BEFORE THE NATIONAL GREEN TRIBUNAL

Western Zone Bench, Pune

Appeal No. 529 of 2025 (WZ)

IN THE MATTER OF

Akshay Sunil Jagtap … **Appellant**

Versus

State Environment Impact Assessment Authority, Maharashtra & Ors. … Respondents

INDEX OF ADDITIONAL REPLY DOCUMENTS

Sr. No.	Annexure No.	Particulars / Description	Page Nos.
1.	-	Index Of Additional Documents	116
2.	-	Affidavit Of The Appellant Pursuant To Order Dated 19.11.2025	117-118
3.	**Annexure R-1**	Copy of Extract of EIA Report uploaded on Parivesh Portal by the Project Proponent showing suppression of existing natural Nala	119 to 525
4.	**Annexure R-2**	RTI Reply received from Irrigation Department confirming that **no permission** has been granted for diversion/realignment/coverage of the natural Nala	526 to 528
5.	**Annexure R-3**	RTI Reply obtained from **PMC Storm Water Drainage Department** along with maps showing official **Nala alignment and survey mojni** relating to Mo.Ra. No. 444/2023 of project proponent	529 to 541
6.	**Annexure R-4**	Extract of UDCPR 2020 (Regulation 3.1.1(ii)) showing mandatory 6 meter "no construction zone" on either side of natural streams / Nala	542 to 563
7.	**Annexure R-5**	**Development Plan Sheet** of Mundhwa Village with **Index sheet** highlighting the designated watercourse/Nala passing through the project land	564 to 567
8.	**Annexure R-6**	Copy of **Marked Site Plan** with Nala alignment superimposed over the building footprint showing overlap and illegal utilization of buffer zone	568
9.	**Annexure R-7**	Copy of Judgment of Hon'ble NGT Principal Bench, New Delhi passed in **O.A. No. 16/2014 (M.A. No. 63/2022)** relating to protection of natural drainage channels	569 to 584
10.	**Annexure R-8**	Proof of service for Additional reply documents	585

Filed By:

Akshay Sunil Jagtap

Appellant

Date: 10/12/2025

117

BEFORE THE NATIONAL GREEN TRIBUNAL
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IN THE MATTER OF:
Akshay Sunil Jagtap ... Appellant
Versus
State Environment Impact Assessment Authority, Maharashtra & Ors. ... Respondents

AFFIDAVIT OF THE APPELLANT PURSUANT TO ORDER DATED 19.11.2025

I, **Akshay Sunil Jagtap**, Age: adult, self-employed, Address: 211, Mundhawa, Pune 411036, the Appellant herein, state on solemn affirmation as follows:

1. Background

The present appeal challenges the Environmental Clearance dated **16.07.2025** issued to **Respondent No. 7 – Bajaj Finserv Ventures Limited** for the construction of a massive IT/ITES & Commercial Building Project at survey nos. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa,, Pune 411036. The challenge is based primarily upon suppression of crucial environmental information, encroachment over the natural watercourse (Nala) & mandatory buffer zone and making profit from public property i.e., watercourse (Nala) by increasing the built up area of project. The NGT act 2010 permits any person aggrieved or concerned with environmental compliance to approach this h`ble tribunal.

2. Suppression of Natural Nala in EIA Proposal ***(Supported by: Annexure R-1):***

The EIA Report uploaded on Parivesh by the Project Proponent completely suppresses the existence of a natural drainage channel (Nala) passing through said Survey Nos. on page no.165. The site layout falsely depicts a plain and obstruction-free plot, which is factually incorrect based on uploaded maps on parivesh website. Such misrepresentation of site hydrology amounts to fraud in statutory environmental appraisal.

3. No Permission for Nala Diversion*(Annexure R-2: RTI reply from Irrigation Department):*

The Irrigation Department has issued a clear reply that no permission has been granted for either alteration, realignment, covering or construction on/over the said natural Nala. Thus, any manipulation of Nala is illegal and unauthorized.

4. PMC Storm Water Drainage Records Confirm Nala Existence ***(Annexure R-3: RTI reply from PMC SWD Department)***

PMC Storm Water Department has officially provided under RTI:

i. Nala alignment maps
ii. Survey number details
iii. Mojni record copy pertaining to project proponent's request **Mo.Ra. 444/2023.**

These confirm the exact alignment of the natural Nala within the project land.

5. Mandatory 6 Meter "No Construction Zone" Violated ***(Annexure R-4: UDCPR 2020, Regulation 3.1.1(ii)):***

UDCPR mandates minimum 6 m open space from each edge of any natural stream/Nala. Here, footprint of main building blocks intersects with the delineated buffer zone, a direct violation of statutory planning norms.

6. Development Plan (DP) Map Confirms Watercourse ***(Annexure R-5: DP Sheet of Mundhwa + Index):***

Development Plan clearly marks the **natural watercourse**. Project land overlaps this watercourse — proving concealment in EIA submission.

7. Hand-marked Overlap on Project Layout ***(Annexure R-6: Marked Site Plan):***

I have superimposed the Nala alignment on the building footprint uploaded on parivesh website by project proponent, clearly demonstrating **overlapping and buffer interference**.

8. Judicial Precedent from NGT ***(Annexure R-7: NGT O.A. 16/2014 Judgment):***

NGT Principal Bench has held that natural drainage cannot be blocked/covered/diverted by private developers for commercial use. The flow of water could not be obstructed by permitting any commercial construction state and state has to act as trustee for protecting environment. Also Mantri Techzone, Supra the h`ble supreme court held direction of this tribunal to maintain buffer zone on all drains- primary, secondary and tertiary.

Thus, the instant violation is squarely covered by binding environmental jurisprudence.

11. Legal Grounds Supporting the Challenge:

Ground	Legal Violation
A	**Suppression of vital environmental facts** in EIA (Contrary to EIA Notification, 2006)
B	**Obstruction to natural drainage system** affecting flood vulnerability
C	**Violation of UDCPR 2020** mandatory buffer requirements
D	**Construction on watercourse land** — illegal
E	**Risk to ecology & hydrological connectivity** of Mula-Mutha river system

12. Reliefs Sought (for clarity)

The Appellant prays for:
a) Setting aside and cancellation of the EC dated 16.07.2025
b) Restoration of natural Nala alignment
c) Directions for fresh appraisal
d) Any other orders in the interest of environmental justice.

13. I say that this affidavit is made bonafide and in interest of environmental justice.

Verification:

I, **Akshay Sunil Jagtap**, do hereby verify that the contents of paragraphs 1 to 13 are true and correct to the best of my knowledge and belief.

Place: Pune
Date: 10/12/2025

BEFORE ME

NOTED AND REGISTERED AT SERIAL NUMBER 3943/2025
10 DEC 2025

Adv. VIKAS D. KODRE
NOTARY GOVT. OF INDIA
S. No. 51/4, Shri Swami Samarth Kunj,
Kirtane Baug, Mundhwa, Pune - 36.

Akshay Sunil Jagtap
Appellant

NOTARIAL NOTARIAL NOTARIAL NOTARIAL NOTARIAL

(119)

Annexure R-1.

UIN No.: ECS/EIA/NCPL/EIA Report/01/2024

Environmental Impact Assessment (EIA) Report

For

"Proposed IT/ITES/Commercial Building Project Located at

At

S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra

[Schedule as per EIA Notification, 2006: 8(b), Category: 'B1']

Name of Project Proponent

M/s. Bajaj Finserv Ventures Limited & Others

Environmental Consultant

Element Consultancy Services, Pune

(NABET Certificate No: NABET/EIA/23-26/IA 0127)

Valid up to 11th August, 2026

Baseline Monitoring Period: March 2024 to May 2024

Approved Laboratory: EUROFINE ENVIRO LAB PVT. LTD.

CPCB Certificate No.: F.No. LB/2021/7/99-INST LAB-HO-CPCB-HO Pvt./ 2025, Validity: 11.12.2027

Submission Date: February 2025

Prepared & Issued By		Approved By	
Signature:	R Patil	**Signature:**	R Patil
Name:	Ms. Runa S. Patil	**Name:**	Ms. Runa S. Patil
Designation:	EIA Coordinator	**Designation:**	Proprietor

120

BAJAJ FINSERV

DECLARATION OF PROPONENT

To Whomsoever It May Concern

This is to confirm that we have checked the Environment Impact Assessment prepared by environmental consultant for our project Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Pune City, Dist. Pune, Maharashtra by Bajaj Finserv Ventures Limited & Others.

The data incorporated in EIA Report is provided by Bajaj Finserv Ventures Limited & Others and it is correct as per our understanding at this moment.

We declare the ownership of this EMP Report and its content (Information and Data).

Bajaj Finserv Ventures Limited & Others

Mr. S. Sreenivasan
Authorized Signatory

Mr. Mahesh Kunkulol
Authorized Signatory

Place : Pune
Date : 04/02/2025

BAJAJ FINSERV VENTURES LIMITED

Registered Office: Bajaj Finserv Limited, S No. 208/1B, Off Pune - Ahmednagar Road, Lohagaon, Viman Nagar, Pune - 411 014, Maharashtra, India
Tel: +91 20 7150 5700 | Fax: +91 20 7150 5792

Corporate ID No.: U65990PN2021PLC204605 | **Email ID:** bipratip.chakraborty@bajajfinserv.in

ANNEXURE – VII

Declaration by Experts contributing to the EIA for "Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others"

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA coordinator : Mrs. Runa S. Patil

Signature : RPatil

Period of Involvement : February, 2024 onwards

Team Member as EIA Coordinator : Ms. Swati Amol Chougule

Signature :

Period of Involvement : February, 2024 onwards
Contact Information : Element Consultancy Services
Register Office Address: 101, Chidanand Heights, S.No.43/76, Manajinagar, Narhe, Pune.
Office Address : 105/3, 5th floor, F-Wing, KK Market Business Premises, Satara Road, Dhankawadi, Pune - 411043, Maharashtra.

List of Functional Area Experts:

SN	Functional Areas	Name of the expert/s	Involvement		Signature and date
			Period	Task	
1	Air pollution monitoring, prevention and control (AP)	Mr. Sanjay Patil	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	
2	Water pollution monitoring, prevention and control (WP)	Mr. Pritam Kadam	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	

SN	Functional Areas	Name of the expert/s	Involvement		Signature and date
			Period	Task	
3	Solid and Hazardous waste Management (SHW)	Mrs. Runa Patil	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	
4	Socioeconomics (SE)	Mr. Navnath Dhakane	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	
5	Ecology and Biodiversity (EB)	Mr. Ratnakar Pandey	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	
6	Hydrology, ground water and water conservation (HG)	Mr. Ajay Kadam	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	
7	Soil conservation (SC)	Mr. Ajay Kadam	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	
8	Meteorology, air quality modeling and prediction (AQ)	Mr. Pritam Kadam	February, 2024onwards	Identification of source, its impact and providing mitigation measures	
9	Noise (N)	Mr. Ajay Kadam	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	
10	Land use (LU)	Mr. Ajay Kadam	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	
11	Risk assessment and hazards management (RH)	Mrs. Runa Patil	February, 2024 onwards	Identification of source, its impact and providing mitigation measures	

List of Team Members involved in EIA Study:

SN	Functional Areas	Name of the expert/s	Involvement	Signature and date
1	Water Pollution monitoring, prevention and control (WP)	Mrs. Swati Chougule	Assisted Category A Expert as Team member for FA-WP	
2	Solid Waste Management	Mrs. Swati Chougule	Assisted Category A Expert as Team member for FA-SW	
3	Noise (N)	Mrs. Rupali Kadam	Assisted Category A Expert as Team member for FA-NV	

Declaration by the Head of the accredited consultant organization/ authorized person

I, Runa S. Patil, hereby, confirm that the above-mentioned experts prepared the EIA of Declaration by Experts contributing to the EIA for **"Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others"** I have gone through the report, and the consultant organization shall be fully accountable for any misleading information.

It is certified that no unethical practices, plagiarism involved in carrying out the work and external data/text has not been used without proper acknowledgement while preparing this EIA report.

Signature : RPatil.

Name : **Mr. Runa Patil**

Designation : **Proprietor**

Name of the EIA consultant organization: **Element Consultancy Services**

NABET Certificate No. & Issue Date: **NABET/EIA/23-26/IA 0127_Rev.01, Valid up to 11th August, 2026.**

125

सत्यमेव जयते

File No.: SIA/MH/INFRA2/489762/2024
Government of India
Ministry of Environment, Forest and Climate Change
(Issued by the State Level Expert Appraisal Committee(SEAC), MAHARASHTRA)
***

Dated **12/11/2024**

To,

Mahesh Kunkulol
BAJAJ FINSERV VENTURES LIMITED
S. No. 208/1B, Off Pune-Ahmednagar Road, Lohegaon, Viman Nagar, Viman Nagar, PUNE, MAHARASHTRA, 411014
mahesh.kunkulol@bajajfinserv.in

Subject: Grant of Standard Terms of Reference (ToR) to the proposed Project under the EIA Notification 2006-and as amended thereof-regarding.

Sir/Madam,

This is in reference to your application submitted to SEAC vide proposal number SIA/MH/INFRA2/489762/2024 dated 18/09/2024 for grant of Terms of Reference (ToR) to the project under the provision of the EIA Notification 2006-and as amended thereof.

2. The particulars of the proposal are as below :

(i) ToR Identification No.	TO24B3813MH5698398N
(ii) File No.	SIA/MH/INFRA2/489762/2024
(iii) Clearance Type	Fresh ToR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	8(b) Townships/ Area Development Projects / Rehabilitation Centres
(vii) Name of Project	Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa, Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others
(viii) Name of Company/Organization	BAJAJ FINSERV VENTURES LIMITED
(ix) Location of Project (District, State)	PUNE, MAHARASHTRA
(x) Issuing Authority	SEAC
(xii) Applicability of General Conditions	NO

3. The **SEAC** has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after detailed examination hereby decided to grant Standard Terms of Reference to the instant proposal of **M/s. BAJAJ FINSERV VENTURES LIMITED** under the provisions of the aforementioned Notification.

4. The brief about products and by products as submitted by the Project proponent in Form-1 (Part A, B) and Standard Terms of Reference are annexed to this letter as Annexure (1).

5. The Ministry reserves the right to stipulate additional TORs, if found necessary.

6. The Standard Terms of Reference (ToR) to the aforementioned project is under provisions of EIA Notification, 2006 and as amended thereof. It does not tantamount to approvals/consent/permissions etc required to be obtained under any other Act/Rule/regulation. The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/ Regulations or Statutes, as applicable, to the project.

7. The granted letter, all the documents submitted as a part of application viz. Form-1 Part A and Part B are available on PARIVESH portal which can be accessed by scanning the QR Code above.

Annexure 1

Standard Terms of Reference for conducting Environment Impact Assessment Study for Townships/ Area Development Projects / Rehabilitation Centres and information to be included in EIA/EMP report

1. Project Details

Sr. No.	Terms of Reference
1.1	Need and benefits of the project.
1.2	Submit data for built-up area for each building, the use and occupancy classification in line with NBC 2016 also to be indicated [for differential functional requirements].
1.3	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.

2. Land Environment

Sr. No.	Terms of Reference
2.1	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.

3. Land acquisition and R&R

Sr. No.	Terms of Reference
3.1	Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/villages and present status of such activities.

4. Environmental Monitoring and Management

Sr. No.	Terms of Reference
4.1	Examine baseline environmental quality along with projected incremental load due to the project.
4.2	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.
4.3	Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of EP Act.
4.4	Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.
4.5	Possible carbon footprint contribution from each activities and mitigation measures proposed shall be included as part of Environment Management Plan.

5. Drainage

Sr. No.	Terms of Reference
5.1	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.

6. Forest

Sr. No.	Terms of Reference
6.1	Submit the details of the trees to be felled for the project, if any .
6.2	Submit the present land use and permission required for any conversion such as forest, agriculture etc.

7. Water Environment

Sr. No.	Terms of Reference
7.1	Ground water classification as per the Central Ground Water Authority.

8. Water Management

Sr. No.	Terms of Reference
8.1	Examine the details of Source of water, water requirement, use of treated waste water and prepare a water balance chart.
8.2	Rain water harvesting proposals should be made with due safeguards for ground water quality.
8.3	Maximize recycling of water and utilization of rain water. Examine details.
8.4	Examine soil characteristics and depth of ground water table for rainwater harvesting

Sr. No.	Terms of Reference
8.5	Permission from CGWA for abstraction of groundwater, if any, including dewatering during basement excavation.

9. Waste Management

Sr. No.	Terms of Reference
9.1	Examine details of solid waste generation treatment and its disposal.
9.2	Construction & Demolition Waste Management Plan shall be prepared as part of EMP providing details of demolition activities involved along with quantification and disposal mechanism.

10. Energy Requirements

Sr. No.	Terms of Reference
10.1	A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project.
10.2	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.
10.3	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.

11. Road and Traffic

Sr. No.	Terms of Reference
11.1	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 analysed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.
11.2	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.
11.3	Examine the details of transport of materials for construction which should include source and availability.

12. Disaster Management Plan

Sr. No.	Terms of Reference
12.1	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster. This should cover details of vulnerabilities due to natural and manmade hazards (earthquake, flooding, cyclone, landslides, fire etc.) and details of disaster mitigation efforts for buildings and infrastructure through structural sufficiency and Fire and Life Safety compliance in line with National Building Code NBC, 2016.

13. Court Cases

Sr. No.	Terms of Reference
13.1	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

14. Miscellaneous

Sr. No.	Terms of Reference
14.1	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website http://moef.nic.in/Manual/Townships.

Additional Terms of Reference

1) Project proponent and Accredited Consultant also to refer the model ToR available on Ministry (MoEF&CC) website.

(2) With reference to the directions given by Hon'ble National Green Tribunal, Central Zone Bench, Bhopal in Original Application No. 93/2024(CZ) vide order dt., 08.09.2024, PP and Consultant to confirm and jointly submit undertaking that the project site is not located in whole or in part within 5 km. of the protected area notified under the Wildlife (Protection) Act, 1972, critically polluted areas and severely polluted areas as identified by the CPCB, eco-sensitive areas notified under Section 3(2)of the Environment (Protection) Act, and the inter-state boundaries.

Annexure 2

Details of Products & By-products

Name of the product /By-product	Product / By-product	Quantity	Unit	Mode of Transport / Transmission	Remarks (eg. CAS number)
Total Construction area	Product	614387.19	SqM	-	This is a building construction projec

Signature Not Verified

Digitally Signed by : Joy S Thakur
Member Secretary, SEAC

Date: 12/11/2024

M/s. Bajaj Finserv Ventures Limited & Others	Environmental Impact Assessment (EIA) Report for Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036, Maharashtra

Table of Contents

EXECUTIVE SUMMARY 12

CHAPTER 1: INTRODUCTION 23

1.1 Purpose of the Project 23

1.1.1 Objectives of Environmental Impact Assessment Studies: 23

1.2 Identification of Project and Project Proponent 23

1.3. Brief description of nature, size, project location and its importance to the country, region 24

1.3.1 Brief History of the Project 24

1.3.2 Project Brief 24

1.3.3 Importance of the Project 25

1.3.4. Environmental 26

1.3.5. Social 26

1.3.6. Financial 26

1.3.7. Applicable environmental regulations and standards: 26

1.4. Scope of the study – details of regulatory scoping carried out (As per Terms of Reference) 27

1.4.1 Terms of Reference 27

1.4.2 Any Litigation Pending: 33

CHAPTER 2: PROJECT DESCRIPTION 34

2.1 Type of project 34

2.2 Need for the project 34

2.3 Location (maps showing general location, specific location, project boundary & project site layout, longitude and latitude), site surroundings 34

2.3.1 Detailed Project location/ Address 34

2.3.2 Co-ordinates of Project Boundary 35

2.3.3 Development Plan 35

2.3.4 Environmental sensitive places within 15 km radial area from project site 36

2.3.5 Area Statement of the Project Site 38

2.3.6 Site Photographs 39

2.4 Size or magnitude of operation 40

2.4.1 Topography of 10 Km....42
2.5 Proposed Schedule for Approval and Implementation....42
2.5.1 Status of Land Allocation....43
2.6 Technology and Process description....43
2.6.1 Water Requirement....43
2.6.2 Wastewater generation....46
2.6.3 Sewage Disposal Facilities....48
2.6.4 Solid and Hazardous waste details....48
2.6.5 Waste management during operation....49
2.6.6 Energy Requirement....50
2.6.7 Rain Water Harvesting....52
2.6.8 Green Belt Development....52
2.6.9 Parking Details....53
2.7 Project description including drawings showing project layout, components of project etc. Schematic representations of the feasibility drawings which give information important for EIA purpose....58
2.7.1 Project description including drawings showing project layout, components of project etc. .58
2.7.2 Water Consumption and sewage Generation....58
2.8 Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements (as required by the scope)....58
2.9 Assessment of New & Untested Technology for the Risk of Technological Failure....58

CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT....59
3.1. Study Area, Period, Components & Methodology....59
3.1.1 Study area....59
3.1.2 Study Period....59
3.1.3 Methodology....59
3.2 Establishment of baseline for valued environmental components, as identified in the scope 59
3.2.1. Land use & Land cover....60
3.3.2 LULC Analysis for the Study Area....61
3.3 Base maps of all environmental components....64
3.3.1 Topography....64

3.3.2 Hydrology 65
3.3.3 Drainage Map 65
3.3.4 Soil Quality 67
3.3.5 Water Environment 71
3.3.5.1 Surface Water 71
3.3.5.2 Ground Water 74
3.3.6 Air Environment 77
3.3.6.1 Climate Conditions in the Study Area 77
3.3.6.2 Air Environment 77
3.3.7 Noise Environment 82
3.3.8 Ecological Biodiversity Study 84
3.3.8.1 Study Area 84
3.3.8.2 Survey Methodology: 85
3.3.8.3 Study Area 86
3.3.9 Socio – Economic Environment 95
3.3.10 Traffic Analysis 100

CHAPTER 4. ANTICIPATED IMPACT ANALYSIS AND MITIGATION MEASURES .. 104
4.1 Details of Investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project 104
4.2 Measures for minimizing and / or offsetting adverse impacts identified 106
4.2.1 Impact Identification 107
4.3 Irreversible and Irretrievable commitments of environmental components 107
4.4 Assessment of Environmental Impacts during development & construction phase 109
4.4.1 Topography Impact 109
4.4.2 Land Environment Impact 109
4.4.3 Water Environment 109
4.4.4 Groundwater Quality Impact 110
4.4.5 Surface and Ground Water Hydrology 110
4.4.6 Soil 111
4.5Mitigation measures 114

CHAPTER 5: ALTERNATIVE STUDIES 127
5.1 Description of each alternative 127
5.2 Summary of adverse impacts of each alternative and Selection of alternative 127

CHAPTER 6: ENVIRONMENTAL MONITORING PROGRAM 129
6.1 Technical aspects of monitoring the effectiveness of mitigation measures 129
6.1.1 Implementation Schedule of Mitigation Measures 129
6.1.2 Post Project Environmental Monitoring 129

CHAPTER: 7 ADDITIONAL STUDIES 132
7.1 Public Consultation 132
7.2 Risk Assessment 132
7.2.1 Scope of the study 132
7.2.2 Study Objective 132
7.2.3 The study Approach 133
7.2.4 Disaster Management Plan 133
7.2.4.1 Purpose of Disaster Management Planning: 135
7.2.4.2 Scope: 135
7.2.4.3 Risk Assessment And Vulnerability Analysis: 136
7.2.4.4 Disaster Mitigation Action: 139
7.2.4.5 Emergency Resonance Plan: 145
7.3 Social Impact Assessment. R&R Action Plans 163

CHAPTER 8: PROJECT BENEFITS 164
8.1 Improvements in the Physical Infrastructure 164
8.2 Improvement in Social Infrastructure 164
8.3 Employment potential –skilled; semi-skilled and unskilled 164
8.4 Other tangible benefits 164

CHAPTER 9. ENVIRONMENTAL COST – BENEFITS ANALYSIS 166
CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN 167
10.1. Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA 167

10.1.1 Environmental Inspection 172

CHAPTER 11 SUMMARY AND CONCLUSIONS 181

11.1 Overall Justification for Implementation of Project 181

11.2 Explanation of How, Adverse Effects Have Been Mitigated 181

CHAPTER 12: DISLOSURE OF CONSULTANT 182

12.1 The names of the Consultants engaged with their brief resume and nature of Consultancy rendered 182

LIST OF TABLES

Table 1.1: List of Project Proponent 23

Table 1.2: Brief Description 24

Table 1.3: Compliance of ToR Points 27

Table 2.1: Geographical Co-ordinates of project site corners 35

Table 2.2 Environmental Sensitivity 36

Table 2.3: Proposed Configuration 42

Table 2.4: Schedule for Approval and Implementation 43

Table 2.5: Water Requirement 43

Table 2.6 Sewage Generation 46

Table 2.7: STP Parameters 47

Table 2.8: Quantity of Solid/Hazardous Waste and Disposal Details 49

Table 2.9: Power Requirement 50

Table 2.10: Energy Saving Table 50

Table 2.11: Estimate of Rainwater Harvesting 52

Table 2.12: Parking Statement 53

Table 3.1: Land use/ Land cover Statistics of the 10 km radius area around project site 63

Table 3.2 Soil Sampling Locations in the Study Area 67

Table 3.3 Soil Analysis Report.....68

Table 3.4 Fertility Status Classification 70

Table 3.5: Relationship of CEC with Absorptivity 70

Table 3.6: Relationship of CEC with Productivity.....70

Table 3.7: Surface water Monitoring Location 71

Table 3.8: Surface water Monitoring Report.....72

Table 3.9: Ground water Monitoring Location 74

Table 3.10: Ground water Monitoring Report.....75

Table 3.11 Ambient Air Quality Monitoring Location 79

Table 3.12 Details of The Air Sampling Locations.....80

Table 3.13 Noise Monitoring Locations.....82

Table 3.14: Noise Monitoring Results.....83

Table 3.15: Summary of Demographic Structure in Study Area.....97

Table 3.16: Site Connectivity of the Project Site 98

Table 3.17: Observed Traffic Peak Hour.....102

Table 3.18: Level of Service (LOS) comparison 103

Table 4.1: Impact Identification Matrix for Construction Phase.....105

Table 4.2 Pollutant Sources and Characteristics 106

Table 4.3 Environment aspects of proposed Establishment scheme other than sources of pollution 108

Table 4.4: Emission Details of DG Sets.....115

Table 4.5: Overall Scenarios within Study Area.....117

Table 4.6: Ecological concerns along with their sources of threat and affected ecological parameters and impact of project 124

Table 4.7: Impact Matrix 126

Table 6.1: Environmental Monitoring during Construction Phase 130

Table 6.2 Environmental Monitoring during Operation Phase 130

Table 6.3: Responsibilities and Penalties under act 131

Table 7.1: Different categories of Hazard Possibilities 134

Table 7.2- Disaster Management Strategies 136

Table 7.3 - Disaster Phase Analyses 137

Table 7.4: Possible Hazard ConFigureuration 138

Table 7.5: Construction Guidance Codes 140

Table 7.6: Guidelines to reduce Evacuation Time 144

Table 7.7: List of different NGOs near the proposed site 146

Table 7.8: List of Hospitals near Proposed Project 148

Table 7.9: List of Fire Stations near Proposed Project 149

Table 7.10: DG Sets 153

Table 7.11: Actionable Points for Disaster Management Strategies 159

Table 7.12: Safety Drills and Maintenance for Commercial Building 159

Table 7.13: DMP Cost Analysis 160

Table 10.1: Organization& Environment Cell 167

Table 10.2: Activities for Construction Phase 168

Table 10.3: Monitoring Schedule 174

Table 10.4: Management Plan 175

Table 10.5: Water (Prevention & Control of Pollution) Act, 1974 (No. 6 Of 1974).....176

Table 10.6: Environment (Protection) Act, 1986 (No.29 of 1986).....178

Table 10.7: Budget For Environmental Management Plan 179

LIST OF FIGURES

Figure 1.1: Google Image with plot boundary (source- google earth) 24

Figure 2.1 Geographical Location of the Project Site 35

Figure 2.2 Google Image showing Project Boundary Coordinates 35

Figure 2.3 Development Plan 36

Figure 2.4: Site photograph (source-actual photos).....39

Figure 2.5: Project Layout.....40

Figure 2.6: Building Section Plan 41

Figure 2.7. Cut and Fill Section of the Site 41

Figure 2.8: Contour plan.....42

Figure 2.9: Toposheet of 10 Km.....42

Figure 2.10: Water Balance Diagram – During Dry Season 44

Figure 2.11: Water Balance Diagram – During Wet Season.....45

Figure 2.12: Water Supply Layout 45

Figure 2.13: STP Section A-A.....47

Figure 2.14: STP Schematic Flow Chart.....48

Figure 2.15: OWC Layout.....49

Figure 2.16: Electrical Schematic Layout 51

Figure 2.17: Lighting Arrester.....51

Figure 2.18 Landscape Layout 53

Figure 2.19: Parking Plan (Basement 5 Level).....54

Figure 2.20: Parking Plan (Basement 4 Level).....54

Figure 2.21: Parking Plan (Basement 3 Level).....55

Figure 2.22: Parking Plan (Basement 2 Level).....55

Figure 2.23: Parking Plan (Basement 1 Level).....56

Figure 2.24: Parking Plan (Ground Floor).....56

Figure 2.25: Parking Plan (Third Floor).....57

Figure 2.26: Parking Plan (Second Floor).....57

Figure 2.27: Parking Plan (First Floor).....58

Figure 3.1: Toposheet Map of 10 Km Radius Area Around Project Site.....61

Figure 3.2: Satellite Image Map of 10 Km Radius Area Around Project Site.....62

Figure 3.3: Land use/Land cover map of 10 km radius area around project site.....63

Figure 3.4: Land Use Graph.....64

Figure 3.5: Contour map of 10 Km radius area around project site.....64

Figure 3.6: Drainage map of 500m radius area around Project site.....65

Figure 3.7: Drainage map of 5 km radius area around Project site.....66

Figure 3.8: Drainage map of 10 km radius area around Project site.....66

Figure 3.9 Soil Sampling Locations in the Study Area.....67

Figure 3.10: Surface water Monitoring Location.....71

Figure 3.11: Ground water Monitoring Location.....74

Figure 3.12: Wind Rose for Period January 2024 to December 2024.....78

Figure 3.13: Ambient Air Quality Monitoring Location.....80

Figure 3.14 Noise Monitoring Location.....83

Figure 3.15 Locations (1-4) of field survey within 500m periphery of project site 89

Figure 3.16 - 10 km radius Google Earth Map and Distance from project site 95

Figure 3.17 Village Map of the Study Area 96

Figure 3.18: Site Layout Plan 101

Figure 3.19 : Site Location Map 102

Figure 4.1 - Ground Level Concentrations of PM10 118

Figure 4.2 - Ground Level Concentrations of $PM_{2.5}$ 119

Figure 4.3 - Ground Level Concentrations of SO_2 120

Figure 4.4 - Ground Level Concentrations of NOx 121

Figure 7.1: Location of the proposed project 133

Figure 7.2: Disaster Management Planning 136

Figure 7.3 Disaster Matrix 137

Figure 7.4: Risk assessment strategies 137

Figure 7.5: Climate Risk Management Phase Analyses 138

Figure 7.6: Lightening Arrestor Plan 145

Figure 7.7: Locations of Hospitals 147

Figure 7.8: Road map of the proposed project from nearest Fire Station 149

Figure 7.9: Technologies and Disaster Management 154

Figure 7.10: Fire hydrant pump systems 155

Figure 7.11: Wet Riser 155

Figure 7.12: Fire sprinkler system 155

Figure 7.13: Heat Detection and Smoke Detection System 156

Figure 7.14: Fire Alarm system 156

Figure 7.15: Fire Hose Reel system 156

Figure 7.16: Diesel Generator 157

Figure 7.17: Disaster management cell 158

Figure 7.18: National Disaster Management Authority 158

Table 7.19: Directories 161

LIST OF ANNEXURES

Annexure-1	TOR Letter
Annexure-2	Monitoring Report
Annexure-3	Air Quality modelling with dispersion modelling
Annexure-4	Traffic Impact Assessment report
Annexure-5	Carbon Foot print Report
Annexure-6	ECBC Report along with Shadow analysis
Annexure-7	Geo Hydrology Report
Annexure-8	Water NOC

EXECUTIVE SUMMARY

1.0 Introduction

This EIA report is prepared to assess the Environmental Impact and to suggest suitable mitigation measures for Proposed IT/ITES/Commercial Building Project of M/s. Bajaj Finserv Ventures Limited & Others at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune,411036, Maharashtra.

The proposed project is a Greenfield (New) for Commercial Building Project. As per Environmental Impact Assessment Notification published by MoEF&CC vide S.O. 1533 dated 14th September, 2006 and its amendments till date, the proposed activity of Construction project more than 1,50,000 Sq.mt. entails Prior Environmental Clearance as proposed activity is falling under schedule 8(b) of the notification & to be appraised by SEAC as Category B1 project.

Application submitted for TOR letter to SEIAA Maharashtra vide proposal number SIA/MH/INFRA2/489762/2024 dated 18/09/2024 and Auto ToR issued by SEIAA Maharashtra on dated 12/11/2024.

Table 1: The Owner (Project Proponent)

S. No.	Particulars	Details
1.	Name of the applicant	1. Bajaj Finserv Ventures Limited 2. Bajaj Finserv Limited 3. Bajaj Finance Limited 4. Bajaj Allianz General Insurance Company Limited 5. Bajaj Allianz Life Insurance Company Limited
2.	Registered Address	Bajaj Finserv Limited, S.No 208/1B, Off Pune-Ahmednagar Road, Lohegaon, Viman Nagar, 411014
3.	Address for correspondence	Bajaj Finserv Limited, S.No 208/1B, Off Pune-Ahmednagar Road, Lohegaon, Viman Nagar, 411014
	Name	Mahesh Kunkulol
	Designation	Group RE & Infra Head
	Pin Code	411014
	E-mail	mahesh.kunkulol@bajajfinserv.in
	Telephone No.	+91 (20) 71505700
	Fax No.	--

2.0 Project Location

Proposed Commercial Building will be carried out at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036, Maharashtra, by M/s. Bajaj Finserv Ventures Limited & Others. The GPS (Global Positioning System) location of the project site is 183226.63N latitude and 735501.92E longitudes & it is situated at 545 m above from mean sea level.

M/s. Bajaj Finserv Ventures Limited & Others	Environmental Impact Assessment (EIA) Report for Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036, Maharashtra

The project location is accessible from N Main Road, and Ghorpadi Road. The nearest major Railway station from the proposed project site is Pune station 4.42 km. Hadapsar railway station at 1.65 km and nearest Airport is Pune International Airport is at 4.83 km. from the project site. Kalyani Nagar metro station is on 1.31 Km.

There are no national parks, wildlife sanctuaries, Biosphere Reserves, Tiger/Elephant Reserves, and Wildlife Corridors etc. within 10 km distance.

3.0 Project Description

The proposed activity of Area development and township project falls under schedule 8(b). Salient features of proposed project are presented in **Table No. 2.**

Table 2: Salient Features

Sr. No.	Component	Details
1	Name & Address of Company	Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036, Maharashtra.
2	Product Type	Area development and Township
3	Project Type	New
4	Schedule of project as per EIA Notification, 2006	8(b)
5	Category of Project	'B1'
6	**Plot Area Details**	
	Particulars	**Area in Sq. m.**
a	Plot area	70,631.81
	Net Plot area	54,027.75
e	FSI area	3,47,700.51
f	Non FSI area	2,66,686.68
g	BUA	6,14,387.19
7	**Project Details**	
a	Proposed Configuration	

No. of	Building Name	Configuration	Height (m)
	Tower 1	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2nd floor Parking + 3rd floor parking + 4th and 5th floor (comprising of food and training rooms) + 22 office floors.	125.25
	Tower 2	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2nd floor Parking + 3rd floor	125.25

	Tenements		parking + 4th and 5th floor comprising of food and training rooms + 22 office floors.	
		Tower 3	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2nd floor Parking + 3rd floor parking + 4th and 5th floor comprising of food and training rooms + 22 office floors.	125.25
		1 Visitor Centre	Ground Floor	8.40

8	**Budgetary Estimation**	
a	Project Cost (Indian Rs.)	Rs. 3306.63 Cr. (INR)
b	EMP Cost (Indian Rs.)	Capital: 2181 Lakhs (INR), Recurring/Annum: 112.50 Lakh
9	**Water requirement and sewage generation**	
a	Total Water requirement	2933 m3/day
b	Source	Pune Municipal Corporation
c	Sewage generation	1763 m3/day
d	STP capacity	1940 KLD
10	**Solid waste management**	
a	Solid waste management	Wet garbage -2673 Kg/day Dry Garbage - 6238 Kg/day STP Sludge – 1146.2 kg/day
b	OWC Capacity	3 nos. x 900 Kg/day = 2700 Kg/day
11	**Power generation details**	
	Connected load	45442 Kw
	Maximum Demand	18254 KW
12	**DG set and Transformer details**	
a	DG set	2000 x 18 KVA
b	Transformer	2000 x 18 KVA

Energy saving measures

	Total Capex & Saving Summary	
Sr. No.	Energy saving measures	Total Savings in MWh
1	Use of LED lights for Internal & External Lighting	1435.5
2	Use of Occupancy/Day Light Sensors for internal lighting & timers for External lighting	4593.6
3	Use of Solar Street Lights	23.1
4	Solar PV Cells with installed capacity of 475 KW	0.0
	Overall Savings in Energy	6052

13	**Rain water Harvesting**	
	Details of Rain Water Harvesting Plan	Total Runoff before development - 12590.20 Cum/year Total Runoff after development - 31560.79 Cum/year

		Incremental Runoff- 18,970.59 Cum/year i.e. 249.61 m3/day. No. of Recharge pits- 32 nos. Percentage of Rainwater Harvest: 127 %
14	**Parking details**	
a	Parking details as per norms	Total Car parking (Required as per DCR) – 3546 nos. Total Car parking (Actual provided) - 4951 nos. Total two-wheeler parking (Required as per DCR) – 13004 nos. Total two-wheeler parking (Actual provided). – 14808 Nos Total area proposed for parking 91509 m2

4.0 Description of the Environment

Baseline studies were conducted during summer season March 2024 - May 2024 for collecting information on physicochemical, biological, socioeconomic and physical environment from the study area.

4.1 Topography, Land use & its Classification

Land cover is a fundamental parameter describing the Earth's surface. This parameter is a considerable variable that impacts on and links many parts of the human and physical environments. Remote sensing technique can represent land cover categories by means of classification process. With the availability of multispectral remotely sensed data in digital form and the developments in digital processing, remote sensing supplies a new prospective for land-cover/land-use analysis. Geographical Information Systems have already been used for assessing environmental problems, since they provide a flexible environment and a powerful tool for the manipulation and analysis of spatial information for land cover feature identification and the maps of all variables were combined to extract information to better understand analyzing. Satellite remote sensing, in conjunction with geographic information systems, has been widely applied and been recognized as a powerful and effective tool in analyzing land cover/use categories This study made use of remotely sensed data and GIS technologies; to evaluate qualitatively and quantitatively outcome of part of **Pune district** land cover/use distribution. Obtained results were compared, visualized, and analyzed, in Geographic Information System.

According to the known land cover classes, agriculture is the one of the main land uses in the regions. Only a small amount of the land is covered with scrub 0.19% and there is 1.27% barren land, but 30.01% of the land without scrub cannot be converted into arable land. However, only roughly 1.60% of forestland exists. According to the LULC, the area covered by the settlement area (Build up area, Settlements, Road etc.) accounts for 48.57% of the total area. Mentioned image (Figure 3.3) shows that the most settlements were discovered in Pune and its neighboring suburbs. Furthermore, the terrain is very gentle and contains stony mass (rocky stone). According to the facts, water bodies such as rivers, dams, canals, tributaries, and ponds account for around 2.99% of the total.

4.2 Soil Environment

The soil samples were derived from 8 different locations within the study area of the project. The pH of the soil in the study area is moderately alkaline in reaction having pH 7.47. The soluble salts were determined from soil extract (1:2). The soluble salts are expressed in terms of electrical conductivity (EC). The (Electrical Conductivity) of the soil extract in the study area is 1054.0 mS/cm the soluble salt content in all the soils are low < 1dS/m. Chemical analysis shows that the soils are normal (EC<1dS/m).

CEC is 47.6 meq/100g, moreover it can be interpreted that the soil is clayey type in texture and has

Moderate Productivity and High Absorption Capacity.

4.3 Air Environment

Ambient Air quality for criteria pollutants viz. PM_{10}, $PM_{2.5}$, NOx, SO_2 and CO was monitored at eight (8) locations in study area.

Particulate Matter (PM_{10})

The study reveals that maximum concentration was observed to be in the range of 56.3-63.8 µg/m3. The highest 24-hourly concentration was recorded at sampling location A8. At the same time, minimum concentration was observed at location A1. The average concentration of PM_{10} can be said to be ranged between 30.73-36.86 µg/m3. The high concentration of particulate matter recorded at project site (A5) may be due to local vehicular movement on unpaved road.

Particulate Matter ($PM_{2.5}$)

The major source of $PM_{2.5}$ is said to be the combustion of fossil fuels, fire wood and industrial emissions etc, present within study area. The maximum of $PM_{2.5}$ (42.1µg/m3) during the study period was recorded at location A8, whereas the minimum value (26.4µg/m3) concentration was recorded at A3 location . The average concentration of $PM_{2.5}$ during the study period was computed to be in the range of 29.67-34.40 µg/m3.

Sulphur Dioxide (SO_2)

High level of SO_2 in ambient air indicates the presence of combustion of fossil fuel in the vicinity. The maximum of SO_2 (30.6 µg/m3) during the study period was recorded at location A8, whereas the minimum value (17.4 µg/m3) concentration was recorded at A1 location. The average concentration of SO_2 during the study period was computed to be in the range of 21.97-27.85 µg/m3.

Oxides of Nitrogen (NOx)

The various forms of Nitrogen in NO, NO2 and N2O are collectively called as Oxides of Nitrogen. The highest value of NOX during the monitoring period was observed at location A2 while the minimum average was recorded at A1. The average concentrations were in the range of 26.28-31.37 µg/m3. The maximum 24-hourly value of NO_X was recorded at the monitoring location A5 (36.5 µg/m3) whereas the minimum concentration of NOx was recorded at location A1 (21.1µg/m3).

Carbon Monoxide (CO)

The anthropogenic source of CO is due to incomplete combustion of fuel majorly in absence of air. The maximum concentration of CO estimated at all locations during the study period can be observed is 0.5-1.8 mg/m3.

All the parameters were found to be within the desired limits specified by NAAQ Standard.

4.4 Noise Environment

Ambient noise levels were monitored at eight (8) locations in the study area during the study period.

Commercial Zone

The day time noise level at the project premises was observed to be 53.32 dB (A) while during night time the noise level was recorded to be 41.14 dB (A). It shall be noted that the noise levels during the day time as well as night time were estimated to be under the prescribed standards by CPCB.

Residential Zone

The minimum noise level recorded during the daytime was observed at location N1, whereas the maximum noise levels can be observed at location N4. The location N4 is surrounded by commercial area hence can give rise to high noise level in the surroundings. It shall be noted that the permissible limits for noise did not exceed at any of the locations selected for sampling.

4.5 Ground Water Environment

Water quality of ground has been studied in order to assess proposed water-uses in construction, drinking, and horticulture purpose. The water quality near the site and other locations within the 10 km impact zone was monitored during March 2024 to May 2024.

pH – 7.58, TDS – 488.9 mg/l, Sulphates – 86.5 mg/l, Nitrate – 21.6 mg/l, Bicarbonate – 14.5 mg/l, Calcium – 48.6 mg/l, Sodium – 58.4 mg/l, Potassium 21.3 mg/l, Fluoride - <0.01 mg/l, Magnesium – 16.5 mg/l, COD - <5.00 mg/l, BOD - <1.00 mg/l, Iron– <0.05 mg/l, whereas concentrations of Arsenic, Lead were <0.01 mg/l and that of Cadmium, Chromium, Mercury, Nickel & Zinc were <0.001 mg/l, <0.05 mg/l, <0.001 mg/l, <0.01mg/l & <0.05 mg/l. Total Coliforms & E. Coli were <2 No./100ml.

4.6 Surface Water Environment

Surface water samples were derived from4 locations in different surface water bodies within study area, analysis results of the same revealed that pH values amongst all samples varied in the range of 7.40 to 7.64, Total Hardness concentration varied in the range of 128.6 mg/l to 241.6 mg/l & maximum concentration was recorded at SW1, TDS concentration varied in the range of 301.6 to 663.8 mg/l. Electrical Conductivity was found to be ranging in between 463.5 to 1020.5 µS/cm. The concentrations of Dissolved Oxygen, COD & BOD were found to be varying in the range of 2.6 to 5.8 mg/lit, 8.0 to 36 mg/l, 3.0 to 12.0 mg/lit respectively.

Heavy metals viz. Lead, Chromium, Mercury, Cadmium, Arsenic & Nickel were below detection limits in all samples whereas the concentration ranges of metals viz. Zinc, Boron & Magnesium were <0.05 mg/l, <0.01 mg/l & 9.54 to 21.6 mg/l respectively. Concentration of Fluoride varied in the range of <0.01mg/l.

4.7 Biotic Environment

Project site flora & fauna:

The scrub forest, wetland and grassland of study area support several ecological important plant species which plays crucial role for the conservation of birds, insects, and mammals. Total 77 plant species were reported during survey of which, 48 are tree species, 13 shrubs, 6 herbs, 4 grass and 6 were climbers, 7 butterflies were also found during field visit, which shows a greater diversity. Species composition of insects is very peculiar of study area; total 26 insects were recorded of which beetles and bugs were more divers among all insect groups. 93 bird species were recorded in the study area, most of them around the water bodies and grassland. Mammals observed during field survey were 5 species which are mostly common, 3 Dragonflies, 20 Avifauna no threatened taxa have been reported from proposed project site. Reptiles and amphibian's diversity were also noteworthy in study area, 1 reptile were documented from study area.

4.8 Socio-Economic Environment

The 10 km study area includes Pune District. The study area is essentially urban in nature. The socio economics of study area is studied through primary and secondary survey. The socio-economic aspects of the study area are summarized in the table given below.

Table 3: Summary of Demographic Structure in Study Area

Sr. No.	Particulars	Total	Male	Female
1	Total No. of Houses	**7,537**	-	-
2	Population	**29,965**	16,309	13,656
3	Child (0-6)	**4,128**	2,218	1,910

4	Schedule Caste	**3,499**	1,826	1,673
5	Schedule Tribe	**549**	331	218
6	Literacy	**87.86 %**	90.16 %	85.10 %
7	Total Workers	**12,345**	9,757	2,588
8	Main Worker	**11,498**	-	-
9	Marginal Worker	**847**	520	327

5.0 Anticipated Environmental Impacts and Mitigation Measures

Impacts considered for Construction Phase

Change in natural land cover can affect surface run-off.

The solid waste generation during & after construction, operation of the proposed project can result into land pollution.

Disposal of demolition waste.

Storage of construction material/chemicals.

Accidental spillage of Hazardous chemicals leads to soil contamination.

Solid Waste generation during construction phase by workers dwelling on site.

Impacts Considered in Operation Phase

The solid waste generation during operation of the proposed project.

Incidental dispersal of domestic waste / sewage from the project.

Solid waste Management

- The solid waste generated at the project would be from Commercial. The segregated bio-degradable waste will be treated in composting machine.
- Solid waste Management plan with transport, collection, storage, disposal for all types of wastes Garbage collection bins are provided in each building. Final screening shall be done with dedicated efforts. It is expected that residents will segregate the waste at source. The philosophy of solid waste management at proposed project will be to encourage the four R's of waste i.e., waste reduction, reuse, recycling, and recovery (materials & energy). This will result in lesser reliance on land filling. Regular public awareness meetings will be conducted to involve the residents in the proper segregation, storage, recycling and individual composting options and techniques. The Environmental Management Plan for the solid waste focuses on three major components during the life cycle of the waste management system, i.e., collection & transportation, treatment or disposal and closure & post closure care of treatment/disposal facility.
- **Collection:** Adequate number of people will manage to collect the waste from each building and deliver it to the composting machine in closed containers. Segregated solid waste will be collected from each wing of the building. Final screening shall be done with dedicated efforts. The non-biodegradable waste shall be disposed through the authorized contractor. The bio- degradable waste will be subjected to treatment in composting machine.
- **Segregation:** The waste will be segregated at source by flat /office owners. They will segregate garbage in two different color buckets.
- **Storage:** The bio-degradable waste will be treated on daily basis.
- **Disposal:** Manure generated by treating Bio-degradable waste will be used in garden. Non-biodegradable waste will be disposed through authorized recycler.
- **Area requirement:** Room is proposed for the storage and treatment of the solid waste.

E-Waste Management

Various types of electrical and electronic wastes (computers, CDs, etc.) may be generated. E-waste will

be handed over to SWACH/ Authorized Agency for disposal.

Hazardous Solid Waste

This is a predominantly Commercial project. Its Solid Waste is covered by Municipal Solid Waste (Management& Handling) Rules 2016. The Hazardous Waste (Management, Handling and Trans boundary movement) Rules 2016, in its Rule No. 2(e) has stated certain exemptions, in which inter alia MSW or municipal establishments are not covered as Hazardous. Although this is so, the Project Proponents feel their responsibility towards identification and mitigation of the menace of Hazardous Waste, camouflaged within Municipal Solid Waste.

Mitigation considered for Construction Phase

Structure demolished. During Demolition phase, C & D rules 2016 will be followed. During the construction phase, building was designed so as to cause minimum changes in the earlier land cover pattern. Green belt development on virgin land ensures the infiltration of rainwater. Since. Incremental run-off due to the project is brought to minimum by providing rain water harvesting Tanks. Spillage of waste oil from DG sets is avoided by collecting it in a container. Then it is handed over to the authorized recycler. Oil and grease traps are provided in order to avoid their entry into storm water channel and its further seepage into ground water.

- All materials will be stored in covered sheds to avoid dispersal due to wind Storage places will be designed as per material specifications/type, with all precaution of fire norms
- Proper covering will be provided to prevent damages due to water seepages at godowns especially cement, top soil etc.
- Separate area for hazardous materials like paint containers, varnish cans etc. will be handed over to authorized dealer.
- The solid waste generated due to workers, will be segregated and given to authorized recycler.
- Sanitation facilities will be provided for labors.

Mitigation considered for Operation Phase

- Segregation and collection of biodegradable & non-biodegradable waste. Biodegradable waste will be treated in composting Machine. Dry garbage will be handed over to authorized recycler for disposal and further treatment.
- OWC is proposed.
- Avoiding spillage of waste oil from DG sets by collecting it in a container before handing it over to the authorized recycler approved by CPCB.
- Providing Sewage Treatment Plant and regular maintenance of the project premises will result in maintaining the land environment.
- Use of dried STP sludge as manure after treating it in OWC machine.
- The agreement with authorized agency. The preparation of treatment and disposal shall be done well in advance of bringing the project operational.
- Awareness training will be arranged for the staff, residents to make them aware to the need of not making litter indiscriminately.
- Arrangements such as provision of garbage bins shall be made for collection,
- Horticultural waste and garden sweepings shall not be subjected to open burning, but will be used for mulching.
- The collected waste shall be quickly removed in closed/covered vehicles.
- Awareness shall be spread to segregate the waste as organic, inorganic and inert. Staff will be appointed to supplement this.
- Waste storage shall not be unsightly.

- Waste handling shall be by manual methods, and multiple handling shall be avoided.

WATER ENVIRONMENT

Impacts considered during Construction Phase

- Increased water demand during construction phase for site preparation, water spraying for dust suppression, for construction activities, curing, domestic and other water requirements for labors and staff onsite
- Wastewater disposal by construction labors and staff can lead to pollution.

Impacts considered during Operation Phase

- Lowering the infiltration capacity and increased run off.
- Increased run off, water logging in the low-lying areas.
- Stress on existing water supply & generation of waste water.

Domestic Usage

a) Use of water efficient plumbing fixtures (ultra-flow toilets and urinals, low flow sinks, water efficient dishwashers and washing machines). Water efficient plumbing fixtures use less water with no marked reduction in quality and service.
b) Leak detection and repair techniques.
c) Sweep with a broom and pan where possible, rather than hose down for external areas.
d) Meter water usage, employ measurement and verification methods. Monitoring water use is a precursor for water management.
e) Awareness campaign to disseminate knowledge on strategies and technologies that can be used for water conservation.

AIR ENVIRONMENT

Impacts considered for Construction phase

- Increased level of dust and other air pollutants due to infrastructure development, building construction and other related activities.
- Emissions from vehicles carrying building material as well as the construction machinery.
- Emissions from DG sets, if any, used during construction phase.

Impacts during operation phase of the Project

- Emission from vehicular movement
- Emission form D.G sets

Mitigation considered for Construction Phase

- Source Specific Recommended Management and Mitigation Measures for construction phase
- Construction phase impacts are expected to have a short duration, due to the phase timelines.
- Construction site shall be barricaded using sheets to avoid dust entering into other areas.
- Separate entry and exit for construction vehicles will ensure smooth traffic movement
- The use of water sprays on areas being constructed and material transfer points will ensure that the soil moist and compact for an increased period of time, thereby reducing dust emissions.
- Wind-blown dust from exposed stockpiles should be managed through covering – netting, vegetation and/or rock cladding.
- Reducing the drop height of the material reduces the dust generation at site.
- Since construction roads would mostly be temporary, it is customary to regulate particulate emissions from haul roads by employing a watering programme.

- Washing of truck tires while going out.
- Works generating dust will be done away from the buildings.
- Use of DG sets, if any, shall be as per CPCB norms.
- Water sprinkling at a regular interval is recommended for achieving 90 to 91% of control efficiency during summer season.
- Selecting and planting air pollution abating plant species for greenbelt development is suggested.
- Logistic plan, phasing of activity to be prepared keeping in view the predominant wind direction during that period. E.g., Material storage/stockpiling to be stored in crosswind direction to reduce the impact of dust emission in downwind direction of the site.

Mitigation considered for Operation Phase

- Operation phase impacts are expected due to generation of additional vehicular traffic due to proposed project and operation of DG set.
- Implementing traffic management plan developed to reduce congestion on the connecting road.
- Developing greenbelt as per CPCB guidelines within the project and along the plot boundary.
- Proposed Plantation for RG should include air and noise attenuating plant species
- DG sets will be installed as per CPCB norms and fuel used will be low Sulphur diesel Exhaust of DG set will be released at adequate height by providing stacks of height as per CPCB norms so that ground level concentrations of the pollutants released are minimal

NOISE ENVIRONMENT

Impacts considered for Construction phase

- Construction equipment noise
- construction vehicular traffic noise
- The major source of noise during this phase is construction equipment noise and noise due to transport of construction material (vehicular noise). List of the equipment used during construction phase along with its noise levels are as mentioned below,

Observation

It is observed that the most of the working of equipment exceeds the limit which makes it mandatory to take up some mitigate measures to control and bring the noise within permissible limit.

Impacts considered for Operation phase

- Vehicular traffic from the project
- Operation of DG set (in case of power failure).

6.0 Quantitative Risk Assessment and Mitigation Measures

Appropriate recommendations for the identified category & range of hazards explicitly are mentioned in Chapter 7 in respective sections.

7.0 Disaster Management Plan

Disaster Management Plan will be implemented in consultation with the District Administration. On-site Emergency Plans are important and hence has been prepared for the Construction activity. Additionally, recommendations for and Off-site shall be provided to the District Administration. During operational phase, surrounding population shall be made aware of safety precautions to be taken in case of any emergency situation due to the overall project activity.

8.0 Occupational Safety & Health Management

The Project Proponent shall continue to strictly adhere to the rules of Factories Act 1948 & the

Maharashtra Factories Rules, 1963 regarding the occupational health facilities to be provided to the workers of the company.

i. Regular health checkup of construction workers
ii. Adequate safety instructions to given to all employees.
iii. Provide necessary protective equipment, safety appliances e.g. safety helmet, goggles, welder's equipment for eye and face protection, earplugs, safety belt, hand gloves, safety shoes and clothing, and to ensure their proper use.
iv. Keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up-to-date knowledge.
v. Provide appropriate facilities for first aid and prompt treatment of injuries and illness.
vi. Proper implementation of fire prevention methods and an appropriate firefighting service.
vii. Maintain collection of data on accidents with a view to take corrective, remedial and preventive action.
viii. Regular safety inspection by a competent person at suitable intervals of all buildings, equipment
ix. Training to all occupiers for different type of emergencies.

9.0 Post Project Environmental Monitoring Plan

Post project environmental status will be evaluated as per the Environmental Monitoring Plan framed in EIA along with additional parameters suggested if any Statutory Clearances/Permissions and frequency of environmental attributes including monitoring locations will be as per the guidelines provided by MoEF&CC/CPCB/MPCB. Monitoring shall be carried out by third party laboratories that are accredited by NABL and/or MoEF&CC.

10.0 Environmental Management Plan

Conduction of Environmental monitoring program as per plan, periodic reviews & audits will be carried out for effective environmental management. Project Management along with EHS department will ensure overall effective implementation of the management plan.

Systems will be in place to ensure compliance of all environmental statutory requirements & obligations and it will be ensured Corporate Environment Policies of M/s. Bajaj Finserv Ventures Limited & Others are strongly adhered to all time.

All recommendations given in the EIA report including that of occupational health, risk mitigation and safety shall be complied. M/s. Bajaj Finserv Ventures Limited & Others have allocated Indian Rs. 2181.00 Lakh for environmental pollution control measures & environment management plan activities including construction and Operational phase.

11.0 Project Benefits

The following benefits are expected from the proposed project:

- This project of M/s. Bajaj Finserv Ventures Limited & Others will have locale specific positive social and economic benefits.
- Some of these would be direct benefits of long-term nature
- Improvement in the physical infrastructure
- Improvement in the social infrastructure
- Employment skilled

  Local people will be preferred for employment during the construction and operation stage.

CHAPTER 1: INTRODUCTION

1.1 Purpose of the Project

This EIA report is prepared to assess the Environmental Impact and to suggest suitable mitigation measures for proposed greenfield project IT/ITES/Commercial Building Project of M/s. Bajaj Finserv Ventures Limited & Others at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036, Maharashtra.

1.1.1 Objectives of Environmental Impact Assessment Studies:

1) To establish existing baseline conditions of different environmental components by primary & secondary data collection.
2) Summarize project related data, its impacts and mitigation measures.
3) Identification of different pollution sources from proposed activity.
4) Identification & quantifications of probable impacts on different environmental components due to identified pollution sources; by superimposing predicted incremental values on baseline output.
5) Advocating suitable mitigation measures by developing, analysing different pilot plans.
6) Identification & quantification of pollution load from proposed activity of company
7) Identify & quantify anticipated risk & hazard in the operating phase of the project & recommending appropriate mitigation measures to mitigate the identified risk & hazard impacts.
8) Explanation of environmental management plan (EMP) outlining prevention and control strategies for mitigating the anticipated adverse impacts of the project.
9) Preparation of environmental monitoring program to evaluate the baseline status during operational phase of the unit.

Total plot area of the project is 70,631.81 m2, FSI - 3,47,700.51 m2, Non FSI - 2,66,686.68 m2 & Total Built up area will be 6,14,387.19 m2. Application submitted for receiving TOR letter to MoEF&CC vide proposal number SIA/MH/INFRA2/489762/2024 dated 18/09/2024 and grant of Terms of Reference (ToR) issued by SEAC Maharashtra on dated 12/11/2024.

1.2 Identification of Project and Project Proponent

The project is developed by M/s. Bajaj Finserv Ventures Limited & Others. The details of the project proponent is mentioned as below-

1.2.1 Name of the proponent:

M/s. Bajaj Finserv Ventures Limited & Others.

Address for correspondence: Bajaj Finserv Limited, S.No 208/1B, Off Pune- Ahmednagar Road, Lohegaon, Viman Nagar, 411014

Table 1.1: List of Project Proponent

1	Project Proponent	1. Bajaj Finserv Ventures Limited 2. Bajaj Finserv Limited 3. Bajaj Finance Limited 4. Bajaj Allianz General Insurance Company Limited 5. Bajaj Allianz Life Insurance Company Limited
2	Environmental Consultant	Element Consultancy Services
3	Architect	Voussiors Architect (Sameer Valimbe)

1.3. Brief description of nature, size, project location and its importance to the country, region

The plot is vacant plot when purchased by M/s. Bajaj Finserv Ventures Limited & Others. The proponent decided to use the land is for Building construction purpose. The proposed project includes open space, green area and associated infrastructure.

1.3.1 Brief History of the Project

The proposed project is located at geographical location from 183226.63N latitude and 735501.92E longitudes & it is situated at 545 m above from mean sea level. Google image showing the project location with plot boundary is shown in below Fig. 1.1

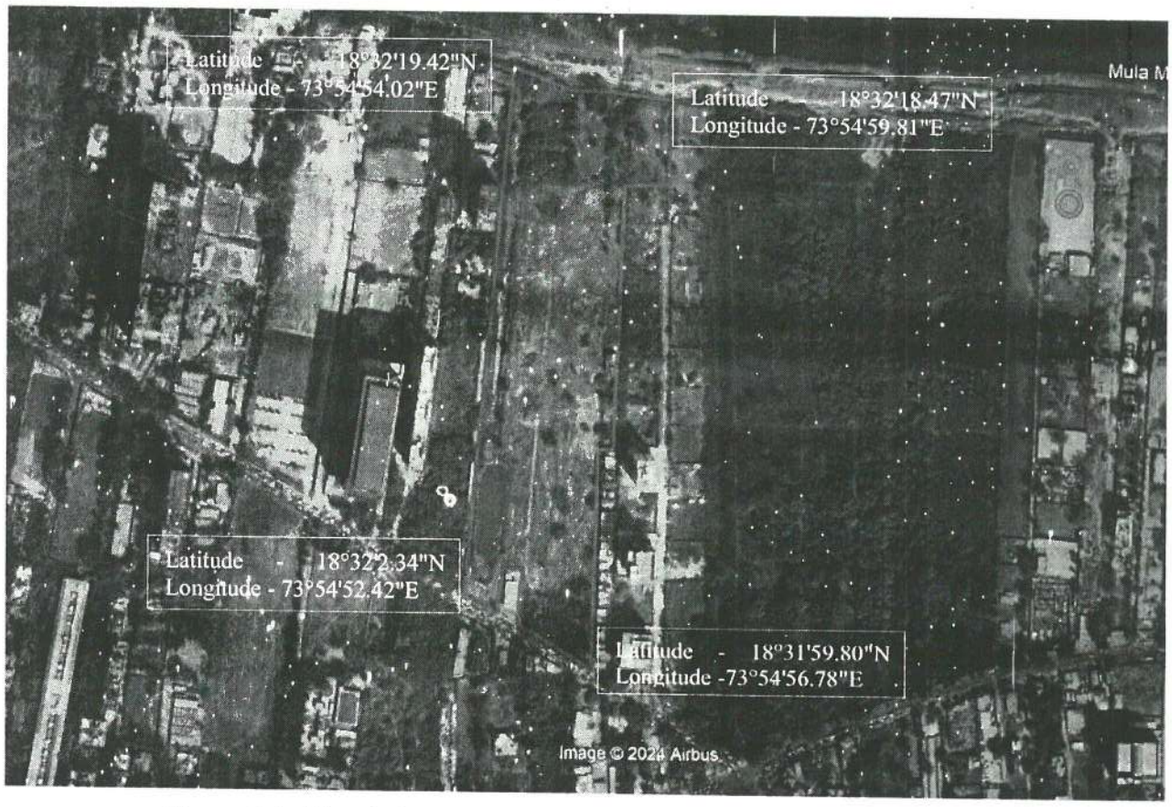


Figure 1.1: Google Image with plot boundary (source- goog'e earth)

The land use of the proposed project is in jurisdiction with the local planning authority i.e PMC. The natural drainage pattern is utilized for the drainage services to municipal drains. There is municipal water, Drainage line by PMC.

1.3.2 Project Brief

Table 1.2: Brief Description

SR.NO.	DETAILS	PARTICULARS
1.	Plot area	70631.81 m^2

2.	FSI		347700.51 m2
2.	Non FSI		266686.68 m^2
3.	Built up Area		614387.19 m2
4.	No. of tenements	Tower 1	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2nd floor Parking + 3rd floor parking + 4th and 5th floor (comprising of food and training rooms) + 22 office floors.
		Tower 2	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2nd floor Parking + 3rd floor parking + 4th and 5th floor comprising of food and training rooms + 22 office floors.
		Tower 3	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2nd floor Parking + 3rd floor parking + 4th and 5th floor comprising of food and training rooms + 22 office floors.
		1 Visitor Centre	Ground Floor
5.	Project Cost		Rs. 3306.63 Cr
6.	Total Water requirement		2933 m3/day
7	Sewage generation		1763 CMD
8	STP Capacity		1940 CMD
9	Solid waste management		Wet garbage - 2673 Kg/day Dry Garbage - 6238 Kg/day STP Sludge – 1146.2 kg/day
10	Parking nos.		2-Wheeler – 4951 Nos. 4-Wheeler – 14808 Nos.
11	Parking area		91503.50 Sq. M

1.3.3 Importance of the Project

The proposed project is situated in Mundhwa area of Pune. The project is a Commercial development project. Other amenities have been also proposed. These all together will add to the infrastructure of the surrounding area and increase the aesthetic appeal as well. The project will fulfill the demand of ever-increasing population in the areas of Mundhwa, and other nearby locations. Location of the project is situated at village Mundhwa, which is easily accessible to nearby railway stations, busdepot etc. The nearest major Railway station from the proposed project site is Pune Railway Stations at 4.40 km and nearest Airport is Pune International Airport is at 4.64 km. Nearest metro station at 1.31 km.

1.3.4. Environmental

The project will provide many facilities for improvement of the physical environment. This is a well-designed project and uses the sustainable development policy. The project will be provided with sufficient road facilities within the project premises and a large area will be provided for the parking of vehicle. The proposed project has a greenery area, which helps to protect the environmental quality. STP, OWC, RWH system, Solar systems all proposed.

1.3.5. Social

- The project is proximate to school, Collages, Hospitals, Malls, Markets, Banks.
- The project will be a model to other commercial projects surrounding to the projects.
- The project will also provide an employment opportunity to the local people.
- The proposed commercial development will generate job opportunity.
- Proposed project is mixed use development plan to give work & live nearby.
- Create employment opportunities to skilled & unskilled labours.
- The proposed site is nearby to various IT sectors, MIDC, business hub etc. the project will provide job opportunity.

1.3.6. Financial

The proposed project is situated in center of Pune, which has observed exclusive commercial developments due to land development. The construction activity of the project will generate employment to the local peoples. All government bodies at state & central level will be benefited by local taxes, GST, payment for development charges etc.

1.3.7. Applicable environmental regulations and standards:

With respect to prevention and control of environmental pollution, the following Acts and Rules of Ministry of Environment and Forest, Government of India govern the proposed project:

- Water (Prevention and Control of Pollution) Act, 1974 as amended from time to time.
- Air (Prevention and Control of Pollution) Act, 1981 as amended from time to time.
- Environment (Protection) Act, 1986 as amended from time to time.
- Hazardous Waste (Management & Handling) Rules, 2016, as amended upto date.

- Municipal Solid waste (Management & Handling) Rules, 2016 as amended from time to time.
- The Noise Pollution (Regulation and Control) Rules, 2000 and as amended upto date.
- EIA Notification dated 14.09.2006 as amended upto date.
- C&D Waste Management Rule, 2016
- E- waste management rules, 2018
- Solid waste (Management & Handling) Rules, 2016 as amended time to time.
- Meteorology data, 2020 Indian Metrological Data.
- Water Quality Criteria as per Central Pollution Control Board as per IS 2296IS 10500 for Ground Water
- National Building Code 2016.
- Census 2001 &2011

1.4. Scope of the study – details of regulatory scoping carried out (As per Terms of Reference)

1.4.1 Terms of Reference

Auto TOR received vide File No.: TO24B3813MH5698398N granted by SEAC Maharashtra on dated 12/11/2024, for Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others. Table 1.3 gives the Auto ToR approved by the EAC including a point wise response to how the TOR are addressed in the following EIA report.

Table 1.3: Compliance of ToR Points

Sr. No.	Details	Compliance Covered in
1	**Project Details**	
1.1	Need and benefits of the project.	As project is a Commercial Development Project. The project is new project, project proponent is planned to develop the project by considering the Environmental aspects like Green belt development, Provision of STPs, OWCs, provision of RWH and SWD etc. 1) The proposed project will contribute to the creation of Commercial spaces, as office/shop and restaurant are available on affordable sale.

		2) Physical infrastructure includes the development of roads, availability of technological facilities for the operation of commercial project. 3) With the establishment of the proposed project, there will be substantial improvement in the overall economy of the local people in the form of additional income through employment. 4) Growth in direct & indirect jobs and business opportunities to the local and surrounding people such as daily wage laborers, transporters, and raw material suppliers due to the development in the area. 5) Due to Proposed project employment and other infrastructural facilities will improve which will indirectly boost the urban quality of life in the immediate vicinity. 6) This project will increase the economic activities around the area, creating avenues for direct/ indirect employment during construction and operation phase of the project. 7) Due to this project, development adaptation of new technologies and other infrastructural facilities will improve which will indirectly boost the civilization of the surrounding people. 8) The proposed project offer opportunity to transform the currently semi developed region into commercially developed area. 9) Proposed project will further increase the above amenities directly/indirectly either by providing or by improving the existing facilities in the area, which will help in uplifting the living standards of local communities.
1.2	Submit data for built-up area for each building, the use and occupancy classification in line with NBC 2016 also to be indicated [for differential functional requirements].	Detailed Area statement including FSI and Non-FSI with total Construction Built-up area for of each building along with Occupancy is mentioned in Chapter 2. Total Plot area for the project is 70631.81 sq.mt. FSI of the project is 347700.51 sq.mt and Non FSI area is 266686.68 sq.mt. Total Construction BUA is 614387.19 sq.mt. Total no. of Towers are 3,
1.3	The cost of the Project (capital cost and recurring cost) as well as the cost	The Project cost is Rs. 3306.63 Cr EMP Cost of the project during Operational Phase

	towards implementation of EMP should be clearly spelt out	will be 2541.04 Lakh. Operational and Maintenance Cost of the project will be 209.98 lakh.
2	**Land environment**	
2.1	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.	LULC have been identified which are Built-up land, Agricultural land, Vegetation, Forests, Wastelands, and Water bodies. LULC classification study is carried out using the visual interpretation of satellite imagery. Land use around 10 km radius of the project site indicate that the dominant land use/ land cover are mentioned in Chapter 3.
3	**Land acquisition and R&R**	
3.1	Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/villages and present status of such activities.	No environmentally sensitive places and areas observed within 10 km radius of the project site. Details are mentioned in Chapter 2. There is no rehabilitation and resettlement involved in this project.
4	**Environmental Monitoring and Management**	
4.1	Examine baseline environmental quality along with projected incremental load due to the project.	An assessment of baseline air quality was undertaken in 5 km in months, March 2024 to May 2024. Baseline environmental study for ambient air (PM10, PM2.5, SO_2, NOx & CO) at 8 locations (Results are well within the prescribed standards of MoEF), & water were carried out in the month of May 2024, as per MoEF&CC/CPCB guidelines, Noise and soil locations in the study area of 5 km has been collected and analyzed by NABL & MOEF approved laboratory. Air modelling study for incremental pollution load is carried out. Details are included in chapter 3. Refer Annexure 2 for Environmental Monitoring report
4.2	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.	Soil sampling has been done as per MoEF&CC/CPCB guidelines in the study area of 5 km in the month of March 2024 to May 2024. Baseline environmental study for water has been done in the month of May 2024. Air quality was under taken in 5 km in months, March 2024 to May 2024. Ecology and Biodiversity study carried out for preparation of management plan to avoid /minimize and to combat any significant impact due to proposed activity. Socio-economic baseline study is carried out in study area. Details are mentioned in Chapter 3

4.3	Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of EP Act.	EMP cell is formed to implement environmental management plan effectively. Roles and responsibility of the cell mentioned in EMP.
4.4	Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.	During construction-, All the environmental practices will be monitored by the PP. An organizational set up will be carried out to ensure the effective operation of mitigation measures. During operation phase - All the environmental practices will be monitored by the respective appointed agencies an organizational set up will be formed to ensure the effective implementation of mitigation measures. Environmental Management plan separately mentioned in a chapter 10, where details are given for Construction and Operational Phase with Cost and Parameters. EMP Cost of the project during Operational Phase will be 2541.04 Lakh. Operational and Maintenance Cost of the project will be 209.98 lakh.
4.5	Possible carbon footprint contribution from each activities and mitigation measures proposed shall be included as part of Environment Management Plan.	Carbon Foot print for the proposed Commercial project is carried out, details are mentioned in Chapter 7 of additional studies, where mitigation measures are proposed with EMP.
5	**Drainage**	
5.1	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.	The contour plan with slopes, drainage pattern of the site and surrounding area is discussed in Chapter 3. Also detailed hydrogeological study having drainage pattern with total run off calculations before & after development has been attached in Annexure 7 as Rainwater harvesting report.
6	**Forest**	
6.1	Submit the details of the trees to be felled for the project, if any.	Total Green area on plot – 5795.39 m^2 (10% open space)

Existing trees on plot	776
Number of trees to be cut/ Transplant	326
Retained	119
Number of trees to be planted Required	675 Nos.
Proposed	556 Nos

6.2	Submit the present land use and permission required for any conversion such as forest, agriculture etc.	The Project site falls within the jurisdiction of Pune Municipal Corporation (PMC).
7	**Water Environment**	
7.1	Ground water classification as per the Central Ground Water Authority.	Fresh water requirement is from PMC, permission for the same is received. Project proponent is not using ground water hence CGWA NOC is Not applicable for the project.
8	**Water Management**	
8.1	Examine the details of Source of water, water requirement, use of treated waste water and prepare a water balance chart	During Operational, phase water will be sourced from PMC. Fresh water requirement will be 1113 m3/day. Permission from PMC is obtained. Treated water will be reused for flushing (840 m3/day), landscaping (90 m3/day) and for HVAC (745 m3/day) in the premises. Water NOC is attached as Annexure 8.
8.2	Rainwater harvesting proposals should be made with due safeguards for ground water quality.	Rainwater Harvesting studies is carried out. 32 nos. of Recharge pits are proposed for the project. Runoff calculations along with RWH and Drainage Layout is attached.
8.3	Maximize recycling of water and utilization of rainwater. Examine details.	During Operational, phase water will be sourced from PMC. Total water requirement for the project will be **2933** m3/day, out of which Fresh water requirement will be 1113 m3/day. Fresh Water Permission from PMC is obtained. Wastewater generated from the project will be 1763 m3/day, which will be treated in STP of capacities 1940 KLD. Use of treated wastewater - Treated water will be reused for flushing (840 m3/day), landscaping (90 m3/day) and for HVAC (890 m3/day) in the premises. Sewer line NOC is is in process.
8.4	Examine soil characteristics and depth of ground water table for rainwater harvesting.	Geohydrology report is carried out for the project, also monitoring from MoEF&CC laboratory is carried out for the soil sample. Report for the same is attached in chapter 3.
8.5	Permission from CGWA for abstraction of groundwater, if any, including dewatering during basement excavation.	Permission from CGWA is not applicable, as fresh water requirement is from PMC. Permission for the same is also received, Basement dewatering plan showing sump location is shown in chapter 2.
9	**Waste Management**	
9.1	Examine details of solid waste generation treatment and its disposal.	**Construction phase** - Construction waste will be handed over to authorized vendor. Hazardous waste like adhesives, paint, varnish, solvents etc. will be handed over to authorized vendor.

