APPENDIX II
(See paragraph 6)
FORM-1 A (only for construction projects listed under item 8 of the Schedule)

CHECK LIST OF ENVIRONMENTAL IMPACTS
(Project proponents are required to provide full information and wherever necessary attach explanatory notes with the Form and submit along with proposed environmental management plan & monitoring programme)

1. LAND ENVIRONMENT (Attach panoramic view of the project site and the vicinity)

1.1. Will the existing land use get significantly altered from the project that is not consistent with the surroundings? (Proposed land use must conform to the approved Master Plan / Development Plan of the area. Change of land use if any and the statutory approval from the competent authority be submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) The site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

Site Location:
The project site under reference is located on Plot no. 188A of Sector 10 and Plot no. 9 of Sector 11, Juinagar, Sanpada node, Taluka & District- Thane, Sate: Maharashtra. The project is under the jurisdiction of Navi Mumbai Municipal Corporation (NMMC) and planning authority is City and Industrial Development Corporation of Maharashtra Limited (CIDCO).

The following details are enclosed:'

1	Site Location Map	Enclosed
2	Surrounding features of the proposed site (within 500 mt.)	Enclosed
3	Layout Plan	Enclosed

1.2. List out all the major project requirements in terms of the land area, built up area, water consumption, power requirement, connectivity, community facilities, parking needs etc.

A. Connectivity and community facilities

The project is PMAY Housing Scheme and is located at Plot no. 188A of Sector 10 and Plot no. 9 of Sector 11, Juinagar, Sanpada node, District- Thane, Sate: Maharashtra. Site is connected by 18.00 mt. wide, 20.00 mt. wide and 24.00 mt. wide roads. Juinagar Railway Station is abutting the plot on the Harbour Line of the Mumbai Suburban Railway network. Basic amenities like shopping, schools, hospitals and other amenities are nearby to the project site.

B. Building Details:

Table No.1: Building details

Buildings	Configuration	Details
10 no. of Buildings	Ground + 24 floors each	Flats: 5172 nos.
16 no. of Buildings	Ground + 27 floors each	Shops: 39 nos.
1 no. of Multi Level Car Parking (For residential)	Ground + 4 floors	--
1 no. of Multi Level Car Parking (For station)	Ground + 3 floors	--
Bus Terminal, Auto Stand and Taxi Stand	--	--

C. Area Statement:

Table No. 2: Area Statement

No	Description	Area (Sq.mt.)
1.	Total Plot Area	97467.74
2.	**Proposed Built–up area as per FSI**	**2,05,781.57**
3.	**Total Construction Built–up area (FSI + NON FSI)**	**4,14,524.67**

	D. Occupancy load: Shall be calculated as per National Building Code (NBC) -2016 – Part 9, Page 9, Occupant Load. And details shall be submitted in EIA report. **E. Water requirement for the project:** **1. During Construction Phase –** Details shall be submitted in the EIA report **2. During Operational Phase** Shall be calculated National Building Code (NBC) -2016 – Part 9, Page 9, Water Requirement and quantities shall be submitted in the EIA report. **F. Sewage Generation:** Shall be calculated as per Manual on norms and standards for EC of large construction projects MoEF and quantities shall be submitted in the EIA report. **G. Solid Wastes:** **1. During Construction Phase:** Solid waste generated shall be segregated into biodegradable and non-biodegradable waste and shall be disposed suitably. Quantities shall be submitted in the EIA report **2. During Operation Phase: Shall be calculated as per NBC 2016** The project proponents have proposed provision for segregation and collection of biodegradable & non-biodegradable waste within the premises. Biodegradable waste will be treated in OWC and the non-biodegradable waste will be handed over to Navi Mumbai Municipal Corporation (NMMC). Quantities shall be submitted in the EIA report. **H. Power requirement:** **1. During Construction Phase -** Details shall be submitted in the EIA report **2. During Operational Phase -** Details shall be submitted in the EIA report
1.3.	**What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing land use, disturbance to the local ecology).**
	There shall have impacts on water, air environment, power requirement but it shall be mitigated by providing proper pollution control facilities. Package type Sewage Treatment Plant (PTP) shall be provided for treatment of sewage and recycling of treated sewage there by reducing fresh water demand. Also for water conservation, rain water harvesting shall be done. Power consumption shall be reduced by using energy saving practices. Impact on air quality shall be reduced by plantation of trees on green cover area. This project will generate employment and there by shall have positive impact on socio economy. Detailed impact assessment and mitigation measures for each attribute shall be given.
1.4.	**Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc. may be given).**
	As per the Seismic Zoning Map of India, region falls under Zone- III. Stability Certificate, as per prevalent IS Code obtained for these buildings from registered Consulting Structural Engineer considering the seismic forces and wind forces etc.
1.5.	**Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)**
	Assessment of storm water disposal system of proposed project site considering site and adjoining areas shall be submitted in the EIA report.
1.6.	**What are the quantities of earthwork involved in the construction activity-cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from**

	outside the site etc.)
	Details shall be submitted in the EIA report.
1.7.	**Give details regarding water supply, waste handling etc during the construction period.**
	Details shall be submitted in the EIA report.
1.8.	**Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)**
	No
1.9.	**Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labour and the means of disposal)**
	Excavation material shall be partly used on site for road leveling and remaining shall be disposed to authorized landfill site as per permission from local authority. Construction waste generated during construction activity shall be partly recycled on site and partly shall be disposed to authorized landfill site with permission of local authority Proper segregation of the wastes generated during construction phase shall be done and shall be handed over to Local Authority.
2.	**WATER ENVIRONMENT**
2.1.	**Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement be met? State the sources & quantities and furnish a water balance statement.**
	Water Requirement & Source: **<u>During Construction Phase –</u>** Details shall be submitted in the EIA report. **<u>During Operational Phase –</u>** Shall be calculated National Building Code (NBC) -2016 – Part 9, Page 9, Water Requirement and quantities shall be submitted in the EIA report.
2.2.	**What is the capacity (dependable flow or yield) of the proposed source of Water?**
	Fresh Water Supply s from CIDCO.
2.3.	**What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)**
	Fresh Water Supply s from CIDCO.
2.4.	**How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)**
	Details shall be submitted in the EIA report.
2.5.	**Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)**
	No.
2.6.	**What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity)**
	Details shall be submitted in the EIA report.
2.7.	**Give details of the water requirements met from water harvesting? Furnish details of the facilities created.**
	Provision of Rain Water Harvesting system shall be done. Details shall be submitted in the EIA report.
2.8.	**What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?**
	Precaution to avoid water logging on site: • Minimizing the incremental runoff from the site with the help of rain water harvesting tanks. • Provision of internal Storm water drainage system with adequate capacity • Use of screens and silt traps to SWD • These drains shall have silt and oil and grease traps to avoid pollution of water in drains outside the plot.

