developers	Monitor compliance	During operation phase
6.8	Parking of vehicles alongside the road should be prohibited at all time.	Jubilee Builders & Developers	Monitor compliance	During construction and operation phase
7	**Wastewater Generation**			
7.1	**Wastewater Generation During Construction**			
7.1.1	Wastewater generated at the campsites will be stored temporarily in septic systems comprising of septic tanks from where it will be routed to a nearest drain/sewerage system.	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
7.1.2	At the time of restoration, septic tanks will be dismantled in place and backfilled with at least 1m of soil cover above the surrounding natural surface level	CC	Monitor compliance	After the completion of construction phase
7.2	**Wastewater Generation During Operation**			
7.2.1	The grey water will be recycled to be re-used again in toilets and kitchens etc.	Jubilee Builders & Developers	Monitor compliance	During operation phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
7.2.2	Black water will be temporary stored in septic tanks and will be discharged into a nearby out fall sewer via trunk sewer	Jubilee Builders & Developers, CC	Monitor compliance	During design, construction & operation phase
7.2.3	Waste segregation measures would be employed to minimize entry of solid waste into the wastewater stream	Jubilee Builders & Developers	Monitor compliance	During operation phase
7.2.4	Water conservation strategies will be employed to avoid wastage of water	Jubilee Builders & Developers	Monitor compliance	During operation phase
8	**Solid Waste Generation and Management**			
8.1	**Solid Waste Generation and Management During Construction**			
8.1.1	Separate bins will be placed for different types of wastes- plastics, paper, metal, glass, wood, and cotton.	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
8.1.2	Recyclable material will be separated at source. The recyclable waste will be sold to waste contractors for recycling	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
8.1.3	Non-hazardous non-recyclable wastes such as construction camp kitchen wastes will be disposed off in landfill site through municipal administration or approved waste contractor.	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
8.1.4	No waste will be dumped at any location outside the proposed site boundary.	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
8.1.5	All hazardous waste will be separated from other wastes. Hazardous wastes will be stored in designated areas with restricted access and proper marking. Hazardous wastes will be disposed off through approved waste contractors.	Jubilee Builders & Developers, CC	Check hazardous waste disposal records	During construction phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
8.1.6	Surplus construction materials including partially filled chemical and paint containers will be returned to suppliers. Inert construction wastes will be disposed of onsite as fill material or sold as scrap to contractors.	Jubilee Builders & Developers CC	Check waste records	During construction phase
8.1.7	Records of all waste generated during the construction period will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register	Jubilee Builders & Developers, CC	Check waste record register	During construction phase
8.1.8	Training will be provided to personnel for identification, segregation, and management of waste	Jubilee Builders & Developers, CC	Check training records	During construction phase
8.2	**Solid Waste Generation and Management During Operation**			
8.2.1	Waste generation will be minimized by adopting waste management strategy of reduce, reuse and recycle	Jubilee Builders & Developers	Monitor compliance	During operation phase
8.2.2	A waste management plan will be prepared, implemented and monitored for the safe collection, storage and treatment/disposal of the building waste	Jubilee Builders & Developers	Monitor compliance	During operation phase
8.2.3	Records of all waste generated will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register	Jubilee Builders & Developers	Check waste tracking register	During operation phase
8.2.4	Training will be provided to personnel for identification, segregation, and management of waste	Jubilee Builders & Developers	Check training records	During operation phase
8.2.5	All inert and non-hazardous construction wastes will be disposed to the existing tipping sites within or outside of the city limits	Jubilee Builders & Developers, Waste Contractor	Monitor compliance	During operation phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
8.2.6	Hazardous wastes will be disposed of through waste management contractors who will identify suitable disposal options for these wastes such as recycling, metal recovery, incineration or bioremediation etc.	Jubilee Builders & Developers, Waste Contractor	Monitor compliance	During operation phase
8.2.7	Various waste containers for waste collection should be placed at appropriate locations in the building	Jubilee Builders & Developers	Monitor compliance	During operation phase
8.2.8	Waste storage areas should be located within the facility and sized to the quantities of waste generated, with the following design considerations: Hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply, Secured by locks with restricted access designed for access and regular cleaning by authorized cleaning staff and vehicles Protected from sun, and inaccessible to animals/Rodents Equipped with appropriate lighting and ventilation Segregated from food supplies and preparation areas Equipped with supplies of protected clothing, and spare bags/containers	Jubilee Builders & Developers, CC	Monitor compliance	During operation phase
9	**Seismicity**			
9.1	No specific mitigation measures other than to construct the facility in accordance with UBC Zone 2B	Jubilee Builders & Developers, Structure Design Consultant, CC	Monitor compliance	During project design phase
10	**Sustainability**			
10.1	Best practice of energy efficiency will be incorporated in the building design	Jubilee Builders & Developers, CC	Monitor compliance	During project design phase

Table 7.1: Environmental Management Plan (EMP)				
S.#	**Impact and Mitigation Measures**	**Responsibilities**	**Monitoring**	**Timing**
10.2	Buildings to be constructed with high levels of thermal insulation	Jubilee Builders & Developers, CC	Monitor compliance	During project design phase
10.3	Ensure that HVAC system, refrigeration equipment and fire suppression equipment do not contain HCFC's or Halons	Jubilee Builders & Developers, CC	Monitor compliance	During project design phase
11	**Socio-Economic Impacts**			
11.1	Deliveries should be programmed to arrive and routed to minimize disturbance to residential areas, hospitals and offices.	Jubilee Builders & Developers, CC	Monitor compliance	During construction phase
11.2	Designated parking areas will be provided for different type of project vehicles within and around project site	Jubilee Builders & Developers, CC	Monitor compliance	During construction & operation phase
11.3	Areas earmarked for amenity will not be used for other purposes after construction	Jubilee Builders & Developers	Monitor compliance	During construction & operation phase
11.4	Employment preference will be given to residents of the project area	Jubilee Builders & Developers, CC	Monitor compliance	During construction & operation phase
11.5	Local contractors will be given preference for hiring equipment and machinery during operation	Jubilee Builders & Developers, CC	Monitor compliance	During construction & operation phase
11.6	Ensure maximum quantity of water to be treated and reused in order to lessen its burden on the existing sewerage system.	Jubilee Builders & Developers	Monitor compliance	During design, construction & operation phase
11.7	Locals, surrounding business and city government are kept on the same page during all stages of the development of the project.	Jubilee Builders & Developers	Monitor compliance	During construction phase
11.8	A complaint register will be maintained on site during construction to record complaints of the nearby residents.	Jubilee Builders & Developers	Provision of complaint register	During construction phase

Table 7.2: Environmental Monitoring Plan

Ambient Air Quality Sampling Plan				
Parameters	**Locations**	**Frequency**	**Duration**	**Standards**
SOx, NOx, CO, O3, PM2.5, PM10 Lead, SPM	At the interface of project site and nearby community	Quarterly	Continuous for 8 hours* in a full working day	SEQS
Drinking Water Quality Sampling Plan				
Parameters	**Locations**	**Frequency**	**Duration**	**Standards**
Heavy metals, TDS, TSS, pH, Total Coliform, Faecal Coliform	Drinking water sources	Monthly	Grab sampling	SEQS for drinking water
Wastewater Quality Sampling Plan				
Parameters	**Locations**	**Frequency**	**Duration**	**Standards**
BOD, COD, DO, TSS, TDS, pH, NO_3, SO_4, Oil & Grease)	Camp site discharge points into drains	Quarterly	Grab sampling	SEQS
Noise Level Sampling Plan				
Parameters	**Locations**	**Frequency**	**Duration**	**Standards**
Decibels [dB(A)Scale]	At the interface of project site & residential community 7 m from the equipment at construction site	Monthly	Continuous for 8 hours in a full working day	WHO Noise Guidelines
Solid Waste				
Parameters	**Locations**	**Frequency**	**Duration**	**Standards**
Waste generation rate, waste composition; recyclables and non-recyclables, hazardous waste	At main solid waste collection point from where the waste is transported from site	Monthly	24-hour sample collected during week days	Best Practices

Table 7.3 EMP Implementation Cost		
Activity	**Cost (Rupees PKR)**	**Remarks**
Training Program	500, 000	refer section 7.14
Environmental Monitoring		
Ambient Air (Construction)	(40,000 * 4) = 160,000	Cost for 1-year monitoring at 01 location @Rs.40,000/per location.
Drinking Water Quality (Construction)	(20,000 * 12) = 240,000	Cost for 1-year monitoring at 1 sample @Rs.20,000 for all primary parameters
Wastewater (Construction)	(50,000 * 4) = 200,000	Cost for 1-year monitoring at 1 location @Rs.50,000/location
Noise Levels (Construction)	(1,000 * 4 * 12) = 48,000	Cost for 1-year monitoring at 04 locations @Rs.1,000/location
Solid Waste (Construction/Operation)	10,000	Estimated cost for 1 year
Gaseous Emissions (Construction)	(1,500 * 1 * 6 * 4) = 36,000	Cost for 1-year monitoring at 1 location for 06 parameters @Rs.1,500/parameter
Mitigation Measures (Construction)	500,000	Initial estimates
Mitigation Measures (Operation)	1,000,000	Initial estimates
Reporting	1,000,000	Initial estimates
Contingencies (5% of EMP cost)	500,000	-
Grand Total	**3,694,000**	-
Grand Total (in words)	**Three Million, Six Hundred Ninety-Four Thousand**	-

Chapter 8 CONCLUSION

Realizing that the city has overgrown its sustainability limits, it is imperative that the Builders and Developers take cognizance of the cumulative effect of the current pace of rapid development. Consequently, each project is required to keep the sustainability principles in view and go an extra mile beyond the present approach which is confined to bare survival. Their projects have so far been profited oriented, now they will have to share the profit with net zero energy and net zero discharge approach in the project design.

Based on the findings of the environmental impact assessment it is concluded that the environmental impacts of the construction and operation of project are manageable and can be mitigated by implementing the Environmental Management and Monitoring Plan which forms an integral part of EIA document. The screening process has through review of literature, primary as well as secondary baseline data, and expert judgment, made assessment of the potential impacts of said activities on the physical, biological, and socioeconomic environment of the Project. Mitigation measures have been proposed to reduce, minimize or compensate for the identified potential negative impacts and their adoption has been recommended. The proposed project is a self-contained building having its own back-up power generation, water supply and sewage treatment, recycling and disposal system in addition to commitment for the provision of required parking space. This being a positive impact would be an indicator of achievement of the objectives of the Project.

Construction and operation of project is not expected to have unacceptable/significant impact on the aesthetics of the microenvironment and macro environment. Nevertheless, the impact will be mitigated through careful planning, suitable landscaping, waste management, traffic management and adopting appropriate mitigation measures.

Mitigation measures will be assured by a program of environmental monitoring conducted to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged.

There are three essential recommendations that need to be followed to ensure that the environmental impacts of the project are successfully mitigated. The proponent shall ensure that:

- All mitigation, compensation and enhancement measures proposed in this EIA report are implemented in full, as described in the document;
- The Environmental Management and Monitoring Plan are implemented in letter and spirit.

Screening of potential impact suggests that the Construction & operation of project will, on adoption of the suggested mitigation measures, be an environmentally acceptable proposition.

ANNEXURES

Annex I: NOCs / Approvals

SINDH BUILDING CONTROL AUTHORITY
ONE WINDOW CELL

No. Clifton/PC-18/89/OWC/Arch:&Planning/Construction Permit/2022/ 80 Dated:28/06/2022

M/S. Jubilee Builders & Developers (2532)
Mr. Abdul Majid & other (Owner/Attorney)
CNIC : 42301-3066183-3,
Office No.2, Hina Centre, Block-13/A, Gulshan-e-Iqbal, Scheme-24, Karachi.

Area of plot: 5815.00 sq.yds
Gross covered area:962234.39 Sq.fts
Net area after exemptions:462660.13 Sq.fts
Category: FL

Professional Team:-
1. **Lic. Arch: Syed Akbar Jamil (AL-01-584)**
2. **Lic. Engr. Syed Muaffar Hasan (SE-06-209)**
3. **Lic. Site Engr: Muhammad Wahaj uddin (Civil/44824)**
4. **Builder License from ABAD: (FM-737)**

Above professionals will be fully responsible for safe & sound construction in accordance with approved plan and standard specifications and ensuring all safety measures during construction for the safety of workers, neighbors and pedestrians at site as defined in KB & TPR-2002 (As amended).

SUBJECT: REVISED CONSTRUCTION PERMIT ON PLOT NO. FL-11, BLOCK-01, KDA SCHEME-5, CLIFTON, KARACHI.

Reference:- Counter dairy No.4378/16, dated: 04-07-2016

No. of Stories: Basement-2 (Parking + Services) + Basement-I (ARS + Parking + Services) + Ground to 4th Floors (Parking + Services) + 5th Floor (Recreation Area + Services) + 6th to 45th Floors (Flats) + Roof (Solar Panel + Battery Room + Helipad + Services) only.

- Architectural Concept Plan (Not valid for construction) vide No.Clifton/PC-18/89/OWC/Arch:&Planning/2022/66, Dated: 26-05-2022.
- Structure NOC No. SBCA/DD/(STR)/2022/101, Dated:27-06-2022.
- CAA NOC No. No. HQCAA/1117/003/ARS/KHI-180/170, dated: 06.10.2017 (500 feet from AGL).
- Verification of title documents and status of land issued vide No. Clifton/PC-I8/89/SBCA/Title verification Cell/AD/TP&R/2021/87, dated: 07-07-2021, by the Assistant Director, OWC/TP, SBCA. Reply has been received through portal vide letter NO. KDA/Land/AD(B.P)/2022/31/L, dated: 12.01.2022, from the Additional Director (B.P) Land Management, KDA.

1. The building plan for the above mentioned plot attached herewith is hereby approved and you are Permitted to carry out construction on the said plot accordingly.
2. Provided that it does not entitle you to build on land not lawfully conveyed to you and land or road of City District Government, Karachi or any other local Authority.
3. Provided that right of easement is a matter between the concerned parties with which this Authority has not concern.
4. Provided that it holds good only if the work is started within **ONE YEAR** from the date where after it shall be deemed to have lapsed.
5. A full time site engineer registered with PEC shall be deputed by the owner/builder during the execution of work.
6. Provided that rain water spouts from balconies, shops, windows doors of the building shall not Project or over hanged on public streets or the land belonging to the CDGK or local Authority.
7. Provided that the construction shall be carried out under the supervision of Lic. Engineering and Lic. Architect started above.
8. The Lic. Architect, Lic. Engineer/Owner shall be jointly and severally responsible for all the structural design and standard specification to be provided for the execution of the work.
9. Provided that plinth cornice shall not project more than 2" on any public street for ornamental purpose.

AND

10. Provided that premises shall not be used for the purpose other than the use approved by the Authority and according to the terms and condition of allotment / lease.
11. Subject to the condition that if any violation is found during / after construction, the same shall be demolished.
12. Provided that the quality control and stability of the structure slab be the responsibility of the owner /attorney and Lic. Architect / Lic. Engineer.
13. No building materials or any kind of machine shall be stores/placed for execution on road of Govt. land / footpaths during construction.
14. Subject to condition that all the constructional activities supervision etc shall jointly be the responsibility of professionals & owner.
15. Fire-fighting and safety arrangements shall be provided as per existing regulations and also in accordance with international standard.
16. This approval is granted with the condition that owner / builder shall mandatory design / provide the provision for utilization of at-least 5% for solar energy.

OFFICIAL COPY OF CONSTRUCTION PERMIT
FOR OWNER

Contd...../2

17. This approval is granted with the condition that owner / builder shall design / provide the provision of Broadband wiring which is MANDATORY as per Clause 25-1.9.3 of KB&TPR-2002.
18. Owner shall obtain the plinth verification through licensed professionals on prescribed form (ZP-4) upon completion of foundation as per KB&TPR from concerned Town.
19. The owner and professionals shall submit to the authority floor certificate (form ZP-5) at the time of casting of slab of each floor as per KB&TPR in concerned Town.
20. In case of any complaint / dispute or any court matter, the **SBCA** shall not be a party and shall not be responsible.
21. If at any later stage, it is found that the approval of Proposed plan was obtained with mis-representation of facts, the same will be withdraw / cancelled.
22. Owner / Attorney is bound to get the completion / occupancy plan approved from this Authority before occupation as per KB&TPR.
23. Air Raid Shelter (ARS) provided in **Basement-I** shall not be misused under any circumstances.
24. Parking as provided on **Basement-2, Basement-1, Ground Floor, 1st Floor, 2nd Floor, 3rd Floor & 4th Floor** shall not be misused under any circumstances.
25. Recreation area as provided at **5th Floor** shall not be misused under any circumstances.
26. All the construction work to be carried out strictly as per Administrative Instruction and as per KB & TPR-2002 (Amended to date) with maintaining the shear wall / columns etc. as per structure drawings.
27. Owner & License professionals will take all the precautionary measures as per KB & TPR-2002 (Amended to date) and also follow the specifications / notes mentioned by Dy. Director Structure Section, SBCA in the approval letter / structural drawings during excavation and further construction to avoid any mishap to the adjoining / surrounding buildings.
28. In case of any complaint / evidence regarding Sale / Booking of Units without Sale NOC, approval of building plan should be withdrawn and builder license shall be cancelled by the Authority.
29. As per Notification No. SBCA/Secy. to DG/2016/503 Dated: 18-05-2016, owner / builder shall obtain NOC from Environment & Building Services Section, SBCA as and when made functional.
30. NOC for Sale & Advertisement shall be obtained from Design Section, SBCA as per Notification No. SBCA/PS CE/2020/06, dated 23.07.2020.
31. To achieve quality concrete of required strength for sale, sound and stable structure, the owner / builder shall use ready mix concrete from batching plant which is mandatory under clause 11-11of KB&TPR-2002 and amended up to date.
32. This approval is granted by One Window Cell/Town Planning Section only planning point of view, all other aspects like ownership/court case/complaint/dispute implementation of construction activities according to KB & TPR shall be the responsibility of concerned Town.
33. At any stage, any ambiguity / error found in the approval of building plan, the same shall be conveyed accordingly by the Town concerned.
34. The site plan of subject plot is showing a storm water drain along the said plot line, therefore, **20'-00"** feet set back from the edge of the storm water drain is to be maintained as mention in clause No. 18-2.7, otherwise the same NOC shall be deemed as withdrawn/cancelled.
35. This approval is granted with the condition that owner/builder shall not raise any construction in setback portion & chamfer area.
36. The owner/builder shall conduct Traffic Impact Study through consultants and accordingly report shall be submitted to SBCA before the final approval.
37. The owner is required to produce **Valid Builder's License, Valid ABAD Membership & NTN Certificate, NOC for Height Clearance & site report / clearance from concerned town** before issuance of NOC for sale & advertisement and before commencement of construction at site.
38. Owner/builder/Lic.Architect will produce all required NOCs and documents before final construction permit or within 90 days from issuance of this final construction permit said plan will be cancelled/Expired automatically without any notice.
39. SBCA reserve the right to obtain all fees / charges / taxes / dues remaining to owner / builder subsequently. (if applicable)

E ncl:

- Approved Proposed Building Plans.

Assistant Director
One window Cell / Architectural & Planning
Head Quarters, SBCA

28/06/22

Copy for information to:-

1. Director, (District South), SBCA.
2. Director, Design, SBCA.
3. Director, Vigilance Section, SBCA.
4. Director, I.T, SBCA.
5. Chairman, ABAD, Karachi.
6. Secretary to DG, SBCA.

SINDH BUILDING CONTROL AUTHORITY
ONE WINDOW CELL

File No:Clifton/PC-18/89/OWC/Arch:&Planning/2022/166 Dated: 26/05/2022

(ARCHITECTURAL CONCEPT PLAN)
(NOT VALID FOR CONSTRUCTION)

M/S. Jubilee Builders & Developers (2532)
Mr. Abdul Majid & other (Owner/Attorney)
CNIC : 42301-3066183-3,
Office No.2, Hina Centre, Block-13/A,
Gulshan-e-Iqbal, Scheme-24, Karachi.

Area of plot: 5815.00 sq.yds
Gross covered area:962234.39 ,, Sq.fts
Net area after exemptions:462660.13 Sq.fts
Category: FL

Professional Team:-
1. Lic. Arch: Syed Akbar Jamil (AL-01-584)
2. Lic. Engr. Syed Muaffar Hasan (SE-06-209)
3. Lic. Site Engr: Muhammad Wahaj uddin (Civil/44824)
4. Builder License from ABAD: (FM-737)

Subject:- **PROPOSED ARCHITECTURAL CONCEPT PLAN IN RESPECT OF PROPOSED BUILDING PLAN ON PLOT NO.FL-11, BLOCK-01, KDA SCHEME-5, CLIFTON, KARACHI.**

Reference:- Counter dairy No.4378/16, dated: 04-07-2016

The proposal has been examined and scrutinized with the requirements of Karachi Building & Town Planning Regulations,2002 and amended upto date. This Architectural Concept Plan has been issued as per Notification Issued by Director General, SBCA vide letters No. SBCA/PS-CE/2020/05, Dated: 27-7-2020, No. SBCA/PS-CE/2020/07, Dated: 29-7-2020, No. SBCA/PS-CE/2020/5/574, Dated:31-08-2020, No. SBCA/PS-CE/2021/831, Dated: 08-01-2021 & No. SBCA/Secy. to DG/2021/18, Dated: 28-01-2021.

The Competent Authority has been pleased to accept the revised Architectural Concept Plan (Not Valid for Construction) of plot admeasuring 5815.00 sq.yds for Basement-2 (Parking + Services) + Basement-I (ARS + Parking + Services) + Ground to 4th Floors (Parking + Services) + 5th Floor (Recreation Area + Services) + 6th to 45th Floors (Flats) + Roof (Solar Panel + Battery Room + Helipad + Services) only with following terms and conditions: -

1. This approval is granted on the basis of title verification by the response to the letter No.Clifton/PC-I8/89/SBCA/Title verification Cell/AD/TP&R/2021/87, dated: 07-07-2021, by the Assistant Director, OWC/TP, SBCA. Reply has been received through portal vide letter NO. KDA/Land/AD(B.P)/2022/31/L, dated: 12.01.2022, from the Additional Director (B.P) Land Management, KDA.
2. The Presentation of the project consisting B+G+45 Floors was held on 15-12-2021 before presentation Committee.
3. The Competent Authority i.e. Project Management Board for High Density Zone (RIBBON) has been pleased to grant permission vide its meeting held on 14-3-2022.
4. This Architectural Concept Plan is for Basement-2 (Parking + Services) + Basement-I (ARS + Parking + Services) + Ground to 4th Floors (Parking + Services) + 5th Floor (Recreation Area + Services) + 6th to 45th Floors (Flats) + Roof (Solar Panel + Battery Room + Helipad + Services) only.
5. Parking on Basement-2, Basement-1, Ground Floor, 1st Floor, 2nd Floor, 3rd Floor & 4th Floor and Recreation Area at 5th Floor shall not be misused under any circumstances.
6. This approval is granted with the condition that Air Raid Shelter provided as per provision of KB&TPR-2002 is for the use of allottees of Flats only in emergency condition and shall not be sale by owner/builder under any circumstance.
7. This approval is granted with the condition that owner/builder shall design / provide the provision of Broadband wiring which is MANDATORY as per Clause 25-1.9.3 of KB&TPR-2002.
8. This approval is granted with the condition that owner/Builder shall mandatory design/provide the provision for utilization of at-least 5% for Solar Energy.
9. In case of any complaint / dispute of any court matter the SBCA shall not be the party and shall not be the responsible.