		Operation phase - The total solid waste generation will be 8911 kg/day; out of which dry waste is 6238 kg/day and wet waste is 2673 kg/day. OWC Machines of garbage handling capacity is proposed to process the organic solid waste generated by the project users.
9.2	Construction & Demolition Waste Management Plan shall be prepared as part of EMP providing details of demolition activities involved along with quantification and disposal mechanism	Construction waste and Demolition waste management plan is mentioned in Environmental management plan.
10	**Energy Requirements**	
10.1	A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project	For Operation phase, power supply will be met from MSEDCL. Connected Load: 45442 Kw Demand Load: 18254 KW
10.2	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.	We have proposed to provide solar panels. Details on renewable energy are included in chapter 2 & also enclosed as Annexure 6 – ECBC Report
10.3.	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	Construction Phase- 500 KW (approx.) Operational Phase – DG Set details - 2000 x 18 KVA Regular monitoring will be conducted to detect the emission levels. Air modelling study conducted to estimate the impacts and predict the mitigation measures due to DG Set. Refer Annexure 3 Air Modelling report.
11	**Road and Traffic**	
11.1	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 analysed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.	Traffic Impact assessment Report is attached as **Annexure 4.**
11.2	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic	Traffic Impact assessment Report is attached as **Annexure 4.**
11.3	Examine the details of transport of materials for construction which should include source and availability	Construction materials such as Concrete, blocks, steel, glass, tiles etc. will be obtained from existing local vendors. Mode of transportation - by road
12	**Disaster Management Plan**	

12.1	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster. This should cover details of vulnerabilities due to natural and manmade hazards (earthquake, flooding, cyclone, landslides, fire etc.) and details of disaster mitigation efforts for buildings and infrastructure through structural sufficiency and Fire and Life Safety compliance in line with National Building Code NBC, 2016	PP has proposed 6.0 m, 8.0 m & 9.0 m internal roads and 9 m turning radius for movement of fire tender and Refuge areas as per the fire norms are proposed. Fire hydrant system has been proposed in case of fire accident. Disaster Management Plan w.r.t various disasters such as flood, cyclone, earthquake considering their risks has been included in chapter 7
13	**Court Cases**	
13.1	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	Not Applicable.
14	**Miscellaneous**	
14.1	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigated measure, project proponent can refer to the model ToR available on Ministry website "http://moef.nic.in/Manual/Townships".	EIA Report is prepared by referring to the model ToR available on Ministry website **"http://moef.nic.in/Manual/Townships".**

1.4.2 Any Litigation Pending:

No court case or directions by any court of law/ any statutory authority against the project is pending.

CHAPTER 2: PROJECT DESCRIPTION

2.1 Type of project

This is a Greenfield project Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036, Maharashtra.

As per EIA notification, 2006 & its subsequent amendments till date, the proposed project activity by **M/s. Bajaj Finserv Ventures Limited & Others** comes under Schedule 8(b) as Township and Area development project.

2.2 Need for the project

As project is a Commercial Development Project. The project is new project, project proponent is planned to develop the project by considering the Environmental aspects like Green belt development, Provision of STPs, OWCs, provision of RWH and SWD etc.

1) The proposed project will contribute to the creation of Commercial spaces, as offices are available on lease.
2) Physical infrastructure includes the development of roads, availability of technological facilities for the operation of commercial project.
3) With the establishment of the proposed project, there will be substantial improvement in the overall economy of the local people in the form of additional income through employment.
4) Growth in direct & indirect jobs and business opportunities to the local and surrounding people such as daily wage laborers, transporters, and raw material suppliers due to the development in the area.
5) Due to Proposed project employment and other infrastructural facilities will improve which will indirectly boost the urban quality of life in the immediate vicinity.
6) This project will increase the economic activities around the area, creating avenues for direct/ indirect employment during construction and operation phase of the project.
7) Due to this project, development adaptation of new technologies and other infrastructural facilities will improve which will indirectly boost the civilization of the surrounding people.
8) The proposed project offer opportunity to transform the currently semi developed region into commercially developed area.
9) Proposed project will further increase the above amenities directly/indirectly either by providing or by improving the existing facilities in the area, which will help in uplifting the living standards of local communities. The project is in Mundhwa Pune coming under PMC jurisdiction.

2.3 Location (maps showing general location, specific location, project boundary & project site layout, longitude and latitude), site surroundings

2.3.1 Detailed Project location/ Address

The proposed project would be located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra.

The 10 km radius area lies within latitudes of 18°26'49.636"N to 18°37'36.879"N and longitudes of 73°49'13.491"E to 74°0'38.393"E.

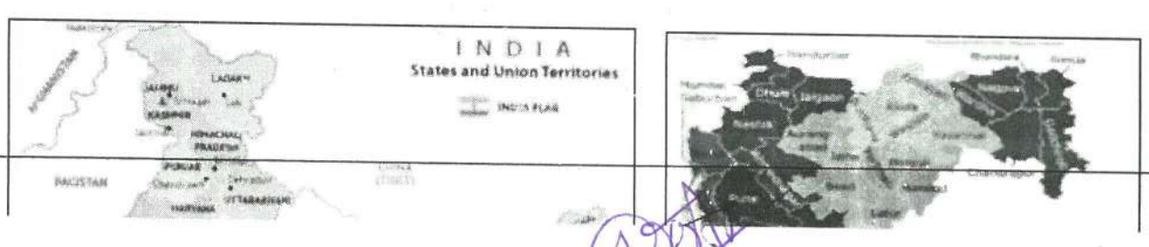


Figure 2.1 Geographical Location of the Project Site

2.3.2 Co-ordinates of Project Boundary

Table 2.1: Geographical Co-ordinates of project site corners

Sr. No.	Latitude	Longitude
A	18°32'19.58"N	73°54'54.09"E
B	18°32'18.45"N	73°54'59.65"E
C	18°31'59.95"N	73°54'56.87"E
D	18°32'2.37"N	73°54'52.35"E

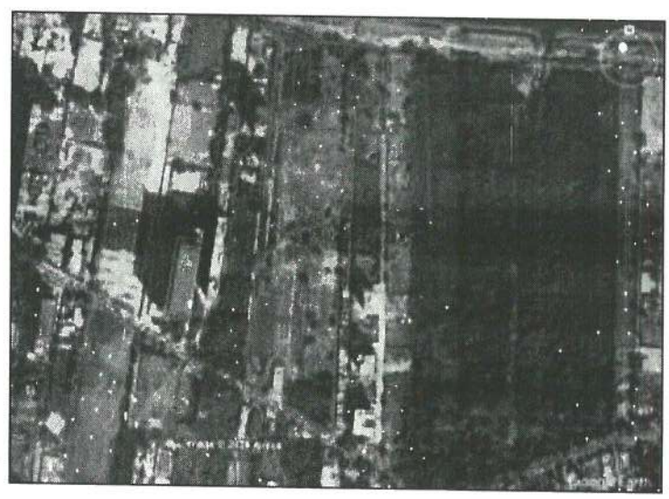


Figure 2.2 Google Image showing Project Boundary Coordinates

2.3.3 Development Plan

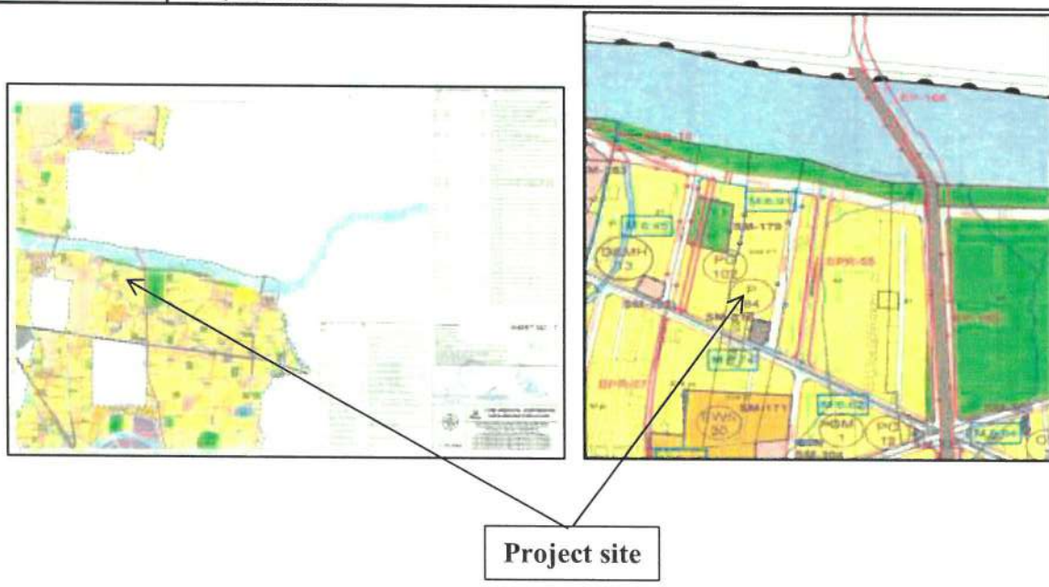


Figure 2.3 Development Plan

2.3.4 Environmental sensitive places within 15 km radial area from project site

Table 2.2 Environmental Sensitivity

S No	Area	Name / Identity	Aerial Distance (within 15 km of the project site)
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	Not Present	Not Present
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Mula Mutha River	0.06 Km
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	Not Present	Not Present
4	Inland, coastal, marine or underground waters	Not Present	Not Present
5	State, National boundaries	Not Present	Not Present
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	The project site does not directly come on any important routes or in immediate vicinity of facilities that are used by tourists for recreational and pilgrimage purposes. The transport infrastructure for the city of Pune is as follows:	
		Pune International Airport	4.64 km
		Pune Railway Stations	4.40 km
		Dhole Patil Farm Bus Stand	0.01 km

7	Defense installations	Pune Cantonment Board	4.60 km
8	Densely populated or built-up area	The project is a part of the Pune city and located within its jurisdiction. The core city of Pune is about 6.44 km from the project site.	
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	The project site is in an urban area and thus there are numerous educational and healthcare facilities located in its immediate vicinity. Being commercial/ IT/ITes project, the project will not have any major impact on sensitive locations such as hospitals, schools, and religious places. The details of some of these establishments is as follows:	
		Educational Facilities	
		Prehab 121 Academy	1.15 km
		Tech mahindra smart academy	0.96 km
		Lighthouse Skilling Centre - Tingre Nagar - Educational institution	5.45 km
		Eklavya Academy | 11th & 12th science | JEE, NEET, MHTCET	2.78 km
		Robokidz Eduventures Pvt Ltd - Educational institution	0.68 km
		Healthcare Facilities	
		Manuski Health Care Centre	0.65 km
		Phenixcare - Home Healthcare Services| Nursing Bureau | Elder Care Services in Pune | Patient Care Taker Services in Pune	2.75 km
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	Not Present	Not Present
11	Areas already subjected to pollution or environmental damage. (Those where existing legal environmental standards are exceeded)	Not Present	Not Present

12	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	Not Present	▪ The project site lies in Earthquake Zone III. Thus there is a moderate to low risk of earthquake. ▪ All relevant design parameters as per zone III have been considered for RCC design of the buildings. ▪ As per the Vulnerability Index Map of India, the project site does not fall in any other zones with a high risk of natural disaster.

2.3.5 Area Statement of the Project Site

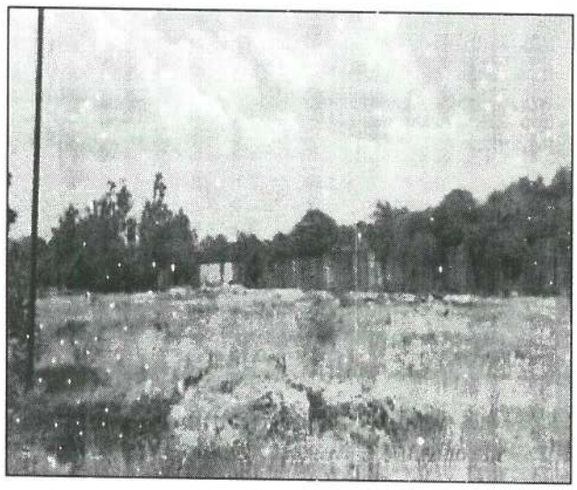
Sr. No.	Particulars	Area in SqM
1.	Plot area	70630.81
	a] Ass per ownership document[7/12, CTS Extract]	73393.00
	B] As per measurement sheet	75910.99
	C] Minimum area considered	70631.81
2.	Deduction for:	
	A] Area under 30.00 .M.W. Road widening [North Main]	2724.31
	B] Area under 30.00 .D.P. Road [River front]	4445.18
	C] Area under 9.00 M.W. road widening [Riverdale]	746.33
	D] Area under green belt Area	5789.54
	Total [A+B+C+D]	13705.36
3.	Balance Area of Plot [1-2]	56926.45
4.	Amenity Space 1	1544.09
	A] Required upto 20000 Nil, more than than 20000= 5%	0.00
	B] Adjustment of 2[B], if any	-
	C] Proposed	2898.70
5.	Net plot area [3-4[C]]	54027.75
6.	Recreational open space	
	A] Required -	5692.65
	B] Proposed	5797.39
7.	Internal Road area	-
8.	Plot able Area	54027.75
9.	Built up area with reference to basic FSI as per front road	59430.53
10	Addition of FSI-	
	A] Max. Permissible premium FSI	172348.52

	B] Proposed FSI on payment of premium	172348.52
12.	Total Entitlement of FSI in the proposal	231779.05
13.	A] Ancillary area FSI upto 80% with payment of charges	185423.24
	B] Total Entitlement	417202.29
14.	Total built up area-	
	A] Proposed built up area	347700.51
15.	**a. Proposed FSI area**	**347700.51**
	b. Proposed Non FSI area	**266686.68**
	Total BUA (FSI+Non-FSI)	**614387.19**

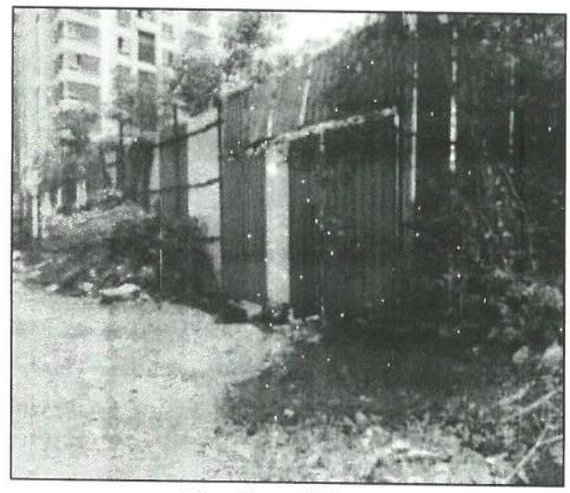
Parking Statement

Tower	Parking Required	Carpet Area	Required		Provided	
			Car	Scooter	Car	Scooter
Tower 1	Office and IT Building Every 200 Sq Mt (3-11)	79075.99 m	1186	4349	1654	4950
Tower 2	Office and IT Building Every 200 Sq Mt (3-11)	79027.21 m	1185	4346	1653	4947
Tower 3	Office and IT Building Every 200 Sq Mt (3-11)	78328.19 m	1175	4308	1644	4910
Total			**3546**	**13004**	**4951**	**14808**
	Area Required per nos		12.50	2.00	12.50	2.00
	Parking Area		44331 m	26007 m	61893 m	29615 m

2.3.6 Site Photographs



Plot North Side



Plot East Side

Figure 2.4: Site photograph (source-actual photos)

2.4 Size or magnitude of operation

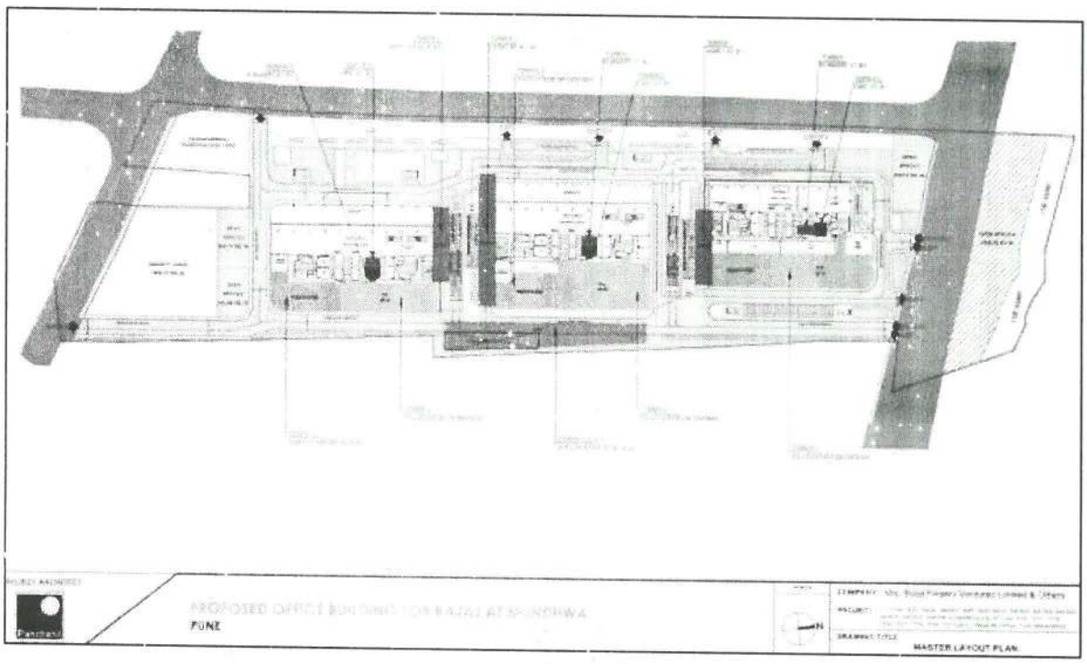


Figure 2.5: Project Layout

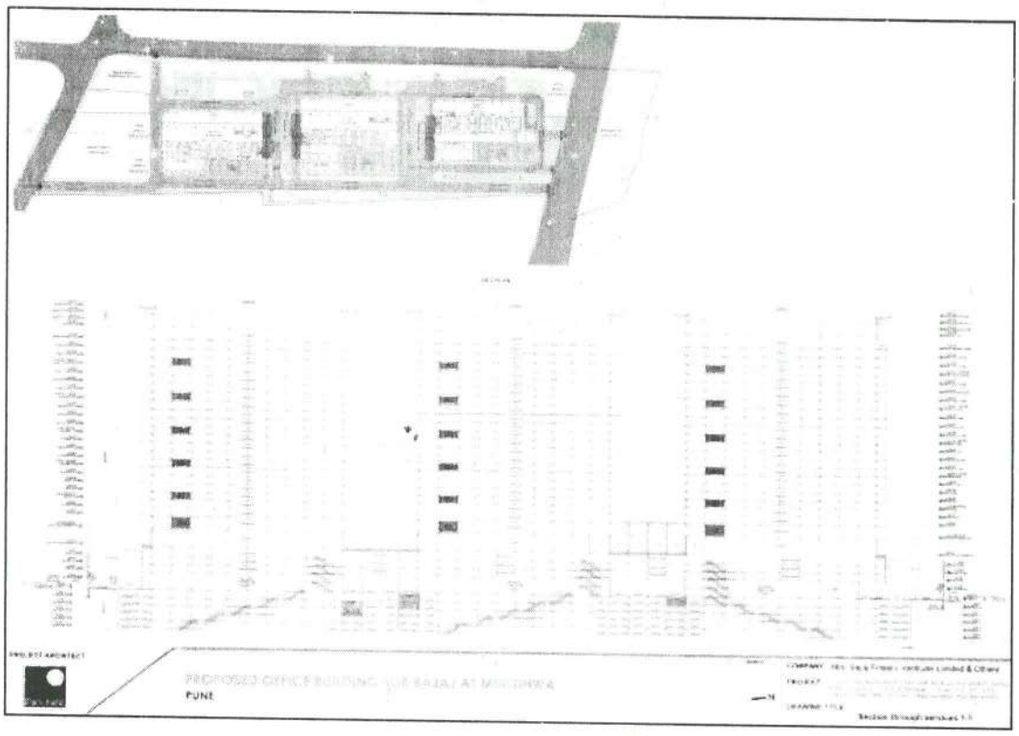


Figure 2.6: Building Section Plan

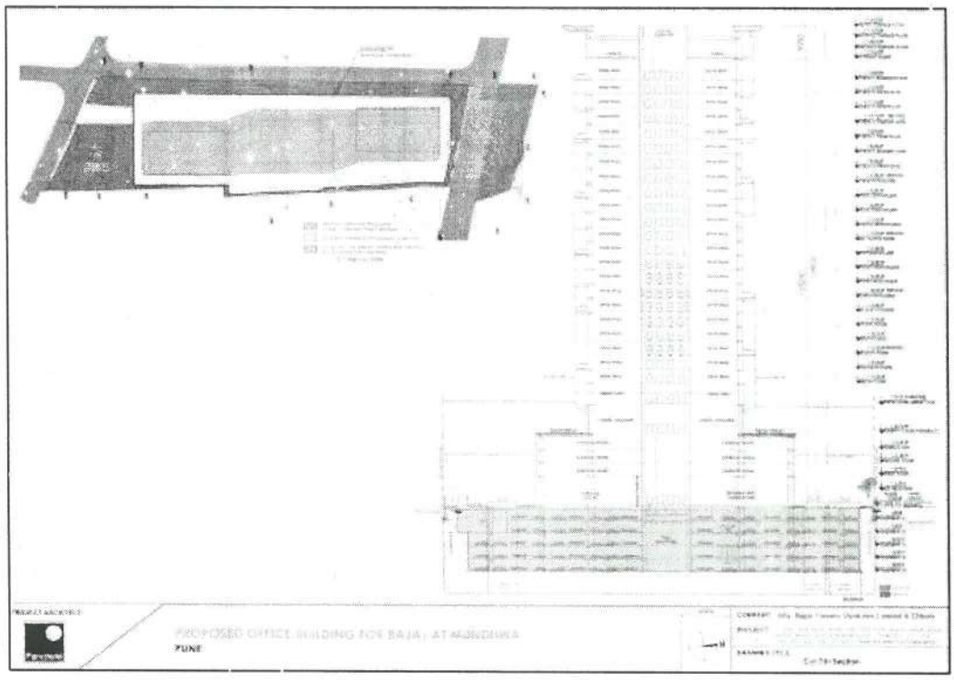


Figure 2.7. Cut and Fill Section of the Site

The contour of the project site is 550.19 m to 542.02 m in nature. The difference is 8.17m. Drainage pattern will not change due to proposed project.

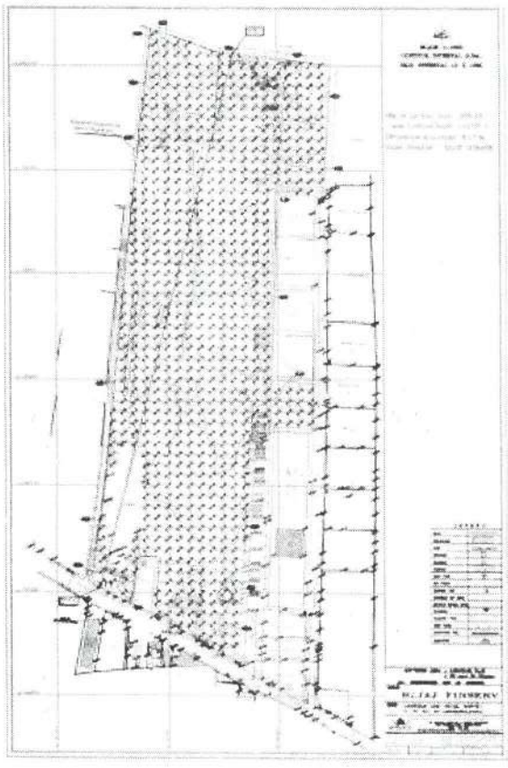


Figure 2.8: Contour plan

2.4.1 Topography of 10 Km

A map showing in below image i.e. water bodies such as rivers, dams, canals, tributaries, and ponds railway tracks, roads.

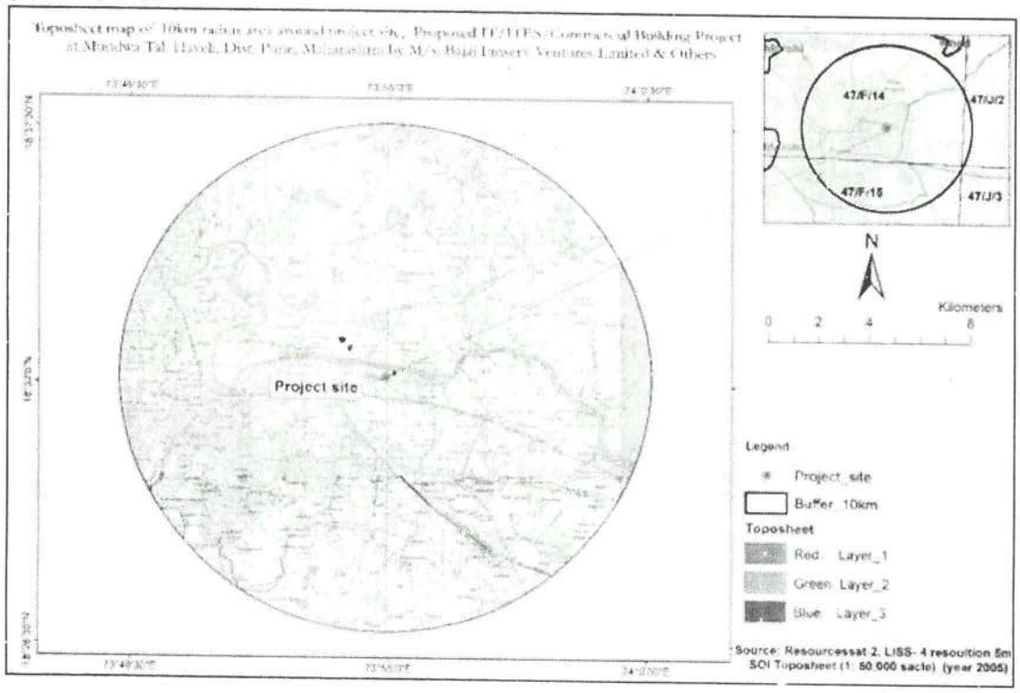


Figure 2.9: Toposheet of 10 Km

Table 2.3: Proposed Configuration

Building Name	Configuration	Height (m)
Tower 1	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2 nd floor Parking + 3 rd floor parking + 4th and 5th floor (comprising of food and training rooms) + 22 office floors.	125.25
Tower 2	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2 nd floor Parking + 3 rd floor parking + 4th and 5th floor (comprising of food and training rooms) + 22 office floors.	125.25
Tower 3	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2 nd floor Parking + 3 rd floor parking + 4th and 5th floor (comprising of food and training rooms) + 22 office floors.	125.25
1 Visitor Centre	Ground Floor	8.40

2.5 Proposed Schedule for Approval and Implementation

The total project cost including land and machinery is estimated to be Rs. 3306.63 Cr. The tentative timeline of getting Environmental Clearance of this project and subsequent activities is mentioned in

following table- As the total built-up area of the proposed Commercial Project is more than 1,50,000 SqM; as per the EIA Notification dated 14th September 2006 and its subsequent amendments thereof, the proposed project activity may fall under Category – B1, 8(b) – Township and area development project', which necessities to obtain Environmental Clearance from SEIAA Maharashtra.

Table 2.4: Schedule for Approval and Implementation

No.	Description	Time Period
1	Obtaining all statutory permission with respect to project	3 Months
2	Design and Engineering Plan	3 Months
3	Construction completion	12 Months

2.5.1 Status of Land Allocation

The proposed project will be located at at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra
IOD for the BUA 614387.19 m2 sq.mt. is in process from Pune Municipal Corporation

2.6 Technology and Process description

2.6.1 Water Requirement

The total water requirement of the project during operation phase is 2933 KLD, out of which, the freshwater requirement of 1113 KLD will be sourced from PMC and the recycled water which will be sourced from treated water in STP. Total recycled water will be 1675 KLD out of which 840 KLD will be used for Flushing, 90 KLD will be used for Gardening and 745 KLD will be used for HVAC. 145 KLD additional water for HVAC will be met from Tanker. The total water requirement during operation phase is shown in table 2.4 below.

Table 2.5: Water Requirement

Description	Dry Season m3/day	Wet Season m3/day
Domestic Water Requirement	1113	1113
Flushing Water Requirement	840	840
Gardening Requirement	90	30
HVAC	890	890
Total Water Requirement	2933	2873
Waste Water Generation	1763	1763

Treated Sewage	1675	1675
Flushing Water Requirement	840	840
Gardening Requirement	90	30
HVAC (Requried 890)	745	805
Total Utilized	1675	1675
Zero Discharge to Muncipal Sewer Line	0	0
HVAC Make Up water shortfall will be met from water tanker	145	85

Water meters will be provided to measure the Domestic water consumption, raw sewage inlet to the STP, STP outlet i.e. treated water for recycling and reuse.

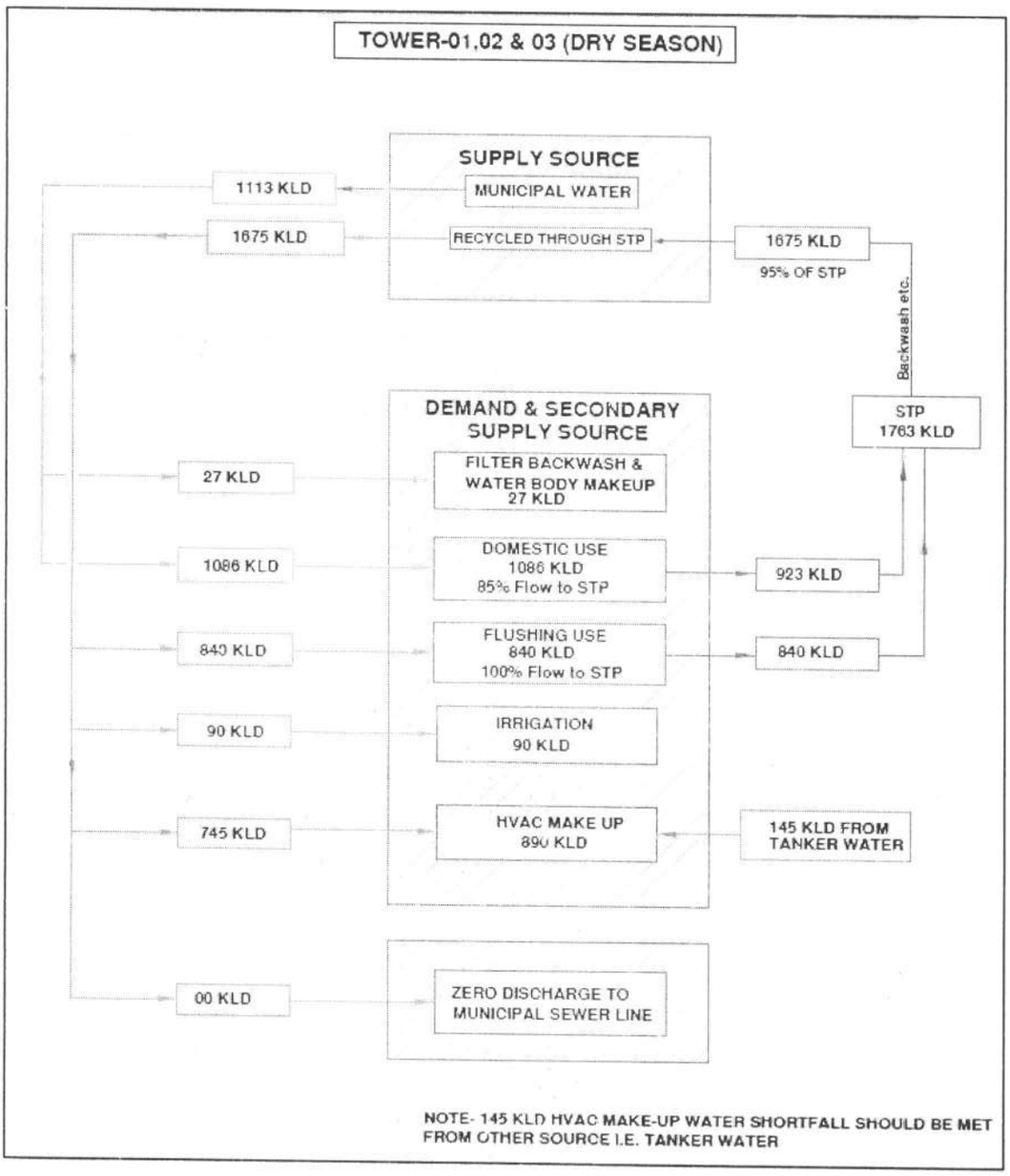


Figure 2.10: Water Balance Diagram – During Dry Season

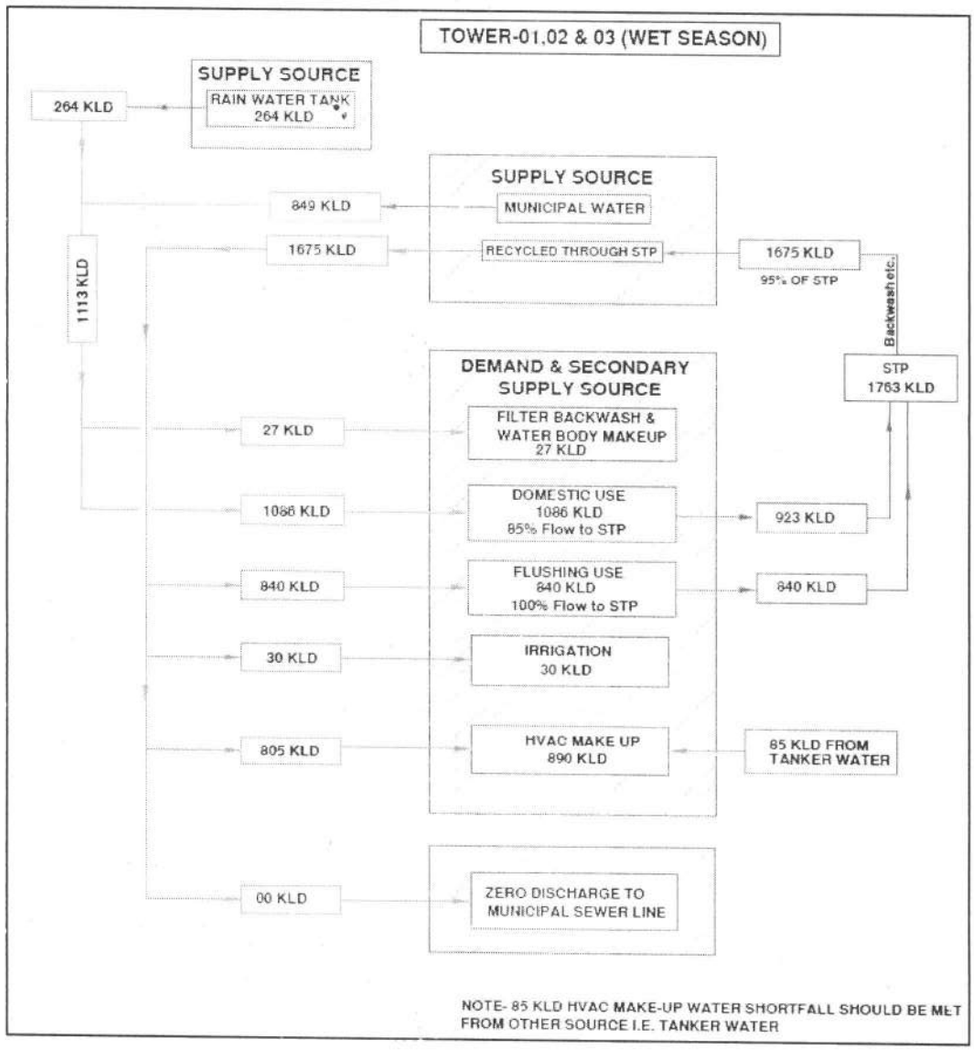


Figure 2.11: Water Balance Diagram – During Wet Season

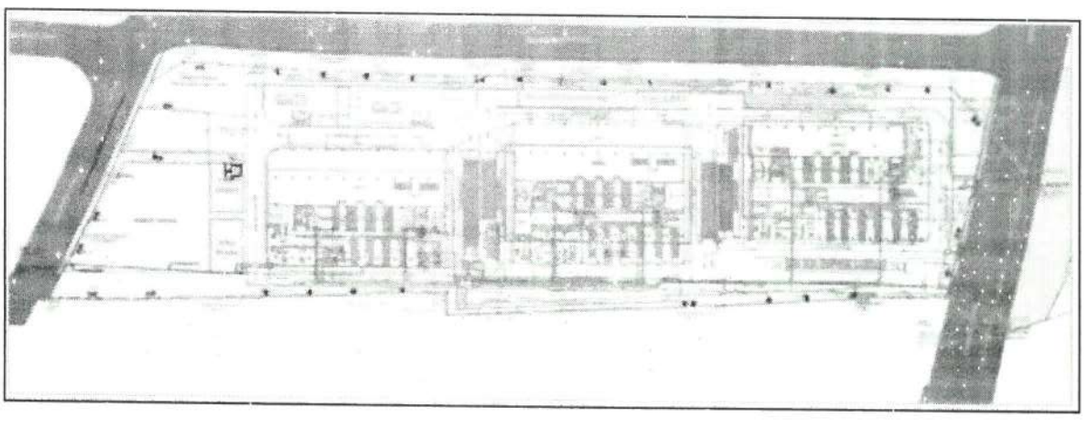


Figure 2.12: Water Supply Layout

2.6.2 Wastewater generation

Total quantity of wastewater generated from this project during operation phase is 1763 KLD. It is proposed to treat the sewage water in STP of Total Capacity 1940 KLD. The treated wastewater is used for Flushing and remaining will be sent to green belt development in project Area. The water balance details are shown in table 2.5 below.

Table 2.6 Sewage Generation

No.	Description	Quantity of Sewage generated (m3/day)	Treatment/ Disposal
1	Construction Phase	25	Mobile toilets will be provided
2	Operation Phase	1763	Total recycled water will be 1675 KLD out of which 840 KLD will be used for Flushing, 90 KLD will be used for Gardening and 745 KLD will be used for HVAC. 145 KLD additional water for HVAC will be met from Tanker.

The generated sewage will be collected by gravity through pipe network to STP and thereafter will be transferred till final disposal line.

Sewage treatment process

The sewage will be first passed through a **Bar Screen Chamber & an Oil & Grease Trap** where any extraneous / floating matter would get trapped.

The sewage would then be collected in **Equalization Tank** where the variations in flow and Characteristics are dampened, which otherwise can lead to operational problems and moreover it allows a constant flow rate downstream. Here the sewage is kept in mixed Condition by means of coarse air bubble diffusion

The equalized sewage will then be pumped to the Anoxic tank where denitrification shall occur. Then sewage shall be sent to Bioreactor tank by gravity, where BOD/COD reduction is achieved by virtue of aerobic microbial activities. The oxygen required will be supplied through coarse air bubble grid and the excess bio-solids formed in the biological process will be separated in the downstream **MBBR Membrane Tank.**

Treated Sewage is pumped through membranes are collected in STP Treated Water Tank for disinfection. Treated sewage shall be used for flushing purpose. From here, the treated sewage will be pumped into Softner to reduce the hardness for HVAC purpose.

The biological sludge generated from the Bioreactor and Membrane tank, will be collected in a sludge holding tank from here it will be pumped to Batch type centrifuge for dewatering of sludge.

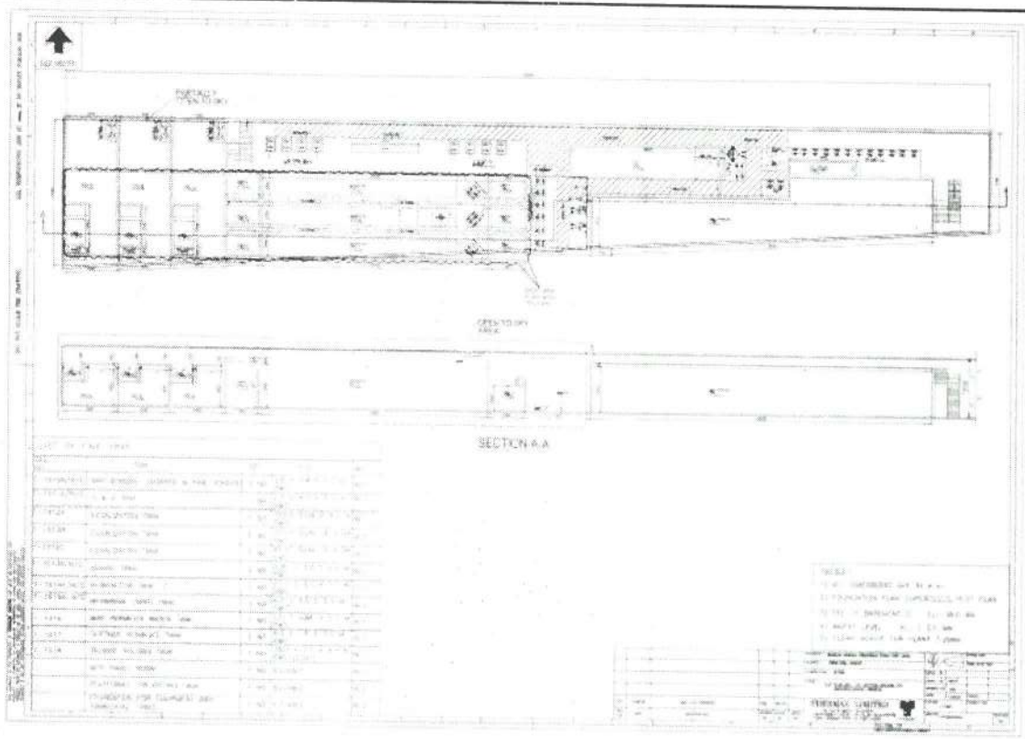


Figure 2.13: STP Section A-A

Table 2.7: STP Parameters

Sr. No.	Parameters	At the Inlet Of STP	At the Outlet Of STP
1.	PH	6 to 8.5	6.5 to 7.5
2.	COD, mg/l	800 + 80 = 880 mg / liter with 10 % Extra Organic Shock Load	< 30 mg / liter
3.	BOD	400 + 40 = 440 mg / liter with 10 % Extra Organic Shock Load	<5 mg / liter
4.	Total Suspended solids, mg/l	450 + 45 = 495 mg /liter with 10 % Extra Organic Shock Load	< 10 mg / liter
5.	Oil & grease, mg/l	90 + 10 = 100 mg/ liter (Max) with 10 % Extra Organic Shock Load	BDL (Below Detectable Limit)

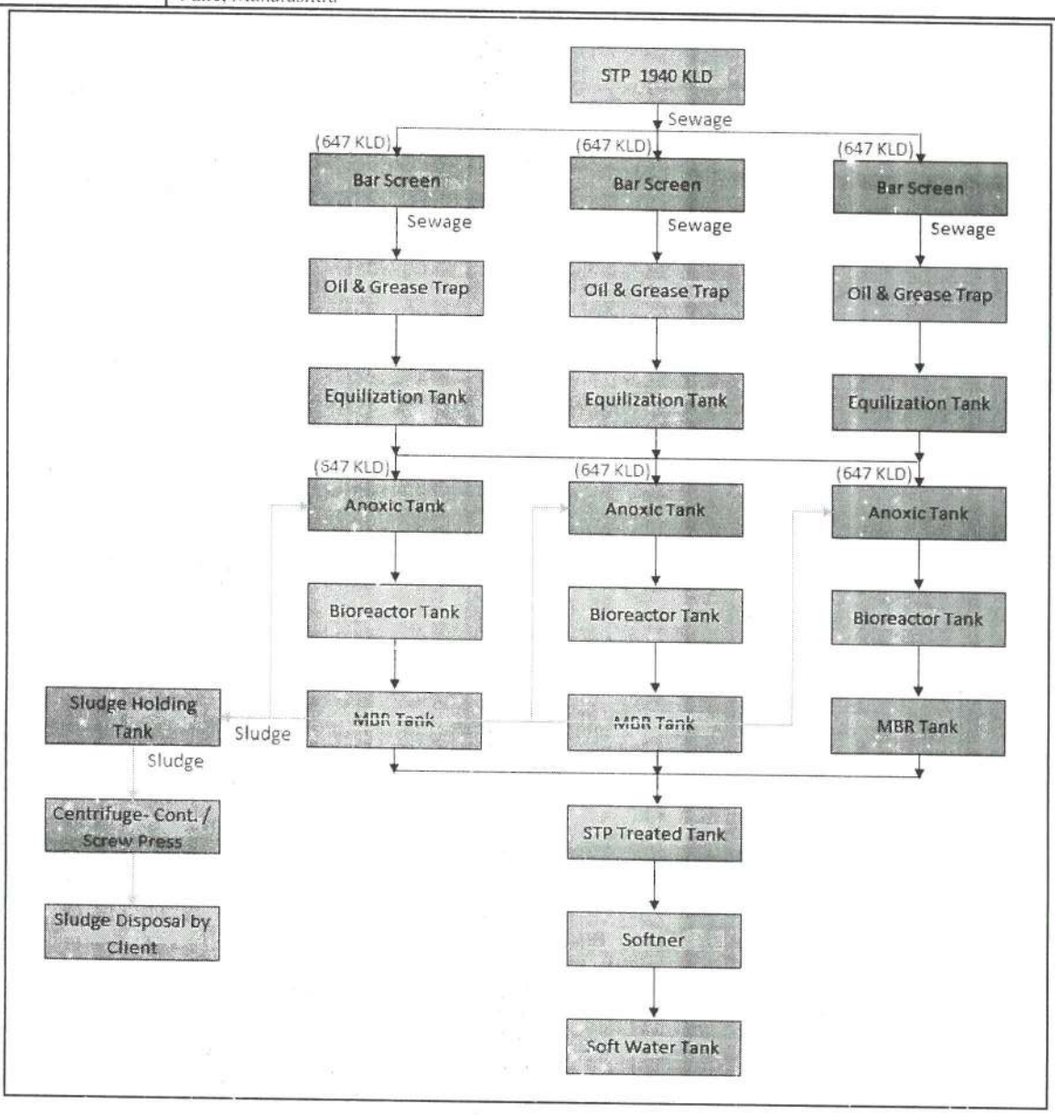


Figure 2.14: STP Schematic Flow Chart

2.6.3 Sewage Disposal Facilities

Fresh water requirement will be met by Pune municipal Corporation and rest water requirement. i.e. Flushing and Landscaping water available through the water treated by proposed STP.

2.6.4 Solid and Hazardous waste details

Solid waste will be generated from both the construction and operation phases of the project. To manage this waste, the following measure will be taken:

- Construction yards will be designated for the storage of construction materials within the site.
- Excavated materials such as topsoil and stones will be stacked for reuse during later stages of construction.
- Topsoil will be stored in a temporary soil bank and reused for landscape development.
- Remaining soil will be utilized for refilling, road work, or raising the site level at designated locations.

2.6.5 Waste management during operation

During the operation phase of the project, solid waste will be generated from commercial sectors. This waste will be managed in accordance with the following steps:

- Waste segregation: Waste will be segregated into different categories, such as Biodegradable (Wet waste) and non- biodegradable (Dry waste).
- Dry waste: Will be handed over to authorized recycler.
- Wet waste: Will be treated in OWC
- E-Waste: Will be handed over to authorized recycler
- STP Sludge (dry): Will be used as manure for gardening purpose.

Table 2.8: Quantity of Solid/Hazardous Waste and Disposal Details

Solid Waste Management during Construction Phase	Type	Quantity (kg/d)	Treatment / disposal
	Dry waste:	53 kg/day	280219 m3 construction waste will be used within the site for backfilling, gardening and the remaining qty. 427703 m3 will be used or another plot.
	Wet waste:	23 kg/day	
	Construction waste	707922 M3	
Solid Waste Management during Operation Phase	Type	Quantity (kg/d)	Treatment / disposal
	Dry waste:	6238 kg/day	Handed over to authorized recycler for further handling & disposal purpose.
	Wet waste:	2673 kg/day	Wet waste will be treated in onsite organic waste converter machine.
	Hazardous waste:	NA	NA
	Biomedical waste	NA	NA
	E-Waste	10745 kg/ A	Handed over to authorized recyclers for further handling & disposal purpose.
	STP Sludge (dry)	1146.2 kg/day	Will be used as manure (Landscape)

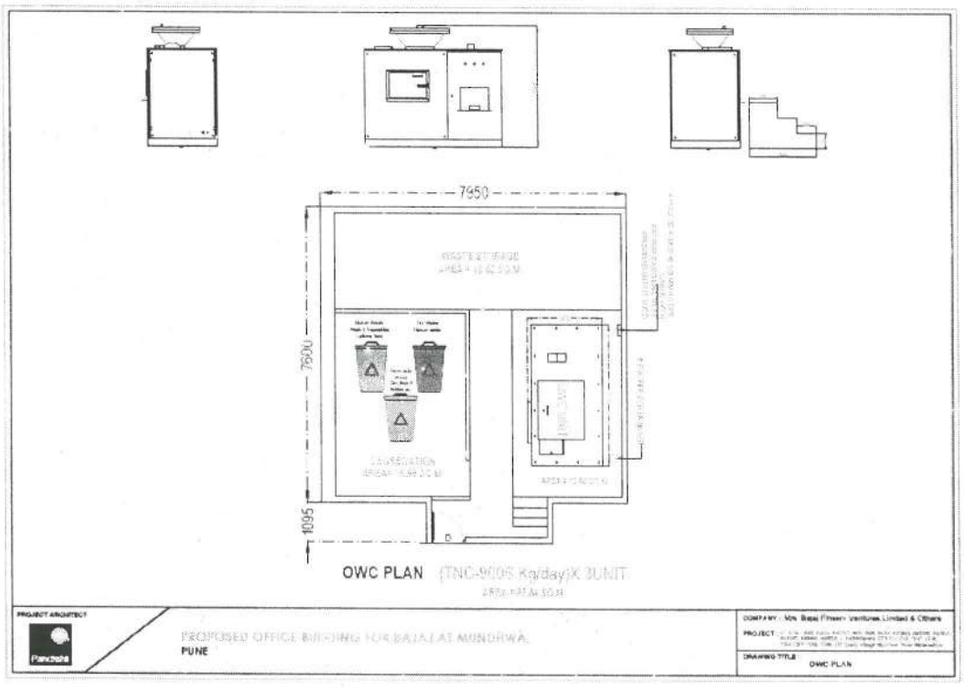


Figure 2.15: OWC Layout

2.6.6 Energy Requirement

During Construction Phase

- Total Demanded Load During Construction = 500 KW.
  MSEDCL Construction Meter – 50/5A C.T. Operated Meter.
- DG Set Required During Construction = 500 KVA
- Source of Power Supply - MSEDCL. (Maharashtra State of Electricity Distribution Company Ltd.)

During Operation Phase

Table 2.9: Power Requirement

S. no.	Details	Load
1	Connected Load	45442 Kw
2	Maximum Demand	18254 KW
3	D.G. Set	2000 x 18 KVA
4	Transformer	2000 x 18 KVA

Energy saving by non-conventional method:

- Auto Timer control for external & Common lighting
- Use of CFL / LED lamps in all public/ common areas.
- Electronic V3F Drives for Elevators
- Solar PV Panel power for common area lighting.

Table 2.10: Energy Saving Table

	Total Capex & Saving Summary		
Sr	Energy saving measures	Differential Capex for Energy Savings In lakhs (INR)	Total Savings in MWh
1	Use of LED lights for Internal & External Lighting	87	1435.5
2	Use of Occupancy/Day Light Sensors for internal lighting & timers for External lighting	70	4593.6
3	Use of Solar Street Lights	57	23.1
4	Solar PV Cells with installed capacity of 475 KW	0	0.0
	Overall Savings in Energy	214	6052

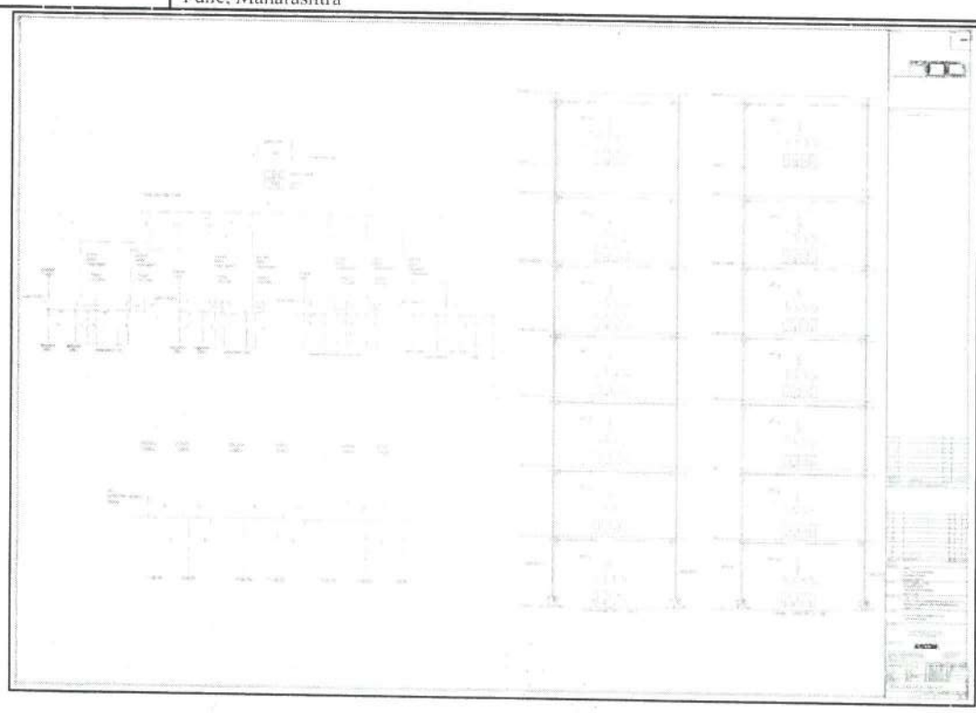


Figure 2.16: Electrical Schematic Layout

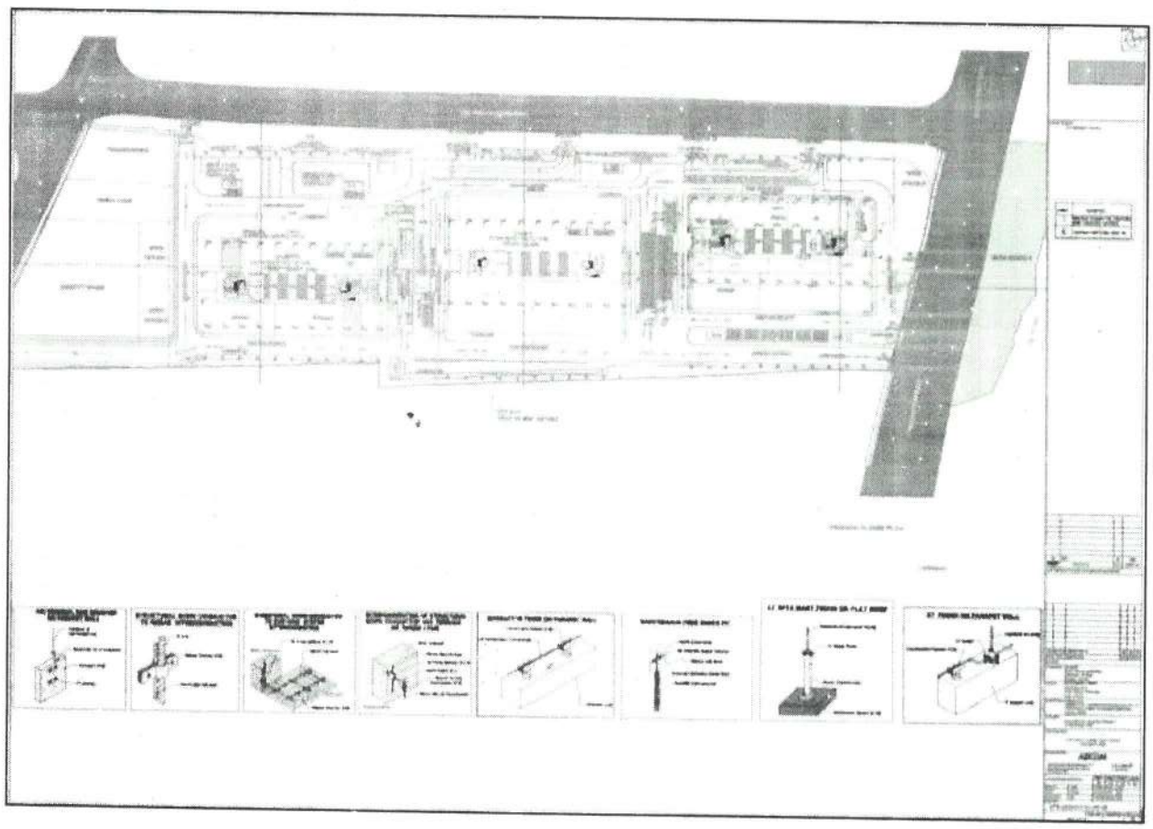


Figure 2.17: Lighting Arrester

2.6.7 Rain Water Harvesting

Rainwater from the roof shall be conveyed till the upper basement ceiling. All the rain water pipes shall then be connected to the external drainage network comprising of pipe & chambers. Surface runoff of storm water on the areas around the building is also collected in the same network. This building storm water drainage network shall be connected to the external storm drain at appropriate location in view of invert & high flood level.

Rain water harvesting is planned along the path of Site storm water drain.

- Rooftop Rain Water Harvesting is the technique through which rain water is captured from the roof catchments.
- Usually the storm water that initially runs off an area will be more unclean than the storm water that runs off later, after the rainfall has 'cleansed' the catchment. The storm water containing this high initial load is called the 'first flush'.
- This unclean first flush should be discharged into main storm water drain.
- The excess or Overflow water shall be discharged to the external storm water drain through gravity.

Table 2.11: Estimate of Rainwater Harvesting

Level of the Ground water table:	20.0 Mtr. to 22.0 Mtr. BGL 18.0 Mtr. to 20.0 Mtr. BGL
Size and no of RWH tank(s) and Quantity	NA
Quantity and size of recharge pits:	32 no. of recharge pits of size 1.5 m x 1.5 m x 4.0 m
Details of UGT tanks if any:	NA
Rainfall Runoff potential before development	12,590.20 Cum/year
Rainfall Runoff potential after development	31,560.79 Cum/year
Total increased in runoff after construction	18,970.59 Cum/year

Rain water from the roof tops shall be carried up to storm water network outside the building. This rain water is proposed to be conveyed through storm water drainage network comprising of pipes & collection chambers and/or drain channel. Surface runoff of storm water on the areas around the building is also collected in the same network. Overflow is ultimately connected to the municipal storm water network at an appropriate level.

In our case with above scenario, it is proposed to provide on-line recharge pits along with the storm water network with duly study on report by hydro-geological consultant/ rain water harvesting consultant to decide on location, size & numbers.

One number of recharge pond & 32 nos. of Recharge pits are considered to Harvest and Recharge the Rainwater.

2.6.8 Green Belt Development

It is suggested that this area should be well utilized by planting dwarf trees and shrubs. This will not only serve beautiful purpose but also functional being physical barrier for the shine of head lights of the vehicles which is essential for effective and safe operation of the roads during dark hours. Planting may be done either in single or double row depending upon the space available. Since these plants are closer to the automobile exhaust, their capacity for pollution tolerance should be considered before selection.

Total green area (10%) proposed to is 5795.39 Sq.m, Existing trees on plot 776 Nos, 556 Nos. of trees proposed. 326 nos of trees will be cut and 119 trees retained.

Selection of the plant species will be based on their adaptability to the existing geographical conditions and the vegetation composition of the forest type of the region. During the development of the green belt within the project area, it has to be emphasized that those native plant species should be planted

which are having good ornamental values and fast growing with excellent canopy cover.

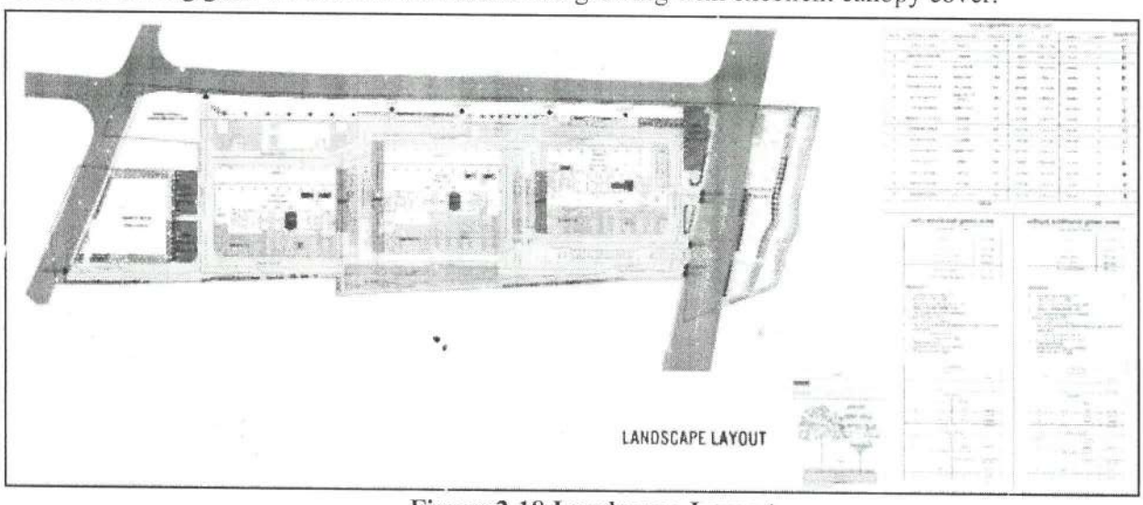


Figure 2.18 Landscape Layout

2.6.9 Parking Details

Internal circulation pattern will be set to ensure that it does not cause any congestion within the complex. Total parking provided for Cars – 4951 Nos., Scooters – 14808 Nos.