	Carrying capacity of external drain is sufficient to take the runoff and there will be no flooding on and around project site.
2.9.	**What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any)**
	Provision of rain water harvesting system shall be done.
2.10.	**What precautions/measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts).**
	The runoff from the site during construction phase would be prevented as under: • Use of polymeric spray for dust suppression instead of water wherever possible • Curing water shall be sprayed on concrete structures, free flow of water will not be allowed for curing • Use of wet jute cloth/ gunny bags instead of water spray for curing activity.
2.11.	**How is the storm water from within the site managed?(State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels).**
	Storm water drains will be constructed strictly in accordance to the governing authority regulations. • Proper management of channelization of storm water • Designing storm water drainage with adequate capacity to cater the total runoff from site and outside catchment area and avoid flooding on site or surrounding • Proper maintenance of storm water drainage to avoid choking of drains and flooding on site • Surface rainwater to be passed through oil & grease trap & desilting chamber and then transferred to municipal storm water drain • Prompt completion of works relating to drainage and sediment control • Ensure discharge of storm water from the site or inflow to the site
2.12.	**Will the deployment of construction labourers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)**
	• Regular segregation and disposal of solid waste generated by the workers • First aid and medical facilities to all the concerned people working on the site • Proper housekeeping throughout the premises • Regular site sanitation
2.13.	**What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology & facilities for recycling and disposal).**
	Details shall be submitted in the EIA report.
2.14.	**Give details of dual plumbing system if treated waste used is used for flushing of toilets or any other use.**
	Details shall be submitted in the EIA report.
3.	**VEGETATION :**
3.1	**Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with its unique features, if any)**
	No.
3.2	**Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees & vegetation affected by the project)**
	Trees shall be planted as per norms
3.3	**What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale)**
	Trees shall be planted as per norms
4	**FAUNA**
4.1	**Is there likely to be any displacement of fauna- both terrestrial and aquatic or creation of barriers for their movement? Provide the details.**
	No
4.2	**Any direct or indirect impacts on the avifauna of the area? Provide details.**
	No

4.3	**Prescribe measures such as corridors, fish ladders etc to mitigate adverse impacts on fauna.**
	Not Applicable
5	**AIR ENVIRONMENT**
5.1	**Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)**
	One season baseline data for ambient air parameters namely PM_{10}, $PM_{2.5}$, Oxides of Sulphur, Oxides of Nitrogen and CO at project site and in an area extending 2 Km radius from the boundary of project site shall be reported in EIA.
5.2	**What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.**
	During Construction Phase: **Anticipated Impacts –** • Increased level of dust and other air pollutants due to building construction and other related activities • Emissions from vehicles carrying the construction materials • Emissions from DG sets • Open burning of solid wastes can cause air pollution **Mitigation Measures-** • Use of water for dust suppression and polymeric dust suppression system (wherever possible) • Use of covering sheets shall be done for trucks carrying construction material to prevent air borne dust • All material storages shall be adequately covered to avoid dust / particulate emissions • Use of CPCB approved DG sets • Proper maintenance of DG sets • Adequate parking provision and proper traffic arrangement for smooth traffic flow • Vehicles having valid pollution under control certificate shall be allowed to ply on site • Open burning of solid waste shall be prohibited • Regular health checkup of the workers • Use of the standard personal protective equipments like masks, goggles, etc. **During Operation Phase:** **Anticipated Impacts –** • Vehicular emissions • Emissions from DG sets **Mitigation Measures –** • Adequate parking provision, proper traffic management for smooth traffic flow • DG sets with acoustic enclosures is to be installed and stacks height to be kept as per Central Pollution Control Board (CPCB) norms to allow effective dispersion of pollutants • Periodic monitoring of RSPM and SO2 concentration and thereby schedule and implement proper maintenance of DG sets • Plantation of trees of various varieties on ground Climatological data is obtained from India Meteorological Department (IMD) station for one full year. Micro meteorological data consisting of wind speed, wind direction, temperature, humidity, rainfall (peak and average daily rainfall) and wind rose patterns shall be reported in EIA.

5.3	**Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry & exit to the project site.**
	The project proponents have proposed to provide well organized arrangement. Detailed traffic report stating present level of transport infrastructure and measures proposed for improvement including the traffic management shall be submitted.
5.4	**Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc., with areas under each category.**
	The project proponents have proposed to provide adequate well organized parking arrangement. • The project proponents have proposed to provide adequate well organized parking arrangement. • Adequate parking provision and proper traffic arrangement for smooth traffic flow. • Provision of separate entry & exit. • Proper directional arrows used in parking bays.
5.5	**Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.**
	During Construction Phase: ➢ **Anticipated Impacts –** • Noise due to construction activities • Impact due to transportation activities • Nuisance to nearby areas due to noise polluting work at night • Noise generated due to DG sets ➢ **Mitigation Measures –** • During construction activities the noise will be monitoring to ascertain the noise levels are within limit • All precautions for noise abatement shall be taken during the construction activities • During high noise construction activity there will be provision of ear plugs for construction labour and staff • No noise polluting work in night shifts • Provision of barricades along the periphery of the site • Acoustic enclosure for DG sets **During Operation Phase:** ➢ **Anticipated Impacts –** • Impact of noise due to vehicular traffic • Noise generated due to DG sets ➢ **Mitigation Measures –** • Provision of proper parking arrangement, traffic management plan for smooth flow of a vehicle helps to abate noise pollution due to vehicular traffic • Plantation of trees of various varieties shall be planted on ground that shall act as natural noise buffer • Acoustic enclosure for DG sets
5.6	**What will be the impact of DG sets & other equipment on noise levels & vibration in & ambient air quality around the project site? Provide details.**
	• D.G. Sets will be operated only in case of power failures during operational phase. The Pollutants like RSPM, SO_2 that may arise from emissions from D.G. Sets will be discharged through vent of proper height. • D.G. sets are with inbuilt acoustic enclosures to reduce the noise of D.G. sets while in operation. • Plantation of trees would act as noise barrier and will reduce the noise level. • Noise modeling details for both construction and operation phase considering impact of DG sets, vehicular movement shall be submitted in EIA report.