Continued on Page/2

10. Land escaping shall be provided as per KB&TPR-2002 (amended upto date).
11. Subject to condition that all constructional activities, supervision etc. shall jointly be the responsibility of professionals and owner / builder.
12. In order to achieve better quality concrete of required strength for Safe, Sound and Stable Structure, Builder shall use Ready Mix Concrete from the batching plant as defined in these regulations.
13. NOC / Clearance from Structure Section of SBCA to obtained before Final Construction permits.
14. NOC for Sale /Advertisement shall be obtained from Design Section, SBCA as per Notification No.SBCA/PS-CE/2020/06, Dated: 23-07-2020 after construction permit.
15. In case of any compliant / evidence regarding Sale / Booking of units without Sale NOC, this Architectural Concept Plan will be withdrawn and Builder License shall be cancelled by the Authority.
16. This TP NOC based on CAA, NOC issued by Director Airspace & Aerodrome Regulations vide letter No. HQCAA/1117/003/ARS/KHI-180/170, dated: 06.10.2017, allowable height 500 feet.
17. The site plan of subject plot is showing a storm water drain along the said plot line, therefore, 20' feet set back from the edge of the storm water drain is to be maintained as mention in clause No. 18-2.7, otherwise the same NOC shall be deemed as withdrawn/cancelled.
18. This approval is granted with the condition that owner/builder shall not raise any construction in setback portion & chamfer area.
19. The owner is required to produce Valid Builder's License, Valid ABAD Membership & NTN Certificate before Final Approval.
20. The owner/builder shall conduct Environmental Impact Assessment (EIA) Study through consultants and accordingly report shall be submitted to SBCA well before the commencement of construction.
21. The owner/builder shall conduct Traffic Impact Study through consultants and accordingly report shall be submitted to SBCA before the final approval.
22. In case of any misrepresentation / concealment of facts or construction started without getting construction permit under Section 6 (1) of SBCA 1979, this approval will be withdrawn / cancelled without any notice.
23. Owner/builder will provide the List of previous project of Builder with details showing completion certificate to be produced before construction permit or within 90 days from date of issuance of this letter.
24. Owner/builder/Lic.Architect will produce all required NOCs and documents before final construction permit or within 90 days from issuance of this Architect Concept Plan otherwise said plan will be cancelled/Expired automatically without any notice.
25. The owner has paid the betterment charges in respect of enhance ratio that prevailed high density zone including covered area 269525.25 Sq.fts @ Rs.50/- per Sq.ft amounting to Rs. 1,34,76,263/- vide challan No. 2936/147, dated: 27.05.2022.
26. The owner has paid the balance scrutiny fees on balance covered area 39645.59 Sq.fts @ Rs.16/- per Sq.ft amounting to Rs. 6,34,330/- vide challan No. 2937/147, dated: 27.05.2022.
27. SBCA reserves the right to obtain all fees / charges / taxes / dues remaining to owner / builder subsequently. (if applicable)

You are therefore, advised to comply above and submit the Structure requirements for further process in accordance with these rule regulations.

26/05/22

Assistant Director
One window Cell / Architectural & Planning
Head Quarters, SBCA

26/05/22

Copy for information to: -

1. Director, (District South), SBCA.
2. Director, Structure Section, SBCA.
3. Director, IT, SBCA.
4. Chairman, ABAD.
5. Secretary to DG, SBCA.

(3)

KARACHI DEVELOPMENT AUTHORITY

ENGINEERING DEPTT.

Registration No. K.D.A/L26/Gul/cc/95/-/589 DA, 20.12.95

(ACKNOWLEDGEMENT OF POSSESSION ORDER)

Sub: Possession of Occupancy Rights for plot No. FL-11

Block/~~Sector~~ No. 01 Scheme No/~~Township~~ 05. CLIFTON

I hereby acknowledge that Mr./Mrs. M/S. G.S. Builders, 9.32/1-A Block-6 P.C.H.S Karachi having paid to the KARACHI DEVELOPMENT AUTHORITY a sum of Rs. /- (Rupees /-) being the 50% of occupancy value at the rate of Rs. /- per sq. yd. and an annual rent in advance @ Rs. /- per sq. yd, as per form of his/her application for the above plot of land measuring 5815.00 Sq.yds. sq. yds. by the same a little more or less, I have this the 21st day of Dec., 1995 on behalf of the said application entered upon and taken possession of all that piece and parcel of land bearing plot No. FL-11 Block/~~Sector~~ No. 01 in the above Scheme.

On behalf of the said Allottee I accept the plot allotted to the applicant/me in the conditions it is today and I/said allottee undertake/s not to hold the Karachi Development Authority responsible for any deficiency or lack of facilities whatsoever on the said plot.

Dated this the 21st day of Dec, 1995

Witness

For & on behalf.

Certified that the possession of plot No FL-11 Block/~~Sector~~ No. 01 Scheme No/~~Township~~ 05. CLIFTON was handed over by me on 21/12/1995 to Mr./Mrs. Mehmood Hameed S/o Abdul Hameed representing the allottee.

The actual area of the plot is. 5815.00 sq.yds.

EXECUTIVE ENGINEER 21/12/95

Division

K.D.A. Karachi.

Dated 21/12/1995

Copy to Asstt. Director (cc.) for information

KARACHI DEVELOPMENT AUTHORITY
DIRECTORATE OF LAND AND ESTATES
(CONSTRUCTION COMPANIES CELL)

No.KDA/L&E/GUL/CC/95/ 589 Dated 20-12-95

M/s. G.S.Builders
C/o. 32/1-A, Block-6,
P.E.C.H.Society,
K a r a c h i.

SUBJECT:- POSSESSION ORDER

In continuation to this office letter No.KDA/L&E/GUL/CC/95/849 dated 17.12.1995. You are advised to obtain physical possession of Flat Site No. FL-11, Block-1, Clifton, from the Executive Engineer Scheme No-5, within 15-day's positively.

ASSISTANT DIRECTOR (CC)
ADDITIONAL DIRECTOR (R-II)
Directorate of Land Management
K. D. A.

COPY TO:-

The Executive Engineer, Clifton Division KDA, with the request you to please hand over the physical possession of the above noted flat site to M/s. G.S.Builders.

The Controller of Building's KDA.

The Accounts Officer (Rev), KDA.

ASSISTANT DIRECTOR (CC)

KARACHI DEVELOPMENT AUTHORITY
DIRECTORATE OF LAND MANAGEMENT,
(CONSTRUCTION COMPANIES CELL).

No. KDA/LAND/GUL/CC/ALLOTMENT/ 847 Dated: 17th December 1995

M/s. G.S. Builders
C/o. 32/1-A, Block-6, PECHS,
Karachi.

SUBJECT: ALLOTMENT OF FLAT SITE NO. FL-11, BLOCK NO. 1, SCHEME-NO.5, CLIFTON.

REFERENCE: G.B. Resolution Date: 05-04-1989.

Having accepted your Bid offer @ Rs. 6400/- per sq. yd. of the above plot put to auction on 14-12-1988 and having paid 100% Occupancy Value of the Flat Site No. FL-11 Block No. 1, Scheme No.5, Clifton, [illegible] This Flat Site is hereby allotted to you on the following terms and conditions:-

1. 1. The terms and conditions of sale of plots by Auction on 14.12.1988 in KDA Schemes, already accepted by you, shall be remained un-charged.

2. The word Authority wherever occurring denoting the KDA and the word company delating your concern.

3. The Company shall cause residential flats to be constructed upon the flat sites in accordance with the plans and specifications laid down by the Authority.

4. Building plans for flat sites shall be submitted by the Company for approval to the Authority within thirty days of the possession order. In case of allotment of both plots and flat sites the building plans for both shall be submitted together.

5. The period of construction for each category of plots or sites will be determined by the Authority at the time of approval of building plans and the schedule of progress fixed by the Authority shall be binding on the Company.

6. The Authority will have the right of inspect from time to time, the quality of construction so as to ensure its being technically sound according to the prescribed specifications and standard and as per approved plans and to issue such instruction from time to time as may be deemed necessary and the Company shall be bound to carry out the work accordingly. For the work of supervision of construction the company shall pay to the Authority charges as may be fixed by the Authority.

7. The Company shall at the outset construction model house of each type or one flat on the ground floor in case of flat sites as per specification and design approved by the Authority. These flats shall always be available for inspection by Officer of the Authority till the project is completed.

Contd...P/2

8. The Company shall submit progress report once in a quarter to the Authority on proforma prescribed by the Authority.

9. The Company shall not sell the houses/flats except at the prices fixed and the terms and conditions laid down by the Authority.

10. The terms and conditions of disposal of houses/flats and the procedure for such disposal shall be as laid down in Part IX of Appendix "C" of the Authority's Disposal of Land & Estates Regulation, 1965.

11. The Company shall not sell any open plot/site without construction thereon to any other construction Company/Firm or any individual unless construction has been completed on the plot/flat site.

12. The Company shall not be permitted to transfer any house flat once allotted to any individual without prior permission of the Authority. In case permission is given a mutation fee of Rs.50/- shall be charges. This permission will only be given if the Authority is satisfied that the first allottee has failed to fulfil the terms and conditions of allotment as originally agreed.

13. The Company shall maintain proper record of the applications showing particulars of the prospective purchaser, date of receipts of applications and details of payment made by each prospective purchaser. This record shall be available for inspection by any Officer of the Authority, authorized by the Director General, KDA in this behalf.

14. The Company shall be governed by the provisions regarding security deposit and penalties laid down in Part XI & XII of Appendix "C" of the Authority's Disposal of Land & Estates Regulations, 1965. In respect of penalties the decision of the Director General of the Authority shall be final and binding on the Company.

Yours faithfully,

ADDITIONAL DIRECTOR (LAND)
Directorate of Land Management

ASSISTANT DIRECTOR (CC)
Director of Land Management
K.D.A. Civic Centre, Karachi.

Copy to:-

1) The D.P & U.D. KDA
2) The C.O.B. KBCA/KDA.
3) The E.E.Scheme-5, KDA.
4. The A.O. (Rev).KDA.

ADDITIONAL DIRECTOR (LAND)

17/1/95

Sindh Building Control Authority

Civic Centre, Annexe University Road,
Gulshan-e-Iqbal, Karachi-5(Pakistan)
Phones: Tel: 021-9923029
Fax: 021-99230326
www.sbca.gov.pk

No: SBCA/DD(PSA&C)/125/Adv-132 /2022
Dated: 29 -08-2022.

New Owner
Abdul Majid Adhia S/O Haji Ahmed Adhia
CNIC No. 42301-3066183-3
Owner of Plot & Partners of
M/s Jubilee Builder & Developer
Office # 2, Hina Centre, Above Pizza Hut,
Block-13-A, Main University Road
Gulshan-e-Iqbal, Karachi.

Previous Owner
Mr. Mehmood Hameed s/o Abdul Hameed
Attorney of Co-owner & having agreement with
M/s Abid Associates
through its Partner
Mr. Jawaid Hameed S/o Abdul Hameed
NIC NO. 513-61-049512
10th Floor Adamjee House, I.I. Chandrigar Road,
Karachi.

Basement-2 (Parking + Services) + Basement-1 (ARS + Parking + Services) + Ground to 4th Floor (Parking + Services) + 5th Floor (Recreation + Services) + 6th to 45th Floors (Flats) + Roof (Solar Panel + Battery Room + Services) Only

DATE OF COMPLETION OF PROJECT: 31-12-2027

SUBJECT: REQUEST FOR DECLARATION OF **ABANDONMENT** OF THE PROJECT **"RUBY SEA WIND"** AND NO OBJECTION CERTIFICATE FOR SALE & ADVERTISEMENT OF FLATS & DUPLEX FOR THE PROJECT NEW NAME **"SEA FRONT"** PLOT NO. FL-11, BLOCK-1, SCHEME-05 CLIFTON, KARACHI.

Reference: Your application dated: 04.08.2022

I have been directed to convey the approval of the subject noted NOC. The copies of Approved Draft of Advertisement, Terms and Conditions and Specifications for Construction are enclosed. No addition or alteration is allowed in the approved documents at any stage.-

THIS NOC IS BEING ISSUED WITH THE FOLLOWING CONDITIONS:

1. Declaration Abandonment of the project namely "**RUBY SEA WIND**" earlier issued vide No. KBCA/KDA/DCB(MP)/276/ADV-17/96, Dated: 21-04-1996, in favor of above mentioned owner / attorney / builder with the condition that in future if any dispute / litigation arrived, present owner / attorney / builder shall resolved the same as per directives of SBCA and KBTPR-2002 (amended upto date) as per undertaking dated: 24-08-2022.
2. This NOC is being issued on the basis of Approval of Building Plan / Valid Construction Permit approved by Assistant Director One Window Cell / Architectural &Planning Head Quarters, SBCA, vide No. Clifton/PC-18/89/OWC/Arch: & Planning/ Construction Permit/2022/80 Dated: 28-06-2022. In case of any litigation / dispute pertain to land status / ownership / violation of approved building plan, the PSA&C Section will not be a party and this NOC will be treated as withdrawn / cancelled.
3. This NOC is being issued with the condition that the Builder will submit Security Deposit within 07 days time as allowed by Director (PSA&C), SBCA on 29.08.2022.
4. As per undertakings dated: 15.06.2022 submitted by the builder.
5. That the Builder shall follow the terms & conditions for allotment of units as prescribed in Chapter 5-1 of KB & TPR-2002 as amended up to date and Section-12 of SBCO 1979 amended up to date.

6 This NOC is being issued only for Advertisement & Marketing purpose only. Design Section is not responsible for violation in approved plan / delay in completion of project.

7 The Builder shall submit the Printed Brochure within 30 days

8 Notice Board (4'-0" X 4'-0) displaying the information material pertaining to the project should be installed at the booking office and copy of NOC, Building Plan, information regarding the covered area, Numbers of units should place on the Notice Board.

9 In case of any misrepresentation of facts the NOC/Approval will be treated as withdrawn without any notice

10 In case of any violation/deviation of the NOC/Approval will be suspended /withdrawn

11 The builder shall follow the decision of Anomaly Committee and instruction of the Authority

12 The builder shall submit list of booked units and site progress report duly verified by the License Archt. and D.D Concerned on quarterly basis.

13 Builder will execute an agreement with each individual allottee on stamp paper as per the approved Mode Agreement of KBCA in pursuance of Section 12(4) of SBCO within 30 days of booking of the unit and before issuance of allocation letter the agreement will be got countersigned and witnessed by the authorized representative of ABAD within 15 days otherwise will not be allowed to collect further payments / installments as per approved schedule of payment.

14 The concerned District (District South) is liable for the compliance of conditions in respect of NOC for Sale and Advertisement.

15 The owner / builder shall obtain the requisite NOC from SEPA before the commencement of construction of building as per DG Order vides # SBCA/Secy to DG/2021/23, Dated: 15-02-2021.

PROJECT SUMMARY

TYPE	FLOOR	NOS	COVERED AREA	UNIT PRICE
A	6th to 43th	76	956.18 Sq.ft	Rs. 1,14,75,000/-
A1	6th to 43th	76	1508.18 Sq.ft	Rs. 1,80,98,000/-
A2	6th to 43th	76	1427.91 Sq.ft	Rs. 1,71,35,000/-
XL	6th to 43th	76	2209.33 Sq.ft	Rs. 2,65,12,000/-
XL (L.L DUPLEX)	44th to 45th	02	2324.32 Sq.ft	Rs. 2,78,92,000/-
XL (U.L DUPLEX)	44th to 45th			

The above mentioned prices do not include the documentation, Corner, West Open, Road Facing charges. Extra charges will be as follows:

- Documentation charges to be clearly mentioned in schedule of payment as per clause 5-1.13 of KB & TPS 2002 (Amended up to date).
- Transfer fee will be 2% of unit price.
- Corner charges is equal to 2% of unit price can only be levied on the units facing the two CDGK's planned roads (if applicable).
- West open is equal to 2% of unit price (if applicable).
- Road facing is equal of 1% of unit price (if applicable).

Enclosure:
As above

Assistant Director
Public Sale Advertisement
& Complaints, SBCA

Copy to: -

Director (PSA&C), SBCA
Deputy Director (District South), SBCA, with the request to provide site progress report on quarterly basis & Look after the Terms & Conditions of NOC for Sale.
Assistant Director One Window Cell / Town Planning Section Head Quarters, SBCA
Deputy Director (I.T), SBCA ... with request to please insert QR Code & uploaded on SBCA Web Site.
Secretary ABAD.

Proposed Building Plan, approved vide #No. Clifton/PC-18/89/OWC/Arch: & Planning/ Construction Permit/2022/28, Dated: 28/06/2022.

NOC for Sale & Advertisement vide # SBCA/D-II/ /ADV- /2022, Dated: .2022.

M/S. JUBILEE BUILDERS & DEVELOPERS

Present

SEA FRONT

Date of Completion: 31.12.2027



PLOT NO. FL-11, BLOCK-01, KDA SCHEME-5, CLIFTON, KARACHI.

SUMMARY OF PROJECT

Type	Nos. of Unit	Floors	Covered Area "Sq. Fts."	Price in Rs.
A	76	6th to 43th	956.18	11,475,000.00
A1	76	6th to 43th	1508.18	18,098,000.00
A2	76	6th to 43th	1427.91	17,135,000.00
XL	76	6th to 43th	2209.33	26,512,000.00
XL (L.L Duplex)	2	44th to 45th	2324.32	27,892,000.00
XL (U.L Duplex)		44th to 45th		

Schedule of Payment

As approved by SBCA.

NOTE: Payment according to the Schedule Approved by SBCA. The above mentioned Price do not include the Documentation, Corner, West Open, Road Facing Charges & Transfer Fee. Extra Are Following,

Documentation Charges as per Clause 5-1.13 of KB&TPR 2002 -2011 to be Clearly Mentioned in Schedule of Payment.

1-	Corner Charges	=	2% of unit Price
2-	West open	=	2% of unit Price
3-	Road Facing	=	1% of unit Price
4-	Transfer Fee	=	0.5 % of unit Price

M/S. JUBILEE BUILDERS & DEVELOPERS, (BL-2532)

Head Office situated 2, HINA CENTRE, ABOVE PIZZA HUT, BLOCK-13-A, MAIN UNVERSITY ROAD, GULSHAN-E-IQBAL, KARACHI.

Lic. Arch:	Syed Akbar Jamil (AL-01-584)
Lic. Engr:	Syed Muaffar Hasan (SE-06-209)

Dy. Director (Design-II)
Sindh Building Control Authority
Civic Centre Annexe,
University Road,
Gulshan-e-Iqbal, Karachi.

Deputy Director
Public Relations Section
K.B.C.A.

KARACHI DEVELOPMENT AUTHORITY (L.M. DEPTT.
CCCKDA

CITY DISTRICT GOVERNMENT KARACHI

REVENUE GROUP OF OFFICES

(Note: Details of other Owners are mentioned at back Page.)

LAND MANAGEMENT (DEFUNCT KDA) 018997

Computer #: 000000048790
Print Date: 20-05-2019

TRANSFER / MUTATION ORDER

Despatch #: ccc/554/L
Date: 14-6-2019

SCHEME: 005 CLIFTON | NATURE: FLAT SITE

Name & Address of Allottee	Category FL	
M/S.JUBLEE BUILDERS & DEVELOPERS F/H : THR.ITS PARTNERS ABDUL MAJEED(50%SH HOUSE # FL-11, BLOCK-1, CLIFTON, KARACHI.	Plot No: 11 Block/Sector No: 1	
	Plot Size (In sq. yds): 5815	Rate (per sq.yd.): Rs. 6,400.00
CNIC # 42301-3066183-3	Application # 1/14938	

The competent authority has been pleased to transfer/mutate the occupancy / leasehold rights of the above noted plot in your name by way of **Pre-Lease Transfer** on the same terms and conditions on which the plot was originally alloted to Mr./ Ms. **G.S.BUILDER F/H Name**

No relaxation in the construction period shall be allowed on account of this transfer/mutation and it shall be expired in years from date of possession order. In case of failure to complete construction on the above period, the allotment/transfer/mutation order shall be cancelled without any further notice.

The following documents have been surrendered in original by the transferee/mutatee/allottee and they have been kept on record.

1.
2.
3.
4.

Special Instructions:

Deputy District Officer

14/6/19
ASSISTANT DIRECTOR-IV
Construction Complaints Cell
Land Management
(KDA)

Copy forwarded for information/necessary action to:

1. Additional District Officer, W&SGO, CDGK **CLIFTON Div**
2. Office Copy

Deputy District Officer

3. Last Owner copy M/S.JUBLEE BUILDERS & DEVELOPERS & OTHER F/H THRO PATNER:ABDUL

Printed by 183

Ch No 86.
Date. 14-6-15
Rs. 232 600.

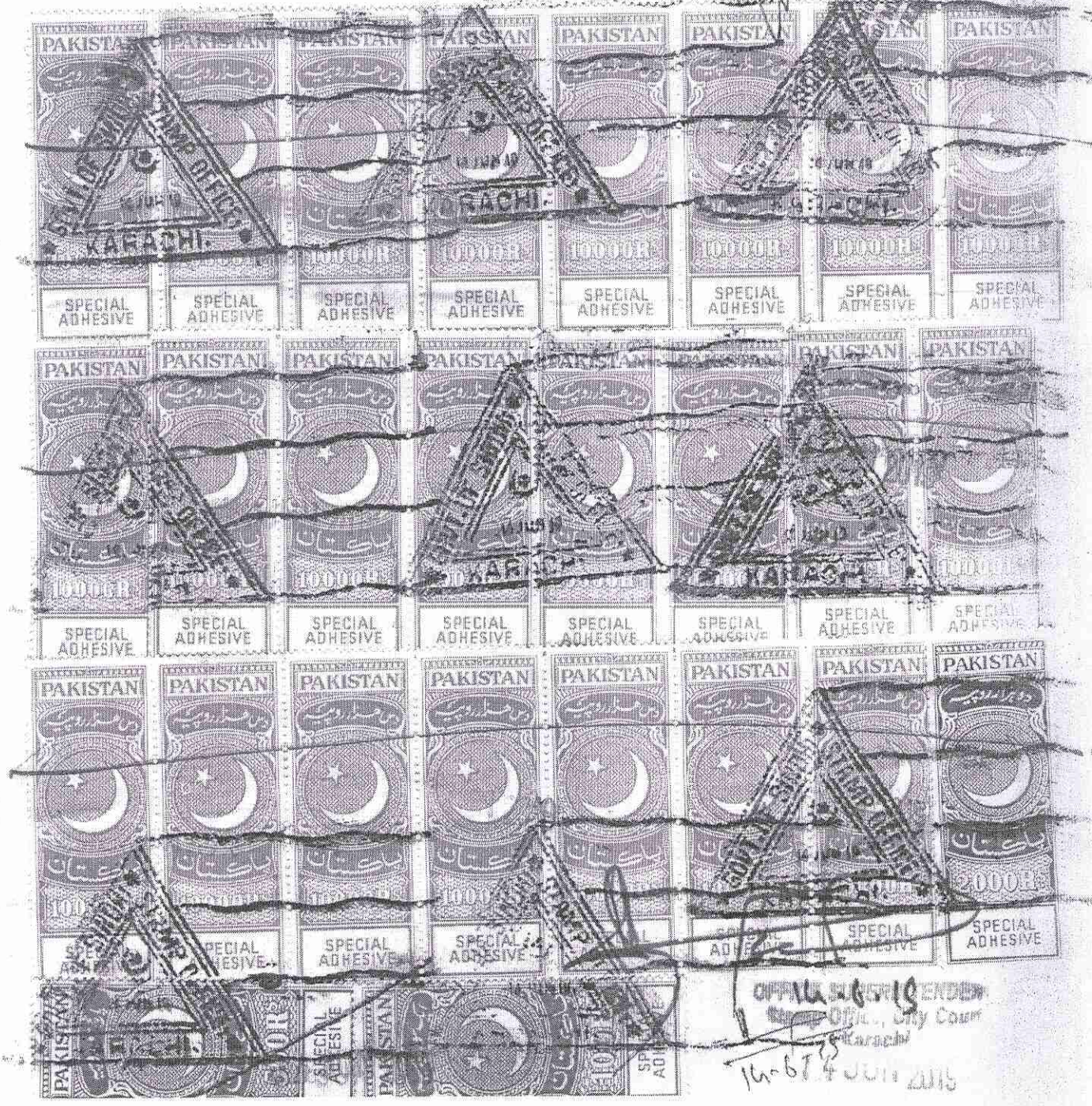
NAME OF OTHER TRANSFREE

Sr.#:	Name / F.H. Name: / NIC / CNIC :	PHOTO:	Sr.#:	Name / F.H. Name: / NIC / CNIC :	PHOTO:
2	MUHAMMAD NAEEM (12.50% SHAI ABDUL QADIR 42201-0438997-1		3	KHUBAB AHMED (12.50% SHARE) MUHAMMAD AHMED 42301-8953353-3	
5	MUHAMMAD BILAL (12.50% SHARI ABDUL RAUF 42201-0341980-3		4	OWAIS AHMED (12.50% SHARE) MUHAMMAD AHMED 42301-0893762-9	