Table 2.12: Parking Statement

Tower	Parking Requried	Required		Provided	
		Car	Scooter	Car	Scooter
Tower 1	Office and IT Building Every 200 Sq Mt (3-11)	1186	4349	1654	4950
Tower 2	Office and IT Building Every 200 Sq Mt (3-11)	1185	4346	1653	4947
Tower 3	Office and IT Building Every 200 Sq Mt (3-11)	1175	4308	1644	4910
	No. of Car and Scooter	**3546**	**13004**	**4951**	**14808**
	EV parking Provided	**30 % EV charging provided – 1486 Nos.**			
	Area Required per nos	12.50	2.00	12.50	2.00
	Parking Area	**44331**	**26007**	**61893**	**29615**
	Total Provided Parking Area			**91509 Sq.m.**	

Parking plans as below

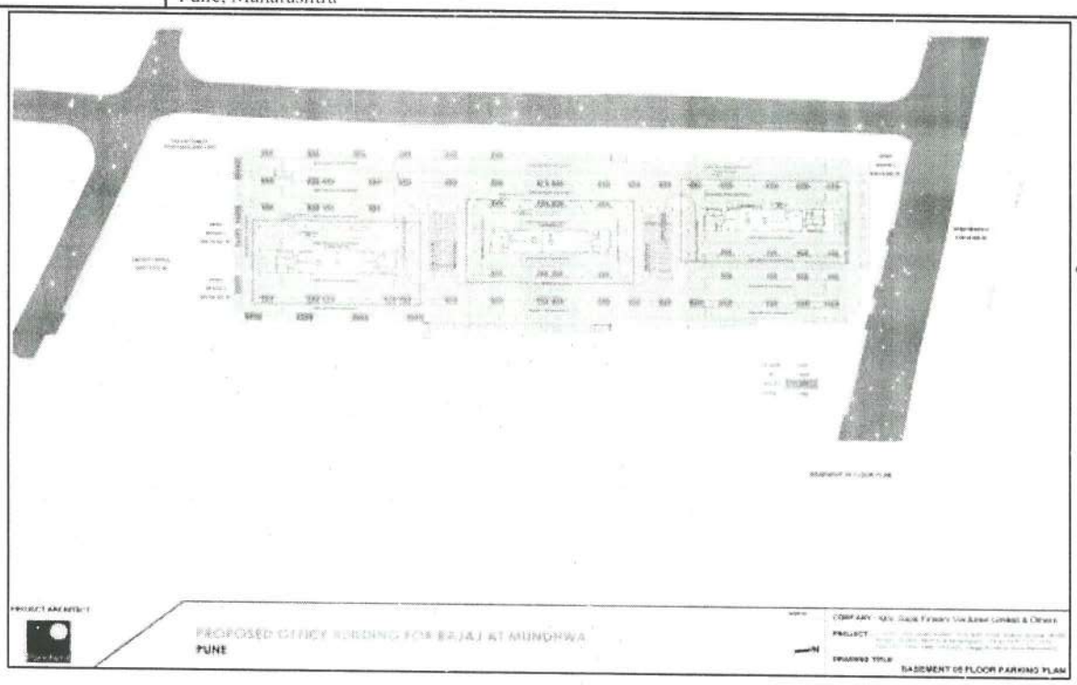


Figure 2.19: Parking Plan (Basement 5 Level)

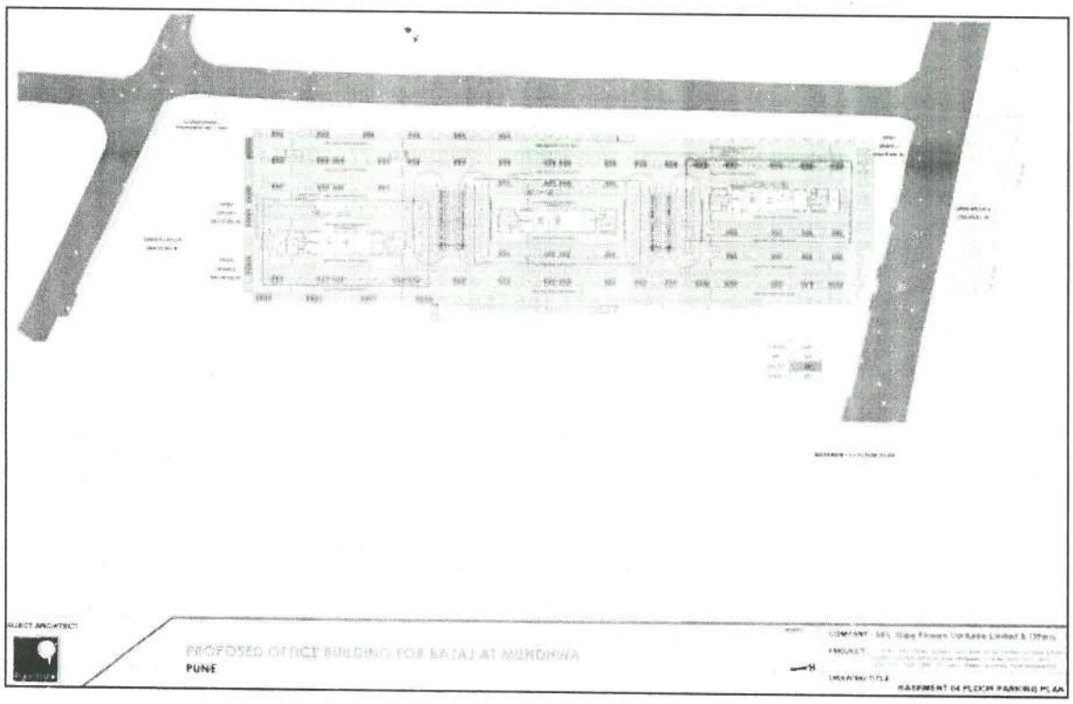


Figure 2.20: Parking Plan (Basement 4 Level)

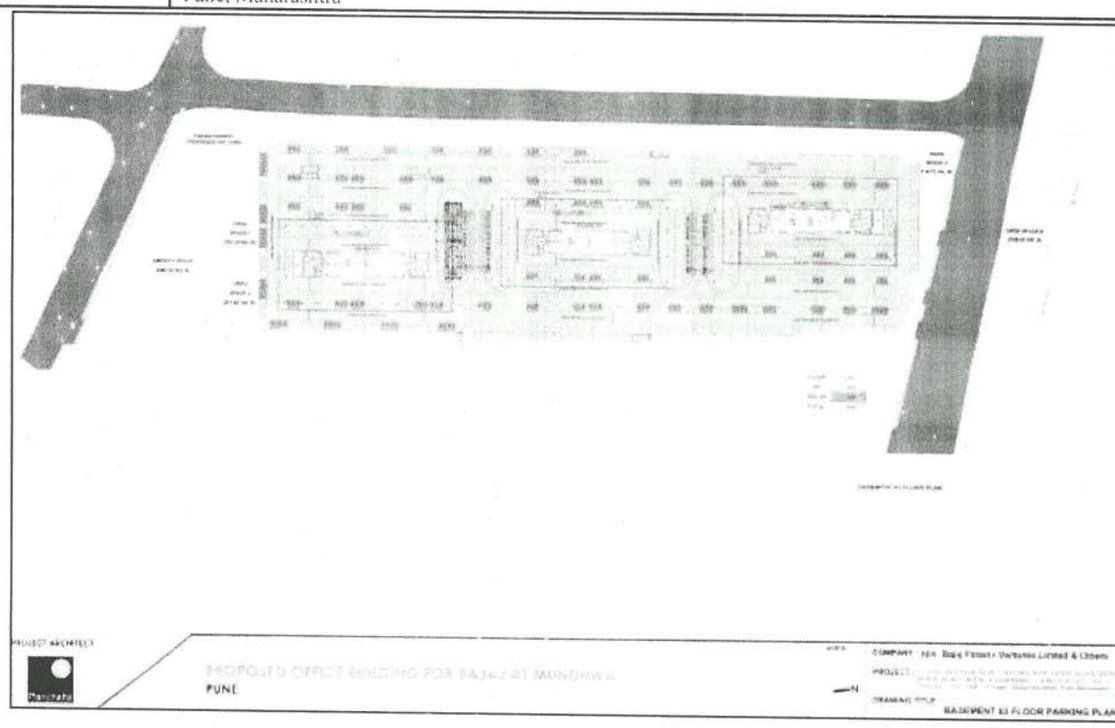


Figure 2.21: Parking Plan (Basement 3 Level)

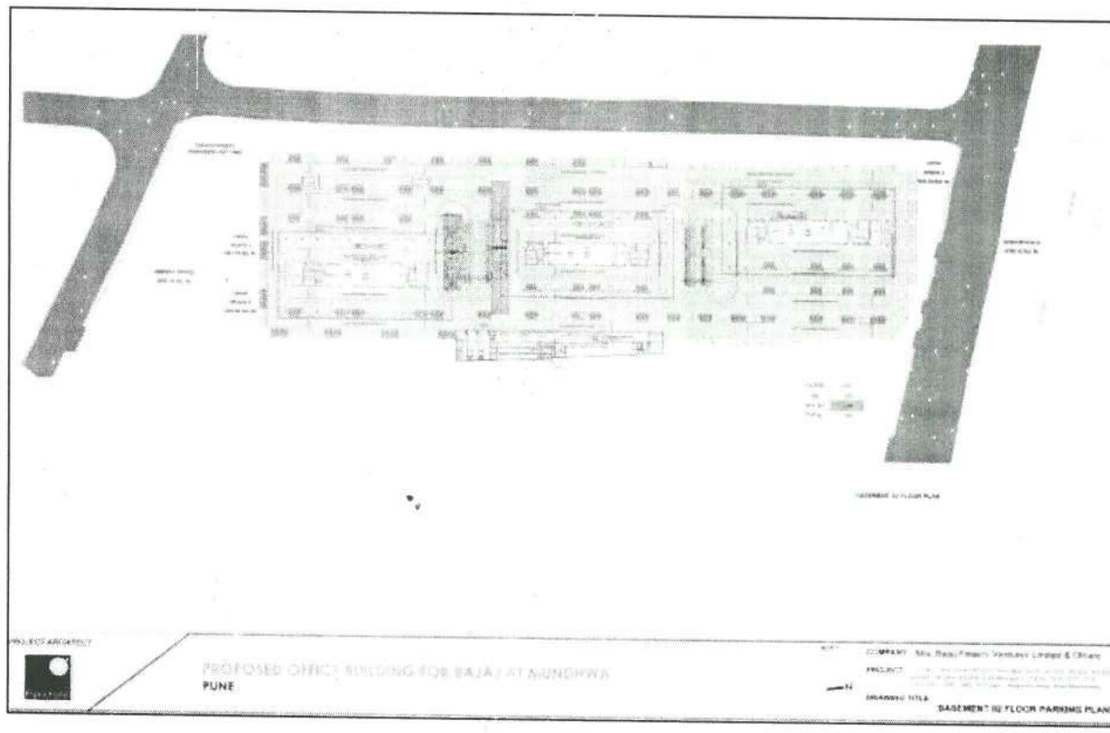


Figure 2.22: Parking Plan (Basement 2 Level)

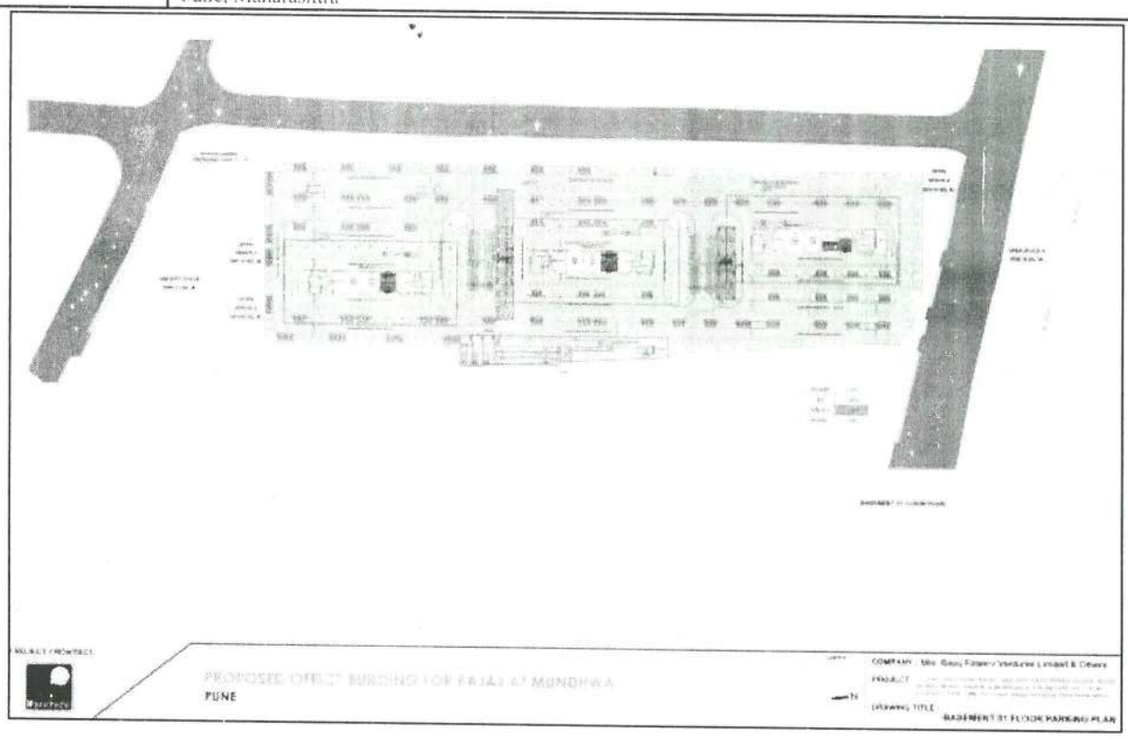


Figure 2.23: Parking Plan (Basement 1 Level)

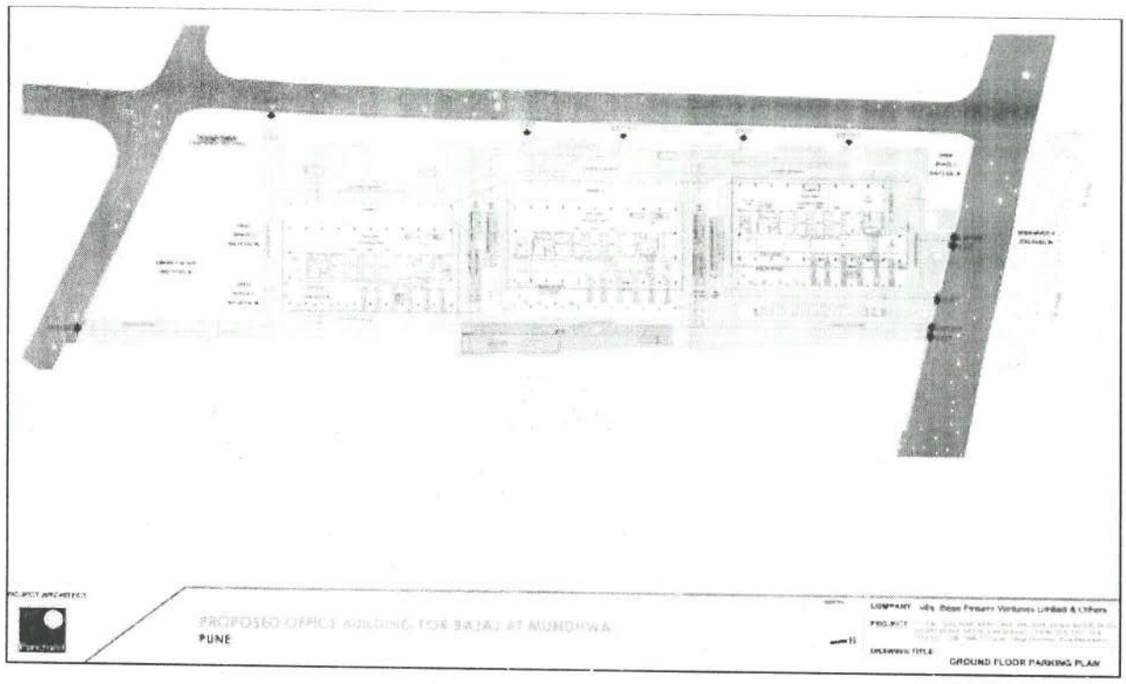


Figure 2.24: Parking Plan (Ground Floor)

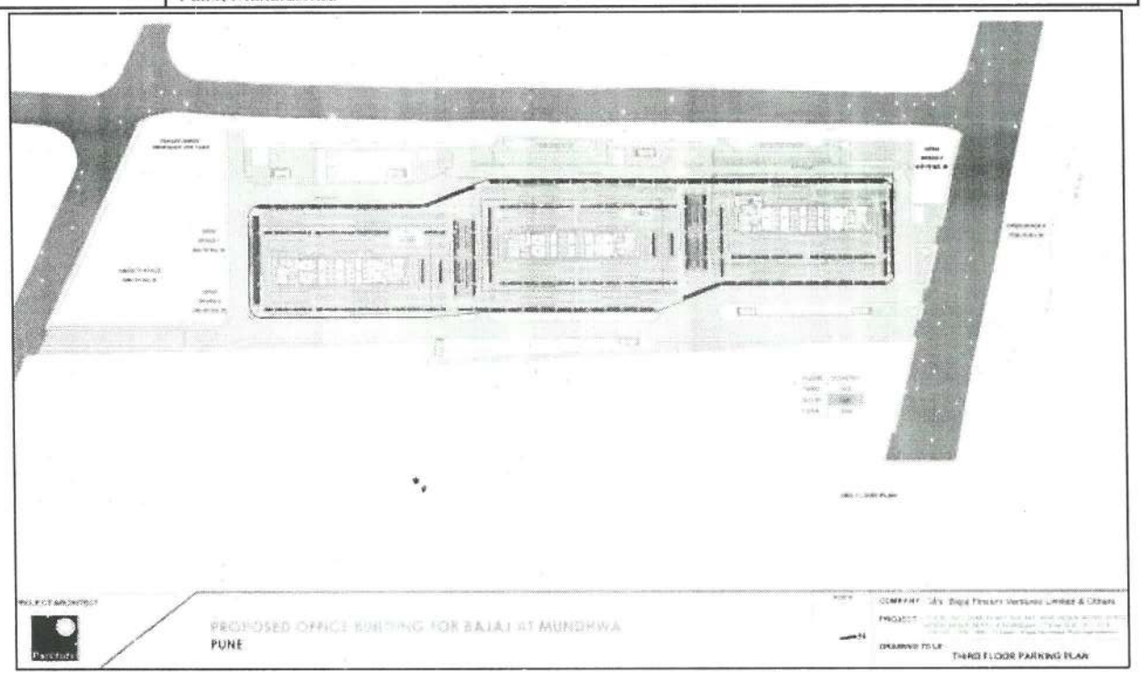


Figure 2.25: Parking Plan (Third Floor)

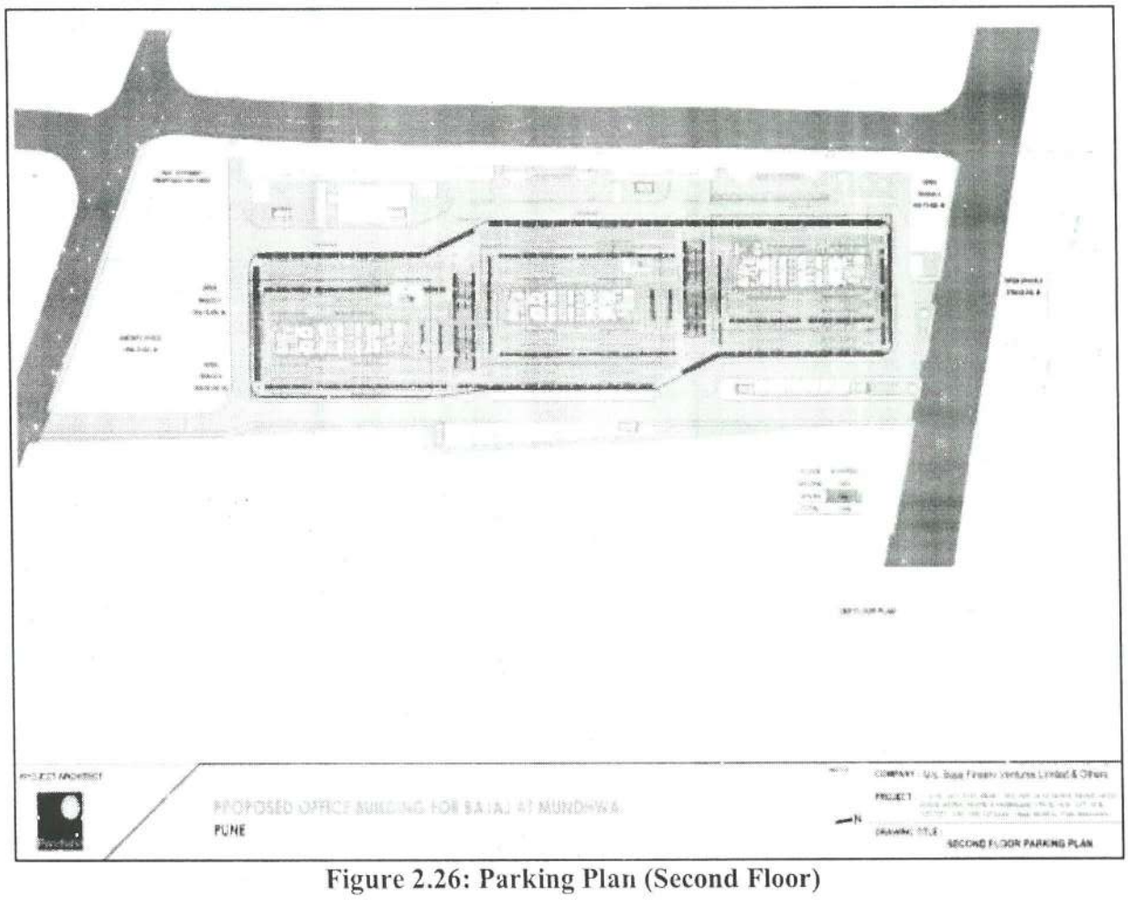


Figure 2.26: Parking Plan (Second Floor)

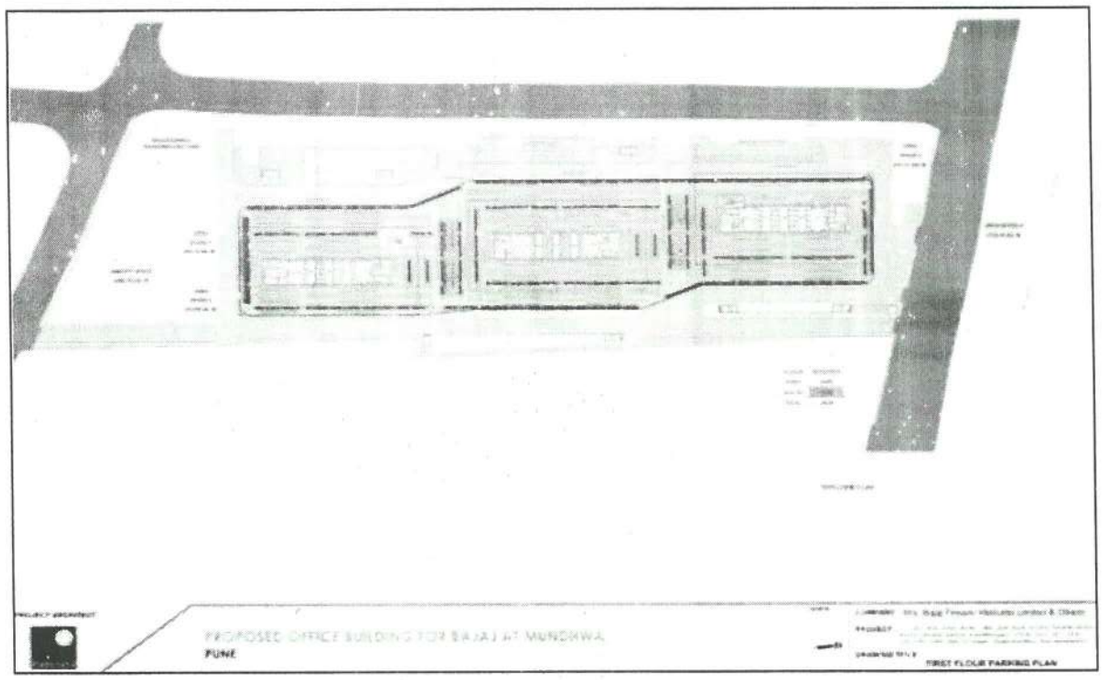


Figure 2.27: Parking Plan (First Floor)

2.7 Project description including drawings showing project layout, components of project etc. Schematic representations of the feasibility drawings which give information important for EIA purpose

2.7.1 Project description including drawings showing project layout, components of project etc.

Description along with layout is given at Section 2.3 of Chapter 2.

2.7.2 Water Consumption and sewage Generation

Description along with layout is given at Section 2.4 of Chapter 2.

2.8 Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements (as required by the scope)

The details regarding impacts and mitigation measures considering all environmental aspects are mentioned in chapter 4 of EIA report.

2.9 Assessment of New & Untested Technology for the Risk of Technological Failure

NCPL shall be adopted all the tested and proven technology for Construction activities. EHS will be taken care as per the Factory Act norms and BOC norms.

CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT

The following Chapter gives a detailed description of the baseline environmental conditions present on the project site and the study area. The various environmental parameters used to establish this baseline environmental status are as follows:

- Land
- Air
- Noise
- Water
- Biological
- Socio-economic
- Solid waste
- Traffic

3.1. Study Area, Period, Components & Methodology

3.1.1 Study area

The study area designated for projects under the Township and Area Development Projects is a radius of 10.0 km surrounding from the project site. Due to the nature and spread of construction activity impact, Primary data collection is restricted to locations within a radius of 5.0 km from the project site boundary. Secondary sources of data are accessed to understand baseline environment Conditions up to 10 km radius from project site.

3.1.2 Study Period

For surveying, primary data monitoring has been carried out from March 2024 to May 2024.

3.1.3 Methodology

For conducting the baseline, environmental survey methodology considered as per the guidelines given in the Environmental Impact Assessment Guidance Manual for Building, Construction Projects. Baseline information with respect to air quality, noise level, water quality, soil quality in the study area (5.0 km radius from project boundary) were collected by conducting primary sampling / field studies during study period.

Baseline status of Land, Biological and Socio-economic environment are also studied. The characteristics of baseline status of study area with respect to the following environmental parameters were studied:

Primary Data Collection

- Ambient air quality
- Noise Level
- Groundwater and Surface water quality
- Soil quality
- Land use pattern

Secondary Data Collection

- Meteorological data from Indian Meteorological Department (IMD)
- Flora and Fauna
- Socio-economic conditions
- Sensitive areas such as forests, sanctuaries, places of historical, archaeological and tourist importance.

3.2 Establishment of baseline for valued environmental components, as identified in the scope

The land resource is a base on which any development activity takes place. In addition, once the

character of land, its land cover and use changes, it is an irreversible impact. Thus, it is important to assess the historic and prevailing land character present in the study area of the proposed project.

A detailed Land Use and Land Cover (LULC) analysis has been conducted for the study area. LULC generally refers to the categorization or classification of human activities and natural elements on the landscape within a specific period based on established scientific and statistical methods of analysis of appropriate source materials. Land cover indicates the physical and type such as forest or open water whereas land use refers to the purpose the land serves, for example, recreation, wildlife habitat, or agriculture.

LULC maps play a significant role in planning, management, and monitoring programs at local, regional, and national levels. This type of information, on one hand, provides a better understanding of land utilization aspects and on the other hand, it plays an important role in the formation program required for development planning. For sustainable development, it is necessary to monitor the ongoing process on land use/land cover pattern over a period.

3.2.1. Land use & Land cover

Land cover is a fundamental parameter describing the Earth's surface. This parameter is a considerable variable that impacts on and links many parts of the human and physical environments. Remote sensing technique has ability to represent of land cover categories by means of classification process. With the availability of multispectral remotely sensed data in digital form and the developments in digital processing, remote sensing supplies a new prospective for land-cover/land-use analysis. Geographical Information Systems have already been used for assessing environmental problems, since they provide a flexible environment and a powerful tool for the manipulation and analysis of spatial information for land cover feature identification and the maps of all variables were combined to extract information to better understand analyzing. Satellite remote sensing, in conjunction with geographic information systems, has been widely applied and been recognized as a powerful and effective tool in analyzing land cover/use categories This study made use of remotely sensed data and GIS technologies; to evaluate qualitatively and quantitatively outcome of part of Pune district land cover/use distribution. Obtained results were compared, visualized and analyzed, in Geographic Information System.

The study area is proposed Project site Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others. The 10 km radius area lies within latitudes of 18°26'49.636"N to 18°37'36.879"N and longitudes of 73°49'13.491"E to74°0'38.393"E.

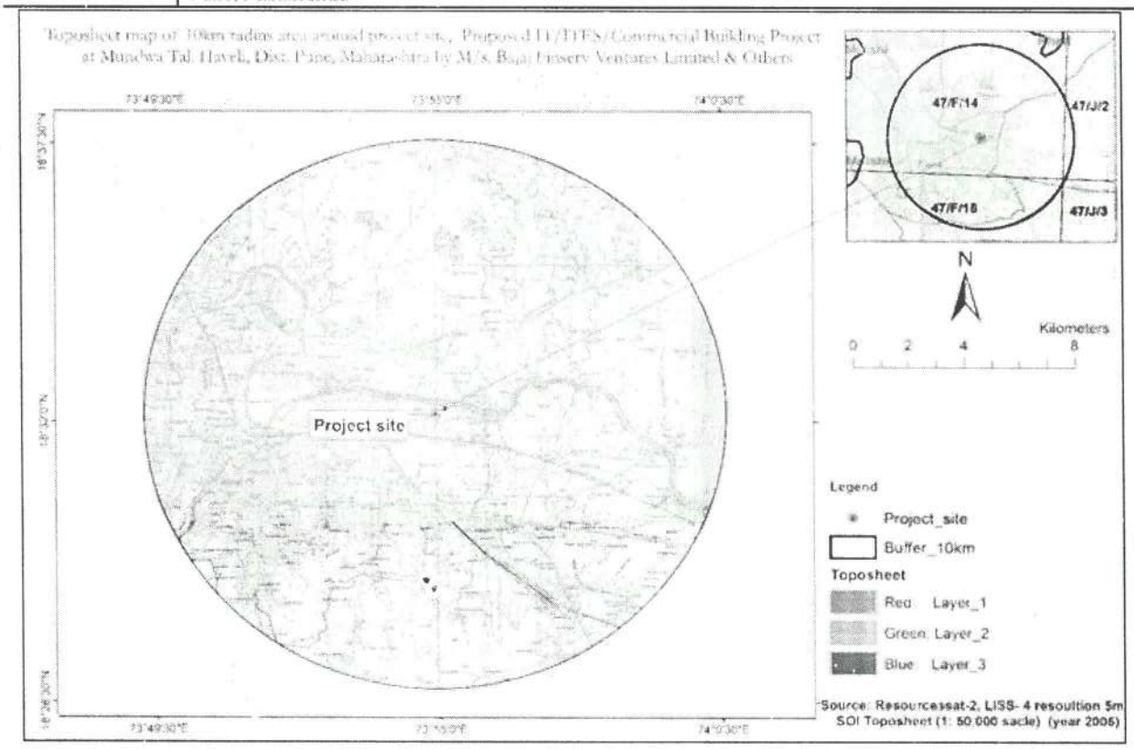


Figure 3.1: Toposheet Map of 10 Km Radius Area Around Project Site

3.3.2 LULC Analysis for the Study Area

LULC for the study area (10 km and 2 km, considering building and constructions projects have an impact on the environment within 2 km radius from the project boundary)

Six different categories of LULC have been identified in this study area, which are Built-up, Agriculture, Vegetation, Wastelands, Water bodies, and Reserved Forest. These categories are based on Level-1 categories (Source: Description and classification of land use / land cover: NRSA – TR – LU & CD – 01 –90). The explanation of classes is as below:

Built up: It is an area of human habitation developed due to non-agricultural use and that has a cover of buildings, transport and communication, utilities in association with water, vegetation and vacant lands.

Agriculture: These are the lands primarily used for farming and for production of food, fiber, and other commercial and horticultural crops.

Vegetation: The term vegetation is used to refer to land with a tree canopy cover, vegetated land, and plantations.

Wastelands: These are described as degraded lands which can be brought under vegetative cover with reasonable effort, and which is currently under-utilized and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes.

Water bodies: This category comprises areas with surface water in the form of ponds, lakes, tanks, and reservoirs.

Reserved Forest: The Reserved Forests demarcated on the SOI Toposheet. The following maps indicate the project site with reference to the 5 Km & 10 Km study area.

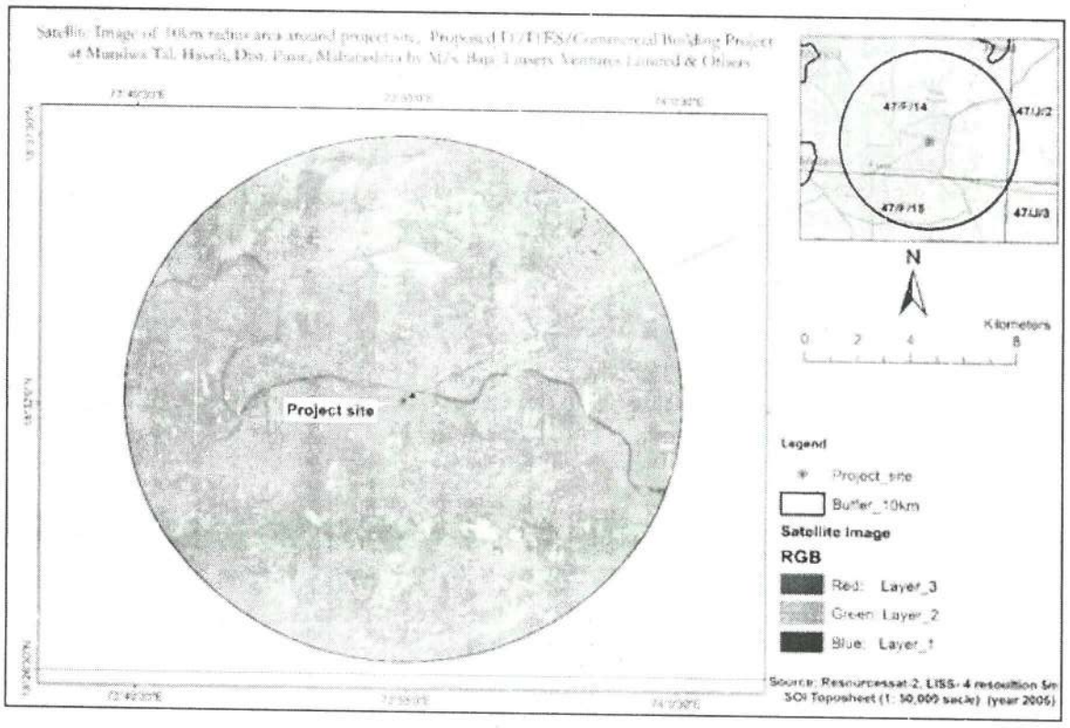


Figure 3.2: Satellite Image Map of 10 Km Radius Area Around Project Site

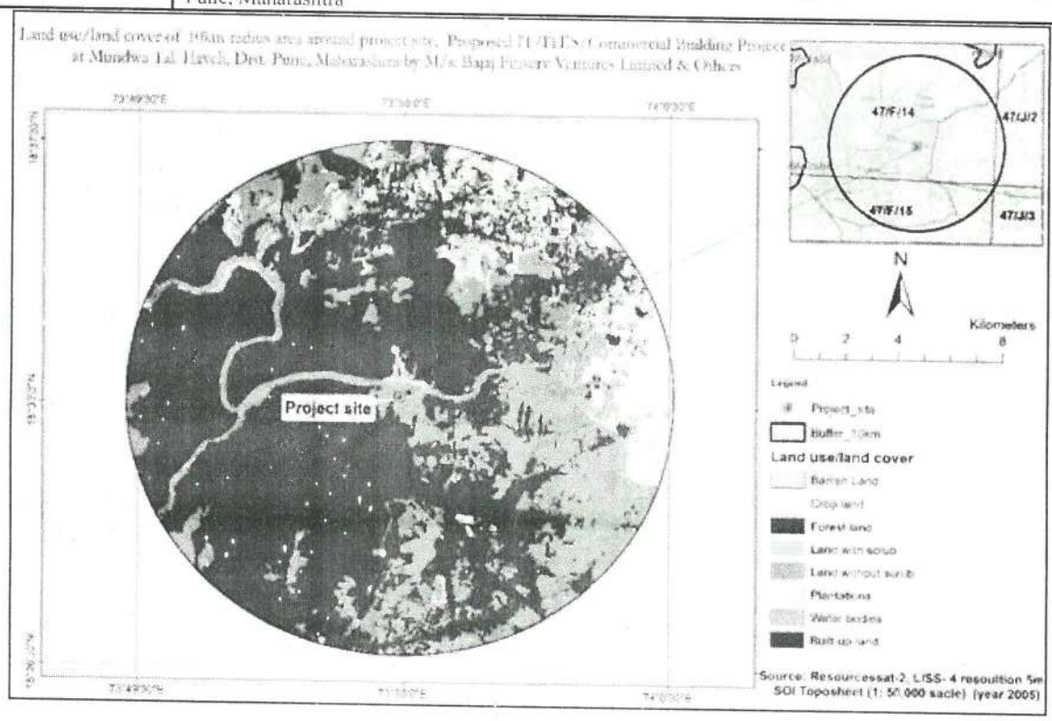


Figure 3.3: Land use/Land cover map of 10 km radius area around project site

Table 3.1: Land use/ Land cover Statistics of the 10 km radius area around project site

Sr. No.	Land Use/Land Cover	Area (Hectare)	Area (%)
1	Built-Up Land		
	Settlements, Road etc	15296.64	48.57
2	Water Bodies		
	River/tank	659.39	2.09
3	Reserved Forest / Vegetation		
	Forest land	504.11	1.60
4	Waste land		
	Land with scrub	58.53	0.19
	Land without scrub	9450.38	30.01
	Barren Land	399.53	1.27
5	Agriculture land		
	Crop land	4617.70	14.66
	Plantation	510.55	1.62
	Total	31496.83	100.00

Conclusion

The LULC of Project sites 10 km radius area shows five major types of land use and land cover were found. According to the known land cover classes, agriculture is the one of the main land uses in the regions. Only a small amount of the land is covered with scrub 0.19% and there is 1.27% barren land, but 30.01% of the land without scrub cannot be converted into arable land. However, only roughly

1.60% of forestland exists. According to the LULC, the area covered by the settlement area (Build up area, Settlements, Road etc) accounts for 48.57% of the total area. Above image shows that the most settlements were discovered in Pune and its neighboring suburbs. Furthermore, the terrain is very gentle and contains stony mass (rocky stone). According to the facts, water bodies such as rivers, dams, canals, tributaries, and ponds account for around 2.99% of the total.

Figure 3.4: Land Use Graph

3.3 Base maps of all environmental components

3.3.1 Topography

Thematic manuscript for contour layer was generated from Survey of India toposheet at 1:50,000 scale. After scanning coverage was generated. Coverage was edited to remove all errors of dangle. Attribute value was given to each contour in the coverage.

- **Contour** – Thematic manuscript for contour layer was generated from Survey of India toposheet at 1:50,000 scale. After scanning coverage was generated. Coverage was edited to remove all errors of dangle. Attribute value was given to each contour in the coverage.

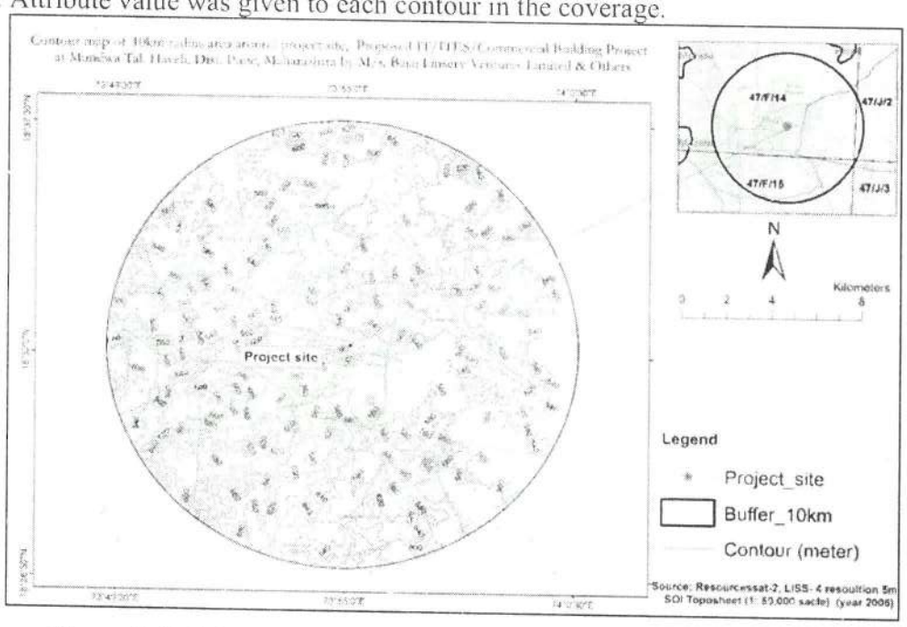


Figure 3.5: Contour map of 10 Km radius area around project site.

3.3.2 Hydrology

The main river near the study area is the Mula-Mutha River. The study area falls under the Pune district in Maharashtra. The area is predominantly a Built-Up region. Agricultural activities are less significant in the region and is very much dependent on water storage systems.

3.3.3 Drainage Map

Drainage layer, which was generated after scanning thematic manuscripts, was edited for line the errors. Two different layers were made separately for line drainage. Drainage order was given to all the drain lines in the layer 's. Strahler method of ordering was used for giving order to drainage. Whenever two drains of any order joined the order of next drain was increase by one.

The area does not show no undulating topography thus it shows the dendritic drainage patterns. The project site is present in the catchment area of Mula-Mutha River. The first order drainage is present near the project site.

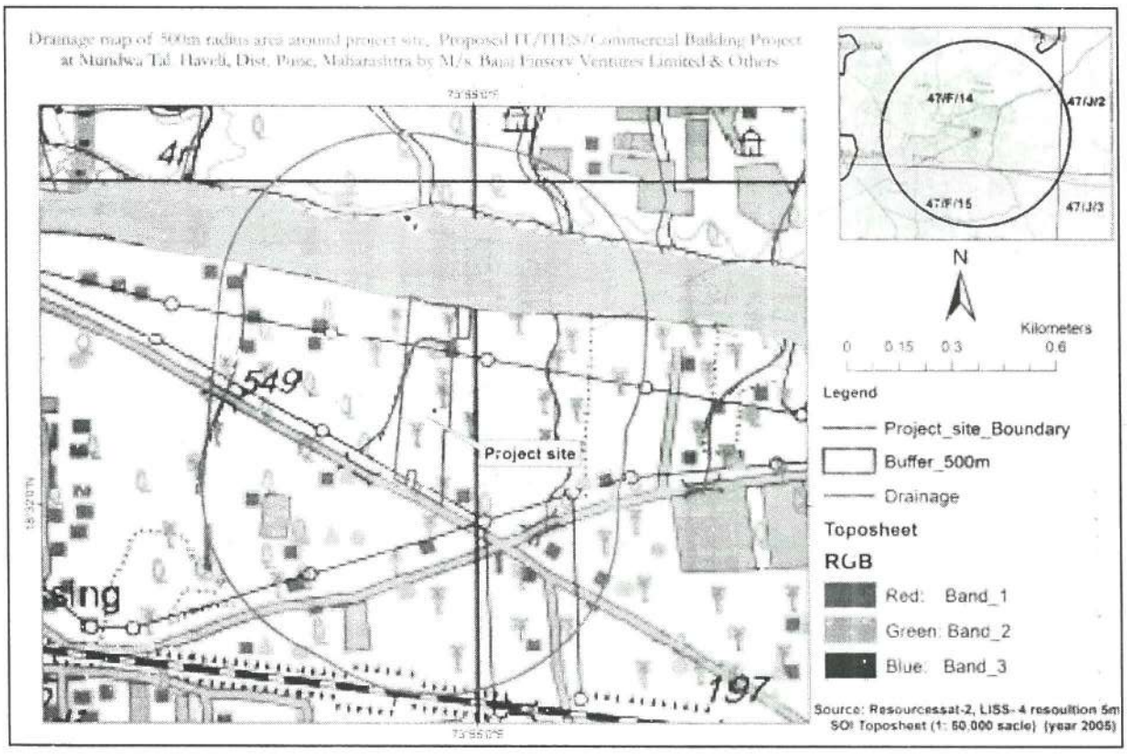


Figure 3.6: Drainage map of 500m radius area around Project site

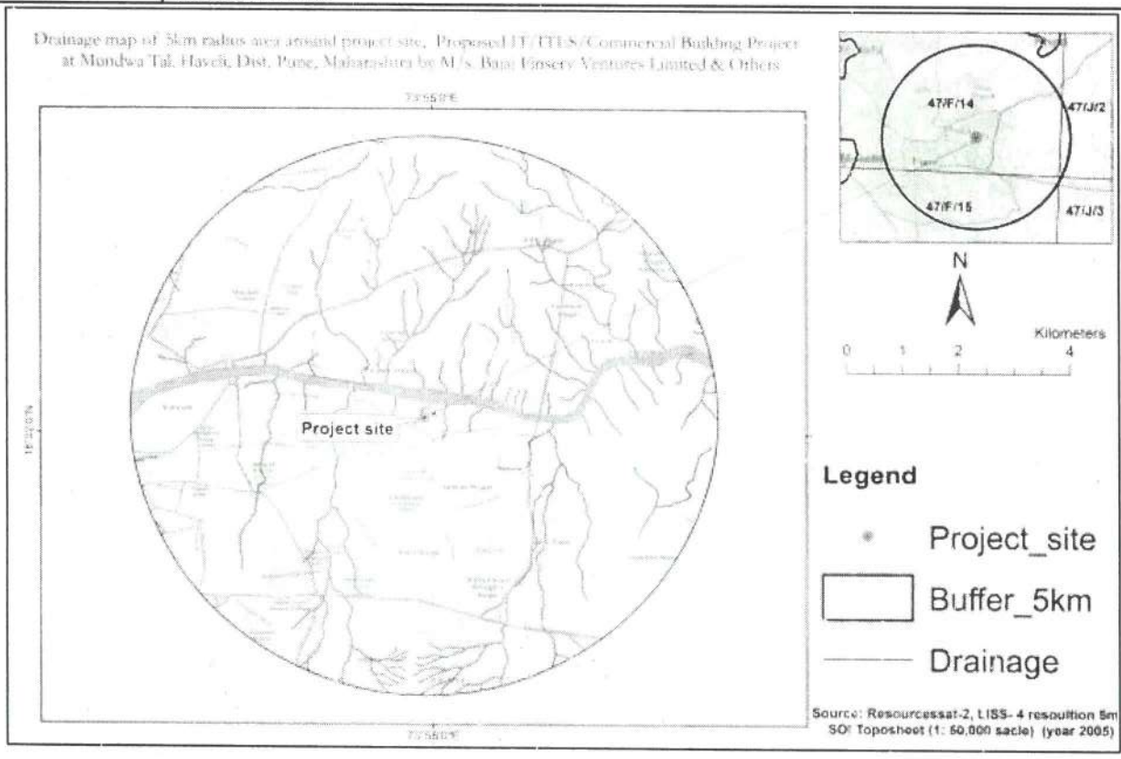


Figure 3.7: Drainage map of 5 km radius area around Project site

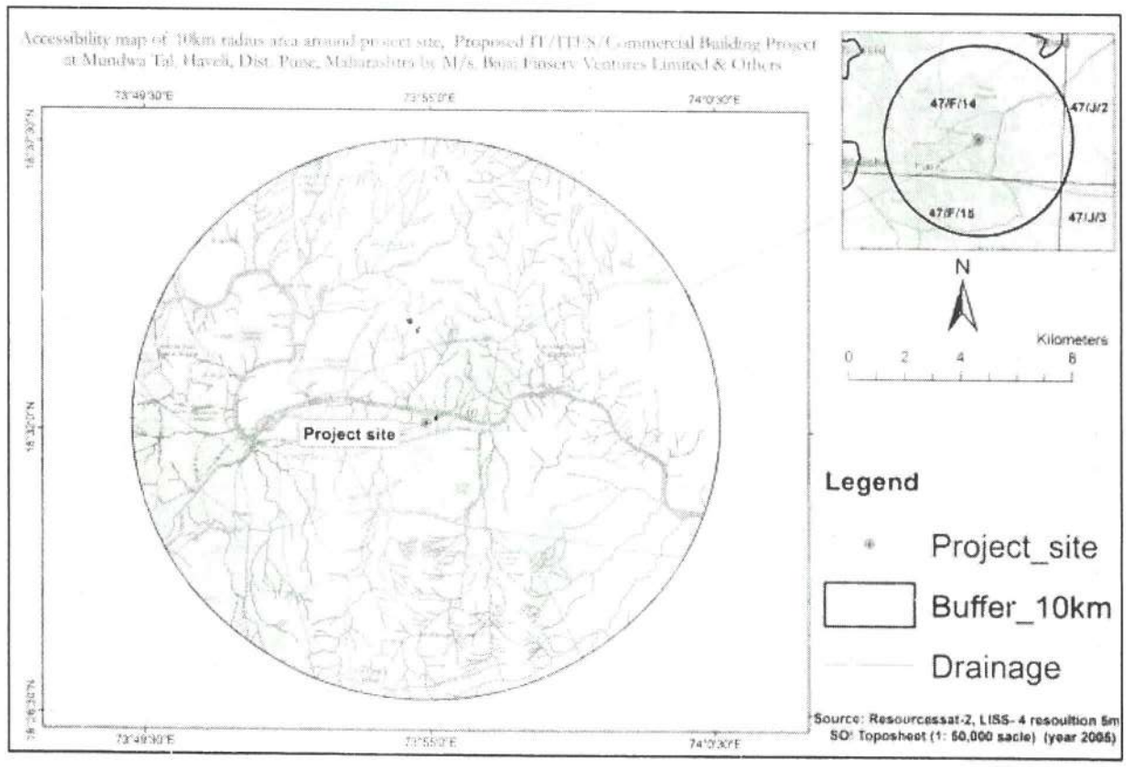


Figure 3.8: Drainage map of 10 km radius area around Project site

3.3.4 Soil Quality

Soil quality is an important parameter of understand the physical status of environment. Soil fertility is based on the type, pH, Organic matter, suitable nutrient distribution and Heavy metals content. Soil monitoring was done at project site.

Pre methodology for soil sampling, take the plastic bags and sampling equipment called Augur. In sampling procedure, the Augur was used to collect soil sample to the depth of 30 cm, The Augur is called post Hole-Augur, which is used for sampling purpose at selected sites. For the physico- chemical parameters, about 1 kg of soil sample was collected from each site.

Sampling Frequency: Once

Sampling equipment: Sample collection is done manually using hammer and container tube for collecting undisturbed top soil.

Observation: Soil is suitable for construction and habitation. Top soil can be used for landscaping proposed in the development.

Table 3.2 Soil Sampling Locations in the Study Area

Code	Location	Latitude	Longitude	Distance
S1	Project site	18°32'7.38"N	73°54'54.81"E	-
S2	Koregaon Park Annexe	18°31'55.55"N	73°54'55.45"E	S
S3	Marigold Complex	18°32'37.63"N	73°54'30.28"E	NW
S4	Ganesh Garden	18°32'3.87"N	73°55'46.68"E	E
S5	Agarkar Nagar	18°31'41.21"N	73°52'13.89"E	SW
S6	Sasane Nagar	18°29'31.57"N	73°56'3.68"E	SE
S7	Laxmi Nagar	18°33'2.45"N	73°52'47.67"E	NW
S8	Anand Park Sciety	18°29'53.52"N	73°52'18.85"E	SW

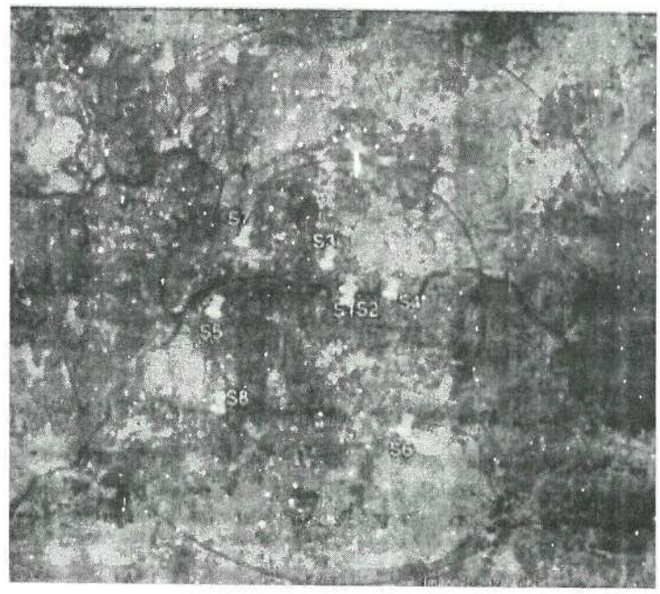


Figure 3.9 Soil Sampling Locations in the Study Area

Physical and Chemical parameters of soil are tested from NABL approved laboratory, and below Table below shows the values observed.

Table 3.3 Soil Analysis Report

Sr. No.	Parameter	Unit (s)	Location				Analysis Method
			Project site	Koregaon Park Annexe	Marigold Complex	Ganesh Nagar	
1.	Colour	-	Brown	Brown	Brown	Brown	IS 2720
2.	Grain Size Distribution						IS 2720-P4
		Sand %	26.00	24.00	25.00	24.00	
		Silt%	17.00	13.00	12.00	22.00	
		Clay %	57.00	63.00	61.00	54.00	
3.	Texture Class		Clay	Clay	Clay	Clay	IS 2720
4.	Bulk Density	gm/cc	1.32	1.45	1.36	1.28	IS 2720-p2
5.	Permeability	cm/hr	0.28	0.35	0.32	0.24	IS :2720 P-17/36
6.	Water Holding capacity	%	41.6	49.6	45.3	37.5	IS 14765
7.	Porosity	%	61.3	67.8	64.3	52.4	IS 2720
8.	pH (1: Aq Extraction)	--	7.47	7.58	7.53	7.42	IS 2720 (Part 26)
9.	Electrical Conductivity (1: Aq Extraction)	µS/cm	1054.0	1176.0	1151.0	1014.0	IS:1892
10.	Cation Exchange Capacity	meq/100gm	47.6	62.3	56.2	44.2	IS 2720
11.	Exchangeable Calcium	meq/100gm	25.6	33.6	29.8	21.4	IS 2720
12.	Exchangeable Magnesium	meq/100gm	19.8	22.5	21.3	15.4	IS 2720
13.	Exchangeable Potassium	meq/100gm	0.58	0.78	0.62	0.45	IS 2720
14.	Exchangeable Sodium	meq/100gm	0.48	0.59	0.52	0.36	IS 2720

15.	Sodium Absorption Ratio	----------	0.055	0.064	0.060	0.044	IS 2720
16.	Nitrogen (N)	mg/kg	272.3	284.3	281.3	267.9	IS 14684:1999 Reaff 2005
17.	Available Phosphorous (P)	mg/kg	53.8	51.6	52.3	47.9	IS 2720
18.	Available Potassium	mg/kg	76.9	83.6	81.6	72.3	IS 2720
19.	Organic Carbon	%	1.12	1.42	1.28	0.78	IS 2720-P22
20.	Organic Matter	%	1.94	2.18	2.10	1.57	IS 2720-P22
21.	Water Soluble Chloride (Cl)	mg/kg	73.6	88.6	74.3	61.2	IS:812 P-4
22.	Water Soluble Sulphate (SO_4)	mg/kg	57.6	64.5	61.3	51.3	IS 2720-27
23.	Aluminum (Al)	%	0.14	0.21	0.18	0.08	USEPA
24.	Total Iron (Fe)	%	4.13	5.52	4.82	3.16	Method 3050B
25.	Manganese (Mn)	mg/kg	1.18	1.69	1.52	0.92	
26.	Boron (B)	mg/kg	0.4	1.34	0.99	0.72	
27.	Zinc (Zn)	mg/kg	3.61	5.48	4.64	3.21	
28.	Total Chromium (Cr)	mg/kg	BDL	BDL	BDL	BDL	
29.	Lead (Pb)	mg/kg	BDL	0.16	BDL	BDL	
30.	Nickel (Ni)	mg/kg	3.45	4.21	3.76	3.24	
31.	Arsenic (As)	mg/kg	BDL	BDL	BDL	BDL	
32.	Mercury (Hg)	mg/kg	BDL	BDL	BDL	BDL	
33.	Cadmium (Cd)	mg/kg	BDL	BDL	BDL	BDL	
34.	Barium as (Ba)	mg/kg	1.64	2.26	2.12	1.21	
35.	Selenium (Se)	mg/kg	BDL	BDL	BDL	BDL	
36.	Copper (Cu)	mg/kg	BDL	BDL	BDL	BDL	

Note: *BDL – Below Detectable Limit

198

3.3.4.1 Inference:

Chemical Properties of Soil:

The collected soil sample was analyzed for various chemical parameters. The parameters selected were pH, electrical conductivity, soluble anions and cations, nutrients and organic carbon content. pH is an important parameter indicating alkaline and acidic nature of soil. It severally affects the microbial population as well as the solubility of metal ions that regulates nutrient availability. The pH of the soil in the study area is moderately alkaline in reaction having pH 7.47.

The soluble salts were determined from soil extract (1:2). The soluble salts are expressed in terms of electrical conductivity (EC). The (Electrical Conductivity) of the soil extract in the study area is 1054.0 mS/cm the soluble salt content in all the soils are low < 1dS/m. Chemical analysis shows that the soils are normal (EC<1dS/m).

CEC is 47.6 meq/100g, moreover it can be interpreted that the soil is clayey type in texture and has Moderate Productivity and High Absorption Capacity.

Nutrient Status of Soil

Organic matter present in the soil influences its physical and chemical properties. It commonly accounts as one third or more of the cation exchange capacity of surface soil and is also responsible for stability of soil aggregates. Analysis shows that the concentration of and total organic carbon is 1.12% indicates soil sample is medium fertile in nature.

It was observed that the P_2O_5, K2O, and Nitrogen content in the soil are adequate to classify the soil as medium fertile to fertile and the soil has poor Nitrogen content.

Table 3.4 Fertility Status Classification

Fertility Status	Organic Carbon (%)	Nitrogen (kg/ha)	P_2O_5 (kg/ha)	K_2O (kg/ha)
Poor Soil	<0.5	<280	<23	<133
Medium Fertile Soil	0.5-0.75	280-560	23-57	133-337
Fertile Soil	>0.75	>560	>57	>337

Table 3.5: Relationship of CEC with Absorptivity

CEC	Range in meq/100g	Absorptivity
Very low	<10	Low or Limited absorption
Low	10-20	Moderate absorption
Moderate	21-30	High absorption
High	>30	Very High absorption

Table 3.6: Relationship of CEC with Productivity

CEC	Range (cmol (p+) kg-1)	Productivity
Very low	< 10	Very low
Low	10 - 20	Low
Moderate	20 - 50	Moderate
High	> 50	High

Heavy Metal Content in the Soil

The heavy metals occur in the solution as cations and are adsorbed by the negatively charged soil particle. They are held strongly as complex on the surface of clay, alumino silicates, hydrated oxide and humus. In general, adsorption increases with pH, heavy metals pollution is serious because it can persist for many decades. The heavy metals also create problems in the nutrient utilization in plant and also marked reduction in chlorophyll content. The concentration of heavy metals found in the soil sample is normal.

3.3.5 Water Environment

3.3.5.1 Surface Water

Water quality monitoring is essential components of EIA study. Such monitoring helps in assessing the current health of water body and suggesting suitable mitigation measures to reduce the potential impact from development projects. Surface water quality has been studied in order to assess proposed water-uses in drinking purpose.

The Surface water quality near the site and other locations within the 10 km impact zone was monitored during March 2024 to May 2024. The locations of the monitoring sites are mentioned in below image and table. The result of the monitoring and analysis of surface water is given below.

Table 3.7: Surface water Monitoring Location

Code	Location	Latitude	Longitude	Distance (Km)	Direction
SW1	Mula-Mutha River	18°32'21.12"N	73°54'57.35"E	0.36	N
SW2	Mutha River	18°31'39.24"N	73°51'38.63"E	5.82	W
SW3	Amnora Lake	18°31'5.69"N	73°56'33.11"E	3.45	SE
SW4	Aditi Garden Lake	18°30'53.80"N	73°55'32.79"E	2.58	SSE

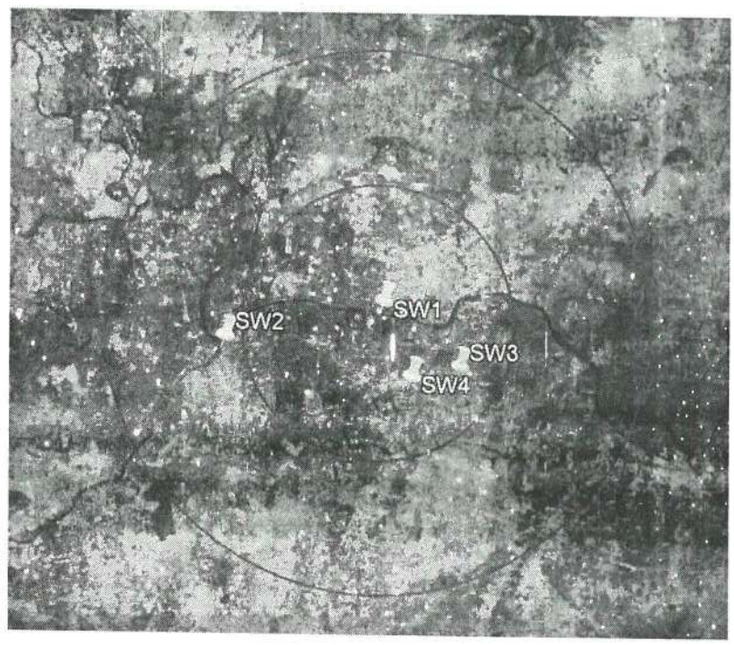


Figure 3.10: Surface water Monitoring Location

Table 3.8: Surface water Monitoring Report

Sr. No.	Parameter	Unit(s)	Location				Limits as per IS 10500: 2012	Permissible Limit in the Absence of Alternate Source	Analysis Method
			SW1 Mula-Mutha River	SW2 Mutha River	SW3 Amanora Lake	SW4 Aditi Garden Lake			
1.	Color	Hazen	Clear	Clear	Clear	Clear	5.00	15.00	IS : 3025 (Part4):1983
2.	Odor	--	Non-Agreeable	Non-Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	IS : 3025 (Part5):1983,
3.	pH	--	7.64	7.61	7.40	7.46	6.5-8.5	No relaxation	APHA 4500 H+, A, 23rd Ed.2017
4.	Conductivity	µS/cm	1020.5	944.61	463.5	561.4	Not Specified	Not Specified	IS 3025 (Part 14) 1984 (RA 2006)
5.	TDS	mg/lit	663.8	614.3	301.6	356.2	< 500.00	2000	IS 3025 (Part 16):
6.	Turbidity	NTU	12.0	10.0	3.00	6.0	< 1.00	5	IS 3025 (Part 10): 1983
7.	TSS	mg/lit	32.0	28.0	09.0	21.0	Not Specified	Not Specified	IS: 3025 (Part-17)-1984
8	D.O	mg/lit	2.6	2.9	5.8	5.5	Not Specified	Not Specified.	IS:3025 (Part-38) 1989
9.	COD	mg/lit	36.0	32.0	8.0	12.0	Not Specified	Not Specified	IS:3025 (Part 58)-2006 .
10.	BOD 3	mg/lit	12.0	10.0	3.0	4.0	Not Specified	Not Specified	IS:3025 (Part 44)-1993,
11.	Ammonical Nitrogen	mg/lit	1.16	1.05	<0.01	<0.01	< 0.50	No relaxation	APHA 4500 NH_3 F
12.	Nitrate as NO_3	mg/lit	34.5	32.6	12.3	14.6	< 45.00	No relaxation	APHA 4500 NO_3 - B
13.	Nitrite as NO_2	mg/lit	<0.01	<0.01	<0.01	<0.01	Not Specified	Not Specified	IS 3025 (Part 34) 1988,
14.	Nitrogen as N	mg/lit	1.98	1.78	<0.01	<0.01	Not Specified	Not Specified	APHA-4500
15.	Phosphorous as PO_4	mg/lit	2.46	2.31	1.56	1.89	Not Specified	Not Specified	APHA 4500 P-C
16.	Potassium as K	mg/lit	32.5	28.9	10.5	12.5	Not Specified	Not Specified	APHA 3111 B
17.	Sodium as Na	mg/lit	81.6	78.5	36.5	43.2	Not Specified	Not Specified	APHA 3111 B
18.	Calcium as Ca	mg/lit	57.1	54.6	34.5	39.8	< 75.00	200.00	IS 3025 (Part 40) 1991
19.	Magnesium as Mg	mg/lit	21.6	18.7	9.54	11.4	< 30.00	100.00	IS 3025 (Part 46) 1994 (RA 2009)
20.	Total Hardness as $CaCO_3$	mg/lit	241.6	236.5	128.6	151.8	< 200.00	600.00	IS 3025 (Part 21): 2009
21.	Carbonates as CO_3^{2-}	mg/lit	64.0	59.6	34.5	38.7	Not Specified	Not Specified	APHA 2320
22.	Bicarbonates as HCO_3	mg/lit	60.0	56.4	28.6	30.6	Not Specified	Not Specified	APHA 2320

23.	Chlorides as Cl^-	mg/lit	146.4	142.3	62.3	76.0	< 250.00	1000.00	IS 3025 (Part 32):
24.	Sulphates as SO_4	mg/lit	97.6	86.7	51.6	55.4	< 200.00	400 00	IS 3025 (Part-24):
25.	Sulphide as H_2S	mg/lit	<0.001	<0.001	<0.001	<0.001	< 0.05	No relaxation	APHA-4500-S2
26.	Fluorides as F^-	mg/lit	<0.01	<0.01	<0.01	<0.01	< 1.00	1.50	APHA 4500-F^- D
27.	Iron as Fe	mg/lit	0.22	0.18	<0.05	0.14	< 0.30	No relaxation	APHA 3111 B
28.	Aluminum as Al	mg/lit	<0.001	<0.001	<0.001	<0.001	<0.03	0.20	APHA 3111 B
29.	Barium as Ba	mg/lit	<0.001	<0.001	<0.001	<0.001	<0.70	No relaxation	APHA 3111 B
30.	Boron as B	mg/lit	<0.01	<0.01	<0.01	<0.01	< 0.50	1.00	APHA 3111 B
31.	Copper as Cu	mg/lit	<0.04	<0.04	<0.04	<0.04	< 0.05	1.50	APHA 3111 B
32.	Selenium as Se	mg/lit	<0.001	<0.001	<0.001	<0.001	<0.01	No relaxation	APHA 3111 B
33.	Zinc as Zn	mg/lit	<0.05	<0.05	<0.05	<0.05	<5.00	15.00	APHA 3111 B
34.	Cadmium as Cd	mg/lit	<0.001	<0.001	<0.001	<0.001	<0.003	No relaxation	APHA 3111 B
35.	Lead as Pb	mg/lit	<0.01	<0.01	<0.01	<0.01	<0.01	No relaxation	APHA 3111 B
36.	Mercury as Hg	mg/lit	<0.001	<0.001	<0.001	<0.001	<0.001	No relaxation	APHA 3111 B
37.	Nickel as Ni	mg/lit	<0.01	<0.01	<0.01	<0.01	< 0.02	No relaxation	APHA 3111 B
38.	Arsenic as As	mg/lit	<0.01	<0.01	<0.01	<0.01	< 0.01	0.05	APHA 3111 B
39.	Chromium as Cr	mg/lit	<0.05	<0.05	<0.05	<0.05	< 0.05	No relaxation	APHA 3111 B
40.	Total Coli form	No./100ml	**33**	**26**	**06**	**10**	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)
41.	Fecal Coli form	No./100ml	**12**	**09**	Absent	**03**	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)

202

Conclusion:

Surface water samples were derived from 4 locations in different surface water bodies within study area, analysis results of the same revealed that pH values amongst all samples varied in the range of 7.40 to 7.64, Total Hardness concentration varied in the range of 128.6 mg/l to 241.6 mg/l & maximum concentration was recorded at SW1, TDS concentration varied in the range of 301.6 to 663.8 mg/l. Electrical Conductivity was found to be ranging in between 463.5 to 1020.5 µS/cm. The concentrations
of Dissolved Oxygen, COD & BOD were found to be varying in the range of 2.6 to 5.8 mg/lit,8.0 to 36 mg/l, 3.0 to 12.0 mg/lit respectively.

Heavy metals viz. Lead, Chromium, Mercury, Cadmium, Arsenic & Nickel were below detection limits in all samples whereas the concentration ranges of metals viz. Zinc, Boron & Magnesium were <0.05 mg/l, <0.01 mg/l & 9.54 to 21.6 mg/l respectively. Concentration of Fluoride varied in the range of <0.01mg/l.

3.3.5.2 Ground Water

Water quality of ground has been studied in order to assess proposed water-uses in construction, drinking, and horticulture purpose. The water quality near the site and other locations within the 10 km impact zone was monitored during March 2024 to May 2024.

Table 3.9: Ground water Monitoring Location

Code	Location	Latitude	Longitude	Distance (Km)
GW1	Ubale Nagar Well	18°33'56.25"N	73°57'22.44"E	5.44

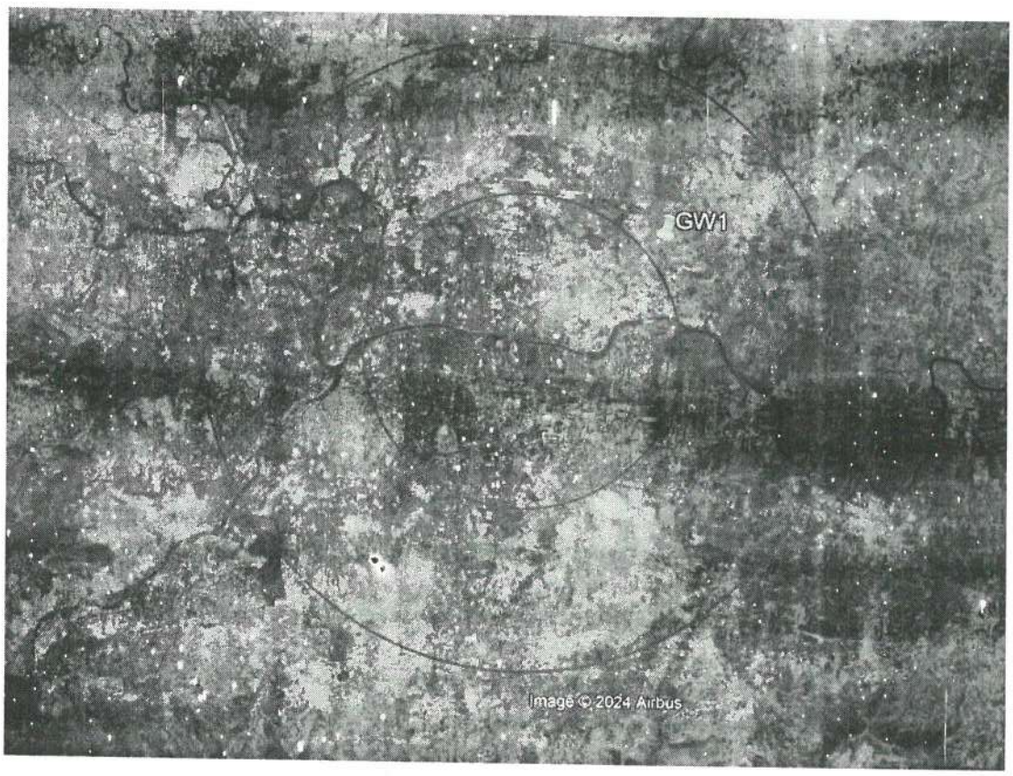


Figure 3.11: Ground water Monitoring Location

Table 3.10: Ground water Monitoring Report

Sr. No.	Parameter	Unit(s)	Location	Limits as per IS 10500:2012	Permissible Limit in the Absence of Alternate Source	Analysis Method
			GW-1 Ubale Nagar Well			
1.	Color	Hazen	Clear	5.00	15.00	IS : 3025 (Part4):1983
2.	Odor	--	Agreeable	Agreeable	Agreeable	IS : 3025 (Part5):1983,
3.	pH	--	7.58	6.5-8.5	No relaxation	APHA 4500 H^+, A, 23rd Ed.2017
4.	Conductivity	µS/cm	752.6	Not Specified	Not Specified	IS 3025 (Part 14) 1984 (RA 2006)
5.	TDS	mg/lit	488.9	< 500.00	2000	IS 3025 (Part 16):
6.	Turbidity	NTU	2.00	< 1.00	5	IS 3025 (Part 10): 1983
7.	TSS	mg/lit	7.0	Not Specified	Not Specified	IS: 3025 (Part-17)-1984
8.	COD	mg/lit	<5.00	Not Specified	Not Specified	IS:3025 (Part 58)-2006 .
9.	BOD 3	mg/lit	<1.00	Not Specified	Not Specified	IS:3025 (Part 44)-1993,
10.	Ammonical Nitrogen	mg/lit	0.28	< 0.50	No relaxation	APHA 4500 NH_3 F
11.	Nitrate as NO_3	mg/lit	21.6	< 45.00	No relaxation	APHA 4500 NO_3 - B
12.	Nitrite as NO_2	mg/lit	<0.01	Not Specified	Not Specified	IS 3025 (Part 34) 1988,
13.	Nitrogen as N	mg/lit	0.84	Not Specified	Not Specified	APHA-4500
14.	Phosphorous as PO_4	mg/lit	1.98	Not Specified	Not Specified	APHA 4500 P-C
15.	Potassium as K	mg/lit	21.3	Not Specified	Not Specified	APHA 3111 B
16.	Sodium as Na	mg/lit	58.4	Not Specified	Not Specified	APHA 3111 B
17.	Calcium as Ca	mg/lit	48.6	< 75.00	200.00	IS 3025 (Part 40) 1991
18.	Magnesium as Mg	mg/lit	16.5	< 30.00	100.00	IS 3025 (Part 46) 1994 (RA 2009)
19.	Total Hardness as $CaCO_3$	mg/lit	172.8	< 200.00	600.00	IS 3025 (Part 21): 2009
20.	Carbonates as CO_3^{2-}	mg/lit	41.6	Not Specified	Not Specified	APHA 2320
21.	Bicarbonates as HCO_3	mg/lit	14.5	Not Specified	Not Specified	APHA 2320

204

22.	Chlorides as Cl^-	mg/lit	112.0	< 250.00	1000.00	IS 3025 (Part 32):
23.	Sulphates as SO_4	mg/lit	86.5	< 200.00	400.00	IS 3025 (Part-24):
24.	Sulphide as H_2S	mg/lit	<0.001	< 0.05	No relaxation	APHA-4500-S2
25.	Fluorides as F^-	mg/lit	<0.01	< 1.00	1.50	APHA 4500-F^- D
26.	Iron as Fe	mg/lit	<0.05	< 0.30	No relaxation	APHA 3111 B
27.	Aluminum as Al	mg/lit	<0.001	<0.03	0.20	APHA 3111 B
28.	Barium as Ba	mg/lit	<0.001	<0.70	No relaxation	APHA 3111 B
29.	Boron as B	mg/lit	<0.01	< 0.50	1.00	APHA 3111 B
30.	Copper as Cu	mg/lit	<0.04	< 0.05	1.50	APHA 3111 B
31.	Selenium as Se	mg/lit	<0.001	<0.01	No relaxation	APHA 3111 B
32.	Zinc as Zn	mg/lit	<0.05	<5.00	15.00	APHA 3111 B
33.	Cadmium as Cd	mg/lit	<0.001	<0.003	No relaxation	APHA 3111 B
34.	Lead as Pb	mg/lit	<0.01	<0.01	No relaxation	APHA 3111 B
35.	Mercury as Hg	mg/lit	<0.001	<0.001	No relaxation	APHA 3111 B
36.	Nickel as Ni	mg/lit	<0.01	< 0.02	No relaxation	APHA 3111 B
37.	Arsenic as As	mg/lit	<0.01	< 0.01	0.05	APHA 3111 B
38.	Chromium as Cr	mg/lit	<0.05	< 0.05	No relaxation	APHA 3111 B
39.	Total Coli form	No./100ml	<2	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)
40.	Fecal Coli form	No./100ml	<2	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)

Conclusion

The above result revealed that values/ concentrations of various parameters amongst the sample as pH – 7.58, TDS – 488.9 mg/l, Sulphates – 86.5 mg/l, Nitrate – 21.6 mg/l, Bicarbonate – 14.5 mg/l, Calcium – 48.6 mg/l, Sodium – 58.4 mg/l, Potassium 21.3 mg/l, Fluoride - <0.01 mg/l, Magnesium – 16.5 mg/l, COD - <5.00 mg/l, BOD - <1.00 mg/l, Iron– <0.05 mg/l, whereas concentrations of Arsenic, Lead were <0.01 mg/l and that of Cadmium, Chromium, Mercury, Nickel & Zinc were <0.001 mg/l, <0.05 mg/l, <0.001 mg/l, <0.01mg/l & <0.05 mg/l. Total Coliforms & E. Coli were <2 No./100ml.

3.3.6 Air Environment

Ambient Air Quality (AAQ) is an indication of overall state of environment of a particular area. AAQ is an important measure for healthy environment and its degradation causes various long- term impacts on the human health. AAQ can be termed to be good only if it is having proportionate concentrations of natural gases like oxygen, nitrogen etc. Toxic gases like SO2, NOx, CO, CO2, Hydrocarbons, and chlorofluorocarbons; introduced through various polluting sources cause degradation of ambient air quality. To identify the air quality in the study area, primary air samples are taken at particular locations in the direct neighborhood of the project site.

To know the baseline air environment, it is important to have information about the area's climatic conditions and primary parameters or meteorology such as rainfall data, wind direction and wind speeds. This data can help recognize the way air pollutant dispersion may happen on the project site.

3.3.6.1 Climate Conditions in the Study Area

Based on the Indian Meteorological Department (IMD) data for Pune Station, the average annual rainfall is 1076 mm in the study area. The Wind rose diagram on the study area for the study period from March 2024 to May 2024, it can be inferred that the Winds are observed to blow from_direction for max. Speed during the study period. Wind is blowing from East to West direction during baseline period.

3.3.6.2 Air Environment

Climate: The climate of Pune is dry. The cold season from November to February is followed by the hot season lasting up to early June. The periods from early June to about the beginning of October constitute the southwest monsoon season. The Succeeding period up to November is the post monsoon or transition season.

Wind: Winds are in generally light to moderate with an increase in force during the monsoon season. Winds are variable in direction during October. Winds during November and December are generally calm or blow mainly from the east or southeast. In the rest of the year the winds are mainly from directions between southwest and northwest, the south-westerlies and westerlies being more common during the late summer and monsoon seasons than before that period.

Cloud Cover: During the monsoon season the skies are generally heavily clouded or overcast. During the season, for brief spells of a day or two, occasionally, passing western disturbances cause cloudy weather. In the latter part of the summer season, especially the afternoons, clouding increases.

Rainfall: The average annual rainfall in the district is 700 mm. About 87 per cent of the annual normal rainfall in the district is received during the monsoon months June to September, July being the rainiest month generally. Some rainfall, mostly in the form of thundershowers is received during the pre-monsoon months of April and May and during the Post-monsoon months.

Humidity: During the monsoon season the humidity is usually between 70 and 80 per cent on the average. The humidity is comparatively less in the rest of the year. Mornings are generally more humid than the afternoons. Summer afternoons with less than 30 per cent humidity are the driest. Air Dispersion Modelling Report is explained in next chapter.

Meteorology

The parameters for which data have been collected are:

- Wind speed
- Wind direction
- Temperature
- Relative humidity
- Cloud cover
- On Site Micro - Meteorology at site
- Meteorological station was set-up at site, to record surface meteorological data; during the summer season i.e. December to February; the Wind speed and wind direction data recorded.

Figure 3.12: Wind Rose for Period January 2024 to December 2024

Baseline data on Ambient Air Quality

Ambient air quality is the most important parameter that is required to quantify the impact on the natural and biophysical environment. The ambient air quality status of the study area is mainly dependent on the topographical features, background levels, concentration of specific air pollutants and local meteorological conditions. In addition, it varies with respect to proximity and magnitude of traffic density, commercial activities and industrial zones, which are likely sources of atmospheric emissions.

Ambient air quality in study area

Ambient air quality of the study area has been calculated during study period March 2024 to May 2024, through a network of eight air quality stations within an area of 10 km region around the project site. The locations for Ambient Air Quality Monitoring were decided based on the guidelines given in EIA manual from MoEF&CC and micro and macro meteorological condition like wind direction, wind speed, temperature etc.

The monitoring stations have been set-up to find the locations as close as likely to the expected maximum pollutant concentration areas. Logistic concern such as availability, security and accessibility of consistent power supply etc. were also observed while finalized the stations.

The concentrations of PM10, PM2.5, SO2, NOX and CO samples were collected as 24-hourly average by drawing air at the rate of 1.0 -1.5 m^3/min through glass fiber filter paper and analyzing by the gravimetric method. Concentrations of SO2 and NOX were analyzed by absorption & colorimetric method. Pre-calibrated fine dust particulate samplers were used for monitoring of PM10& PM2.5.

The Monitoring and analysis of the samples was carried out through the NABL approved laboratory. To understand the air quality in the study area, primary air samples are taken at specific locations in the immediate vicinity of the project site. Below figure gives the locations of air sampling stations in the study area.