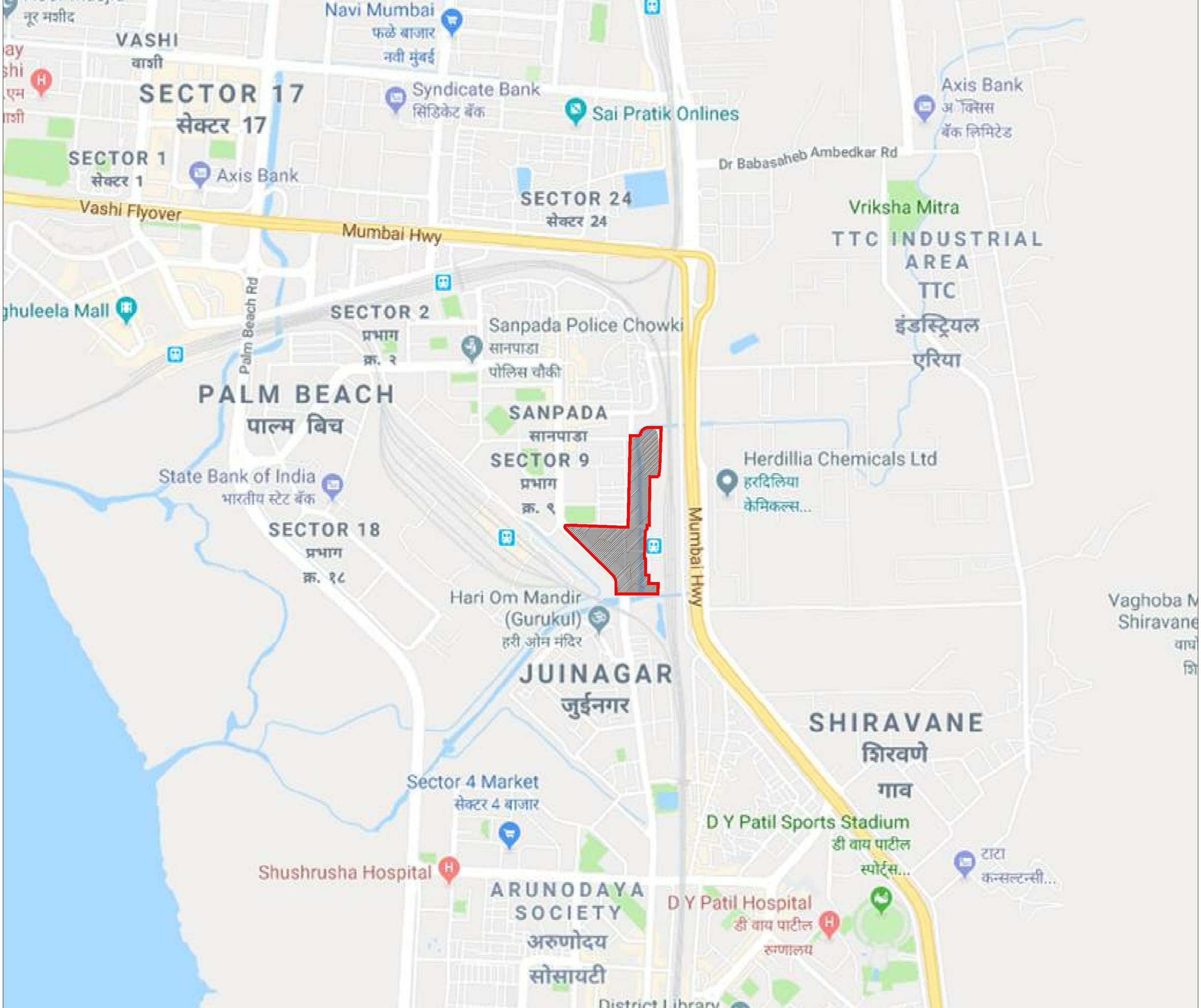
6	**AESTHETICS**
6.1	**Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?**
	No.
6.2	**Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?**
	All precautions will be taken to mitigate the impact due to water, air and noise pollution during construction and operation phase. Environmental Management plan is prepared and shall be implemented along with Environmental Monitoring Programme.
6.3	**Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.**
	No
6.4	**Are there any anthropological or archaeological sites or artifacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.**
	No
7	**SOCIO-ECONOMIC ASPECTS:**
7.1	**Will the proposal result in any changes to the demographic structure of local population? Provide the details.**
	Details shall be submitted
7.2	**Give details of the existing social infrastructure around the proposed project.**
	The proposed project is located near Juinagar railway station, Sanpada node. The project is a PMAY Housing Scheme which includes modern and necessary amenities. Apart from that Civil structures, School, Hospitals, Recreation facilities, Markets, etc. are available in the area to a reasonable degree.
7.3	**Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?**
	No.
8.	**BUILDING MATERIALS**
8.1	**May involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)**
	The conservation material & resources strategy will be achieved through the following: • Reducing and Reusing of Waste • Using recycled material in construction • Use of Regional Material in construction • Pozzolana Cement containing up to 20% fly ash will be used for plaster, masonry, flooring • Old bricks will be used for water proofing • Low VOC (volatile organic compound) paints will be used. • Use of china mosaic for roofing Energy efficient materials and systems will be utilized.
8.2	**Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?**
	The material required for construction activities shall be procured from company's authorized / approved vendors only. The vendor's performance is monitored periodically. In case of urgency or non-availability of materials from authorized/approved vendors, it will be procured from the open market to maintain the pace of the work. The mode of transport for above materials will be by trucks and / or by trailers. • The construction material will be carried in properly covered vehicles. • All the contractors / Vendors shall be instructed to use vehicles having PUC certificates. • Security staff presents at site will supervise loading and unloading of material at site. • Construction material shall be stored at identified site/ temporary godowns at site. • Provision of Suitable construction platform
8.3	**Are recycled materials used in roads and structures? State the extent of savings achieved?**
	Construction Materials Equipments: • Fly Ash will be used in Concrete (12 - 15 %)

	• Pozzolana Cement containing up to 20% fly ash will be used for plaster, masonary, flooring. • BBC water proofing will be done with old bricks • Use of single glazed glass for windows • Use of china mosaic for roofing • Low VOC (volatile organic compound) paints will be used • Energy efficient materials and systems will be utilized.
8.4	**Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.**
	• Segregation of solid waste into non-biodegradable and biodegradable garbage • Treatment of biodegradable waste in Organic Waste Converter • Non-biodegradable waste: To Navi Mumbai Municipal Corporation • STP Sludge (Dry sludge): Use as manure
9	**ENERGY CONSERVATION**
9.1	**Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?**
	Power requirement: **During Construction Phase -** Details shall be submitted in the EIA report **During Operational Phase -** Details shall be submitted in the EIA report
9.2	**What type of, and capacity of, power back-up to you plan to provide?**
	DG sets are provided for emergency backup during power failure:
9.3	**What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?**
	Glass shall be used only for windows.
9.4	**What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.**
	• Maximize the use of natural lighting though design. • The roof shall be insulated so that there will not be direct heat gain due to sunlight
9.5	**Does the layout of streets & buildings maximize the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.**
	Details shall be submitted in the EIA report
9.6	**Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Walls on the East and the West and the Roof? How much energy saving has been effected?**
	It is proposed to insulate the roofs of these buildings to minimize the heat gain and intern saving the electricity
9.7	**Do the structures use energy-efficient space conditioning, lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions? Are you using CFC and HCFC free chillers? Provide specifications.**
	Details shall be submitted in the EIA report.
9.8	**What are the likely effects of the building activity in altering the micro-climates? Provide a self-assessment on the likely impacts of the proposed construction on creation of heat island & inversion effects?**
	The proposed project will not have space conditioners or glass wall. Alteration of microclimate is not notable in this case. Systematic design of buildings in order to assure light ventilation, open spaces, green areas, tree plantation as per requirement are considered which will help to reduce the effect of creation of heat island.