Deputy District Officer

14/6/15

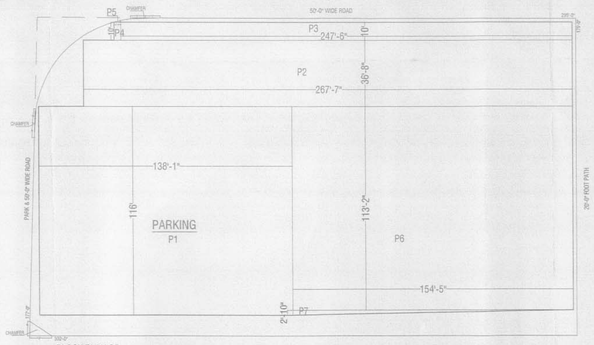
DIRECTOR-IV
Companies Cell
SECP



OFFICIAL SUPERINTENDENT
Nazir's Office, City Court
Karachi

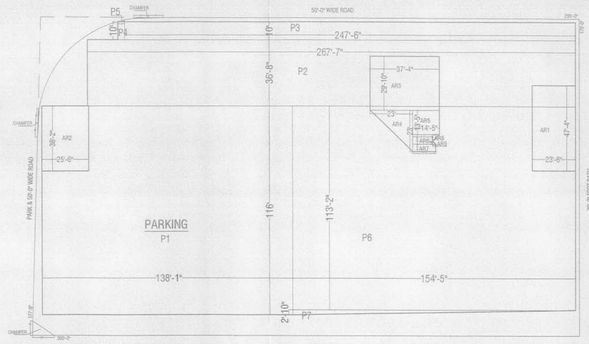
14-6-15

Annex II: Floor Plans



BLOCK PLAN OF BASEMENT -2 (PROJECT PARKING)

300'-0" WIDE MARINE PROMINADE



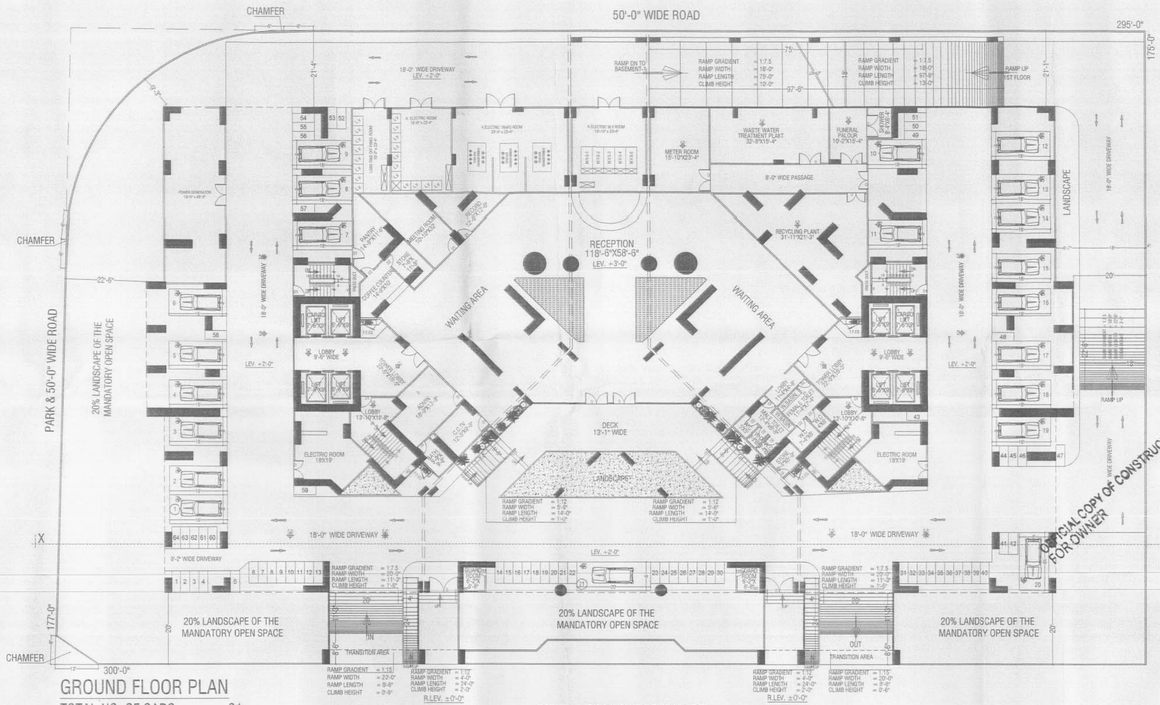
BLOCK PLAN OF BASEMENT -1 (PROJECT PARKING)

300'-0" WIDE MARINE PROMINADE

OFFICIAL COPY OF CONSTRUCTION PERMIT
FOR OWNER

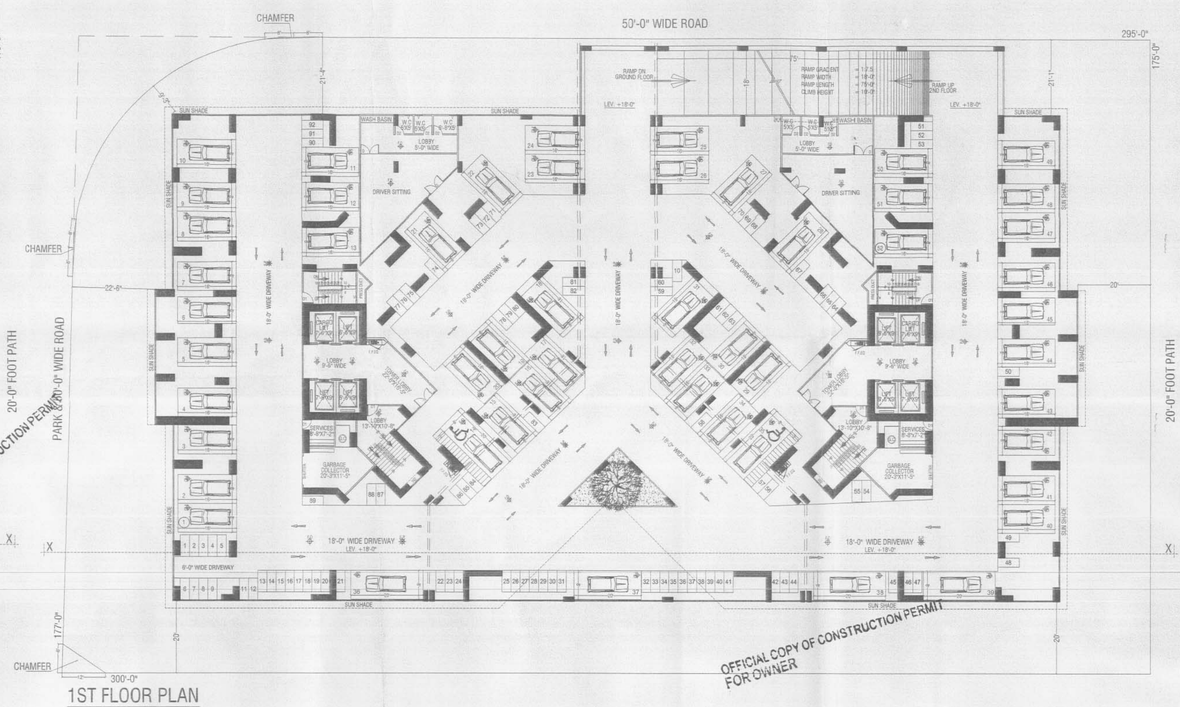
CONSTRUCTION PERMIT / FINAL APPROVAL
OF BUILDING PLAN THROUGH
ONE WINDOW CELL / ARCHITECTURAL & PLANNING
SINDH BUILDING CONTROL AUTHORITY (HQ)
WITH THE CONDITIONS MENTION AS PER
LETTER No: CLIFTON/E-18/89/one Arch/Planning/2022/80
DATED: 28/06/2022

Assistant Director
One Window Cell / Architectural
& Planning (HQ)
SINDH BUILDING CONTROL AUTHORITY
28/06/22



GROUND FLOOR PLAN

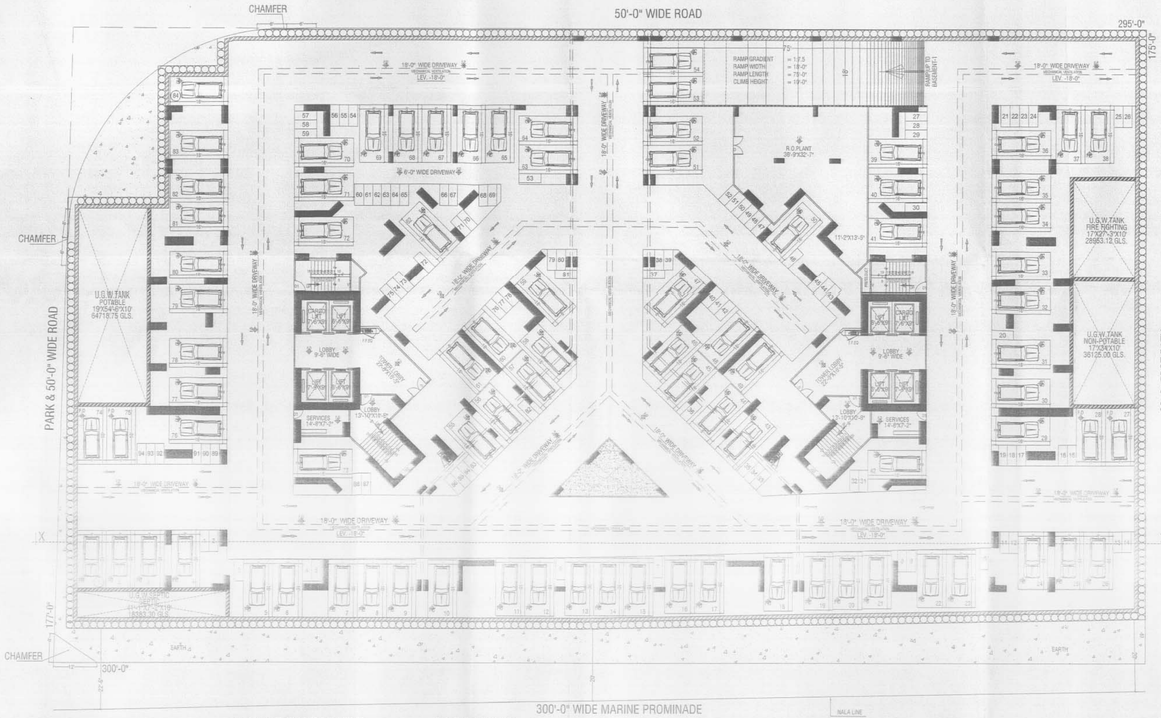
TOTAL NO. OF CARS = 21
TOTAL NO. OF M/C. = 64



1ST FLOOR PLAN

TOTAL NO. OF CARS = 52
TOTAL NO. OF M/C. = 92

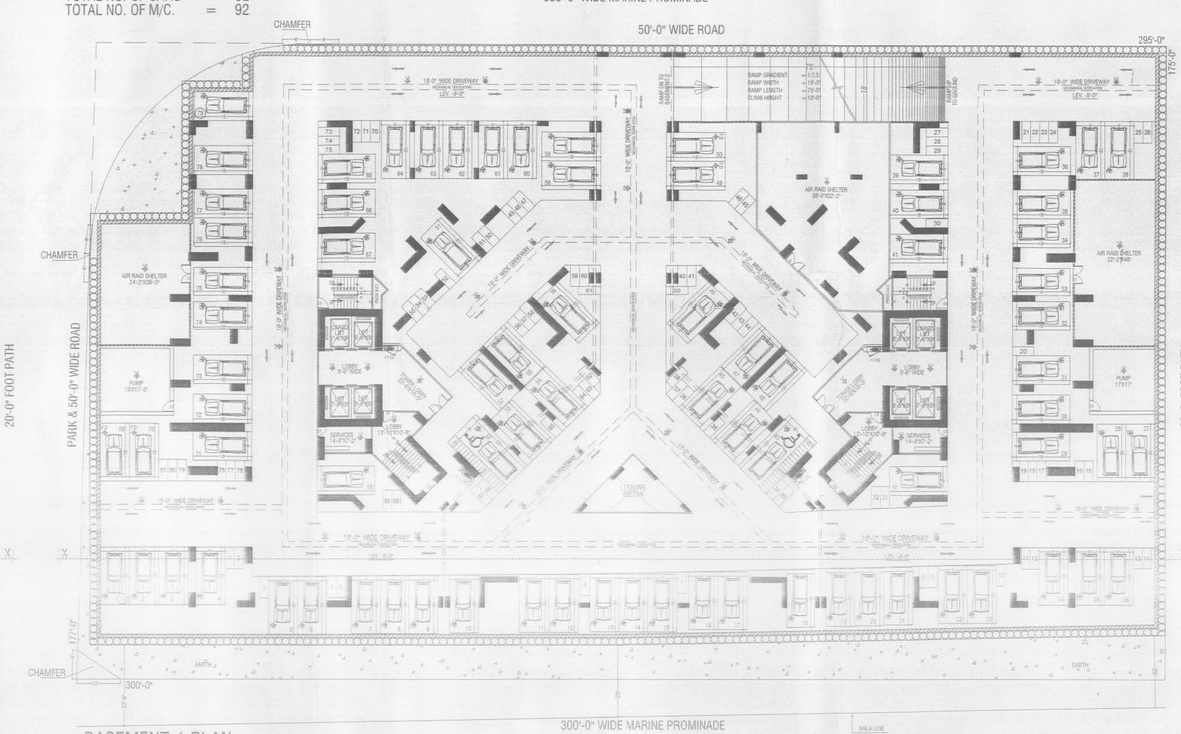
OFFICIAL COPY OF CONSTRUCTION PERMIT
FOR OWNER



BASEMENT-2 PLAN

TOTAL NO. OF CARS = 84
TOTAL NO. OF M/C. = 94

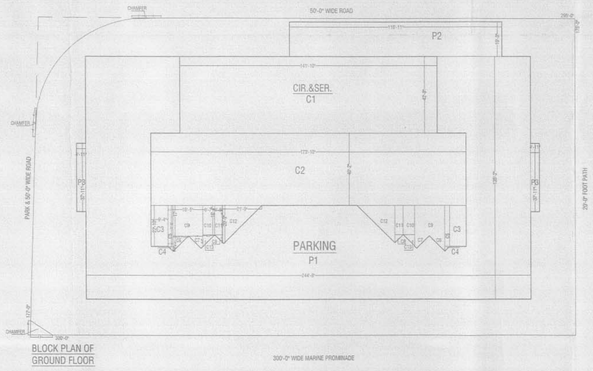
U.G.W.TANK POTABLE = 64718.75 GLS.
U.G.W.TANK NON-POTABLE = 36125.00 GLS.
U.G.W.TANK FIRE FIGHTING = 28953.12 GLS.
U.G.W.SEPTIC TANK = 18383.30 GLS.



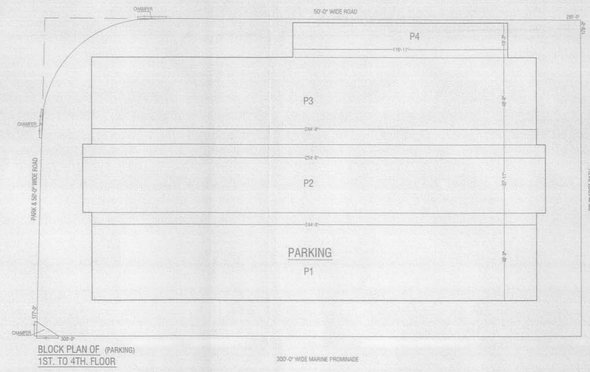
BASEMENT-1 PLAN

TOTAL NO. OF CARS = 79
TOTAL NO. OF M/C. = 81

ADDRESS: PROPOSED BUILDING PLAN ON PLOT NO. FL-11, BLOCK NO: 01,SCHEME NO-05, KARACHI.	NORTH: N W E S	SCALE: 1/16" = 1'-0" / SHEET NO. 01/05	OWNER / ATTORNY:	ENGINEER: SYED MUZAFFAR HASAN Structural Engineer, P.E. K.B.C.A. Lic. No. SE-05-225 P.E.C. Regn. No. Consult / 922	ARCHITECT SYED AKBAR JAMIL S.B.C.A. ARCHITECT LIC. AL-3184 101, RIZVI TRADE CENTER, GULSHAN-E-IQBAL, KARACHI.



BLOCK PLAN OF
GROUND FLOOR



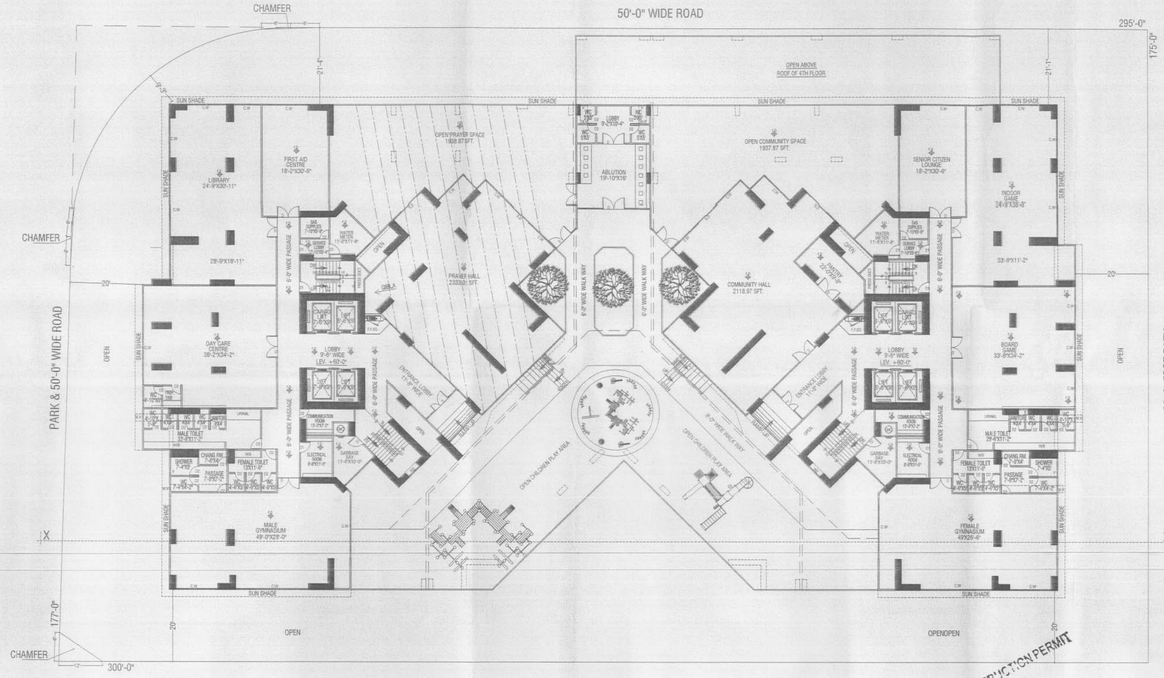
BLOCK PLAN OF (PARKING)
1ST. TO 4TH. FLOOR

OFFICIAL COPY OF CONSTRUCTION PERMIT
FOR OWNER

CONSTRUCTION PERMIT / FINAL APPROVAL
OF BUILDING PLAN THROUGH
ONE WINDOW CELL / ARCHITECTURAL & PLANNING
SINDH BUILDING CONTROL AUTHORITY (HQ)
WITH THE CONDITIONS MENTION AS PER
LETTER No: Clftn/Dc-185/89/owc/Arch & Planning/2022/80
DATED: 28/06/2022

Assistant Director
One Window Cell / Architectural
& Planning
Sindh Building Control Authority

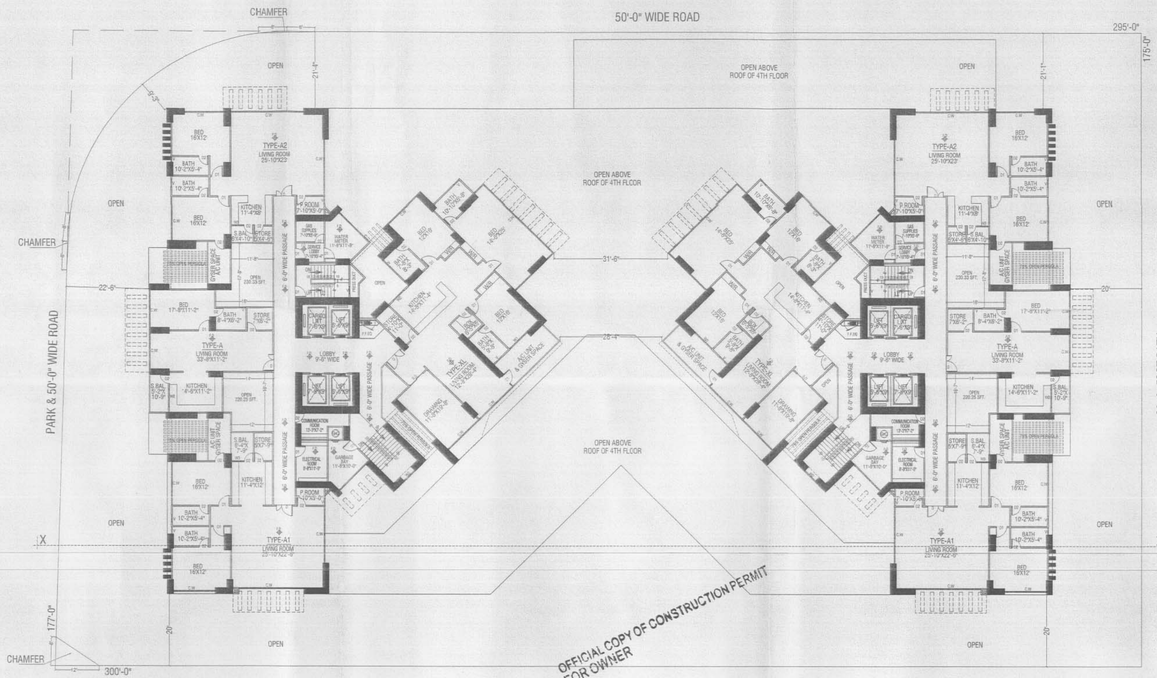
28/06/22



5TH.FLOOR PLAN
RECREATION

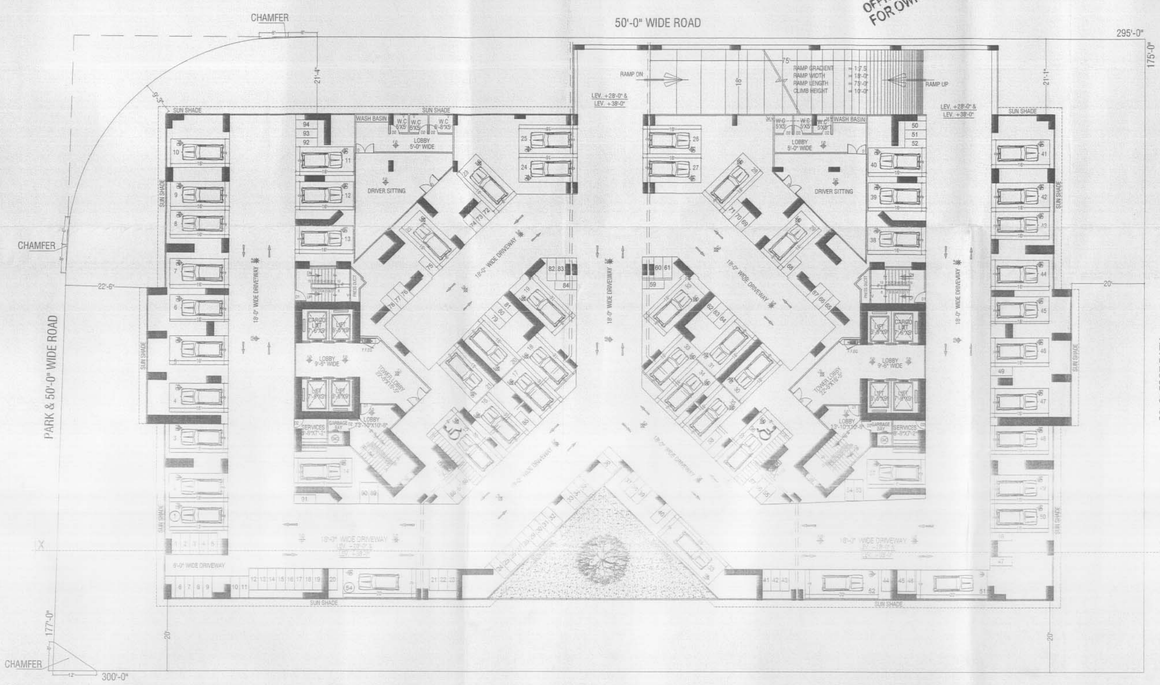
300'-0" WIDE MARINE PROMINADE

OFFICIAL COPY OF CONSTRUCTION PERMIT
FOR OWNER



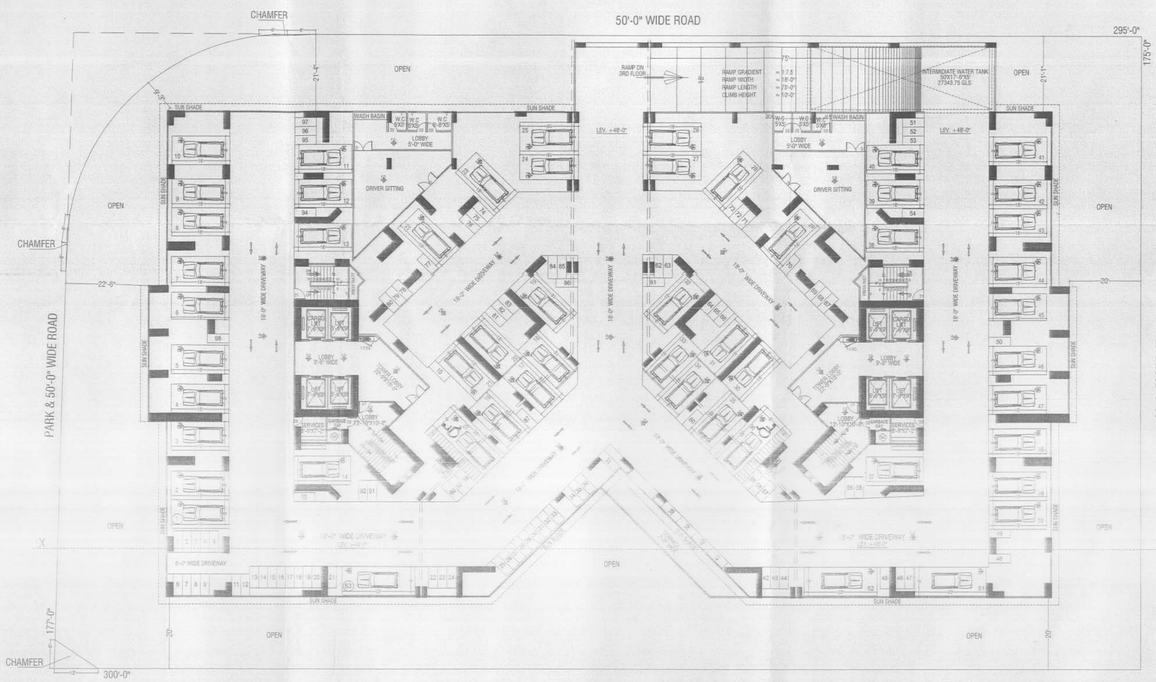
TYPICAL FLOOR PLAN
6TH. TO 43RD. FLOOR PLAN
TOTAL NO. OF FLATS = (08 X 38) = 304

300'-0" WIDE MARINE PROMINADE



2ND & 3RD FLOOR PLAN
TOTAL NO. OF CARS = 54 X 2 = 108 CARS
TOTAL NO. OF M/C. = 94 X 2 = 188 M/C.