Table 3.11 Ambient Air Quality Monitoring Location

Code	Location	Latitude	Longitude	Distance	Direction
A1	Project site	18°32'7.38"N	73°54'54.81"E	-	-
A2	Koregaon Park Annexe	18°31'55.55"N	73°54'55.45"E	S	0.44
A3	Marigold Complex	18°32'37.63"N	73°54'30.28"E	NW	1.14
A4	Ganesh Garden	18°32'3.87"N	73°55'46.68"E	E	1.52
A5	Agarkar Nagar	18°31'41.21"N	73°52'13.89"E	SW	4.77
A6	Sasane Nagar	18°29'31.57"N	73°56'3.68"E	SE	5.26
A7	Laxmi Nagar	18°33'2.45"N	73°52'47.67"E	NW	4.09
A8	Anand Park Sciety	18°29'53.52"N	73°52'18.85"E	SW	6.22

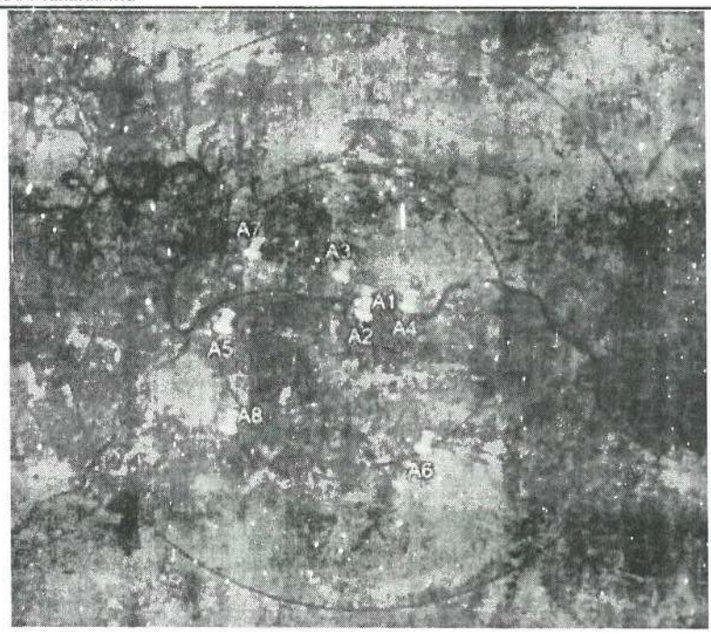


Figure 3.13: Ambient Air Quality Monitoring Location

Table 3.12 Details of The Air Sampling Locations

Station code	Locations		PM 10 24 hr µg/m3	PM2.5 24 hr µg/m3	SO2 24 hr µg/ m3	NOx 24 hr µg/m3	CO mg/m3 mg/m3
A-1	Project site	Average	51.25	30.73	22.06	26.28	0.84
		Maximum	56.3	36.1	25.8	30.2	1.2
		Minimum	47.1	26.5	17.4	21.1	0.4
A-2	Koregaon Park Annexe	Average	53.87	34.50	23.87	29.24	0.93
		Maximum	58.4	38.5	27.4	36.5	1.3
		Minimum	48.3	28.5	19.2	23.1	0.5
A-3	Marigold Complex	Average	53.73	32.13	21.97	27.10	0.8
		Maximum	59.6	38.1	26.4	30.7	1.5
		Minimum	47.5	26.4	17.6	22.3	0.4
A-4	Ganesh Garden	Average	56.64	36.86	27.85	28.33	1.70
		Maximum	61.8	41.6	29.3	32.1	1.7
		Minimum	52.2	31.5	22.1	3.51	0.8
A-5	Agarkar Nagar	Average	56.66	35.86	25.38	30.70	1.22
		Maximum	61.4	40.3	29.4	34.6	1.6

		Minimum	51.2	31.2	22.1	27.1	0.7
A-6	Sasane Nagar	Average	53.43	32.74	24.27	29.09	1.03
		Maximum	59.4	38.3	28.6	32.2	1.4
		Minimum	49.2	28.2	21.1	24.5	0.6
A -7	Laxmi Nagar	Average	54.79	33.52	23.78	28.56	0.95
		Maximum	60.3	38.9	27.5	33.6	1.5
		Minimum	50.3	29.1	20.3	25.1	0.5
A-8	Anand Park Society	Average	56.62	35.71	26.71	31.37	1.41
		Maximum	63.8	42.1	30.6	36.6	1.8
		Minimum	53.4	32.1	23.4	27.6	1.0
Permissible AAQ standard (CPCB)	Residential, Rural, Industrial	Average	100	60	80	80	04
	Sensitive	Average	100	60	80	80	04

Note: Samples were collected for three months.

The permissible standards are as per National Ambient Air Quality Standard (NAAQS) issued by Central Pollution Control Board (CPCB) is B-29016/20/90/PCI-I dated November 18, 2009.

Ambient Air Quality analysis results

Particulate Matter (PM_{10})

The study reveals that maximum concentration was observed to be in the range of 47.1– 63.8 $\mu g/m^3$. The highest 24-hourly concentration was recorded at sampling location A8. At the same time, minimum concentration was observed at location A1. The average concentration of PM_{10} can be said to be ranged between 51.25 -56.66 $\mu g/m^3$. The high concentration of particulate matter recorded at project site (A8) may be due to local vehicular movement on unpaved road.

Particulate Matter ($PM_{2.5}$)

The major source of $PM_{2.5}$ is said to be the combustion of fossil fuels, fire wood and industrial emissions etc, present within study area. The maximum of $PM_{2.5}$ (42.1$\mu g/m^3$) during the study period was recorded at location A8, whereas the minimum value (26.4$\mu g/m^3$) concentration was recorded at A3 location. The average concentration of $PM_{2.5}$ during the study period was computed to be in the range of 30.73-36.86$\mu g/m^3$.

Sulphur Dioxide (SO_2)

High level of SO_2 in ambient air indicates the presence of combustion of fossil fuel in the vicinity. The maximum of SO_2 (30.6$\mu g/m^3$) during the study period was recorded at location A8, whereas the minimum value (17.4 $\mu g/m^3$) concentration was recorded at A1 location. The average concentration of SO_2 during the study period was computed to be in the range of 21.97-27.85$\mu g/m^3$.

Oxides of Nitrogen (NOx)

The various forms of Nitrogen in NO, NO_2 and N_2O are collectively called as Oxides of Nitrogen. The highest value of NO_X during the monitoring period was observed at location A8 while the minimum average was recorded at A1. The average concentrations were in the range of 27.10-31.37$\mu g/m^3$. The maximum 24-hourly value of NO_X was recorded at the monitoring location A8 (36.6 $\mu g/m^3$) whereas the minimum concentration of NOx was recorded at location A1 (21.1$\mu g/m^3$).

Carbon Mono oxides (CO)

The anthropogenic source of CO is due to incomplete combustion of fuel majorly in absence of air. The

maximum concentration of CO estimated at all locations during the study period can be observed is 1.2-1.8 mg/m^3.

Conclusion:

All parameters were observed to be within the permissible limit compared to NAAQS standard Major source observed was vehicular traffic and other urbanized activity.

The concentrations of PM10, PM2.5, SO2 NOx and CO were found within the National Ambient Air Quality Standards (NAAQ).

Air quality modelling study is carried out with an objective to estimate and analyze concentrations of air pollutants and their impact on surrounding areas. Air emissions are estimated following appropriate scientific methods, using activity data and emission factors prescribed by agencies such as CPCB and ARAI. ERA5 meteorological reanalysis data for parameters including temperature, cloud cover, wind speed and direction is used for the modelling analysis. Background concentrations data is obtained from air quality monitoring data collected on proposed site during study period i.e. March 2024 to May 2024. The data collected during the study period was then used as input to simulate the concentrations of selected pollutants viz. PM10, PM2.5, CO, NO2 and SO2. Steady state Gaussian plume dispersion model, AERMOD, is used to simulate the ground level concentrations of the selected pollutants.

3.3.7 Noise Environment

Noise caused due to construction equipment and activities are a significant source of environmental pollution. Hence, before any project activity begins, it is important to determine the baseline noise levels on the project site and its immediate neighborhood.

Noise generating sources have been identified with respect to the activities, viz. construction noise and ambient noise. The measurements were carried out in such a way that the monitoring locations were 1 m away from the sources and 1 m away from the edge of the roads.

Noise monitoring was conducted at 8 locations within the study area. The background-monitoring program was done in accordance with the requirements of an EIA study. Sound pressure level (SPL) measurements were automatically recorded to give the noise level for every hour continuously for 24 hours in a day. These monitoring locations are detailed in Table 3.13.

Table 3.13 Noise Monitoring Locations

Code	Location	Latitude	Longitude	Distance (Km)	Direction
N1	Project site	18°32'7.38"N	73°54'54.81"E	-	-
N2	Koregaon Park Annexe	18°31'55.55"N	73°54'55.45"E	S	0.44
N3	Marigold Complex	18°32'37.63"N	73°54'30.28"E	NW	1.14
N4	Ganesh Garden	18°32'3.87"N	73°55'46.68"E	E	1.52
N5	Agarkar Nagar	18°31'41.21"N	73°52'13.89"E	SW	4.77
N6	Sasane Nagar	18°29'31.57"N	73°56'3.68"E	SE	5.26
N7	Laxmi Nagar	18°33'2.45"N	73°52'47.67"E	NW	4.09
N8	Anand Park Sciety	18°29'53.52"N	73°52'18.85"E	SW	6.22

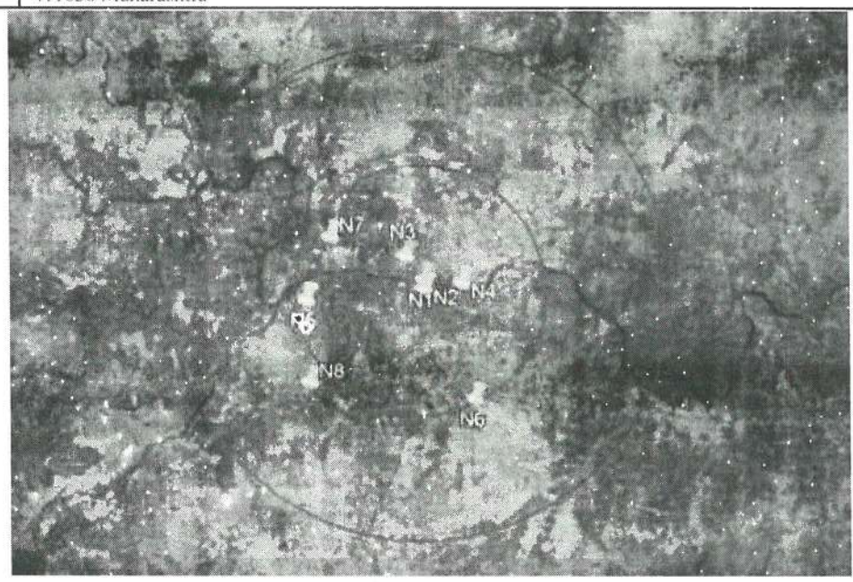


Figure 3.14 Noise Monitoring Location

Table 3.14: Noise Monitoring Results

Code	Location	Day Leq dB(A) (6.00 am to 10.00 pm)	Night Leq dB(A) (10.00 pm to 6.00 am)
N1	Project site	51.2	41.15
N2	Koregaon Park Annexe	52.42	42.87
N3	Marigold Complex	51.64	41.54
N4	Ganesh Garden	52.74	43.24
N5	Agarkar Nagar	52..0	41.91
N6	Sasane Nagar	52.59	43.0
N7	Laxmi Nagar	51.70	41.74
N8	Anand Park Society	52.48	42.18
Noise pollution rules 2000	Residential Zone	55	45
	Silence zone	50	40
	Commercial Zone	65	55

Inference:
The day time noise level at the project premises was observed to be 52.74 dB (A) while during night time the noise level was recorded to be 41.15 dB (A). It shall be noted that the noise levels during the day time as well as night time were estimated to be under the prescribed standards by CPCB.

Obtained Ambient Noise Quality results were compared with Noise Pollution Rules 2000. It can be concluded that as per category wise distribution (Commercial/Residential/Silence zones), results were below permissible limit.
All monitoring reports are enclosed as **Annexure 2.**

3.3.8 Ecological Biodiversity Study

The study of biological environment is one of the most important aspects for Environmental Impact Assessment. Ecological systems show complex inter-relationships between biotic and abiotic components including dependence, competition and mutualism. Flora represents the plant and fauna the animal life that are present in a particular region or habitat at a particular time. In the last few decades a steady increase in the extinction rate of flora and fauna has been noticed. Therefore, conservation of biological biodiversity has become importance to the survival of man and to preserve the continuity of food chains.

Biotic components comprise of both plant and animal communities, which interact not only within and between them but also with the abiotic components viz. physical and chemical components of the environment. Generally, biological communities are the indicators of climatic and edaphic factors.

The objectives of the study were,

The present study was undertaken with the following objectives:

- To assess the nature and distribution of vegetation in and around the project site and identify the flora and fauna, rare and endangered species (if any)
- To prepare list of Flora and Fauna of the study area along with classification for fauna as per Schedule given in the Wildlife (Protection) Act, 1972 and IUCN.
- To evaluate the distribution of animal life spectra, including avifauna and butterflies, available in this area
- To find out whether the development will have any adverse impact on the ecology in and around project areas and suggest mitigation measures, if needed.

3.3.8.1 Study Area

As per guidelines of MoEF & CC for Environmental Impact Assessment, pertaining to Construction projects, total study area is restricted up to 10 km periphery from the project site, of which primary data need to be collected from the area up to 500 m periphery, while remaining 9.5 km will be represented by secondary data. The data up to 500 m surroundings were generated with reference to topography, land use, vegetation pattern, animals etc. All observations were undertaken during site visit and select sampling locations.

To recommend suitable environment management plan to minimize any adverse impact on adjacent area due to the proposed project.

Activities undertaken during survey:

- Flora survey
- Tree, shrub, herb, climber and grass species identification and enumeration
- Diversity of species under plantations
- Analysis of Rare-Endangered-Threatened flora

- Fauna survey
- Documentation of Avian, Reptilian, Insect, Amphibian, Mammal, and other faunal diversity
- Observations by direct and indirect evidence (Direct evidence- Sighting and hearing, Indirect evidence- Pug marks, nests, and other signs)
- Analysis of Scheduled species

- Habitat/microhabitat diversity in the Core site and Buffer areas

- Photo documentation

3.3.8.2 Survey Methodology:

Random quadrate method:

The land use / land cover images prepared by remote sensing technology were used for vegetation survey. Study area is dominated by the natural vegetation of reserved forest, which includes dense or sparse evergreen forests, degraded forests. On the basis of forest cover the sampling stations were decided, while the density and diversity were calculated by using quadrate method. The quadrate method includes lying down of a square sample plot of suitable size for detailed analysis of vegetation. It may be a single sample plot or may be divided into several subplots.

Quadrates of 10m x10m, 5m x5m and 1m x1m were used for trees, shrubs and herbaceous communities respectively. (John G. Rau and David C. Wooten, Environmental Impact Analysis handbook, 1980, pp1-44).

To characterize vegetation in the study area, the primary data was collected and analysed for describing the characteristics of vegetation with reference to species composition and structural attributes. The diversity measurements reflect as to how many diverse species are present, while the density measurements indicate number of individuals of a species in the study area. Species diversity is the best measure of community structure and it is sensitive to various environmental stresses. Smaller value of Simpson's Diversity Index shows healthy ecosystem and the higher value shows that an ecosystem is under environmental stress. Formulae for analysing phytosociological characteristics of vegetation are as follow,

$$\text{Density} = \frac{\text{Number of individual species A}}{\text{Area Sampled}}$$

$$\text{Relative Density} = \frac{\text{Density of species A}}{\text{Total density of all species}} \times 100$$

$$\text{Dominance} = \frac{\text{Total cover of basal area of species A}}{\text{Area sampled}}$$

$$\text{Relative dominance} = \frac{\text{Dominance of species A}}{\text{Total dominance of all species}} \times 100$$

$$\text{Frequency} = \frac{\text{Number of plots in which species A occurs}}{\text{Total number of plots sampled}}$$

$$\text{Relative Frequency} = \frac{\text{Frequency value for species A}}{\text{Total frequency values of all species}} \times 100$$

$$\text{Importance ValueIndex} = \frac{\text{R. Density + R. Dominance + R. Frequency}}{3}$$

$$\text{Simpson's Diversity Index} = \sum_{i=1}^{n} \frac{ni\,(ni-1)}{n\,(n-1)}$$

ni - is the number of individuals of the i^{th} species in the sample and

n - is the total number of individuals in the sample.

Transect Method:

Systematic sampling in each habitat in a belt transect at regular intervals along environmental gradient (significant with respect to the project or with respect to the flora / fauna present / existing) as identified at the site present / existing) as identified at the site. In general, the width of belt transect is taken as 50m. The width, length and sampling interval of belt transect may vary depending on the field judgment viz. Based on site conditions, Size of the particular habitat, Significant environmental gradient, Type of biological sampling being done etc.

The roadside counts of birds were undertaken following standard procedures by traversing a given distance in which designated sampling areas occur. The milometer of the vehicle was used to measure the stretch of the study area. Birds were studied by direct observation with the help of binocular and were identified by consulting the available literature. The field data were collected by walking through the sampling sites and also the different locations in study area. The birds were identified with the help of standard book. (Ref: The books of Indian Birds by Salim Ali)

In the present study area is an urban commercial area with a well-developed civic infrastructure. However, the project being residential/commercial in nature, following steps are carried out during the field survey, above transect method is use for ecology biodiversity survey,

- Study area for primary data collection is up to 500 m from the project site.
- Physical inspection and recording the state of biodiversity at selected vegetation patches, each of about 400 Sq. mt. were undertaken in 4 locations.
- Checklist of trees, shrubs, herbs, grasses & climbers from the study area was prepared.
- Different types of animals, including avifauna and butterflies available in this area, have been recorded.
- Secondary data, pertaining to 10 Km boundary from the project site have been collected from literature, forest department, and discussions with local people & NGOs.
- Probable impact, if any, of project activity on biota and mitigation measures have been delineated.

3.3.8.3 Study Area

As per guidelines of MoEF & CC for Environmental Impact Assessment, pertaining to Construction projects, total study area is restricted up to 10 km periphery from the project site, of which primary data need to be collected from the area up to 500 m periphery, while remaining 9.5 km will be represented by secondary data. The data up to 500 m surroundings were generated with reference to topography, land use, vegetation pattern, animals etc. All observations were undertaken during site visit and select sampling locations (Figure 3.14).

3.3.8.4 Observation:

A. Project site

Study of biological environment is one of the important aspects in environmental impact assessment in view of the need for conservation of environmental quality. Natural flora and fauna are the two important components of the biological environment of the ecosystem. They are organized into natural communities and constantly interact with their physical environment as well as among themselves. They show various responses and sensitivities to outside influences. The need to assess the change in status of the animal and plant resources is the primary requirement for a meaningful assessment. In view of this, baseline studies of biological environment with reference to terrestrial and aquatic ecosystem under the study area were carried out. Information regarding ecological resources was collected through field visits and from records of different Government Departments.

The main objective of biological survey is to collect the baseline data regarding flora and fauna in the study area. Data has been collected through extensive survey of the area with reference to flora and fauna. Information is also collected from different Government Departments, such as Social Forestry, Animal Husbandry & Forest Office of Pune, Government of Maharashtra. On the basis of onsite observations as well as forest department records the checklist of flora and fauna was prepared.

I. Terrestrial Ecology:

Based on field survey and land use map, one location (1) was selected within the project site for field survey (Figure 3.14).

Trees and ecological survey for project site was carried out to study the ecological characteristics. The observations were carried out for the flora and fauna within the site boundaries during the survey. Insects, reptiles and birds were observed during the site visit. These observations also part of this report

There are 776 existing/retained trees on site. Retained trees will be protected from all construction activity so they flourished well. The most common species observed are Godi Babhul (*Acacia nilotica*), Subabhul (*Leucaena leucocephala*) and Vilayati babul *(Prosopis juliflora)*. Although the existing fauna on site is restricted to few varieties it shows a well-balanced ecosystem. The list of plant species presented below,

Sr. Nos.	Tree name	Number of trees
1.	*Acacia nilotica (L.) Delile*	48
2.	*Acacia catechu (L.f.) Willd.*	1
3.	*Albizia lebbeck (L.) Benth.*	1
4.	*Albizia saman (Jacq.) Merr.*	8
5.	*Annona squamosa L.*	2
6.	*Azadirachta indica A.Juss.*	45
7.	*Bauhinia purpurea L.*	1
8.	*Butea monosperma (Lam.) Taub.*	2
9.	*Cocos nucifera L.*	2
10.	*Cordia dichotoma G.Forst.*	1
11.	*Dalbergia lanceolaria L.f.*	1
12.	*Delonix regia (Hook.) Raf.*	4
13.	*Eucalyptus globulus Labill.*	23
14.	*Ficus virens Aiton*	1
15.	*Ficus benghalensis L.*	1
16.	*Ficus racemosa L.*	1
17.	*Ficus religiosa L.*	10
18.	*Grevillea robusta A.Cunn. ex R.Br.*	1
19.	*Holoptelea integrifolia Planch.*	14
20.	*Leucaena leucocephala (Lam.) de Wit*	328
21.	*Mangifera indicaL.*	6
22.	*Manilkara zapota (L.) P.Royen*	2
23.	*Markhamia lutea (Benth.) K.Schum.*	6
24.	*Millingtonia hortensis L.f.*	2
25.	*Moringa oleifera Lam.*	6
26.	*Muntingia calabura L.*	1
27.	*Phoenix sylvestris (L.) Roxb.*	1
28.	*Pithecellobium dulce (Roxb.) Benth.*	7
29.	*Pongamia pinnata (L.) Pierre*	1
30.	*Prosopis juliflora (Sw.) DC.*	176
31.	*Psidium guajava L.*	2
32.	*Putranjiva roxburghii Wall.*	1
33.	*Santalum album L.*	21
34.	*Spathodea campanulata P.Beauv.*	34
35.	*Syzygium cumini (L.) Skeels*	5
36.	*Tamarindus indica (L.) Skeels*	1

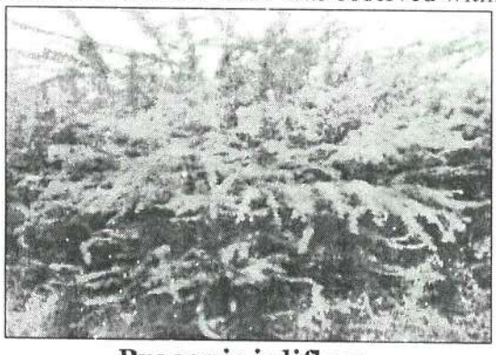
37.	*Terminalia catappa L.*	1
38.	*Ziziphus jujuba Mill.*	3
Total		**776 Nos.**

Few birds are noticed in the area as crows, parrots, and Indian Manias. A few Indian herons and Egrets were spotted near the river side area.
No rare bird was spotted in the survey. Common reptiles like Sarada and insect-like red tree ants, butterflies, and moths are seen. A few river-crabs were also noticed during the early morning on the river side area. No endangered flora and fauna have been noticed. Captured photos of Fauna are given below.

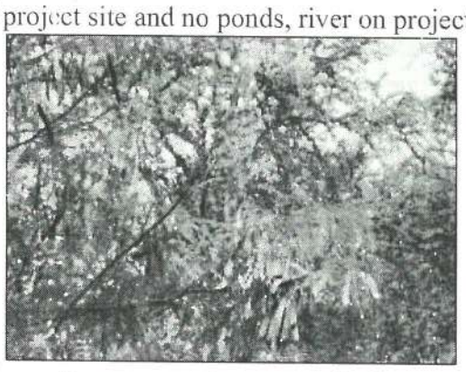
Common Indian crow

II. Aquatic Ecology

No source of surface water was observed within the project site and no ponds, river on project site.

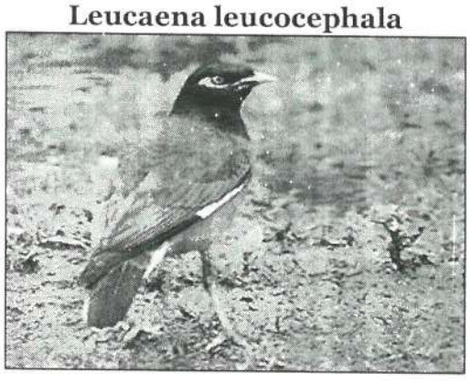


Prosopis juliflora

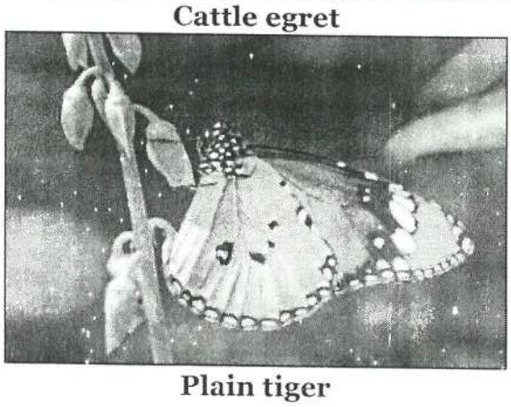


Leucaena leucocephala

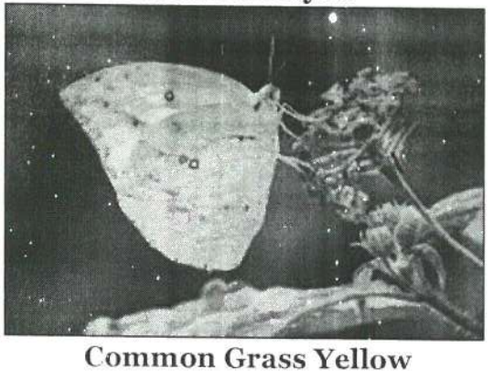
Cattle egret



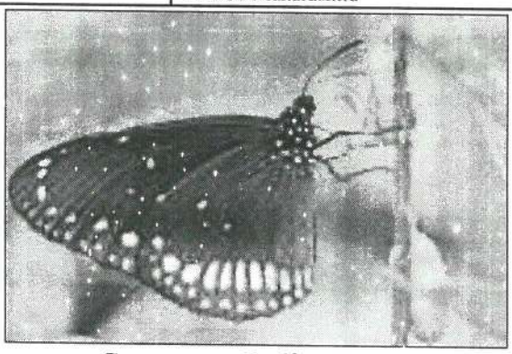
Common myna



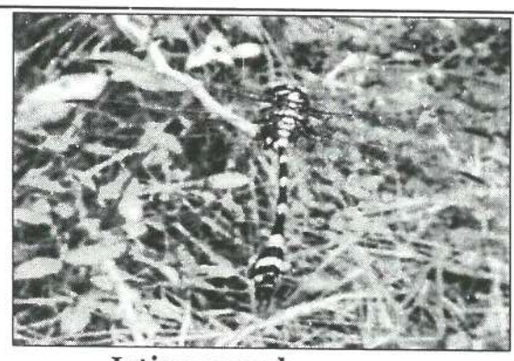
Plain tiger



Common Grass Yellow



Common Indian crow



Ictinogomphus rapax

B. Area between project site and 500 m surroundings:

I. Terrestrial Ecology:

a) Flora

3 locations viz, Near Gulmohar City (2), Near Tadi Gutta - Bus stop (3) and Near Mula Mutha River (4) (Figure 3.14) were selected for vegetation studies. Primary data were generated by preparing a general checklist of the plants encountered in these areas. The area showed overall 77 plant species. The area shows abundance of *Leucaena leucocephala, Peltophorum pterocarpum, Alstonia scholaris, Terminalia catappa, Pongamia pinnata, Ficus religiosa, Mangifera indica, Delonix regia* and *Lagerstroemia parviflora* etc.

Figure 3.15 Locations (1-4) of field survey within 500m periphery of project site

Presence of vegetation within 500m surroundings from the project site

Sr. No.	Scientific Name	Local Name	Family	IUCN Status
Tree				
1.	*Acacia Arabica**	Babul	Fabaceae	-
2.	*Acacia catechu**	Khair	Fabaceae	-
3.	*Acacia nilotica**	Australian Babhul	Fabaceae	-
4.	*Albizia lebbeck*	Siris	Fabaceae	-
5.	*Alstonia scholaris**	Saptaparni	Apocynaceae	LC
6.	*Anona squamosal*	Sitaphal	Annonaceae	-
7.	*Azadirachta indica**	Kadu neem	Meliaceae	LC
8.	*Anthocephalus cadamba*	Kadamb	Rubiaceae	-
9.	*Bauhinia racemosa**	Apta	Fabaceae	-
10.	*Bauhinia variegate*	Kanchan	Fabaceae	
11.	*Bombax spp.*	Kate sawar	Malvaceae	-
12.	*Bougainvillea spectabilis*	Boganvel	Nyctaginaceae	-
13.	*Caryota spp.*	fishtail palms	Arecaceae	-
14.	*Cassia fistula*	Bahava	Fabaceae	-
15.	*Dalbergia sisso**	Shisham	Fabaceae	LC
16.	*Delonix regia*	Gulmohar	Fabaceae	LC
17.	*Erythrina suberosa*	Pangara	Fabaceae	-
18.	*Eucalyptus spp.**	Nilgiri	Myrtaceae	-
19.	*Ficus benghalensis*	Vad	Moraceae	-
20.	*Ficus hispida*	kala umbar	Moraceae	-
21.	*Ficus racemose**	Umbar	Moraceae	LC
22.	*Ficus religiosa**	Pimpal	Moraceae	-
23.	*Jacaranda mimosifolia*	Neel Gulmohor	Bignoniaceae	VU
24.	*Lagerstroemia parviflora**	Bonda, Bondara	Lythraceae	-
25.	*Lagerstroemia Speciosa*	Jarul	Lythraceae	-
26.	*Leucaena leucocephala**	Subhabhul	Mimosaceae	-
27.	*Mangifera indica**	Amba	Anacardiaceae	DD
28.	*Melia azedarach*	Bakan neem	Meliaceae	-
29.	*Mimusops elengi*	Bakul	Sapotaceae	LC
30.	*Morinda citrifolia*	Bartondi	Rubiaceae	-
31.	*Moringa oleifera**	Shevga	Moringaceae	-
32.	Muntingia calabura	Singapore cherry	Eleocarpaceae	-
33.	*Nyctanthes arbor-tristis*	Parijatak	Oleaceae	-
34.	*Peltophorum pterocarpum**	Copper pod	Fabaceae	-
35.	*Phoenix sylvestris*	Shindi	Arecaceae	-
36.	*Prosopis juliflora**	Vilayati babul	Fabaceae	-
37.	*Polyalthia longifolia**	Ashok	Annonaceae	-
38.	*Pongamia pinnata*	Karanj	Fabaceae	-
39.	*Psidium guajava*	Amrood	Myrtaceae	LC
40.	*Saraca asoka**	Sita Ashok	Fabaceae	-
41.	*Samanea saman**	Rain Tree	Fabaceae	-
42.	*Sapindus mukorossi*	Ritha	Sapindaceae	-
43.	*Spathodea campanulata*	Pichkari	Bignoniaceae	-
44.	*Sterculia Foetida*	Jangali Badam	Malvaceae	-

Sr. No.	Scientific Name	Local Name	Family	IUCN Status
45.	*Syzygium cumini**	Jambhul	Myrtaceae	LC
46.	*Tamarindus indica**	Chinch	Fabaceae	LC
47.	*Terminalia catappa**	Badam	Combretaceae	-
48.	*Zizyphus xylopyra**	Ghout, Ghatbori	Rhamnaceae	-
Shrubs				
1.	*Canna malawiensis*	Canna dwarf	Cannaceae	-
2.	*Cordyline fruticosa*	Palm Lily	Asparagaceae	
3.	*Calotropis gigantean**	Rui	Apocynaceae	-
4.	*Hibiscus rosa-sinensis**	Jaswand	Malvaceae	-
5.	*Holarrhena antidysenterica*	Kuda, Pandhrakuda	Apocynaceae	-
6.	*Ixora Coccinea**	Bakora	Rubiaceae	-
7.	*Jasminum pubescens*	Ranmogra, Ranjai	Oleaceae	-
8.	*Jatrojpha curcas*	Mogli Erandi	Euphorbiaceae	-
9.	*Lantana Camara**	Ghaneri	Verbenaceae	-
10.	*Nerium odorum*	Kanher	Apocynaceae	-
11.	*Ricinus communis**	Erand	Euphorbiaceae	-
12.	*Solanum indicum**	Bhui, Ringani	Solanaceae	-
13.	*Vitex negundo**	Nirgudi	Lamiaceae	-
Herbs				
1.	Argemone Mexicana*	Pivla-dhotra	Papavaraceae	-
2.	*Celosia argentea*	Kurdu	Amaranthaceae	-
3.	*Catharanthus roseus**	Sadaphuli	Apocynaceae	-
4.	Ocimum sanctum*	Tulsi	Lamiaceae	-
5.	*Tridax procumbens*	Coatbuttons	Asteraceae	
6.	*Urena Lobata*	Vanbhendi	Malvaceae	-
Grass				
1.	*Bambusa arundinacea*	Bamboo	Poaceae (Grass)	-
2.	*Cynodon dactylon**	Dhurva	Poaceae	-
3.	*Cyperus spp.*	Motha	Cyperaceae	-
4.	*Fimbristylis spp*	---	Cyperaceae	-
Climbers				
1.	*Bougainvillea spp.*	-	Nyctaginaceae	-
2.	*Cocculus villosus*	Parvel	Ranunculaceae	-
3.	*Cyclea burmanni*	Pakav	Ranunculales	-
4.	*Epipremnum spp.**	Money plant	Araceae	-
5.	*Tinospora cordifolia*	Gulvel	Menispermaceae	-
6.	*Trachelospermum jasminoides**	Jasmine	Apocynaceae	-

Note: Source: Primary data generation by **Element Consultancy** team; LC- Least concern, NT- Near Threatened & VU- Vulnerable

* Observed on site in and around project site

Fauna:

Methodology The commonly available fauna i.e. mammals, amphibians, reptiles, butterflies, dragonflies and damselflies around 500 m of project site were enumerated. The method followed for avifauna survey has been outlined in respective section.

Observation

Vertebrates

The domestic animals in the study area mostly comprised of buffalo, dog and cow the survey revealed that 5 species of common mammals were recorded, while no wild mammal was observed in this area. 20 avifaunal species were recorded in study area, which has been addressed separately and 1 species of reptiles were recorded. Availability of fauna in the vicinity of the site. None of these animals are endangered (Schedule I) as per Wildlife (Protection) Act 1972.

Avifauna

Birds were studied by direct observation with the help of binocular and were identified by adopting available literature. A total of 20 bird species dominated by blue rock pigeon, House crow, Indian black drongo, Jungle Babbler, Indian myna, Koel, Small green bee-eater and Rose-ringed Parakeet etc. None of these birds are endangered (Sch I) as per Wildlife (Protection) Act 1972.

Invertebrates

Butterflies: Study area comprised of 7 species of butterflies, dominated by Common grass yellow, Common Indian crow *and* Plain tiger *etc.* Butterfly diversity and community composition are dependent on plants, as their caterpillars are highly specific to host plants, on which they feed and metamorphose into the adults. Therefore, richness of host plant diversity contributes to butterfly diversity. None of these is endangered (Schedule I) as per Wildlife (Protection) Act 1972.

Dragonflies: Three species of dragonflies were recorded in 500 m surroundings. Species *Ictinogomphus rapax* are commonly seen throughout the project area.

Fauna recorded in the study area up to 500m periphery

Sr. No.	Local Name	Scientific Name	Family	IUCN Status	Conservation status as per Wildlife (Protection) Act 1972
Mammals					
1.	Common cat	*Felis silvestris catus*	Felidae	-	Not enlisted
2.	Common dog*	*Canis lupus familiaris*	Canidae	-	Not enlisted
3.	Cow	*Bos taurus*	Bovidae	-	Not enlisted
4.	Domestic buffalo	*Bubalus bubalis*	Bovidae	-	Not enlisted
5.	Squirrel*	Funambulus palmarum	Sciuridae	LC	Sch-IV
Reptiles					
1.	Common garden lizard*	*Calotes versicolor*	Agamidae	-	Not enlisted
Butterflies					
1.	Blue Mormon	*Papilio polymnestor*	Papilionidae	LC	Not enlisted
2.	Blue tiger	*Tirumala limniace*			
3.	Common grass yellow*	*Eurema hecabe*	Pieridae	-	Not enlisted
4.	Common Indian crow*	*Euploea core*	Nymphalidae		Sch – IV
5.	Common leopard	*Phalanta phalantha*	Nymphalidae	-	Not enlisted
6.	Common pierrot	*Castalius rosimon*	Lycaenidae	-	Not enlisted
7.	Plain tiger*	*Danaus chrysippus*	Nymphalidae	-	Not enlisted
Dragonflies					
1.	Common clubtail*	*Ictinogomphus rapax*	Gomphidae	LC	Not enlisted

Sr. No.	Local Name	Scientific Name	Family	IUCN Status	Conservation status as per Wildlife (Protection) Act 1972
2.	Golden dartlet	*Ischnura aurora*			Not enlisted
3.	Red marsh trotter	*Tramea basilaris*	Libellulidae	LC	Not enlisted
Avifauna					
1.	Blue rock pigeon*	*Columba livia*	Columbidae	LC	Sch – II
2.	Cattle egret*	*Bubulcus ibis*	Ardeidae	LC	Sch – II
3.	Grey heron	*Ardea cinerea*	Ardeidae	LC	Sch – II
4.	House crow*	*Corvus splendens*	Corvidae	LC	Sch – II
5.	House sparrow	*Passer domesticus*	Passeridae	LC	Sch – II
6.	House swift	*Apus affinis*	Apodidae	LC	Sch – II
7.	Indian black drongo *	*Dicrurus macrocercus*	Dicruridae	LC	Sch – II
8.	Indian cuckoo*	*Cuculus micropterus*	Cuculidae	LC	Sch – II
9.	Indian myna*	*Acridotheres tristis*	Sturnidae	LC	Sch – II
10.	Jungle Babbler	*Turdoides striatus*	Leiothrichidae	LC	Not enlisted
11.	Jungle crow	*Corvus macrorhynchos*	Corvidae	LC	Sch – II
12.	Koel	*Eudynamys scolopacea*			Sch – II
13.	Little cormorant	*Phalacrocorax niger*	Phalacrocoracidae	LC	Sch – II
14.	Oriental magpie robin	*Copsychus saularis*	Muscicapidae	LC	Sch – II
15.	Puff-throated Babbler	*Pellorneum ruficeps*	Pellorneidae	LC	Not enlisted
16.	Red vented bulbul*	*Pycnonotus cafer*	Pycnonotidae	LC	Sch – II
17.	Rose-ringed Parakeet	*Psittacula krameri*	Psittaculidae	LC	Not enlisted
18.	Small blue kingfisher	*Alcedo atthis*			Sch – II
19.	Small green bee eater *	*Merops orientalis*	Meropidae	-	Sch – II
20.	Small Minivet	*Pericrocotus cinnamomeus*	Campephagidae	LC	Sch – II

Note: Source: Primary data generation by **Element Consultancy** team; LC- Least concern, NT- Near Threatened & VU- Vulnerable

*Observed on site in and around project site

II. Aquatic Ecology:

The surroundings of the project site are covered built-up land. Mula-mutha river is source of surface water was observed.

3.8.5 Secondary data:

Area between 500m and 10 km of the project boundary

Methodology: The data pertaining to flora and fauna have been collected based on discussions with

concerned forest department officials, local people, NGOs and published literature. Secondary data also referred and collocated during study. The collated data have been delineated hereunder.

I. Terrestrial Ecology:

A sizable portion is covered by Barren land, forest vegetation, built up land, open land within 10 Km periphery of the study area. There are many varieties of trees like *Peltophorum pterocarpum, Alstonia scholaris, Terminalia catappa, Ficus religiosa, Acacia catechu, Ficus religiosa* and *Azadirachta indica* etc. Shrubs like *Calotropis gigantean, Hibiscus rosa-sinensis, Ricinus communis, Lantana Camara and Nerium odorum* etc. and herbs like *Tridax procumbens, Urena Lobata, Catharanthus roseus and Argemone mexicana* etc.

Wild Animals: No wild animals were sighted, as per views of local people.

Domestic Animals: The domestic animals in the study area mostly comprises of goat, buffalo, dog and cow.

Avifauna: Based on discussions with local people and forest officials, it is recorded that besides commonly available birds' species was observed within 10 km boundary of the project site. Also, raptors like Jungle Babbler, Puff-throated Babbler, Rose-ringed Parakeet etc. were also observed as per views of local people. Flocks of aquatic birds like cattle egret were spotted near bank of Mula-mutha river.

II. Aquatic Ecology:

Some of the water bodies are present within 10 Km boundary of the project site.

• **Flora and fauna,** the data pertaining to flora and fauna for above river and lakes have been collected based on discussions with concerned staff members, gardener, local people, by attending nature trail under WWF, guards and supported by physical verifications, wherever feasible. The collated data for the wetlands have been delineated hereunder

Particulars of different Creek, Lakes and River within 10 km surrounding of the project area

Sr. No.	Name of River/Lakes within 10 km Surroundings	Distance / Directions	Information
Mula-Mutha River Abutting to plot/ North			
1.	Mula River	6.28/ West	Total of 162 algal species belonging to 75 genera were recorded at selected sampling stations at Mula River throughout the study period. **Phytoplankton Diversity:** High polluted water has some tolerant phytoplankton species such as *Scenedesmus*, *Chlorella*, *Euglena*, *Oscillatoria*, *Melosira*, *Nitzschia*, *Fragilaria* which were recorded from downstream stations. Similar observation recorded by Goel *et al.* (1986). The occurrence of certain pollution tolerant species such as *Microcystis*, *Oscillatoria*, *Chlorella*, *Scenedesmus*, *Ankistrodesmus*, *Fragilaria*, *Euglena* and *Phacus* clearly indicates organic pollution (Palmer 1969; Tiwari and Shukla 2007). Source:http://www.globalsciencebooks.info/Online/GSBOnline/images/2012/TAET_6(2)/TAET_6(2)136-142o.pdf

2.	Mutha River	5.82/ West	A total of 243 flowering plant species belonging to 204 genera and 68 families were recorded from various sites located along the river. **Trees:** Mangifera indica, Polyalthia longifolia, Cassia siamea, Delonix regia, Bauhinia purpurea, Cassia fistula etc **Shrub:** Adhatoda vasica, Carissa carandas, Calotropis gigantea etc **Herbs:** Tridax procumbens, Xanthium strumarium, Blumea spp, Cassia tora etc Source:https://www.researchgate.net/publication/376630422_An_Exploration_of_Plant_Diversity_Along_the_Mutha_River_Banks_in_Pune_Maharashtra_India#:~:text=A%20total%20of%20243%20flowering,followed%20by%20Khadakwasla%20(93).

3.8.6 Forest and National Parks/ Sanctuaries

As per records of Divisional Forest Office and Toposheet there is no national park and no sanctuary is there within 10 km periphery of the project site. The details are as follows:

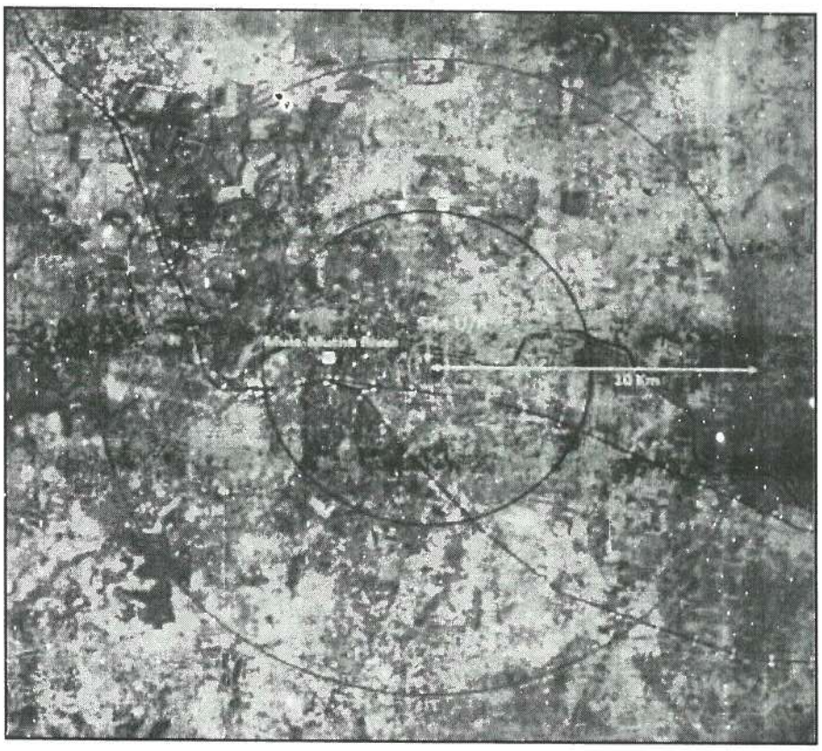


Figure 3.16 - 10 km radius Google Earth Map and Distance from project site

(Project site is outside of the National Parks and Sanctuaries)

3.3.9 Socio – Economic Environment

3.3.9.1. Introduction

Socio-economic study of the area is a part of environmental impact assessment study for the proposed power project. Socio-economics, a component of environment includes description of demography, available basic amenities like housing, health care services, transportation, education and cultural activities. Information on the above said parameters has been collected to define the socio-economic profile of the

study area (10-km radius).

Socio-demographic features / survey are very useful for understanding social and economic issues and identifying potential solutions. To understand the socio demographic status and the trends of the communities in the 10 km radial area, Census 2011 & District census handbook 2011 has been contemplated and necessary data collected and compiled from it. The Village Map of the Study Area is as provided in Figure 3.16.

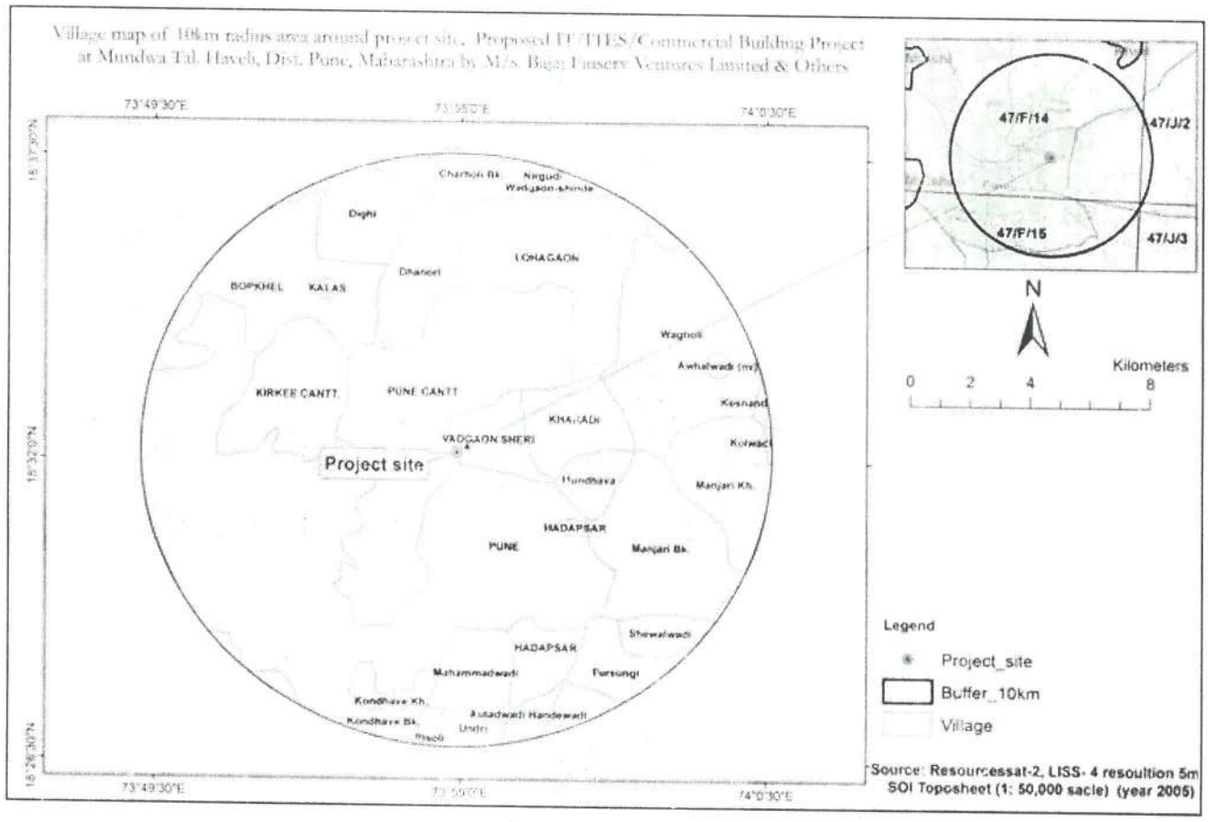


Figure 3.17 Village Map of the Study Area

Baseline Status

Baseline information is collected after delineation of the baseline study area in order to study the Socio-economic profile of the project affected area. The process related to baseline database analysis includes:

- Demographic Structure
- Infrastructure Base
- Economic Structure
- Health Status
- Cultural Attributes
- Salient Observations

The demographic structure of the study area was derived primarily from data of Census record of Pune District. Detailed socio-economic data was collected out within 10 km radius of the proposed project to assess the baseline status.The demographic structures of each village in the study area as per Census 2011. The information was collected from the census and by means of personal interaction. Demographic Details of Mundhwa is given in Table 3.15

Sr. No.	Villages	No of House Holds	Population			Scheduled Castes			Literates			Illiterates		
			Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1	Dhanori	10452	44060	23099	20961	8216	4202	4014	34931	18862	16069	9129	4237	4892
2	Lohagaon	8764	33810	17610	16200	5560	2795	2765	26926	14337	12589	6884	3273	3611
3	Kharadi	5953	24332	13030	11302	3269	1694	1575	18557	10238	8319	5775	2792	2983
4	Mundahwa	7,537	29,965	16,309	13,656	3,499	1,826	1,673	14664	7955	6709	4489	1969	2520
5	Mahamodwadi	9982	44269	23099	21170	4927	2565	2362	32093	17450	14643	12176	5649	6527
6	Hadapsar	5924	23689	11938	11751	1748	886	862	20712	10572	10140	2977	1366	1611
7	Kondhva Khurd	5898	25014	12896	12118	2221	1162	1059	19171	10262	8909	5843	2634	3209

Table 3.15: Summary of Demographic Structure in Study Area

Sr. No.	Particulars	Total	Male	Female
1	Total No. of Houses	**7,537**	-	-
2	Population	**29,965**	16,309	13,656
3	Child (0-6)	**4,128**	2,218	1,910
4	Schedule Caste	**3,499**	1,826	1,673
5	Schedule Tribe	**549**	331	218
6	Literacy	**87.86 %**	90.16 %	85.10 %
7	Total Workers	**12,345**	9,757	2,588
8	Main Worker	**11,498**	-	-
9	Marginal Worker	**847**	520	327

Source: Primary Census Abstract & DCHB 2011, Pune District, State Maharashtra

Mundwa is a large village located in Pune City Taluka of Pune district, Maharashtra with total 7537 families residing. The Mundwa village has population of 29965 of which 16309 are males while 13656 are females as per Population Census 2011.

In Mundwa village population of children with age 0-6 is 4128 which makes up 13.78 % of total population of village. Average Sex Ratio of Mundwa village is 837 which is lower than Maharashtra state average of 929. Child Sex Ratio for the Mundwa as per census is 861, lower than Maharashtra average of 894.

Mundwa village has higher literacy rate compared to Maharashtra. In 2011, literacy rate of Mundwa village was 87.86 % compared to 82.34 % of Maharashtra. In Mundwa Male literacy stands at 90.16 % while female literacy rate was 85.10 %.

Site Connectivity:

As per stated Auto ToR, secondary data for socio-economic profiling is done for the study area of radius 10 km of the proposed project. It is observed that the entire 10 km study area falls under PMC.

Table 3.16: Site Connectivity of the Project Site

Sr. No.	Nearest Social Infrastructure	Name/Type	Distance From project (in kms)
1	Airport	Pune International Airport	4.64 km
2	Railway Station	Pune Railway Stations	4.40 km
3	Airport	Dhole Patil Farm Bus Stand	0.01 km
4	Hospital	Manipal Hospital, Kharadi - Pune Matoshri Meenatai Balasaheb Thakare Polyclinic - Government hospital	1.18 km
		Manipal Hospital, Kharadi - Pune	2.20 km
5	Police Station	Koregaon Park New Police Station - Government office	4.01 km
		Koregaon park police station - State police	2.14 km
6	Fire Station	Dayanand Sonkamble Fire Station	1.98 km
7	Bank	State Bank of India	1.20 km
8	Park	Koregaon Park	1.72 km
9	Post office	Ghorpadi bazar post Office	2.42 km
10	School	Saraswati English Medium School	1.68 km
		ORCHIDS The International School - CBSE School in Wadgaonsheri	1.58 km
11	Collages	Poona College of Arts, Science and Commerce	5.28 km
		Late Tukaram Dhondiba Pathare Arts, Commerce & Science [B.B.A., B.B.A.(C.A.), B.SC.(COMPUTER SCIENCE)] Senior college	3.46 km
12	Market	Shree Datta Super Market	0.42 km
		Phoenix Market city Pune	2.90 km

Infrastructure Resources

The socio-economic wellbeing of the area and its people is represented by the infrastructure and the social assets available in the area. The study area constituted of various infrastructures related to education, health care, communication, transportation, drinking water etc. Infrastructure facilities are given below.

Educational Facilities

The educational facilities are adequate in the study area, which reflects in the literacy rate as census 2011.

Within 10 years there is 4.37% growth has been measured. Government has provided facilities of education for the people of all sectors of the society. There are private schools are available in the study area but they are charring more as compare to Government schools.

Health and Medical Infrastructure:

The health care facilities were available in the area to fulfill the health need of the people. The morbidity pattern in the study area collected from Health Department fever, diarrhoea, gastritis, malaria, dengue and skin diseases are common diseases and few cases of T.B, Leprosy and RTI have been reported in this PHC. During discussions with medical officer, he pointed out that common fever, diarrhoea and respiratory disorders are due to seasonal changes. Ring worm infestations are mostly reported among the patients.

Post and Telegraphs

In the study, area post offices with speed post facilities are available. Most of the people are using cell phones some of them are having landline phone connections. Commercial and cooperative banks are also available in the study area.

Power supply

Power supply was available in most of the villages and villagers were using power for agriculture and domestic purposes.

Drinking water facility

Various drinking water sources were available within the study area. Drug well, tube wells and tankers were the major sources of drinking water. Moreover, surface water (river and ponds) available for other domestic purposes.

Transportation facilities

Private vehicles, Private Vehicles, Auto and Bus are the main mode of transportation.

Salient observation of the survey

House pattern: Study area was mainly urban dominant. Near about 80% houses were in semi-pukka form. Mainly clay tiles, asbestos sheets and iron sheets were used by villagers for roof and brick with cement for house construction. 20% houses are pukka in nature as this area is developing hence people have constructed RCC roof pukka houses.

Employment: Private and Government jobs, vendor and scattered for day to day business, local pan tapari, tea and other fast food stalls, grocery shops, laboures engages in local construction activities.

Fuel: Mainly people were using LPG facility.

Language: Official language as well as mother tongue of the people in the study area is Marathi.

Sanitation: In the study area sanitation facilities were adequate. Lack of awareness about sanitation was found route cause behind the problem. 70% households were using the toilets facilities and 30% household was found that they are going for open defecation in the study area.

Water Supply: Main source of drinking water in the study area were Municipal Corporation.

Education facility: Mainly primary schools, Middle schools, high schools and colleges were available. The literacy rate of the study area is satisfactory.

Transportation facility: Study area was connected with pakka roads. For transportation purpose auto, jeep, railways and private buses were available. All the wards are connected with each other by Pucca roads. The road conditions are very poor in some area which leads to poor transportation.

Communication facility: In the study area, mobile phones, television, radio, newspapers, post offices were mainly used for communication purpose

Medical facility: Under the NRHM (National rural health mission) program, most of the villages had the medical facilities in the form of sub- centers, primary health center. Private clinics and medical shops also existed in the study area.

Electricity: All villages were availing electricity facility for domestic purpose. However frequently power cut problem reported by villagers.

Market facility: Market facilities were available only in some villages; most of the villages were deprived from market facility. Due to small population size of the villages, villagers used to go weekly market in the range of 3-5 km

Urbanization: Social changes have been observed in urban communities, which reflect the positive impact of development of project area.

The people of the project area basically those who are living in colony are anticipating better construction quality of house and improvement in the basic amenities.

The employment rate is very low (34.99%). Density of population plays an important role in urban area; the work force availability for the developmental activities is low. People are engaged in the secondary source of employment like industries, construction activities, small business etc.

All the respondents are aware of activities of project and have favorable opinion for the project.
Most of the surrounding population is high class and middle-class standard of living. Some slum areas are also abutted in study area, the above-mentioned project will helpful to provide social infrastructure for surrounding people.

3.3.10 Traffic Analysis

3.3.10.1 Introduction

The proposed Commercial Project in Mundhwa is being developed by M/S Bajaj Finserv Ventures Ltd & Others. A detailed Traffic Impact Study has been carried out for the subject development with intended land uses (IT/ITES/Commercial and Office Building) for future year conditions. Below is the summary of the subject plot and findings of the Traffic Study.

3.3.10.2 Project Background

The proposed Commercial IT/ITES office building by M/S Bajaj Finserv Ventures Ltd & Others is located in Mundhwa, Pune. The subject development plot is identified as S. No. 84, Mundhwa, Taluka-Haveli, Pune in the state of Maharashtra. Access to the subject development is proposed via the existing road-

i. N Main Road (Existing-20M wide) located on the South side.
ii. Riverdale Road (Existing -10M wide) is located on the West side. This access road connects to N Main Road.
iii. Proposed D.P. Road (Proposed -30M wide) located on the North side.

For traffic analysis purposes, traffic data has been collected on study area roads in May 2024. Accordingly, the existing year is considered at Year 2024 for traffic analysis purposes. Full build-out and occupancy of the subject development is assumed for the Year 2029 (+5 Year Scenario). This traffic study report has

depicted the site under reference as a "Proposed Development". This proposed development would generate new vehicular traffic, which would have an impact on the traffic conditions in the nearby roadway network and at the access points. Hence, there is a need to address the traffic impacts of the proposed project with respect to vehicular traffic for accessibility and circulation. Figure 3.18 is provided below to show the layout plan of the subject development.

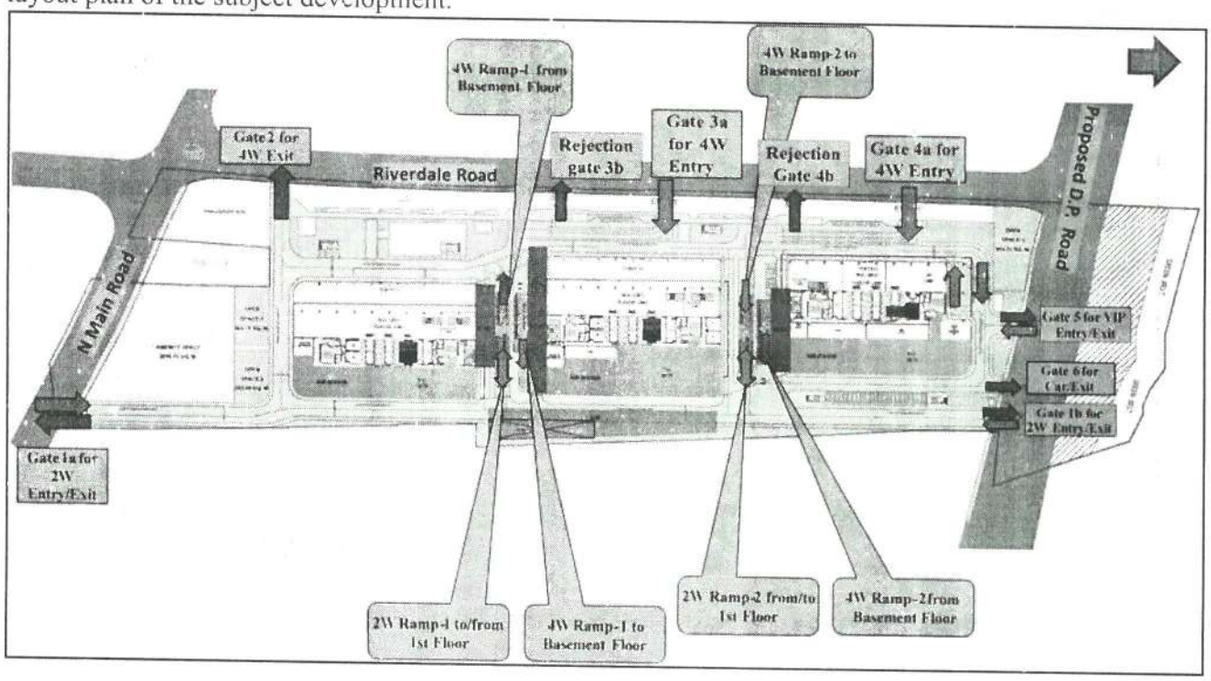


Figure 3.18: Site Layout Plan

For successful completion of this traffic study Sincrono has identified and analyzed the following roadways which are in the immediate vicinity of the site and will serve as major access points. Figure 3.19 is provided to illustrate the location of the proposed development with respect to the surrounding roadway network.

Roads in the Vicinity of Subject Site:

- Road Link 1: N Main Road (East-West Direction)
- Road Link 2: Ghorpadi Road (East-West Direction)
- Road Link 3: East Avenue Road (North-South Direction)
- Road Link 4: Magarpatta Road (North-South Direction)
- Road Link 5: Samrat Ashok Road (East-West Direction)

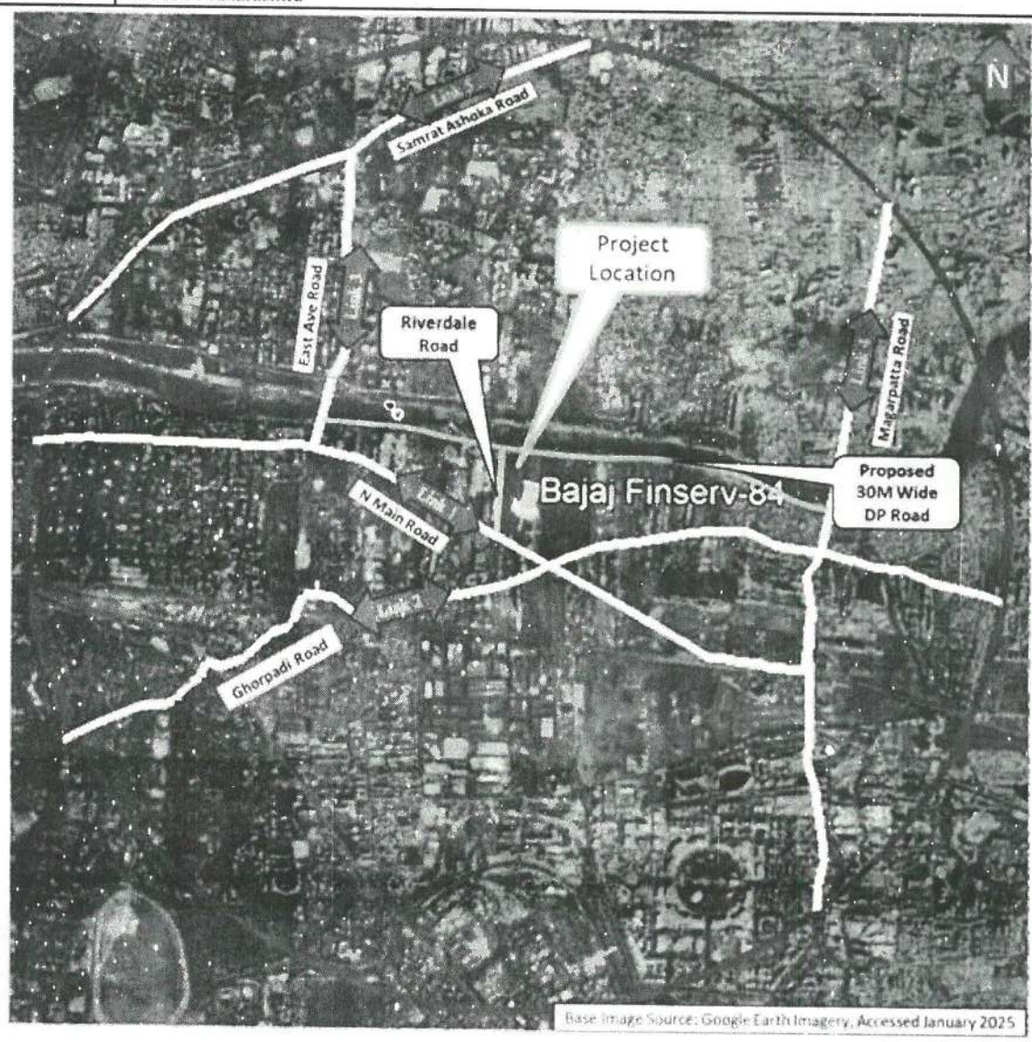


Figure 3.19 : Site Location Map

Following Table 3.17 is provided to show the classified traffic volume observed traffic peak hour

Table 3.17: Observed Traffic Peak Hour

No.	Road Link	Traffic Peak Hours	
		AM	PM
1	N Main Road	9:00 to 10:00	07:00 to 08:00
2	Ghorpadi Road	10:00 to 11:00	06:00 to 07:00
3	East Avenue Road	09:00 to 10:00	06:00 to 07:00
4	Magarpatta Road	11:00 to 12:00	06:00 to 07:00
5	Samrat Ashok Road	11:00 to 12:00	04:00 to 05:00

Based upon road survey and available information, the study area roadways are categorized into different types of roads for capacity analysis purposes. Recently released Indian Highway Capacity Manual (Indo-HCM) 2017 is utilized to estimate base capacity of the study area roads. Table 3.18 is provided below to show the study area roadways with corresponding lane configuration and maximum capacities.

Table 3.18: Level of Service (LOS) comparison

No.	Road Names	Typology of the Road	Existing / Proposed Road	Total Road Width Available / DP Road Width	Approx. Carriageway Width	Details	Level of Service (LOS)										Site Traffic Impact on Public Roads	
							2024 Existing Conditions		+5 Year Scenario (Year 2029)				+10 Year Scenario (Year 2034)					
									without Proposed Development		with Proposed Development		without Proposed Development		with Proposed Development			
							AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1**	N Main Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	LOS	D	E	C	C	C	C	C	C	C	D	11.3 %	12.6 %
						V/C	0.78	0.86	0.57	0.62	0.65	0.73	0.66	0.72	0.74	0.83		
2**	Ghorpadi Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	LOS	B	B	B	B	B	B	B	B	B	B	8.4%	11.8 %
						V/C	0.37	0.32	0.26	0.22	0.29	0.26	0.30	0.26	0.33	0.29		
3**	East Avenue Road	4 Lane (Divided)	Existing	17.5 M	13.0 M	LOS	B	B	B	B	C	C	C	C	C	C	12.9 %	14.4 %
						V/C	0.30	0.33	0.41	0.45	0.48	0.54	0.47	0.52	0.54	0.61		
4**	Magarpatta Road	8 Lane (Divided)	Existing	45.0 M	24.6 M	LOS	B	B	C	C	C	C	C	C	C	C	4.0%	4.7%
						V/C	0.40	0.42	0.51	0.54	0.54	0.57	0.59	0.63	0.62	0.66		
5**	Samrat Ashok Road	8 Lane (Divided)	Existing	55.7 M	41.0 M	LOS	C	C	C	C	C	C	D	D	D	D	1.4%	1.7%
						V/C	0.55	0.54	0.70	0.69	0.71	0.71	0.81	0.80	0.83	0.82		
6**	Riverdale Road	6 Lane (Divided)	Proposed	24.0 M	16.0 M	LOS	–	–	B	B	B	B	B	B	B	C	22.7 %	24.6 %
						V/C	–	–	0.28	0.31	0.38	0.43	0.32	0.37	0.42	0.48		
7**	Proposed DP Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	LOS	–	–	A	B	B	B	A	B	B	B	28.7 %	27.8 %
						V/C	–	–	0.12	0.16	0.17	0.23	0.14	0.18	0.19	0.25		

(Detailed traffic analysis report will attached as Annexure 4)

CHAPTER 4. ANTICIPATED IMPACT ANALYSIS AND MITIGATION MEASURES

The identification and assessment of environmental impacts of a given project is complex because of the diversity of impacts caused by human interference to the environmental and social systems. Impact identification and assessment requires collection and collation of large amount of diverse data and communicating the final results to the decision makers (experts in various fields) and general public (laymen). Although there are a large number of EIA methodologies, their organizing principles are common. All methodologies are generic in nature and are adapted to specific type of project assessment.

Environmental Impact Assessment or EIA in short, is a formal study process used to predict the environmental consequences of a proposed major development project. An EIA concentrates on problems, conflicts or natural resource constraints that could affect the viability of a project. It also examines how the project might cause harm to people, their homeland or their livelihoods or to nearby developments. After predicting potential problems, the EIA identifies measures to minimize the problems and outlines ways to improve the project's suitability for its proposed environment.

The important steps in EIA are: Impact identification, prediction and evaluation. A number of techniques are available for identification, prediction and evaluation of impacts. Appropriate techniques have been applied for environmental impact assessment of the proposed project.

4.1 Details of Investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project

This chapter discusses identification and appraisal of various environmental impacts due to the proposed project. Generally, the environmental impacts can be categorized as either primary or secondary. The development, construction and functional phase of the proposed project comprise various activities, each of which may have some impact on environmental parameters. Various impacts during the development & construction and operation phase on the environmental parameters have been studied to estimate the impact on environment.

The present report covers baseline environmental data generated in the study area (10 km radius all around the project site for land use and the sample selection for monitoring are done within 2 km radius of the project site).

Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G (part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036, Maharashtra will be developed and constructed gradually in the time span of 2 to 3 years. In development phase, basic infrastructure facilities like internal roads, rainwater harvesting, storm water drainage, street lighting etc. will be developed.

Table 4.1: Impact Identification Matrix for Construction Phase

S.N	Main Activities	Potential Impacts								
		Ecology	Water Resources	Ambient Air Quality	Soil Resources	Ambient Noise Quality	Water Quality	Traffic &Transport	Livelihood	Occupational Health &
A	Site Preparation									
1	Site Clearing			√	√		√		√	√
2	Excavation			√		√				
3	Access Road			√				√		
4	Tree and vegetation clearance	√								
5	Transportation of Machinery			√		√		√		√
B	Labour Engagement									
1	Construction of Labour Camp		√	√			√			√
2	Waste handling & its disposal		√		√		√			√
3	Sewage disposal		√				√			
4	Power Supply			√						
5	Water Requirement		√							
C	Material Handling & Storage									
1	Transportation & Unloading of construction material			√		√		√		
2	Storage & Handling of construction wastes									√
D	Construction activities									
1	Preparation/Mixing of construction material			√		√				
2	Supply of water, power, sanitation facilities		√		√			√		
3	Operation of construction Machinery			√		√		√		
4	Handling and Disposal of construction wastes				√	√	√			
E	Demobilization									
1	De8mobilization of Construction Equipment			√					√	√
2	Dismantling of temporary construction equipment's			√		√		√		√
3	Removal of construction machinery			√				√		
4	Transportation of Construction/Dismantled wastes			√				√		

For proper evaluation and assessment of the environmental impacts due to development and construction and functional phase of proposed project, understanding to the various activities associated with the proposed project is essential. Various activities related to the project would be different, in terms of nature during the development, construction and Operational (functional) phase.

The impact identification and prediction process aim to:

- Identify potential source or cause of impact throughout the life of project.
- Characterize the potential impacts affecting a target or receptor (physical, human and socio - economic).
- Assess the potential of changing the likelihood of impact through Environmental Management Plan (EMP).

The project activities described earlier in Chapter-2 of this report have been taken into consideration for understanding of cause - condition effect relationship between a given activity and environmental parameter for identification of impacts. Prediction of the impacts due to the development, construction and functional activities encompass the development process to be undertaken during construction and functional phases. For each category of environmental receptor (such as, ambient air quality, water quality, soils, land, etc) the potential impacts of activities during development, construction and functional phases and magnitude of the impacts have been assessed and discussed in detail in following sub sections. In each case, cognizance has been taken to mitigation measures inherited in the development, construction and functional phase. The baseline status of the environment at the proposed site and the surrounding study area has been quantified and presented in chapter-3.

4.2 Measures for minimizing and / or offsetting adverse impacts identified

Pollutants generated in the development of proposed project during both construction and operational phases are solid, liquid and gaseous in nature. Also, the generation of pollution could be continuous, periodic or accidental. Sources of pollutants and their characteristics during the construction and functional phase are given in

Table 4.2 Pollutant Sources and Characteristics

S.r.	Activity / Area	Pollutant	Pollutant Characteristics	Frequency
Development & Construction Phase				
1	Site Preparation	Air emission- PM10, PM2.5, SO2 and NOx	a. Dust from construction activities and excavation. b. Particulates matter, NO2 and CO from Vehicle exhaust	a. Temporary during construction phase only. b. Bulk of the emissions are expected from ground working and leveling activities.
		Earth / Solid waste	Solid waste from construction activity and excavation.	Periodic
		Noise	Noise generated from construction equipment machinery and vehicles	Temporary during initial construction phase
2	Labour Welfare Camps	Sewage	Sewage generated from temporary labour camps on site	Temporary during the initial construction phase
		Solid Waste	Solid Waste generated from temporary labour camps on site	Temporary during the initial construction phase

Operational Phase				
1	Vehicular Movement	Air emissions and Noise	Vehicle exhaust emissions	Continuous / periodic
2	Diesel generators	Air emissions	SO2, NO2, PM, CO from fuel burning	Occasional during power failure
		Noise	Noise due to running of equipment	Occasional during power failure
		Hazardous Waste	Used Oil Generation	Occasional during oil changes
3	LPG Cylinders/ PNG	Thermal / Blast Effect	Accidental Explosion due to LPG/PNG leaks and fire	Accidental
4	Maintenance / Housekeepig	Wastewater	Floor washing	Continuous
		Solid waste Hazardous waste	Used equipment parts and garden wastes	Continuous
5	Air Conditioners	Air emission	Ozone Depleting Substance release	Continuous
6	Vehicle Parking Area	Oil spills	Minor oil leaks In parking space	Occasionally, Negligible quantities
7	Storm water drains	Waste water	Contamination discharge from site-mainly suspended solids	During rainy season

4.2.1 Impact Identification

The areas of environmental concerns for which the impacts and their predictions are taken into consideration are mainly:

- Air Environment
- Water Environment
- Noise Environment
- Land Environment
- Biological Environment
- Socio economic Environment
- Aesthetics Environment

The impacts can be further categorized as positive impacts and negative impacts depending upon their nature, potential and magnitude.