9.9	**What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R values of the individual components.**
	It is proposed to insulate the roofs of these buildings to minimize the heat gain and intern save the electricity.
9.10	**What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans.**
	Firefighting system has been designed as per No Objection Certificate from Chief Fire Officer. Details shall be submitted in the EIA report.
9.11	**If you are using glass as wall material provides details and specifications including emissivity and thermal characteristics.**
	Glass shall be used only for windows.
9.12	**What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.**
	This is not a centrally air conditioned building hence it has not been studied.
9.13	**To what extent the non-conventional energy technologies are utilized in the overall energy consumption? Provide details of the renewable energy technologies used.**
	Details shall be submitted in the EIA report
10	**Environment Management Plan:** Adequate environmental management measures will be incorporated during the entire planning, construction and operating stages of the project to minimize any adverse environmental impact and assure sustainable development of the area. Project specific EMP with location and design specific details shall include the following elements for construction phase and operation phase • Air Pollution Control and Management • Noise Control and Management • Water Conservation • Storm water management • Solid, Hazardous and E Waste Management • Energy Conservation and use of Non-conventional energy • Traffic Management • Plantation, Landscaping and Land Management • Management of Social Issues Occupational, Safety and Health issues • Environmental Monitoring • Emergency Response Plans for emergency scenarios • Environmental Management System For the effective and consistent functioning, an Environmental Management System (EMS) will be established at the site. The following components will be part of the EMS: • Environmental Policy • Objectives & Targets • Structure and Responsibility • Emergency Planning • Environmental Monitoring Program • Operation and Maintenance of Environmental Management Facilities like STP, rain water Harvesting, solar systems, landscape development, solid waste management system • Non-conformance & Corrective and Preventive Action • Short term and long term budgetary provisions for the EMP

LIST OF ENCLOSURES	
No.	**Enclosures**
1.	Site Location Map
2.	Surrounding features of the proposed site (within 500 mt.)
3.	Geotechnical Investigation Report
4.	Layout Plan
5.	Draft Terms of Reference (ToR)

Enclosure 1


Navi Mumbai
फळे बाजार
नवी मुंबई
VASHI
वाशी
SECTOR 17
सेक्टर 17
Syndicate Bank
सिंडिकेट बँक
Sai Pratik Onlines
Axis Bank
अ क्सिस
बँक लिमिटेड
SECTOR 1
सेक्टर 1
Axis Bank
Dr Babasaheb Ambedkar Rd
Vashi Flyover
Mumbai Hwy
SECTOR 24
सेक्टर 24
Vriksha Mitra
TTC INDUSTRIAL AREA
TTC
इंडस्ट्रियल
एरिया
ghuleela Mall
Palm Beach Rd
SECTOR 2
प्रभाग
क्र. २
Sanpada Police Chowki
सानपाडा
पोलिस चौकी
PALM BEACH
पाल्म बिच
SANPADA
सानपाडा
SECTOR 9
प्रभाग
क्र. ९
Herdillia Chemicals Ltd
हरदिलिया
केमिकल्स...
State Bank of India
भारतीय स्टेट बँक
SECTOR 18
प्रभाग
क्र. १८
Mumbai Hwy
Hari Om Mandir
(Gurukul)
हरी ओम मंदिर
JUINAGAR
जुईनगर
SHIRAVANE
शिरवणे
गाव
Sector 4 Market
सेक्टर 4 बाजार
D Y Patil Sports Stadium
डी वाय पाटील
स्पोर्ट्स...
टाटा
कन्सल्टन्सी...
Shushrusha Hospital
ARUNODAYA SOCIETY
अरुणोदय
सोसायटी
D Y Patil Hospital
डी वाय पाटील
रुग्णालय
District Library

Enclosure 2


Chhatrapati-Shivaji-Marg
Baba-Pasha-Patil-Marg
Jumagar-Station-Rd
500 m
Sector-8-Sanpada-Rd
Station
Thane-Belapur-Rd
Sion-Panvel-Expy
Qundalik-Mahadu-Patil-Marg
Ganesh-Mandir-Marg
Tukaram-Janu-Patil-Marg
N
800 m

Enclosure 3

INTERIM GEOTECHNICAL INVESTIGATION REPORT (MARCH 2019)
PROPOSED HOUSING PROJECT
AT JUINAGAR RAILWAY STATION, NAVI MUMBAI
FOR CITY AND INDUSTRIAL DEVELOPMENT CORPORATION

Table of Contents

INTERIM GEOTECHNICAL INVESTIGATION REPORT (MARCH 2019)
PROPOSED HOUSING PROJECT
AT JUINAGAR RAILWAY STATION, NAVI MUMBAI
FOR CITY AND INDUSTRIAL DEVELOPMENT CORPORATION

1.0 INTRODUCTION

City and Industrial Development Corporation plans construction of buildings at Juinagar Railway Station, Navi Mumbai. Proposed buildings will consist of Stilt + 24 Upper Floors. The work of geotechnical investigation was awarded to Unitech Engineers. The field work and laboratory tests for the geotechnical investigation were completed by Unitech Engineers in March 2019. This interim report prepared by Geocon International Pvt. Ltd. presents results of the geotechnical investigation along with foundation recommendations for proposed buildings.

2.0 EXPLORATION PROGRAM

2.1 Exploration Scope

Ten Boreholes (BH-01 to BH-10) were completed for the project as illustrated on the Borehole Location Plan in the Annexure. Borehole termination depths are summarized in Table A below.

TABLE A
BOREHOLE TERMINATION DEPTHS

Borehole Number	Borehole Termination Depths
BH-01	10.5m
BH-02	10.0m
BH-03	12.0m
BH-04	10.5m
BH-05	12.0m
BH-06	10.0m
BH-07	10.0m
BH-08	10.0m
BH-09	10.0m
BH-10	10.0m

2.2 Subsurface Conditions

Subsurface profile at this site generally consists of fill overlying residual soils underlain by completely weathered rock and then by hard basalt bedrock. Encountered soil/rock layers are described below;

LAYER I: FILL

Fill was encountered at ground surface in the boreholes. The lower boundary of this layer was encountered at depths of 1.5m to 3.6m below ground surface.

LAYER II: RESIDUAL SOIL

Residual soils, consisting mostly of brownish clay were encountered below fill layer in the boreholes. Based on Standard Penetration Tests (SPT) conducted within this layer, consistency of cohesive soils (clay) was stiff to hard. The lower boundary of this layer was encountered at depths of 3.0m to 6.0m below ground.