300'-0" WIDE MARINE PROMINADE



4TH FLOOR PLAN
TOTAL NO. OF CARS = 53 INTERMIDIATE WATER TANK = 27343.75 GLS.
TOTAL NO. OF M/C. = 98

300'-0" WIDE MARINE PROMINADE

ADDRESS :

PROPOSED BUILDING PLAN ON PLOT NO. FL-11, BLOCK NO: 01,SCHEME NO-05, KARACHI.

NORTH : N W E S

SCALE: 1/16" = 1'-0"

SHEET NO. 02/05

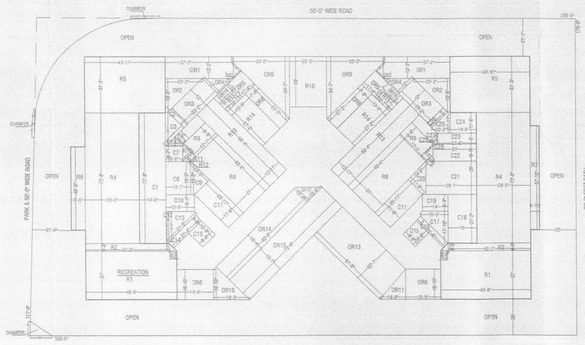
OWNER / ATTORNY :

ENGINEER:

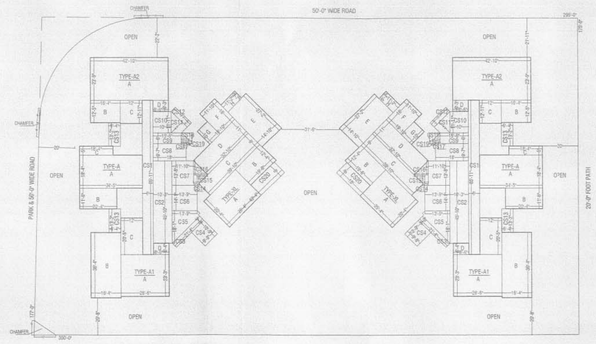
SYED MUZAFFAR HASAN
Structural Engineer, P.E.
K.B.C.A. Lic. No. SE-06-299
P.E.C. Regn. No. Consult / 622

ARCHITECT

SYED AKBAR JAMIL
S.B.C.A. ARCHITECTS-AG-01-594
109, RIAZ TRADE CENTER
OFF SHAHRAH-E-FAISAL, KARACHI.



BLOCK PLAN OF
5TH FLOOR

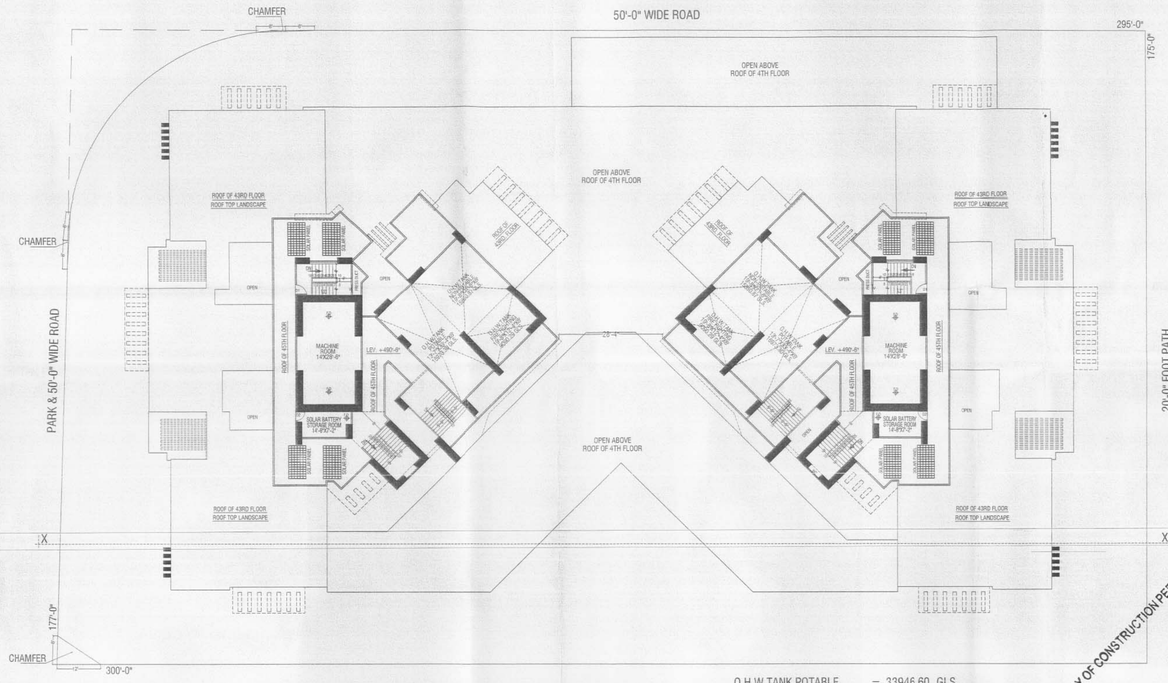


BLOCK PLAN OF 6TH TO 43RD. FLOOR

OFFICIAL COPY OF CONSTRUCTION PERMIT
FOR OWNER

CONSTRUCTION PERMIT / FINAL APPROVAL
OF BUILDING PLAN THROUGH
ONE WINDOW CELL / ARCHITECTURAL & PLANNING
SINDH BUILDING CONTROL AUTHORITY (HQ)
WITH THE CONDITIONS MENTION AS PER
LETTER No: Clifton/EC-18/89/Plan-6/arch/Planning/2022/80
DATED: 28/06/2022

Assistant Director
One Window Cell / Architectural
& Planning (HQ)
SINDH BUILDING CONTROL AUTHORITY
28/06/22

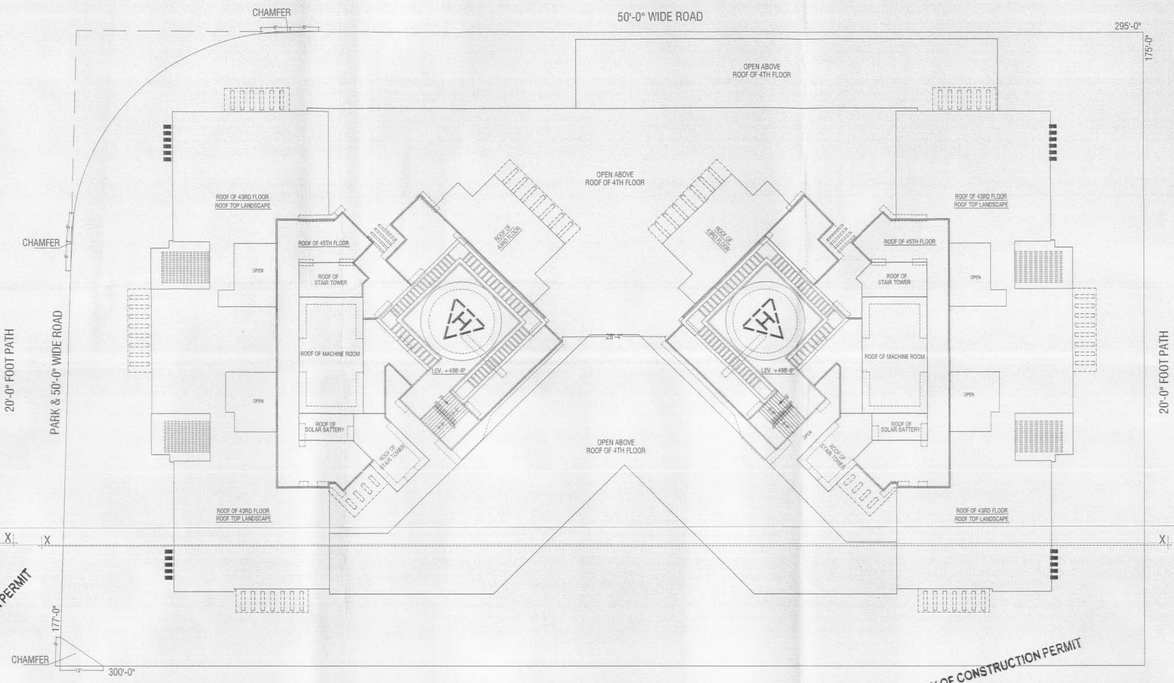


MECHANICAL FLOOR PLAN

O.H.W.TANK POTABLE = 33946.60 GLS.
O.H.W.TANK NON-POTABLE = 31701.74 GLS.
O.H.W.TANK FIRE FIGHTING = 18180.58 GLS.

300'-0" WIDE MARINE PROMINADE

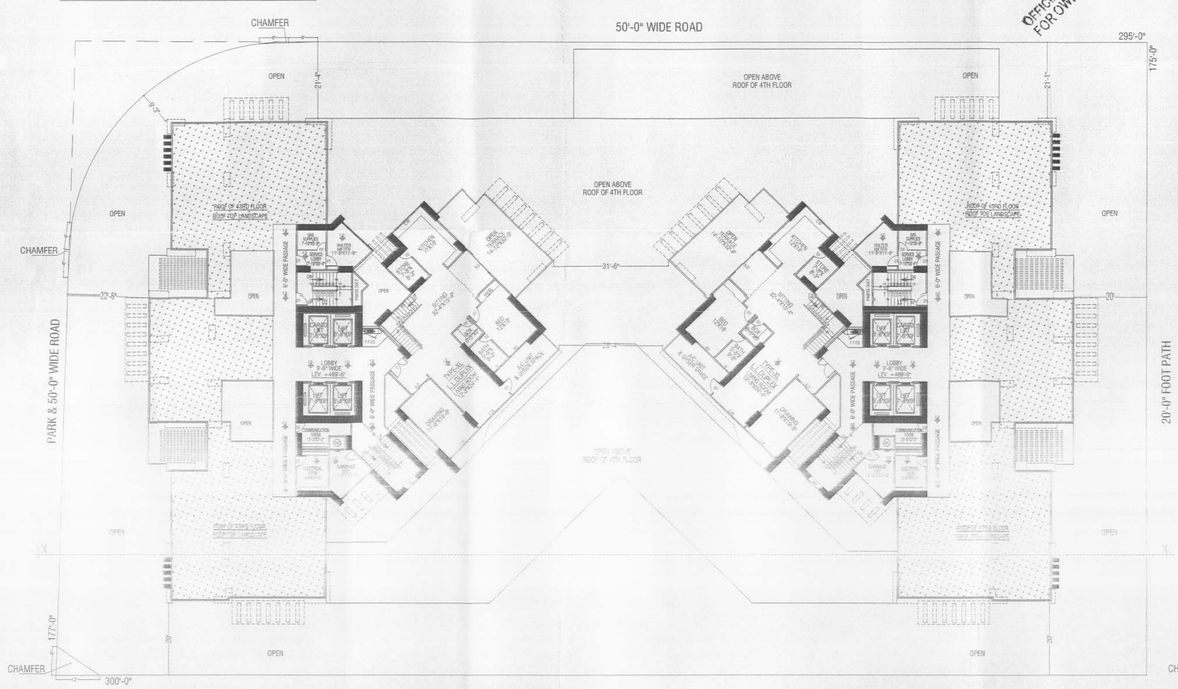
OFFICIAL COPY OF CONSTRUCTION PERMIT
FOR OWNER



HELIPAD

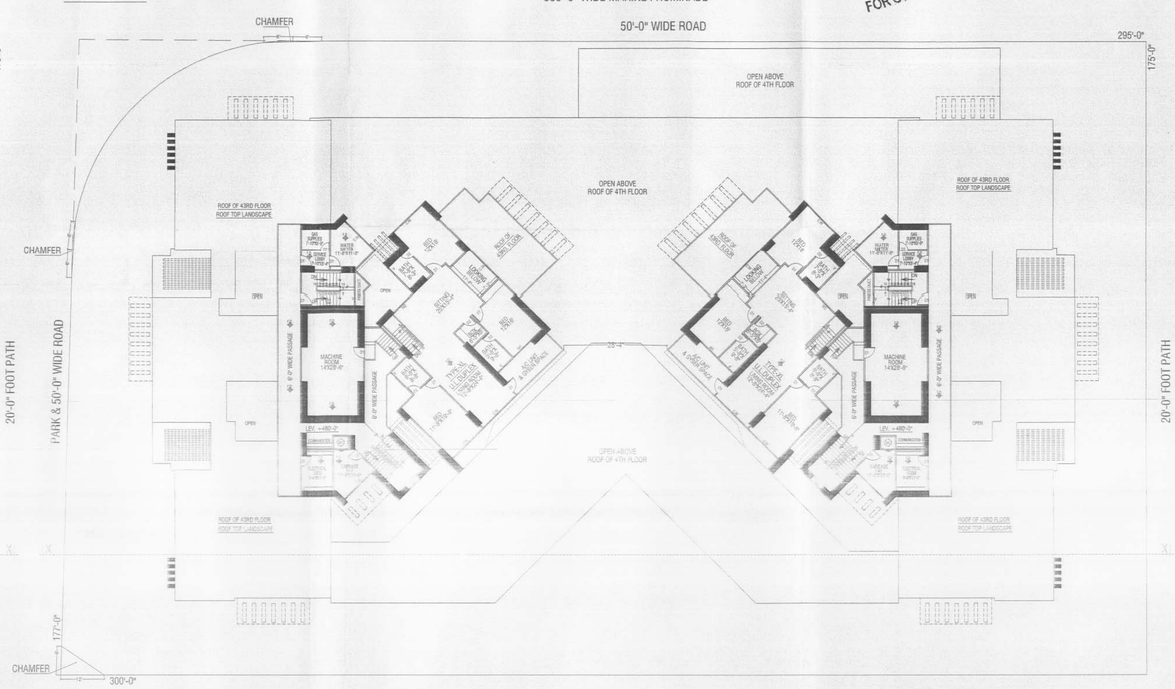
300'-0" WIDE MARINE PROMINADE

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44TH. FLOOR PLAN
TOTAL NO. OF L.L. DUPLEX = 02

300'-0" WIDE MARINE PROMINADE



45TH FLOOR PLAN
TOTAL NO. OF U.L. DUPLEX = 02

300'-0" WIDE MARINE PROMINADE

ADDRESS :

PROPOSED BUILDING PLAN ON PLOT NO. FL-11, BLOCK NO: 01,SCHEME NO-05, KARACHI.

NORTH : N W E S

SCALE: 1/16" = 1'-0"

SHEET NO. 03/05

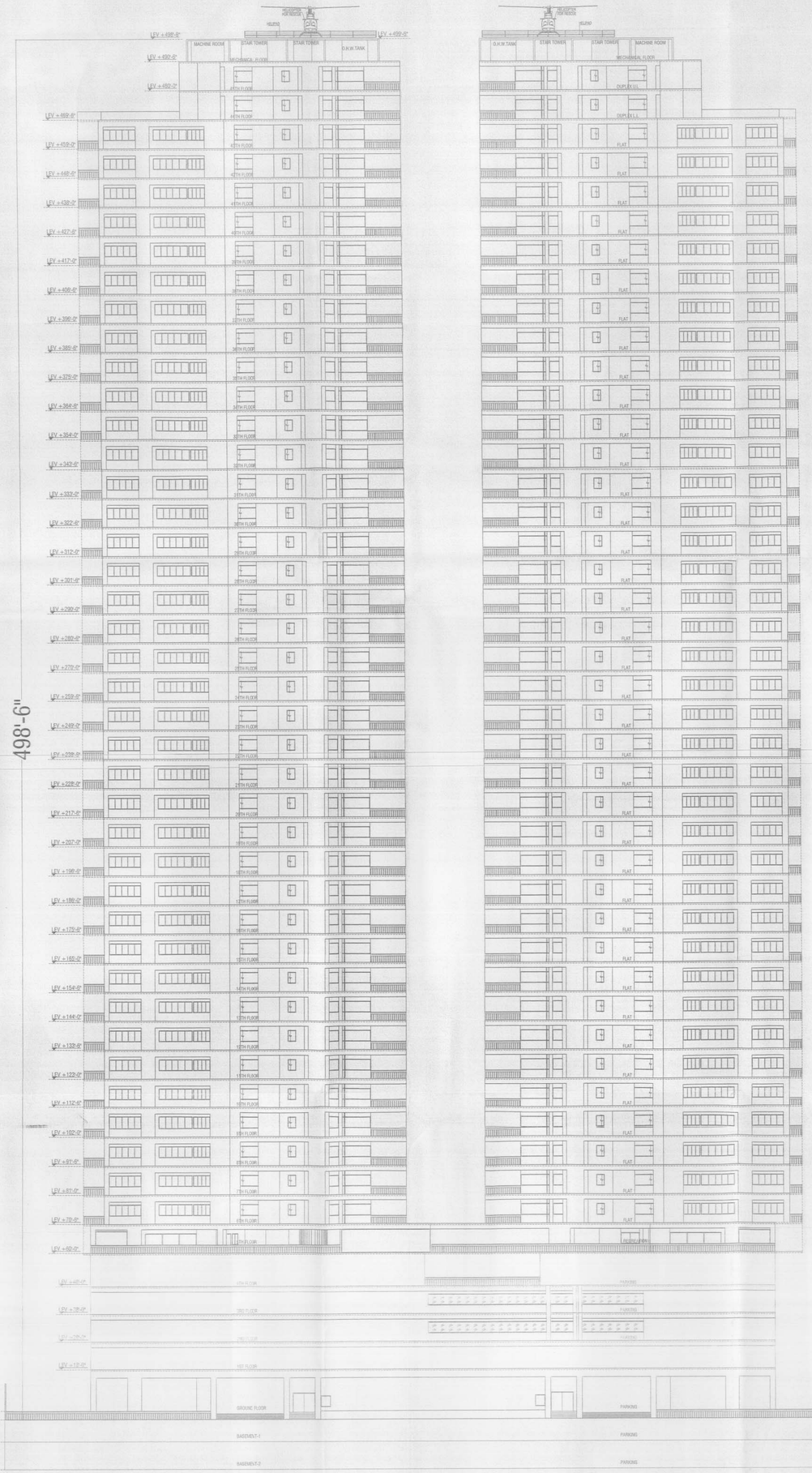
OWNER / ATTORNY :

ENGINEER:

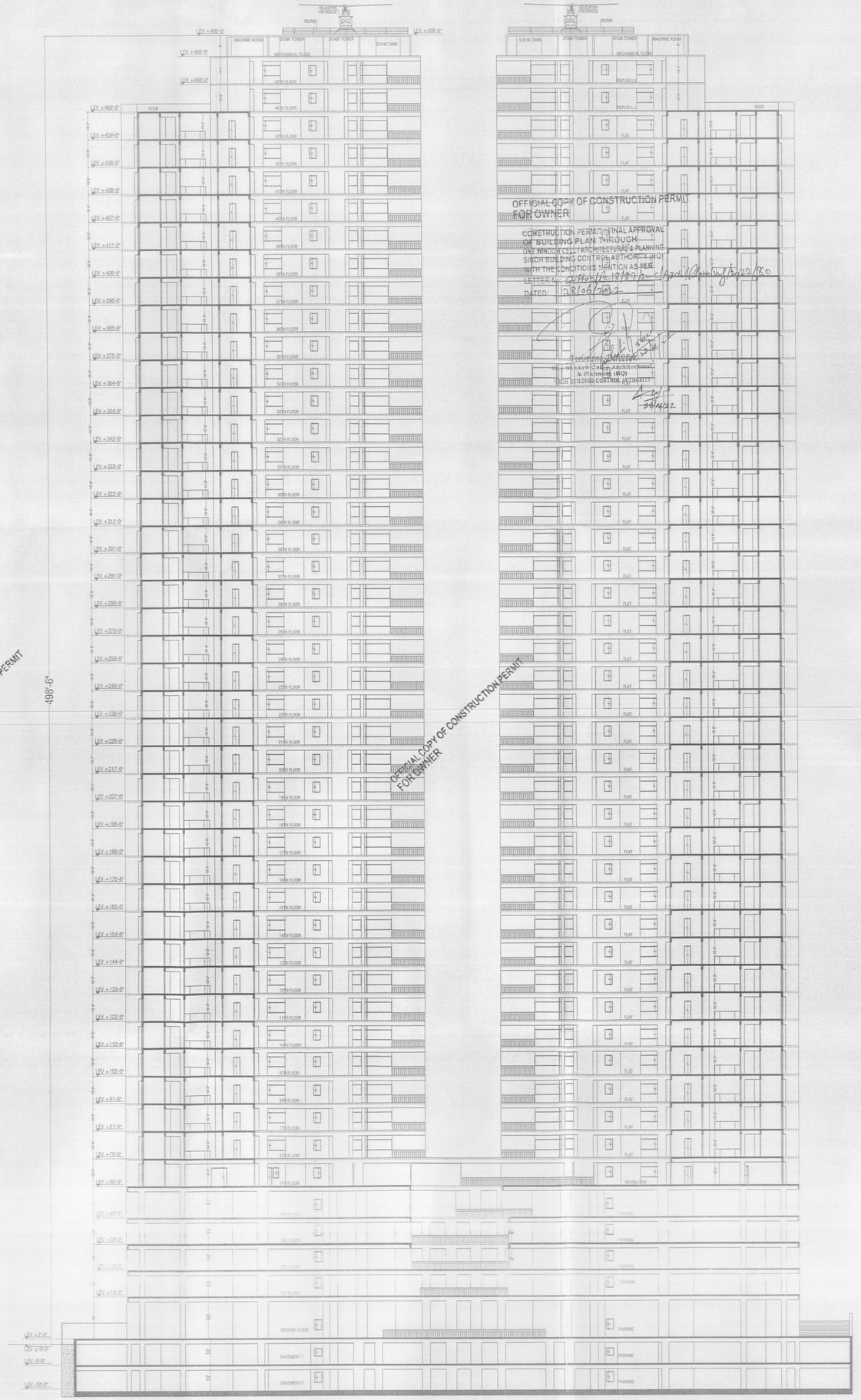
SYED MUZAFFAR HASAN
Structural Engineer, P.E.
K.B.C.A. Lic. No. 05-75-209
P.E.C. Regn. No. Consult / 622

ARCHITECT

SYED AKBAR JAMIL
S.B.C.A. ARCHITECT LIC. 01-01-584
103, MERI TRADE CENTER
GULSHAN-E-IQBAL, KARACHI.