4.3 Irreversible and Irretrievable commitments of environmental components

- Generation, storage, and disposal of construction wastes;
- Noise pollution due to plant, machinery, equipment's and vehicle movement;
- Air pollution due to plant, machinery, equipment's and vehicle movement;

- Generation and disposal of wastewater;
- Impact on ecology;
- Consumption of resources such as water, electricity, and diesel
- Physical change in landscape due to earth work excavation and related activities
- Soil erosion caused due to loss of vegetation and other construction activities
- Impact on socio-cultural environment.

Environmental Aspects of Building Planning and Use

Impacts identified during operation of the proposed project and its use includes major concerns such as:

- Disposal of domestic (sewage) effluent generated
- Increase in noise levels due to transport
- Consumption of water and impact on water resources
- Impact on traffic on the road
- Storm water during rains
- Management and maintenance of the project

Environmental aspects of present scheme are not just limited to impact of sources of pollution but also related to energy conservation, water conservation and other issues, which are mentioned in Table 4.3.

Table 4.3 Environment aspects of proposed Establishment scheme other than sources of pollution

S.I.	Area	Aspect
I.	Energy Conservation	Solar Heating, Day Lighting, Design Natural Ventilation, Thermal Transfer value of Building Material, Energy Efficient Building Services and Equipment, Public Area Lighting Exterior Lighting, use of sensors.
II.	Water Conservation	Use of Recycled Water Gardening Water Sources Rainwater Harvesting Sprinkler will be used for curing and quenching during construction phase Constructed of STP during construction phase.
III.	Internal Roads and Accesses	Pedestrian Access Ramps for Disabled persons, Road painting and Signage Speed Breakers
IV.	Material Use	Construction Materials Selection Paint Selection Use of Recycled Materials Use of Timber, use of fly ash
V.	Aesthetics during functional Use	Clothes Drying Facilities Stilt Parking
		Visitors Parking Playground for children Service Roads for walking Flower bed water disposal Floor washing arrangements Air conditioning arrangements Standby Power Supply Maintenance Staff
VI.	Facilities for proposed project	Rest Rooms with toilets for Visitors and Security Persons.
VII	Use of mobile STP	The treated (up to tertiary treatment) water from STP may be used for construction purposes

VIII	Air Quality	Wheel wash arrangement will be made at exit point during construction phase Height of the stack will be 6 m higher than the tallest building. Landscape development

4.4 Assessment of Environmental Impacts during development & construction phase

4.4.1 Topography Impact

Topography around the proposed project is plain. Therefore, topography and physiography of the area will not be affected during the construction and post construction phase of the project. Hence, no significant impact is anticipated on the topography and physiography from proposed commercial project.

Mitigation measures

Since there is no significant impact on topography from the proposed project, no detailed mitigation measures are proposed. It is however proposed that apart from the proposed plantation greens, with local species will be carried out comprehensively.

Land Use Pattern

Proposed project will be located on the area of 70,631.81 m2, which has been proposed for commercial propose. Therefore, Land use pattern of the area will not be affected by the proposed project.

4.4.2 Land Environment Impact

During construction phase, soil will be excavated in order to provide foundations. It is estimated that approx. 70,7922.00 m^3 of earth material will be excavated during proposed construction phase for foundations, basement etc.

Mitigation measures

- Excavated material will be properly stacked within the site under tarpaulin cover and 201561.00 m^3 will be re-used for backfilling, road construction and filling low-lying areas.
- The top-soil 78658.00 m3 will be preserved separately and will be used for landscaping, green turfing purpose only. Hence, no direct adverse impacts on the land environment are envisioned.
- Balance 427703.00 m^3 of excavated earth will be utilized other construction site in filling through hired transporters after due approval.
- Proper drainage system shall be provided to deal with the storm water in case of rain. The impact on soil during construction phase will be marginal and reversible in the nature.
- It is proposed to remove vegetative cover only from the specific site on which construction is to take place and allowing minimal disturbance to the vegetation in adjacent areas. Land clearing activities will only be kept to necessary areas. The number, frequency and area of movement of heavy machinery will also be restricted.

4.4.3 Water Environment

Surface Water Quality Impact

The primary concerns relating to surface water quality associated with construction activities are pointed out below:

- Runoff related to unpaved and excavated areas during the rain shower.
- Sediments transported to runoff from the construction site.
- Run off related to area where lubricant, fuel other materials are stored, used and disposed, off.

Surface water quality may be affected with the discharge of the runoff from the project site. The impact to the surface water bodies could arise from the increased soil erosion from excavated site only causing increase in the suspended particles and turbidity of runoff water from the site. However, this impact will be temporary in the nature and would be observed in first rain only and as soon as rain is over excavated

soil at site would be stabilized. Therefore, the surface water quality during rains will be impacted marginally for very short duration.

Mitigation Measures

During the construction phase, surface water quality is likely to be affected due to soil erosion during first rain and generation of wastewater mainly from construction labour camp. However, this phenomenon will be temporary and restricted to close vicinity of construction site. The impact on surface water quality can be minimized by adopting following measures:

- Excavation during dry season and proper management of excavated soils,
- Clearing all debris from site as soon as construction is over.
- By providing proper hutment and toilet facilities for construction labour in the form of portable toilets and mobile STP
- Through the proper disposal of wastewater generated at site with its final outfall to municipal sewers.

4.4.4 Groundwater Quality Impact

No hazardous chemical and material will be used in the development and construction phase of proposed project. Debris and wastes generated during this phase will be collected and disposed suitably. Therefore, possibility of contamination of ground water will be negligible. Hence, no impact is anticipated on the ground water quality during the construction phase.

Mitigation Measures

Solid waste generation during construction phase will be negligible. However, a well-planned solid waste management plan will be followed during the construction phase including timely collection, segregation and disposal as per legal requirements.

4.4.5 Surface and Ground Water Hydrology

Surface Water Hydrology Impact

The project site area falls in the drainage basin of Mula-Mutha River but is outside from any flood plain. Runoff during rains takes way to natural drain and in storm water drains laid in the area. During construction phase, there is no impact anticipated on the drainage pattern of the project area.

Mitigation Measures

Project proponent will ensure zero impact on water runoff flow direction and drainage pattern of the area throughout the construction of the proposed project by providing adequate water drainage.

Ground Water Hydrology Impact

Water requirement during construction phase will vary depending upon construction activities and will be met by municipal supply along with private tankers or using recycled water from STP after tertiary treatment at the site. It is expected that construction of proposed project will spread over a period of 2 to 3 years.

Water will be required for site preparation activities dust settlement, consolidation, compaction and curing as well as building construction and drinking water purposes. The requirement of construction water will not put sudden pressure on the available ground water recourses of area.

Mitigation Measures

Although no significant impact is anticipated on the groundwater regime as, municipal supply will be used augmented with private tankers for construction purpose. Therefore, impact on ground water resources will be insignificant during construction of project.

It is proposed to carry out the following to further minimize the demand on freshwater resources:

- Curing water will be sprayed on concrete structures and free flow of water not allowed.
- After liberal curing on the first day, all concrete structures will be painted with curing chemical to save water to stop daily water curing hence save water.

- Concrete structures will be covered with thick cloth/gunny bags and then water sprayed on them to avoid water rebound and ensure sustained and complete curing.
- Water ponding will be done using sand ridges to avoid water flowing away from the flat surface while curing.
- Water ponding will be done on all sunken slabs. This will also highlight the importance of having an impervious formwork.

4.4.6 Soil

- At proposed project, if required, the soil excavated during construction will be first temporarily stored in an area earmarked and later will be used to fill up low lying area in and around the project as well as for landscaping of project site. Proper drainage system shall be provided to deal with the storm water in case of rain.
- Solid waste generated during the construction phase shall be properly collected, segregated as plastic, metal, & other, and shall be disposed of as per the standard practice.
- During the development and construction phase, some amount of debris, cuttings of construction materials may be observed at construction site. However, the quantity of these waste materials would be very small and limited up to the construction site only. Contamination of these wastes would be minor and would be collected time to time during construction phase, it will be reused in different application, and non-usable items will be disposed accordingly.
  The impact on soil during construction phase will be marginal and reversible in nature.

4.4.7 Transport Linkage and Traffic Impact

During development and construction phase, labour and construction materials bringing vehicles will approach to the project site. The proposed scheme is well connected to neighborhood, where public transport facility, like, buses and minibuses are easily available in the area as transport linkage. The project site is easily accessible.

During construction phase, some impact is anticipated on the transport linkage of the area, however increase in traffic will not adversely affect the local traffic pattern since the site is well connected by road. In addition, construction of various towers will take place in phased manner; this will reduce peak traffic load bringing labour and building material to the site.

Mitigation Measures

The vehicles from the project will increase car and two-wheeler traffic load on roads during peak hour. However, since present load is lean, increase in traffic load may not lead to traffic congestion problem. Once construction work finishes, heavy traffic volume will decrease and that will further improve traffic condition in the area.

Additionally, the proposed construction site is well connected to the road and there would not be sudden influx of vehicles on the road from the proposed project. The available width will provide sufficient merging space for the vehicles while meeting the road. Hence it can be concluded that traffic impact is not a significant adverse impact from the construction and operation of the proposed project.

4.4.8 Energy Resources

During the functional phase of proposed project, electric supply will be provided by State Power grid (MSEDCL). During construction phase, power requirement will be kept minimum and construction work will be done gradually in about 2 to 3 years. Therefore, energy resources will not be affected significantly.

Air Quality

A. Emission Sources during the Construction Phase

The potential sources of air emissions during the construction and development phase of the project will be as follows:

- Dust from earth works (during site preparation)
- Emissions from power generator at site
- Emissions from the operation of construction equipment and machines
- Fugitive emissions from vehicles running to site
- Fugitive emissions during the unloading of material at the site
- Fugitive emissions during mixing of cement with other building materials during development and construction activities
- Air emissions other than dust arise from combustion of hydrocarbons. The pollutants of concerns are NO_2, SO_2, CO, suspended particulate matter.

B. Potential Impacts

The likely impact on air environment during construction phase has been identified in the form of "Impact Matrix" in Table. Ambient air quality effects are normally assessed in relation to their potential to cause.

- Health deterioration and nuisance in local communities
- Health deterioration amongst on-site workers

C. Assessment of the impacts due to Dust Emissions

During the excavation of channels, foundations, unloading of construction material, cement bags and mixing of cement with other building materials, fugitive dust emissions may be emitted at construction site. It may be noted that these emissions would be in the form of coarse particulate matter and will be settled down ultimately in the closed vicinity of construction site. Therefore, no significant impact is anticipated due to dust emission during development and construction phase. The proposed mitigation measures for the above are:

- The soil management as discussed in EMP. The excavated soil shall be stored and used in landscaping.
- The dust emissions shall be controlled by regular sprinkling of water during earthwork and construction cement bags shall be placed in covered areas. Sand and bricks shall be covered with gunny bags to avoid dispersion of material in air.
- The approach roads to the proposed site are good metaled roads, therefore during material handling there shall be least spread of dust in the environment.
- It is mandatory for all automobiles vehicles to maintain the quality of exhaust emissions within permissible standards.
- The ambient air quality shall be monitored regularly to ensure that the activities at site are not polluting the ambient environment.
- Pollution under Check (PUC) certificate provision at entry gate.

D. Assessment of the impact due to Diesel Generators

Emissions from the DG sets during construction phase may cause some localized impact on ambient air quality for short duration, as these will be operated during power failure only. It may be noted that the DG set power will be used to operate construction equipment only if required. Adequate height of stacks will be provided to the DG sets as per guidelines of CPCB to facilitate the dispersion of flue gases into the atmosphere.

Mitigation Measures

It is proposed to provide adequate dust control systems in the form of installation of batch plants, and loose material handling in covered sheds. Dust suppression system is also proposed to be provided where necessary. It is further proposed to cover scaffolding, hosing down road surfaces and cleaning of vehicles especially during the dry season. Avenue and curtain plantation on the internal roads and peripheral plantation around the site will also be developed.

Noise Impact

During the construction phase of project, noise will be generated from the various sources. Some major sources of noise generation at project site are listed here under,

- Generation of noise during movement of vehicles carrying materials and loading & unloading activities.
- Generation of noise from excavation machines, concrete mixer and other construction machines.
- Generation of noise during the operation of DG set.
- Generation of noise during concreting, hammering, etc.

All the above-mentioned sources at proposed development and construction activities will be intermittent and would be experienced occasionally. The expected noise levels from various activities are given here under:

From vehicles bringing materials to the site	70 dB (A)
DG set	85 dB (A)
Excavation	80 dB (A)
Concrete Mixtures	80 dB (A)
Hammering	80 dB (A)

Mitigation Measures

To minimize impacts of noise generation from construction activities, the workers will be provided with ear muffs and other protection devices. D.G. Sets with proper acoustic enclosure for controlling noise would be installed.

4.4.9 Economic Impacts

Relatively long-lived economic impacts of the development and construction phase are likely to be experienced in local area for the duration of construction phase of 1 to 2 years as workers make everyday purchases from local traders in nearby areas. This is likely to give a short-lived stimulus to the traders that may disappear as soon as the construction is complete. Noticeable, flow-on economic impacts will be experienced in other sectors of economy as a result of purchase of construction materials and the payment of wages and salaries to the personnel engaged in the development and construction of Group Housing. Once the development and construction of proposed project will complete, there will be some long-term positive impact on the economic structure of the area. People in the area will get direct / indirect employment opportunities and other benefits from the proposed project. Therefore, overall positive impact is anticipated on economy of the area due to development and construction activity of the proposed project.

Socio-Economic

During the development and construction of proposed project, about 100 to 150 skilled, semiskilled and unskilled workers per day will get direct employment opportunity, which will have beneficial impact on the socio-economic conditions of the area.

Construction Camp Impact

During the development and construction phase, most of the laborers will be from local areas as proposed project will develop gradually in the time span of 2 to 3 year, but temporary laborer camps will be constructed to accommodate the laborers near to the project site.

Mitigation Measures

Suitable measures will be taken at the construction camps to mitigate anticipated impacts due to temporary accommodation of laborers such as provision of clean drinking water, adequate toilet facilities, medical aid, crèche facilities for the children of workers, water and solid waste disposal system.

Other safety precautions to be maintained at work site including provision of PPE's, guarding of dangerous machine parts, maintenance of equipment's as hoists and lifts etc., and adequate provision of different types of fire extinguishers will be made. All applicable rules and regulations pertaining to workplace health and welfare of workers will be adhered to.

4.5Mitigation measures

4.5.1 Land Environment Impact

During the operation phase of the project, the soil may get polluted/ contaminated from littering of various kinds of wastes generated within the site such as food items, paper, wood pieces, paints, pesticides, oil & grease etc. However, owing to the proposed solid waste management system, no significant impact is anticipated.

Mitigation Measures

To ensure against any chances of soil pollution, it is imperative to establish a well-planned solid waste collection system covering all areas of the site apart from door to door for the commercial units. An identified area shall be designated for storage and segregation of the wastes, which will be treated/ disposed as per their characteristics.

4.5.2 Water environment

Surface water hydrology Impact

During the post construction phase, no water will be taken from water bodies in the area. Further, adequate drainage will be provided at the project site to channelize the storm water for rainwater harvesting.

The sewage effluents generated from the present scheme will be treated in Sewage Treatment Plant (STP) located at the site to get required treated water for recycling. Required treated sewage will be used for cooling of DG sets, Flushing, HVAC and landscaping purpose and other low end uses. Surplus sewage will be discharged into Municipal sewers. Therefore, impact on the surface water hydrology will be insignificant during the post construction phase.

Mitigation Measures

It is proposed to provide rainwater harvesting across the project site. The roof tops of buildings will also be connected to the rainwater collection system. This will not only reduce the pressure of storm water management system of the city but also recharge groundwater.

4.5.3 Ground water hydrology Impact

During post construction phase, the total water requirement has been taken by PMC Municipal supply. The developer shall make internal distribution network of water in the proposed project. Underground water tank of required capacity will be provided and overhead tanks will be provided for water storage.

Mitigation Measures

The proposed rainwater harvesting will recharge groundwater aquifers from the open areas as well as rooftop of the buildings. Treated wastewater from the site will be recycled for landscaping, flushing, HVAC and D.G. Set cooling to further reduce demand on ground water resources.

As indicated in baseline environment conditions, plenty of ground water sources in the area are available. Further, rainwater harvesting will also recharge groundwater aquifers. Therefore, no significant impact is anticipated on ground water resources due to proposed project.

Water meters conforming to Indian standards should be installed at the inlet point of water uptake and at the discharge point to monitor the daily water consumption. To further lower the water consumption, options of Low flow flushing systems, sensor-based fixtures, waterless urinals, tap aerators etc. will be explored.

4.5.4 Surface Water Quality Impact

The sewage effluents generated from the present scheme will be collected through the sewer line network provided in the proposed project site for treatment in the Sewage Treatment Plant (STP), to get required

treated water for recycling. Required treated Sewage will be recycled from Sewage Treatment Plant and will be used for cooling of DG sets, HVAC, Flushing and gardening purpose and other low end uses. Surplus sewage will be discharged into Municipal sewers after secondary treatment. However, in the event of excessive rainfalls the surplus runoff will be guided into natural drains flowing along the periphery of the colony.

Mitigation Measures

As no significant impact is anticipated on the water bodies of the region, no mitigation measures are suggested.

4.5.5 Ground Water Quality Impact

The storm water from the site will be used for recharging groundwater resources after adequate treatment of the storm water through oil and grease traps and filtration. The wastewater from the site is proposed to be used for landscaping only after adequate treatment in Sewage Treatment plant. Hence, no adverse impact is anticipated on the groundwater quality form the proposed project.

Mitigation Measures

The proposed Project will be well maintained. Solid waste management practices will be adopted and followed to prevent groundwater pollution through leaching.

4.5.6 Impact Air Emissions Sources

Impact on Air Environment and Mitigation Measures

The present baseline concentrations were monitored. The additional emissions are mainly from proposed DG sets during emergency.

The nature of emissions from the above units is detailed below in **Table 1.**

Table 4.2: Nature of Emission and Pollutant

Particular	Nature of Emission
DG Sets (18 x 2000 kVA)	PM_{10}, $PM_{2.5}$, SO_2 and NOx

The major air emissions from the proposed project is mainly from the DG Set where the dust and gaseous emissions are released to the atmosphere.

Project developer will provide 18 tall stacks for each of the proposed DG set to exhaust the flue gas emissions. The major pollutants emitted from the unit will be particulate matter, Sulphur dioxide and oxides of nitrogen.

The details of emission considered for estimation of impacts are given below in **Table 4.3**

Table 4.4: Emission Details of DG Sets

Particular	DG Set (2000 kVA)
Nos. of DG Sets	18
Nos. of Stacks	18
Diesel (Requirement for Each DG Set (kg/hr)	220
Sulphur Content in HSD (%)	0.25%
Height of each Stack (m)	130
Diameter of each Stack (m)	1.0
Temperature of each flue Gas (^oC)	140
Velocity of each Flue Gas (m/s)	15
Volumetric Flow Rate (Nm^3/sec)	8.50
PM10 (gm/sec/stack)	0.25

PM2.5(gm/sec/stack)	0.15
SO_2 (gm/sec/stack)	0.31
NOx (gm/sec/stack)	0.42

Stack Emissions Input Data to the Model

AERMODE model recommended by United States Environmental Protection Agency (USEPA) has been used for predicting the incremental concentrations of PM_{10}, $PM_{2.5}$, SO_2 and NOx from the proposed plant activities. AERMOD is capable of modeling multiple sources in simple and complex terrain.

AERMOD calculates ground level and elevated ambient concentrations or deposition from stack, volume and/ or area sources. The steady-state Gaussian plume equation for a continuous source is used to calculate ground level concentrations for stack.

Input parameters required for AERMOD are given below:

- X and Y co-ordinates for the source,
- Source strength in terms of g/sec for NOx, SO_2 and PM_{10}, $PM_{2.5}$,
- Height of the stack in meters,
- Temperature of the exit gas in degree centigrade,
- Exit velocity of the gas in m/sec,
- Diameter of the stack in meters,
- Meteorological parameters such as hourly data for wind direction, wind speed, mixing height and atmospheric stability class.

The air pollution modeling carried out represents the worst-case operating scenarios. The pollutants considered for modeling include NOx, SO_2 and PM_{10} $PM_{2.5}$.

4.5.7 Meteorological Data

The meteorological data recorded continuously during the months of **March 2024 to May 2024** on hourly basis for temperature, wind speed, wind direction, relative humidity and rainfall near project site. Stability classes computed for the mean hours are based on guidelines issued by CPCB on modeling. Mixing heights representative of the region have been taken from the available published literature. The hourly meteorological data recorded at site is used for the modeling. In absence of site-specific mixing depths, literature published in "Spatial Distribution of hourly Mixing Depths over Indian Region" by Mr. R.N. Gupta has been used.

Model Employed

Prediction of cumulative ground level concentration due to emissions from the proposed project has been computed using EPA approved AERMOD model.

Application of AERMOD for Prediction of Ground Level Concentration

AERMOD Model with the following options has been employed to predict the ground level concentration due to emissions from the proposed project.

- Areas being urban, urban dispersion parameters are considered.
- Predictions have been carried out to estimate concentration values over radial distance of 10 km around the sources.
- Emission rates from the point sources were considered as constant and during the entire period.
- Consideration of settling velocity of the particles.
- The ground level concentrations computed were as is basis without any consideration of decay coefficient.
- Calm winds recorded during the study period were also taken into consideration.
- 24 hourly mean ground level concentrations were estimated for the winter season using the meteorological data of **March 2024 to May 2024.**

Emission Sources Considered for Simulations

Emissions from the 18 no's 2000 KVA DG sets have been considered for prediction of impacts.

Maximum Ground Level Concentrations:

Ground level concentrations of PM_{10}, $PM_{2.5}$, SO_2 and NOx were estimated using the meteorological data to project the incremental load in baseline concentrations due to emission from emission sources.

The resultants values are compared with National Ambient Air Quality Emission (NAAQE) Standards issued by Ministry vide G.S.R no. 826(E) dated November 16, 2009. **Figure 4.1, Figure 4.2, Figure 4.3 and Figure 4.4** represents the spatial distribution of the predicted ground level concentrations of PM_{10}, $PM_{2.5}$, SO_2 and NOx due to emissions from the proposed project.

Post Project Scenario

Maximum ground level concentrations are predicted considering 24-hourly meteorological data during **March 2024 to May 2024**, superimposed on the maximum baseline concentrations obtained during the study period to estimate the post project scenario.

The Overall Scenario with predicted concentrations over the maximum baseline concentrations is given in **Table 4.4.**

Table 4.5: Overall Scenarios within Study Area

24 Hourly Concentrations	**PM_{10} ($\mu g/m^3$)**	**$PM_{2.5}$ ($\mu g/m^3$)**	**SO_2 ($\mu g/m^3$)**	**NOx ($\mu g/m^3$)**
Baseline Scenario (Max)				
Predicted Ground Level Concentration (Max)	1.43	0.861	1.78	2.41
Overall Scenario				
NAAQ Standards	**100**		**80**	**80**

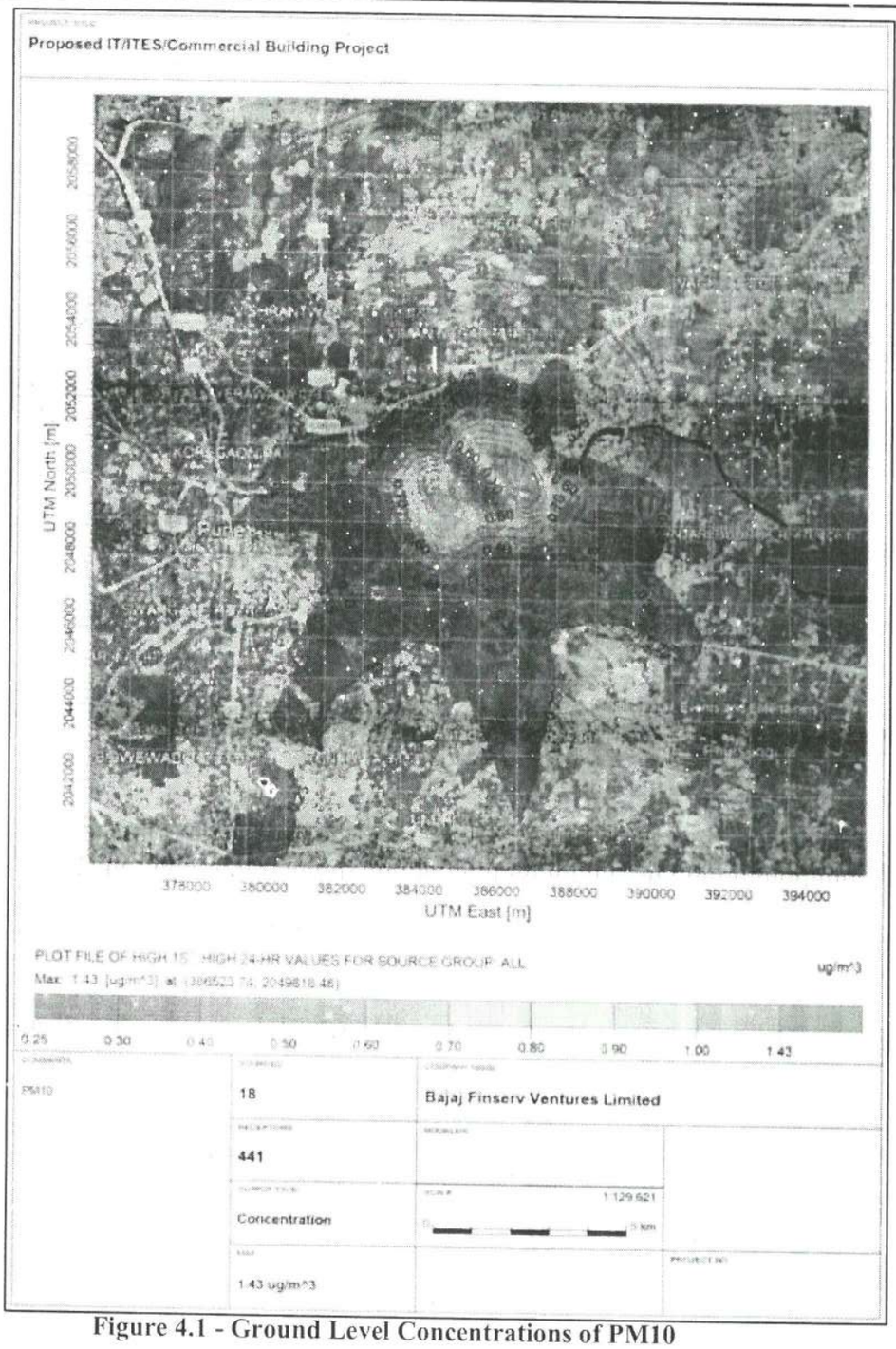


Figure 4.1 - Ground Level Concentrations of PM10

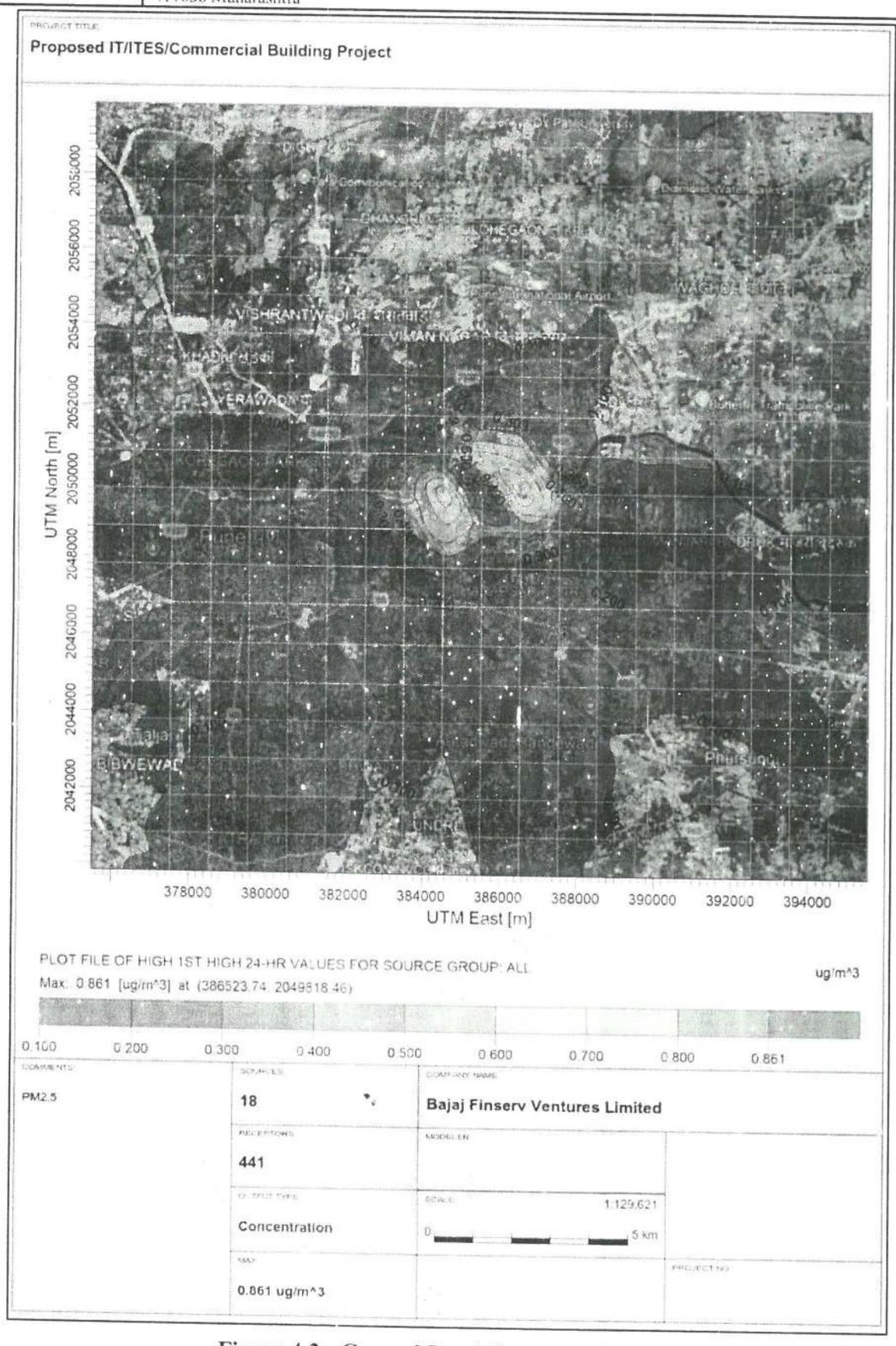


Figure 4.2 - Ground Level Concentrations of $PM_{2.5}$

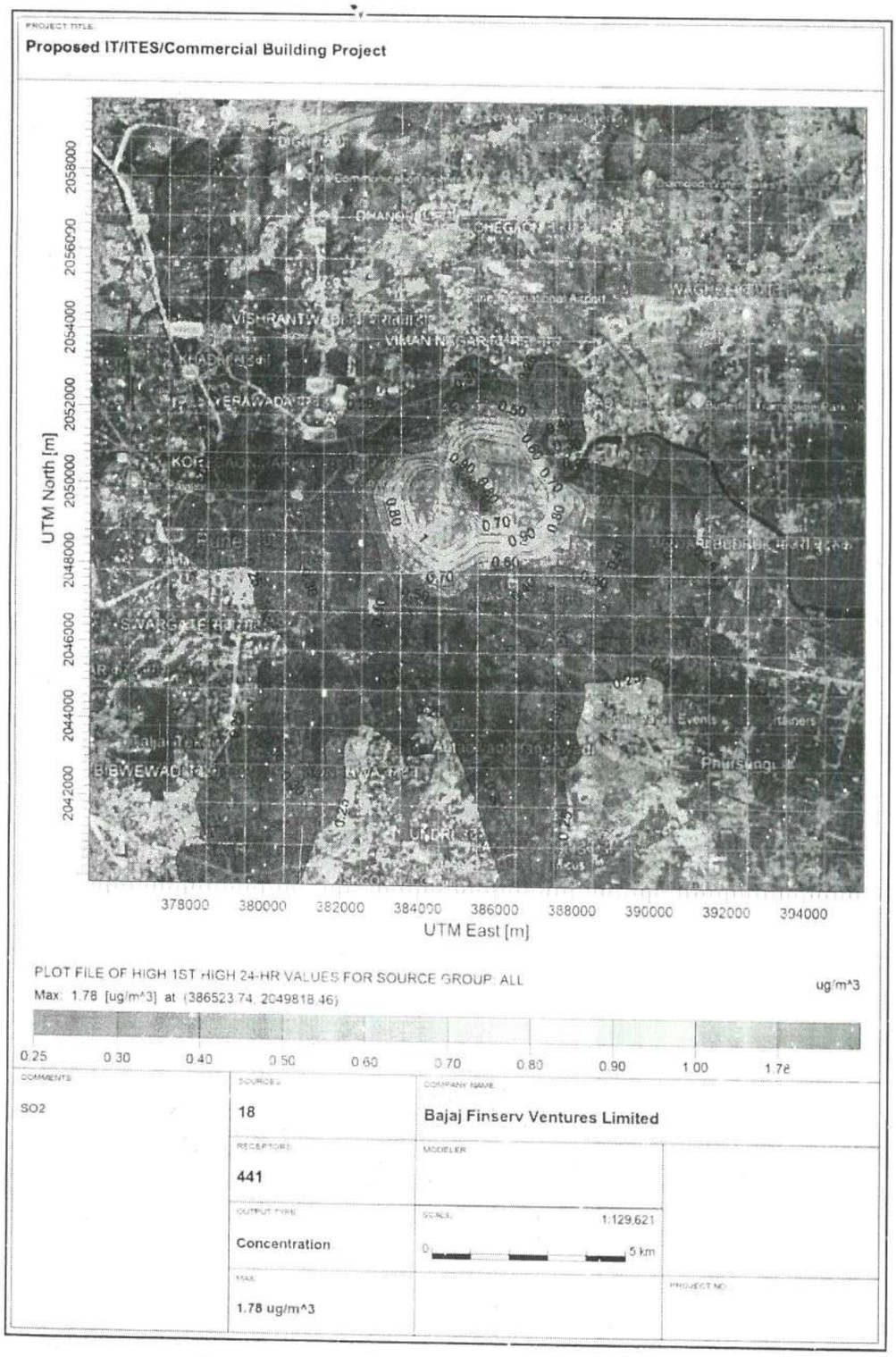


Figure 4.3 - Ground Level Concentrations of SO_2

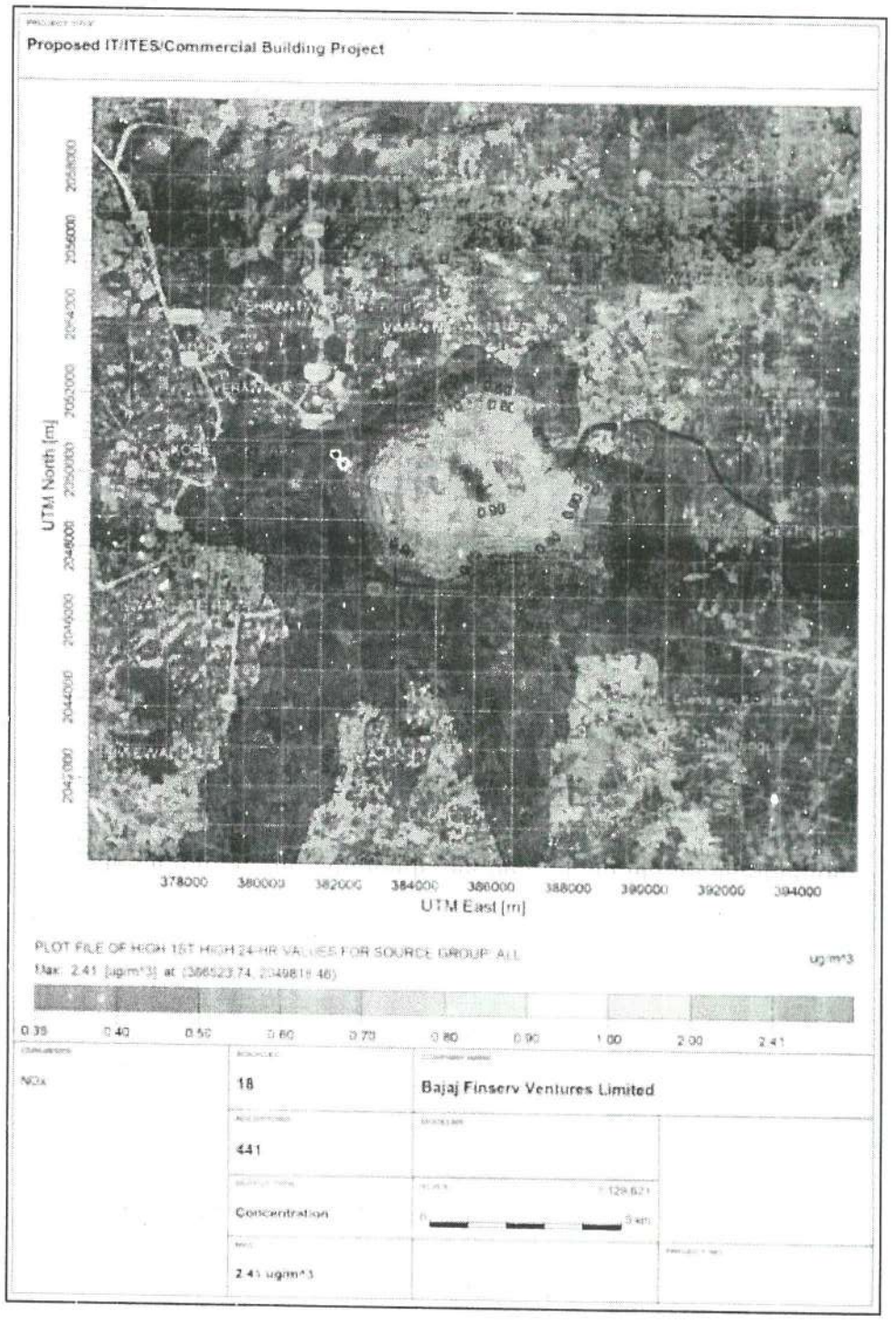


Figure 4.4 - Ground Level Concentrations of NOx

Observations

It is observed from the model output that the incremental concentrations for PM_{10}, SO_2 and NOx levels, maximum GLCs were observed to be 0.48 km in SW direction. It is noted that after adding the incremental concentrations to maximum baseline values also, the ambient levels will be within the specified limits.

Hence, it can be concluded that there will be an increase in GLCs levels, but not crossing the CPCB Specified limits.

Mitigation Measures

i. Stack height would be 130-m for gaseous emission confirming to the CPCB norms.
ii. DG sets will be used during failure of electricity.
iii. Ambient air quality and stack emission would be regularly monitored.
iv. In order to avoid fugitive emissions from different sources, water will be sprayed. Also, the roads within the premises will be concreted.
v. Green belt around the periphery and within premises will be developed which will help in attenuating the pollutants.

4.5.8 Environment Management Plan

The predicted average concentrations with baseline BAU along with the proposed contribution from the project will be below the standards hence considering the present and the future scenario, it can be concluded that there is minimal impact of the project. Whereas impacts have to be mitigated as far as possible so as to keep the air quality pollutant free. Therefore, following environment management measures need consideration the prevailing conditions;

•Site barricades will be provided along with the tree planting at the site boundary;
•The project will have a pre-cast factory for the walls & slabs. These pre-cast units will be fitted to the structural component of the buildings reducing raw material handling, transportation and waste.
•Excavation, handling and transport of materials will be avoided under high wind conditions or when a visible dust plume is present;
•During windy conditions, dust suppression measures will be adopted (dampening with water, tire washing facility at the entrance of the project site, etc.;
•The vehicles hired for transportation of material and labor shall have PUC certificate in order to reduce air emissions;
•Dust covers will be provided on trucks used for transportation of materials prone to fugitive dust emissions.
•The development will use Ready Mix Cement (RMC) to prevent any air emission occurring during mixing of the cement;
•If small volumes of concrete are to be mixed (manually), mixing is to be undertaken on a hard surface covered in plastic sheeting so that concrete waste and runoff can be contained;
•Traffic Management - vehicular movement to be regulated with proper parking facility and internal road system;
•The generators used on the site for energy backup will be CPCB norms complied for air emissions with possibility of using Low Sulphur Diesel;
•Air & Dust monitoring will be conducted at the site boundary during drilling, excavation, stockpiling and building activities and at post occupancy stage with the help of MoEF approved laboratory.

Conclusion

All pollutant levels were found to be within prescribed limits during construction phase Future scenario analysis i.e. during operations phase illustrates that pollutant concentrations also to be within prescribed standards, thus project have no implication in overall air quality.

4.6.9 Impact on Noise

Impact

The main sources of noise from the project are running of D.G. Sets and vehicular traffic. D.G. Sets installed in the proposed scheme will provide emergency electricity supply during power failure. This will be intermittent and for short durations. The vehicles plying within the site will be mainly of the visitors and workers and are hence not expected to cause unnecessary noise. Hence, during this phase, no major impact on noise environment is anticipated.

Mitigation Measures

D.G. Sets will be fitted in acoustic enclosures to control the noise generated. Adequate personnel protective equipment (PPE) will be provided to the personnel engaged in D.G. Set room. The traffic noise will diminish within a short distance from the source of origin. Honking within the site will be discouraged. Proposed rows of plantation will further restrict the noise on either side of the plantation.

4.5.10 Impact on Aesthetics

There is no scenic amenity or landscapes around the project site which will be deteriorate due to proposed project. The surrounding vicinity shall be aesthetically improved as far as possible.

Biological Environment Impact

Prediction of impacts on biological environment is comparatively difficult due to various reasons. For prediction of biological environment, adequate information about the structure and function of an ecosystem is required to be collected. Large amount of long time base line data is required from the secondary sources but such data is often limited with concerned authorities. In addition to that the ecosystem with varieties of interactions sometimes behaves in an unexpected way. Biological impacts on ecosystem are typically predicted in two ways.

- Professional judgment based upon knowledge of the biota and habitat, present knowledge of the impending impact resulting from similar studies and commonsense.
- Similarity models based upon simplifying assumptions and knowledge of the biota & habitat within the study area, which is predominantly agricultural, these are no reserve forests and no endangered species in the core zone.

Mitigation Measures

The change in land use profile of core zone shall induce some impact on biological environment, though this impact will be limited to the maximum extent in the core zone alone & is inevitable. Although there would be some traffic increase in the buffer zone and increase in the fuel consumption in the core zone of the project area, but its impact is not envisaged to be significant on the biological environmental of the buffer zone.

In the core area these in no reserve forest to be cleared which could affect the normal functioning of food chain, food web, prey predator, relationships locally. Hence as such, no impact is predicted on the biological Environment in the core zone.

Various kinds of large and small tree will be planted all around the boundary of the project to minimize the spreading of dust and particulate matter during the construction and operation phase. More plantations such as curtain, avenue and ornamental plantation and lawns will be done during the construction phase itself and maintained during the operation phase. Open space and parks will be fancied through the grasses and ornamental plants. Local and low water demanding plants that will also be effective as sinks for various pollutants and attract birds will be planted at the site that will contribute in positive to the local ecology.

Ecological Concerns Matrix

Any infrastructure development project is likely to involve some activities that may have negative impact on the ecology of the area. Table 4.13 below lists the possible ecological concerns and the impact of the

project on the environment of the area.

Table 4.6: Ecological concerns along with their sources of threat and affected ecological parameters and impact of project

Ecological Concern	Source of threat	Affected Ecological Parameters	Impact of Project
Deforestation	Road Building	Loss of habitat Loss of soil Loss of species. Impact on animal/ avifaunal route Variation in local climate	No impact as no large-scale road building is proposed; only internal roads will be made, minimizing threat to habitat, soil or species.
		Habitat damage Loss of trees Change in land use Gradual encroachment in forest areas	No impact as no forest or tree is involved
Habitat destruction	Road Building and Construction of Building	Loss of species Reduced ecosystem productivity Reduced ecosystem resilience. Biological invasions and introduction of exotics.	No negative impacts, as habitat destruction not involved. Project site does not support many species and biodiversity is poor. Surrounding area land use is commercial
Disposal of wastes in critical habitat	Wastes generated	Loss of species Reduction in groundwater recharge. Pollution of water sources	No negative impacts as generated rubble and waste would not be disposed in critical habitats (floodplains)
Threat to Wildlife	Colonization	Disturbance to animals/ avifaunal routes Incidences of poaching and illegal trade Restricted movement of wild animals	Bird friendly diffused blue lights will be used to facilitate movement of avifauna.
Firewood extraction	Laborers and workers colony	Would result in reduced ecosystem productivity Rampant firewood extraction or lopping could permanently damage some trees and reduce their regeneration potential Wood cutting during flowering and fruiting will result in reduced number of prop gules for regeneration.	Not applicable

4.5.11 Impact on Bio-diversity

Impact of development of the project on ecology and available resources on site, example impact of building shade on open spaces, existing wind patterns on the site, impact on soil erosion, existing vegetation, habitat protection, water and air pollution and waste handling are assessed and mitigation options to reduce the negative impact on the resources are suggested.

Threat to Biodiversity

As such there will not be any threat to biodiversity at the project site as the whole area is totally denuded and does not have any water body also to support aquatic life. There is no existing vegetation as the area has been previously developed for such schemes and is totally denuded.

Mitigation measure

The green belt will be developed for control of pollution and aesthetic view of the complex. For landscape developing, we have proposed plantation native tress, which help in attracting the birds and providing nesting site for different kind of the birds.

Biodiversity will be increased by developing proper landscaping in an area by plantation of native / fruit bearing varieties of trees. The trees will be planted with adequate space between them so that their growth is not hampered. About 5797.39 m^2 RG areas are provided for the development of green belt in the project site. Total number of trees on plot 776 this will remarkably enhance biodiversity of flora and fauna to attract the birds for nesting and roosting.

- Total RG area (m^2) 10% : 5797.39m^2
- Existing trees on plot : 776 Nos.
- Number of trees to be cut/transplant : 326 Nos.
- Number of trees retain : 119 Nos.
- Number of trees to be proposed : 556 Nos.

Nocturnal insects are strongly attracted to light sources that emit large amounts of UV radiation (blue, fluorescent lights and mercury lamps). Behaviors, such as flight and mating are inhibited in such insects that are exposed to bright light at night. Artificial night lighting might in turn affect the provision of pollination by moths. Vehicular traffic will be monitored especially during nighttime for nocturnal faunal species.

Biodiversity will be increased by developing green belt and landscaping in an area by plantation of native / fruit bearing varieties of trees. Emphasis will be on growing nesting and birds, butterflies; insect and other fauna attracting trees

The details of baseline biological environment are given.

Impact Matrix

Various activities from the proposed scheme are likely to have some impacts on the environmental constituents during its construction as well as functional phase.

Table 4.7: Impact Matrix

Environmental Parameters	Nature of Potential Impacts during Construction and Function							
	Local	Regional	Short Term	Long Term	Reversible	Irreversible	Adverse	Beneficial
Topography	√							
Drainage	√							
Soil	√							
Water Resources	√	√			√		√	
Water Quality	√							
Land Use	√					√		√
Air Quality	√	√			√		√	
Noise	√	√			√		√	
Flora	√					√	√	
Fauna	√					√	√	
Employment	√					√		√
Aesthetic	√					√		√

The impact assessment matrix given in Table 4.11 reveals the impact associated with each activity of the project on various environmental parameters during construction and function phase respectively before any mitigation measures are implanted.

255

CHAPTER 5: ALTERNATIVE STUDIES

It is the best practice that the EIA should consider project alternatives and their relative potential impact on the environment. Alternatives must, however, be both practical and reasonable, within the overall constraints of the proposed project development.

A project of any nature consists of various activities, which involve men, money and material. These activities may consume natural resources and discharge wastes, which are likely to have serious consequence to the environment. A number of alternative options may be available to carry out many of these activities. An option with least or nil adverse environment impacts is to be selected. Critical analysis is therefore required for selection of the right alternative. Alternative Analysis has been done for critical aspects of the project.

5.1 Description of each alternative

The proposed project is Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, 411036 Maharashtra. Analysis of alternatives presumed during the pre-designed stage of the project. It depends various factors viz. site, market scenario, availability infrastructure, economy & fund.

The proposed project site is in the Mundhwa area hence all required infrastructure such as water, roads, electricity etc. are already readily available. Analysis of alternative study for proposed project is carried out on the basis of following factor –

A. Site alternatives
B. Technology Alternatives
C. Raw Material alternatives

5.2 Summary of adverse impacts of each alternative and Selection of alternative

Sr. No.	Description	Details	Remark
1	Raw Material Availability	Availability of raw material from nearby area of 25 kms.	Cost Saving and environmental friendly.
2	Environmental Settings	No notified critically polluted area in the proposed study area. No national park or wildlife habitats within 10 km radius.	Positive impact due to proposed project
3	Road Connectivity	Good road connectivity for transportation and no additional construction of road requirement	Cost Saving
4	Land	Expenses incurred due to NA land is nil for this proposed project. Cost savings in land allotment and purchase.	Cost Saving

The major materials required for construction of the proposed project will be steel, cement, bricks, metal, flooring tiles/stones, sanitary and hardware items, electrical fittings, water, etc. Many of these materials

selected based on the recycled component to the allowable extent as mentioned here below:

Steel	:	20-25%
Cement	:	25-30%
Fly-ash Blocks	:	30-40%
Glass	:	10-15%
Ceramic tiles	:	20-30%
MDF Wood	:	15%
Roofing Tiles	:	25-30%

Ready Mix Concrete (RMC) will be used in the project so as to reduce environment pollution at site. Materials like fly-ash brick and recyclable aluminum shall be preferred

The project site falls under seismic zone–III as per the map of Seismic Zones of India. Various measures taken to make the proposed building structure earthquake resistance include:

1. Building designed as a RCC framed structure.
2. The design of frame structures is based on stipulation of I.S. codes of earthquake design (I.S.1893) 3. Ductility provisions to improve earthquake resistivity, as per the Indian Standards requirement also being incorporated.
4. As such the structure is designed for earthquake resistivity taking into account latest provisions of Indian Standards codes for earthquake resistivity.

5.2.1 Reinforcement steel & other steel elements

Reinforcement steel of high yield strength i.e. Fe 500 grade will be used. The steel will be procured only from client certified vendors. The material will reach site along with their Material test certificate which will be provided by the vendors.

The steel after reaching site will be subject to physical and chemical tests as instructed by the site incharge. The steel will be marked and stacked on raised platforms and will be covered to protect it from moisture ingress. Periodic tests will be carried out on steel to check the quality. Reinforcement steel will be fabricated on the basis of approved barbending schedule. Steel will be fabricated using automated cutting and bending machines. The column and beam cages will be fabricated on ground and shifted in place using tower cranes. Galvanized iron binding wires will be used for binding the bars. Couplers will be used for higher diameter bars to avoid congestion. Cut and remains will be used for making rings, chairs etc. to minimize wastage.

5.2.2 Partition and finishing works

Light weight AAC blocks with ready-mix mortar and Gypsum boards will be used as partition wall. Gypsum plaster will be used wherever finishing is required. The tiles in the Water closets and toilets will bear fixed using adhesives.

CHAPTER 6: ENVIRONMENTAL MONITORING PROGRAM

This Chapter plans the various technical aspects of environmental monitoring to be followed at specified intermissions to assess the efficiency of mitigation measures. The details of environmental monitoring program include locations, necessities of monitoring facilities, frequency, parameters to be monitored and methods for compiling and examining data, making comparisons with the baseline data and check points of whether compliance is being achieved.

6.1 Technical aspects of monitoring the effectiveness of mitigation measures

6.1.1 Implementation Schedule of Mitigation Measures

A monitoring program has been detailed out in which the frequencies of measurement, the planned location of measurement and detailed budgets are listed.

The environmental monitoring program includes

- Ambient Air Quality Monitoring
- Ambient Noise Quality Monitoring
- Water Quality Monitoring
- Soil / Manure Quality Monitoring

The MoEF & CC approved laboratory is appointed for the environmental monitoring during construction and operation phases. There will be one record section for recording all the sampling frequencies and analysis reports.

The mitigation measures suggested in the Chapter-4 should be implemented so as to reduce the impact on environment due to the construction and operations of the proposed project. In order to facilitate easy implementation, mitigation measures are phased as per the priority implementation.

6.1.2 Post Project Environmental Monitoring

6.1.2.1 Ambient Air Quality Monitoring

Ambient Air Quality Monitoring during Construction Phase shall be conducted for 24 hours, twice a week, once a month, two times in a year. This monitoring will be carried out prior to the filing of six-monthly compliance report for the proposed project. For ambient air quality parameters of Particulate Matters (PM10, PM2.5), Carbon Monoxide (CO), and Oxides of Nitrogen (NOx) and Sulphur Dioxide (SO2). Ambient air monitoring should measure if the mitigation measures recommended are effective and chart accurse of corrective action, if not.

Ambient Air quality monitoring will be conducted at specific locations, mainly to assess the impact of DG set operation. During the Operation Phase, ambient air quality monitoring is suggested to be carried out periodically to monitor air quality around DG sets and Parking areas.

Location of Air Quality Monitoring sampling during Construction Phase shall be based on baseline monitoring as detailed out in Chapter 3. Data should be generated once in a season excluding monsoon at the monitoring locations in accordance with the National Ambient Air Quality Standards formulated by MoEF & CC through Notification on November 18, 2009.

6.1.2.2 Ambient Noise Quality Monitoring

Ambient noise quality monitoring will be done daily during Construction Phase. The location shall be selected in the area where there are changes of high noise levels. The noise released from heavy construction equipment during construction period, shall be monitored and wherever required, industrial preventive measures and temporary noise barriers for noise reduction are recommended. Location of Noise Quality Monitoring shall be based on baseline monitoring locations as detailed out in Chapter 3. Noise monitoring will be conducted at DG set locations during Operation phase sometimes and in locations that are possibly noise sources such as DG sets, STP and Vehicular movement areas.

6.1.2.3 Water Quality Monitoring

Water quality monitoring will be conducted for different water sampling locations and uses, to check the physicochemical and microbiological parameters. These water samples shall be derived from:

- Surface or ground water locations present on project site
- Outlet of treated wastewater from STP, during Operation phase
- Drinking water supply source, for labor colony during Construction phase and for users, during Operation phase of the project

Water sampling shall be done once in six months for natural water bodies. For STP effluent, it will be done monthly and for drinking water, it will be monitored on a periodic basis.

Location of surface and groundwater quality monitoring, during Construction Phase, will be on the basis on baseline monitoring sampling as detailed in Chapter 3.

6.1.2.4 Soil quality

Soil sampling, during construction will be done on the well-maintained topsoil accumulation to check any contamination. Soil Sampling will be done once in six months and physicochemical and bacteriological parameters of soil will be monitored. Manure from the Organic Waste Convertor (OWC) machines shall be monitored during the Operation Phase of the project.

Routine monitoring of environmental parameters will be carried out during construction and operation phases of the project.

Table 6.1: Environmental Monitoring during Construction Phase

Sr. No	Monitoring	Parameter	Frequency	Location	Cost per year (Rs.)
1	Ambient Air Monitoring	PM10, PM2.5, SO2, NOx, CO	24 hours twice in a week every three Months 8 hourly twice a week every three months	DG set, upwind, downwind, entry gate, parking area DG Set	1,00,000/-
2	Ambient Noise	Hourly equivalent Noise level in dB (A)	Daily	near entry gate, One at Exit and One near DG set	75,000/-
3	Water Monitoring	As per IS: 10500 standards	Once in a week	One for Labour drinking water	1,50,000/-
4	Soil Testing	Physical& chemical properties	Once in six months	One sample from stud area	5,000/-
Total					3,30,000/-

Table 6.2 Environmental Monitoring during Operation Phase

Sr. No	Particular	Parameter	Frequency	Location	Cost per year (Rs.)
1	Ambient Air Monitoring	PM10, PM2.5, SO2, NOx	24 hours twice in a week every three months	DG set, upwind, downwind, entry gate, parking area	3,00,000/-
2	DG Stack Monitoring	CO	8 hourly twice a week once in a month for three months.	DG sets, upwind site and downwind site	25,000/-
3	Ambient Noise	Hourly equivalent Noise level in dB(A)	Once in a month	DG set, entry gate, parking area	

4	Water Monitoring	As per IS: 10500 standards	Once in months	Water from STP outlet	50,000/-
			Once in a week	WTP/drinking water	50,000/-
5	OWC manure & Soil	Physical & chemical properties	Once in a month	One sample of manure	75,000/-
Total					5,00,000/-

6.1.2.5 Statutory Compliance Schedule

Table 6.3: Responsibilities and Penalties under act

ACT	Responsibilities under section	Penalties section under
Water (Prevention & Control Of Pollution) ACT, 1974 (No. 6 of 1974)	19, 20(2) & (3), 21(3)(e), 23, 24(1) (a), 24(1) (b), 25(1) & 26, 25(4) & 26, 27(2), 28, 29, 31(1), 32(1)(c), 33(3)(l), 33 A	41(1), 41(2), 42(1), 42(2), 43, 44, 45, 45A
Environment (Protection) Act (No. 29 of 1986) 1986	5, 7, 8, 9(1), 9(3), 10(1), 10(2), 11(1)	15, 26

Project proponent will comply with construction worker's safety & welfare Act.

Compliance schedules:

There will be three facts to design and follow the schedules viz.:

A. For compliance of responsibilities,
B. For day-to-day operation and maintenance of STP and OWC, and
C. For routine environmental monitoring, to assess the impact and take timely action.

The schedule:

I) Daily Compliance:

1. Take the meter readings - initial and final, for checking the water consumption.
2. Maintain the electricity consumption record for pollution control equipment's.
3. Monitor ambient air periodically as per Consent and EC Conditions.

II) Monthly Compliance:

1. Monitor the emission sources through the competent laboratory and submit the analysis reports to the board and MoEF.
2. Monitor ambient/work zone noise levels & ensure conformance to standards.

III) Quarterly Compliance:

1. Monitor the ambient air quality at upwind and downwind locations of the Project.
2. Review the Water Reuse performance.

IV) Half Yearly Compliance:

Submit the Post Environment Clearance Report to the Regional Office MoEF& Climate Changes along with the State Pollution Control Board prescribed in the prior EC every June & December.

CHAPTER: 7 ADDITIONAL STUDIES

7.1 Public Consultation

Proposed Commercial Development project falls under category B1 project relating to Area Development Projects and Townships which doesn't attract general conditions as per EIA notification 2006 & amendment thereof, hence proposed project doesn't require public consultation.

7.2 Risk Assessment

The risk assessment studies have been conducted for identification of hazards, to calculate damage distances and to spell out risk mitigation measures. Proposed project is for IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, Maharashtra.

Hazard analysis involves the identification and quantification of various probable hazards (unsafe conditions) that may occur at the proposed project. On the other hand, risk analysis deals with the identification and quantification of risks, the equipment/facilities and personnel exposed to, due to accidents resulting from the hazards present at the proposed project. At the proposed development, hazard occurrence may result in on-site implications like:

- Fire and/or explosion;
- Leakage of flammable material and catching fire;
- Natural calamities like earthquake, cyclone etc.

Other incidents, which can also result in a disaster, are:

- Agitation/forced entry by external group of people and;
- Sabotage

Emergency prevention through good design, operation, maintenance and inspection are essential to reduce the probability of occurrence and consequential effect of such eventualities. However, it is not possible to eliminate such eventualities and random failures of equipment or human errors, omissions and unsafe acts cannot be ruled out. An essential part of major hazard control has therefore, to be concerned with mitigating the effects of such Emergency and restoration to normalcy at the earliest. The overall objective of a disaster management plan is to make use of the combined resources at the site and outside services to achieve the following:

1) To localize the emergency and if possible, eliminate it;
2) To minimize the effects of the accident on people and property;
3) Effect the rescue and medical treatment of casualties;
4) Safeguard other people;
5) Evacuate people to safe areas;
6) Informing and collaborating with statutory authorities;
7) Provide authoritative information to news media;
8) Initially contain and ultimately bring the incident under control;
9) Preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of the emergency
10) Investigating and taking steps to prevent reoccurrence

7.2.1 Scope of the study

The scope of work is to carry out risk analysis for the proposed project of plant covering all the risk to be handled and stored at the plant after construction.

7.2.2 Study Objective

The objective of the risk assessment includes the following:

- Identification of hazards

- Selection of credible scenarios
- Consequences analysis of selected accidents scenarios

7.2.3 The study Approach

- System Description
- Identification of Hazards
- Selection of Credible Accident Scenarios
- Consequence Analysis
- Risk Mitigation Measures

7.2.4 Disaster Management Plan

This is the development of for Proposed IT/ITES/Commercial Building Project of M/s. Bajaj Finserv Ventures Limited & Others at Survey No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, Maharashtra, under the municipal limits of PMC.

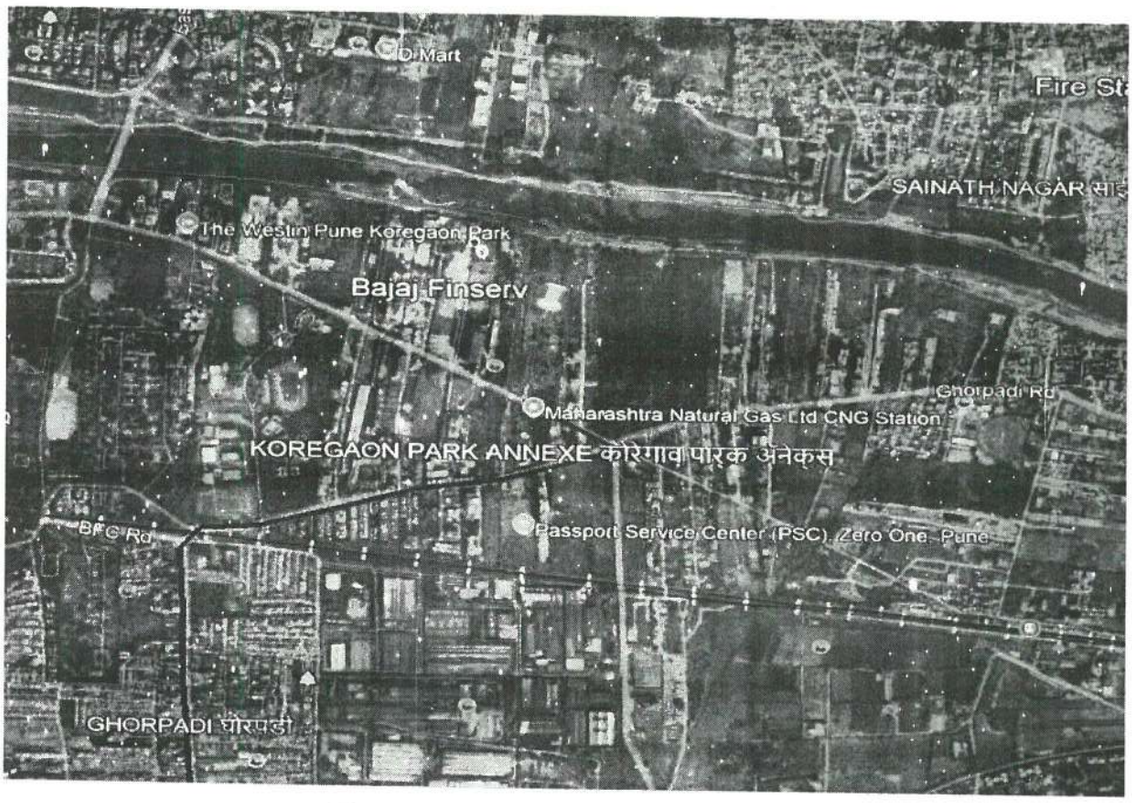


Figure 7.1: Location of the proposed project

As per the regional plan and approvals issued by authority, the proposed project site falls under Residential zone.

The Disaster Management Planning has done for total built-up area 70,631.81 m^2
The building configuration details given in below table:

Proposed Configuration		
Building Name	Configuration	Height (m)
Tower 1	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2nd floor Parking + 3rd floor parking + 4th and 5th floor (comprising of food court and training rooms) + 22 office floors.	125.25
Tower 2	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2nd floor Parking + 3rd floor parking + 4th and 5th floor (comprising of food court and training rooms) + 22 office floors.	125.25
Tower 3	B5+B4+B3 + B2 + B1 + GR + Mz + 1st floor parking +2nd floor Parking + 3rd floor parking + 4th and 5th floor (comprising of food court and training rooms) + 22 office floors.	125.25
1 Visitor Centre	Ground Floor	8.40

Disaster is nothing but a status, which poses a level of threat to life, health, a property that negatively affects society or environment. The different type of disaster occurs because of man-made as well as Natural calamity. The damage caused by disasters is immeasurable and varies with the geographical location, climate and the type of the earth surface or degree of vulnerability. This influences the mental, socio-economic, political and cultural state of the affected area.

Hazard Possibilities are classified into different categories that are listed in below **Table 7.1**

Table 7.1: Different categories of Hazard Possibilities

Sr. No.	Type of Disaster	Category	Remark
Pune climate type:		Hot semi-arid climate bordering with Tropical wet and dry climate	
1.	Natural Disaster	**Earthquake**	Proposed site at Zone III: Moderate Damage Risk Zone (MSK VII)
		Avalanche	Absent: Moderately hot with high level of humidity condition at the proposed site
		Drought	Depends on annual percentage rainfall, green index, soils moisture, groundwater index.
		Floods	Depends on improper storm-water drainage systems and unplanned urbanization. Proposed site has well planned 300 mm to 450 mm wide drainage system for discharge quantity of SWD 1.75 cum/sec and max. excess treated water will send to Drainage line
		Landslides	Depends on a burst of heavy rainfall as well as the 3echanics. As per topographical characterization; proposed site has a gradual slope and building design has been done
			Keeping the topography in view hence major cutting and fillinghas been avoided. Hence there is no cause of such occurrence.
		Cyclones	Proposed site at Low risk of cyclone zone
2.	**Man Made Disaster**	**Technological Disasters**	Engineering failures, Road Accidents, Fire or Explosion, Accidents, Transformers and Electrical Failures. These are accidental and unpredicted
		Sociological	Criminal acts/Terrorist attack, Stampedes, Riots and War and

		Disasters	Biological war. This type of disaster is not anticipated

An **Internal Emergency** is one that directly involves the facility and is a threat to the residence and staff, such as an in-house fire, groundwater contamination or a naturaldisaster such as a cyclone, earthquake that causes damage to the facility.

An **External Emergency** is one that occurs outside of the facility and does not directly threaten the residence and staff inside the buildings. The indirect effect on the facility is thepossibility of large numbers of casualties arriving for treatment. External disasters include; accidents, explosions, chemical spills and leachate, natural disasters occurring outside the facility such as tornadoes or flood and violent incidents involving a large group of people.

7.2.4.1 Purpose of Disaster Management Planning:

Provide an organizational and operational framework for the proposed site to assist affected local jurisdictions in managing an operation to recovery. The efficient and rapid management of disaster management will help to protect the health and safety of theaffected population, minimize threats to the environment and ensure that critical response and recovery activities can proceed in a timely and unencumbered manner.

In short, DMP plans for the reduction of disaster impacts, and take a positive step to recovery after the adverse impression. The report is prepared site specific, in terms of its impact from natural calamities and manmade disaster taking into consideration. The site conditions, geographical layout and on the study reports, data available from the disaster management reports of PMC, SDMA, NDMA, MOR, MOCA, MHA, CWC, MOHFW etc. as well as other information from other government institutions like IMD, MERI, NEERI, MMB etc.

7.2.4.2 Scope:

This document is designs to cover the following with dovetailing information for linkage to DMP as thrust area:

- ✓ Emergency Prevention
- ✓ Emergency Preparedness
- ✓ Emergency Mitigation
- ✓ Activities for preparing for and prevention of emergencies such as training and maintenance
- ✓ Overall control and coordination arrangements for emergency response. Thisincludes evacuation strategies for occupants with a disability

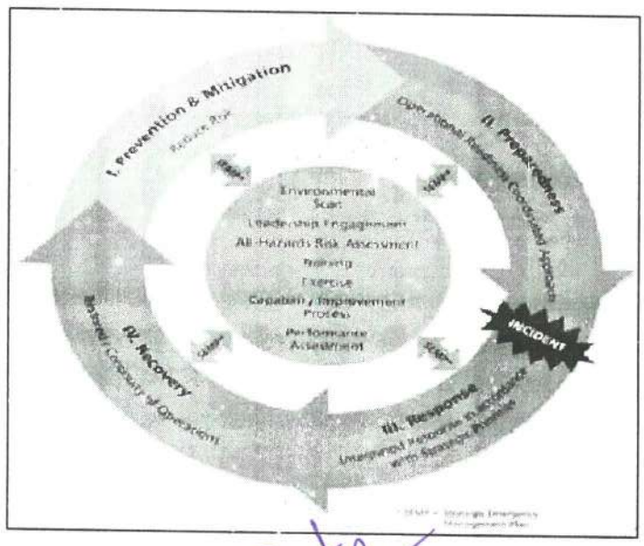


Figure 7.2: Disaster Management Planning

Preparedness means the state of readiness to deal with a threatening disaster situation or disaster and effects thereof.

Mitigation means measures aimed at reducing the risk, impact or effects of a disaster or threatening disaster situation.

Response means conducting emergency operations to save lives and properties by positioning emergency equipment's and supplies, evacuating potential victims, providing food, water, shelter and medical care to those in need and restoring critical services.

Recovery is the efforts to return to normal life and protect against future hazards.

Table 7.2- Disaster Management Strategies

Deeds	Frequencies
Pilot study and Approvals	At the project proposal stage
Planning and Implementation	Initial formation
Operation and Maintenance	As per requirements
Review	6 month/ yearly updating
Mock Drill Schedule	Emergency schedule

7.2.4.3 Risk Assessment And Vulnerability Analysis:

Disaster risk reduction is nothing but a concept and practice of reducing disaster risk through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land, the environment and improved preparedness for adverse events.

Risk assessment is the determination of a quantitative or qualitative estimate of risk related to a well-defined situation and a recognized threat. The risk can calculated as impact multiplied by probability weighed against the cost:

$$Risk = Impact * Probability/Cost$$

Probability is the likelihood the event could occur within a given timeframe. Cost is the amount it takes to mitigate or reduce the risk to an acceptable level.

A **hazard** is a dangerous event or circumstance that has the potential to lead to an emergency or disaster.

An **emergency** is a dangerous event or circumstance that normally can managed at the local level.

Severity is an expression for the consequence seriousness associated with each deviation. The

vulnerability is a concept, which describes constraints of an economic, social, ethnic,physical or geographic nature, which reduce the ability to cope with the impact of hazards.

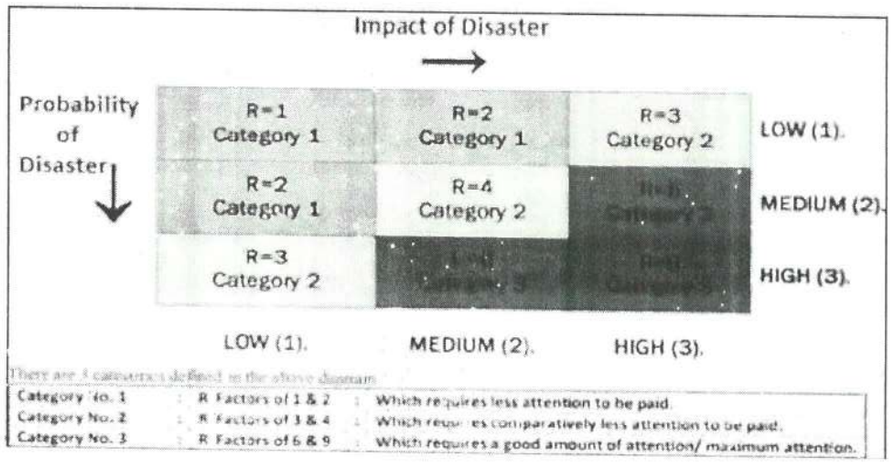


Figure 7.3 Disaster Matrix

The process of Risk Assessment starts with the assessment of potential disasters through a combination of hazards mapping and vulnerability analysis. Risk assessment strategies specified as below.

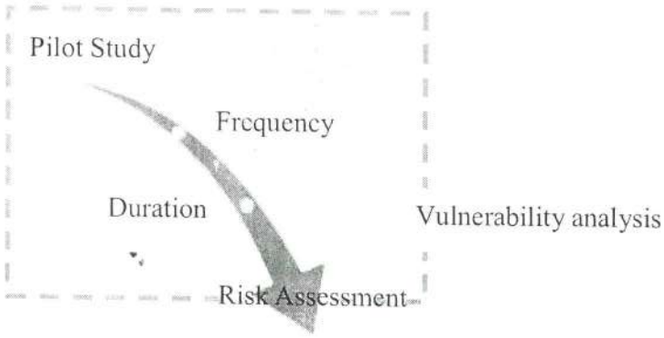


Figure 7.4: Risk assessment strategies

Active Phase Analysis:

The different kinds of phase's leads to issues related to Environmental health and thedetailed analysis as shown in **Table**

Table 7.3 - Disaster Phase Analyses

Phase	Provisions
Construction Operations Maintenance	It is important that impact and assessment work be properly planned so as to protect human health, comply with regulations, conserve disposal capacity, reduce injuries and minimize or prevent environmental impacts. It involves advance thought, planning and coordination among individuals at various levels of government and the private sector with experience and expertise in Environmental Impact and Assessment.