LAYER III: COMPLETELY TO HIGHLY WEATHERED ROCK

Completely to highly weathered rock was encountered at depths of 3.0m to 6.0m below ground surface in the boreholes. This layer is formed by the complete in-place disintegration of parent bedrock material, but still partially retains the original rock mass structure. SPT tests conducted in this layer encountered refusals. Core recoveries were less than 35%. The lower boundary of this layer was encountered at depths of 6.0m to 10.5m below ground surface. The boreholes BH-03 & BH-04 were terminated in this bedrock layer at depths of 10.5m to 12.0m below ground surface

LAYER IV: HARD BASALT BEDROCK

Gray hard basalt bedrock was encountered at depths of 4.5m to 10.5m below ground surface in the boreholes. The bedrock was moderately weathered to sound, generally improving with depth. Core Recoveries varied from 40% to 90%, while Rock Quality Designation (RQD) varied from Nil to 90%. The boreholes were terminated in this bedrock layer at depths of 10.0m to 12.0m below ground surface.

2.3 Ground Water Levels

Groundwater accumulation in boreholes was monitored during and after completion of drilling activities. Groundwater was observed in boreholes at depths of 4.75m to 6.5m below ground level. Seasonal and annual fluctuations in ground water levels can be expected.

3.0 FOUNDATION RECOMMENDATIONS

Weathered rock was encountered at depths of 3.0m to 6.0m below ground surface. Spread foundations for proposed building should be embedded 1.5m in this weathered rock. Depths of weathered rock and hard rock are summarized in Table B given below

TABLE B
DEPTHS TO CWR & HR

Borehole Number	Depths to CWR	Depths to HR	Recommended Depth of Foundation	Net Allowable Bearing Capacity
BH-01	5.5m	10.5m	7.0m	100 t/m^2
BH-02	6.0m	9.0m	7.5m	
BH-03	4.5m	4.5m	4.5m	200 t/m^2
BH-04	6.0m	6.0m	6.0m	
BH-05	4.5m	6.0m	6.0m	
BH-06	4.5m	9.0m	6.0m	100 t/m^2
BH-07	4.5m	9.0m	6.0m	
BH-08	3.0m	9.0m	4.5m	
BH-09	4.5m	4.5m	4.5m	200 t/m^2
BH-10	3.0m	6.0m	4.5m	

CWR: Completely Weathered Rock
HR: Hard Rock

Refusal of bucket excavators to be ensured at founding level prior to PCC. Maximum settlement of foundations will be less than 12mm. A modulus of subgrade reaction of 8000 t/m^3 can be utilized for design of foundations. Excavation sides should be sloped at a maximum slope of 1:1 (Horizontal:Vertical) or flatter within 4.5m to 6.0m overburden soils and 1:2 (Horizontal: Vertical) below this depth. Excavated soils can be used for backfilling.

3.1 Foundation Protection

Groundwater samples were collected for chemical analysis from the site. Results of Chemical analysis are enclosed in the Annexure. Based on chemical results, the site falls under Class I for sulphates and chlorides (As per IS456-2000 and as per CIRIA Special Publication No. 31). A 'Moderate' exposure condition was assigned to this site. Hence, following precautions shall be taken to protect concrete and reinforcement in foundations;

Type of Cement:	OPC or PPC
Minimum Grade of Reinforced Concrete:	M25
Minimum Cement Content for Spread Footings:	300 kg/m^3
Maximum Water Cement Ratio:	0.50
Minimum Cover to Reinforcement:	50mm

4.0 FIELD EXPLORATION PROCEDURES

The sub-surface investigation was completed generally as per IS: 1892-1979. The field investigation was carried out using a rotary machine. Casing was used to support sides of borehole until sufficiently stiff strata was encountered. Standard Penetration Tests (i.e. SPT) were carried out in soil in accordance with IS 2131-1981. Using this procedure, a 2" outside diameter split-barrel sampler is driven into the soil by 63.5 kg weight falling through 75 cm height. After an initial set of 15cm, the number of blows required to drive the sampler an additional 30 cm, is known as the "penetration resistance" or "N value".

When SPT refusal was obtained in hard strata, rock coring was done using diamond bit and double tube core barrel to obtain rock samples. Percent Rock Core Recovery and Rock Quality Designation (%RQD) were determined. % RQD = 100 x Sum of length of rock pieces in cms, each having lengths greater than 10cms/Total length of core run.

Sincerely,

GEOCON INTERNATIONAL PVT. LTD.

_____

Jaydeep Wagh
B.E., M.S., P.E. (Geotechnical)

REFERENCES

1) Foundation Analysis and Design, J.E. Bowles, McGraw Hill Publication, 5th Edition, 1996.

2) Canadian Foundation Engineering Manual.

3) Soil Mechanics in Engineering Practice, 2nd Edition, Terzaghi K. and Peck R. B., John Willey and Sons, 1967.

4) Foundation Design Manual, N. V. Nayak, 5th Edition, 1996.

5) IS:6403-1981, Code of Practice for Design and Construction of Shallow Foundations on Soils.

6) IS 12070: 1987, Code of Practice for Design and Construction of Shallow Foundations on Rocks

CLIENT :	CITY AND INDUSTRIAL DEVELOPMENT CORPORATION		
PROJECT :	GEOTECHNICAL INVESTIGATION WORK PROPOSED HOUSING PROJECT AT JUINAGAR RAILWAY STATION, NAVI MUMBAI.		
BORE HOLE NO. :	BH-01	SHEET NO. :	1 OF 1
LOCATION :	--	DATE :	10/03/2019 TO 12/03/2019
CO-ORDINATES :	N=- , E=-	METHOD :	ROTARY DRILLING
GROUND R. L. :	-- m	CASING :	100mm Ø Upto 4.00m & NX mm BGL.
GROUND W. T. :	5.50m BELOW GL.		

DEPTH (m.)	DIA. OF BORE HOLE	LOG.	STRATA DESCRIPTION	SAMPLE DEPTH (m)	SAMPLE TYPE	BLOWS/15cm 15	15	15	15	SPT N	C R %	RQD %	REMARK
1.00	100 mm Ø		Filling Materials With Soil, Cobbles, Boulders.	0.00									
				1.50	DS1								
2.00			Brownish Silty Gravelly Stiff CLAY	2.10	SPT-1	02	03	04	05	07			
3.00				3.00									
				3.60	SPT-2	04	06	07	11	13			
4.00				4.50									
5.00				5.10	SPT-3	03	07	10	13	17			
				5.50									
6.00			Grayish Weathered BASALT	6.00							25	NIL	
7.00	NX			7.50							28	15	
8.00				9.00							45	40	
9.00													
10.00				10.50							60	45	

SPT N = STANDARD PENETRATION TEST VALUE
CR = CORE RECOVERY
RQD = ROCK QUALITY DESIGNATION
DS = DISTURBED SOIL SAMPLE
UDS = UNDISTURBED SOIL SAMPLE
PLI = POINT LOAD INDEX
UCS = UNIAXIAL COMPRESSIVE STRENGTH

REMARKS : BORE HOLE TERMINATED AT DEPTH 10.50m Below GL.