FRONT ELEVATION



SECTION AT X-X

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OFFICIAL COPY OF CONSTRUCTION PERMIT FOR OWNER

CONSTRUCTION PERMIT/FINAL APPROVAL OF BUILDING PLAN THROUGH ONE WINDOW CELL FARCHITECTURE & PLANNING SINDH BUILDING CONTROL AUTHORITY (SBCA) WITH THE CONDITIONS MENTION AS PER LETTER No. 28/06/14-18/82/0-C/Arch/Planning/2022/80 DATED: 28/06/2022

Victoria Director
Cell, Architectural & Planning (BO)
SINDH BUILDING CONTROL AUTHORITY
30/6/22.

ADDRESS :

PROPOSED BUILDING PLAN ON PLOT NO. FL-11, BLOCK NO: 01,SCHEME NO-05, KARACHI.

NORTH : N W E S

SCALE: 1/16" = 1'-0"

SHEET NO. 04/05

OWNER / ATTORNY :

ENGINEER:

SYED MUZAFFAR HASAN
Structural Engineer, P.E.
K.B.C.A. Lic. No. SE-06-210
P.E.C. Regn. No. Consult / 622

ARCHITECT

SYED AKBAR JAMIL
S.B.C.A. ARCHITECT LIC. NO. AL-01-584
103, KUTUB TOWER CENTER,
GULSHAN-E-IQBAL, KARACHI.

REQUIRED FOR ARRAAD SHELTER			
TYPE	FLATS / FLOOR	NO. OF FLOOR	TOTAL UNITS IN PROJECT
2-BED	06 FLATS	6TH. TO 43TH. FLOOR	228
3-BED	02 FLATS	6TH. TO 43TH. FLOOR	76
4-BED	02 DUPLEX	44TH. & 45TH. FLOOR	02

AVERAGE OF 04 PERSON IN 02 - BED APPARTMENT
AVERAGE OF 06 PERSON IN 03 - BED APPARTMENT

2-BED =	228 X 04	= 912
3-BED =	76 X 06	= 456
4-BED =	02 X 06	= 12
TOTAL PERSON IN PROJECT		= 1380
1380 / 4 = 345		= 345
345 X 10.76		= 3712.20 SQFT FOR FLATS
REQUIRED AIR RAID SHELTER		= 3712.20 SQFT
PROPOSED AIR RAID SHELTER		= 3722.47 SQFT

DEDUCTIONS

PARKING	(ON BASEMENT-2)	=	46031.71 SQ.FT
PARKING	(ON BASEMENT-1)	=	46031.71 SQ.FT
PARKING	(ON GROUND FLOOR)	=	20759.85 SQ.FT
PARKING	(ON 1ST. FLOOR)	=	35691.78 SQ.FT
PARKING	(ON 2ND. FLOOR)	=	35691.78 SQ.FT
PARKING	(ON 3RD. FLOOR)	=	35691.78 SQ.FT
PARKING	(ON 4TH. FLOOR)	=	35691.78 SQ.FT
RECREATION	(5% ALLOWABLE)	=	23550.75 SQ.FT
CIRCULATION & SERVICES	(ALL FLOORS)	=	218397.81 SQ.FT
ROOF SERVICES		=	2035.31 SQ.FT
TOTAL		=	499574.26 SQ.FT
962234.39 - 499574.26		=	462660.13 SQ.FT
TOTAL		=	462660.13 SQ.FT

SUMMARY OF PARKING

FLATS AREA			462660.13 SQ.FT
462660.13 / 1000		462.66 SAY	463 CARS
REQUIRED CAR PARKING			463 CARS
M.C / C.P = 16% OF 463 = 74.08 CARS		SAY	74 CARS
REQUIRED CAR PARKING	463 - 74	=	389 CARS
M.C / C. PARKING	74 X 6	=	444 M.C
DISABLE CAR PARKING			
389 / 50 = 7.78 (I/C IN PROVIDED CARS)			08 CARS
PROVIDED PARKING			
BASEMENT-2		=	84 CARS
BASEMENT-1		=	79 CARS
GROUND FLOOR		=	21 CARS
1ST. FLOOR		=	52 CARS
2ND. FLOOR		=	54 CARS
3RD. FLOOR		=	54 CARS
4TH. FLOOR		=	53 CARS
TOTAL PROVIDED CAR PARKING		=	397 CARS
BASEMENT-2		=	94 M/C
BASEMENT-1		=	81 M/C
GROUND FLOOR		=	64 M/C
1ST. FLOOR		=	92 M/C
2ND. FLOOR		=	94 M/C
3RD. FLOOR		=	94 M/C
4TH. FLOOR		=	98 M/C
TOTAL PROVIDED M/C PARKING		=	617 M/C

DETAIL OF TANKS

REQUIREMENT OF U.G.W.TANK PER APARTMENT		500 GLS.
REQUIREMENT OF O.H.W.TANK PER APARTMENT		250 GLS.
NOS. OF APARTMENT IN PROJECT		306 UNIT
REQUIRED U.G.W.TANK	(306X500)	153000.00 GLS.
REQUIRED O.H.W.TANK	(306X250)	76500.00 GLS.
PROVIDED U.G.W.TANK		158276.42 GLS.
PROVIDED O.H.W.TANK		83828.92 GLS.
PROVIDED INTERMEDIATE TANK		27343.75 GLS.

SUMMARY

BASEMENT -2	(PARKING)	=	46031.71 SQ.FT
BASEMENT -1	(PARKING)	=	46031.71 SQ.FT
GROUND FLOOR	(PARKING & SERVICES)	=	35691.02 SQ.FT
1ST FLOOR	(PARKING)	=	35691.78 SQ.FT
2ND FLOOR	(PARKING)	=	35691.78 SQ.FT
3RD FLOOR	(PARKING)	=	35691.78 SQ.FT
4TH FLOOR	(PARKING)	=	35691.78 SQ.FT
5TH FLOOR	(RECREATION)	=	20897.82 SQ.FT
6TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
7TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
8TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
9TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
10TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
11TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
12TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
13TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
14TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
15TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
16TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
17TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
18TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
19TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
20TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
21ST FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
22ND FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
23RD FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
24TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
25TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
26TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
27TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
28TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
29TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
30TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
31ST FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
32ND FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
33RD FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
34TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
35TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
36TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
37TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
38TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
39TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
40TH FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
41ST FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
42ND FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
43RD FLOOR	(FLATS+CIRCULATION & SERVICES)	=	17191.56 SQ.FT
44TH FLOOR	(L.L.DUPLEX+CIRCULATION & SERVICES)	=	7841.70 SQ.FT
45TH FLOOR	(U.L.DUPLEX+CIRCULATION & SERVICES)	=	7658.72 SQ.FT
ROOF SERVICES	(SERVICES)	=	2035.31 SQ.FT
TOTAL		=	962234.39 SQ.FT

SUMMARY OF 6TH TO 43RD FLOOR (EACH FLOOR)

TYPE	NET AREA	NOS	TOTAL AREA
TYPE-XL	2209.31 SQ.FT	02	4418.62 SQ.FT
TYPE-A	956.17 SQ.FT	02	1912.34 SQ.FT
TYPE-A1	1508.10 SQ.FT	02	3016.20 SQ.FT
TYPE-A2	1427.89 SQ.FT	02	2855.78 SQ.FT
CIRCULATION & SERVICES	2494.31 SQ.FT	02	4988.62 SQ.FT
TOTAL		08 FLATS	17191.56 SQ.FT

SUMMARY OF 44TH. FLOOR

TYPE	NET AREA	NOS	TOTAL AREA
TYPE-XL L.L.DUPLEX	1744.26 SQ.FT	02	3488.52 SQ.FT
CIRCULATION & SERVICES	2176.59 SQ.FT	02	4353.18 SQ.FT
TOTAL			7841.70 SQ.FT

SUMMARY OF 45TH. FLOOR

TYPE	NET AREA	NOS	TOTAL AREA
TYPE-XL U.L.DUPLEX	1652.77 SQ.FT	02	3305.54 SQ.FT
CIRCULATION & SERVICES	2176.59 SQ.FT	02	4353.18 SQ.FT
TOTAL			7658.72 SQ.FT

DETAIL OF SERVICES

SERVICES AREA					
S1	=	18'-0" X 32'-6" X2	=	1170.00 SQ.FT.
S2	=	15'-4" X 7'-6" X2	=	229.95 SQ.FT.
S3	=	11'-1" X 15'-0" X2	=	332.40 SQ.FT.
S4	=	15'-5" X 9'-10" X2	=	302.96 SQ.FT.
TOTAL			=	2035.31 SQ.FT.

SUMMARY OF CIRCULATION & SERVICES

FLOOR	TOTAL AREA
GROUND FLOOR	14931.17 SQ.FT
5TH. FLOOR	5192.72 SQ.FT
6TH. TO 43RD. FLOOR (4988.62 X 38)	189567.56 SQ.FT
44TH. & 45TH. FLOOR (4353.18 X 02)	8706.36 SQ.FT
TOTAL	218397.81 SQ.FT

SUMMARY OF UNITS

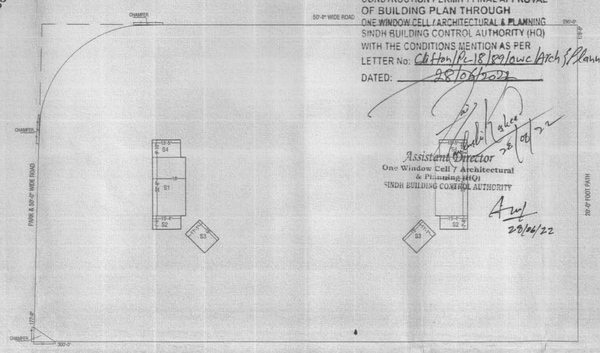
TYPE	TOTAL UNITS
TYPE-XL	76
TYPE-A	76
TYPE-A1	76
TYPE-A2	76
TYPE-XL DUPLEX	02
TOTAL	306

OFFICIAL COPY OF CONSTRUCTION PERMIT FOR OWNER

CONSTRUCTION PERMIT / FINAL APPROVAL OF BUILDING PLAN THROUGH ONE WINDOW CELL FARCHITECTURAL & PLANNING SINDH BUILDING CONTROL AUTHORITY (HQ) WITH THE CONDITIONS MENTION AS PER LETTER No: CB Hon/Fc-18/89/Lawic Arch & Planning/2022/80 DATED: 28/04/2022

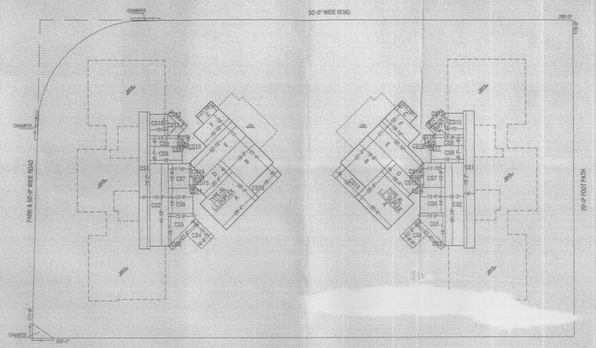
Assistant Director
One Window Cell / Architectural & Planning (HQ)
SINDH BUILDING CONTROL AUTHORITY

29/04/22



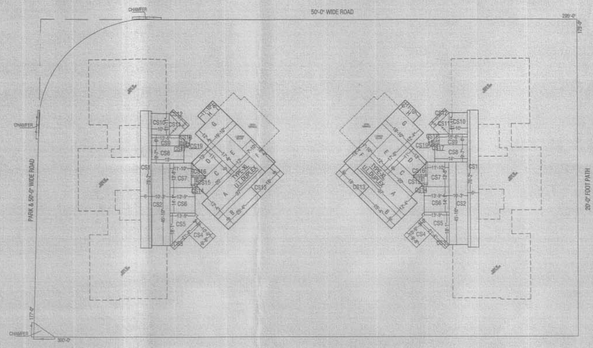
BLOCK PLAN OF ROOF SERVICES

300'-0" WIDE MARINE PROMINADE



BLOCK PLAN OF 44TH FLOOR

300'-0" WIDE MARINE PROMINADE



BLOCK PLAN OF 45TH FLOOR

300'-0" WIDE MARINE PROMINADE

TYPE-A :

A	=	34'-5" X 18'-4"	=	630.73 SQ.FT.
B	=	20'-4" X 11'-6"	=	233.79 SQ.FT.
C	=	18'-4" X 5'-0"	=	91.65 SQ.FT.
TOTAL			=	956.17 SQ.FT.

TYPE-A1 :

A	=	26'-6" X 23'-3"	=	616.12 SQ.FT.
B	=	16'-4" X 36'-4"	=	593.26 SQ.FT.
C	=	12'-0" X 20'-5"	=	244.92 SQ.FT.
D	=	8'-6" X 6'-4"	=	53.80 SQ.FT.
TOTAL			=	1508.10 SQ.FT.

TYPE-A2 :

A	=	42'-10" X 23'-9"	=	1017.20 SQ.FT.
B	=	16'-4" X 12'-5"	=	202.65 SQ.FT.
C	=	12'-0" X 12'-11"	=	154.92 SQ.FT.
D	=	8'-6" X 6'-3"	=	53.12 SQ.FT.
TOTAL			=	1427.89 SQ.FT.

CIRCULATION & SERVICES :

CS1	=	6'-0" X 85'-11"	=	515.46 SQ.FT.
CS2	=	10'-3" X 45'-10"	=	469.75 SQ.FT.
CS3	=	21'-4" X 3'-2"	=	67.40 SQ.FT.
CS4	=	9'-8" X 10'-9"	=	103.84 SQ.FT.
CS5	=	13'-9" X 18'-1" /2	=	124.30 SQ.FT.
CS6	=	13'-9" X 14'-1"	=	193.60 SQ.FT.
CS7	=	11'-10" X 13'-8"	=	161.59 SQ.FT.
CS8	=	18'-0" X 9'-7"	=	172.44 SQ.FT.
CS9	=	15'-6" X 6'-0"	=	93.00 SQ.FT.
CS10	=	10'-0" X 11'-11"	=	119.10 SQ.FT.
CS11	=	8'-5" X 11'-11" /2	=	50.08 SQ.FT.
CS12	=	3'-3" X 12'-4"	=	40.07 SQ.FT.
CS13	=	6'-4" X 13'-2" X2	=	166.60 SQ.FT.
CS14	=	1'-11" X 5'-10"	=	11.13 SQ.FT.
CS15	=	5'-10" X 5'-10" /2	=	16.99 SQ.FT.
CS16	=	7'-9" X 7'-9" /2	=	30.03 SQ.FT.
CS17	=	2'-6" X 1'-9"	=	4.37 SQ.FT.
CS18	=	4'-3" X 4'-3" /2	=	9.03 SQ.FT.
CS19	=	1'-9" X 1'-9" /2	=	1.53 SQ.FT.
CS20	=	18'-0" X 8'-0"	=	144.00 SQ.FT.
TOTAL			=	2494.31 SQ.FT.

TYPE-XL : (L.L.DUPLEX)

A	=	25'-4" X 20'-4"	=	514.95 SQ.FT.
B	=	19'-6" X 21'-4"	=	415.93 SQ.FT.
C	=	11'-10" X 6'-0"	=	70.98 SQ.FT.
D	=	20'-4" X 9'-0"	=	182.97 SQ.FT.
E	=	32'-10" X 11'-0"	=	361.13 SQ.FT.
G	=	10'-0" X 19'-10"	=	198.30 SQ.FT.
TOTAL			=	1744.26 SQ.FT.

TYPE-XL : (U.L.DUPLEX)

A	=	37'-0" X 12'-4"	=	456.21 SQ.FT.
B	=	25'-4" X 8'-0"	=	202.64 SQ.FT.
C	=	20'-0" X 9'-0"	=	180.00 SQ.FT.
D	=	13'-0" X 11'-0"	=	143.00 SQ.FT.
E	=	12'-0" X 17'-8"	=	211.92 SQ.FT.
F	=	7'-10" X 18'-4"	=	143.52 SQ.FT.
G	=	19'-10" X 12'-4"	=	244.50 SQ.FT.
H	=	11'-10" X 6'-0"	=	70.98 SQ.FT.
TOTAL			=	1652.77 SQ.FT.

CIRCULATION & SERVICES : (44TH & 45TH FLOOR)

CS1	=	6'-0" X 76'-2"	=	456.96 SQ.FT.
CS2	=	10'-3" X 45'-10"	=	469.75 SQ.FT.
CS3	=	21'-4" X 3'-2"	=	67.40 SQ.FT.
CS4	=	9'-8" X 10'-9"	=	103.84 SQ.FT.
CS5	=	13'-9" X 18'-1" /2	=	124.30 SQ.FT.
CS6	=	13'-9" X 14'-1"	=	193.60 SQ.FT.
CS7	=	11'-10" X 13'-8"	=	161.59 SQ.FT.
CS8	=	18'-0" X 9'-7"	=	172.44 SQ.FT.
CS9	=	15'-6" X 6'-0"	=	93.00 SQ.FT.
CS10	=	10'-0" X 11'-11"	=	119.10 SQ.FT.
CS11	=	9'-4" X 13'-2" /2	=	61.39 SQ.FT.
CS12	=	3'-3" X 12'-4"	=	40.07 SQ.FT.
CS13	=	18'-0" X 8'-0"	=	40.07 SQ.FT.
CS14	=	1'-11" X 5'-10"	=	11.13 SQ.FT.
CS15	=	5'-10" X 5'-10" /2	=	16.99 SQ.FT.
CS16	=	7'-9" X 7'-9" /2	=	30.03 SQ.FT.
CS17	=	2'-6" X 1'-9"	=	4.37 SQ.FT.
CS18	=	4'-3" X 4'-3" /2	=	9.03 SQ.FT.
CS19	=	1'-9" X 1'-9" /2	=	1.53 SQ.FT.
TOTAL			=	2176.59 SQ.FT.

DETAIL OF 5TH FLOOR

CIRCULATION & SERVICES :

C1	=	14'-6" X 72'-8"	=	1053.57 SQ.FT.
C2	=	12'-4" X 3'-3"	=	40.07 SQ.FT.
C3	=	14'-5" X 18'-11" /2	=	136.24 SQ.FT.
C4	=	6'-0" X 2'-5"	=	14.46 SQ.FT.
C5	=	5'-3" X 5'-3" /2	=	13.78 SQ.FT.
C6	=	4'-3" X 5'-3" /2	=	11.15 SQ.FT.
C7	=	9'-6" X 8'-7"	=	81.51 SQ.FT.
C8	=	13'-7" X 18'-5"	=	250.00 SQ.FT.
C9	=	14'-5" X 18'-5" /2	=	132.64 SQ.FT.
C10	=	15'-6" X 9'-4"	=	144.61 SQ.FT.
C11	=	11'-8" X 25'-11" X2	=	604.22 SQ.FT.
C12	=	1'-6" X 17'-10"	=	26.74 SQ.FT.
C13	=	21'-9" X 16'-10" /2 X2	=	366.05 SQ.FT.
C14	=	4'-3" X 21'-4"	=	90.65 SQ.FT.
C15	=	10'-9" X 9'-8" X2	=	207.69 SQ.FT.
C16	=	21'-4" X 3'-6"	=	74.65 SQ.FT.
C17	=	15'-5" X 17'-10" /2	=	137.38 SQ.FT.
C18	=	16'-0" X 27'-2"	=	434.56 SQ.FT.
C19	=	14'-0" X 9'-4"	=	130.62 SQ.FT.
C20	=	11'-8" X 14'-5" /2	=	84.01 SQ.FT.
C21	=	28'-1" X 18'-5"	=	516.95 SQ.FT.
C22	=	24'-0" X 9'-7"	=	229.92 SQ.FT.
C23	=	21'-6" X 6'-0"	=	129.00 SQ.FT.
C24	=	14'-6" X 11'-6"	=	166.75 SQ.FT.
C25	=	10'-2" X 11'-11" /2	=	60.50 SQ.FT.
C26	=	12'-4" X 3'-3"	=	40.07 SQ.FT.
C27	=	4'-3" X 4'-3" /2	=	9.03 SQ.FT.
C28	=	2'-6" X 1'-9"	=	4.37 SQ.FT.
C29	=	1'-9" X 1'-9" /2	=	1.53 SQ.FT.
TOTAL			=	5192.72 SQ.FT.

COVERED RECREATION :

R1	=	49'-8" X 27'-0" X2	=	2681.64 SQ.FT.
R2	=	45'-5" X 4'-3" X2	=	385.98 SQ.FT.
R3	=	4'-3" X 4'-3" X2 /2	=	18.06 SQ.FT.
R4	=	29'-5" X 72'-8" X2	=	4273.86 SQ.FT.
R5	=	43'-11" X 31'-3" X2	=	2744.37 SQ.FT.
R6	=	7'-5" X 46'-3"	=	342.71 SQ.FT.
R7	=	4'-11" X 57'-10"	=	283.94 SQ.FT.
R8	=	21'-0" X 40'-4" X2	=	1693.86 SQ.FT.
R9	=	17'-1" X 9'-8" X2	=	329.98 SQ.FT.
R10	=	6'-9" X 6'-9" X2 /2	=	45.56 SQ.FT.
R11	=	3'-11" X 2'-11" X2 /2	=	11.37 SQ.FT.
R12	=	2'-11" X 2'-11" X2 /2	=	8.46 SQ.FT.
R13	=	12'-11" X 56'-4" X2	=	1454.44 SQ.FT.
R14	=	13'-9" X 27'-2" X2	=	746.90 SQ.FT.
R15	=	10'-1" X 5'-7" X2	=	112.49 SQ.FT.
R16	=	20'-5" X 28'-0"	=	571.48 SQ.FT.
TOTAL			=	15705.10 SQ.FT.

OPEN RECREATION :

OR1	=	37'-2" X 12'-2" X2	=	903.73 SQ.FT.
OR2	=	20'-2" X 18'-8" X2 /2	=	376.18 SQ.FT.
OR3	=	23'-2" X 12'-0" X2	=	555.84 SQ.FT.
OR4	=	12'-0" X 12'-0" X2 /2	=	144.00 SQ.FT.
OR5	=	11'-4" X 10'-7" X2	=	239.74 SQ.FT.
OR6	=	19'-9" X 16'-10" X2	=	664.78 SQ.FT.
OR7	=	6'-0" X 6'-0" X2 /2	=	36.00 SQ.FT.
OR8	=	7'-9" X 27'-2" X2	=	420.98 SQ.FT.
OR9	=	33'-2" X 34'-7" X2 /2	=	1146.67 SQ.FT.
OR10	=	10'-1" X 5'-0" X2	=	100.80 SQ.FT.
OR11	=	14'-4" X 16'-10" /2	=	120.58 SQ.FT.
OR12	=	10'-4" X 10'-4" /2	=	53.35 SQ.FT.
OR13	=	51'-9" X 22'-1"	=	1142.64 SQ.FT.
OR14	=	10'-4" X 62'-5"	=	644.69 SQ.FT.
OR15	=	15'-7" X 72'-9"	=	1133.44 SQ.FT.
OR16	=	19'-9" X 16'-10" /2	=	166.19 SQ.FT.
TOTAL			=	7849.61 SQ.FT.

COVERED RECREATION AREA	=	15705.10 SQ.FT.
OPEN RECREATION AREA	=	7849.61 SQ.FT.
CIRCULATION & SERVICES AREA	=	5192.72 SQ.FT.
TOTAL	=	28747.43 SQ.FT.
LESS OPEN RECREATION	=	7849.61 SQ.FT.
28747.43 - 7849.61		
TOTAL	=	20897.82 SQ.FT.

DETAIL OF RECREATION ON 5TH FLOOR

COVERED RECREATION	15705.10	SQ.FT
OPEN RECREATION	7849.61	SQ.FT
TOTAL	23554.71	SQ.FT

DETAIL OF INDIVIDUALS & CIRCULATION

TYPE-XL :

A	=	25'-4" X 20'-4"	=	514.95 SQ.FT.
B	=	19'-6" X 12'-4"	=	240.43 SQ.FT.
C	=	39'-10" X 9'-0"	=	358.47 SQ.FT.
D	=	32'-10" X 11'-0"	=	361.13 SQ.FT.
E	=	14'-10" X 27'-2"	=	402.78 SQ.FT.
F	=	11'-10" X 16'-0"	=	189.28 SQ.FT.
G	=	8'-0" X 10'-0"	=	80.00 SQ.FT.
H	=	11'-2" X 5'-7"	=	62.27 SQ.FT.
TOTAL			=	2209.31 SQ.FT.