All kind of hazards could occur at the different time period. They could vary seasonally, especially natural hazards like flood and cyclone. Man-made hazards could occur at any time of the year. Similarly, earthquake and tsunami could occur at any time of the year, depending on climatic conditions. A seasonal hazard mapping for different disasters is presented in Table 7.5

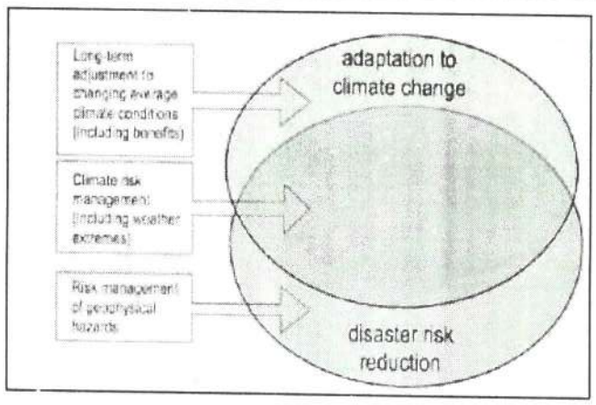


Figure 7.5: Climate Risk Management Phase Analyses

Table 7.4: Possible Hazard ConFigureuration

Type of Disasters	Vulnerability Mapping	Remark	Seasonal Mapping
Floods	The vulnerability of floods at the proposed site would dependon the drainage pattern, sewerage system, heavy rainfall and another climatic study as well as engineering services. The site under reference is not flooded prone area as per the records of PMC. Pune has recorded an average annual rainfall of 722 cm.	Municipal Drainage Chambers as well as Rain Water Harvesting Chambers have provided for thestorm water management to the proposed project.	Mainly from July-September as thereis the possibility of heavy rainfall.
Cyclone	Pune falls under Low Risk Zone for cyclone mapping. Cyclone is formed in condition when environmental heat radiation negatively effects on sea to get warm sea. As Pune is not located near coastal line of Maharashtra.	Proposed site city Pune is locatedin the hearts of Maharashtra.	There will be minimal risk of cyclones.
Earthquake	Pune city falls under Earthquake Zone III, Moderate Risk Zone, as per the map showing seismic zones of India IS 1893 (Part I): 2002.	Natural Disaster Managementprovisions provided.	This is a natural calamity; it could take place at any point of time.
Fire	Fire accidents could take place due to improper maintenance of electrical wiring, faultyconnections and gas leakage etc. Carelessness is one of the major factors for fire hazards.	Fire Hazard is and an evacuation plan also designed for the proposed project. There will be clear open space of all along the building. There will be also provision of 9 m turning radius for fire tender. All the provisions required as per NBC 2016.	It can occur at anypoint of time.

The proposed commercial project is located in Pune City. It could face various challenges from both natural and manmade hazards as highlighted in previous sections. Some of the precautionary measures that could taken in case of disasters in terms of social aspects are highlights as bellow:

Response Plan:

The purpose of this Disaster & Emergency Response and Recovery Plan is to provide a cohesive immediate response to a Disaster or Emergency that will help to managethe initial crisis stage, provide for the safety to the public, reduce the impact of the event and foster the speedy recovery and restoration of operations.

Disaster Mitigation Strategy:

The mitigation strategy made up of three main required components: mitigation goals, mitigation actions and an action plan for implementation. These provide the framework to identify, prioritize and implement actions to reduce risk to hazards.

- **Mitigation goals** are general guidelines that explain the requirements to achieve with the plan. This is usually broad policy-type long-term statements; represent visions for reducing or avoiding losses from the identified hazards.
- **Mitigation actions** are specific projects and activities that help achieve the goals.

The primary types of mitigation actions to reduce long-term vulnerability are:

- Local plans and regulations
- Structural projects
- Natural systems protection
- Education programs
- Preparedness and response actions
- The **action plan** describes how the mitigation actions will implemented; including how those actions will prioritized, administered and incorporated into the community's existing planning mechanisms. In a multi-jurisdictional plan, each jurisdiction must have an action plan specific to that jurisdiction and its vulnerabilities.

7.2.4.4 Disaster Mitigation Action:

Cyclones and Floods:

- Community awareness and mass education Programmed would be arrange in association with NGOs to manage the challenges during and after floods and cyclones.
- Residents will be, made aware to switch off the electrical mains in case of an emergency.
- Resident would be educated about Do's and Don'ts during cyclone and Floods.
- The proposed project will have the provision to avoid the floods during rainyseason.
- Regular maintenance of storm water channel and sewer lines and avoidgroundwater contamination by building unit leakages.
- The developer would build the proposed building with all the measures towithstand high wind velocity.
- Details of the nearby medical shop will be made available to people.
- Awareness will be, spread about the hazards of stored water. Communicablediseases like malaria, dengue, etc. could spread if water is stored for longer time.

Earthquake:

- There will be the provision of the local newspaper, radio or television station to:

✓ Provide a series of information on locating hazards in homes, workplaces, daycare centers, etc.
✓ Provide tips for earthquake drills.

- ✓ Run interviews with representatives of the gas, electric and water companiesabout how individuals should prepare for an earthquake.
- There will be proper maintenance team to assist the concerned authority in repair and strengthening tips for exterior features, such as porches, front and back decks, sliding glass doors, canopies, carports and garage doors.
- The list of building codes will be, given to building manager or the concerned authority. National building codes would be, made available to the concerned authority.
- The developer would prepare a disaster emergency kit, which will be maintained at society office.
- Some municipalities, counties and states have enacted codes and standards to protect property and occupants in case of an earthquake. Code that would be followed by the developer is given in Table 7.6

Table 7.5: Earthquake Guidance Codes

Codes	Unit Operations
IS: 1893 (Part 2)	Elevated and Ground Supported Liquid Retaining Structures
IS: 1893 (Part 3)	Bridges and Retaining Walls
IS: 4326	Earthquake Resistant Construction
IS: 13920	Ductile Detailing of Reinforced Concrete Structures
IS: 13827	Earthen Dwellings
IS: 13828	Low Strength Masonry Structures
IS: 13935	Seismic Strengthening of Structures

Water Scarcity Management:

- For efficient water balance, there will be the provision of sewage treatment plant, which will decrease the water demand for flushing and Gardening.
- Residence will be, provided with a booklet that would highlight measures to savewater and importance of water.
- Ultra low flow faucets and flushing devices will be, installed by the proponent.
- The developer would tie up with NGOs to promote the development of emergencylow-cost water treatment plant as well as zero discharge liquid.
- The Residence unit will arrange the tanker water if required.

Construction Phase Management:

- The developer would not allow any child labor.
- The developer would evaluate the health status of both skilled and unskilled workers on regular basis. If any workers found to have any diseases, then he/she will transferred to a different sector depending on their skills.
- The developer would provide wages as per the Payment Wages Act, 1936 and Minimum Wages Act, 1948.
- Other act that would be followed by developer for workers, The Buildings and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.
- Similarly, the developer would follow standard specifications for construction workers as well as for construction activities. These specifications and codes that to be followed are given in Table 7.7.

Table 7.5: Construction Guidance Codes

Codes		Publication
IS 7969-1975		Safety code for handling and storage of building material
IS 3696 (Part-I & II)-1987& 1991		Safety code for scaffolds and ladders

IS 7293-1974		Safety code for working with construction machinery
IS 3764-1992		Safety code for excavation work
IS 4912-1978		Safety requirements for floor and wall openings, railings and toe boards
IS 4130-1991		Safety code for the demolition of the building
Part-VII		National building code of India, 1983
IS 7205-1974		Safety code for the erection of structural steelwork
IS 2750-1964		Steel scaffoldings
IS 1905-1987		Code of practice for structural use of unreinforced masonry
IS 1904-1986		Code of practice for design and construction of foundations in soils: General Requirements

- All the storage area must be under the supervision of skilled and qualified staffs.
- Facility Manager will appointed by the developer and that person would beresponsible for managing all safety-related activities on the site.

Some of the immediate measures that will adopted by the developer:

- Construction and maintenance of safety facilities such as access roadways,pedestrian routes, barricades and overhead protection.
- Safety signs will installed at the various location of the construction site. Itmust be in Hindi, Marathi and English or other local languages.
- Testing of lifting machineries such as cranes and goods hoists and lifting gear suchas ropes and shackles on regular basis.
- Inspection and rectification of access facilities such as scaffolds and ladders.
- Inspection and cleaning of welfare facilities such as toilets, clothing accommodationand canteens.
- The organization and conduct of safety training programs, including inductiontraining for all workers on the site.
- The investigation and review of the circumstances and causes of accidents andoccupational diseases to advice on preventive measures.
- Necessary protective equipment will provided by the developer.
- First aid kit box will maintained at site engineer and Facility Manager Office.

Noise control measures:

- Workers will advised to switch off the machines when they are not inoperation.
- Workers will advised and trained to keep compressor motor covers closedwhen they are running.
- Workers will advised to wear earplugs while working with noise-relatedmachines.

Sanitary services:

- Proper water supply will made available for all workers. This water will made available through tankers.
- Toilet and urinal facilities will provided in adequate number.
- Drinking-water containers shall placed in cool and protected areas. These containers must made from impermeable materials with suitable covers. The containers shall cleaned regularly by a designated person. The drinking water must be tested for the chemical and bacteriological parameter on regular basis.
- Developer could tie up with nearby institute to carry out this activity.
- Meal area or canteen should be cleaned properly by authorized personnel.
- Toilet and washroom facilities would be provided.

Fire Hazard:

- List of nearby fire stations and hospitals would be displayed at lobbies and society office room.

- The road map of nearby fire stations would be displayed at lobbies, society office room by the developer and the same would be maintained by the concerned authority.
- Developer and concerned authority would be given a booklet for Do's and Don'ts for fire hazard.
- The developer would follow the appropriate building codes for construction of the proposed building.
- The developer would follow appropriate norms for electrical wiring system to minimize the fire hazards.
- Evacuation plan would be shared with all the staff members, employees and the same would be displayed on each floor lobbies and society office. The same plan would be maintained by the concerned authority.
- The developer would be installing fire hoses/ fire extinguisher and first aid kit box. The number of the same will be provided as per CFO nos. The concerned authority would be inspecting them on a regular interval. Maintenance for the same could be taken care initially by the developer and later by society management committee.
- Sprinkler systems, fire, smoke alarm and smart sensors would be installed by the developer. Locations for the same would be chalked out after completion of the project. They would be regularly monitored for their efficient functioning.
- Importance of assembly point and its location would be highlighted by the developer.
- An underground water storage tank of would be provided for firefighting measures.
- Electric supply to these pumps would be on the independent circuit.
- Walls enclosing lift shaft would have 2 hours of fire resistant capacity.
- One dry chemical powder type fire extinguisher of 10 kg capacity having ISI certification mark and two buckets filled with dry sand would be kept in the Electric Meter Room as well as Lift Machine Room.
- The building would be provided with a manual fire alarm system with a main control panel at ground and pill boxes and hooters at each floor level. The layout of the fire alarm would be in accordance to relevant I.S. Specification.
- There will be provision clear distance all around the buildings as specified in CFO requirement. This will be helpful for the fire tender movement. The following Figure shows the fire tender movement of the proposed project.

The complete building evacuation time for the worst possible case depends on different evacuation phases as follows;

FROM	Section	Veh. Type	TO	VIA	Evacuation Start Time	Time required by 1st Vehicle to exit	For "Overall 100% Occupancy"	Time to Evacuate	Total Clearing Time for Level	Total Clearing Time for Floor/ Part	Total Clearing time for Simultaneous Floors	Total Clearing Time
Level					(min)	(min)	(units)	(min)	(min)	(min)		(min)
3rd Floor	A	2-W	Gate 1a	Ramp A	24.0	1.6	1234	10.3	35.9	35.9	36.0	36
	B	2-W	Gate 1a		24.0	1.6	1234	10.3	35.8	35.8	36.0	
	A	2-W	Gate 1b	Ramp B	23.0	1.4	1234	10.3	34.7	34.7	35.0	
	B	2-W	Gate 1b		23.0	1.3	1234	10.3	34.6	34.6	35.0	
2nd Floor	A	2-W	Gate 1a	Ramp A	12.0	1.3	1234	10.3	23.5	23.5	24.0	
	B	2-W	Gate 1a		12.0	1.2	1234	10.3	23.5	23.5	24.0	
	A	2-W	Gate 1b	Ramp B	11.0	1.1	1234	10.3	22.3	22.3	23.0	
	B	2-W	Gate 1b		11.0	0.9	1234	10.3	22.2	22.2	23.0	
1st Floor	A	2-W	Gate 1a	Ramp A	0.0	0.9	1234	10.3	11.2	11.2	12.0	
	B	2-W	Gate 1a		0.0	0.9	1234	10.3	11.2	11.2	12.0	
	A	2-W	Gate 1b	Ramp B	0.0	0.7	1234	10.3	11.0	11.0	11.0	
	B	2-W	Gate 1b		0.0	0.6	1234	10.3	10.9	10.9	11.0	
Basement 1	A	Car	Gate 2	Ramp A	0.0	0.9	248	2.1	2.9	2.9	3.0	
	B	Car	Rejection Gate 3b		0.0	0.7	248	2.1	2.7	2.7	3.0	
	A	Car	Rejection Gate 4b	Ramp B	0.0	0.4	248	2.1	2.5	2.5	3.0	
	B	Car	Gate 6		0.0	0.7	248	2.1	2.8	2.8	3.0	
Basement 2	A	Car	Gate 2	Ramp A	3.0	1.4	248	2.1	6.5	6.5	7.0	
	B	Car	Rejection Gate 3b		3.0	1.2	248	2.1	6.2	6.2	7.0	
	A	Car	Rejection Gate 4b	Ramp B	3.0	1.0	248	2.1	6.0	6.0	7.0	
	B	Car	Gate 6		3.0	1.3	248	2.1	6.3	6.3	7.0	
Basement 3	A	Car	Gate 2	Ramp A	7.0	1.9	248	2.1	11.0	11.0	11.0	
	B	Car	Rejection Gate 3b		7.0	1.7	248	2.1	10.8	10.8	11.0	
	A	Car	Rejection Gate 4b	Ramp B	7.0	1.5	248	2.1	10.6	10.6	11.0	
	B	Car	Gate 6		7.0	1.8	248	2.1	10.9	10.9	11.0	
Basement 4	A	Car	Gate 2	Ramp A	11.0	2.5	248	2.1	15.5	15.5	16.0	
	B	Car	Rejection Gate 3b		11.0	2.3	248	2.1	15.3	15.3	16.0	
	A	Car	Rejection Gate 4b	Ramp B	11.0	2.0	248	2.1	15.1	15.1	16.0	
	B	Car	Gate 6		11.0	2.3	248	2.1	15.4	15.4	16.0	
Basement 5	A	Car	Gate 2	Ramp A	16.0	3.0	248	2.1	21.0	21.0	22.0	
	B	Car	Rejection Gate 3b		16.0	2.7	248	2.1	20.8	20.8	21.0	
	A	Car	Rejection Gate 4b	Ramp B	16.0	2.6	248	2.1	20.6	20.6	21.0	
	B	Car	Gate 6		16.0	2.9	248	2.1	20.9	20.9	21.0	

For evacuation time analysis there will be the time required for a pre-alarm period, pre- evacuation period and coordination during movement period. In order to reduce these modules, the following measures are proposed;

Table 7.6: Guidelines to reduce Evacuation Time

Measures Proposed	Additional measures required
Pre- Alarm Period	
1.Early warning system; • Fire alarm & fire detection system • A signal located at fire Control room • With appropriate zonal indications • Smoke detector system • Auto water sprinkler with Thermal • Detector • LPG /PNG detector system • CCTV system 2. Watch and ward staff	1. Automatic smoke detection system shall be provided in lift machine room & electric meter room 2. Trained security staff & fire staff shall be posted on duty at the strategic location aroundthe clock
Pre- Evacuation Period	
1. Communication systems; • Intercoms & Cell phones • Public address system • Hand heldloudspeaker • Two-way radio • Signage	1. Periodic Awareness programs
Movement Period	
1. Refuge floor, Escape route signage, enclosed staircases, fire resistance doors, illumination of the escape route, emergency power supply etc. as per NBC provisions.	1. Mock drill shall be conducted regularly in consultation with Pune fire brigade and a logofthe same shall be maintained 2. Efficient PA System is recommended for entire building with standard 3. Building management system and Voice evacuation system will be an additional advantage

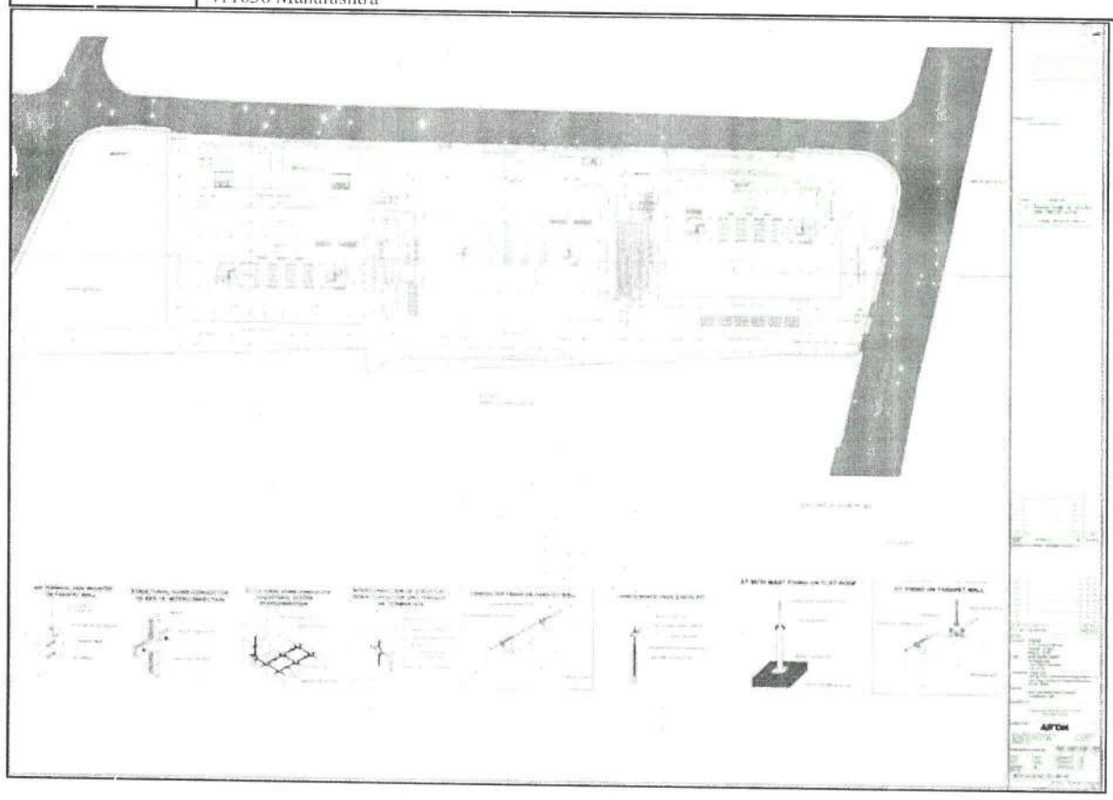


Figure 7.6: Lightening Arrestor Plan

7.2.4.5 Emergency Resonance Plan:

PMC list out the all-possible disaster categories and all the relevant information as well as management statistics available on the website **www.pmc.gov.in.** This website contains required bygone hazards, current situations, mitigation strategies, SOPs, work departments and their responsibilities in detailed. Preparedness and mitigation plans will have to be evolved and implementation monitored locally at the ward level to reduce the impact of the disasters. While evolving such area-specific preparedness and mitigation plans, types of vulnerabilities will essentially define the levels of preparedness and mitigation strategies. These strategies will have to be concentrated more towards the social and economically backward communities, as against the vulnerability of the overall system. PMC worked under different categories such as Healthcare and livelihood systems, Water Supply, Town Planning, Vulnerability to floods and consequent loss of life and damage to property, Public Work/Public Utilities, Electrical Services, Fire Hydrant Services, Educational Institution and Transport. The following flowchart gives the idea regarding the overall path to be followed during a disaster.

Inventory Resources:

Disaster management Kit and First aid kit:

The developer would prepare a disaster emergency kit, which would consist of:

1. Battery operated torch
2. Extra batteries
3. Battery operated radio
4. First aid kit and manual
5. Candles and matches in a waterproof container
6. Knife
7. Rope
8. Chlorine tablets or powdered water purifiers.
9. Can opener
10. Essential medicines
11. Thick ropes and cords
12. Sturdy shoe

These tools would be maintained at the society office. Detail of first aid kit box which is to be prepared and kept at the appropriate location. This first aid kit box must be check and inspected by society manager and fire officer on a regular interval. The details of different medicines to be kept in first aid kit box are:

Bandages	Dettol	Antiseptic cream	Medical tape roll
Dressing material	Sterile gauze pads	Adhesive bandages	Scissors
Antibiotics	Soap	Burnol	Crocin

List of NGOs:

List of various NGOs and their functional area has been highlighted in the Table 1.9. These NGOs can be contacted for awareness creation and providing basic knowledge to the employees. Developers would provide such list to the society manager and the decision would be taken by society to conduct such an awareness campaign.

Table 7.7: List of different NGOs near the proposed site

Name	Address	Contact Details	Roles
Farmers for Forest	ClimateSense Private Limited 203 Jasper, Lapis lazuli, Lane # 5, South Koregaon Park, Pune	hello@farmersforforests.org +91 8999118289	The mission of NGO to Combat impact of climate change on environmental and human well-being by increasing India's natural and biodiverse forest cover

Asha-Kiran Shelters Foundation	35/B Basement, "Nalanda" Lane C, North Main Road, Koregaon Park, Pune, Maharashtra 411001	020 2605 4100	The NGO working towards finding an alternative to acquire their basic rights to childhood & advocating for the issues of abandonment, neglect and indifference that they are exposed to in society
Pi Jam Foundation	Mantri Manor, B16, Lane Number 5, Suyojana Society, Kavadewadi, Koregaon Park, Pune, Maharashtra 411001	09820803677	• Pi Jam Foundation is a NGO to equip children and educators of India with access to affordable technology and enhanced quality of Computer Science education.
Marpu Foundation (NGO)	Sr.no.442, Sant Gadge Maharaj Vasahant, S Main Rd, Koregaon Park, Pune, Maharashtra 411001	08645663150	NGO is working To be a beacon of transformation, crafting a future that's equitable, compassionate, and sustainable through collective efforts and partnerships.

List of Hospitals:

List of hospitals near a proposed project is given in Table. The proposed project wouldbe displaying this list of the hospital in lobbies or appropriate locations and society office rooms. Also, they would share the same list with concerned authority and employees. So as the time of emergency, one could contact any of the hospitals for early response.

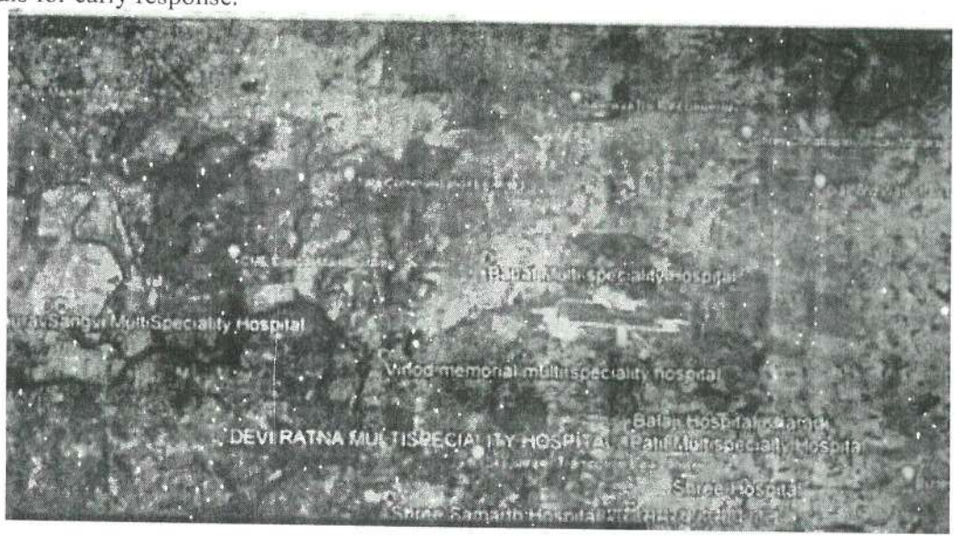


Figure 7.7: Locations of Hospitals

Table 7.8: List of Hospitals near Proposed Project

Name of hospitals	Address	Contact details	Distance (Km)
Chaitanya General Hospital	Ghoir Colony, near Ram Krishna More Sabha Gruha, Ganesh Nagar, Ghorpadi, Pune, Maharashtra 411033	09922553333	2.5 Km
Dr. Mulay Super Speciality Hospital	B T, Bhagwan Tatyasaheb Kawade Rd, Bhaskar Colony, Swami Vivekanand Nagar, Lakshmi Nagar, Wanwadi, Pune, Maharashtra 411040	08208068750	3.8 Km
Manipal Hospital, Kharadi - Pune	22/2A, Mundhwa - Kharadi Rd, near Nyati Empire, Santipur, Thite Nagar, Kharadi, Pune, Maharashtra 411014	02061656666	3.0 Km
Jehangir Hospital	32, Sasoon Rd, opposite Railway Station, Central Excise Colony, Sangamvadi, Pune, Maharashtra 411001	02066819999	4.9 Km
KEM Hospital	489, Mudaliar Rd, Rasta Peth, Pune, Maharashtra 411011	02066037300	6.8 Km

Warning System And Information Sharing:

Maharashtra has eight Area Cyclone Warning Centre (ACWC) monitoring stations of IMD. They mainly release special bulletins for cyclone warning. They would instruct the employees as per the information, without creating any panic situation. In order to share this information some of the communication routes that could be taken are:

Battery-less Hand Radio:

Some battery-less, low-cost hand radios are now available in the market which will be useful for receiving warnings. The developer would provide such battery-less hand radios to the manager for receiving warnings from All India Radio (AIR).

Internet:

In the present era of electronic communication, the internet provides a useful platform for communications. It provides a new and potentially revolutionary option for the rapid,automatic and global dissemination of disaster information. A number of individuals, organizations and groups, including IMD, are using the internet for real-time dissemination of weather observations, forecasts, satellite and other data. In the most critical phase of natural disasters, electronic communication has provided the most effective and, in some instances, perhaps the only means of communication with the outside world. The developerwill help to provide internet-based services at society office and also to all the flats. Itwould be dependent on flat owners to decide on selecting a particular brand of the internet.

All these warning systems would be utilized by the proposed building for acquiring warning data and thus plan adequately for the disasters.

Road Map of Fire Brigades:

The proposed project is located at Pune. The address, phone number, and minimum distance (by road) of nearby Fire stations are given in Table 7.9

Table 7.9: List of Fire Stations near Proposed Project

Name of Fire Station	Address	Contact Details	Nearest Ariel Distance (in km)
Damkal Fire Station	GWC3+76J, Bhagwan Tatyasaheb Kawade Rd, Dombi Wadi, Ghorpadi, Pune, Maharashtra 411001	9689930070	0.91 km
Hadapsar fire station	Plot No.55, Pravin Masalewale-One Suhana, Hadapsar Industrial Estate, Hadapsar, Pune, Maharashtra 411013	--	3.0 Km
Venkatesh Graffiti Fire Pumping Station	Venkatesh Graffiti, UGWT, Lonkar Nagar, Mundhwa, Pune, Maharashtra 411036	--	3.8 Km

Note: The distance given in the table is measured from Google Earth.

Figure 7.8: Road map of the proposed project from nearest Fire Station

The final accessibility of the nearest station depends on traffic density on road and busytime schedule.

Sop For Disasters:

Fire:

1. Do not panic; keep calm, think and act quickly
2. Activate the manual fire alarm system provided on the floor to raise the alarm
3. Report to security management
4. Summon the fire brigade on telephone No. 101
5. Alert the people in the vicinity of the fire
6. Do not take shelter in the toilet
7. Figureht the fire only if you can. Do not take undue risk
8. Crawl, in case you encounter smoke

9. If you know the details of the fire/fire extinguishing system provided, inform the firebrigade personnel on their arrival

*All of these could be listed, shared and displayed near security office or lobbies.

Cyclone:

i. **Before the Cyclone season:**

- Concern authority would inspect the building; secure loose tiles, carry out repair works for doors and windows.
- Remove dead woods or dying trees close to the building; anchor removable objects like lumber piles, loose tin sheds, garbage cans, sign-boards etc. which can fly in strong winds.
- Emergency light with extra batteries, battery operated torches, battery operated radio and enough dry cells would be kept at the security office.
- Check first aid kit box regularly.

When the Cyclone starts:

- Listen tc the radio (All India Radio stations give weather warnings).
- Keep monitoring the warnings. This will help one to prepare for a cycloneemergency.
- Pass on the information to others. But one must not spread rumors.
- Ignore rumors and do not spread them; this will help to avoid panic situations.
- Believe in the official information.
- The developer would be built the project with all the measures to withstand high-velocity wind.
- Employees would be made aware to switch off electrical mains at an emergencysituation.

ii. **Post-cyclone measures:**

- One must get inoculated against diseases immediately.
- Strictly avoid any loose and dangling wires from the lamp posts.
- Concern authority will clear all the debris from the premises.

Floods:

The concerned authority should take the following measures as soon as they receive flood warning:

- The closing of sewer wells
- Tight Ropes
- Emergency lights and jackets
- Acquiring sufficient food material and potable drinking water
- Maintenance of First Aid Kit - This First Aid Kit should include disinfectant (Dettol), dressing material, soap, Band-Aid, antiseptic cream, medicines, antibiotics and scissor.

i. **Measures after Floods:**

- During floods, the incidence of water-borne and vector-borne diseases increases. Hence all the staffs and members of the security would be advised to undergo a thorough medical checkup for the betterment of their health.
- All the underground and overhead tanks must be cleaned and disinfected. This mustbe carried out in presence of qualified staff. The developer would assist in identifying the concern authority or NGO who carried out this kind of activities.
- The flood affected area must be disinfected. Any water which was stored during floods (in pits, vessels, drums etc.) should be cleaned and disinfected. This would prevent growth and spread of vectors.
- Cleaning of storm water channels should be carried out by the concerned authority. The developer would assist in carrying out this activity.

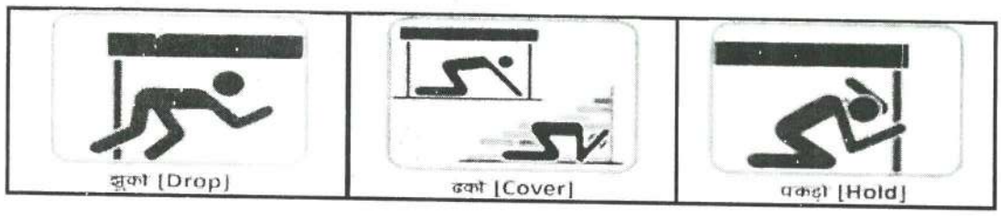
Earthquake:

i. If one is outdoor at the time of earthquake:

- If open space is available nearby, go there.
- Keep away from tall chimneys, buildings, balconies and other projections.
- Do not run through streets; hoardings or lamps may fall.

If one caught indoors at the time of an earthquake:

- Be calm.
- Stay indoors until the shaking stops.
- Stay away from glass windows, doors, cupboards etc.
- Stay away from falling plaster, bricks or stones.
- Get under a table so that one does not get hurt by falling objects.
- Do not rush towards the doors or staircase. They may be broken or jammed.
- If one goes outside, move quickly away from the building to prevent injury from falling debris.
- Be aware that fire alarm and sprinkler systems frequently go off in buildings during an earthquake, even if there is no fire. Check for and extinguish small fires and exit via stairs.



Avoid the following in an Earthquake:

- Do not crowd around damaged areas or buildings.
- Do not waste water. It will be needed for fireFigurehting.
- Do not move the seriously hurt people.
- Wait for medical help to arrive.
- Do not spread rumors. They lead to panic and worsen the situation.

If you are in structurally sound buildingstay there.	If you are inside an old weak structurally take the fastest and safest way out.
Do not use elevators.	After the shaking stops, take the staircase to reach open space.

If you are not next to an exit and situated in high rise building/ upstairs stay inside, do not panic, keep calm and take necessaryaction.	If you are near an exit, leave the building as soon as possible, do not rush to the exit point, get out calmly and orderly manner.
Move away from power lines, posts, walls, false ceiling, parapet, falling flower pots and other elements that may fall or collapse.	Stay away from building with glasspanes.

i. After an Earthquake:

- Check if anyone else is hurt. Use first aid at least on the cuts and bruises.
- Keep the streets clear for emergency services.
- Switch off all appliances like the refrigerator, TV or Computers.
- Turn off the gas.
- A battery operated radio would aid in receiving important messages.
- Use the stairs, not an elevator.
- Listen to a portable, battery-operated radio or television for updated emergency information and instructions.
- Cellular telephone equipment is subject to damage by quakes and cell phones maynot be able to get a signal, but regular "land line" phones may work.
- Open closet and cabinet doors cautiously as contents may have shifted during theshaking and could fall, creating further damage or injury.
- Watch out for fallen power lines or broken gas lines, and stay out of damaged areas.
- Stay out of damaged buildings. Damaged buildings may be destroyed byaftershocks following the main quake.
- Be alert for and observe official warnings.
- Do not smoke; smoking in confined areas can cause fires.

b. DG Sets:

Table 7.10: DG Sets

S. No.	Risk Assessment	Risk Mitigation Plan
1	DG Catches Fire	• DG Sets have inbuilt fault detection and tripping mechanism in case of low oil level or any other faults. • A trained operator shall always be present in the DG Room to keep a check on the functioning of the DG and taking necessary measures in case of DG malfunction.
2	DG Explosion	• DG Sets have inbuilt fault detection and tripping mechanism in case of low oil level or any other issues. • A trained operator shall always be present in the DG Room to keep a check on the functioning of the DG and taking necessary measures in case of DG malfunction.

		• An annual maintenance contract shall be given to the DG vendor for regular servicing of the DG Sets.
3	Day Storage Tank Catching Fire	• A trained operator shall always be present in the DG Room to keep a check on the functioning of the DG and taking necessary measures in case of DG malfunction. • An annual maintenance contract shall be given to the DG vendor for regular servicing of the DG Sets.

Technology And Disaster Management Cell:

Nowadays, advanced technology machines and equipment are used for smart disastermanagement:

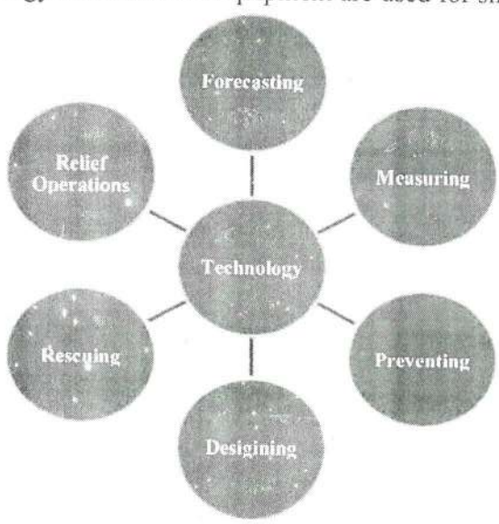


Figure 7.9: Technologies and Disaster Management

- **Earthquake:** Seismograph, Seismic micro-zonation, retrofitting of buildings, Modern earthmoving equipment.
- **Floods:** Automatic Rain Gauges, Flow Meters, Velocity Meters, Doppler radar, Satellite images.
- **Train accidents/ bomb blast:** Anti-collision equipment, CCTV, Metal Detectors.
- **Landslides:** Soil conservation, strengthening of hill, footage area.
- **Chemical Disaster:** Chemical fireFigurehting equipment, Gas masks, off-site plan of chemical factories.
- **Building Structural infrastructure and provisions:** Structural designing and management, refuse area, fire station (min. dist.), staircase, fire lift, stationary and security, sensor detectors, hazard identification, accidental prone.

Fire Hydrant and Fire Pump Systems are (also known as fire pumps, hydrant boosters, fire water pumps) are high-pressure water pumps designed to increase the firefighting capacity of a building by boosting and maintaining the desired level of pressure in the hydrant service to keep the system alive and charge all the

time. They can also be used in water transfer and irrigation applications.

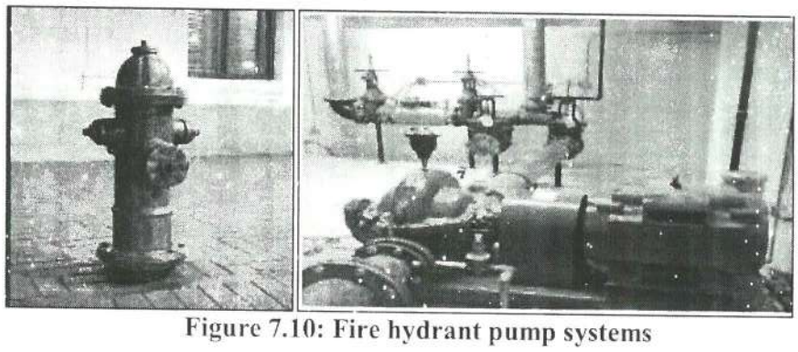


Figure 7.10: Fire hydrant pump systems

Wet Riser is a supply system intended to distribute water to multiple levels or compartments of a building, as a component of its fire Figurehting systems.

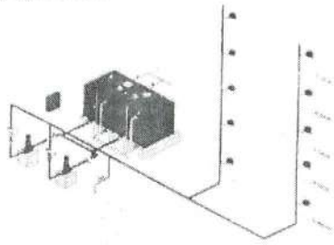


Figure 7.11: Wet Riser

Firewater Sprinkler System is an active fire protection method, consisting ofa water supply system, providing adequate pressure and flow rate to a water distribution piping system, onto which fire water sprinklers are connected.

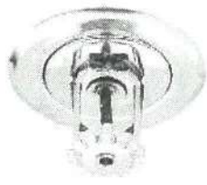


Figure 7.12: Fire sprinkler system

Heat Detection System Set to alarm when ambient temperatures reach a fixed point, typically indicating a fire, fixed-temperature heat detectors are a highly cost-effective solution for many property protection applications. If the rapid response to fire is vital, rate-of-rise heat detectors are an ideal solution where rapid temperature increases would only be caused by a fire emergency. Combination heat detectors provide both fixed and rate-of-rise detection. This enables the heat detector to communicate an alarm to the central control panel prior to reaching its fixed set point for high rates of rising, providing atimely response to both rapid and slow temperature increases.

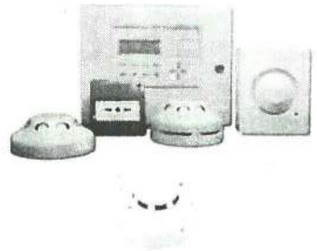


Figure 7.13: Heat Detection and Smoke Detection System

A Smoke Detector is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household smoke detectors, also known as smoke alarms, generally issue a local audible or visual alarm from the detector itself.

A Fire Alarm System has a number of devices working together to detect and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are present. These alarms may be activated automatically from smoke detectors, and heat detectors or may also be activated via manual fire alarm activation devices such as manual call points or pull stations. Alarms can be either motorized bells or wall mountable sounders or horns. They can also be speaker strobes which sound an alarm, followed by a voice evacuation message which warns people inside the building not to use the elevators.

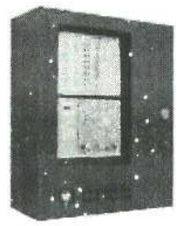


Figure 7.14: Fire Alarm system

Fire Hose Reel Systems are attached to the wet riser and hose reels located strategically ina building, ensuring proper coverage of water to combat a fire. The system is manually operated and activated by opening a valve enabling the water to flow into the hose that is typically 30 meters away. The system pressure loss will activate the pump ensuring adequate water flow and pressure to provide a water jet of typically a minimum of 10 meters from the nozzle.

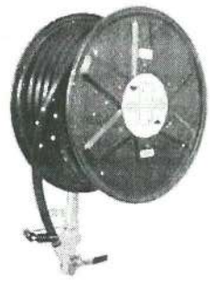


Figure 7.15: Fire Hose Reel system

A Diesel Generator is the combination of a diesel engine with an electric generator (often an alternator) to generate electrical energy. This is a specific case of engine-generator. A diesel compression-ignition engine is usually designed to run on diesel fuel, but some typesare adapted for other liquid fuels or natural gas.

Diesel generating sets are used in places without connection to a power grid, or as emergency power-supply if the grid fails, as well as for more complex applications such as peak-lopping, grid support and export to the power grid. An adequate quantity of fuel is stored for this purposed by maintaining the laws and acts related to the storage of fuels.

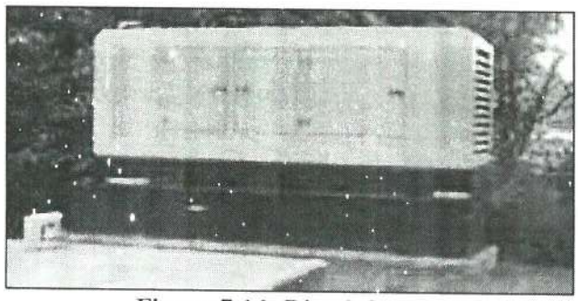


Figure 7.16: Diesel Generator

Conclusion and Recommendation:

- The essential information of cyclone and flood warning to security manager or concerned authority will be provided.
- The buildings will be constructed based on the codes. National building codes wouldbe made available to the concerned authority. These codes identify construction techniques for buildings that help them withstand earthquakes without collapsing and killing people. Also, Developer would follow appropriate building codes during the construction phase.
- Localize the information by printing the phone numbers of local emergency servicesoffices and hospitals.
- Provide tips on conducting earthquake drills at the proposed site.
- Interview representatives of the gas, electric and water companies about shuttingoff utilities.
- There will be proper arrangement of water distribution for the society.
- All the sensors and fire safety equipment shall be inspected on regular basis by concerned authority. If any faulty equipment is found then they must be replaced by the developer or they assist in this activity. Security management committee should keep separate funds for DMP.
- All the members would be made familiar with an evacuation plan
- The developer would formulate disaster management cell and they would be responsible for:

✓ Checkup and structural auditing of building and submitting the report to manager and PMC on regular basis.

✓ Evaluation of sprinklers, fireFigurehting equipment's, first aid kit box, disaster management rescue items, safety training, mock drills, awareness among employees, etc.

✓ Training and knowledge dissemination.

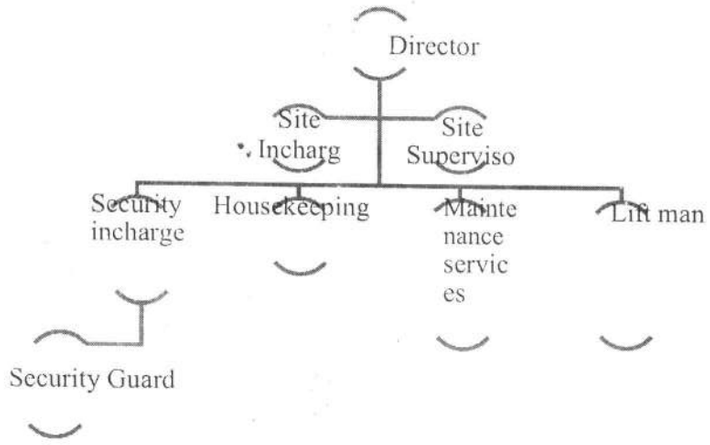


Figure 7.17: Disaster management cell

Figure 7.18: National Disaster Management Authority

Table 7.11: Actionable Points for Disaster Management Strategies

Sr.No.	Parameters	Actionable Points
1	Preparation of Manual and SOPs to track various disasters	SOPs Do's and Don'ts for various disasters are already prepared by the developer.
2	Fire Evacuation Plan	Fire Evacuation Plan is already prepared by the developer.
3	Listing of fire brigades, hospitals, NGOs, Medical store	It is been already prepared and identified by the developer.
4	Mock drills	It would be carried out in every year and the report for the same is submitted to CFO and also through compliance monitoring to Environment Department.
	Structural Audit	It will be carried out by developers every year.
6	Sprinklers and Firefighting Equipment	Sprinklers and fireFigurehting Equipment will be installed by the developer as per the direction of CFO.
7	Safety Training and Awareness among peoples and guards	This will be carried out in every 3 months and report for the same is submitted to CFO.
8	First Aid Kit Box	It is already listed by the developer.
9	Earthquake Planning	The developer would follow requisite codes for earthquake resistant buildings
10	Fire Proof Materials	The developer would provide all safety doors and materials two hours of fire rating.
11	Drinking water quality	This will be carried out in every 3 months and the report would be submitted to Environment department compliance monitoring.
12	Cleaning of overhead and underground tanks	This will be carried out in every 3 months and the report would be submitted to Environment department compliance monitoring.
13	Drainage Checkup	It would be carried out in every 6 months; especially once before the onset of monsoon season.
14	Air, Water, Noise Assessment	It would be carried out as per EC direction.
15	Compliance monitoring and reporting	It would be carried out as per EC direction.

Table 7.12: Safety Drills and Maintenance for Commercial Building

Sr. No.	Types of Drills	Frequency of drill	Who must attend	Date of drill and any issues: Log of drills
1	Earthquake safety	1 Year	All occupants	Logbook
2	Fire safety	1 Year	All occupants	Logbook
3	Fire and any other Equipment maintenance	1 Year	Security management, manager/utility secretary	Must report to Facility Manager/ secretary and maintain a log book
4	Lift security management	6 Months	Security management, Utility manager/ secretary	Must report to Facility Manager/ secretary and maintain a log book

5	Water management	6 Months	Security management, Utility manager/secretary	Must report to Facility Manager/ secretary and maintain a log book
6	Safety kit check	1 Year	Security management, Facility Manager/ secretary	Logbook

DMP Costing:

The table below gives the detail DMP costing;

Table 7.13: DMP Cost Analysis

Sr No	Description	Qty	Cost in Rs.
1	Safety Shoes	200	50000
2	Chemical Splash Goggles	40	6200
3	Safety Goggles	40	8000
4	Gloves	200	30000
5	Safety Jackets	200	40000
6	Safety Helmets	200	60000
7	Safety Harness	50	120000
8	First Aid Box	4	7600
9	Safety Training	200	100000
10	Safety sign Boards	10	4500
11	Warning Tapes and Paints	40	4400
12	Fire Extinguisher	20	100000
13	Fire Extinguisher	20	100000
14	Fire Mask	50	100000
15	Fire Blanket	10	3000
16	Green net	10	28500
17	Safety Belt	30	22500
18	Life Line Rope	25	32500
19	PPE-Ear Plug	50	17500
20	Full Face Shield	10	3650
21	Respiratory Protection	10	55000
22	Fall Protective Equipemnt	15	375000
23	Protective Clothing	10	15000
	Total		**12,65,850**

DMP Cost and maintenance Operation Phase;

Sr No	Description	Capital Cost in Rs.	O& M Cost in Rs.
1	Fire Fighting measures (Fire alarm, Portable fire extinguishers, Fire Tanks, Fire Hydrant Cabinets with hose reels, Fire Lifts, Signage)	100,10,500	4,50,925
2	Diesel pumps for emergency	85,00,000	16,75,000
3	Disaster Management training to Security Staff, Mock Exercise	0	2,00,000
4	Lightning Arrestors	8,45,500	1,80,900
5	Basement Ventilation	1,50,25,000	5,20,250
	Total	**3,43,81,000**	**30,27,075**

Directory:

Table 7.19: Directories

Sr. No.	Category	Name	Address	Contact Details
1	**Emergency Control Room**	-	-	101
2	**Fire Station**	Damkal Fire Station	GWC3+76J, Bhagwan Tatyasaheb Kawade Rd, Dombi Wadi, Ghorpadi, Pune, Maharashtra 411001	9689930070
3	**Disaster Management Cell**	Pune Municipal Corporation	PMC Main Building, Near. Mangla Theatre, Shivajinagar, Pune- 411 005	020 25501000 020 25501130 1800 1030 222 info@punecorporation.org
4	**Central Control**	National Disaster Management Authority	-	022 22025042, 022 22028762, 022 22028594 +91 9821911010 *Email:* chiefsecretary@mah

				arashtra.gov.in
5	**Hospitals**	Chaitanya General Hospital	Ghoir Colony, near Ram Krishna More Sabha Gruha, Ganesh Nagar, Ghorpadi, Pune, Maharashtra 411033	09922553333
		Dr. Mulay Super Speciality Hospital	B T, Bhagwan Tatyasaheb Kawade Rd, Bhaskar Colony, Swami Vivekanand Nagar, Lakshmi Nagar, Wanwadi, Pune, Maharashtra 411040	08208068750
		Manipal Hospital, Kharadi - Pune	22/2A, Mundhwa - Kharadi Rd, near Nyati Empire, Santipur, Thite Nagar, Kharadi, Pune, Maharashtra 411014	02061656666
		Jehangir Hospital	32, Sasoon Rd, opposite Railway Station, Central Excise Colony, Sangamvadi, Pune, Maharashtra 411001	02066819999
		KEM Hospital	489, Mudaliar Rd, Rasta Peth, Pune, Maharashtra 411011	02066037300
6	**Ambulance Services**	1] King Air and Train Ambulance Services	Ambulance service Connaught Rd Central Excise Colony, Sangamvadi Pune, Maharashtra 411001	072609 37628
		2] Life Care Ambulance Pune	Swami Vivekanand Nagar, Hadapsar Industrial Estate, Hadapsar, Pune, Maharashtra 411013	7798441818/ 7350701818
7	**Higher Authorities**	Quick Life Support	Ambulance service Somwar Peth Pune, Maharashtra 411011	084848 18118
		Commissioner Of Police Pune	Pune City	02026125396/ 26208201. +91 7798210007
		Joint Commissioner of Police	Pune City	02026122784/ 26208203. +91 9822943358 *Email:* jtcp.pune@nic.in
		Addl. Commissioner of Police	Pune City	02026205405 / 25672479/ 26111431 +91 9823954000/ 9967435402. *Email:* addcpnorth.pune@ni

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	Mantralaya Control Room	Deputy Commissioner of Police	Pune City	020 24454450/ 27487777. +91 9823337933/ 9923423291 *Email:* dcpzone1.pune@nic.in
8	**Police Station**	Collector & District Magistrate	New Collector Office Building, Opposite Sassoon Hospital, Station Road, Pune, Maharashtra 411011	020 2611 4949
9	**Traffic Police Station**	-	-	022 22024243/ 22027990
10	**Rapid Action Force**	Police Commissioner Office of Pune City	Police department GVCG+Q8J Sadhu Vaswani chowk Church Path, Agarkar Nagar Pune, Maharashtra 411001	020 2612 6296
11	**Anti-Terrorism Squad**	Camp Police Station	Police station GVCG+V5W Dr Annie Besant Rd Agarkar Nagar Pune, Maharashtra 411001	020 2620 8228
12	**Nearest Road**	-	N Main Road / Hadapsar Railway Station Road	
13	**Department of Climatology**	India Meteorological Department	University Road, Opp. All India Radio, Shivaji Nagar, Pune, Maharashtra 411005	020 2553 5211
14	**Railway Station**	Pune Railway station	Railway services Railway station Agarkar Nagar Pune,	182, **26126575** 2222621230, 2026137400
15	**Airport**	Pune Airport	HWH6+H6Q, New Airport Rd, Sakore Nagar, Viman Nagar, Pune, Maharashtra 411032	

7.3 Social Impact Assessment. R&R Action Plans

This project does not require the acquisition of other land relating to social settlement and will not affect any kind of social settlement, infrastructure, and establishment of society. Hence, there is no applicability of rehabilitation and resettlement

CHAPTER 8: PROJECT BENEFITS

Introduction

The proposed project will contribute to the creation of Commercial Buildings. To ensure that the impacts of the proposed project are addressed, the project has proposed all necessary environmental infrastructures such as a sewage treatment plant, organic waste convertors, rainwater harvesting systems & greenbelt. Further, the current barren plot of land will have numerous trees being planted, providing green area for the users/visitors and increasing the tree density in the overall area.
Care has been taken to provide the users and visitors with necessary facilities as power, water supply, parking spaces, and broad roads that are safe and secure and all other recreational facilities

8.1 Improvements in the Physical Infrastructure

Physical infrastructure includes the development of roads, availability of technological facilities for the operation of commercial project. This ultimately improves physical infrastructure facility for nearby users.
Project is sited within developmental part of Pune city. The project is Commercial development project. Also, project is strategically located to have quick access to many well-reputed educational institutions, hospitals, banks and restaurants.

8.2 Improvement in Social Infrastructure

The project will provide employment to many unskilled and semi-skilled labors in nearby villages. This project will also help in generation of indirect employment to those people who render their services for the personnel directly working in the project. With the establishment of the proposed project, there will be essential improvement in the overall budget of the local people in the form of additional income through employment. Growth in indirect jobs and business opportunities to the local and surrounding people such as daily wage laborers, transporters, and raw material suppliers due to the development in the area. Due to Proposed project employment and other infrastructural facilities will improve which will indirectly boost the urban quality of life in the immediate vicinity.

8.3 Employment potential –skilled; semi-skilled and unskilled

The expansion project will provide employment to a large number of local people during construction phase. Skilled, semi-skilled and unskilled manpower will be utilized during construction phase. During the development and construction of proposed project, about 100 to 150 skilled, semiskilled and unskilled workers Manpower will be recruited as per their educational qualifications. This will positively impact the economic condition of the project and surrounding area The project and its supporting activity need many types of people right from manual to managerial strength, in a pyramid. So, in manufacturing activity all three types i.e. skilled, semi-skilled and unskilled people are required.

8.4 Other tangible benefits

Effective rainwater harvesting system and storm water drainage network will be planned for entire project based on geophysical exploration, which will be also helpful to strengthen the water management in nearby areas. Adequate road connectivity and maintenance will be provided for easy transportation during both construction and operation phase. Such improved transport networks will improve flow of goods and increase business. Due to proposed project, other commercial facilities like power lines and telecommunications will also be upgraded. The corrective measures planned to improve the environmental quality will definitely reduce the health problems.

Implementation of effective mitigation measures to control land, water and air pollution through solid waste management through at source segregation and treatment of wet waste, sewage treatment plant & optimum energy saving helps in waste minimization, resource recovery and recycling. Every small

aspect of environment including drainage pattern, energy saving, water recycling, groundwater recharge, traffic management, green belt etc. has been taken care in the design.The Project will employ best available technology for waste treatment, minimization, and utilization. Upcoming Metro and roads will further add to easiness of connectivity.

Due to this project, development adaptation of new technologies and other infrastructural facilities will improve which will indirectly boost the civilization of the surrounding people. The proposed project offer opportunity to transform the currently semi developed region into commercially developed area. Proposed project will further increase the above amenities directly/indirectly either by providing or by improving the existing facilities in the area, which will help in uplifting the living standards of local communities.

CHAPTER 9. ENVIRONMENTAL COST – BENEFITS ANALYSIS

The project activity falls under the schedule 8(b); category 'B1' as per the EIA Notification, 2006. The environmental cost benefit analysis was not made mandatory in the project specific terms of reference accorded to Standard terms of reference for EIA studies for Area Development and Township by SEIAA Maharashtra vide proposal number SIA/MH/INFRA2/489762/2024 dated 18/09/2024. Also the Standard Terms of Reference published by the MOEF&CC on April 2015 does not include the environmental cost benefit analysis in the general & specific TOR prescribed for proposed Area Development and Township which falls under schedule 8(b); category 'B1'. Hence, not applicable.

CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN

10.1. Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA

The purpose of an EIA study is to arrive at a specific action plan such that the identified Impacts on the Environment due to the proposed project are addressed in a systematic manner through avoidance, mitigation, and compensation. An Environmental Management Plan (EMP) is a site-specific plan developed to ensure that the project is implemented in an environmentally sustainable manner where all stakeholders including project proponents, contractors, and subcontractors, including consultants, understand the potential environmental risks arising from the proposed project and take appropriate actions to properly manage that risk.

The actions of an EMP need to be incorporated during the entire life cycle of the proposed project, including project planning, site preparation, construction, and operating stages of the project to minimize any adverse environmental impact and compensate for any anticipated loss of resources. The EMP is proactive in nature so that actions are not done post environmental damage but are planned for before the actual impact takes place.

The Environmental Management Plan (EMP) is as its specific plan developed to ensure that the project is implemented in an environmentally sustainable manner where all contractors and subcontractors including consultants understand the potential environmental risks arising from the proposed project and take appropriate actions to properly manage the risks. EMP also ensures that the project implementation is carried out in accordance with the design by taking appropriate mitigate action stored adverse environmental impacts during its lifecycle. The plan outlines existing and potential problems that may adversely affect the environment and recommends corrective measures where required. Also, the plan outlines roles and responsibilities of the key personnel and contractors who are entrusted with the specific responsibility to manage the entire area.

Environment Management Plan comprises following points -

1. Objective
2. Organization & Environmental Cell
3. Design – Management
4. Design – Monitoring
5. Design – Emergency
6. Legal Obligation
7. Schedules
8. Funds

Objective

- To define the components of environmental management.
- To prepare a checklist for statutory compliance.
- To prepare environmental organization.
- To prepare a schedule for monitoring & compliance.

Organization& Environment Cell

Table 10.1: Organization& Environment Cell

SN.	Designation	Qualification	Facet	Responsibility

1	Management Representative	Member of the apex body representing buildings	Environmental Issues	Person from federation responsible for environmental issues and decisions related to environment.
2	Project Manager	B.E. (Five years' experience)	Construction Phase – Site in-charge	Material waste minimization, labour camp sanitation, Noise, oilgrease & vibration nuisance control, accident prevention.
3	Environmental Coordinator/ Society Representative	M.Sc. (Environmental Science) Two years' experience in Environmental Monitoring and reporting.	Air	Monitoring PUC control, Noise& odour mitigation measures
			Water	Water budget, O&M of water supply & Monitoring functioningof wastewater treatment plant.
			Solid waste	Monitoring Segregation, collection, composting & disposal
			Greening	Monitoring tree plantation, Lawn development, storm water managemer
			Monitoring	Field observation, Laboratory tests, interpretation & reporting.
			Compliance reporting	Six Monthly post EC Compliance and State Pollution Control Board consents
			Public relation & Press	Documentation, training
4	Operators-2nos	B.Sc. Equivalent	Field work with sampling	Operation and sampling of environmentalfacilities and reporting to Environmental Coordinator.
5	Field Workers 10	SSC, if possible	Site management & Sanitation	Solid waste collection and site maintenance.

Project Manager shall be responsible for implementation of EMP. Project Manager and his team shall review effectiveness of the system on monthly basis. All project safety issues and environmental issues, non-compliances shall be discussed and resolved in this meeting. The Project Manager will review the management plan to accommodate any changes to the project conditions, which may have an effect on the effectiveness of the EMP and achievement of environmental objectives like material use, machineries, processes of disposal of waste and wastewater etc. When any Non-conformance or incident is detected, it shall be corrected and records of the same shall be maintained to avoid recurrence of the same describing cause of such non-conformance and incident.

Following are detailed list of activities for construction phase

Table 10.2: Activities for Construction Phase

Construction phase	Activities	EMP applicability

Site Establishment	Fences & hoardings to site compound. Temporary services Temporary access roads.	Required throughout the duration of this phase.
Foundations & Ground works	Lift Pit; Formwork.Steel reinforcement Place concrete In ground hydraulic services. In ground electrical services.	Required throughout the duration of this phase.
Fit Out & Finishes	Steel Stud wall & ceiling framingWindows & glazed doors, Electrical Services, Hydraulic Services, Mechanical services, Plasterboard wall & ceiling linings Cement Rendering Carpentry & joinery fit outTiling Painting	Required throughout the duration of this phase
External Works	Concrete Footpaths Formwork edge boards. Sand blinding & plastic membrane. Steel reinforcement. Place concrete.	Required throughout the duration of this phase
Transportable Building Site Establishment	Fences & hoardings to site compound.	Required throughout the duration of this phase
Transportable Building Foundations	Detailed excavation. Footings; -Fix Steel reinforcement. -Place concrete	Required throughout the duration of this phase.
Transportable Building Delivery & Installation	Deliver to site on trucks Crane into position Connect Services to buildings.	Required throughout the duration of this phase.

Implementation of EMP shall be the responsibility of the developer and contractor.

Impact Matrix and Mitigation Measures

Sr. No	Media	Aspect	Mitigation measures	Responsibility
		Construction related air emissions, including dust, onneighboring and nearby receptors.	Water Sprinkling within the site onthe internal roads. Covered material storage area specifically for gravels and cement	

1	Air	Vehicular movement for transportation materials and equipment	All contractor vehicles shall be PUC compliant Wind breaks in the form of site barricades shall reduce the generation of fugitive dust fromthe site Internal roads shall be constructed before start of the construction. Paving or construction of roads will reduce the abrasion thereby reducing the dust generation.	Site Engineer Project Proponent/ Site Contractor
		Clearance of vegetation	Trees will be planted during construction phase	
		Excavation	Site logistics management will dofor proper moment and loading/unloading Signage board will used	
		Vehicle movement for transportation materials and equipment	Noise generating vehicles operated only during the daytime and maintained properly to avoid generation of high noise due to lack of wear and tear.	
		Operation of Machinery during Construction	Provision of silencers to modulate the noise generated by machines Provision of protective devices like ear muff/ plugs to the workers who will be working in the noise prone areas Strategic locations will also help to reduce noise pollution. The equipment, which is the source of noise, will have built-in type noise control abatement technology. Green belt using noise abatement trees will be developed during construction phase	

3 (a)	Ground Water	Ground water contamination	No ground water extraction for construction activity. During construction, the entire water shall be fulfilled through thetanker water. The entire wastewater generated through the labors shall be divertedinto mobile STP.	Site Engineer/ Safety Officer
(b)	Surface Water	Surface water contamination	waste water will be generated in construction phase. Storm water drain with silt trap shall be constructed along the construction activity. All sanitary waste from the site shall be diverted into mobile STP All the debris resulting from the site shall be isolated from the wastewater and disposed of separately generally through dedicated handling agency. An oil trap shall be provided in the drainage line to prevent contamination by accidental spillage of oil / grease Wash down area for cleaning of vehicles wheels shall be provided and wheel Wastewater shall be drained properly. Provision of settling pit and baffled oil water separator.	Site Engineer/ Safety Officer
		Clearance of vegetation	Clearance of vegetation limited to project footprint. Proper management and use of top soil and its reuse for greenbelt development.	
		Excavation for basement and foundation	Excavated earth will be managed on site to the maximum for refilling and internal roads disposed of as per the C&D WasteManagement Rules, 2016. During construction, the waste materials shall be re used or sold tothe recyclers. The following measures shall be adopted to prevent/ reduce soil	

			contamination: Litter, fuel, oil drums, used greasecartridges shall be collected and removed properly as per recommendation of competent authority Dustbins / litter bins shall be placed at strategic locations Lubrication waste oil shall be collected separately in drums andshall be disposed of as per the stipulations of Consent order and HW authorization from MPCB	
6	Traffic Management	Heavy vehicular movement	Vehicular movement will be restricted to daytime only and adequate parking facility will be provided. On site, excess roads will be utilized for construction. PUC Certified vehicles were used. Traffic management will beensured.	Project Proponent
7	Ecology , flora and fauna	Site development during construction	Retention of existing tree covers by retaining and transplantation of Existing trees.	Project Proponent

10.1.1 Environmental Inspection

Weekly inspection shall be conducted by Site Engineer of the site. These site visits shall also be conducted after adverse climatic incidence occurred. This report and observations shall be submittedto Project Manager.

The site manager will then update the project team for any specific issues at the weekly toolbox session and monitor the implementation of action items.

Environmental Agencies may also be called for inspection on quarterly basis for review and suggestion on the effectiveness of the EMP.

Items listed	Action Required Or Observations	Action by	Signature	Date
Is there any evidence of runoff from site?				
Are stockpiles covered?				
Are access roads free from dirt/mud?				
Is there excessive noise coming from site during the week?				

Are there adequate no of bins andare they placed at appropriate locations?				
Is there overflow of any bin observed?				
Is there any waste, which is dumped /thrown elsewhere than in the bin?				
Is the waste and vehicle carrying waste checked at the gate for covers and type of waste?				
Are there hazardous waste generated during any activity/phase of construction?				
Is the hazardous waste stored in separate place and managed as per hazardous Wastes. (Management, Handling and Transboundary Movement) Rules, 2008, amended 2011)				
Is there incidence of dumping hazardous waste in general bins?				
Is the dust suppression plan being followed?				
Is there a traffic management plan in place/available?				
Are there hazards identified to local people due to transportation to the site?				
Are there incidences of leakage of oil and diesel and is the contaminated soil disposed of in the appropriate manner?				
Are there leakages of water pipelines or wastage of water?				
Is there adequate no of sanitary facilities provided to the site workers (min 5 no of toilets/100 workers)?				
Is first aid kit provided in the site office				

Audit Schedule

- Audit shall be conducted **every 6 months by external Environmental Agency**.Key areas to be audited are following system and records -
  - Compliance of conditions of Environmental Clearance
  - Compliance of conditions of Consent to Establish
  - Compliance to other applicable statutory and regulatory requirements
  - Environmental Statement (submitted annually) to SPCB

- Records of operation of equipment and generation of pollution (Air and Noise pollution)
- Abiding CPHEEO norms and Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, amended 2011)

The Audit report shall be distributed to -

- Project Manager
- Site Engineer
- Legal/Liaisioning officer

The audit report shall be discussed in management review meeting.

➢ **Communication with neighbor's and handling of complaints**

Site shall be displayed with contact details of Project Manager to be contacted in case of any query or complaint regarding activities related to the project.

Advertisement about the grant of environmental clearance shall be made in two newspapers - local and English languages. Tentative start date of the project shall also be made publicly.

The EMP shall be strictly followed to minimize the impact of project activities on surrounding environment and local residents, procedure shall be in place to record and manage complaints regarding the activities of the project.

Complaint Register shall be provided at security office for lodging the complaint against any activity creating nuisance to the local people. The particular complaint shall be reported to the Project Manager as soon as the complaint is received. The security officer shall report the incident to the Site Engineer and Site engineer shall communicate the matter to Project Manager.

Complaint Register:

DATE	TIME	NAME OF INDIVIDUAL	COMPLAINT	DATE ON WHICH RECEIVED	ACTION TAKEN	CLOSED ON

Monitoring Schedule: (During Construction & Operational Phase)

Table 10.3: Monitoring Schedule

Sr. No.	Environmental Monitoring	Parameters	Frequency	Location
1	Ambient Air quality	PM10, PM2.5, SO2, NOX, CO	Quarterly	Total 3 locations around periphery of the site.
2	Noise Level	Equivalent noise level	Quarterly	Total 3 locations around periphery ofthe site.

3	Exhaust from DG Set	SPM, SO2, NOx	Quarterly	Stack of DG set.
4	Drinking Water	pH, Temperature, EC, Turbidity, Total dissolved solids, Calcium, Magnesium Total hardness, Chlorides, Sulphates, Nitrates, DO, COD, BOD, Iron, Zinc Manganese (Physico-chemical and bacteriological parameters as per the source and utilization of water)	Quarterly	Domestic water tank

Design Emergency –

Emergency Preparedness & Response (EPR)

Table 10.4: Management Plan

S No.	Emergency	Action
1	Collapse of temporary structure	• Declare emergency by sounding siren, activate team Barricade affected area, restrict entry, evacuate to Assembly Point. • Take head count Carry stretchers to endanger site. • Rescue persons trapped under debris Call for ambulance, carry first aid box with responsible person send to nearest hospital. • When emergency is over, declare so by siren • Announce everyone to attend normal work.
		Report & record action taken Note what improvements are needed.
2	Fire at construction site	Declare emergency by sounding siren, activate team rush to that area with fire fighter Commence extinguishing the fire. Call external fire brigade if necessary. Carry stretchers to endanger site. Rescue persons trapped in fire Stop vehicle movement (except emergency vehicles) Take head count Call for ambulance, carry first aid box With responsible person, send seriously injured to nearest hospital. When emergency is over, declare so by siren Announce everyone to attend normal work. Report & record action taken Note what improvements are needed.
3	Persons fallingfrom height	Giving exact location, call for ambulanceReach the scene forthwith Carry stretchers to endanger site.Give first aid to injured person With responsible person, send the injured to nearest hospital.Report & record action taken Note what improvements are needed.

4	Material (brick-steel) falling fromheight	Declare emergency by sounding siren, activate teamCarry stretchers to endangered site. Take head count Call for ambulance, carry first aid box. Use it. With responsible person send to nearest hospital. When emergency is over, declare so by siren Announce everyone to attend normal work. Report & record action taken Note what improvements are needed.
5	Abrupt heavy rain washing the area or spillage.	Declare emergency by sounding siren, activate team Evacuate all to Emergency Assembly Area, at a higher altitude Take head count.
6	Case of earthquake	Declare emergency by sounding siren, activate team Evacuate all to Emergency Assembly Area, smooth & fast. Immediately on normalcy take up search operation Extinguish fire, if any Report & record action taken Note what improvements are needed.
7	Case of riot/ mob	If small gathering of 10-20, discuss with them & call securityIf mob of 20-40, call supervisor & extra security. Also call respective sub-contractor & settle If mob over 50 workers, isolate them from others in the work station. Call police if out of control
8	Diseases (Diarrhea, Jaundice, Cholera, Malaria etc.)	Clean all water tanks Send water samples for tests Disinfect water with care Canteens not to keep food open Arrange medical facility & awareness
9	Terrorist attack (bomb threat, gun-fire, suicide attack)	Aiert security guards, informing possible weapon Keep infrastructure ready like wireless, transport, ambulance Contact police control room
10	a. Cement slurry	Collect and reuse the cement slurry Dilute slurry by spraying water Use PPE like gum boot, hand gloves
	b. Heavy rain	Keep handy, plastic sheet/ tarpaulin to cover area being concreted. Stop concreting activity Cover electrical equipment Restrict vehicle speeds Protect drainage line

➢ **Statutory Responsibilities**

A checklist is given here to point out the added responsibilities. As per needs, reference may be made to standard books.

Table 10.5: Water (Prevention & Control of Pollution) Act, 1974 (No. 6 Of 1974)

S. No.	Section	Responsibility of the occupier
1	19	Ascertain that the place where your activity is located is inside the declared Water Pollution and control area whereby the provisions of

		this act apply.
2	20(2) & (3)	Give information to SPCB on abstraction of water or discharge of wastewater, on its treatment and disposal, as may be asked. Else punishable under section 41(1) or under section 42(1) (d), see below.
3	21(3)(e)	Decide in time on division of sample into two parts and so inform the officer taking sample.
4	23	Not that SPCB has power to enter your premises and has power for search and seizure. Obstructions punishable under section 42(1) (b) see below.
5	24(1) (a)	No person to knowingly cause pollution to stream. Else punishable under section 43, see below. Enhanced penalty under section 45 for second offence, see below.
6	24(1) (b)	No person to knowingly cause an aggravation of pollution. Else punishable under section 43, see below.
7	25(1) & 26	No person shall establish or operate his activity without having avalid consent from SPCB. Else punishable under section 44, see below.
8	25(4) & 26	Conditions imposed by the consent are binding on the occupier (Unless appealed and relief received). Else punishable under section44, see below
9	27(2)	Submit a Review application to the board if aggrieved by the consent conditions or refusal of consent.
10	28	If aggrieved by refusal of consent, or by any unreasonable conditions in the consent or the same is not reviewed by SPCB, prefer an appeal before the appellate authority within a specified time of 30 days on prescribed form with documents and fees.
11	29	If felt that the appellate Authority has not dealt with your request taking both legality and propriety into consideration, make a Revision Application to the state government writing all facts and prayer.
12	31(1)	Forthwith intimate an occurrence, or such apprehension, of accident, unforeseen act or event to SPCB and other relevantauthorities
13	32(1)(c)	Follow instructions of SPCB, where issued, regarding mitigating asituation arising from accident, unforeseen act or event. Else punishable under section 41(2), see below
14	33(3)(l)	Follow the directions of the court, where issued, regarding restraining pollution of stream and desist from such action as maycause pollution. Else punishable under section 41(2), see below
15	33 A	Where a situation arises, submit a detailed, comprehensive, timely reply to show cause Notice of intended directions of closure etc. and convey your due diligence. This is a time when you can commitfor some quick stop gap arrangement and a promise of good behavior, to save situation if you can.
16	33 A	Submit again a latest detailed, comprehensive, timely reply invitingattention to the present safe situation due to your honest stop- gap arrangements, if so, on receipt of confirmed directions of closure etc. or follow the directions and so inform. Else punishable

		under section 41(2) see below.
	Penalties	
17	41(1)	Non-compliance with sections 20(2) or 20(3), punishable with imprisonment for a term which may extend to ten thousand rupees or with both.
18	41(2)	Non-compliance of sections 32(1)(c) or 33(2) or 33 A, punishable with imprisonment for a term which shall not be less than one year and six months but which may extend to six years and fine.
	42(1)	Do not play with board notices put up, pillars or properties, obstructpersons, fail to furnish information, fail to intimate occurrences, andgive false information. Else punishable under this section 42(1) with imprisonment for a term which may extend to three months or with fine which may extend to three months or with fine which may extend to thousand rupees, or with both.
20	42(2)	Do not tamper with interfere or knowingly alter a flow- measuring device that is required to follow the provisions of section 25 and 26. Else punishable under this section 42(2), with imprisonment for a term which may extend to ten thousand rupees, or with both.
21	43	Where provisions of section 24 are contravened, punishable with imprisonment for a term which shall not be less than one year andsix months but which may exceed to six years and with fine.
22	44	Where provisions of section 25 or of 26, are contravened, punishable with imprisonment for a term which shall not be lessthan two years but which may extend to six years and with fine.
23	45	Where provisions of section 24 or 25 or 26 are contravened for second time, punishable with imprisonment for a term which shall not be less than two years but which may extend to seven years and fine.
24	45A	Where any other provisions of this act or Directions there under are contravened, punishable with imprisonment, which may extend toten thousand rupees or with both.