M/S. UNITECH ENGINERS.

Enclosure 4

LAYOUT PLAN

Enclosure 5

Draft Terms of References (TOR)

(Based on the standard TOR notified by MoEF & CC on dt. 10.04.2015 and as per the guidelines given in Environmental Impact Assessment Guidance Manual for building construction projects & Township/ Area development projects by MoEF & CC)

For

"Pradhan Mantri Awas Yojana (PMAY) Housing Scheme"

At

Plot no. 188A of Sector 10 and Plot no. 9 of Sector 11, Juinagar, Sanpada node, Taluka & District- Thane, Sate: Maharashtra.

By

City and Industrial Development Corporation Maharashtra Limited (CIDCO)

Submitted to

State Level Expert Appraisal Committee – 2 (SEAC-2), Maharashtra.

Prepared by

M/s. ULTRA TECH

(An ISO 9001-20015 Company, Accredited by NABET, Lab: Accredited by NABL & Gazetted by MOEF, GoI)

224, Jai Commercial Complex, Eastern Express Highway,
Opp. Cadbury Factory, Thane (W) – 400 601
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Website: www.ultratech.in
Phone: (022) 25342776 / 25380198
Fax: (022) 25429650

1.0 INTRODUCTION

The site is located at Plot no. 188A of Sector 10 and Plot no. 9 of Sector 11, Juinagar, Sanpada node, Taluka & District- Thane, Sate: Maharashtra. The site under reference falls within the limits of Navi Mumbai Municipal Corporation (NMMC) and planning authority is City and Industrial Development Corporation Maharashtra Limited (CIDCO). There are existing structures on site which shall be demolished and shall be developed as a Residential along with Multilevel Car Parking (MLCP) under PMAY Housing Scheme.

Government of India has declared the housing policy known as the Pradhan Mantri Awas Yojana (PMAY), which is being implemented by the State Government in the Housing Department for the purpose of providing Affordable Housing to the Economically Weaker Sections (EWS).

It was launched with the aim to provide housing at an affordable price to the weaker sections of the society, lower income group people, urban poor, and rural poor. While making the allotment, families with physically handicapped persons and senior citizens should be given priority for allotment on ground floor or lower floors.

As per the Environment Impact Assessment (EIA) Notification dated 14th September 2006 as amended, the proposed project falls under **'Category B'** with activity number **'8 (b)'**, which requires preparation of EIA Report.

The EIA Report shall address the environmental impacts of the project and shall propose the mitigation measures for the same. The EIA Report shall be prepared based on standard TOR notified by Ministry of Environment, Forests and Climate Change (MoEF & CC) on dt. 10.04.2015 and as per the guidelines given in Environmental Impact Assessment Guidance Manual for Large Building Construction Projects by MoEF & CC

2.0 PROJECT DESCRIPTION:

The area statement including the total plot area available for development, ground coverage area along with the built up area as per Floor Space Index (FSI) and the construction built up area which include FSI and non FSI area is explained as follows:

No.	Description	Area (Sq. mt.)
1.	Total Plot Area	97467.74
2.	**Proposed Built-up area as per FSI**	**2,05,781.57**
3.	**Total Construction Built-up area (FSI + NON FSI)**	**4,14,524.67**

Project Proposal:

The brief details of the project are as follows:

Buildings	Building Configuration	No. of Flats
10 no. of Buildings	Ground + 24 floors each	Flats: 5172 nos.
16 no. of Buildings	Ground + 27 floors each	Shops: 39 nos.
1 no. of Multi Level Car Parking (For residential)	Ground + 4 floors	--
1 no. of Multi Level Car Parking (For station)	Ground + 3 floors	--
Bus Terminal, Auto Stand and Taxi Stand	--	--

3.0 STUDY AREA:

The report shall include detailed characterization of existing status of environment in an area of 10 km radius around the project site. As per the Standard Terms of Reference (ToR) notified on dt. 10/04/2015 for Large Building Construction projects by MoEF & CC study area considered for this report is 10 km radius around the project site.

Map of the study area clearly delineating the location of various monitoring stations (air/ water/ soil and noise) superimposed with location of habitats shall be shown. Collection of Primary data for one season except rainy season completed. Monitoring of the parameters has been carried out within the study area.

Fig. 1: Study area of Proposed Project 10 Km radius around the plot boundary (Scale - 1: 1000)

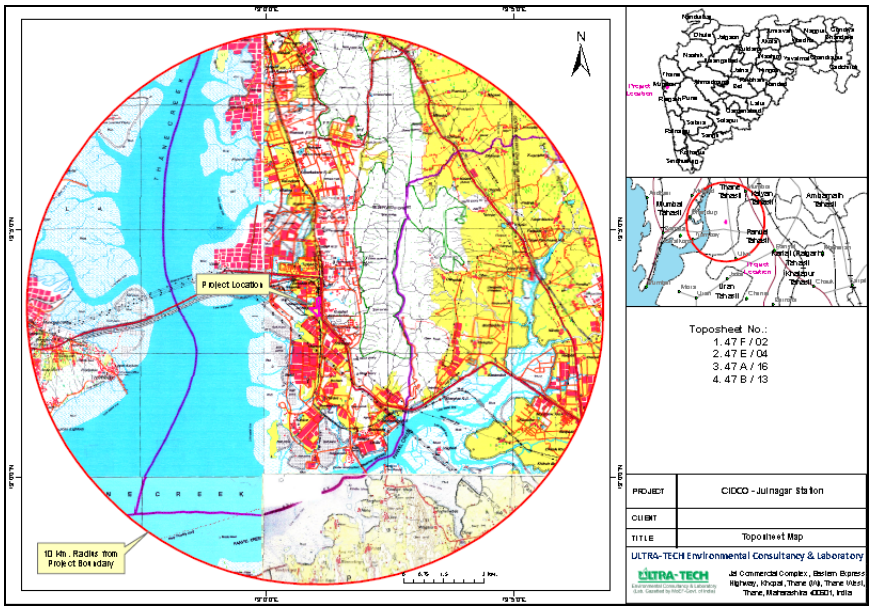


Fig. 2: Toposheet map of 10 Km radius around the plot boundary

EIA study for this project shall be done as per the standard TOR notified by MoEF & CC on dt. 10.04.2015 and as per the guidelines given in Environmental Impact Assessment Guidance Manual for Building Construction Projects by MoEF & CC.