SCHEDULE OF AREA

TOTAL PLOT AREA	=	5815.00 SYD.
OR	=	52335.00 SQ.FT

ITEM	ALLOWABLE	PROPOSED
RATIO= 1: 9	471015.00 SQ.FT	462660.13 SQ.FT
FOOT PRINT TYP. (30% TO 40%)	15700.50 SQ.FT	17191.56 SQ.FT (FLATS & DRAWERS)
	20934.00 SQ.FT	
RECREATION 5%	23550.75 SQ.FT	23554.71 SQ.FT (3.95 IN F.A.R)

DETAIL OF BASEMENT- 02

PARKING AREA

P1	=	138'-1" X 116'-0"	=	16017.28 SQ.FT.
P2	=	267'-7" X 36'-8"	=	9809.48 SQ.FT.
P3	=	247'-6" X 10'-0"	=	2475.00 SQ.FT.
P4	=	3'-8" X 10'-0"	=	36.60 SQ.FT.
P5	=	3'-8" X 1'-0" /2	=	1.83 SQ.FT.
P6	=	154'-5" X 113'-2"	=	17473.03 SQ.FT.
P7	=	154'-5" X 2'-10" /2	=	218.49 SQ.FT.
TOTAL			=	46031.71 SQ.FT.

DETAIL OF BASEMENT-01

COVERED AREA

P1	=	138'-1" X 116'-0"	=	16017.28 SQ.FT.
P2	=	267'-7" X 36'-8"	=	9809.48 SQ.FT.
P3	=	247'-6" X 10'-0"	=	2475.00 SQ.FT.
P4	=	10'-0" X 3'-8"	=	36.60 SQ.FT.
P5	=	3'-8" X 1'-0" /2	=	1.83 SQ.FT.
P6	=	154'-5" X 113'-2"	=	17473.03 SQ.FT.
P7	=	154'-5" X 2'-10" /2	=	218.49 SQ.FT.
TOTAL			=	46031.71 SQ.FT.

AIR RAID SHELTER

AR1	=	23'-6" X 47'-4"	=	1112.25 SQ.FT.
AR2	=	25'-6" X 36'-2"	=	922.08 SQ.FT.
AR3	=	37'-4" X 29'-10"	=	1113.55 SQ.FT.
AR4	=	23'-0" X 23'-0" /2	=	264.50 SQ.FT.
AR5	=	14'-5" X 13'-5"	=	193.23 SQ.FT.
AR6	=	10'-8" X 5'-5"	=	57.67 SQ.FT.
AR7	=	12'-5" X 4'-1"	=	50.63 SQ.FT.
AR8	=	3'-9" X 3'-9" /2	=	7.03 SQ.FT.
AR9	=	1'-9" X 1'-9" /2	=	1.53 SQ.FT.
TOTAL			=	3722.47 SQ.FT.

COVERED AREA	=	46031.71 SQ.FT.
AIR RAID SHELTER	=	- 3722.47 SQ.FT.
TOTAL PARKING AREA	=	42309.24 SQ.FT.
AIRRAID SHELTER AREA	=	3722.47 SQ.FT.
PARKING AREA	=	42309.24 SQ.FT.
TOTAL	=	46031.71 SQ.FT.

DETAIL OF GROUND FLOOR

COVERED AREA

P1	=	244'-8" X 135'-2"	=	33068.24 SQ.FT.
P2	=	116'-11" X 19'-3"	=	2250.51 SQ.FT.
P3	=	4'-11" X 37'-11" X2	=	372.27 SQ.FT.
TOTAL			=	35691.02 SQ.FT.

CIR.& SER.

C1	=	141'-10" X 42'-8"	=	6050.46 SQ.FT.
C2	=	173'-10" X 40'-2"	=	6981.01 SQ.FT.
C3	=	9'-4" X 22'-10"	=	213.00 SQ.FT.
C4	=	2'-8" X 2'-8" /2 X2	=	7.07 SQ.FT.
C5	=	2'-8" X 22'-10" X2	=	121.45 SQ.FT.
C6	=	8'-5" X 8'-6" /2 X2	=	71.48 SQ.FT.
C7	=	7'-11" X 6'-7" /2 X2	=	52.04 SQ.FT.
C8	=	4'-6" X 4'-6" /2 X2	=	20.25 SQ.FT.
C9	=	16'-5" X 17'-0" X2	=	557.94 SQ.FT.
C10	=	6'-7" X 16'-4" X2	=	214.90 SQ.FT.
C11	=	4'-6" X 16'-4" X2	=	146.97 SQ.FT.
C12	=	21'-9" X 20'-9" /2 X2	=	451.31 SQ.FT.
C13	=	6'-7" X 6'-7" /2 X2	=	43.29 SQ.FT.
TOTAL			=	14931.17 SQ.FT.

35691.02 - 14931.17	=	20759.85 SQ.FT.
PARKING AREA	=	20759.85 SQ.FT.
CIR.& SER.	=	14931.17 SQ.FT.
PARKING AREA	=	20759.85 SQ.FT.
TOTAL	=	35691.02 SQ.FT.

DETAIL OF 1ST TO 4TH FLOOR (EACH FLOOR)

PARKING AREA

P1	=	244'-8" X 48'-9"	=	11927.17 SQ.FT.
P2	=	254'-6" X 37'-11"	=	9648.09 SQ.FT.
P3	=	244'-8" X 48'-6"	=	11866.01 SQ.FT.
P4	=	116'-11" X 19'-3"	=	2250.51 SQ.FT.
TOTAL			=	35691.78 SQ.FT.

ADDRESS :

PROPOSED BUILDING PLAN ON PLOT NO. FL-11, BLOCK NO: 01,SCHEME NO-05, KARACHI.

NORTH : N W E S

SCALE: 1/16" = 1'-0"

SHEET NO. 05/05

OWNER / ATTORNY :

ENGINEER:

SYED MUZAFFAR HASAN
Structural Engineer, P.E.
K.B.C.A. Lic. No. SE-06-209
P.E.C. Regn. No. Consult / 522

ARCHITECT

SYED AKBAR JAMIL
S.B.S.A. ARCHITECTS INC. A-41-594
109, KORT TRADE CENTER
(DT) SHAHRAH-E-FAISAL, KARACHI.

Annex III: Monitoring Reports

Ambient Air Quality Test Report

Project Name:	**EIA- SEA FRONT,**	**Test Report No:**	**QTS/CFR/22/5064**
Address:	**Plot No:FL-11 Block-01, KDA Scheme-5 Clifton Karachi.**	**Sample Duration:**	**24hr's**
Sample Description:	**Ambient Air Quality Test**	**Location:**	**24°48'50.9"N 66°59'48.8"E**

SEQS-PARAMETERS								
Date	**Time**	**NO ($\mu g/m^3$)**	**NO_2 ($\mu g/m^3$)**	**SO_2 ($\mu g/m^3$)**	**PM 10 ($\mu g/m^3$)**	**PM 2.5 ($\mu g/m^3$)**	**SPM ($\mu g/m^3$)**	**Lead (µg/m3)**
10.10.2022	10:00	15.8	18.4	22.6	80	33	265	BDL
	11:00	16.6	19.0	24.8	83	37	267	BDL
	12:00	17.3	19.8	28.9	88	42	271	BDL
	13:00	19.9	20.7	32.2	91	28	278	BDL
	14:00	20.5	22.6	30.7	86	24	288	BDL
	15:00	21.2	23.3	33.9	78	29	291	BDL
	16:00	22.6	26.8	34.4	80	22	312	BDL
	17:00	23.3	31.3	37.7	93	18	324	BDL
	18:00	24.4	34.4	41.4	102	21	333	BDL
	19:00	26.6	32.8	40.8	108	25	338	BDL
	20:00	29.0	29.0	42.4	114	31	341	BDL
	21:00	27.7	36.6	43.3	116	36	330	BDL
	22:00	26.2	38.8	39.0	118	39	324	BDL
	23:00	23.3	39.1	38.4	113	42	319	BDL
11.10.2022	00:00	24.8	33.8	33.3	119	46	314	BDL
	01:00	25.1	31.2	30.2	123	51	311	BDL
	02:00	22.9	29.0	29.7	128	55	303	BDL
	03:00	19.2	28.7	27.8	131	59	282	BDL
	04:00	18.8	25.5	28.6	138	60	275	BDL
	05:00	16.2	26.3	29.0	142	49	271	BDL
	06:00	15.9	22.9	24.2	136	44	280	BDL
	07:00	17.0	23.8	23.3	127	42	291	BDL
	08:00	18.3	21.0	21.9	120	39	299	BDL
	09:00	18.8	19.8	22.8	118	36	301	BDL
	10:00	19.9	24.6	22.2	105	41	308	BDL
MIN		15.8	18.4	21.9	78	18	265	BDL
MAX		29	39.1	43.3	142	60	341	BDL
AVG		21.3	27.2	31.4	109.5	38.0	300.8	BDL
SEQS		40	80	120	150	75	500	1.5
LDL-Limits		0.0	0.0	0.0	10	2.5	1.0	-

Quality Testing Services Karachi Q.T.S

Ambient Air Quality Test Report

Project Name:	**EIA- SEA FRONT,**	**Test Report No:**	**QTS/CFR/22/5064**
Address:	**Plot No:FL-11 Block-01, KDA Scheme-5 Clifton Karachi.**	**Sample Duration:**	**24hr's**
Sample Description:	**Ambient Air Quality Test**	**Location:**	**24°48'50.9"N 66°59'48.8"E**
Sampling Date:	**10-10-2022**		

Parameter	Unit	Monitoring Duration	Average Obtained Concentration	SEQS	LDL-Limits	Methodology
Carbon Monoxide (CO)	mg/m³	08 Hours	0.93	5.0	0.0	Non Dispersive Intra Red (NDIR)
Nitrogen oxide (NO)	µg/m³	24 Hours	21.3	40.0	0.0	Chemiluminescence
Nitrogen Dioxide (NO_2)	µg/m³	24 Hours	27.2	80.0	0.0	
Sulphur Dioxide (SO_2)	µg/m³	24 Hours	31.4	120.0	0.0	Ultraviolet Fluorescence Method
Ozone (O_3)	µg/m³	01 Hour	17.5	130.0	0.0	Non Dispersive UV Absorption Method
Particulate Matter (PM_{10})	µg/m³	24 Hours	109.5	150.0	10.0	β Ray Absorption Method
Particular Matter ($PM_{2.5}$)	µg/m³	24 Hours	38.0	75.0	2.5	
Suspended Particulate Matter (SPM)	µg/m³	24 Hours	300.8	500.0	1.0	
Lead (Pb)	µg/m³	24 Hours	BDL	1.5	-	ASS Method

*SEQS= Sindh Environmental Quality Standards.
(24 Hours Standard for all the parameters Except O3 and CO),
µg/m3= Micrograms per Cubic Meter
mg/m3= Milligrams per Cubic Meter
ND= Not Detected
LDL=Least Detection Limit

Remarks:

Sample Analyzed By: Ather Adil	**Signature of Laboratory Incharge:** _____ **Name : Ali Raza**

Quality Testing Services Karachi Q.T.S

Lab Report Ref. No. : QTS/CFR/22/5065 Reporting Date: 12/10/2022

Project: **EIA- SEA FRONT, Plot No:FL-11 Block-01, KDA Scheme-5 Clifton Karachi.**

SAMPLE DESCRIPTION

Sample ID: Noise Level Test
Sample Description: Ambient *Noise*
No. of samples: 04
Sample Collected/Submitted by: QTS representative
Sampling Date 10/10/2022

NOISE TEST REPORT

S.NO.	LOCATION/SOURCE	SEQS Limits : *65dB(A) *Leq			
		Noise Level Readings			
		Coordinates	Minimum	Maximum	Average
1	Front Side Right Corner Boundary	24°48'51.4"N 66°59'46.6"E	53.3	54.6	53.95
2	Front Side Left Corner Boundary	24°48'49.8"N 66°59'46.3"E	52.8	53.5	53.15
3	Back Side Right Corner Boundary	24°48'49.5"N 66°59'49.8"E	53.1	54.0	53.55
4	Back Side Left Corner Boundary	24°48'51.5"N 66°59'50.0"E	54.2	54.7	54.45

SEQS= Sindh Environmental Quality Standard

Terms & Conditions:

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- This report is intended only for your guidance & not for legal purpose or for advertisement.

Comments:

The Noise level from the source is within acceptable level as describe in SEQS.

Sample Analyzed by: Ather Adil

Signature of Laboratory In charge:
Name : Ali Raza

Quality Testing Services Karachi Q.T.S

Lab Report Ref. No. : QTS/CRF/22/5066 Reporting Date: 12/10/2022

Report to: **EIA- SEA FRONT, Plot No:FL-11 Block-01, KDA Scheme-5 Clifton Karachi.**

SAMPLE DESCRIPTION

Sample ID: Raw Water
Sample Type: Liquid
Sample Collected/Submitted by: QTS representative
Sampling Date: 10/10/2022

ANALYTICAL TEST REPORT

S.NO.	PARAMETERS TO BE ANALYZED	STANDARD NEQS	UNITS	RESULTS	TEST METHOD
1	pH value	6.5-8.5	-	8.09	USEPA 150.1
2	Total Dissolved Solids(TDS)	<1000	mg/L	355	Hach 8160
3	Total Hardness(as $CaCO_3$)	<500	mg/L	114	Hach 8213
4	Turbidity	<5	NTU	0.89	Turbidity meter
5	Nitrate(NO_3)	≤50	mg/L	0.3	Hach 8039
6	Nitrite(NO_2)	≤3	mg/L	0.012	Hach 8153
7	Phenolic compounds(as phenol)	<0.002	mg/L	0.003	USEPA 420.1
8	Chloride(as Cl^-)	<250	mg/L	98	Hach 8206
9	Fluoride(as F^-)	≤1.5	mg/L	0.82	USEPA 340.1
10	Residual Chlorine	0.2-0.5	mg/L	0.02*	Hach 8167
11	Arsenic	≤ 0.05	mg/L	BDL	APHA-3120 B
MICROBIOLOGICAL TEST REPORT					
11	Total Coliform	0cfu/100ml	cfu	<210*	APHA-SM9221B
12	Fecal Coliform	0cfu/100ml	cfu	<90*	APHA-SM9221F
13	Escherichia Coli(E-Coli)	0cfu/100ml	cfu	<80*	APHA-SM9221F

NEQS = National Environmental Quality Satndards
USEPA = United State Environmental Protection Agency method
Hach USA, method
BDL= Below Detection Limit
ND= Not Detected

Term & Condition:

- This report is not valid for any negotiations
- Report is valid for current batch(sample)
- The remaining portion of the sample will be discarded after 07 days unless otherwise instructed
- This report is intended only for your guidance & not for legal purpose or for advertisement

Sample Analyzed by: Hareem Zehra

Signature of Laboratory In charge:_____
Name : Ali Raza

Quality Testing Services Karachi Q.T.S

Annex IV: Geotechnical Soil Investigation Report

FAZAL GEO-ENGINEERING SERVICES

Geotechnical Report

Plot FL-11,
Block-1, Scheme-5,
Kehkashan Clifton
Karachi.

June, 2021

Report By:

FAZAL GEO-ENGINEERING SERVICES

35 Maniya Colony
Shaheed-e-Millat Road
Karachi
Tel #: 34559647
Web: www.fazalgeo.com

REF: R/1127

SUB-SOIL INVESTIGATION



Plot FL-11, Block-1, Scheme-5,
Kehkashan Clifton, Karachi.

REF: R/1127

FAZAL GEO-ENGINEERING SERVICES

CERTIFICATE

This is to certify that I, Farooq Fazal, am submitting the geotechnical report for Plot FL-11, Block-1, Scheme-5, Kehkashan Clifton, Karachi.

The geotechnical investigation has been conducted under my guidance and supervision.

The recommended pile capacities are:

Pile Diameter (inches)	Pile Tip Level (feet)	Total Allowable (tons)	
		Compression	Uplift
36	95	294	110
36	110	430	192
40	95	347	122
40	110	503	213
48	95	465	146
48	110	662	255

I certify that following conditions were observed during the investigations:

- Mr. Anees was present at site from 01-06-2021 to 10-06-2021 when the field work was in progress using two drilling rigs.
- Field Staff was present as representative of testing laboratory for obtaining soil samples.
- Books and references considered while giving the recommendations are attached.
- Bore logs are generally in conformity and correlated to laboratory results.

FAROOQ FAZAL P.E.
B. Engg. (Civil), M. Engg. (Soil) AIT
Soil & Foundation Consultant
Registered Geotechnical Engineer KDA/KBCA
Pakistan Engineering Council-Consulting Engineer's
Licence # PEC CONSULT – 439

REF: R/1127

FAZAL GEO-ENGINEERING SERVICES

Geotechnical Report

Plot FL-11, Block-1, Scheme-5, Kehkashan Clifton Karachi.

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Bore Log
Laboratory Result

Ref: R/1127

FAZAL GEO-ENGINEERING SERVICES

Geotechnical Report

Plot FL-11, Block-1, Scheme-5, Kehkashan Clifton Karachi.

1 INTRODUCTION

Project is planned to be constructed on Plot FL-11, Block-1, Scheme-5, Kehkashan Clifton, Karachi.

A program of Sub-Soil investigation was performed at the project site in order to obtain the required geo-engineering information for the design of foundations. The task of geo-technical investigation was entrusted to Fazal Geo-Engineering Services (FGES), Karachi, and the same was accomplished in June 2021.

The report describes the subsurface characteristics as ascertained from the geotechnical investigation. The field and laboratory test results have been analyzed to arrive at rational design parameters. Engineering recommendations are incorporated in this report regarding the geotechnical aspects of design and construction of foundations.

2 Program of Investigation

2.1 Bore Holes

The program of investigation comprised drilling of 06 no. bore holes. A maximum of 145 feet of sub-soil was investigated. Drilling was accomplished by Rotary Method.

2.2 Field Testing

Standard Penetration Tests (SPTS) were conducted. The SPT's were performed in accordance with ASTM Designation D-1586 on soil.

2.3 Soil Sampling

During the course of sub-soil investigation, samples recovered from Split Spoon Sampler in SPT were preserved in plastic bags.

All these samples were marked for the number of boring and depth and carefully transported to soil laboratory. Selected Core-samples were waxed to preserve moisture.

2.4 Ground Water Observation

Observations were made in bore holes for determining the position of ground water at the project site. Groundwater fluctuates with tidal variation & is found between 6 – 8 feet depth.

2.5 Laboratory Testing

A program of laboratory testing was performed on selected soil samples recovered during the course of exploration.

Following tests were performed:

- Gradation
- Atterberg Limits
- Density Test
- Salts in Water
- Moisture Content
- Unconfined Strength
- Direct Shear

All the tests were done as per relevant ASTM designations.

3 Subsurface Characteristics

The subsoil conditions are quite homogeneous, as observed from 06 Bore Holes drilled at site upto a maximum depth of 145 feet.

Following stratum were observed.

Layer - I.	Grey / Brown, loose to medium dense fine, Silty SAND, micaceous
Layer - II.	Brownish Grey, medium dense, fine Silty SAND sea shells
Layer - III.	Brown / Grey / White, medium to dense fine to medium grained, Silty SAND, sea shells
Layer - IV.	Brown / Grey, very dense, fine Cemented Silty SAND
Layer - V.	Grey / Brown / Yellow, very stiff, thin bedded Sandy SHALE gravel & sand layers lenses of siltstone / conglomerate
Layer - VI.	Brown / Grey, highly compacted / hard SAND & GRAVELS embedded in SHALE lenses of sandstone / conglomerate
Layer - VII.	Grey, medium hard, fractured SILTSTONE lenses sandstone / shale
Layer - VIII.	Grey, very dense, fine, Cemented SAND lenses of shale / siltstone
Layer - IX.	Grey, hard, fractured SILTSTONE lenses of shale / limestone

The sequence of occurrence of these layers is show on bore log appended to the report.

4 Foundation Recommendations

4.1 General:

The site is located in the coastal area of Clifton in close proximity to the Indian Ocean. Top 50 feet of subsoil is Silty SAND as normally encountered in coastal area. Between 50 – 85 feet is medium Shale followed by Sand & Gravels embedded in clay. Below 105 feet is cemented SAND. Groundwater fluctuates with tidal variation & is found between 6 – 8 feet depth. At the time of this investigation the ground level was approximately same as road level.

4.2 Choice of Foundation:

Top 30 feet of sub soil is loose Silty SAND. The project is a high rise with heavy column loads. As such it is evident the building shall be supported on deep piled foundation. Allowable capacity of Raft has however been evaluated at 30 feet depth.

4.3 Allowable Bearing Capacity:

Allowable Bearing Capacity is dependent on SPT Counts, Shear Strength from laboratory, Factor of Safety, Fluctuations in Groundwater Table etc. and other factors not related to static load. Considering these aspects following is recommended.

Foundation Depth (D)	Foundation Type	Allowable Capacity
30 – 32 feet	Isolated / Strip	Not Allowed
30 – 32 feet	Raft	2.55 tsf

(Foundation depth below road)

The recommended loads shall cause a settlement of 2 – 3 inches. Modulus of subgrade reaction for design can be adopted as 150 kcf. The value of modulus is from co-relations by Bowles. At 30 – 32 feet raft will experience an upward hydraulic upward thrust of 0.85 tsf which should be considered by the structural engineer.

4.4 Allowable Loads on Piles:

Tentative Pile Capacities have been evaluated for axial loading under static condition for Cast-in-Situ Piles.

Pile Diameter (inches)	Pile Tip Level (feet)	Total Allowable (tons)	
		Compression	Uplift
36	95	294	110
36	110	430	192
40	95	347	122
40	110	503	213
48	95	465	146
48	110	662	255

It should be noted that pile tip level is mentioned & not the effective pile length. Top 30 feet of soil is negated for contribution to skin friction. It is recommended not to place pile tip beyond 110 feet depth. Fixity of pile can be adopted at 85+3D feet (D – diameter of pile). The recommended tentative pile capacities have been computed by static formula having limitation. As such pile capacity values shall be verified by full scale pile load test performed as per ASTM D-1143. The imposed load shall be carried upto 2 times the allowable capacity for index pile & upto 1.5 times capacity for working pile. The function of piles is not only to support building with compressive resistance but to provide uplift resistance during earth quake jolts when a high-rise tends to tilt / overturn. As such pile reinforcement should be tied with raft foundation which acts as one single pile cap.

4.5 Lateral Earth Pressure:

The lateral earth pressure parameters for design of retaining wall can be adopted from:

Cohesion (C)	=	nil
Friction Angle (Ø)	=	30 degrees
Bulk Density (γ)	=	110 pcf

The above parameters are for permanent retaining wall & not for shoring wall. For design purpose groundwater to be considered at surface level only.