Table 10.6: Environment (Protection) Act, 1986 (No.29 of 1986)

S. No.	Section	Responsibility of the Occupier
1	5	Where situation so arises, submit a detailed, comprehensive, timely reply to show Cause Notice of intended Directions of closures etc. to convey your diligence and bond of good behavior. This is a time, when you can submit for some quick stop- gap arrangements, to save the situation if you can.
	5	Again, submit a latest, detailed, comprehensive, and timely and inviteattention to the resultant environmentally safe situation due to your honest stop-gap arrangements if any, on receipt of a Notice of conformed directions of closures etc.; or follow the directions. Else Punishable under section 15.

3	7	Do not discharge or emit any environmental pollutants in excess of standards prescribed. Else Punishable under section 15.
4	8	Handle hazardous substances as per procedure and comply with all safeguards. Else Punishable.
5	9 (1)	Forthwith intimate an occurrence, or such apprehension, of excess level of environmental pollutants due to accident, or other unforeseen act or event to the Authorities like SPCB, Collectorate, Factory Inspectorate and render assistant to them when called. Else Punishable.
6	9 (3)	Note that Government may recover expense with interest from the Occupier, which is incurred in remedial measures.
7	10 (1)	Note that the empowered Officer shall have right of entry and inspection and also seizure. Do not obstruct.
8	10 (2)	Occupier is bound to render all assistant to the officer so empowered.
9	11 (1)	Note that an Officer of SPCB shall have power to take samples of air, water, soil other substances.
	Penalty	
10	15	Note that contraventions of provisions of this Act, Rules or Orders there under, shall be punishable with imprisonment for a term which may extend to one lakh rupees or with both
11	26	Under rule 14 every occupier needing Consent or authorization shall submit Environmental Statement on prescribed Form on or before 30th of September of succeeding year

Budget for EMP

Budget for EMP during Construction & Operation Phase is provided in tables below:

Table 10.7: Budget For Environmental Management Plan

During Construction Phase

Type	Details	Cost
Air Environment	Erosion control – dust suppression measures, barricading and top soil preservation	26.45
Land	Labour Camp toilets & sanitation	9.6
Health and Safety	Labour Safety Equipment's and training	11.26
Health facility	Disinfection and Health Check-ups	3.00
	Total	**50.31**

DURING OPERATION PHASE

Component	Details	Capital (Lacs Rs.)	O&M (Lacs Rs./Y)
Storm Water	SWD	100.00	1.00
Sewage treatment	STP	1000.00	60.00
Water treatment	NA	-	-
RWH		64.00	3.50
Swimming Pool	NA		
Solid Waste	OWC	24.00	0.50
Green belt development	Landscape & Trees	62.23	14.21
Energy Savings	Saving measures	947.00	95.00
Environmental Monitoring	NA	-	5.00
Disaster Management	NA	343.81	30.27
Total	-	2541.04	209.98

CHAPTER 11 SUMMARY AND CONCLUSIONS

11.1 Overall Justification for Implementation of Project

- All mitigation measures have been proposed to reduce the impacts on the surrounding water, air and land during construction and operation.
- LFD will be installed to lower the water consumptions
- Green pavers will be used to increase the pervious areas
- Building placement is such a way to avoid Maximum Tree cutting.
- Adaption of Miyawaki forestation to Develop Urban Forest patches within the plot
- Provision of EV vehicle Charging points.
- The proposed project will improve the local aesthetic and add to the surrounding infrastructure. Project involves all environmental infrastructures to have minimum impact on the surrounding environment during operation phase
- The project is in close proximity to the proposed metro station
- Major and essential amenities like school, hospital, offices, garden, markets etc are in within close proximity

11.2 Explanation of How, Adverse Effects Have Been Mitigated

- Due to the availability of infrastructure, Job, healthcare, education and other facilities near the project site people are willing to buy homes in Pune and nearby areas. Also, there are immense job opportunities in and around Pune area due to IT Offices.
- Municipal Drainage system is well developed in the city of Pune
- Upcoming Metro will further add to easiness of connectivity
- Create employment opportunities for formal and informal Sectors.

Employment benefits

- Generation of direct and indirect employment
- Being a mixed-use project, it will create ample of job opportunities
- All these will also help to uplift the employment status of the locality

CHAPTER 12: DISLOSURE OF CONSULTANT

12.1 The names of the Consultants engaged with their brief resume and nature of Consultancy rendered

ELEMENT CONSULTANCY SERVICES is a NABET Accredited EIA Consultant Organization vide Certificate No,: NABET/EIA/2326/IA0127. Valid till 11.08.2026. The registered office is at 101, Chidanand Heights, S.No. 43/76, Manaji Nagar, Narhe, Pune, Maharashtra- 411041.

QUALITY COUNCIL OF INDIA

National Accreditation Board for Education and Training

Certificate of Accreditation

Element Consultancy Services, Pune

101, Chidanand Heights, S. No.-43/76, Manajinagar, Narhe, Pune, Maharashtra-411041

The organization is accredited as ***Category-A*** *under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations, Version 3, for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals-opencast mining only	1	1 (a) (i)	B
2	Thermal power plants	4	1 (d)	B
3	Metallurgical industries (Secondary Metallurgy)	8	3 (a)	B
4	Synthetic organic chemicals industry	21	5 (f)	A
5	Distilleries	22	5 (g)	A
6	Sugar industry	25	5 (j)	B
7	Building and construction projects	38	8 (a)	B
8	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in in IAAC minutes dated November 07, 2023, and Supplementary Assessment minutes dated February 02, 2024, and October 25, 2024 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance with the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/24/3177 dated March 13, 2024. The accreditation needs to be renewed before the expiry date by Element Consultancy Services, Pune following the due process of assessment.

Sr. Director, NABET
Date: December 11, 2024

Certificate No.
NABET/EIA/23-26/IA 0127_Rev.01

Valid up to
August 11, 2026

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to the QCI-NABET website

12.1.1 Environmental Services of Element Consultancy Services

ELEMENT CONSULTANCY SERVICES is engaged in providing following environmental consultancy services to their valuable clients:

1) Obtaining **Environmental Clearance** from Department of Environment of State Govt. and MoEF&CC, GOI
2) Environmental Impact Assessment **(EIA)** studies and Environmental Management Plan **(EMP)**
3) Environmental Due Diligence Services
4) **Consent to Establish, Operate, Renewal**& its amendments from State Pollution Control Board
5) **CRZ Clearance** from Central & State CZMA (Coastal Zone Management Authority)
6) **Forest Clearance** from MoEF&CC, GOI
7) Environmental **Compliance Report** preparation for Environmental Clearances, Consent to Establish and Consent to Operate
8) Designing and Commissioning of **ETP, STP, WTP** & Zero Liquid Discharge **(ZLD)** Plant
9) Preparation of Quantitative Risk Analysis **(QRA),** Disaster Management Plan **(DMP)** Reports.
10) Preparation of On-site & Off-site Emergency Preparedness Plan.

12.1.2 Firm's Experience

Since inception, Element Consultancy Services, Pune have successfully completed some diverse projects for different type of industries and are regarded as a leading environmental management firm. Element have served as consultants to industries and institutions for projects executed in India. Element Consultancy Services, Pune have acquired first-hand experience for the environmental problems of diverse industrial units such as Distilleries, Sugar industry, Building & Construction projects, Townships and Area development projects etc., for Government, Private and Co-operative organizations. An important aspect of Element Consultancy Services, Pune capabilities is the multi-disciplinary expertise and approach.

ANNEXURE – 1

TOR Letter

सत्यमेव जयते

File No.: SIA/MH/INFRA2/489762/2024
Government of India
Ministry of Environment, Forest and Climate Change
(Issued by the State Level Expert Appraisal Committee(SEAC), MAHARASHTRA)
***

Dated **12/11/2024**

To,

Mahesh Kunkulol
BAJAJ FINSERV VENTURES LIMITED
S. No. 208/1B, Off Pune-Ahmednagar Road, Lohegaon, Viman Nagar, Viman Nagar, PUNE, MAHARASHTRA, 411014
mahesh.kunkulol@bajajfinserv.in

Subject: Grant of Standard Terms of Reference (ToR) to the proposed Project under the EIA Notification 2006-and as amended thereof-regarding.

Sir/Madam,

This is in reference to your application submitted to SEAC vide proposal number SIA/MH/INFRA2/489762/2024 dated 18/09/2024 for grant of Terms of Reference (ToR) to the project under the provision of the EIA Notification 2006-and as amended thereof.

2. The particulars of the proposal are as below :

(i) ToR Identification No.	TO24B3813MH5698398N
(ii) File No.	SIA/MH/INFRA2/489762/2024
(iii) Clearance Type	Fresh ToR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	8(b) Townships/ Area Development Projects / Rehabilitation Centres
(vii) Name of Project	Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa, Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others
(viii) Name of Company/Organization	BAJAJ FINSERV VENTURES LIMITED
(ix) Location of Project (District, State)	PUNE, MAHARASHTRA
(x) Issuing Authority	SEAC
(xii) Applicability of General Conditions	NO

3. The **SEAC** has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after detailed examination hereby decided to grant Standard Terms of Reference to the instant proposal of **M/s. BAJAJ FINSERV VENTURES LIMITED** under the provisions of the aforementioned Notification.

4. The brief about products and by products as submitted by the Project proponent in Form-1 (Part A, B) and Standard Terms of Reference are annexed to this letter as Annexure (1).

5. The Ministry reserves the right to stipulate additional TORs, if found necessary.

6. The Standard Terms of Reference (ToR) to the aforementioned project is under provisions of EIA Notification, 2006 and as amended thereof. It does not tantamount to approvals/consent/permissions etc required to be obtained under any other Act/Rule/regulation. The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/ Regulations or Statutes, as applicable, to the project.

7. The granted letter, all the documents submitted as a part of application viz. Form-1 Part A and Part B are available on PARIVESH portal which can be accessed by scanning the QR Code above.

Annexure 1

Standard Terms of Reference for conducting Environment Impact Assessment Study for Townships/ Area Development Projects / Rehabilitation Centres and information to be included in EIA/EMP report

1. Project Details

Sr. No.	Terms of Reference
1.1	Need and benefits of the project.
1.2	Submit data for built-up area for each building, the use and occupancy classification in line with NBC 2016 also to be indicated [for differential functional requirements].
1.3	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.

2. Land Environment

Sr. No.	Terms of Reference
2.1	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.

3. Land acquisition and R&R

Sr. No.	Terms of Reference
3.1	Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities/villages and present status of such activities.

4. Environmental Monitoring and Management

Sr. No.	Terms of Reference
4.1	Examine baseline environmental quality along with projected incremental load due to the project.
4.2	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.
4.3	Submit Roles and responsibility of the developer etc for compliance of environmental regulations under the provisions of EP Act.
4.4	Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.
4.5	Possible carbon footprint contribution from each activities and mitigation measures proposed shall be included as part of Environment Management Plan.

5. Drainage

Sr. No.	Terms of Reference
5.1	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.

6. Forest

Sr. No.	Terms of Reference
6.1	Submit the details of the trees to be felled for the project, if any .
6.2	Submit the present land use and permission required for any conversion such as forest, agriculture etc.

7. Water Environment

Sr. No.	Terms of Reference
7.1	Ground water classification as per the Central Ground Water Authority.

8. Water Management

Sr. No.	Terms of Reference
8.1	Examine the details of Source of water, water requirement, use of treated waste water and prepare a water balance chart.
8.2	Rain water harvesting proposals should be made with due safeguards for ground water quality.
8.3	Maximize recycling of water and utilization of rain water. Examine details.
8.4	Examine soil characteristics and depth of ground water table for rainwater harvesting

Sr. No.	Terms of Reference
8.5	Permission from CGWA for abstraction of groundwater, if any, including dewatering during basement excavation.

9. Waste Management

Sr. No.	Terms of Reference
9.1	Examine details of solid waste generation treatment and its disposal.
9.2	Construction & Demolition Waste Management Plan shall be prepared as part of EMP providing details of demolition activities involved along with quantification and disposal mechanism.

10. Energy Requirements

Sr. No.	Terms of Reference
10.1	A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project.
10.2	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.
10.3	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.

11. Road and Traffic

Sr. No.	Terms of Reference
11.1	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 analysed with measures for preventing traffic congestion and providing faster trouble free system to reach different destinations in the city.
11.2	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.
11.3	Examine the details of transport of materials for construction which should include source and availability.

12. Disaster Management Plan

Sr. No.	Terms of Reference
12.1	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster. This should cover details of vulnerabilities due to natural and manmade hazards (earthquake, flooding, cyclone, landslides, fire etc.) and details of disaster mitigation efforts for buildings and infrastructure through structural sufficiency and Fire and Life Safety compliance in line with National Building Code NBC, 2016.

13. Court Cases

Sr. No.	Terms of Reference
13.1	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

14. Miscellaneous

Sr. No.	Terms of Reference
14.1	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website http://moef.nic.in/Manual/Townships.

Additional Terms of Reference

1) Project proponent and Accredited Consultant also to refer the model ToR available on Ministry (MoEF&CC) website.
(2) With reference to the directions given by Hon'ble National Green Tribunal, Central Zone Bench, Bhopal in Original Application No. 93/2024(CZ) vide order dt., 08.09.2024, PP and Consultant to confirm and jointly submit undertaking that the project site is not located in whole or in part within 5 km. of the protected area notified under the Wildlife (Protection) Act, 1972, critically polluted areas and severely polluted areas as identified by the CPCB, eco-sensitive areas notified under Section 3(2)of the Environment (Protection) Act, and the inter-state boundaries.

Annexure 2

Details of Products & By-products

Name of the product /By-product	Product / By-product	Quantity	Unit	Mode of Transport / Transmission	Remarks (eg. CAS number)
Total Construction area	Product	614387.19	SqM	-	This is a building construction projec

Signature Not Verified

Digitally Signed by : Joy S Thakur
Member Secretary, SEAC

Date: 12/11/2024

ANNEXURE – 2

Monitoring Report

EUROFINE ENVIRO LAB PVT. LTD.

Office Address: Gate No.1414, Near Ranjangaon Bus Stop, Ranjangaon,Tal. Shirur, Dist. Pune - 412209.
eurofinelab@gmail.com 9922474646 / 9637345858

Ambient Air Quality Monitoring Report

Report No.	EFEL/PRO/2024/06/01-24	Date of Report	05/06/2024
Project Name and Address	Proposed IT/ITES/Commercial Building Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		
Sample Collected and	EFEL Team		
NAME OF LOCATION-Project Site			

Sampling Date	Date Of Sample Registration	Week of Sample Analysis	Parameter	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)
			NAAQ Standards	100 (µg/m³)	60 (µg/m³)	80 (µg/m³)	80 (µg/m³)	04 (mg/m³)
			Analysis Method	IS: 5181 (Part-23) 2006	IS: 5181 (Part-23) 2006	Modified West &GaekeMethod	Jacob &Hocheiser's Method	NDIR Method
March – 2024								
04/03/2024	06/03/2024	Week-1		48.3	26.5	20.1	24.5	0.4
05/03/2024	06/03/2024	Week-1		50.4	27.1	19.6	23.3	0.6
11/03/2024	13/03/2024	Week-2		47.2	29.3	21.5	25.7	0.4
12/03/2024	13/03/2024	Week-2		52.6	31.2	23.4	29.3	0.5
18/03/2024	20/03/2024	Week-3		54.1	28.5	20.2	24.1	0.7
19/03/2024	20/03/2024	Week-3		56.3	31.3	22.6	26.3	0.9
25/03/2024	27/03/2024	Week-4		49.5	33.6	25.1	30.2	1.0
26/03/2024	27/03/2024	Week-4		55.4	35.4	23.3	27.4	1.2
April– 2024								
01/04/2024	03/04/2024	Week-1		52.3	32.6	20.1	24.3	1.2
02/04/2024	03/04/2024	Week-1		50.8	30.4	22.5	26.5	0.9
08/04/2024	10/04/2024	Week-2		47.1	28.7	17.4	21.1	0.7
09/04/2024	10/04/2024	Week-2		49.3	26.6	23.1	27.6	1.1
15/04/2024	17/04/2024	Week-3		51.8	27.1	25.8	29.1	1.0
16/04/2024	17/04/2024	Week-3		54.2	29.3	22.3	26.2	0.8
22/04/2024	24/04/2024	Week-4		48.5	36.1	20.2	24.8	1.1
23/04/2024	24/04/2024	Week-4		56.3	33.4	24.5	29.1	0.9
May-2024								
06/05/2024	08/05/2024	Week-2		49.7	35.2	22.2	26.4	1.2
07/05/2024	08/05/2024	Week-2		55.3	29.6	19.4	23.2	0.8
13/05/2024	15/05/2024	Week-3		52.1	27.4	23.6	27.0	0.6
14/05/2024	15/05/2024	Week-3		49.3	30.2	25.1	29.3	0.4
20/05/2024	22/05/2024	Week-4		47.2	32.6	22.3	27.4	0.8
21/05/2024	22/05/2024	Week-4		50.4	34.1	19.5	23.1	1.0
27/05/2024	29/05/2024	Week-5		48.3	31.8	21.0	25.7	1.2
28/05/2024	29/05/2024	Week-5		53.6	29.6	24.7	29.3	0.9
Maximum				56.3	36.1	25.8	30.2	1.2
Minimum				47.1	26.5	17.4	21.1	0.4
Average reading				51.25	30.73	22.06	26.28	0.84
98 %				56.3	35.77	25.47	29.78	1.2

Lab Chemist

Eurofine Enviro Lab Pvt. Ltd.

Authorized Signatory

EUROFINE ENVIRO LAB PVT. LTD.

Office Address: Gate No.1414, Near Ranjangaon Bus Stop, Ranjangaon,Tal. Shirur, Dist. Pune - 412209.
eurofinelab@gmail.com 9922474646 / 9637345858

Ambient Air Quality Monitoring Report

Report No.	EFEL/PRO/2024/06/25-48	Date of Report	05/06/2024
Project Name and Address	Proposed IT/ITES/Commercial Building Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		
Sample Collected and Analyzed by	EFEL Team		

NAME OF LOCATION- Koregaon Park Annexe

Sampling Date	Date Of Sample Registration	Week of Sample Analysis	Parameter	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)
			NAAQ Standards	100 (µg/m³)	60 (µg/m³)	80 (µg/m³)	80 (µg/m³)	04 (mg/m³)
			Analysis Method	IS: 5181 (Part-23) 2006	IS: 5181 (Part-23) 2006	Modified West &GaekeMethod	Jacob &Hocheiser's Method	NDIR Method
March – 2024								
04/03/2024	06/03/2024	Week-1		53.6	32.5	25.1	29.3	0.9
05/03/2024	06/03/2024	Week-1		55.2	31.2	27.4	31.5	1.1
11/03/2024	13/03/2024	Week-2		58.4	34.7	24.5	28.2	1.3
12/03/2024	13/03/2024	Week-2		50.5	37.3	25.6	30.5	1.0
18/03/2024	20/03/2024	Week-3		51.1	35.2	26.1	31.4	0.7
19/03/2024	20/03/2024	Week-3		48.3	38.4	20.6	25.1	1.3
25/03/2024	27/03/2024	Week-4		57.4	31.3	26.1	33.0	1.0
26/03/2024	27/03/2024	Week-4		55.2	38.5	21.5	36.3	1.2
April– 2024								
01/04/2024	03/04/2024	Week-1		58.3	36.6	27.3	31.4	0.6
02/04/2024	03/04/2024	Week-1		51.7	35.2	25.5	30.2	1.2
08/04/2024	10/04/2024	Week-2		53.2	31.2	25.1	29.6	0.7
09/04/2024	10/04/2024	Week-2		49.8	38.5	22.3	26.1	0.9
15/04/2024	17/04/2024	Week-3		56.3	32.4	26.4	30.2	0.8
16/04/2024	17/04/2024	Week-3		53.1	37.2	24.0	28.6	0.5
22/04/2024	24/04/2024	Week-4		57.0	35.6	22.5	27.4	1.2
23/04/2024	24/04/2024	Week-4		50.4	33.8	19.6	23.1	1.1
May-2024								
06/05/2024	08/05/2024	Week-2		51.5	31.2	21.2	36.5	1.3
07/05/2024	08/05/2024	Week-2		53.7	36.5	26.5	32.2	1.0
13/05/2024	15/05/2024	Week-3		50.2	38.1	25.3	29.1	0.5
14/05/2024	15/05/2024	Week-3		58.4	30.3	19.4	23.6	0.7
20/05/2024	22/05/2024	Week-4		57.1	31.0	24.2	28.4	0.9
21/05/2024	22/05/2024	Week-4		54.5	28.5	26.6	30.3	1.2
27/05/2024	29/05/2024	Week-5		49.8	35.4	21.0	26.2	0.5
28/05/2024	29/05/2024	Week-5		58.2	37.5	19.2	23.6	0.8
Maximum				58.4	38.5	27.4	36.5	1.3
Minimum				48.3	28.5	19.2	23.1	0.5
Average reading				53.87	34.50	23.87	29.24	0.93
98 %				58.40	38.50	27.35	36.40	1.30

Lab Chemist

Eurofine Enviro Lab Pvt. Ltd.

Authorized Signatory

EUROFINE ENVIRO LAB PVT. LTD.

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eurofinelab@gmail.com 9922474646 / 9637345858

Ambient Air Quality Monitoring Report

Report No.	EFEL/PRO/2024/06/49-72	Date of Report	05/06/2024
Project Name and Address	Proposed IT/ITES/Commercial Building Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		
Sample Collected and Analyzed by	EFEL Team		

NAME OF LOCATION- Marigold Complex

Sampling Date	Date Of Sample Registration	Date of Sample Analysis	Parameter	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)
			NAAQ Standards	100 (µg/m³)	60 (µg/m³)	80 (µg/m³)	80 (µg/m³)	04 (mg/m³)
			Analysis Method	IS: 5181 (Part-23) 2006	IS: 5181 (Part-23) 2006	Modified West &GaekeMeth	Jacob &Hocheiser's Method	NDIR Method
March – 2024								
04/03/2024	06/03/2024	Week-1		55.2	32.5	25.3	30.4	1.1
05/03/2024	06/03/2024	Week-1		47.5	34.1	17.6	23.2	1.2
11/03/2024	13/03/2024	Week-2		54.3	36.3	19.1	25.6	1.0
12/03/2024	13/03/2024	Week-2		56.5	33.6	22.4	27.4	1.5
18/03/2024	20/03/2024	Week-3		55.2	35.2	22.2	27.3	0.4
19/03/2024	20/03/2024	Week-3		50.4	27.1	20.6	25.1	1.0
25/03/2024	27/03/2024	Week-4		52.3	30.6	25.2	30.2	1.2
26/03/2024	27/03/2024	Week-4		51.7	32.4	24.1	29.6	0.6
April– 2024								
01/04/2024	03/04/2024	Week-1		51.3	29.2	26.4	30.7	0.4
02/04/2024	03/04/2024	Week-1		49.6	36.6	21.2	27.1	0.6
08/04/2024	10/04/2024	Week-2		56.2	34.1	25.6	29.6	0.9
09/04/2024	10/04/2024	Week-2		54.1	32.0	23.4	30.2	1.0
15/04/2024	17/04/2024	Week-3		52.6	35.9	21.2	26.4	0.8
16/04/2024	17/04/2024	Week-3		57.4	27.1	19.6	26.1	0.6
22/04/2024	24/04/2024	Week-4		51.2	29.5	22.3	27.3	0.4
23/04/2024	24/04/2024	Week-4		53.5	31.2	20.1	25.2	1.2
May-2024								
06/05/2024	08/05/2024	Week-2		52.3	38.1	19.6	24.6	1.0
07/05/2024	08/05/2024	Week-2		59.6	32.6	25.4	30.4	0.5
13/05/2024	15/05/2024	Week-3		56.2	29.2	20.6	25.1	0.8
14/05/2024	15/05/2024	Week-3		50.3	31.1	22.1	27.5	0.6
20/05/2024	22/05/2024	Week-4		54.5	28.3	19.4	24.7	0.9
21/05/2024	22/05/2024	Week-4		57.2	26.4	21.2	26.2	0.5
27/05/2024	29/05/2024	Week-5		54.4	33.7	23.5	28.4	0.8
28/05/2024	29/05/2024	Week-5		56.1	34.5	19.3	22.3	0.5
Maximum				59.6	38.1	26.4	30.7	1.5
Minimum				47.5	26.4	17.6	22.3	0.4
Average reading				53.73	32.13	21.97	27.10	0.8
98 %				58.58	37.41	26.03	30.56	1.36

Lab Chemist

Eurofine Enviro Lab Pvt. Ltd.

Authorized Signatory

EUROFINE ENVIRO LAB PVT. LTD.

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eurofinelab@gmail.com 9922474646 / 9637345858

Ambient Air Quality Monitoring Report

Report No.	EFEL/PRO/2024/06/73-96	Date of Report	05/06/2024
Project Name and Address	Proposed IT/ITES/Commercial Building Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		
Sample Collected and Analyzed by	EFEL Team		

NAME OF LOCATION- Ganesh Garden

Sampling Date	Date Of Sample Registration	Week of Sample Analysis	Parameter	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)
			NAAQ Standards	100 (µg/m³)	60 (µg/m³)	80 (µg/m³)	80 (µg/m³)	04 (mg/m³)
			Analysis Method	IS: 5181 (Part-23) 2006	IS: 5181 (Part-23) 2006	Modified West &GaekeMeth	Jacob &Hocheiser's Method	NDIR Method
March – 2024								
04/03/2024	06/03/2024	Week-1		58.2	37.1	29.3	3.51	1.5
05/03/2024	06/03/2024	Week-1		60.3	39.5	22.5	27.3	0.9
11/03/2024	13/03/2024	Week-2		52.7	36.7	24.7	28.5	1.4
12/03/2024	13/03/2024	Week-2		53.6	38.5	28.3	32.1	1.6
18/03/2024	20/03/2024	Week-3		54.8	40.2	23.4	29.6	0.9
19/03/2024	20/03/2024	Week-3		58.2	33.4	27.6	32.1	1.7
25/03/2024	27/03/2024	Week-4		55.6	39.1	22.1	26.3	1.0
26/03/2024	27/03/2024	Week-4		53.7	31.5	25.5	31.2	1.2
April– 2024								
01/04/2024	03/04/2024	Week-1		61.8	33.7	24.3	28.4	0.9
02/04/2024	03/04/2024	Week-1		59.4	36.2	26.1	30.3	1.2
08/04/2024	10/04/2024	Week-2		52.6	34.7	22.8	27.5	1.4
09/04/2024	10/04/2024	Week-2		56.7	40.1	25.3	30.1	0.8
15/04/2024	17/04/2024	Week-3		58.1	37.5	23.4	27.4	0.9
16/04/2024	17/04/2024	Week-3		56.3	39.6	24.1	30.3	1.2
22/04/2024	24/04/2024	Week-4		54.7	36.1	25.7	30.6	1.4
23/04/2024	24/04/2024	Week-4		57.2	40.4	23.6	28.1	1.1
May-2024								
06/05/2024	08/05/2024	Week-2		61.2	32.2	26.1	31.3	0.9
07/05/2024	08/05/2024	Week-2		56.3	35.3	24.3	28.6	1.0
13/05/2024	15/05/2024	Week-3		58.4	41.6	25.8	30.1	1.1
14/05/2024	15/05/2024	Week-3		52.2	36.8	23.1	27.4	1.4
20/05/2024	22/05/2024	Week-4		58.5	34.0	26.5	31.2	1.3
21/05/2024	22/05/2024	Week-4		60.2	40.6	22.3	27.5	1.0
27/05/2024	29/05/2024	Week-5		53.6	36.4	24.2	29.4	0.9
28/05/2024	29/05/2024	Week-5		55.1	33.5	25.4	31.2	1.4
	Maximum			61.8	41.6	29.3	32.1	1.7
	Minimum			52.2	31.5	22.1	3.51	0.8
	Average reading			56.64	36.86	27.85	28.33	1.70
	98 %			61.52	41.14	28.84	32.10	1.65

Lab Chemist

Eurofine Enviro Lab Pvt. Ltd.

Authorized Signatory

EUROFINE ENVIRO LAB PVT. LTD.

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eurofinelab@gmail.com 9922474646 / 9637345858

Ambient Air Quality Monitoring Report

Report No.	**EFEL/PRO/2024/06/97-120**	**Date of Report**	**05/06/2024**
Project Name and Address	**Proposed IT/ITES/Commercial Building Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.**		
Sample Collected and Analyzed by	**EFEL Team**		
NAME OF LOCATION- Agarkar Nagar			

Sampling Date	Date Of Sample Registration	Week of Sample Analysis	Parameter	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)
			NAAQ Standards	100 (µg/m³)	60 (µg/m³)	80 (µg/m³)	80 (µg/m³)	04 (mg/m³)
			Analysis Method	IS: 5181 (Part-23) 2006	IS: 5181 (Part-23) 2006	Modified West &GaekeMeth	Jacob &Hocheiser's Method	NDIR Method
March – 2024								
04/03/2024	06/03/2024	Week-1		52.3	39.5	22.2	27.1	0.8
05/03/2024	06/03/2024	Week-1		54.6	31.2	24.5	28.4	1.0
11/03/2024	13/03/2024	Week-2		51.2	33.8	22.3	27.2	0.9
12/03/2024	13/03/2024	Week-2		55.6	34.2	23.6	29.5	1.1
18/03/2024	20/03/2024	Week-3		53.4	39.7	25.8	31.2	1.3
19/03/2024	20/03/2024	Week-3		57.3	33.3	28.2	34.0	1.5
25/03/2024	27/03/2024	Week-4		59.2	36.1	26.4	30.5	1.6
26/03/2024	27/03/2024	Week-4		55.7	33.6	22.2	28.3	1.5
April– 2024								
01/04/2024	03/04/2024	Week-1		52.4	35.1	25.3	31.6	1.2
02/04/2024	03/04/2024	Week-1		56.8	39.7	27.0	33.3	0.9
08/04/2024	10/04/2024	Week-2		59.4	37.5	24.2	29.3	0.9
09/04/2024	10/04/2024	Week-2		60.2	32.3	26.1	32.2	1.3
15/04/2024	17/04/2024	Week-3		58.3	39.8	25.5	31.4	1.5
16/04/2024	17/04/2024	Week-3		61.4	31.6	27.3	34.6	1.2
22/04/2024	24/04/2024	Week-4		59.3	37.2	26.7	32.2	1.6
23/04/2024	24/04/2024	Week-4		57.4	39.4	29.2	34.3	1.5
May-2024								
06/05/2024	08/05/2024	Week-2		60.2	35.7	25.2	30.9	1.2
07/05/2024	08/05/2024	Week-2		58.1	31.4	24.8	28.5	0.9
13/05/2024	15/05/2024	Week-3		61.3	39.2	23.3	29.3	0.7
14/05/2024	15/05/2024	Week-3		56.7	31.9	22.1	28.2	1.4
20/05/2024	22/05/2024	Week-4		54.2	36.5	29.4	34.1	1.6
21/05/2024	22/05/2024	Week-4		51.3	38.1	25.7	29.4	1.3
27/05/2024	29/05/2024	Week-5		55.2	33.6	28.1	33.3	1.5
28/05/2024	29/05/2024	Week-5		58.5	40.3	24.2	28.0	1.1
Maximum				61.4	40.3	29.4	34.6	1.6
Minimum				51.2	31.2	22.1	27.1	0.7
Average reading				56.66	35.86	25.38	30.70	1.22
98 %				61.35	40.07	29.30	34.46	1.60

Lab Chemist

Eurofine Enviro Lab Pvt. Ltd.

Authorized Signatory

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Ambient Air Quality Monitoring Report

Report No.	EFEL/PRO/2024/06/121-144	Date of Report	05/06/2024
Project Name and Address	Proposed IT/ITES/Commercial Building Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		
Sample Collected and Analyzed by	EFEL Team		

NAME OF LOCATION- Sasane Nagar

Sampling Date	Date Of Sample Registration	Week of Sample Analysis	Parameter	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)
			NAAQ Standards	100 (µg/m³)	60 (µg/m³)	80 (µg/m³)	80 (µg/m³)	04 (mg/m³)
			Analysis Method	IS: 5181 (Part-23) 2006	IS: 5181 (Part-23) 2006	Modified West &GaekeMeth	Jacob &Hocheiser's Method	NDIR Method
March – 2024								
04/03/2024	06/03/2024	Week-1		51.6	28.2	21.4	26.3	0.7
05/03/2024	06/03/2024	Week-1		50.4	29.4	23.6	29.1	0.9
11/03/2024	13/03/2024	Week-2		53.2	33.1	25.3	30.2	0.6
12/03/2024	13/03/2024	Week-2		50.1	35.2	22.4	27.5	0.8
18/03/2024	20/03/2024	Week-3		54.1	32.7	24.0	28.3	1.0
19/03/2024	20/03/2024	Week-3		56.3	36.1	26.8	32.1	1.4
25/03/2024	27/03/2024	Week-4		59.4	31.2	21.1	26.8	1.1
26/03/2024	27/03/2024	Week-4		57.2	35.0	25.3	30.2	1.0
April– 2024								
01/04/2024	03/04/2024	Week-1		54.7	38.2	22.1	26.4	1.4
02/04/2024	03/04/2024	Week-1		51.2	28.5	24.7	28.3	1.0
08/04/2024	10/04/2024	Week-2		50.4	33.3	26.3	32.2	1.1
09/04/2024	10/04/2024	Week-2		53.0	28.2	21.1	24.5	0.9
15/04/2024	17/04/2024	Week-3		54.1	32.7	25.3	30.2	1.2
16/04/2024	17/04/2024	Week-3		51.9	38.3	28.6	32.1	0.8
22/04/2024	24/04/2024	Week-4		53.8	30.0	24.5	28.7	1.3
23/04/2024	24/04/2024	Week-4		56.3	29.2	22.3	26.5	1.0
May-2024								
06/05/2024	08/05/2024	Week-2		49.2	33.7	26.8	31.4	1.2
07/05/2024	08/05/2024	Week-2		50.5	28.2	22.2	27.6	1.0
13/05/2024	15/05/2024	Week-3		57.4	32.8	27.3	32.2	1.1
14/05/2024	15/05/2024	Week-3		55.1	29.7	24.0	28.6	0.9
20/05/2024	22/05/2024	Week-4		52.3	37.3	21.8	27.3	1.2
21/05/2024	22/05/2024	Week-4		50.7	31.2	25.3	30.2	0.7
27/05/2024	29/05/2024	Week-5		53.4	35.6	26.4	32.1	1.2
28/05/2024	29/05/2024	Week-5		56.2	38.1	24.0	29.5	1.3
Maximum				59.4	38.3	28.6	32.2	1.4
Minimum				49.2	28.2	21.1	24.5	0.6
Average reading				53.43	32.74	24.27	29.09	1.03
98 %				58.48	38.25	28.00	32.2	1.40

Lab Chemist

Eurofine Enviro Lab Pvt. Ltd.

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Ambient Air Quality Monitoring Report

Report No.	EFEL/PRO/2024/06/145-168	Date of Report	05/06/2024
Project Name and Address	Proposed IT/ITES/Commercial Building Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		
Sample Collected and Analyzed by	EFEL Team		

NAME OF LOCATION- Laxmi Nagar

Sampling Date	Date Of Sample Registration	Week of Sample Analysis	Parameter	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)
			NAAQ Standards	100 (µg/m³)	60 (µg/m³)	80 (µg/m³)	80 (µg/m³)	04 (mg/m³)
			Analysis Method	IS: 5181 (Part-23) 2006	IS: 5181 (Part-23) 2006	Modified West &GaekeMeth	Jacob &Hocheiser's Method	NDIR Method
March – 2024								
04/03/2024	06/03/2024	Week-1		50.3	29.1	20.3	25.6	0.7
05/03/2024	06/03/2024	Week-1		53.1	30.6	23.5	27.1	0.8
11/03/2024	13/03/2024	Week-2		51.0	33.3	21.7	26.3	0.5
12/03/2024	13/03/2024	Week-2		59.5	34.1	24.3	30.8	0.7
18/03/2024	20/03/2024	Week-3		51.2	32.3	26.1	31.2	1.1
19/03/2024	20/03/2024	Week-3		59.6	37.6	25.3	29.4	1.3
25/03/2024	27/03/2024	Week-4		52.3	30.2	27.5	32.6	0.9
26/03/2024	27/03/2024	Week-4		54.1	38.9	22.8	26.2	1.1
April– 2024								
01/04/2024	03/04/2024	Week-1		60.3	29.1	20.3	25.6	0.6
02/04/2024	03/04/2024	Week-1		53.1	30.6	23.5	27.1	0.8
08/04/2024	10/04/2024	Week-2		51.0	33.3	21.7	26.3	0.5
09/04/2024	10/04/2024	Week-2		59.5	34.1	24.3	30.8	0.7
15/04/2024	17/04/2024	Week-3		51.2	32.3	26.1	31.2	1.5
16/04/2024	17/04/2024	Week-3		59.6	37.6	25.3	29.4	1.3
22/04/2024	24/04/2024	Week-4		52.3	30.2	27.5	33.6	0.9
23/04/2024	24/04/2024	Week-4		54.1	38.9	22.8	26.2	1.1
May-2024								
06/05/2024	08/05/2024	Week-2		50.8	34.1	23.8	27.4	0.7
07/05/2024	08/05/2024	Week-2		59.2	31.2	26.1	30.2	0.9
13/05/2024	15/05/2024	Week-3		51.2	35.6	22.6	26.8	0.8
14/05/2024	15/05/2024	Week-3		53.5	37.4	20.4	25.1	1.0
20/05/2024	22/05/2024	Week-4		59.1	35.6	24.7	30.6	1.2
21/05/2024	22/05/2024	Week-4		52.2	31.5	21.5	26.2	1.5
27/05/2024	29/05/2024	Week-5		57.6	36.2	26.1	31.7	1.3
28/05/2024	29/05/2024	Week-5		59.2	30.7	22.6	28.2	0.9
Maximum				60.3	38.9	27.5	33.6	1.5
Minimum				50.3	29.1	20.3	25.1	0.5
Average reading				54.79	33.52	23.78	28.56	0.95
98 %				59.97	38.90	27.50	33.14	1.50

Lab Chemist

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Ambient Air Quality Monitoring Report

Report No.	EFEL/PRO/2024/06/169-192	Date of Report	05/06/2024
Project Name and Address	Proposed IT/ITES/Commercial Building Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		
Sample Collected and Analyzed by	EFEL Team		
NAME OF LOCATION- Anand Park Sciety			

Sampling Date	Date Of Sample Registration	Week of Sample Analysis	Parameter	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)
			NAAQ Standards	100 (µg/m³)	60 (µg/m³)	80 (µg/m³)	80 (µg/m³)	04 (mg/m³)
			Analysis Method	IS: 5181 (Part-23) 2006	IS: 5181 (Part-23) 2006	Modified West &GaekeMeth	Jacob &Hocheiser's Method	NDIR Method
March – 2024								
04/03/2024	06/03/2024	Week-1		60.5	36.5	24.6	29.8	1.0
05/03/2024	06/03/2024	Week-1		58.6	34.5	26.1	30.5	1.4
11/03/2024	13/03/2024	Week-2		56.4	33.6	25.5	30.5	1.2
12/03/2024	13/03/2024	Week-2		53.4	40.6	27.6	32.4	1.8
18/03/2024	20/03/2024	Week-3		57.6	37.8	29.6	34.5	1.7
19/03/2024	20/03/2024	Week-3		53.4	39.8	24.6	28.7	1.4
25/03/2024	27/03/2024	Week-4		55.0	32.4	30.6	36.6	1.6
26/03/2024	27/03/2024	Week-4		63.8	34.0	23.8	28.9	1.5
April– 2024								
01/04/2024	03/04/2024	Week-1		57.6	35.4	24.0	29.8	1.7
02/04/2024	03/04/2024	Week-1		54.3	34.0	23.8	28.7	1.5
08/04/2024	10/04/2024	Week-2		59.6	42.1	26.6	28.1	1.6
09/04/2024	10/04/2024	Week-2		53.6	36.8	25.4	30.6	1.3
15/04/2024	17/04/2024	Week-3		56.7	35.7	28.9	32.5	1.1
16/04/2024	17/04/2024	Week-3		55.4	34.2	23.7	29.9	1.8
22/04/2024	24/04/2024	Week-4		58.9	35.9	30.5	35.4	1.0
23/04/2024	24/04/2024	Week-4		55.4	38.7	29.7	34.2	1.4
May-2024								
06/05/2024	08/05/2024	Week-2		53.6	32.6	24.6	29.8	1.5
07/05/2024	08/05/2024	Week-2		58.9	34.8	28.9	32.6	1.4
13/05/2024	15/05/2024	Week-3		54.3	35.6	26.8	30.5	1.3
14/05/2024	15/05/2024	Week-3		55.4	36.4	25.4	30.4	1.8
20/05/2024	22/05/2024	Week-4		57.6	35.9	23.4	27.6	1.6
21/05/2024	22/05/2024	Week-4		59.8	34.0	28.9	32.4	1.0
27/05/2024	29/05/2024	Week-5		55.4	33.8	30.5	35.1	1.3
28/05/2024	29/05/2024	Week-5		53.7	32.1	27.6	33.4	1.1
Maximum				63.8	42.1	30.6	36.6	1.8
Minimum				53.4	32.1	23.4	27.6	1.0
Average reading				56.62	35.71	26.71	31.37	1.41
98 %				62.28	41.41	30.55	36.04	1.8

Lab Chemist

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Surface Water Analysis Report

Report Number	**EFEL/PRO/2024/06/201-203**	**Date of Report**	**05/06/2024**
Project Name and Address: Proposed IT/ITES/Commercial Building. Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		**Sample Details**	**Surface Water**
		Nature of sample	**Liquid**
		Date of Sampling	**13/05/2024**
		Date of Sample Registration	**14/05/2024**
		Date of Analysis	**14/05/2024**
Sample Collected and Analyzed by		**EFEL Team**	

Sr. No.	Parameter	Unit(s)	Location			Limits as per IS 10500: 2012	Permissible Limit in the Absence of Alternate Source	Analysis Method
			SW1 Mula-Mutha River	SW2 Mutha River	SW3 Amanora Lake			
1.	Color	Hazen	Clear	Clear	Clear	5.00	15.00	IS : 3025 (Part4):1983
2.	Odor	--	Non-Agreeable	Non-Agreeable	Agreeable	Agreeable	Agreeable	IS : 3025 (Part5):1983,
3.	pH	--	7.64	7.61	7.40	6.5-8.5	No relaxation	APHA 4500 H^+, A, 23rd Ed.2017
4.	Conductivity	µS/cm	1020.5	944.61	463.5	Not Specified	Not Specified	IS 3025 (Part 14) 1984 (RA 2006)
5.	TDS	mg/lit	663.8	614.3	301.6	< 500.00	2000	IS 3025 (Part 16):
6.	Turbidity	NTU	12.0	10.0	3.00	< 1.00	5	IS 3025 (Part 10): 1983
7.	TSS	mg/lit	32.0	28.0	09.0	Not Specified	Not Specified	IS: 3025 (Part-17)-1984
8	D.O	mg/lit	2.6	2.9	5.8	Not Specified	Not Specified	IS:3025 (Part-38)-1989
9.	COD	mg/lit	36.0	32.0	8.0	Not Specified	Not Specified	IS:3025 (Part 58)-2006 .
10.	BOD 3	mg/lit	12.0	10.0	3.0	Not Specified	Not Specified	IS:3025 (Part 44)-1993,
11.	Ammonical Nitrogen	mg/lit	1.16	1.05	<0.01	< 0.50	No relaxation	APHA 4500 NH_3 F
12.	Nitrate as NO_3	mg/lit	34.5	32.6	12.3	< 45.00	No relaxation	APHA 4500 NO_3 - B
13.	Nitrite as NO_2	mg/lit	<0.01	<0.01	<0.01	Not Specified	Not Specified	IS 3025 (Part 34) 1988,
14.	Nitrogen as N	mg/lit	1.98	1.78	<0.01	Not Specified	Not Specified	APHA-4500
15.	Phosphorous as PO_4	mg/lit	2.46	2.31	1.56	Not Specified	Not Specified	APHA 4500 P-C
16.	Potassium as K	mg/lit	32.5	28.9	10.5	Not Specified	Not Specified	APHA 3111 B
17.	Sodium as Na	mg/lit	81.6	78.5	36.5	Not Specified	Not Specified	APHA 3111 B
18.	Calcium as Ca	mg/lit	57.1	54.6	34.5	< 75.00	200.00	IS 3025 (Part 40) 1991

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19.	Magnesium as Mg	mg/lit	21.6	18.7	9.54	< 30.00	100.00	IS 3025 (Part 46) 1994 (RA 2009)
20.	Total Hardness as $CaCO_3$	mg/lit	241.6	236.5	128.6	< 200.00	600.00	IS 3025 (Part 21): 2009
21.	Carbonates as CO_3^{2-}	mg/lit	64.0	59.6	34.5	Not Specified	Not Specified	APHA 2320
22.	Bicarbonates as HCO_3	mg/lit	60.0	56.4	28.6	Not Specified	Not Specified	APHA 2320
23.	Chlorides as Cl^-	mg/lit	146.4	142.3	62.3	< 250.00	1000.00	IS 3025 (Part 32):
24.	Sulphates as SO_4	mg/lit	97.6	86.7	51.6	< 200.00	400.00	IS 3025 (Part-24):
25.	Sulphide as H_2S	mg/lit	<0.001	<0.001	<0.001	< 0.05	No relaxation	APHA-4500-S2
26.	Fluorides as F^-	mg/lit	<0.01	<0.01	<0.01	< 1.00	1.50	APHA 4500-F^- D
27.	Iron as Fe	mg/lit	0.22	0.18	<0.05	< 0.30	No relaxation	APHA 3111 B
28.	Aluminum as Al	mg/lit	<0.001	<0.001	<0.001	<0.03	0.20	APHA 3111 B
29.	Barium as Ba	mg/lit	<0.001	<0.001	<0.001	<0.70	No relaxation	APHA 3111 B
30.	Boron as B	mg/lit	<0.01	<0.01	<0.01	< 0.50	1.00	APHA 3111 B
31.	Copper as Cu	mg/lit	<0.04	<0.04	<0.04	< 0.05	1.50	APHA 3111 B
32.	Selenium as Se	mg/lit	<0.001	<0.001	<0.001	<0.01	No relaxation	APHA 3111 B
33.	Zinc as Zn	mg/lit	<0.05	<0.05	<0.05	<5.00	15.00	APHA 3111 B
34.	Cadmium as Cd	mg/lit	<0.001	<0.001	<0.001	<0.003	No relaxation	APHA 3111 B
35.	Lead as Pb	mg/lit	<0.01	<0.01	<0.01	<0.01	No relaxation	APHA 3111 B
36.	Mercury as Hg	mg/lit	<0.001	<0.001	<0.001	<0.001	No relaxation	APHA 3111 B
37.	Nickel as Ni	mg/lit	<0.01	<0.01	<0.01	< 0.02	No relaxation	APHA 3111 B
38.	Arsenic as As	mg/lit	<0.01	<0.01	<0.01	< 0.01	0.05	APHA 3111 B
39.	Chromium as Cr	mg/lit	<0.05	<0.05	<0.05	< 0.05	No relaxation	APHA 3111 B
40.	Total Coli form	No./100ml	**33**	**26**	**06**	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)
41.	Fecal Coli form	No./100ml	**12**	**09**	Absent	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)

Apatil
Lab Chemist

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Surface Water Analysis Report

Report Number	**EFEL/PRO/2024/06/204**	**Date of Report**	**05/06/2024**
Project Name and Address: Proposed IT/ITES/Commercial Building. Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		**Sample Details**	**Surface Water**
		Nature of sample	**Liquid**
		Date of Sampling	**13/05/2024**
		Date of Sample Registration	**14/05/2024**
		Date of Analysis	**14/05/2024**
Sample Collected and Analyzed by		**EFEL Team**	

Sr. No.	Parameter	Unit(s)	Location SW4 Aditi Garden Lake	Limits as per IS 10500: 2012	Permissible Limit in the Absence of Alternate Source	Analysis Method
1.	Color	Hazen	Clear	5.00	15.00	IS : 3025 (Part4):1983
2.	Odor	--	Agreeable	Agreeable	Agreeable	IS : 3025 (Part5):1983,
3.	pH	--	7.46	6.5-8.5	No relaxation	APHA 4500 H+, A, 23rd Ed.2017
4.	Conductivity	µS/cm	561.4	Not Specified	Not Specified	IS 3025 (Part 14) 1984 (RA 2006)
5.	TDS	mg/lit	356.2	< 500.00	2000	IS 3025 (Part 16):
6.	Turbidity	NTU	6.0	< 1.00	5	IS 3025 (Part 10): 1983
7.	TSS	mg/lit	21.0	Not Specified	Not Specified	IS: 3025 (Part-17)-1984
8	D.O	mg/lit	5.5	Not Specified	Not Specified	IS:3025 (Part-38)-1989
9.	COD	mg/lit	12.0	Not Specified	Not Specified	IS:3025 (Part 58)-2006
10.	BOD 3	mg/lit	4.0	Not Specified	Not Specified	IS:3025 (Part 44)-1993,
11.	Ammonical Nitrogen	mg/lit	<0.01	< 0.50	No relaxation	APHA 4500 NH_3 F
12.	Nitrate as NO_3	mg/lit	14.6	< 45.00	No relaxation	APHA 4500 NO_3- B
13.	Nitrite as NO_2	mg/lit	<0.01	Not Specified	Not Specified	IS 3025 (Part 34) 1988,
14.	Nitrogen as N	mg/lit	<0.01	Not Specified	Not Specified	APHA-4500
15.	Phosphorous as PO_4	mg/lit	1.89	Not Specified	Not Specified	APHA 4500 P-C
16.	Potassium as K	mg/lit	12.5	Not Specified	Not Specified	APHA 3111 B
17.	Sodium as Na	mg/lit	43.2	Not Specified	Not Specified	APHA 3111 B
18.	Calcium as Ca	mg/lit	39.8	< 75.00	200.00	IS 3025 (Part 40) 1991
19.	Magnesium as Mg	mg/lit	11.4	< 30.00	100.00	IS 3025 (Part 46) 1994 (RA 2009)
20.	Total Hardness as $CaCO_3$	mg/lit	151.8	< 200.00	600.00	IS 3025 (Part 21): 2009
21.	Carbonates as CO_3^{2-}	mg/lit	38.7	Not Specified	Not Specified	APHA 2320
22.	Bicarbonates as HCO_3	mg/lit	30.6	Not Specified	Not Specified	APHA 2320
23.	Chlorides as Cl^-	mg/lit	76.0	< 250.00	1000.00	IS 3025 (Part 32):
24.	Sulphates as SO_4	mg/lit	55.4	< 200.00	400.00	IS 3025 (Part-24):
25.	Sulphide as H_2S	mg/lit	<0.001	< 0.05	No relaxation	APHA-4500-S2
26.	Fluorides as F^-	mg/lit	<0.01	< 1.00	1.50	APHA 4500-F^- D
27.	Iron as Fe	mg/lit	0.14	< 0.30	No relaxation	APHA 3111 B
28.	Aluminum as Al	mg/lit	<0.001	<0.03	0.20	APHA 3111 B

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29.	Barium as Ba	mg/lit	<0.001	<0.70	No relaxation	APHA 3111 B
30.	Boron as B	mg/lit	<0.01	< 0.50	1.00	APHA 3111 B
31.	Copper as Cu	mg/lit	<0.04	< 0.05	1.50	APHA 3111 B
32.	Selenium as Se	mg/lit	<0.001	<0.01	No relaxation	APHA 3111 B
33.	Zinc as Zn	mg/lit	<0.05	<5.00	15.00	APHA 3111 B
34.	Cadmium as Cd	mg/lit	<0.001	<0.003	No relaxation	APHA 3111 B
35.	Lead as Pb	mg/lit	<0.01	<0.01	No relaxation	APHA 3111 B
36.	Mercury as Hg	mg/lit	<0.001	<0.001	No relaxation	APHA 3111 B
37.	Nickel as Ni	mg/lit	<0.01	< 0.02	No relaxation	APHA 3111 B
38.	Arsenic as As	mg/lit	<0.01	< 0.01	0.05	APHA 3111 B
39.	Chromium as Cr	mg/lit	<0.05	< 0.05	No relaxation	APHA 3111 B
40.	Total Coli form	No./100ml	10	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)
41.	Fecal Coli form	No./100ml	03	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)

Lab Chemist

Authorized Signatory

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Ground Water Analysis Report

Report Number	**EFEL/PRO/2024/06/213**	**Date of Report**	**05/06/2024**
Project Name and Address: Proposed IT/ITES/Commercial Building. Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		**Sample Details**	**Ground Water**
		Nature of sample	**Liquid**
		Date of Sampling	**13/05/2024**
		Date of Sample Registration	**14/05/2024**
		Date of Analysis	**14/05/2024**
Sample Collected and Analyzed by		**EFEL Team**	

Sr. No.	Parameter	Unit(s)	Location GW-1 Ubale Nagar Well	Limits as per IS 10500:2012	Permissible Limit in the Absence of Alternate Source	Analysis Method
1.	Color	Hazen	Clear	5.00	15.00	IS : 3025 (Part4):1983
2.	Odor	--	Agreeable	Agreeable	Agreeable	IS : 3025 (Part5):1983,
3.	pH	--	7.58	6.5-8.5	No relaxation	APHA 4500 H^+, A, 23rd Ed.2017
4.	Conductivity	µS/cm	752.6	Not Specified	Not Specified	IS 3025 (Part 14) 1984 (RA 2006)
5.	TDS	mg/lit	488.9	< 500.00	2000	IS 3025 (Part 16):
6.	Turbidity	NTU	2.00	< 1.00	5	IS 3025 (Part 10): 1983
7.	TSS	mg/lit	7.0	Not Specified	Not Specified	IS: 3025 (Part-17)-1984
8.	COD	mg/lit	<5.00	Not Specified	Not Specified	IS:3025 (Part 58)-2006
9.	BOD 3	mg/lit	<1.00	Not Specified	Not Specified	IS:3025 (Part 44)-1993,
10.	Ammonical Nitrogen	mg/lit	0.28	< 0.50	No relaxation	APHA 4500 NH_3 F
11.	Nitrate as NO_3	mg/lit	21.6	< 45.00	No relaxation	APHA 4500 NO_3 - B
12.	Nitrite as NO_2	mg/lit	<0.01	Not Specified	Not Specified	IS 3025 (Part 34) 1988,
13.	Nitrogen as N	mg/lit	0.84	Not Specified	Not Specified	APHA-4500
14.	Phosphorous as PO_4	mg/lit	1.98	Not Specified	Not Specified	APHA 4500 P-C
15.	Potassium as K	mg/lit	21.3	Not Specified	Not Specified	APHA 3111 B
16.	Sodium as Na	mg/lit	58.4	Not Specified	Not Specified	APHA 3111 B
17.	Calcium as Ca	mg/lit	48.6	< 75.00	200.00	IS 3025 (Part 40) 1991
18.	Magnesium as Mg	mg/lit	16.5	< 30.00	100.00	IS 3025 (Part 46) 1994 (RA 2009)
19.	Total Hardness as $CaCO_3$	mg/lit	172.8	< 200.00	600.00	IS 3025 (Part 21): 2009
20.	Carbonates as CO_3^{2-}	mg/lit	41.6	Not Specified	Not Specified	APHA 2320
21.	Bicarbonates as HCO_3	mg/lit	14.5	Not Specified	Not Specified	APHA 2320
22.	Chlorides as Cl^-	mg/lit	112.0	< 250.00	1000.00	IS 3025 (Part 32):
23.	Sulphates as SO_4	mg/lit	86.5	< 200.00	400.00	IS 3025 (Part-24):
24.	Sulphide as H_2S	mg/lit	<0.001	< 0.05	No relaxation	APHA-4500-S2
25.	Fluorides as F^-	mg/lit	<0.01	< 1.00	1.50	APHA 4500-F D
26.	Iron as Fe	mg/lit	<0.05	< 0.30	No relaxation	APHA 3111 B
27.	Aluminum as Al	mg/lit	<0.001	<0.03	0.20	APHA 3111 B

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28.	Barium as Ba	mg/lit	<0.001	<0.70	No relaxation	APHA 3111 B
29.	Boron as B	mg/lit	<0.01	< 0.50	1.00	APHA 3111 B
30.	Copper as Cu	mg/lit	<0.04	< 0.05	1.50	APHA 3111 B
31.	Selenium as Se	mg/lit	<0.001	<0.01	No relaxation	APHA 3111 B
32.	Zinc as Zn	mg/lit	<0.05	<5.00	15.00	APHA 3111 B
33.	Cadmium as Cd	mg/lit	<0.001	<0.003	No relaxation	APHA 3111 B
34.	Lead as Pb	mg/lit	<0.01	<0.01	No relaxation	APHA 3111 B
35.	Mercury as Hg	mg/lit	<0.001	<0.001	No relaxation	APHA 3111 B
36.	Nickel as Ni	mg/lit	<0.01	< 0.02	No relaxation	APHA 3111 B
37.	Arsenic as As	mg/lit	<0.01	< 0.01	0.05	APHA 3111 B
38.	Chromium as Cr	mg/lit	<0.05	< 0.05	No relaxation	APHA 3111 B
39.	Total Coli form	No./100ml	<2	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)
40.	Fecal Coli form	No./100ml	<2	Absent	Absent	IS: 1622 (Rev.1,R.A : 2014)

Lab Chemist

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Ambient Noise Monitoring Report

Report No.	EFEL/PRO/2024/06/193-200	Date of Report	05/04/2024
Project Name and Address	Proposed IT/ITES/Commercial BuildingProject Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		
Monitoring Lab	EFEL Team		
Date of Sampling	April -2024		
Analysis Method	S: 4758-1968 Reaff.2002.		

Date	08/04/2024	09/04/2024	10/04/2024	11/04/2024	15/04/2024	16/04/2024	17/04/2024	18/04/2024
Location	Project site	Koregaon Park Annexe	Marigold Complex	Ganesh Nagar	Agarkar Nagar	Sasane Nagar	Laxmi Nagar	Anand Park Society
Time	N1	N2	N3	N4	N5	N6	N7	N8
6.00	49.7	51.2	50.7	51.5	51.6	51.3	51.4	51.6
7.00	50.3	52.2	51.3	52.2	52.1	52.2	51.5	52.3
8.00	52.4	53.4	53.1	53.7	53.6	53.6	53.3	53.1
9.00	53.5	54.3	53.3	54.6	53.5	54.4	53.5	54.1
10.00	52.2	53.4	52.4	52.5	52.5	52.3	52.3	53.3
11.00	50.5	54.2	53.2	53.7	53.6	53.8	53.5	54.2
12.00	51.4	52.7	52.3	52.4	52.4	53.1	52.3	52.6
13.00	52.7	51.5	50.7	53.6	51.0	52.3	51.1	51.4
14.00	53.3	53.1	53.4	54.4	53.1	54.2	53.2	53.2
15.00	50.7	53.7	52.1	54.7	52.8	54.1	52.3	53.1
16.00	53.3	53.3	52.3	53.6	52.6	53.4	52.5	53.0
17.00	53.4	52.0	51.5	52.3	51.3	52.2	51.1	51.3
18.00	53.8	53.4	52.8	53.3	52.5	53.1	52.4	53.7
19.00	52.4	52.3	51.2	52.7	52.1	52.7	51.2	52.6
20.00	48.3	51.1	50.0	51.6	51.0	51.5	50.0	51.1
21.00	47.4	50.0	49.5	50.3	49.7	50.2	49.4	51.8
22.00	45.5	49.4	48.1	49.5	48.6	49.7	48.0	49.8
Average -Day	**51.22**	**52.42**	**51.64**	**52.74**	**52.0**	**52.59**	**51.70**	**52.48**
23.00	42.4	44.0	43.5	44.4	43.7	44.1	43.7	44.5
24.00	41.0	43.3	41.4	43.7	42.4	43.4	41.6	42.4
1.00	40.4	42.1	40.3	43.1	41.1	42.1	40.9	41.2
2.00	39.5	42.2	40.5	42.0	41.3	42.0	41.0	41.3
3.00	40.1	41.7	39.6	43.0	39.5	42.6	39.8	40.2
4.00	42.0	43.1	42.2	42.3	42.3	43.0	42.2	42.6
5.00	42.7	43.7	43.3	44.2	43.1	43.8	43.0	43.1
Average -Night	**41.15**	**42.87**	**41.54**	**43.24**	**41.91**	**43.0**	**41.74**	**42.18**

A Patil
Lab Chemist

Eurofine Enviro Lab Pvt. Ltd.

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Category of Area	Limits in dB (A) Leq	
	Day Time (6.00 am to 10.00 pm)	Night Time (10.00 pm to 6.00 am)
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

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TEST CERTIFICATE

Report Number	**EFEL/PRO/2024/06/205-208**		
Project Name and Address: Proposed IT/ITES/Commercial Building. Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.		**Date of Report**	**05/06/2024**
		Sample Details	**Soil**
		Nature of sample	**Solid**
		Date of Sampling	**13/05/2024**
		Date of Sample Registration	**14/05/2024**
		Date of Analysis	**14/05/2024**
Sample Collected & Analyzed by		**EFEL Team**	

SOIL ANALYSIS REPORT

Sr. No.	Parameter	Unit (s)	Location				Analysis Method
			Project site	Koregaon Park Annexe	Marigold Complex	Ganesh Nagar	
1.	Colour	-	Brown	Brown	Brown	Brown	IS 2720
2.	Grain Size Distribution						IS 2720-P4
		Sand %	26.00	24.00	25.00	24.00	
		Silt%	17.00	13.00	12.00	22.00	
		Clay %	57.00	63.00	61.00	54.00	
3.	Texture Class		Clay	Clay	Clay	Clay	IS 2720
4.	Bulk Density	gm/cc	1.32	1.45	1.36	1.28	IS 2720-p2
5.	Permeability	cm/hr	0.28	0.35	0.32	0.24	IS :2720 P-17/36
6.	Water Holding capacity	%	41.6	49.6	45.3	37.5	IS 14765
7.	Porosity	%	61.3	67.8	64.3	52.4	IS 2720
8.	pH (1: Aq Extraction)	--	7.47	7.58	7.53	7.42	IS 2720 (Part 26)
9.	Electrical Conductivity (1: Aq Extraction)	µS/cm	1054.0	1176.0	1151.0	1014.0	IS:1892
10.	Cation Exchange Capacity	meq/100gm	47.6	62.3	56.2	44.2	IS 2720
11.	Exchangeable Calcium	meq/100gm	25.6	33.6	29.8	21.4	IS 2720
12.	Exchangeable Magnesium	meq/100gm	19.8	22.5	21.3	15.4	IS 2720
13.	Exchangeable Potassium	meq/100gm	0.58	0.78	0.62	0.45	IS 2720
14.	Exchangeable Sodium	meq/100gm	0.48	0.59	0.52	0.36	IS 2720
15.	Sodium Absorption Ratio	--------	0.055	0.064	0.060	0.044	IS 2720
16.	Nitrogen (N)	mg/kg	272.3	284.3	281.3	267.9	IS 14684:1999 Reaff 2005
17.	Available Phosphorous (P)	mg/kg	53.8	51.6	52.3	47.9	IS 2720
18.	Available Potassium	mg/kg	76.9	83.6	81.6	72.3	IS 2720

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19.	Organic Carbon	%	1.12	1.42	1.28	0.78	IS 2720-P22
20.	Organic Matter	%	1.94	2.18	2.10	1.57	IS 2720-P22
21.	Water Soluble Chloride (Cl)	mg/kg	73.6	88.6	74.3	61.2	IS:812 P-4
22.	Water Soluble Sulphate (SO_4)	mg/kg	57.6	64.5	61.3	51.3	IS 2720-27
23.	Aluminum (Al)	%	0.14	0.21	0.18	0.08	USEPA Method 3050B
24.	Total Iron (Fe)	%	4.13	5.12	4.82	3.16	
25.	Manganese (Mn)	mg/kg	1.18	1.69	1.52	0.92	
26.	Boron (B)	mg/kg	0.4	1.34	0.99	0.72	
27.	Zinc (Zn)	mg/kg	3.61	5.48	4.64	3.21	
28.	Total Chromium (Cr)	mg/kg	BDL	BDL	BDL	BDL	
29.	Lead (Pb)	mg/kg	BDL	0.16	BDL	BDL	
30.	Nickel (Ni)	mg/kg	3.45	4.21	3.76	3.24	
31.	Arsenic (As)	mg/kg	BDL	BDL	BDL	BDL	
32.	Mercury (Hg)	mg/kg	BDL	BDL	BDL	BDL	
33.	Cadmium (Cd)	mg/kg	BDL	BDL	BDL	BDL	
34.	Barium as (Ba)	mg/kg	1.64	2.26	2.12	1.21	
35.	Selenium (Se)	mg/kg	BDL	BDL	BDL	BDL	
36.	Copper (Cu)	mg/kg	BDL	BDL	BDL	BDL	

ANALYZED BY-

Apatil

AUTHORIZED SIGNATORY

Eurofine Enviro Lab Pvt. Ltd.

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TEST CERTIFICATE			
Report Number	**EFEL/PRO/2024/06/209-212**		
Project Name and Address: **Proposed IT/ITES/Commercial Building.** **Project Located at Mundhwa, Tal. Haveli, Dist. Pune by M/s. Bajaj Finserv Ventures Limited & Others.**		**Date of Report**	**05/06/2024**
		Sample Details	**Soil**
		Nature of sample	**Solid**
		Date of Sampling	**13/05/2024**
		Date of Sample Registration	**14/05/2024**
		Date of Analysis	**14/05/2024**
Sample Collected & Analyzed by		**EFEL Team**	

SOIL ANALYSIS REPORT

Sr. No.	Parameter	Unit (s)	Location				Analysis Method
			Agarkar Nagar	Sasane Nagar	Laxmi Nagar	Anand Park Sciety	
1.	Colour	-	Brown	Brown	Brown	Brown	IS 2720
2.	Grain Size Distribution						IS 2720-P4
		Sand %	20.00	24.00	22.00	25.00	
		Silt%	12.00	11.00	17.00	19.00	
		Clay %	68.00	65.00	61.00	56.00	
3.	Texture Class		Clay	Clay	Clay	Clay	IS 2720
4.	Bulk Density	gm/cc	1.35	1.21	1.16	1.13	IS 2720-p2
5.	Permeability	cm/hr	0.54	0.47	0.32	0.24	IS :2720 P-17/36
6.	Water Holding capacity	%	58.6	57.6	52.6	50.5	IS 14765
7.	Porosity	%	48.9	46.5	46.4	42.5	IS 2720
8.	pH (1: Aq Extraction)	--	7.57	7.49	7.44	7.35	IS 2720 (Part 26)
9.	Electrical Conductivity (1: Aq Extraction)	µS/cm	1256.3	1186.0	1087.6	1024.3	IS:1892
10.	Cation Exchange Capacity	meq/100gm	58.6	51.6	48.6	42.3	IS 2720
11.	Exchangeable Calcium	meq/100gm	42.3	35.4	32.4	28.7	IS 2720
12.	Exchangeable Magnesium	meq/100gm	18.6	16.8	14.3	12.3	IS 2720
13.	Exchangeable Potassium	meq/100gm	0.64	0.56	0.48	0.36	IS 2720
14.	Exchangeable Sodium	meq/100gm	0.34	0.32	0.26	0.16	IS 2720
15.	Sodium Absorption Ratio	--------	0.046	0.041	0.039	0.024	IS 2720
16.	Nitrogen (N)	mg/kg	278.6	254.3	246.5	234.5	IS 14684:1999 Reaff 2005
17.	Available Phosphorous (P)	mg/kg	71.2	66.4	56.4	52.4	IS 2720

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18.	Available Potassium	mg/kg	81.6	74.5	71.3	64.5	IS 2720
19.	Organic Carbon	%	1.36	1.24	1.14	1.02	IS 2720-P22
20.	Organic Matter	%	3.22	3.25	2.84	2.61	IS 2720-P22
21.	Water Soluble Chloride (Cl)	mg/kg	86.5	77.56	72.5	64.3	IS:812 P-4
22.	Water Soluble Sulphate (SO_4)	mg/kg	66.5	57.6	48.6	42.3	IS 2720-27
23.	Aluminum (Al)	%	0.19	0.16	0.14	0.09	USEPA Method 3050B
24.	Total Iron (Fe)	%	0.44	0.34	0.23	0.16	
25.	Manganese (Mn)	mg/kg	2.84	2.56	2.51	1.14	
26.	Boron (B)	mg/kg	0.46	0.32	0.24	0.15	
27.	Zinc (Zn)	mg/kg	3.91	3.72	2.15	2.86	
28.	Total Chromium (Cr)	mg/kg	BDL	BDL	0.01	BDL	
29.	Lead (Pb)	mg/kg	BDL	BDL	BDL	BDL	
30.	Nickel (Ni)	mg/kg	2.82	2.63	2.48	2.14	
31.	Arsenic (As)	mg/kg	BDL	BDL	BDL	BDL	
32.	Mercury (Hg)	mg/kg	BDL	BDL	BDL	BDL	
33.	Cadmium (Cd)	mg/kg	BDL	BDL	BDL	BDL	
34.	Barium as (Ba)	mg/kg	BDL	BDL	BDL	BDL	
35.	Selenium (Se)	mg/kg	BDL	BDL	BDL	BDL	
36.	Copper (Cu)	mg/kg	BDL	BDL	BDL	BDL	

ANALYZED BY- Apatil

AUTHORIZED SIGNATORY

Eurofine Enviro Lab Pvt. Ltd.

ANNEXURE – 3

Air Quality Modeling

Impact on Air Environment and Mitigation Measures

The present baseline concentrations were monitored. The additional emissions are mainly from proposed DG sets during emergency.

The nature of emissions from the above units is detailed below in **Table 1.**

Table 4.2: Nature of Emission and Pollutant

Particular	Nature of Emission
DG Sets (18 x 2000 kVA)	PM_{10}, $PM_{2.5}$, SO_2 and NOx

The major air emissions from the proposed project is mainly from the DG Set where the dust and gaseous emissions are released to the atmosphere.

Project developer will provide 18 tall stacks for each of the proposed DG set to exhaust the flue gas emissions. The major pollutants emitted from the unit will be particulate matter, Sulphur dioxide and oxides of nitrogen.

The details of emission considered for estimation of impacts are given below in **Table 1.**

Table 1: Emission Details of DG Sets

Particular	DG Set (2000 kVA)
Nos. of DG Sets	18
Nos. of Stacks	18
Diesel (Requirement for Each DG Set (kg/hr)	220
Sulphur Content in HSD (%)	0.25%
Height of each Stack (m)	130
Diameter of each Stack (m)	1.0
Temperature of each flue Gas (^oC)	140
Velocity of each Flue Gas (m/s)	15
Volumetric Flow Rate (Nm^3/sec)	8.50
PM10 (gm/sec/stack)	0.25
PM2.5(gm/sec/stack)	0.15
SO_2 (gm/sec/stack)	0.31
NOx (gm/sec/stack)	0.42

Stack Emissions Input Data to the Model

AERMODE model recommended by United States Environmental Protection Agency (USEPA) has been used for predicting the incremental concentrations of PM_{10}, $PM_{2.5}$, SO_2 and NOx from the proposed plant activities. AERMOD is capable of modeling multiple sources in simple and complex terrain.

AERMOD calculates ground level and elevated ambient concentrations or deposition from stack, volume and/ or area sources. The steady-state Gaussian plume equation for a continuous source is used to calculate ground level concentrations for stack.

Input parameters required for AERMOD are given below:

- X and Y co-ordinates for the source,
- Source strength in terms of g/sec for NOx, SO_2 and PM_{10}, $PM_{2.5}$,
- Height of the stack in meters,
- Temperature of the exit gas in degree centigrade,
- Exit velocity of the gas in m/sec,
- Diameter of the stack in meters,
- Meteorological parameters such as hourly data for wind direction, wind speed, mixing height and atmospheric stability class.

The air pollution modeling carried out represents the worst-case operating scenarios. The pollutants considered for modeling include NOx, SO_2 and PM_{10} $PM_{2.5}$.

4.2.1 Meteorological Data

The meteorological data recorded continuously during the months of **March 2024 to May 2024** on hourly basis for temperature, wind speed, wind direction, relative humidity and rainfall near project site. Stability classes computed for the mean hours are based on guidelines issued by CPCB on modeling. Mixing heights representative of the region have been taken from the available published literature. The hourly meteorological data recorded at site is used for the modeling. In absence of site-specific mixing depths, literature published in "Spatial Distribution of hourly Mixing Depths over Indian Region" by Mr. R.N. Gupta has been used.

Model Employed

Prediction of cumulative ground level concentration due to emissions from the proposed project has been computed using EPA approved AERMOD model.

Application of AERMOD for Prediction of Ground Level Concentration

AERMOD Model with the following options has been employed to predict the ground level concentration due to emissions from the proposed project.

- Areas being urban, urban dispersion parameters are considered.
- Predictions have been carried out to estimate concentration values over radial distance of 10 km around the sources.
- Emission rates from the point sources were considered as constant and during

the entire period.

- Consideration of settling velocity of the particles.
- The ground level concentrations computed were as is basis without any consideration of decay coefficient.
- Calm winds recorded during the study period were also taken into consideration.
- 24 hourly mean ground level concentrations were estimated for the winter season using the meteorological data of **March 2024 to May 2024.**

Emission Sources Considered for Simulations

Emissions from the 18 no's 2000 KVA DG sets have been considered for prediction of impacts.

Maximum Ground Level Concentrations:

Ground level concentrations of PM_{10}, $PM_{2.5}$, SO_2 and NOx were estimated using the meteorological data to project the incremental load in baseline concentrations due to emission from emission sources.