Proposed Terms of References (TOR) for conducting EIA Study are as follows:

Sr. No.	Proposed Terms of References (TOR) for conducting EIA Study as per the standard TOR notified by MoEF & CC on dt. 10.04.2015	Remarks
A	**Site Analysis and Project Details**	
1.	Examine details of land use as per Master Plan and land use around 10 km radius of the project site. Analysis should be made based on latest satellite imagery for land use with raw images. Check on flood plain of any river	Shall be submitted in the EIA report.
2.	Submit details of:	
2.1	Environmentally sensitive places	Already Identified and shall be submitted in the EIA report
2.2	Land acquisition status, rehabilitation of communities villages	Shall be submitted in the EIA report.
2.3	Present status of such activities	Shall be submitted in the EIA report.
3.	Examine baseline environmental quality along with projected incremental load due to the project	Baseline environmental quality is examined during March 2019 to May 2019. All details shall be submitted in the EIA report.
4.	Environmental data to be considered in relation to the project development would be (a) land, (b) groundwater, (c) surface water, (d) air, (e) bio-diversity, (f) noise and vibrations, (g) socio economic and health	Shall be submitted in the EIA report.
5.	Details of litigation pending against the project, if any, with direction/ order passed by any Court of Law against the Project should be given	No litigation pending
B	**Land**	
6.	Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area. Any obstruction of the same by the project	Shall be submitted in the EIA report.
7.	Submit the present land use and permission required for any conversion such as forest, agriculture etc.	Shall be submitted in the EIA report.
C	**Water**	
8.	Ground water classification as per the Central Ground Water Authority.	Shall be submitted in the EIA report.
9.	Examine the details of Source of water, water requirement, use of treated waste water and prepare a	Shall be submitted in the EIA report.

Sr. No.	Proposed Terms of References (TOR) for conducting EIA Study as per the standard TOR notified by MoEF & CC on dt. 10.04.2015	Remarks
	water balance chart.	
10.	Rain water harvesting proposals should be made with due safeguards for ground water quality. Maximize recycling of water and utilization of rain water. Examine details.	Shall be submitted in the EIA report.
11.	Examine soil characteristics and depth of ground water table for rainwater harvesting.	Shall be submitted in the EIA report.
D	**Solid Waste Management**	
12.	Examine details of solid waste generation treatment and its disposal.	Shall be submitted in the EIA report.
E	**Flora and Fauna**	
13.	Submit the details of the trees to be felled for the project.	Shall be submitted in the EIA report.
F	**Energy**	
14.	Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption. Energy conservation and energy efficiency.	Shall be submitted in the EIA report
15.	DG sets are likely to be used during construction and operational phase of the project. Emissions from DG sets must be taken into consideration while estimating the impacts on air environment. Examine and submit details.	Shall be submitted in the EIA report.
G	**Traffic and Transportation**	
16.	Examine road/ rail connectivity to the project site and impact on the traffic due to the proposed project. Present and future traffic and transport facilities for the region should be analyzed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.	Shall be submitted in the EIA report.
17.	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.	
18.	Examine the details of transport of materials for construction which should include source and availability.	
H	**Disaster Management Plan**	
19.	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster.	Shall be submitted in the EIA report.

Sr. No.	Proposed Terms of References (TOR) for conducting EIA Study as per the standard TOR notified by MoEF & CC on dt. 10.04.2015	Remarks
I	**Environmental Management and Monitoring Plan**	
20.	Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters	Shall be submitted in the EIA report.
21.	Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of EP Act.	Shall be submitted in the EIA report.
22.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out	Shall be submitted in the EIA report.

4.0 METHODOLOGY

The methodology for conducting the baseline environmental survey considered is as per EIA Guidance Manual-Building and Large Construction projects by MoEF & CC.

Baseline information with respect to air quality, water quality, noise level and soil quality in the study area examined during March 2019 to May 2019. Baseline status of Land, Biological and Socio-economic environment is being studied by an accredited expert.

Please Note: Baseline data is being carried out including ambient air quality, Noise level, soil, water quality etc. in the month of March 2019 to May 2019. This may please be accepted.

5.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES:

The anticipated negative and positive impacts on the land, water, air, ecological and socioeconomic environment during the construction and operation phase shall be predicted. Impact identification for this project shall be done by using modified Delphi Technique. Mitigation measures shall be suggested to reduce adverse impacts due to the development.

Best environmental practices for conservation of natural resources, environmental management plan, environmental monitoring programme including budgeting for the expenditure proposed, corpus funding for long term maintenance of environmental management facilities in future shall be suggested.

6.0 ENVIRONMENTAL MONITORING PROGRAM:

Environmental Monitoring Program shall include:

- Frequency, location, parameters of monitoring
- Summary matrix of environmental monitoring, during construction and operation stage
- Requirement of monitoring facilities
- Compilation and analysis of data and reporting system

7.0 ADDITIONAL STUDIES:

Additional studies which are carried out are as follows and same shall be incorporated in EIA report

- Disaster Management Plan
- Natural Resource Conservation
- Air Emission and Dispersion Modeling
- Traffic study
- ECBC Compliance analysis Study
- High Performance Building Design (HPBD)
- Computation of the external catchment area contributing the project site and subsequently estimation of the contributing runoff & capacities of external drain

8.0 PROJECT BENEFITS:

Details about the improvements in physical infrastructure, social infrastructure, employment potential and other benefits that are accrued shall be incorporated. Employment potential of this project during construction and operation phases shall be evaluated.

9.0 ENVIRONMENTAL MANAGEMENT PLAN:

Adequate environmental management measures will be incorporated during the entire planning, construction and operating stages of the project to minimize any adverse environmental impact and assure sustainable development of the area. Project specific EMP with location and design specific details shall include the following elements for construction phase and operation phase.

- Air Pollution Control and Management
- Noise Control and Management
- Water Conservation
- Sewage Treatment/Disposal
- Storm water management
- Solid, Hazardous and E Waste Management
- Energy Conservation and use of Non-conventional energy
- Traffic Management
- Plantation, Landscaping and Land Management
- Management of Social Issues Occupational, Safety and Health issues
- Environmental Monitoring
- Emergency Response Plans for emergency scenarios
- Environmental Management System

For the effective and consistent functioning, an Environmental Management System (EMS) will be established at the site. The following components will be part of the EMS:

- Environmental Policy
- Objectives & Targets
- Structure and Responsibility
- Emergency Planning
- Environmental Monitoring Program
- Operation and Maintenance of Environmental Management Facilities like rain water Harvesting, solar systems, landscape development, solid waste management system
- Non-conformance & Corrective and Preventive Action
- Short term and long term budgetary provisions for the EMP
- Submission of six monthly reports to Regional office, MoEF for compliance of conditions in Environmental Clearance

10.0 DISCLOSURE OF CONSULTANT ENGAGED:

The consultants engaged and nature of consultancy rendered shall be listed in EIA.