PILE CAPACITY CALCULATION

Location: FL-11, Block-1, Clifton, Karachi

Pile dia: 36" 36"

Pile Tip Level	Soil Parameters				Effective Pile Length	Unit Weight (γ)	Overburden Pressure			Ultimate Capacity			Allowable Capacity (Compression)	Allowable Capacity (Uplift)
	C	phi Φ	Nc	Nq	RL		P_1	P_2	P_{avg}	End Bearing	Skin Friction	Total		
(feet)	(tsf)	(degree)			(ft)	(pcf)	(tsf)	(tsf)	(tsf)	(tons)	(tons)	(tons)	(tons)	(tons)
61	1.10	0	9	0	31	125	0.88	0.91	0.89	70	107	177	71	36
62	1.10	0	9	0	32	125	0.91	0.94	0.92	70	112	181	73	37
63	1.10	0	9	0	33	125	0.94	0.97	0.95	70	116	186	74	39
64	1.10	0	9	0	34	125	0.97	0.99	0.98	70	121	191	76	40
65	1.10	0	9	0	35	125	0.99	1.02	1.01	70	126	195	78	42
66	1.10	0	9	0	36	125	1.02	1.05	1.04	70	130	200	80	43
67	1.10	0	9	0	37	125	1.05	1.08	1.07	70	135	205	82	45
68	1.10	0	9	0	38	125	1.08	1.11	1.09	70	140	209	84	47
69	1.10	0	9	0	39	125	1.11	1.14	1.12	70	144	214	86	48
70	1.10	0	9	0	40	125	1.14	1.16	1.15	70	149	219	88	50
71	1.10	0	9	0	41	125	1.16	1.19	1.18	70	154	223	89	51
72	1.10	0	9	0	42	125	1.19	1.22	1.21	70	158	228	91	53
73	1.10	0	9	0	43	125	1.22	1.25	1.24	70	163	233	93	54
74	1.10	0	9	0	44	125	1.25	1.28	1.26	70	167	237	95	56
75	1.10	0	9	0	45	125	1.28	1.31	1.29	70	172	242	97	57
76	1.10	0	9	0	46	125	1.31	1.33	1.32	70	177	247	99	59
77	1.10	0	9	0	47	125	1.33	1.36	1.35	70	181	251	101	60
78	1.10	0	9	0	48	125	1.36	1.39	1.38	70	186	256	102	62
79	1.10	0	9	0	49	125	1.39	1.42	1.41	70	191	261	104	64
80	1.10	0	9	0	50	125	1.42	1.45	1.43	70	195	265	106	65
81	1.10	0	9	0	51	125	1.45	1.48	1.46	70	200	270	108	67
82	1.10	0	9	0	52	125	1.48	1.51	1.49	70	205	275	110	68
83	1.10	0	9	0	53	125	1.51	1.53	1.52	70	209	279	112	70
84	1.10	0	9	0	54	125	1.53	1.56	1.55	70	214	284	114	71
85	1.10	0	9	0	55	125	1.56	1.59	1.58	70	219	289	115	73
86	1.10	0	9	0	56	125	1.59	1.62	1.60	70	223	293	117	74
87	1.10	0	9	0	57	125	1.62	1.65	1.63	70	228	298	119	76
88	1.10	0	9	0	58	125	1.65	1.68	1.66	70	233	303	121	78
89	1.10	0	9	0	59	125	1.68	1.70	1.69	70	237	307	123	79
90	1.10	0	9	0	60	125	1.70	1.73	1.72	70	242	312	125	81
91	0.00	33	0	25	61	140	2.15	2.18	2.17	382	259	641	257	86
92	0.00	33	0	25	62	140	2.18	2.22	2.20	389	276	665	266	92
93	0.00	33	0	25	63	140	2.22	2.25	2.24	395	293	688	275	98
94	0.00	33	0	25	64	140	2.25	2.29	2.27	401	311	712	285	104
95	0.00	33	0	25	65	140	2.29	2.32	2.31	407	329	736	294	110
96	0.00	33	0	25	66	140	2.32	2.36	2.34	413	347	761	304	116
97	0.00	33	0	25	67	140	2.36	2.39	2.38	420	366	785	314	122
98	3.00	0	9	0	68	135	2.24	2.27	2.26	191	378	569	228	126
99	3.00	0	9	0	69	135	2.27	2.31	2.29	191	391	582	233	130
100	3.00	0	9	0	70	135	2.31	2.34	2.32	191	404	595	238	135
101	3.00	0	9	0	71	135	2.34	2.37	2.36	191	417	607	243	139
102	3.00	0	9	0	72	135	2.37	2.40	2.39	191	429	620	248	143
103	3.00	0	9	0	73	135	2.40	2.44	2.42	191	442	633	253	147
104	3.00	0	9	0	74	135	2.44	2.47	2.45	191	455	645	258	152
105	3.00	0	9	0	75	135	2.47	2.50	2.49	191	467	658	263	156
106	0.00	33	0	25	76	140	2.68	2.71	2.69	476	488	964	386	163
107	0.00	33	0	25	77	140	2.71	2.75	2.73	482	510	991	397	170
108	0.00	33	0	25	78	140	2.75	2.78	2.76	488	531	1019	408	177
109	0.00	33	0	25	79	140	2.78	2.82	2.80	494	553	1047	419	184
110	0.00	33	0	25	80	140	2.82	2.85	2.83	500	575	1075	430	192

Analysis based on bore hole # 2 stratum
Top 30 feet Skin Friction negated

Skin (FOS) = 2.5
End (FOS) = 2.5

PILE CAPACITY CALCULATION

Location: FL-11, Block-1, Clifton, Karachi

Pile dia: 40" **40"**

Pile Tip Level	Soil Parameters				Effective Pile Length	Unit Weight (γ)	Overburden Pressure			Ultimate Capacity			Allowable Capacity (Compression)	Allowable Capacity (Uplift)
	C	phi Φ	Nc	Nq	RL		P_1	P_2	P_{avg}	End Bearing	Skin Friction	Total		
(feet)	(tsf)	(degree)			(ft)	(pcf)	(tsf)	(tsf)	(tsf)	(tons)	(tons)	(tons)	(tons)	(tons)
61	1.10	0	9	0	31	125	0.88	0.91	0.89	86	119	205	82	40
62	1.10	0	9	0	32	125	0.91	0.94	0.92	86	124	210	84	41
63	1.10	0	9	0	33	125	0.94	0.97	0.95	86	129	215	86	43
64	1.10	0	9	0	34	125	0.97	0.99	0.98	86	134	221	88	45
65	1.10	0	9	0	35	125	0.99	1.02	1.01	86	139	226	90	46
66	1.10	0	9	0	36	125	1.02	1.05	1.04	86	145	231	92	48
67	1.10	0	9	0	37	125	1.05	1.08	1.07	86	150	236	94	50
68	1.10	0	9	0	38	125	1.08	1.11	1.09	86	155	241	97	52
69	1.10	0	9	0	39	125	1.11	1.14	1.12	86	160	247	99	53
70	1.10	0	9	0	40	125	1.14	1.16	1.15	86	165	252	101	55
71	1.10	0	9	0	41	125	1.16	1.19	1.18	86	171	257	103	57
72	1.10	0	9	0	42	125	1.19	1.22	1.21	86	176	262	105	59
73	1.10	0	9	0	43	125	1.22	1.25	1.24	86	181	267	107	60
74	1.10	0	9	0	44	125	1.25	1.28	1.26	86	186	272	109	62
75	1.10	0	9	0	45	125	1.28	1.31	1.29	86	191	278	111	64
76	1.10	0	9	0	46	125	1.31	1.33	1.32	86	196	283	113	65
77	1.10	0	9	0	47	125	1.33	1.36	1.35	86	202	288	115	67
78	1.10	0	9	0	48	125	1.36	1.39	1.38	86	207	293	117	69
79	1.10	0	9	0	49	125	1.39	1.42	1.41	86	212	298	119	71
80	1.10	0	9	0	50	125	1.42	1.45	1.43	86	217	303	121	72
81	1.10	0	9	0	51	125	1.45	1.48	1.46	86	222	309	123	74
82	1.10	0	9	0	52	125	1.48	1.51	1.49	86	228	314	126	76
83	1.10	0	9	0	53	125	1.51	1.53	1.52	86	233	319	128	78
84	1.10	0	9	0	54	125	1.53	1.56	1.55	86	238	324	130	79
85	1.10	0	9	0	55	125	1.56	1.59	1.58	86	243	329	132	81
86	1.10	0	9	0	56	125	1.59	1.62	1.60	86	248	335	134	83
87	1.10	0	9	0	57	125	1.62	1.65	1.63	86	253	340	136	84
88	1.10	0	9	0	58	125	1.65	1.68	1.66	86	259	345	138	86
89	1.10	0	9	0	59	125	1.68	1.70	1.69	86	264	350	140	88
90	1.10	0	9	0	60	125	1.70	1.73	1.72	86	269	355	142	90
91	0.00	33	0	25	61	140	2.15	2.18	2.17	472	288	760	304	96
92	0.00	33	0	25	62	140	2.18	2.22	2.20	480	307	786	315	102
93	0.00	33	0	25	63	140	2.22	2.25	2.24	487	326	813	325	109
94	0.00	33	0	25	64	140	2.25	2.29	2.27	495	346	841	336	115
95	0.00	33	0	25	65	140	2.29	2.32	2.31	503	366	868	347	122
96	0.00	33	0	25	66	140	2.32	2.36	2.34	510	386	896	358	129
97	0.00	33	0	25	67	140	2.36	2.39	2.38	518	406	924	370	135
98	3.00	0	9	0	68	135	2.24	2.27	2.26	235	420	656	262	140
99	3.00	0	9	0	69	135	2.27	2.31	2.29	235	435	670	268	145
100	3.00	0	9	0	70	135	2.31	2.34	2.32	235	449	684	274	150
101	3.00	0	9	0	71	135	2.34	2.37	2.36	235	463	698	279	154
102	3.00	0	9	0	72	135	2.37	2.40	2.39	235	477	712	285	159
103	3.00	0	9	0	73	135	2.40	2.44	2.42	235	491	726	291	164
104	3.00	0	9	0	74	135	2.44	2.47	2.45	235	505	741	296	168
105	3.00	0	9	0	75	135	2.47	2.50	2.49	235	519	755	302	173
106	0.00	33	0	25	76	140	2.68	2.71	2.69	587	543	1130	452	181
107	0.00	33	0	25	77	140	2.71	2.75	2.73	595	566	1161	464	189
108	0.00	33	0	25	78	140	2.75	2.78	2.76	603	590	1193	477	197
109	0.00	33	0	25	79	140	2.78	2.82	2.80	610	614	1224	490	205
110	0.00	33	0	25	80	140	2.82	2.85	2.83	618	639	1257	503	213

Analysis based on bore hole # 2 stratum
Top 30 feet Skin Friction negated

Skin (FOS) = 2.5
End (FOS) = 2.5

PILE CAPACITY CALCULATION

Location: FL-11, Block-1, Clifton, Karachi

Pile dia: 48" **48"**

Pile Tip Level	Soil Parameters				Effective Pile Length	Unit Weight (γ)	Overburden Pressure			Ultimate Capacity			Allowable Capacity (Compression)	Allowable Capacity (Uplift)
	C	phi Φ	Nc	Nq	RL		P_1	P_2	P_{avg}	End Bearing	Skin Friction	Total		
(feet)	(tsf)	(degree)			(ft)	(pcf)	(tsf)	(tsf)	(tsf)	(tons)	(tons)	(tons)	(tons)	(tons)
61	1.10	0	9	0	31	125	0.88	0.91	0.89	124	143	267	107	48
62	1.10	0	9	0	32	125	0.91	0.94	0.92	124	149	273	109	50
63	1.10	0	9	0	33	125	0.94	0.97	0.95	124	155	279	112	52
64	1.10	0	9	0	34	125	0.97	0.99	0.98	124	161	285	114	54
65	1.10	0	9	0	35	125	0.99	1.02	1.01	124	167	292	117	56
66	1.10	0	9	0	36	125	1.02	1.05	1.04	124	174	298	119	58
67	1.10	0	9	0	37	125	1.05	1.08	1.07	124	180	304	122	60
68	1.10	0	9	0	38	125	1.08	1.11	1.09	124	186	310	124	62
69	1.10	0	9	0	39	125	1.11	1.14	1.12	124	192	317	127	64
70	1.10	0	9	0	40	125	1.14	1.16	1.15	124	198	323	129	66
71	1.10	0	9	0	41	125	1.16	1.19	1.18	124	205	329	132	68
72	1.10	0	9	0	42	125	1.19	1.22	1.21	124	211	335	134	70
73	1.10	0	9	0	43	125	1.22	1.25	1.24	124	217	341	137	72
74	1.10	0	9	0	44	125	1.25	1.28	1.26	124	223	348	139	74
75	1.10	0	9	0	45	125	1.28	1.31	1.29	124	230	354	142	77
76	1.10	0	9	0	46	125	1.31	1.33	1.32	124	236	360	144	79
77	1.10	0	9	0	47	125	1.33	1.36	1.35	124	242	366	147	81
78	1.10	0	9	0	48	125	1.36	1.39	1.38	124	248	372	149	83
79	1.10	0	9	0	49	125	1.39	1.42	1.41	124	254	379	151	85
80	1.10	0	9	0	50	125	1.42	1.45	1.43	124	261	385	154	87
81	1.10	0	9	0	51	125	1.45	1.48	1.46	124	267	391	156	89
82	1.10	0	9	0	52	125	1.48	1.51	1.49	124	273	397	159	91
83	1.10	0	9	0	53	125	1.51	1.53	1.52	124	279	404	161	93
84	1.10	0	9	0	54	125	1.53	1.56	1.55	124	285	410	164	95
85	1.10	0	9	0	55	125	1.56	1.59	1.58	124	292	416	166	97
86	1.10	0	9	0	56	125	1.59	1.62	1.60	124	298	422	169	99
87	1.10	0	9	0	57	125	1.62	1.65	1.63	124	304	428	171	101
88	1.10	0	9	0	58	125	1.65	1.68	1.66	124	310	435	174	103
89	1.10	0	9	0	59	125	1.68	1.70	1.69	124	317	441	176	106
90	1.10	0	9	0	60	125	1.70	1.73	1.72	124	323	447	179	108
91	0.00	33	0	25	61	140	2.15	2.18	2.17	680	345	1025	410	115
92	0.00	33	0	25	62	140	2.18	2.22	2.20	691	368	1059	424	123
93	0.00	33	0	25	63	140	2.22	2.25	2.24	702	391	1093	437	130
94	0.00	33	0	25	64	140	2.25	2.29	2.27	713	415	1128	451	138
95	0.00	33	0	25	65	140	2.29	2.32	2.31	724	439	1163	465	146
96	0.00	33	0	25	66	140	2.32	2.36	2.34	735	463	1198	479	154
97	0.00	33	0	25	67	140	2.36	2.39	2.38	746	488	1234	493	163
98	3.00	0	9	0	68	135	2.24	2.27	2.26	339	505	844	337	168
99	3.00	0	9	0	69	135	2.27	2.31	2.29	339	521	860	344	174
100	3.00	0	9	0	70	135	2.31	2.34	2.32	339	538	877	351	179
101	3.00	0	9	0	71	135	2.34	2.37	2.36	339	555	894	358	185
102	3.00	0	9	0	72	135	2.37	2.40	2.39	339	572	911	365	191
103	3.00	0	9	0	73	135	2.40	2.44	2.42	339	589	928	371	196
104	3.00	0	9	0	74	135	2.44	2.47	2.45	339	606	945	378	202
105	3.00	0	9	0	75	135	2.47	2.50	2.49	339	623	962	385	208
106	0.00	33	0	25	76	140	2.68	2.71	2.69	846	651	1497	599	217
107	0.00	33	0	25	77	140	2.71	2.75	2.73	857	679	1536	614	226
108	0.00	33	0	25	78	140	2.75	2.78	2.76	868	708	1576	630	236
109	0.00	33	0	25	79	140	2.78	2.82	2.80	879	737	1616	646	246
110	0.00	33	0	25	80	140	2.82	2.85	2.83	890	766	1656	662	255

Analysis based on bore hole # 2 stratum
Top 30 feet Skin Friction negated

Skin (FOS) = 2.5
End (FOS) = 2.5

4.6 Liquefaction Potential:

When seismic shaping occurs it moves along with it the groundwater with great velocity. Particles with no binding (sand) move with water as fluid – thereby loosing all strength. This is called liquefactions. In the present case for a peak ground acceleration of 0.16 g – 0.24 g & earthquake of magnitude 6.5 on Ritcher scale the top 30 feet of sub-soil with low SPT counts has potential to liquefy.

4.7 Stability of Excavation:

The sub-soil upto 30 feet is loose to medium Silty SAND with groundwater at 6 - 8 feet depth. Such soil slide with deep vertical excavation cut. If double basement is proposed & excavation is carried deep it will be imperative to execute shoring piles. For 25 feet depth of excavation the depth of such piles (from road) should not be less than 50 feet. Diameter of shoring piles not less than 24 inches & concrete strength not less than 4000 psi cylindrical at 28 days. All piles to be tied by tie beam before excavation starts. If single basement is proposed & depth of excavation is 15 feet precautionary measures to be taken such as excavation at slope (60° - 70°) use of sand bags ect. However such measures can only be adopted where there is an offset / open area.

4.8 Dewatering:

Since groundwater is at 6 – 8 feet depth & sub-soil is permeable SAND, dewatering shall be required to keep dry conditions for pouring of concrete. A tentative dewatering plan is attached. Excavation should only proceed after dewatering starts & water table depressed at least 4 – 5 feet below proposed level of excavation. The pumped-out water should be put into a proper drain so as not to revert back into the foundation area.

4.9 Cement Type:

Since the project lies in close proximity to the ocean it is likely to come in contact with highly saline ocean water. As such it is recommended to use

Ordinary Portland Cement with Slag cement in the ratio (50 : 50). Final choice for type of cement is left on the consultants.

4.10 Type of Drilling:

It is recommended to execute pile drilling by reverse rotary & power auger both. Top 50 feet (sand) to be drilled by reverse rotary & the rest upto pile tip by power auger with continued slurry circulation. Percussion drilling can also be adopted with top 50 cased. This is a strong recommendation which is imperative & should not be avoided.

4.11 Seismic Coefficient

According to uniform building code (1997) the soil profile type falls in two categories "Sd" upto 50 feet depth. Above 50 feet the profile is "Sc".

Following parameters can be adopted:

Depth (feet)		Depth: 00 - 50	Depth: 50 - 100
Seismic Zone	=	2B	2B
Zone Factor	=	0.2	0.2
Soil Profile Type	=	Sd	Sc
Seismic Coeff "Ca"	=	0.28	0.24
Seismic Coeff "Cv"	=	0.40	0.32

4.12 Supervision:

The recommendations of this report are valid for all work being done under the supervision of qualified, experienced technical staff in accordance with design / drawing / specifications prepared in conformity with relevant ASTM / ACI / BS or equivalent codes recommended by the consultants.

FAROOQ FAZAL P.E.
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Soil & Foundation Consultant
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Pakistan Engineering Council-Consulting Engineer's
Licence # PEC CONSULTS – 439

LIST OF REFERENCES

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   By J.E. Bowles

2. FOUNDATION DESIGN & CONSTRUCTION

   By M.J. Tomlinson

3. FOUNDATION ENGINEERING

   By Peck, Hanson & Thornburn

4. ROCK MECHANICS

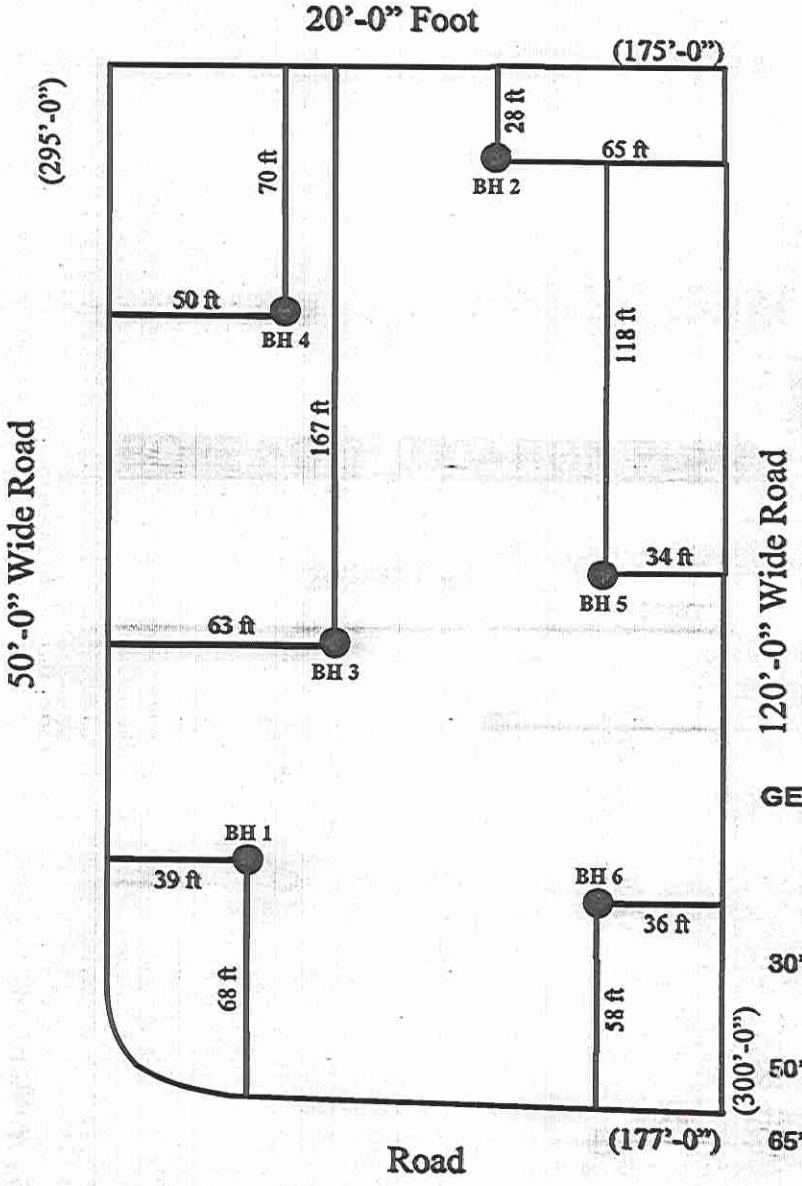
   By Goodman

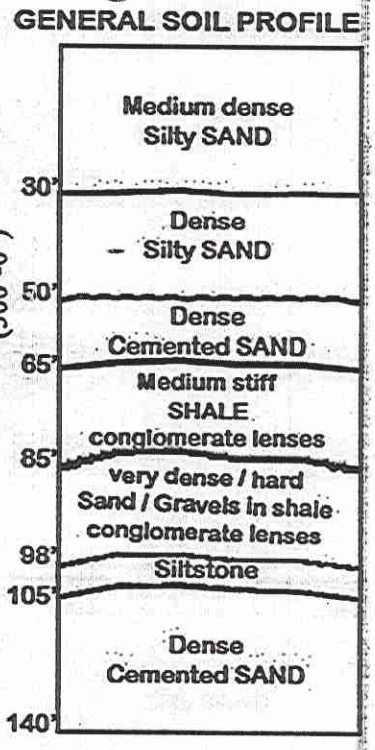
5. FOUNDATION ENGINEERING

   By Winterkorn/Leonards

FAZAL GEO-ENGINEERING SERVICES

BORE HOLE LOCATION PLAN





Plot FL-11, Block-1, Scheme-5,
Kehkashan Clifton, Karachi.

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 1

Sheet # 1 of 2

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N'Count	Percent Recovery	R.Q.D.	Remarks (feet)
0.0	SPT		SM	Grey / Brown, loose to medium dense fine, Silty SAND, micaceous			4			
	SPT						10			
	SPT						8			10.0
12										
	SPT		SM	Brownish Grey, medium dense, fine Silty SAND sea shells			14			
	SPT						17			20.0
	SPT						16			
30	SPT						29			30.0
	SPT		SM	Brown / Grey / White, medium to dense fine to medium grained, Silty SAND, sea shells			41			
	SPT						R			40.0
	SPT						R			
48										
50	SPT		SM	Brown / Grey, very dense, fine Cemented Silty SAND			R			50.0

Cont.. BH - 1

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 1

Sheet # 2 of 2

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N'Count	Percent Recovery	R.Q.D.	Remarks (feet)
51.0										
55	Core		SM	Brown / Grey, very dense, fine Cemented Silty SAND				37	19	Waxed Core
	Core							41	20	Waxed Core
60.0										
	Core							47	28	Waxed Core
	Core							53	30	Waxed Core
70.0										
	Core		CL	Grey / Brown / Yellow, very stiff, thin bedded Sandy SHALE gravel & sand layers lenses of siltstone / conglomerate				48	27	Waxed Core
	Core							60	32	Waxed Core
80.0										
	Core							50	19	Waxed Core
85										
	CPT						R			
90.0										
	CPT		GC	Brown / Grey, highly compacted / hard SAND & GRAVELS embedded in SHALE lenses of sandstone / conglomerate			R			
	CPT						R			
100										100.0

End of BH - 1

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 2

Sheet # 1 of 3

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N Count	Percent Recovery	R.Q.D.	Remarks (feet)
0.0	SPT		SM	Grey / Brown, loose to medium dense fine, Silty SAND, micaceous			4			
	SPT						10			
9	SPT						14			10.0
	SPT						13			
	SPT						12			
	SPT		SM	Brownish Grey, medium dense, fine Silty SAND sea shells			16			20.0
	SPT						18			
	SPT						15			30.0
32	SPT						38			
	SPT		SM	Brown / Grey / White, medium to dense fine to medium grained, Silty SAND, sea shells			42			40.0
	SPT						R			
50	SPT						R			50.0

Cont.. BH - 2

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 2
Sheet # 2 of 3

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi
Ground Elevation: Approx. same as road
Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N'Count	Percent Recovery	R.Q.D.	Remarks (feet)
51.0	SPT		SM	Brown / Grey, very dense, fine Cemented Silty SAND			R			60.0
	Core							37	16	Waxed Core
67	Core							28	nil	70.0
	Core		CL	Grey / Brown / Yellow, very stiff, thin bedded Sandy SHALE gravel & sand layers lenses of siltstone / conglomerate				29	14	
	Core							38	24	Waxed Core 80.0
84	SPT						R			
	SPT		GC	Brown / Grey, highly compacted / hard SAND & GRAVELS embedded in SHALE lenses of sandstone / conglomerate			R			90.0
	SPT						R			
98	Core		ML	Grey, medium hard, fractured SILTSTONE				38	24	Waxed Core
100										100.0

Cont.. BH - 2

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 2

Sheet # 3 of 3

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N'Count	Percent Recovery	R.Q.D.	Remarks (feet)
101.0										
105	Core		ML	Grey, medium hard, fractured SILTSTONE lenses sandstone / shale				57	28	Waxed Core
	Core							41	14	110.0
	Core							28	nil	
	Core							30	16	Waxed Core 120.0
	Core		SM	Grey, very dense, fine, Cemented SAND lenses of shale / siltstone				38	15	Waxed Core
	Core							19	nil	130.0
	Core							38	18	Waxed Core
138	Core							42	16	Waxed Core 140.0
145	Core		ML	Grey, hard, fractured SILTSTONE lenses of shale / limestone				51	14	145.0
				End of BH - 2						

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 3

Sheet # 1 of 2

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N'Count	Percent Recovery	R.Q.D.	Remarks (feet)
0.0	SPT		SM	Grey / Brown, loose to medium dense fine, Silty SAND, micaceous			5			
8	SPT						6			10.0
	SPT						19			
	SPT		SM	Brownish Grey, medium dense, fine Silty SAND sea shells			14			20.0
	SPT						12			
30	SPT						24			30.0
	SPT						36			
	SPT		SM	Brown / Grey / White, medium to dense fine to medium grained, Silty SAND, sea shells			42			40.0
	SPT						R			
50	SPT						R			50.0

Cont.. BH - 3

GAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 3

Sheet # 2 of 2

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N'Count	Percent Recovery	R.Q.D.	Remarks (feet)
51.0	Core		SM	Brown / Grey, very dense, fine Cemented Silty SAND				59	27	
	Core							63	37	Waxed Core 60.0
63	Core							38	27	Waxed Core
	Core		CL	Grey / Brown / Yellow, very stiff, thin bedded Sandy SHALE gravel & sand layers lenses of siltstone / conglomerate				40	22	Waxed Core 70.0
	Core							56	30	Waxed Core
	Core							59	40	Waxed Core 80.0
	Core							60	38	Waxed Core
86	SPT		GC	Brown / Grey, highly compacted / hard SAND & GRAVELS embedded in SHALE lenses of sandstone / conglomerate			R			90.0
	SPT						R			
100	SPT						R			100.0

End of BH - 3

FAZAI GEO-ENGINEERING SERVICES

Bore Hole No. 4

Sheet # 1 of 3

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N'Count	Percent Recovery	R.Q.D.	Remarks (feet)
0.0	SPT		SM	Grey / Brown, loose to medium dense fine, Silty SAND, micaceous			6			
	SPT						7			
	SPT						10			10.0
	SPT						13			
14	SPT		SM	Brownish Grey, medium dense, fine Silty SAND sea shells			12			
	SPT						16			20.0
	SPT						15			
30	SPT						27			30.0
	SPT		SM	Brown / Grey / White, medium to dense fine to medium grained, Silty SAND, sea shells			36			
	SPT						43			40.0
	SPT						R			
49										
50	SPT		SM	Brown / Grey, very dense, fine			R			50.0

Cont., BH - 4

FAZAL GEO ENGINEERING SERVICES

Bore Hole No. 4
Sheet # -2 of 3

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi
Ground Elevation: Approx. same as road
Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N`Count	Percent Recovery	R.Q.D.	Remarks (feet)
51.0										
55	Core		SM	Brown / Grey, very dense, fine Cemented Silty SAND				37	19	Waxed Core
	Core							21	nil	60.0
	Core							43	27	Waxed Core
	Core							45	31	Waxed Core
	Core		CL	Grey / Brown / Yellow, very stiff, thin bedded Sandy SHALE gravel & sand layers lenses of siltstone / conglomerate				46	27	70.0
	Core							39	30	Waxed Core
	Core							40	28	80.0
86										Waxed Core
	SPT						R			90.0
	SPT		GC	Brown / Grey, highly compacted / hard SAND & GRAVELS embedded in SHALE lenses of sandstone / conglomerate			R			
100	SPT						R			100.0

Cont.. BH - 4

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 4

Sheet # 3 of 3

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N Count	Percent Recovery	R.Q.D.	Remarks (feet)
101.0	SPT		GC	Brown / Grey, highly compacted / hard SAND & GRAVELS embedded in SHALE lenses of sandstone / conglomerate			R			
	SPT						R			110.0
114	Core		SM	Grey, very dense, fine, Cemented SAND lenses of shale / siltstone				26	12	Waxed Core
										120.0
	Core							30	nil	
	Core							30	12	
130										130.0
				End of BH - 4						

FAZAL GEO ENGINEERING SERVICES

Bore Hole No. 5

Sheet # 1 of 2

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N`Count	Percent Recovery	R.Q.D.	Remarks (feet)
0.0	SPT		SM	Grey / Brown, loose to medium dense fine, Silty SAND, micaceous			6			
10	SPT						7			10.0
	SPT		SM	Brownish Grey, medium dense, fine Silty SAND sea shells			10			
	SPT						17			20.0
24	SPT						16			
	SPT						33			30.0
	SPT		SM	Brown / Grey / White, medium to dense fine to medium grained, Silty SAND, sea shells			40			
	SPT						R			40.0
	SPT						R			
49	SPT						R			
50			SM	Brown / Grey, very dense, fine						50.0

Cont.. BH - 5

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 5

Sheet # 2 of 2

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N`Count	Percent Recovery	R.Q.D.	Remarks (feet)
51.0										
	Core		SM	Brown / Grey, very dense, fine Cemented Silty SAND				47	28	
58	Core							33	21	60.0
	Core							36	18	Waxed Core
	Core							21	14	Waxed Core
	Core		CL	Grey / Brown / Yellow, very stiff, thin bedded Sandy SHALE gravel & sand layers lenses of siltstone / conglomerate				35	nil	
	Core							38	20	Waxed Core 80.0
	Core							44	23	Waxed Core
87										
	SPT						R			90.0
	SPT		GC	Brown / Grey, highly compacted / hard SAND & GRAVELS embedded in SHALE lenses of sandstone / conglomerate			R			
100	SPT						R			100.0

End of BH - 5

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 6

Sheet # 1 of 3

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N`Count	Percent Recovery	R.Q.D.	Remarks (feet)
0.0										
	SPT		SM	Grey / Brown, loose to medium dense fine, Silty SAND, micaceous			12			
10	SPT						10			10.0
	SPT		SM	Brownish Grey, medium dense, fine Silty SAND sea shells			9			
	SPT						14			20.0
25	SPT						20			
	SPT		SM	Brown / Grey / White, medium to dense fine to medium grained, Silty SAND, sea shells			29			30.0
	SPT						42			
	SPT						39			40.0
	SPT						R			
50	SPT						R			50.0

Cont.. BH - 6

FAZAL GEO-ENGINEERING SERVICES

Bore Hole No. 6
Sheet # 2 of 3

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi
Ground Elevation: Approx. same as road
Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N`Count	Percent Recovery	R.Q.D.	Remarks (feet)
51.0	Core		SM	Brown / Grey, very dense, fine Cemented Silty SAND				32	17	Waxed Core
	Core							40	24	60.0
62	Core		CL	Grey / Brown / Yellow, very stiff, thin bedded Sandy SHALE gravel & sand layers lenses of siltstone / conglomerate				40	27	Waxed Core
	Core							37	26	Waxed Core 70.0
	Core							16	nil	
	Core							37	16	Waxed Core 80.0
	Core							40	21	
88	SPT		GC	Brown / Grey, highly compacted / hard SAND & GRAVELS embedded in SHALE lenses of sandstone / conglomerate			R			90.0
	SPT						R			
100										100.0

Cont.. BH - 6

FAZAL GEO ENGINEERING SERVICES

Bore Hole No. 6

Sheet # 3 of 3

SUBSURFACE EXPLORATION LOG

Location: FL-11, Block-1, Clifton, Karachi

Ground Elevation: Approx. same as road

Ground Water Depth: 6-8 feet

Depth feet	Sample No.	Legend	Classification Symbol	Stratum Description	Dia of Casing / Hole	Elevation	SPT N`Count	Percent Recovery	R.Q.D.	Remarks (feet)
101.0										
	SPT		GC	Brown / Grey, highly compacted / hard SAND & GRAVELS embedded in SHALE lenses of sandstone / conglomerate			R			
110	SPT						49			110.0
	Core		SM	Grey, very dense, fine, Cemented SAND lenses of shale / siltstone				47	29	120.0
	Core							51	32	Waxed Core
	Core							48	21	
130										130.0
				End of BH - 6						

FAZAL GEO-ENGINEERING SERVICES

GRAIN SIZE ANALYSIS

Location: FL-11, Block-1, Clifton, Karachi

(PER CENT FINER BY WEIGHT)

S.No.	Boring	Depth (ft)	3"	1 ½"	¾"	⅜"	NO4	#8	#16	#30	#50	#100	#200	Atterburg Limits	
														LL	PI
1	BH-01	3.0 – 4.6	–	–	–	100	95	92	89	86	85	47	28	NP	
2	BH-01	7.0 – 8.6	–	–	–	100	98	93	91	88	86	54	30	NP	
3	BH-01	12 – 13	–	–	–	100	98	95	94	93	92	32	12	NP	
4	BH-01	20 – 21	–	–	–	–	–	100	97	95	94	33	08	NP	
5	BH-01	30 – 31	–	–	–	100	99	86	72	44	37	04	02	NP	
6	BH-01	53 – 54	–	–	–	–	100	98	97	94	93	80	64	28	10
7	BH-01	57 – 58	–	–	–	–	–	–	–	100	99	92	88	36	14
8	BH-01	68 – 69	–	–	–	–	–	–	–	100	99	97	93	36	13
9	BH-01	72 – 73	–	–	–	–	100	95	90	83	81	71	62	32	12
10	BH-02	5.0 – 6.6	–	–	–	100	96	94	93	92	91	35	09	NP	
11	BH-02	15 – 16	–	–	–	–	–	–	100	94	93	39	19	NP	
12	BH-02	25 – 26	–	–	–	–	100	98	96	93	92	53	21	NP	
13	BH-02	40 – 41	–	–	–	–	–	–	–	100	99	40	21	NP	
14	BH-02	48 – 50	–	–	–	100	89	74	57	40	31	24	14	NP	
15	BH-02	76 – 77	–	–	–	–	100	90	82	76	75	70	64	32	12
16	BH-02	96 – 97	–	100	91	80	74	70	61	57	51	48	40	34	14
17	BH-02	122 – 123	–	–	–	–	–	–	–	100	99	35	16	NP	

FAZAL GEO-ENGINEERING SERVICES

GRAIN SIZE ANALYSIS

Location: FL-11, Block-1, Clifton, Karachi

(PER CENT FINER BY WEIGHT)

S.No.	Boring	Depth (ft)	3"	1 ½"	¾"	⅜"	NO4	#8	#16	#30	#50	#100	#200	Atterburg Limits	
														LL	PI
18	BH-02	143 – 144	–	–	–	–	–	–	–	100	98	86	70	27	07
19	BH-03	7.0 – 8.6	–	–	–	–	–	100	97	95	94	28	15	NP	
20	BH-03	20 – 21	–	–	–	–	–	–	–	100	99	49	20	NP	
21	BH-03	30 – 31	–	–	–	–	100	96	82	76	67	63	12	NP	
22	BH-03	45 – 46	–	–	–	100	98	79	57	31	27	08	05	NP	
23	BH-03	50 – 51	–	–	–	100	98	96	95	94	94	42	18	NP	
24	BH-03	57 – 58	–	–	–	–	–	–	100	98	97	66	47	26	08
25	BH-03	67 – 68	–	–	–	–	–	–	–	100	99	95	92	28	10
26	BH-03	73 – 74	–	–	–	100	98	93	89	83	82	76	68	36	15
27	BH-03	83 – 84	–	–	–	–	–	100	99	97	96	92	86	44	19
28	BH-04	5.0 – 6.6	–	–	–	100	96	85	83	80	78	33	17	NP	
29	BH-04	15 – 16	–	–	–	–	–	–	–	100	99	46	31	NP	
30	BH-04	30 – 31	–	–	–	100	98	86	77	69	67	25	12	NP	
31	BH-04	54 – 55	–	–	–	–	100	97	96	94	93	77	61	23	07
32	BH-04	62 – 63	–	–	–	–	–	–	–	100	99	96	94	36	11
33	BH-04	76 – 77	–	–	–	100	98	92	87	81	80	67	60	40	13
34	BH-05	10 – 11	–	–	–	–	–	100	99	98	97	37	19	NP	

FAZAL GEO-ENGINEERING SERVICES

GRAIN SIZE ANALYSIS

Location: FL-11, Block-1, Clifton, Karachi

(PER CENT FINER BY WEIGHT)

S.No.	Boring	Depth (ft)	3"	1 ½"	¾"	⅜"	NO4	#8	#16	#30	#50	#100	#200	Atterburg Limits	
														LL	PI
35	BH-05	20 – 21	–	–	–	–	–	–	–	100	99	48	23	NP	
36	BH-05	40 – 41	–	–	–	100	92	76	68	59	56	24	11	NP	
37	BH-05	63 – 64	–	–	–	–	–	–	–	100	99	93	91	36	10
38	BH-05	76 – 77	–	–	–	–	100	98	92	87	82	72	61	28	10
39	BH-05	82 – 83	–	–	–	–	100	99	98	96	95	85	73	34	14
40	BH-06	5.0 – 6.6	–	–	–	–	–	100	99	98	97	33	16	NP	
41	BH-06	15 – 16	–	–	–	–	–	–	100	99	97	29	12	NP	
42	BH-06	20 – 21	–	–	–	–	–	–	100	98	97	29	10	NP	
43	BH-06	40 – 41	–	–	–	–	–	–	–	100	99	31	11	NP	
44	BH-06	62 – 63	–	–	–	–	–	–	–	100	99	97	96	35	12
45	BH-06	66 – 67	–	–	–	–	–	–	–	100	99	98	96	38	14
46	BH-06	77 – 78	–	–	–	–	100	96	93	89	88	81	72	30	11
47	BH-06	90 – 95	–	100	91	80	68	62	56	54	50	48	40	40	18
48	BH-06	110 – 112	–	–	–	–	–	–	100	95	81	46	16	NP	

For FAZAL GEO ENGINEERING SERVICES

Location: FL-11, Block-1, Clifton, Karachi

FAZAL GEO-ENGINEERING SERVICES

UNCONFINED STRENGTH

S. NO.	BH #	Depth (feet)	Strength (tsf)	Strain (%)	Density (pcf)	Moisture (%)
1.	BH-01	53 – 54	03.62	02.50	134	14.44
2.	BH-01	57 – 58	02.16	07.39	125	17.10
3.	BH-01	62 – 63	03.36	08.51	135	20.05
4.	BH-01	68 – 69	02.46	07.16	130	16.70
5.	BH-01	72 – 73	01.98	04.55	133	13.87
6.	BH-01	76 – 77	03.81	09.81	138	14.89
7.	BH-01	84 – 85	03.10	03.16	136	12.60
8.	BH-02	62 – 63	04.10	00.96	137	10.71
9.	BH-02	76 – 77	03.06	06.79	136	12.76
10.	BH-02	78 – 79	02.79	04.14	132	11.76
11.	BH-02	98 – 99	06.40	03.18	143	06.17
12.	BH-02	102 – 103	07.90	00.87	141	09.67
13.	BH-02	117 – 118	17.49	02.88	146	14.36

Location: FL-11, Block-1, Clifton, Karachi

FAZAL GEO-ENGINEERING SERVICES

UNCONFINED STRENGTH

S. NO.	BH #	Depth (feet)	Strength (tsf)	Strain (%)	Density (pcf)	Moisture (%)
14.	BH-02	122 – 123	14.20	02.22	144	15.53
15.	BH-02	132 – 133	18.84	02.46	145	15.30
16.	BH-02	137 – 138	12.13	02.05	143	15.43
17.	BH-03	57 – 58	03.76	05.13	136	13.10
18.	BH-03	63 – 64	03.44	07.35	135	16.98
19.	BH-03	67 – 68	02.15	10.91	131	16.22
20.	BH-03	73 – 74	01.68	08.26	134	14.86
21.	BH-03	77 – 78	04.39	03.82	136	09.96
22.	BH-03	83 – 84	03.30	07.51	135	17.30
23.	BH-04	54 – 55	0318	02.25	139	10.55
24.	BH-04	62 – 63	02.38	09.72	133	18.67
25.	BH-04	67 – 68	02.74	10.36	134	19.09
26.	BH-04	76 – 77	04.35	04.11	135	10.44

Location: FL-11, Block-1, Clifton, Karachi

FAZAL GEO-ENGINEERING SERVICES

UNCONFINED STRENGTH

S. NO.	BH #	Depth (feet)	Strength (tsf)	Strain (%)	Density (pcf)	Moisture (%)
27.	BH-04	84 – 85	04.61	03.91	140	10.70
28.	BH-04	117 – 118	11.40	01.10	144	09.87
29.	BH-05	63 – 64	03.45	09.75	130	19.20
30.	BH-05	69 – 70	02.29	09.71	129	19.35
31.	BH-05	76 – 77	03.82	08.06	134	12.92
32.	BH-05	82 – 83	04.92	10.23	135	13.34
33.	BH-06	54 – 55	04.16	01.16	139	11.70
34.	BH-06	62 – 63	02.03	06.19	131	10.66
35.	BH-06	66 – 67	02.02	08.71	130	13.17
36.	BH-06	77 – 78	04.80	08.47	129	11.61
37.	BH-06	121 – 122	13.80	00.94	143	10.10

FOR FAZAL GEO ENGINEERING SERVICES:
FAROOQ FAZAL

Location: FL-11, Block-1, Clifton, Karachi

FAZAL GEO-ENGINEERING SERVICES

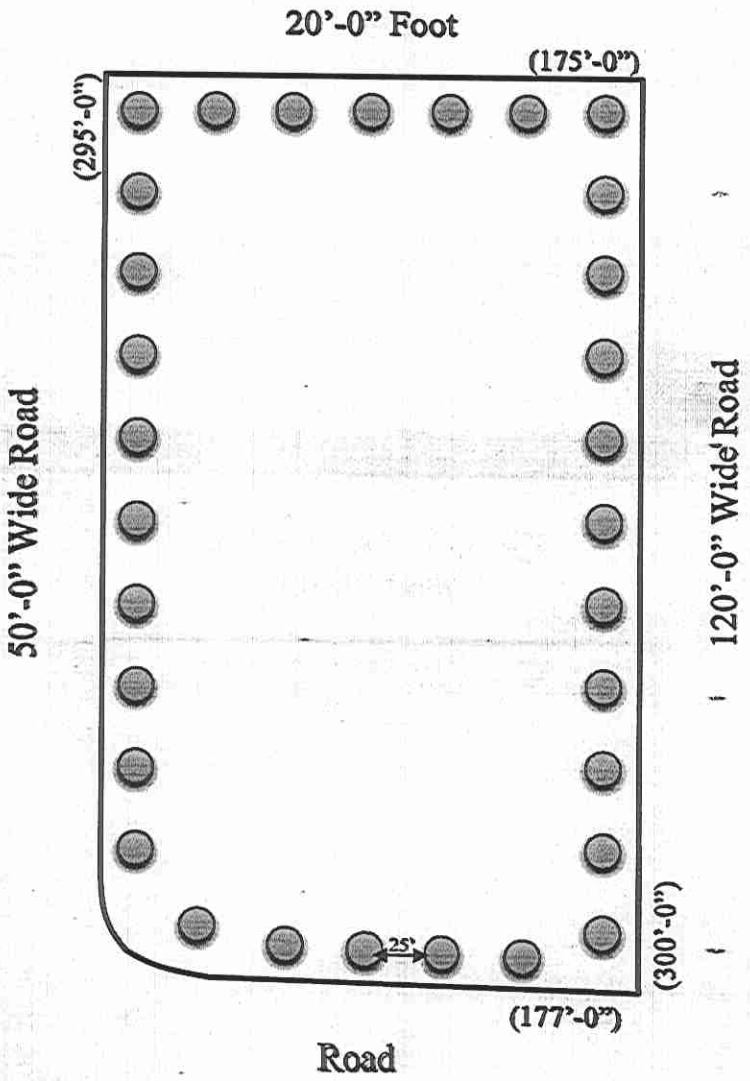
SALTS IN GROUNDWATER

S.#	Boring	Total Salts (ppm)	Sulphates (ppm)	Chlorides (ppm)
1	BH – 01	38500	480	8800
2	BH – 04	43600	600	9600

FOR FAZAL GEO ENGINEERING SERVICES
FAROOQ FAZAL

FAZAL GEO-ENGINEERING SERVICES

TENTATIVE DEWATERING PLAN



= Dewatering Well

Depth of well 25 feet below excavation depth. Diameter of well 12 inches. PVC pipe diameter to be 6 inches. Pumped-out water to be disposed into a proper drain, not to revert back into the foundation pit. Dewatering to precede excavation. No. of Well depends on Trial & Error. Well location inside plot if shoring piles are installed.

Plot FL-11, Block-1, Scheme-5,
Kehkashan Clifton, Karachi.

Sherdad Khan
Director
0300-9210018

SHAHNAWAZ & SONS

Constriction Of Building & Civil Engineering Project

No._____ Date 20.06.2018

Mrs./ Mr. United Contd

Project:- Plot #.....SADDAR Karachi.

Rate of Covered Area Rs=.~~500/=~~ Psft 450/-

LABOUR RATES WITH SAND

Basement +Ground floor+....5.... floors

1. R.C.C slab
2. Foundation as per Drawing.
3. Block Masonry (Block to be supplied by owner).
4. Electric Works as per Drawing.
5. Plumber Works as per Drawing.
6. Internal Plaster and External Plaster.
7. Flooring Tiles and Glazed Tile Bathroom 7'-0" Height.
8. Door Shutter and Door Frame fixing by contractor.
9. Contractor provided shuttering, steel fixing, paranch fixing labour equipment.
10. All material provide owner responsibility and also paranch blanket.
11. Structure RCC foundation Retaining Wall Column Slab & Beam Stairs case and lift.
12. The following sterns will be provided by the owner for using.
    a). Water
    b). Temporary Electric Line.
    c). Electric Pump
    d). Petrol
    e). Generator. (if necessary)
    f). Plastic Pipe.
    g). G.I Pipe on.
13. Under Ground Tank Slab per Sq. Ft.
14. Over Head Tank Two-Slab per Sq. Ft.
16. (Extra Work) Boundary.
17. Totally Ready Mix Concreate will be Provided By Owners

(without Material deduction)

Signature of Contractor

Signature of Owner

A/5 /35, Qayumabad, Korangi Road, Karachi.

rdad Khan
Director
0300-9210018

SHAHNAWAZ & SONS

Constriction Of Building & Civil Engineering Project

No._____ Date _____

Mrs./ Mr._____

DESCRIPTION:-

1. Drainage Line Water Line Connection by the Owner.
2. KDA, KMC, KESC olive Tax and Income Tax by the Owner.
3. Water Supply free of cost by the owner with Water Pump Petrol and Water pipe 3 Phase Electric.
4. Water proofing by Owner.
5. Color Kit Graphic and Tiles Elevation by the Owner.
6. In case of accident at site the owner will be responsible.
7. Hard Soling by the Owner.
8. N.B. Charge for Gas & Aluminum Glass Work will be Owner Side.
9. Advance Mobilization Rs .....

Signature of Contractor

Signature of Owner

A/5 /35, Qayumabad, Korangi Road, Karachi.

rdad Khan
Director
0300-9210018

SHAHNAWAZ & SONS

Constriction Of Building & Civil Engineering Project

No._____ Date _____

Mrs./ Mr._____

S.NO	DESCRIPTION	PARTS % OF WORK	AGREED
Percentage			
1.	FOUNDATION & RETAINING WALL		
	(A)Excavation		11%
	(B)Flooring 1:4:8		
	(C)Raft Foundation		
2.	STUCTURE		
	(D)Columns		38%
	(E)Slab & Beam		
3.	Block Mansony		
	(A)A thick block wall		7%
	(B)Door Frame Fixing		
4.	Electration		
	(A)Piping Laying in Slab		
	(B)Wiring & Main Line		3%
	(C)Sheet & Switches ETC		

rdad Khan
Director
0300-9210018

SHAHNAWAZ & SONS

Constriction Of Building & Civil Engineering Project

No. _____ Date _____

Mrs./ Mr. _____

S.NO	DESCRIPTION	PARTS % OF WORK	AGREED
5.	**Plumbering & Severage**		
	(A)UPVC Work		2%
	(B)PPRC Work		
	(C)Sanitary Wares		
6.	**Plaster**		
	(A)Internal Plaster		20%
	(B)External Plaster		
7.	**Floor Tiles**		
	Katcha Floor Tile Fixing		8%
8.	Door Shutter & Hardware		1%
9.	**Painting**		
	(A)First Coat Filing Internal		4%
	(B)First Coat Internal		
	(C)External Paint		
10.	**Tiles in Bathroom**		
	Tiles in floor & 7" High Dado		2%
11.	Final		3%
			100%

A/5 /35, Qayumabad, Korangi Road, Karachi.