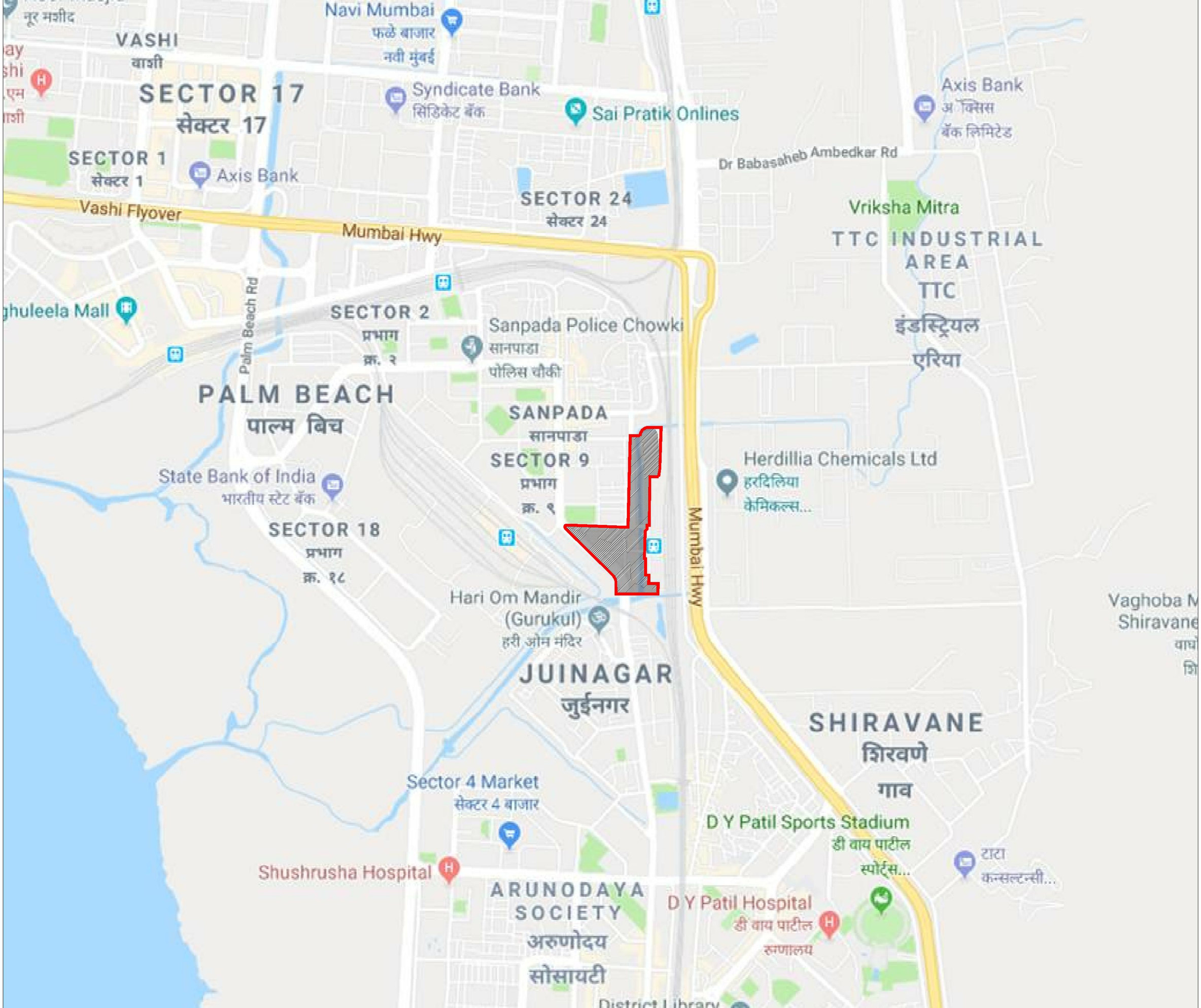
Enclosures:

1. Google image
2. Location plan
3. Layout plan

Enclosure 1


Railway Station Rd
Sector-8 Sanpada Rd
Palm Beach Rd
Station Way
Thane-Belapur Rd
MIDC-IOC Terminal Rd
Sion-Panvel Expy
Google Earth
Image © 2019 DigitalGlobe
©2018 Google
500 m
N

Enclosure 2


Navi Mumbai
फळे बाजार
नवी मुंबई
VASHI
वाशी
SECTOR 17
सेक्टर 17
Syndicate Bank
सिंडिकेट बँक
Sai Pratik Onlines
Axis Bank
SECTOR 1
सेक्टर 1
Axis Bank
Dr Babasaheb Ambedkar Rd
Vashi Flyover
Mumbai Hwy
SECTOR 24
सेक्टर 24
Vriksha Mitra
TTC INDUSTRIAL AREA
TTC
इंडस्ट्रियल
एरिया
Palm Beach Rd
SECTOR 2
प्रभाग
क्र. २
Sanpada Police Chowki
सानपाडा
पोलिस चौकी
PALM BEACH
पाल्म बिच
SANPADA
सानपाडा
SECTOR 9
प्रभाग
क्र. ९
Herdillia Chemicals Ltd
हरदिलिया
केमिकल्स...
Mumbai Hwy
State Bank of India
भारतीय स्टेट बँक
SECTOR 18
प्रभाग
क्र. १८
Hari Om Mandir
(Gurukul)
हरी ओम मंदिर
JUINAGAR
जुईनगर
SHIRAVANE
शिरवणे
गाव
Sector 4 Market
सेक्टर 4 बाजार
D Y Patil Sports Stadium
डी वाय पाटील
स्पोर्ट्स...
Shushrusha Hospital
ARUNODAYA SOCIETY
अरुणोदय
सोसायटी
D Y Patil Hospital
डी वाय पाटील
रुग्णालय
District Library

Enclosure 3


FOOT BRIDGE OVER SION
PANVEL HIGHWAY
TO SANPADA
TO BELAPUR
ROAD
ROAD
ROAD
JUINAGAR STATION
RAILWAY TRACK
SUBWAY
SUBWAY
JUINAGAR STATION
ELEVATED RAILWAY TO DIVA/PNVL
SET BACK LINE
PLOT LINE
COMPOUND WALL
O.S-23
O.S-15
O.S-14
Auto Stand
Bus Terminal
30.00m wide proposed road
24.00 m wide proposed road
12.00m Internal Drive way
6.00m Internal Drive way
LEGEND OF LAYOUT PLAN WITH DIFFERENT COLOUR :
1. WIDTH OF ROAD ADJACENT TO THE PLOT BOUNDARY ENTRY EXISTS FROM THE OUTSIDE ROAD.
2. CLEARANCE IN MT. (SIDE AND FRONT)
3. BOUNDARIES OF PLOT IN DIFFERENT COLOR.
4. BOUNDARIES OF BLDGS. IN DIFFERENT COLOR.
5. ROADS, DRIVEWAYS RAMPS, WIDTHS AND TURNING RADIUS TO BE MARKED IN MT., RAMP SLOPES TO BE MENTIONED.
6. TREES, PARKING, SERVICES, STORM WATER DRAINS STP, SWM, RWH, DG, SUBSTATION ETC. TO THE SCALE. (SHOWN WITH DOTTED LINES IF ON THE DIFFERENT LEVEL)
7. RAILWAY LINE