The resultants values are compared with National Ambient Air Quality Emission (NAAQE) Standards issued by Ministry vide G.S.R no. 826(E) dated November 16, 2009. **Figure 1, Figure 2, Figure 3 and Figure 4** represents the spatial distribution of the predicted ground level concentrations of PM_{10}, $PM_{2.5}$, SO_2 and NOx due to emissions from the proposed project.

Post Project Scenario

Maximum ground level concentrations are predicted considering 24-hourly meteorological data during **March 2024 to May 2024**, superimposed on the maximum baseline concentrations obtained during the study period to estimate the post project scenario.

The Overall Scenario with predicted concentrations over the maximum baseline concentrations is given in **Table 2.**

Table 2: Overall Scenarios within Study Area

24 Hourly Concentrations	**PM_{10} ($\mu g/m^3$)**	**$PM_{2.5}$ ($\mu g/m^3$)**	**SO_2 ($\mu g/m^3$)**	**NOx ($\mu g/m^3$)**
Baseline Scenario (Max)				
Predicted Ground Level Concentration (Max)	1.43	0.861	1.78	2.41
Overall Scenario				
NAAQ Standards	**100**		**80**	**80**

Figure 1: Ground Level Concentrations of PM_{10}

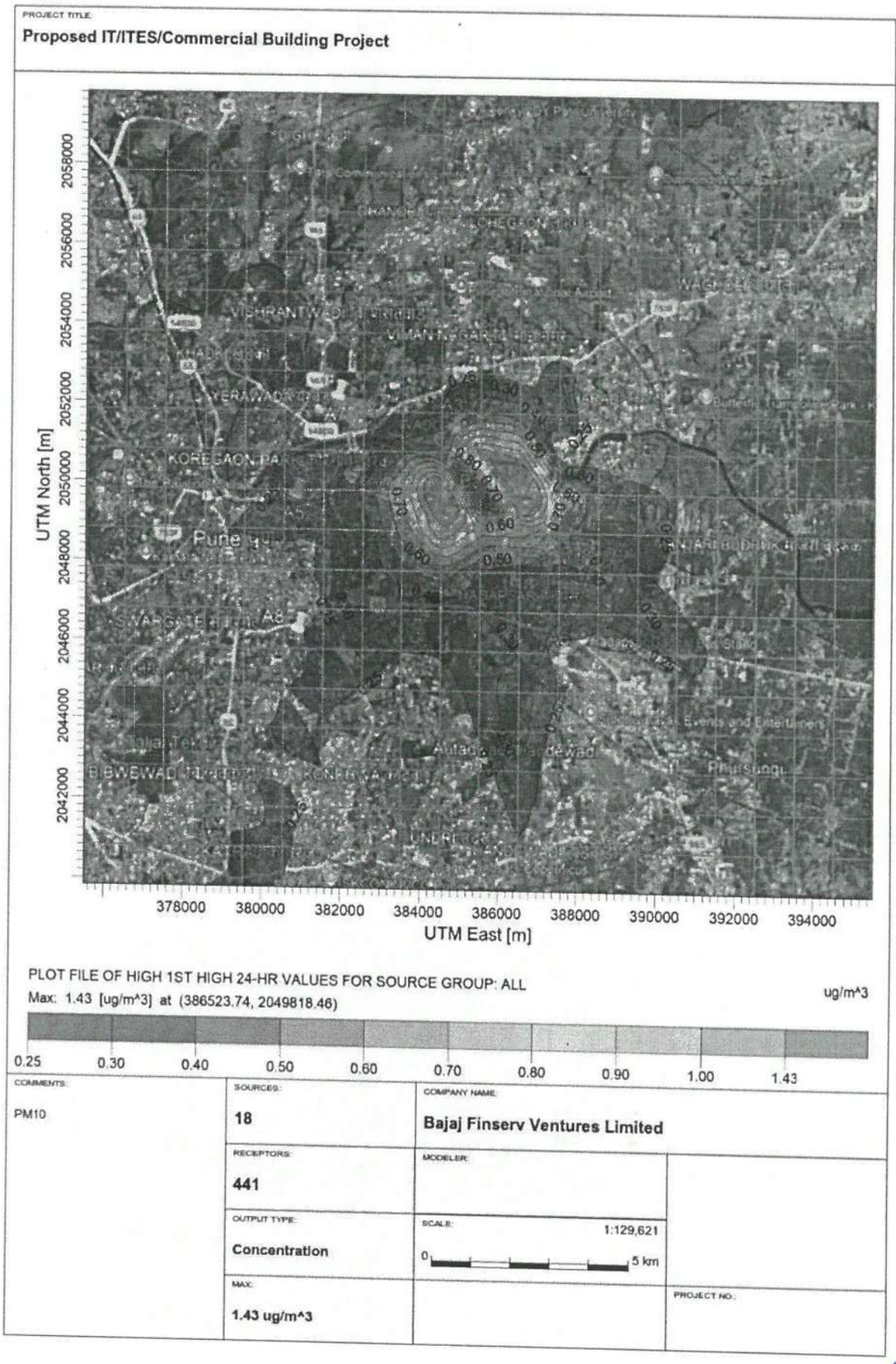


Figure 2: Ground Level Concentrations of $PM_{2.5}$

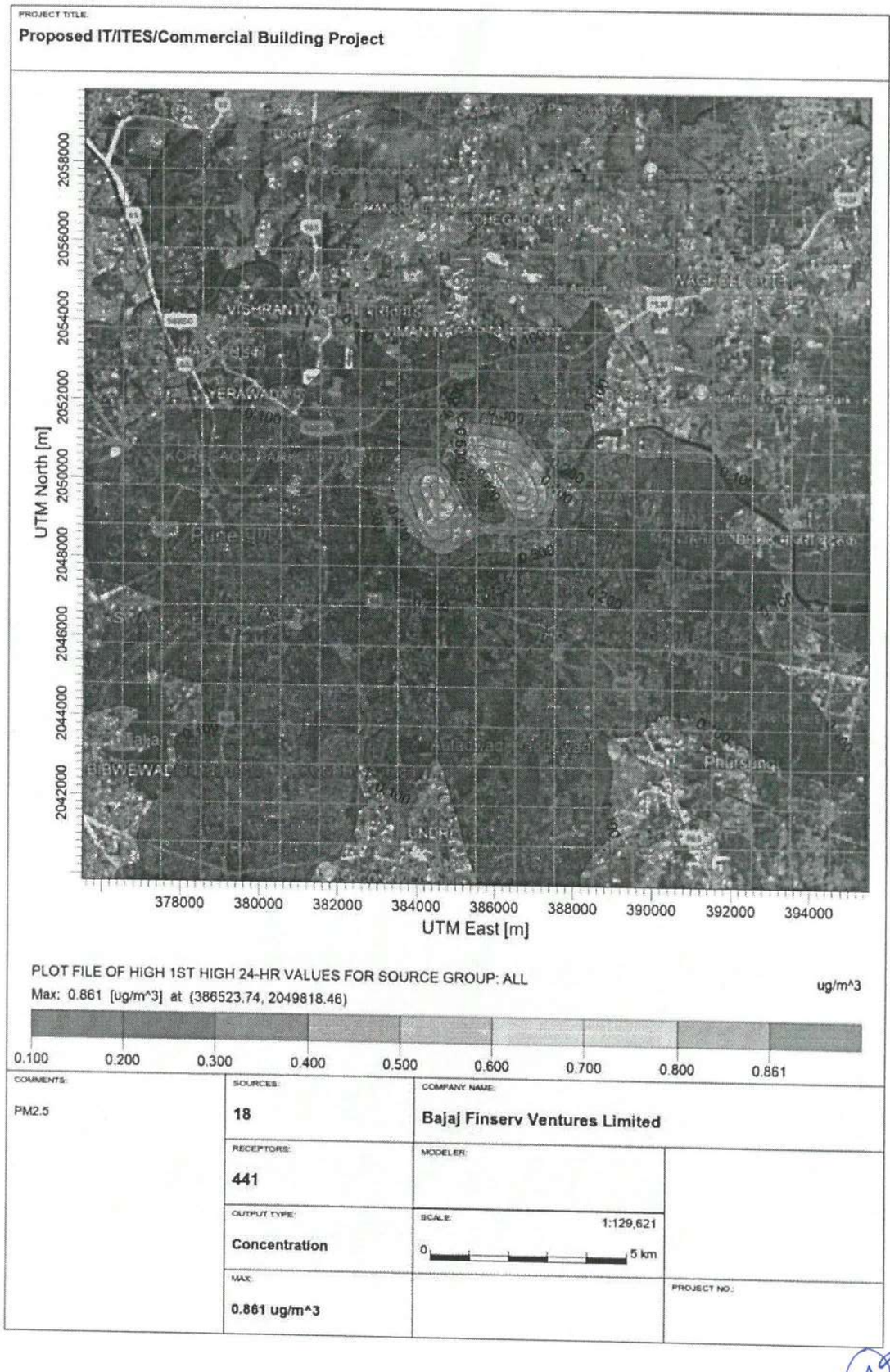


Figure 3: Ground Level Concentrations of SO_2

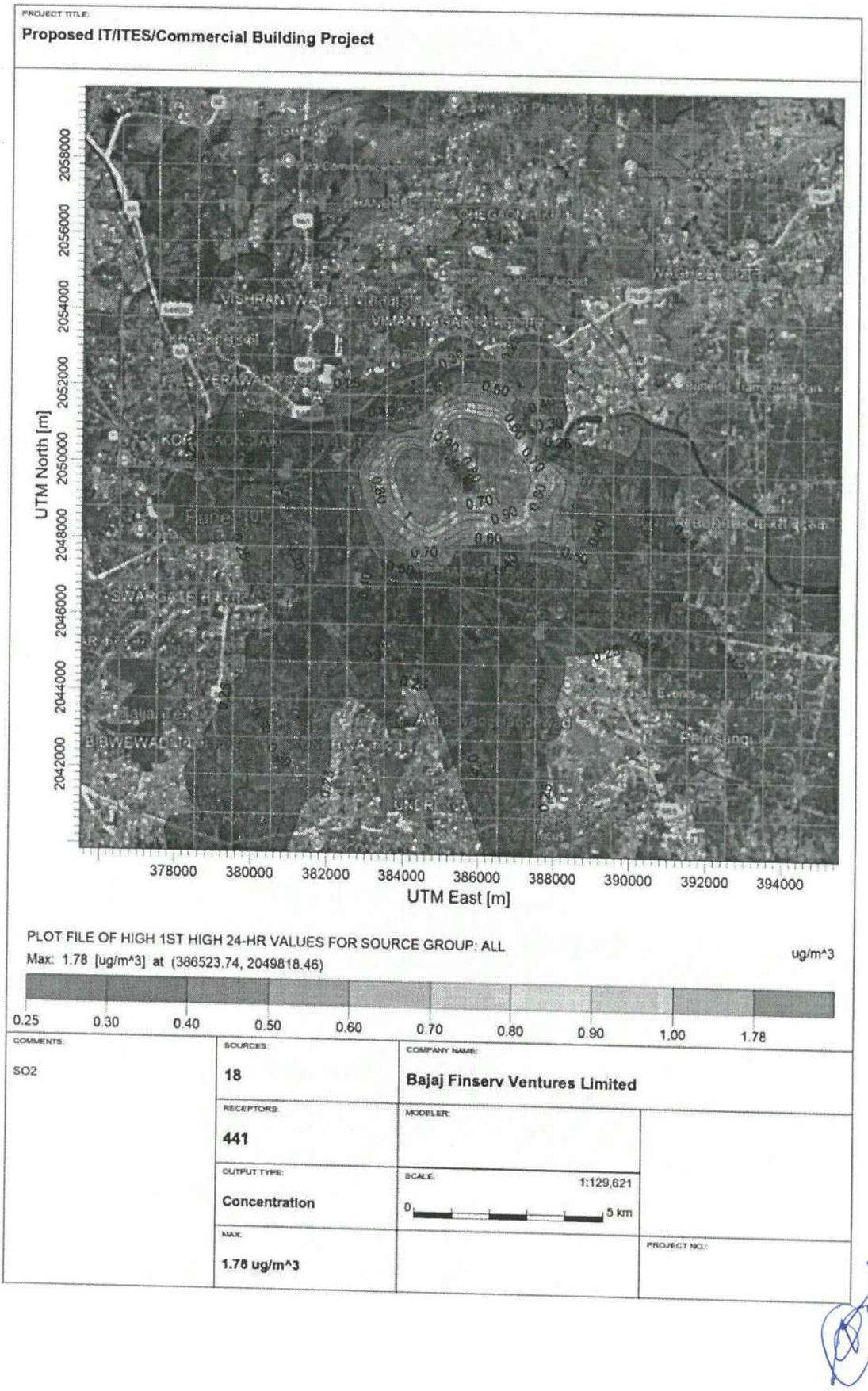
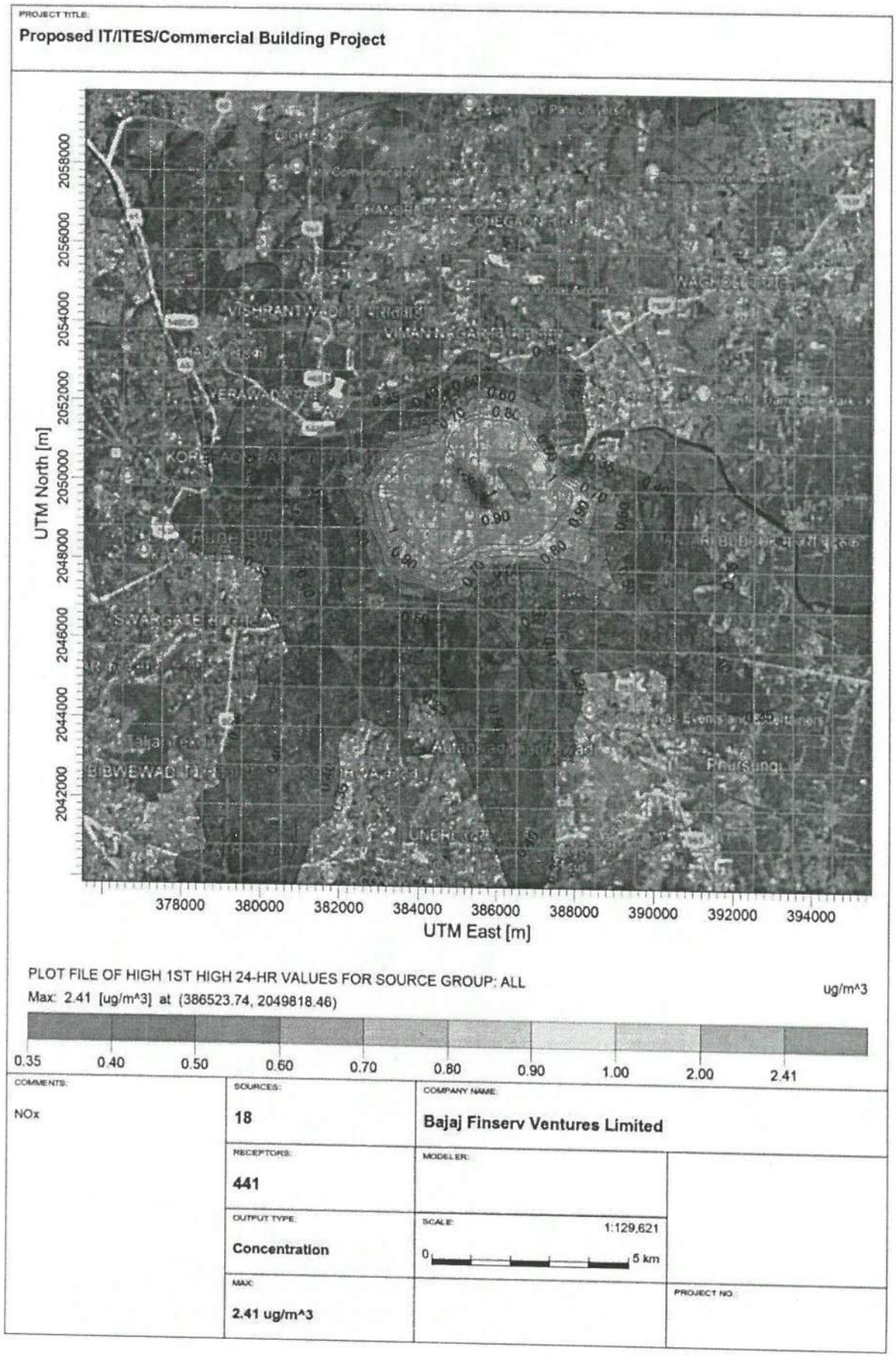


Figure 4: Ground Level Concentrations of NOx



Observations

It is observed from the model output that the incremental concentrations for PM_{10}, SO_2 and NO_X levels, maximum GLCs were observed to be 0.48 km in SW direction. It is noted that after adding the incremental concentrations to maximum baseline values also, the ambient levels will be within the specified limits.

Hence, it can be concluded that there will be an increase in GLCs levels, but not crossing the CPCB Specified limits.

Mitigation Measures

i. Stack height would be 130-m for gaseous emission confirming to the CPCB norms.
ii. DG sets will be used during failure of electricity.
iii. Ambient air quality and stack emission would be regularly monitored.
iv. In order to avoid fugitive emissions from different sources, water will be sprayed. Also, the roads within the premises will be concreted.
v. Green belt around the periphery and within premises will be developed which will help in attenuating the pollutants.

ANNEXURE – 4

Traffic Impact Assessment report

350

SINCRONO
SOLUTIONS PVT LTD

TRAFFIC IMPACT STUDY

Proposed IT/ITES/Commercial Project

At

at S. No. 84, Mundhwa, Taluka-Haveli,

Pune

Final Report

February 2025

Prepared By:

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A Traffic Impact Study of

Proposed IT/ITES/Commercial Project At at S. No. 84, Mundhwa, Tal. Haveli,

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Pune, Maharashtra

Prepared for:

M/S Bajaj Finserv Ventures Ltd & Others.

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February 2025

Disclaimer

The information provided in this Traffic Impact Study Report has been prepared by Sincrono Solutions Private Limited (Traffic & Transportation Engineering Services) based on information collected from primary and secondary sources in Year 2024. The traffic impact is prepared based upon collected traffic data and projections made for subject development and growth for future years. Wherever information was not readily available, reasonable assumptions have been made, to draw meaningful inferences and have been mentioned in the respective sections of the report. Hence, actual conditions on site may vary in future years depending upon time of year, status of surrounding plots developments, impact of transit development, etc. All such assumptions are subject to further corroboration based on the availability of information. This report has been prepared by Sincrono Solutions Pvt. Ltd. for its client, for its use for furthering the project for respective authority approval.

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TABLE OF CONTENTS

1. INTRODUCTION 1
   - A) TRAFFIC STUDY SUMMARY 1
   - B) PROJECT BACKGROUND 1
   - C) PURPOSE OF REPORT AND STUDY OBJECTIVE 3
   - D) METHODOLOGY 3
   - E) TRANSPORTATION TERMINOLOGY 4
   - F) CODES AND MANUALS 6
   - G) EXISTING ROAD NETWORK AND CONNECTIVITY 7
   - H) PROPOSED LAND USES STATEMENT 9
   - I) PROPOSED PARKING STATEMENT 9
2. 2024 EXISITNG TRAFFIC CONDITIONS 10
   - A) TRAFFIC SURVEY 10
   - B) CAPACITY ANALYSIS 31
3. FUTURE BASE TRAFFIC CONDITIONS (WITHOUT PROPOSED SITE) 33
   - A) DEVELOPMENT PLAN ROAD IMPROVEMENTS: 33
   - B) TRAFFIC VOLUME PROJECTION 35
   - C) CAPACITY ANALYSIS 35
4. FUTURE TOTAL TRAFFIC CONDITIONS (WITH PROPOSED SITE) 38
   - A) SITE ACCESS AND BASE CIRCULATION 38
   - B) TRIP GENERATION AND MODAL SPLIT 40
   - C) TRIP DISTRIBUTION 42
   - D) TOTAL TRAFFIC VOLUME PROJECTION WITH SITE 43
   - E) CAPACITY ANALYSIS AND SITE IMPACT 43
5. SWEPT PATH ANALYSIS 49
   - A) OBJECTIVES 49
   - B) DESIGN VEHICLE 49
   - C) SWEPT PATH 50
6. RETRIEVAL ANALYSIS 52
   - A) TYPICAL FLOOR CIRCULATION 53
   - B) BASIC SPECIFICATIONS AND ASSUMPTIONS 53
   - C) RETRIEVAL PLAN 54
   - D) RETRIEVAL TIME 61
   - E) PENDULUM ANALYSIS 63
7. TRAFFIC MANAGEMENT PLAN (TMP) 64
   - A) INTERNAL ROADS/ LAYOUT TMP 64
   - B) EXTERNAL ROADS 66
8. CONCLUSION AND RECOMMENDATIONS 71
   - A) SITE TRAFFIC 71

B) CAPACITY ANALYSIS 71
C) SWEPT PATH ANALYSIS 71
D) RETRIEVAL ANALYSIS 72
E) SUGGESTED IMPROVEMENTS 72
F) ACCESS ROAD - TRAFFIC CONTROL, CIRCULATION AND SAFETY 72

LIST OF FIGURES

FIGURE 1-1 : SITE LAYOUT PLAN 2
FIGURE 1-2 : FOUR-STAGE TRANSPORTATION MODEL 4
FIGURE 1-3 : SITE LOCATION MAP` 8
FIGURE 2-1 : STUDY AREA ROAD NETWORK AND TRAFFIC SURVEY LOCATIONS 11
FIGURE 2-2 : TYPICAL ROAD SECTION – N MAIN ROAD 12
FIGURE 2-3 : MODAL SPLIT – N MAIN ROAD (2024) 13
FIGURE 2-4 : 12 HR TRAFFIC PATTERN –N MAIN ROAD (2024) 13
FIGURE 2-5 :TYPICAL ROAD SECTION – GHORPADI ROAD 15
FIGURE 2-6 : MODAL SPLIT – GHORPADI ROAD (2024) 16
FIGURE 2-7 : 12 HR TRAFFIC PATTERN – GHORPADI ROAD (2024) 16
FIGURE 2-8 : TYPICAL ROAD SECTION – EAST AVENUE ROAD 18
FIGURE 2-9 : MODAL SPLIT - EAST AVENUE ROAD (2024) 19
FIGURE 2-10 : 12 HR TRAFFIC PATTERN – EAST AVENUE ROAD (2024) 20
FIGURE 2-11 : TYPICAL ROAD SECTION – MAGARPATTA ROAD 22
FIGURE 2-12 : MODAL SPLIT –MAGARPATTA ROAD (2024) 23
FIGURE 2-13 : 12 HR TRAFFIC PATTERN – MAGARPATTA ROAD (2024) 23
FIGURE 2-14 : TYPICAL ROAD SECTIONS – SAMRAT ASHOK ROAD 26
FIGURE 2-15 : MODAL SPLIT – SAMRAT ASHOK ROAD (2024) 26
FIGURE 2-16 : 12 HR TRAFFIC PATTERN –SAMRAT ASHOK ROAD (2024) 27
FIGURE 3-1 DEVELOPMENT PLAN 33
FIGURE 4-1 : PROPOSED SITE ACCESS AND CIRCULATION 39
FIGURE 4-2 : TRIP DISTRIBUTION 43
FIGURE 5-1 : FIRE TENDER DIMENSIONS 50
FIGURE 6-1 : RETRIEVAL PLAN – GROUND FLOOR 56
FIGURE 6-2 : RETRIEVAL PLAN – BASEMENT 1 57
FIGURE 6-3 : RETRIEVAL PLAN – BASEMENT 2 57
FIGURE 6-4 : RETRIEVAL PLAN – BASEMENT 3 58
FIGURE 6-5 : RETRIEVAL PLAN – BASEMENT 4 58
FIGURE 6-6 : RETRIEVAL PLAN – BASEMENT 5 59
FIGURE 6-7 : RETRIEVAL PLAN – 1ST FLOOR 59
FIGURE 6-8 : RETRIEVAL PLAN – 2ND FLOOR 60
FIGURE 6-9 : RETRIEVAL PLAN – 3RD FLOOR 60

FIGURE 7-1 : TYPICAL TRAFFIC CALMING AND CROSSWALK DETAILS 67

LIST OF TABLES

TABLE 1-1 : PCU FACTORS 5
TABLE 1-2 : LEVEL OF SERVICE AND V/C RATIO 6
TABLE 1-3 : PROPOSED LAND USE STATEMENT 9
TABLE 1-4 : PROPOSED PARKING STATEMENT 9
TABLE 2-1 : 12 HR CLASSIFIED TRAFFIC VOLUME – N MAIN ROAD (2024) 14
TABLE 2-2 : 12 HR CLASSIFIED TRAFFIC VOLUME – GHORPADI ROAD (2024) 17
TABLE 2-3 : 12 HR CLASSIFIED TRAFFIC VOLUME – EAST AVENUE ROAD (2024) 21
TABLE 2-4 : 12 HR CLASSIFIED TRAFFIC VOLUME – MAGARPATTA ROAD (2024) 24
TABLE 2-5 : 12 HR CLASSIFIED TRAFFIC VOLUME – SAMRAT ASHOK ROAD (2024) 28
TABLE 2-6 : OBSERVED TRAFFIC PEAK HOUR 29
TABLE 2-7 : ROAD CATEGORIES AND CAPACITY (EXISTING) 30
TABLE 2-8 : EXISTING TRAFFIC VOLUME AND LOS 32
TABLE 3-1 : ROAD CATEGORIES AND CAPACITY (FUTURE YEARS) 34
TABLE 3-2 : 2029 BASE YEAR TRAFFIC CONDITIONS AND LOS 36
TABLE 3-3 : 2034 BASE YEAR TRAFFIC CONDITIONS AND LOS 37
TABLE 4-1 : PROPOSED DEVELOPMENT – TRIP GENERATION (COMMERCIAL) 41
TABLE 4-2 : PROPOSED DEVELOPMENT – TRIP GENERATION (TOTAL) 41
TABLE 4-3 : FUTURE YEAR - TOTAL TRAFFIC, SITE IMPACT AND LOS (AM PEAK HOURS) 46
TABLE 4-4 : FUTURE YEAR - TOTAL TRAFFIC, SITE IMPACT AND LOS (PM PEAK HOURS) 47
TABLE 4-5 : LEVEL OF SERVICE (LOS) COMPARISON 48
TABLE 6-1 : RETRIEVAL ANALYSIS ASSUMPTIONS 53
TABLE 6-2 : PARKING STATEMENT – 100% OCCUPANCY 54
TABLE 6-3 : RETRIEVAL PLAN - TIME CALCULATIONS 62
TABLE 6-4 : RETRIEVAL PLAN – PENDULUM ANALYSIS 63

ABBREVIATIONS

DP	Development Plan
INDO-HCM	Indian Highway Capacity Manual
IRC	Indian Road Congress
ITE	Institute of Transportation Engineers
LOS	Level of Service
MCGM	Municipal Corporation of Greater Pune
MoUD GOI	Ministry of Urban Development Government of India
PCU	Passenger Car Unit
TIA	Traffic Impact Analysis
TMP	Traffic Management Plan
URDPFI	Urban and Regional Development Plans Formulation and Implementation

1. INTRODUCTION

a) Traffic Study Summary

The proposed Commercial Project in Mundhwa is being developed by M/S Bajaj Finserv Ventures Ltd & Others. A detailed Traffic Impact Study has been carried out for the subject development with intended land uses (IT/ITES/Commercial and Office Building) for future year conditions. Below is the summary of the subject plot and findings of the Traffic Study.

Plot Location	Village- Mundhwa, Pune
Proposed Land Uses	Commercial/IT/ITES (Office Building)
Proposed Parking	5 Basement+ 3 Parking Floor
Parking Summary	Total Parking – Cars = 4951 nos. 2W = 14808 nos.
Plot Entry/ Exit	1 Entry/Exit for 2W, 1 Entry/Exit for VIP and 1 Exits for 4-wheelers has provided along 30M Wide DP Road, 1 Entry/Exit for 2-Wheeler has provided along N Main Road, 2 Entry, 1 Exit and 2 Rejection gates for 4 wheelers have been Provided along Riverdale Road.
Study Area Roads	• Road Link 1: N Main Road • Road Link 2: Ghorpadi Road • Road Link 3: East Avenue Road • Road Link 4: Magarpatta Road • Road Link 5: Samrat Ashok Road
Nearby Public Transit Stations	1. Kalyani Nagar Metro Station at ~2 KM 2. Hadapsar Railway Station at ~1.6 KM
Existing Traffic Data	**Classified Traffic Data** (Car, 2W, AR, Bus, Minibus, LCV, HCV, MAV, Bicycle and Slow-Moving Vehicles) Collected in May 2024
Traffic Forecast	3%-5% Traffic Growth for +5 and +10 Years for Vicinity Roads
Site-Generated Traffic	Methodology based upon Population and Persons Trips, Referred ITE Manual and Indian Cities survey data. Modal Split as Commercial: 2W@45%, AR@15%, Shuttle Bus@10%, Cars@25% and Walk@10%.
Road Capacity Analysis Methodology	Based upon latest **Indian Highway Capacity Manual (Indo-HCM)**, CSIR-CRRI, December 2017

Road Capacity Analysis for PEAK HOUR		**Existing Yr 2024**	**Future Yr 2029**	**Future Yr 2034**
	N Main Road	E	C	D
	Ghorpadi Road	B	B	B
	East Avenue Road	B	C	C
	Magarpatta Road	B	C	C
	Samrat Ashok Road	C	C	D
	Riverdale Road	-	B	C
	Proposed 30M DP Road	-	B	B
Retrieval Analysis	Proposed Building (Commercial) Retrieval Time – 36 Mins for 100% Occupancy.			

b) Project Background

The proposed Commercial IT/ITES office building by M/S Bajaj Finserv Ventures Ltd **& Others** is located in Mundhwa, Pune. The subject development plot is identified as S. No. 84, Mundhwa, Taluka-Haveli, Pune in the state of Maharashtra. Access to the subject development is proposed via the existing road-

i. N Main Road (Existing-20M wide) located on the South side.

ii. Riverdale Road (Existing -10M wide) is located on the West side. This access road connects to N Main Road.

iii. Proposed D.P. Road (Proposed -30M wide) located on the North side.

For traffic analysis purposes, traffic data has been collected on study area roads in May 2024. Accordingly, the existing year is considered at Year 2024 for traffic analysis purposes. Full build-out and occupancy of the subject development is assumed for the Year 2029 (+5 Year Scenario). This traffic study report has depicted the site under reference as a "Proposed Development". This proposed development would generate new vehicular traffic, which would have an impact on the traffic conditions in the nearby roadway network and at the access points. Hence, there is a need to address the traffic impacts of the proposed project with respect to vehicular traffic for accessibility and circulation. **Figure 1-1** is provided below to show the layout plan of the subject development.

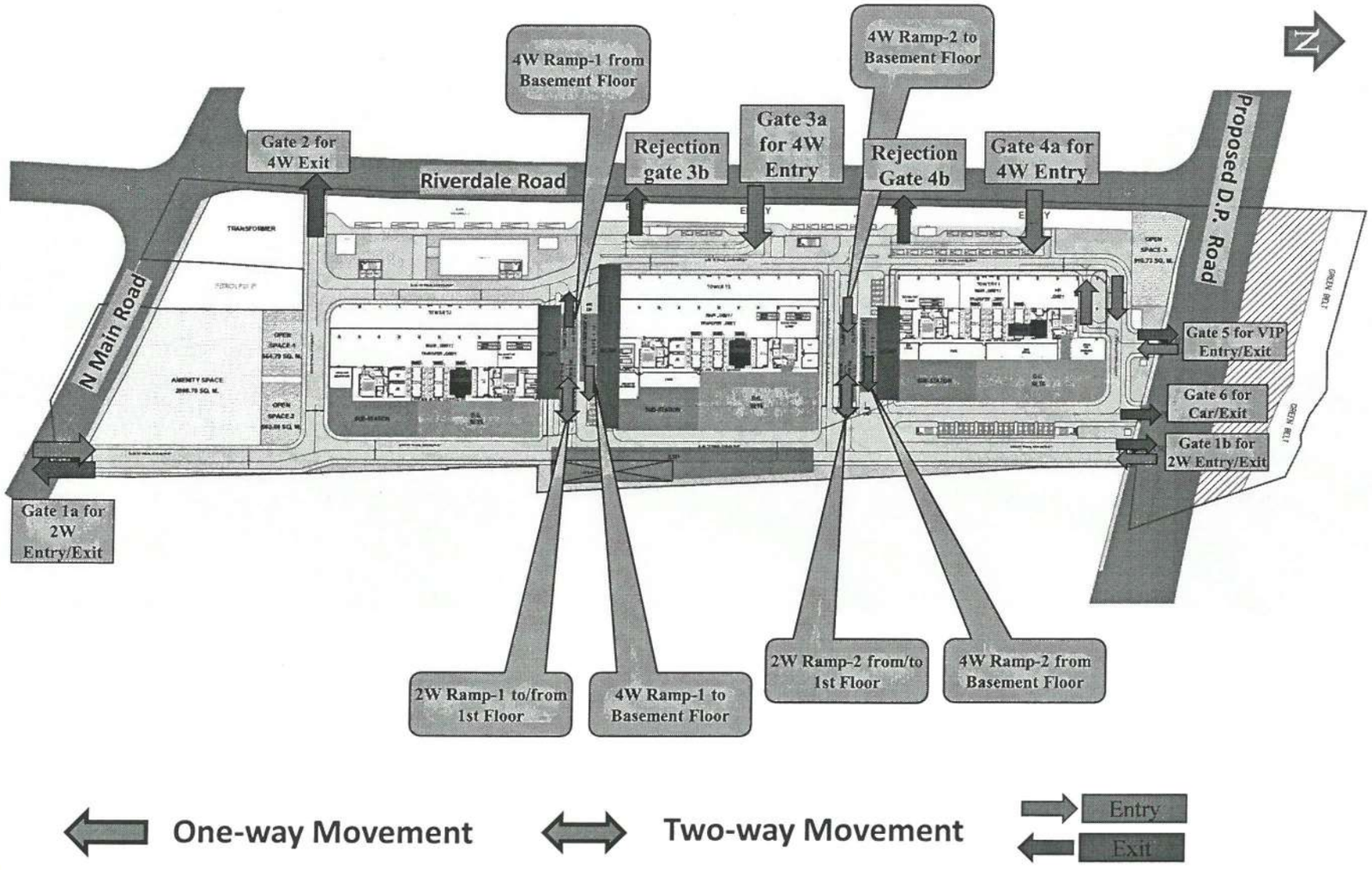


Figure 1-1 : Site Layout Plan

c) Purpose of Report and Study Objective

Sincrono Solutions Pvt Ltd has been appointed by the project proponent, M/S Bajaj Finserv Ventures Ltd & Others, to provide a Traffic Impact Analysis (TIA) for the proposed development project located in Mundhwa, Pune. The purpose of this TIA is to study the traffic aspect of the project and gauge its impact it will have on the existing major roadways in the vicinity and traffic conditions in future years. It looks to understand the vehicular contributions the project will have to the existing roadways and its capacity analysis. This traffic study analyzes the following scenarios for traffic impact analysis:

- 2024 Existing Year Conditions
- Base Traffic Conditions (**without** proposed site) for
  Future Year 2029 (+5 Year Scenario)
  Future Year 2034 (+10 Year Scenario)
- Total Traffic Conditions (**with** proposed site) for
  Future Year 2029 (+5 Year Scenario)
  Future Year 2034 (+10 Year Scenario)

d) Methodology

Transportation modeling is the process of analyzing the pattern in which a zone's transport network would be used by traffic based upon distribution and characteristics of the zone's population, employment, and other land uses. The output of the traffic study will be the number forecast of vehicles using each road segment within the study area network. Traffic forecast is best achieved by transportation modeling. Conventional transportation modeling is a four-stage process and the same is utilized for this project. **Figure 1-2** is provided to give an overview about a four-stage transportation model.

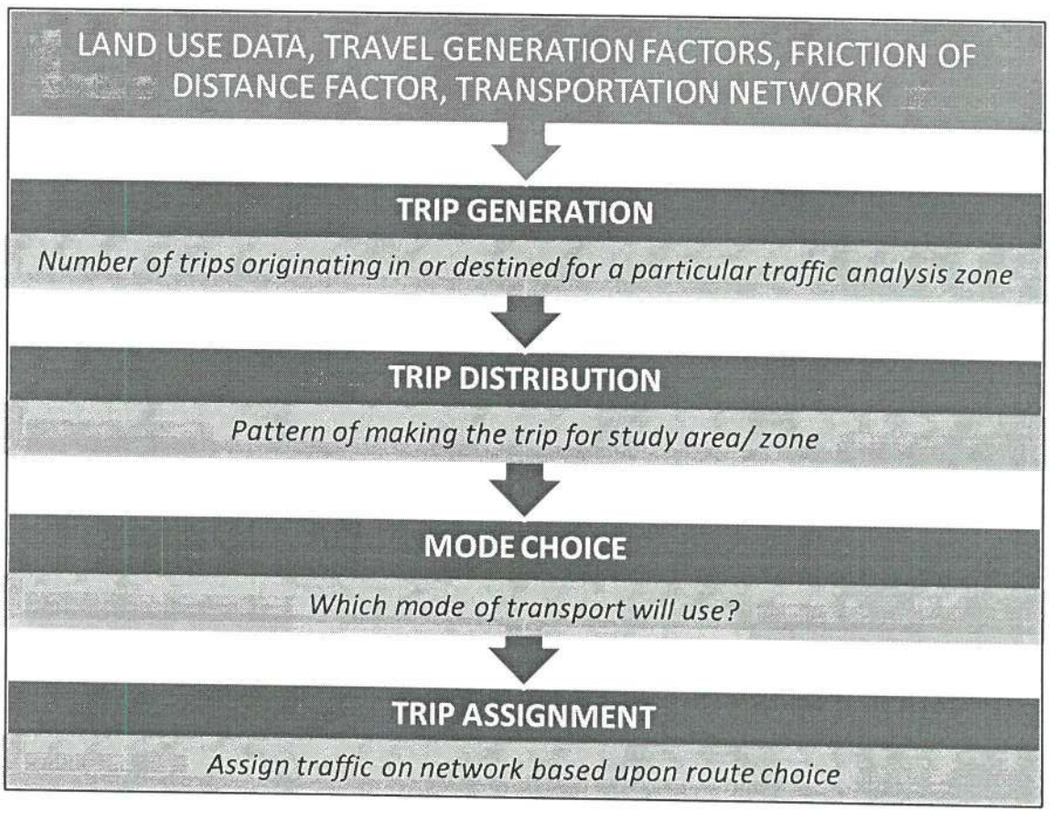


Figure 1-2 : Four-Stage Transportation Model

e) Transportation Terminology

This section describes some general transportation related terms which have been used in this traffic impact analysis report.

Passenger Car Units (PCU): Based upon traffic survey it is observed that traffic in the vicinity has different types of vehicle modes/ classes (Cars, Two-Wheeler, Three Wheelers, Taxi, Buses, Light Commercial Vehicles, Trucks, etc.). The traffic on any road is characterized as mixed traffic conditions, resulting in complex interaction between different types of vehicles. IRC recommends conversion of different types of traffic into a common unit called Passenger Car Units (PCU) or Passenger Car Equivalents (PCE). For this traffic impact analysis, Passenger Car Units (PCU) of different types of vehicles are utilized to convert a mixed traffic stream into a homogeneous equivalent and thereby expressed the mixed traffic flow in terms of equivalent number of passenger cars. The passenger car is considered as the base unit, and every other mode is expressed in a multiple of a passenger car unit. This traffic analysis has referred "Indian Highway Capacity Manual (Indo-HCM), December 2017" to derive PCU factors to use in the traffic study.

Table 1-1 : PCU FACTORS

Vehicle Type	Equivalent PCU Factors			
	2-Lane Road	4-Lane Road	6-Lane Road	8-Lane Road
Passenger Car / Taxi / Jeep	1.0	1.0	1.0	1.0
Two Wheelers	0.20	0.20	0.21	0.24
3-Wheeler	0.73	0.80	0.83	0.96
Buses	3.72	4.58	4.60	4.60
Minibuses	2.24	2.29	2.29	2.61
Light Commercial Vehicle	1.88	2.28	2.30	2.38
Heavy Commercial Vehicle	3.70	3.8	3.90	3.90
Multi Axle Vehicle	5.9	5.1	5.90	5.90
Bicycle	0.39	0.39	0.46	0.46
Other Slow-Moving Vehicles	3.0	3.0	3.0	3.0

Level of Service (LOS): Performance of a study area roadway is generally measured in terms of its level of service. Accordingly, this TIA has analyzed the study area roadway for its capacity and results LOS. According to Indian Road Congress (IRC) practice, Level of Service of a roadway or junction is generally indicated as LOS "A" to "F" as described below.

Level of Service A: Represents conditions of free flow with average travel speed usually about 90 percent of the free flow speed. The general level of comfort and convenience provided to the road users is excellent.

Level of Service B: Represents a zone of stable flow, with the drivers still having reasonable freedom to select their desired speed and maneuver within traffic steam. Average travel speed is usually about 70 percent of the free flow speed.

Level of Service C: This also represents a zone of stable flow but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interaction with others in the traffic stream. Average travel speed is usually about 50 percent of the free flow speed.

Level of Service D: Represents the limit of stable flow, with conditions approaching close to unstable flow. Due to high density, drivers are severely restricted in their freedom to select

desired speed and maneuver within the traffic stream. Average travel speed is usually about 40 percent of the free flow speed.

Level of Service E: Represents operating conditions when traffic volumes are at or close to the capacity level. The speeds are reduced to low, but relatively uniform values, average value being one-third the free flow speed. Freedom to maneuver within the traffic stream is extremely difficult and is generally accomplished by forcing a vehicle to give way to accommodate such maneuvers.

Level of Service F: Represents zone of forced or breakdown flow. This condition occurs when the amount of traffic approaching a point exceeds the amount which can pass it. Average travel speeds are between 25 percent and 33 percent of the free flow speed.

Table 1-2 below shows the Level of Service (LOS) based upon Volume to Capacity (V/C) ratio of the road.

Table 1-2 : Level of Service and V/C Ratio

Level of Service (LOS)	Volume/Capacity Ratio	
	2-Lane Undivided Road	Multilane Divided Road
A	0.0 to 0.35	0.0 to 0.15
B	0.36 to 0.55	0.16to 0.45
C	0.56 to 0.70	0.46 to 0.75
D	0.71 to 0.85	0.76 to 0.85
E	0.86 to 1.0	0.86 to 1.0
F	> 1.0	> 1.0

f) Codes and Manuals

Following codes and manuals are referred for design guidelines in this traffic impact analysis,

- ✓ Indian Highway Capacity Manual (**Indo-HCM),** December 2017, CSIR – Central Road Research Institute, New Delhi.
- ✓ Urban and Regional Development Plans Formulation and Implementation (**URDPFI**) Guidelines, Volume 1, January 2015, MoUD, GOI.
- ✓ Code of Practice (Part 1) Cross Section, Institute of Urban Transport (IUT), MoUD, GOI.
- ✓ IRC:86-2018 (Geometric Design Standards for Urban Roads and Streets)
- ✓ Trip Generation and Parking Generation handbooks by Institute of Transportation Engineers (**ITE**).
- ✓ Design codes by Indian Roads Congress (**IRC**)

g) Existing Road Network and Connectivity

As mentioned earlier, Mundhwa is a major Residential and Commercial zone in Pune. In recent years, there are several low-ranges, mid-ranges and premium Commercial projects that are under construction, planned or being planned in the area by leading developers. N Main Road, Riverdale Road and Proposed DP Road provides access to the plot. This road will serve the residents/ building users of the existing and proposed developments along it in the vicinity. Additionally, roads within a 3 km radius have been taken into consideration. Hadapsar Railway station is approximately 1.6 KM from the proposed Site Vicinity by vehicles.

Figure 1-3 is provided to illustrate the location of the proposed development with respect to the surrounding roadway network. For successful completion of this traffic study Sincrono has identified and analyzed the following roadways which are in the immediate vicinity of the site and will serve as major access points.

Roads in the Vicinity of Subject Site:

- Road Link 1: N Main Road (East-West Direction)
- Road Link 2: Ghorpadi Road (East-West Direction)
- Road Link 3: East Avenue Road (North-South Direction)
- Road Link 4: Magarpatta Road (North-South Direction)
- Road Link 5: Samrat Ashok Road (East-West Direction)

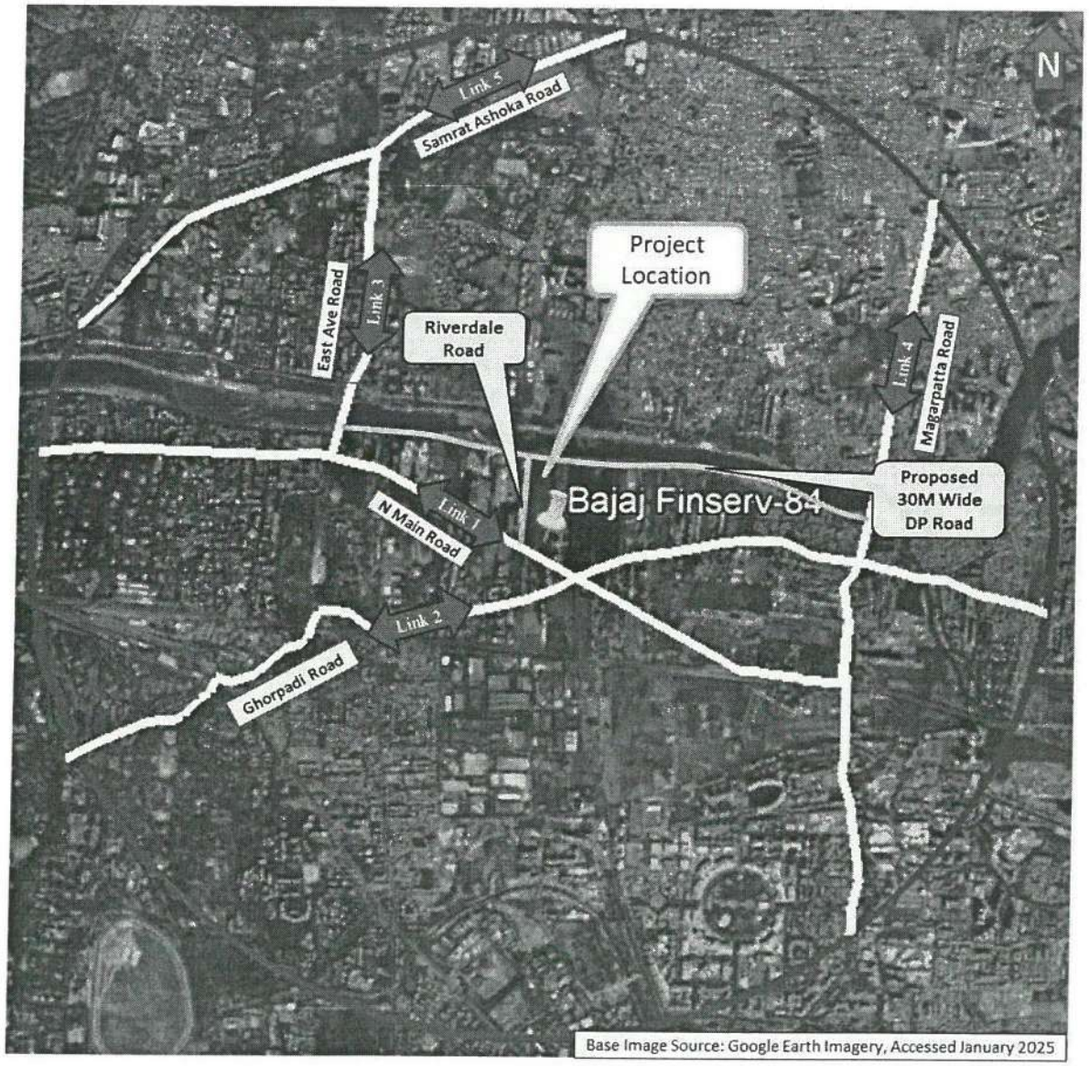


Figure 1-3 : Site Location Map

364

h) Proposed Land Uses Statement

As per information provided by project proponent, Sincrono has considered the following proposed land uses and expected population for the subject traffic study:

Table 1-3 : PROPOSED LAND USE STATEMENT

Sr. No.	Land Use/ Building/ Tower	Land Use	Area (SQ.M)	Total Population
1	**Proposed Devlopment**	Commercial	6,14,387.19	**47,015**

The values shown in the above table are utilized for traffic analysis purposes to check the traffic impact of the proposed site. ***Please refer the Architectural drawings for exact built-up and carpet area for commercial units of the subject development.***

i) Proposed Parking Statement

As per architectural plan, parking for the subject development is provided on the 5 Basements and 3 Parking Floors. 2 Entry/Exit for 2W, 1 Entry/Exit for VIP, 2 Entry 2 Exit and 2 Rejection gates for 4 wheelers are provided for the proposed development. All proposed parking spaces for the project are planned within the subject plot boundary. No on-street parking is proposed. The floor-wise breakup of parking of proposed development is provided below in **Table 1-4**.

Table 1-4 : Proposed Parking Statement

Parking Floor	4W	2W
Third Floor	-	4936
Second Floor	-	4936
First Floor	-	4936
Ground Floor	-	-
Basement 1	990	-
Basement 2	990	-
Basement 3	990	-
Basement 4	990	-
Basement 5	991	-
Total	4951	14808

2. 2024 EXISITNG TRAFFIC CONDITIONS

a) Traffic Survey

To assess the existing traffic pattern in the immediate vicinity of the site, an area within a 3 km radius was considered as the zone of immediate impact for the project. Although site traffic movement would happen beyond the radius of 3 Km study area, the traffic impacts on these larger distances from the project site would be minimum. Sincrono has collected traffic data on major roadways surrounding the site. Sincrono has conducted Weekday Classified Traffic Volume (CTV) counts in May 2024 at the following roadways in immediate vicinity of the site.

Road Link	Road Details	Count Type	Count Method	Day	Time of Day
1.	N Main Road	Mid-Block	Manual	Typical Weekday	8.00 AM. To 8.00 PM.
2.	Ghorpadi Road	Mid-Block	Manual	Typical Weekday	8.00 AM. To 8.00 PM.
3.	East Avenue Road	Mid-Block	Manual	Typical Weekday	8.00 AM. To 8.00 PM.
4.	Magarpatta Road	Mid-Block	Manual	Typical Weekday	8.00 AM. To 8.00 PM.
5.	Samrat Ashok Road	Mid-Block	Manual	Typical Weekday	8.00 AM. To 8.00 PM.

Study area roadway and traffic survey locations as mentioned above are also shown in the **Figure 2-1.**

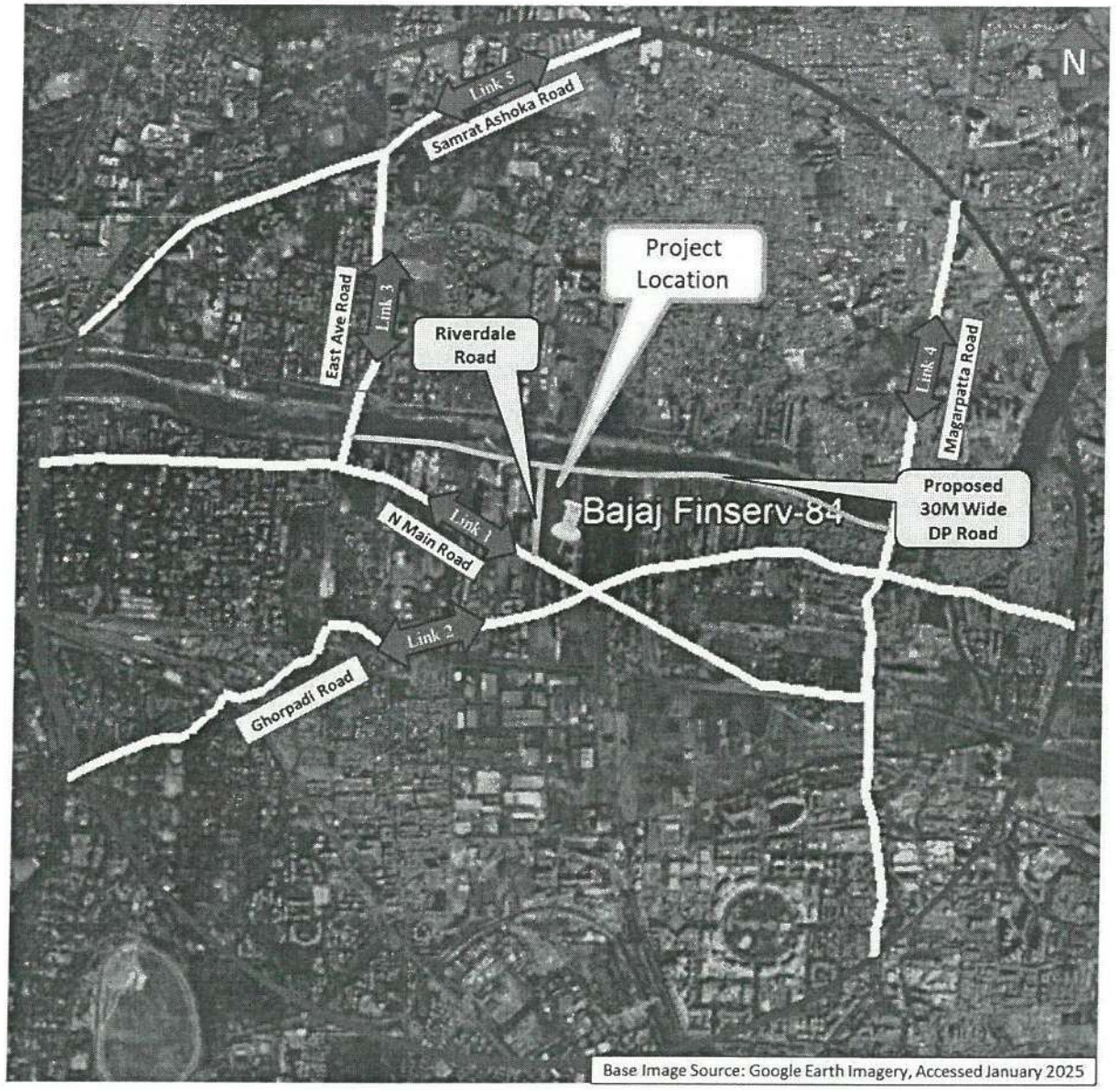


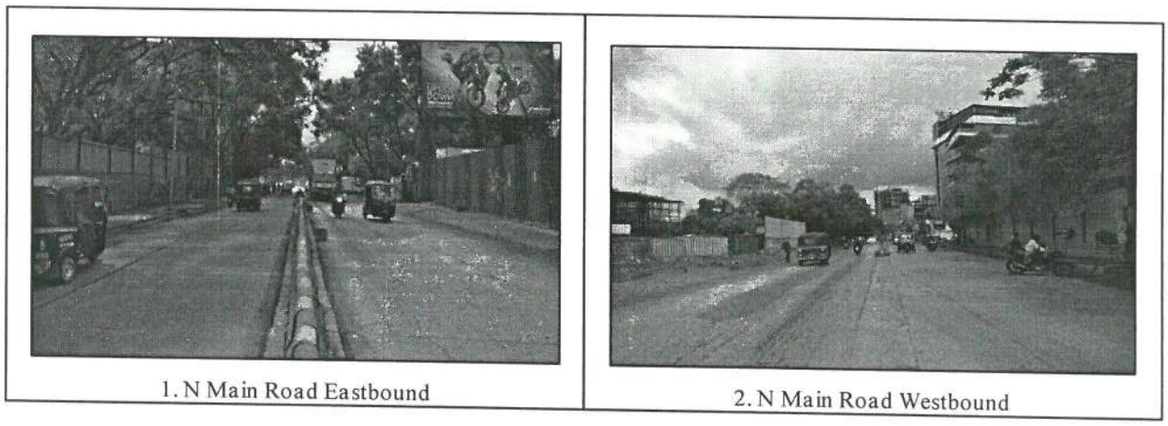
Figure 2-1 : Study Area Road Network and Traffic Survey Locations

Note that the traffic data has been collected for a 12-hour period on a weekday to identify peak hour. The following section will give details about observations made during traffic survey and traffic pattern on the study are roadway network.

i. **Road Link 1 – N Main Road:**

Functional Use and Connectivity: It is an East-West oriented Sub-Arterial Road. It runs for approximately 3.5KM in length with its end-to-end connections. This road connects to Ghorpadi Road towards the East Side and Amrutlal Mehta Road to its West.

Observations for Road Section and Features: As per traffic survey, an average total roadway width of 20M is observed for this road. Footpaths are observed along both sides of the road. Following **Figure 2-2** is shown to illustrate the typical observed road section near site vicinity.



1. N Main Road Eastbound

2. N Main Road Westbound

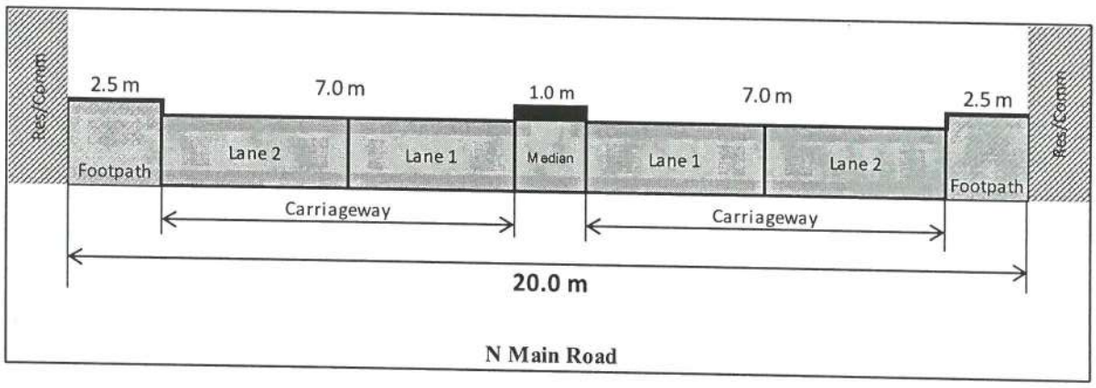


Figure 2-2 : Typical Road Section – N Main Road

Traffic Conditions: For N Main Road, **Figure 2-3** and **Figure 2-4** are provided to show the existing modal split and traffic pattern, respectively, observed for 12-hour period on a weekday in the vicinity of the site. Existing traffic data shows the 2-Wheelers are predominant in the traffic mix contributing around 48% of traffic stream, respectively. Next major road users are Cars contributing around 37% of traffic stream. Morning peak hour traffic is observed during

09:00 am to 10:00 am and evening peak hour traffic observed during 07:00 pm to 08:00 pm. Note that analysis has used morning and evening peak for analysis during which period the proposed land uses (commercial) will generate most of the trips during a typical weekday.

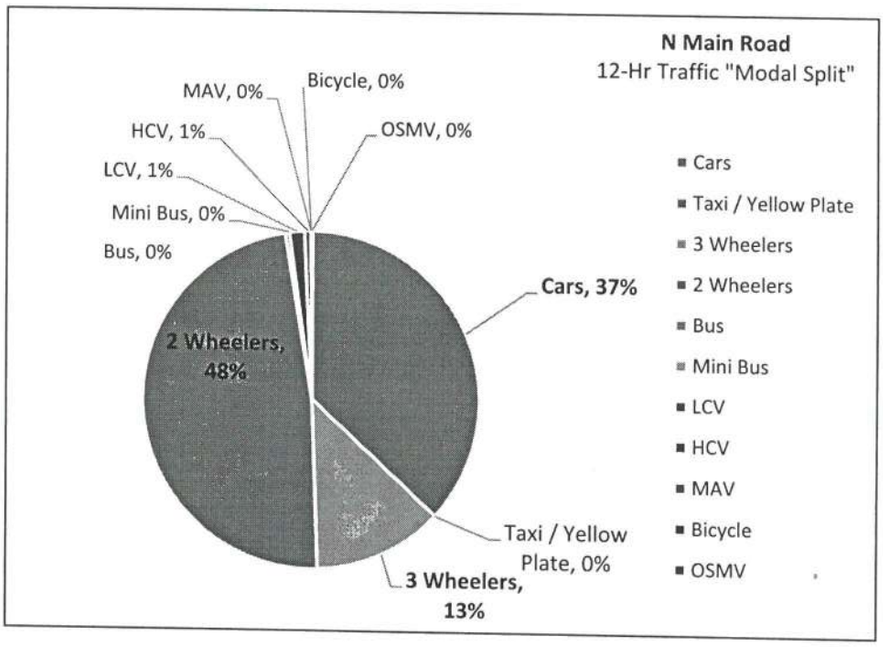


Figure 2-3 : Modal Split – N Main Road (2024)

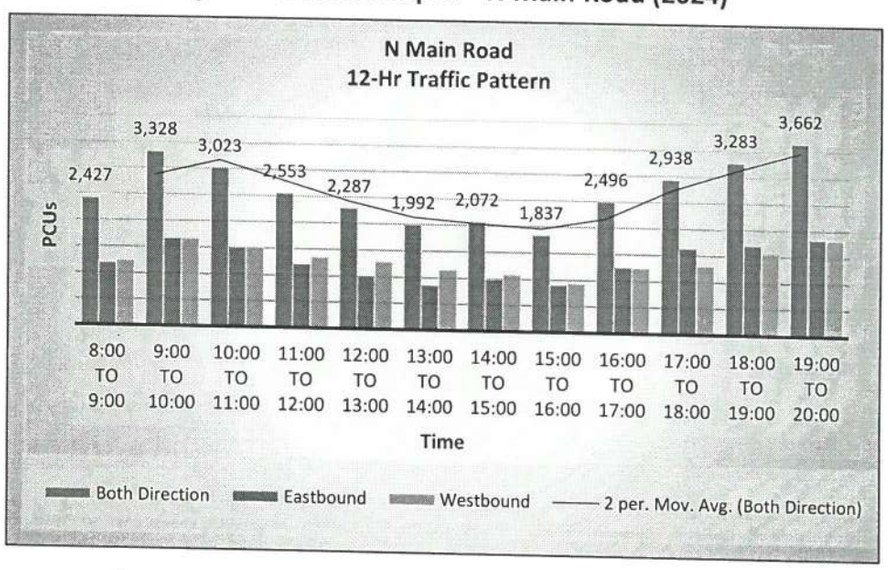


Figure 2-4 : 12 Hr Traffic Pattern –N Main Road (2024)

For N Main Road, following **Table 2-1** is provided to show the classified traffic volume observed for 12-hour period on a weekday in the vicinity of the site.

Table 2-1 : 12 HR CLASSIFIED TRAFFIC VOLUME – N MAIN ROAD (2024)

Road Name :	N Main Road								Analysis Year :	2024 Existing Conditions				
Type :	4-Lane Divided								Direction :	Eastbound				→
Section :	Midblock								Count Method :	Manual				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	704	0	268	905	4	0	12	10	0	0	2	1,905	1,189	8%
9:00 to 10:00	952	0	389	1,151	7	0	33	16	0	0	2	2,550	1,668	11%
10:00 to 11:00	867	0	368	973	6	0	28	14	0	0	3	2,259	1,510	10%
11:00 to 12:00	681	0	300	728	8	0	17	16	0	0	2	1,752	1,209	8%
12:00 to 13:00	589	0	225	702	6	0	13	10	0	0	2	1,547	1,011	6%
13:00 to 14:00	539	0	141	602	6	0	7	8	0	0	0	1,303	846	5%
14:00 to 15:00	631	0	172	677	8	0	7	9	0	0	1	1,505	994	6%
15:00 to 16:00	536	0	197	671	5	0	10	7	0	0	2	1,428	906	6%
16:00 to 17:00	723	0	311	799	8	0	18	8	0	0	3	1,870	1,249	8%
17:00 to 18:00	932	0	330	1,073	10	0	41	18	0	0	4	2,408	1,630	10%
18:00 to 19:00	989	0	357	1,131	10	0	41	17	0	0	4	2,549	1,717	11%
19:00 to 20:00	1,086	0	371	1,136	11	0	42	19	0	0	3	2,668	1,837	12%
Total	**9,229**	**0**	**3,429**	**10,548**	**89**	**0**	**269**	**152**	**0**	**0**	**28**	**23,744**	**15,764**	**100%**

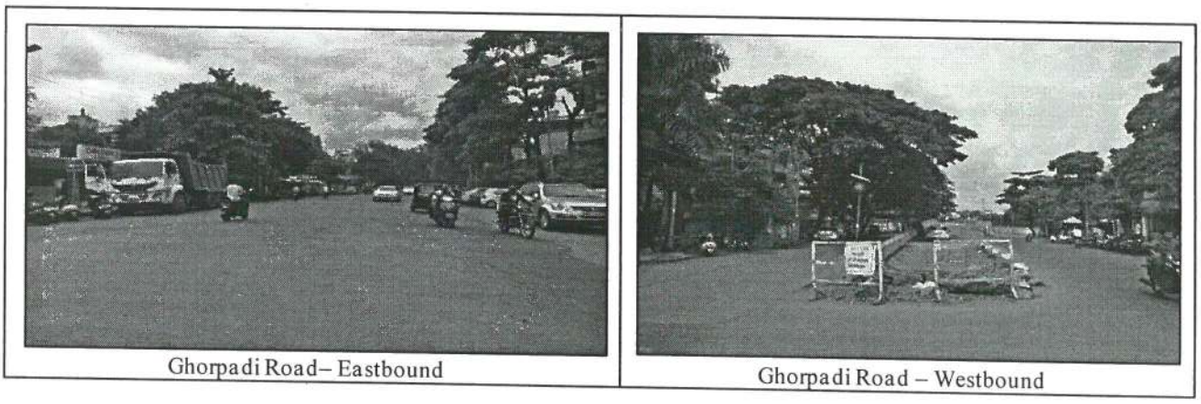
Road Name :	N Main Road								Analysis Year :	2024 Existing Conditions				
Type :	4-Lane Divided								Direction :	Westbound				←
Section :	Midblock								Count Method :	Manual				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	677	0	183	1,144	9	0	32	17	0	2	2	2,066	1,238	8%
9:00 to 10:00	970	0	247	1,354	11	0	42	18	0	3	2	2,647	1,660	10%
10:00 to 11:00	809	0	291	1,344	11	0	39	14	0	3	3	2,514	1,513	9%
11:00 to 12:00	662	0	295	1,266	10	0	38	15	0	2	1	2,289	1,344	8%
12:00 to 13:00	686	0	256	1,152	7	0	33	11	0	1	2	2,148	1,277	8%
13:00 to 14:00	661	0	206	948	9	0	23	9	0	0	1	1,857	1,146	7%
14:00 to 15:00	627	0	184	918	5	0	23	10	0	2	2	1,771	1,078	7%
15:00 to 16:00	532	0	156	774	3	0	30	9	0	1	1	1,506	931	6%
16:00 to 17:00	756	0	177	870	7	0	44	9	0	0	3	1,866	1,247	8%
17:00 to 18:00	742	0	230	951	10	0	40	12	0	7	2	1,994	1,308	8%
18:00 to 19:00	862	0	285	1,228	12	0	47	16	0	4	2	2,456	1,566	10%
19:00 to 20:00	1,066	0	292	1,318	13	0	53	18	0	1	4	2,765	1,824	11%
Total	**9,050**	**0**	**2,802**	**13,267**	**107**	**0**	**444**	**158**	**0**	**26**	**25**	**25,879**	**16,133**	**100%**

Road Name :	N Main Road								Analysis Year :	2024 Existing Conditions				
Type :	4-Lane Divided								Direction :	Eastbound + Westbound				→ ←
Section :	Midblock								Count Method :	Manual				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	1,381	0	451	2,049	13	0	44	27	0	2	4	3,971	2,427	8%
9:00 to 10:00	1,922	0	636	2,505	18	0	75	34	0	3	4	5,197	3,328	10%
10:00 to 11:00	1,676	0	659	2,317	17	0	67	28	0	3	6	4,773	3,023	9%
11:00 to 12:00	1,343	0	595	1,994	18	0	55	31	0	2	3	4,041	2,553	8%
12:00 to 13:00	1,275	0	481	1,854	13	0	46	21	0	1	4	3,695	2,287	7%
13:00 to 14:00	1,200	0	347	1,550	15	0	30	17	0	0	1	3,160	1,992	6%
14:00 to 15:00	1,258	0	356	1,595	13	0	30	19	0	2	3	3,276	2,072	6%
15:00 to 16:00	1,068	0	353	1,445	8	0	40	16	0	1	3	2,934	1,837	6%
16:00 to 17:00	1,479	0	488	1,669	15	0	62	17	0	0	6	3,736	2,496	8%
17:00 to 18:00	1,674	0	560	2,024	20	0	81	30	0	7	6	4,402	2,938	9%
18:00 to 19:00	1,851	0	642	2,359	22	0	88	33	0	4	6	5,005	3,283	10%
19:00 to 20:00	2,152	0	663	2,454	24	0	95	37	0	1	7	5,433	3,662	11%
12 Hr Total	**18,279**	**0**	**6,231**	**23,815**	**196**	**0**	**713**	**310**	**0**	**26**	**53**	**49,623**	**31,897**	**100%**

ii. Road Link 2 – Ghorpadi Road

Functional Use and Connectivity: It is an undivided carriageway running in an East-West direction. The subject road is functioning as a Sub-Arterial Road. Approximate length of this Road is 5KM. This Road connects Sir Maneckji Mehta Road on West side and Manjari Road on East side.

Observations for Road Section and Features: An average total roadway width of 22M is observed along the study area. The actual Vehicle carriageway width carrying the traffic is observed to be 15M. On-street parking is observed on both sides along the entire stretch. Footpaths are observed along the entire stretch of the road. Following **Figure 2-5** is shown to illustrate the typical observed road.



Ghorpadi Road– Eastbound

Ghorpadi Road – Westbound

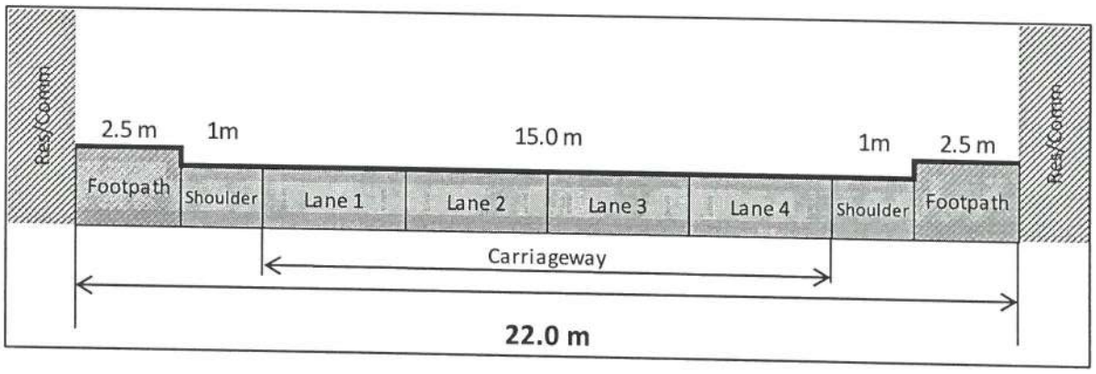


Figure 2-5 :Typical Road Section – Ghorpadi Road

Traffic Conditions: For Ghorpadi Road, **Figure 2-6** and **Figure 2-7** are provided to show the existing modal split and traffic pattern, respectively, observed for 12-hour period on a weekday in the vicinity of the site. Existing traffic data shows 2-Wheelers are predominant in the traffic mix contributing around 64% of traffic stream, respectively. Next major road users are private cars and taxis contributing around 15% of traffic stream. Morning peak hour traffic is observed during 10:00 am to 11:00 am and evening peak hour traffic observed during 06:00 pm to 07:00

pm. Note that analysis has used morning and evening peak for analysis during which period the proposed land use (Commercial) will generate most of the trips during a typical weekday.

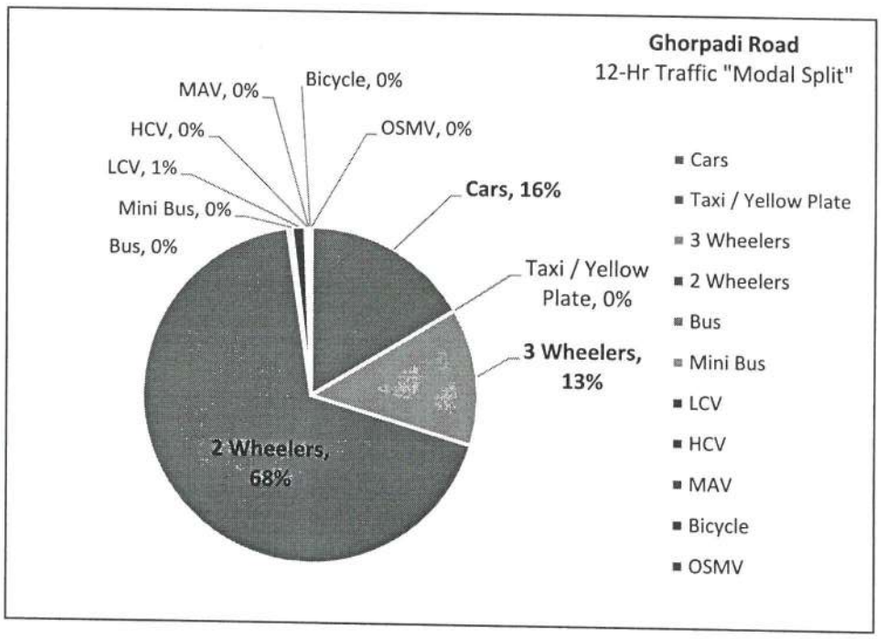


Figure 2-6 : Modal Split – Ghorpadi Road (2024)

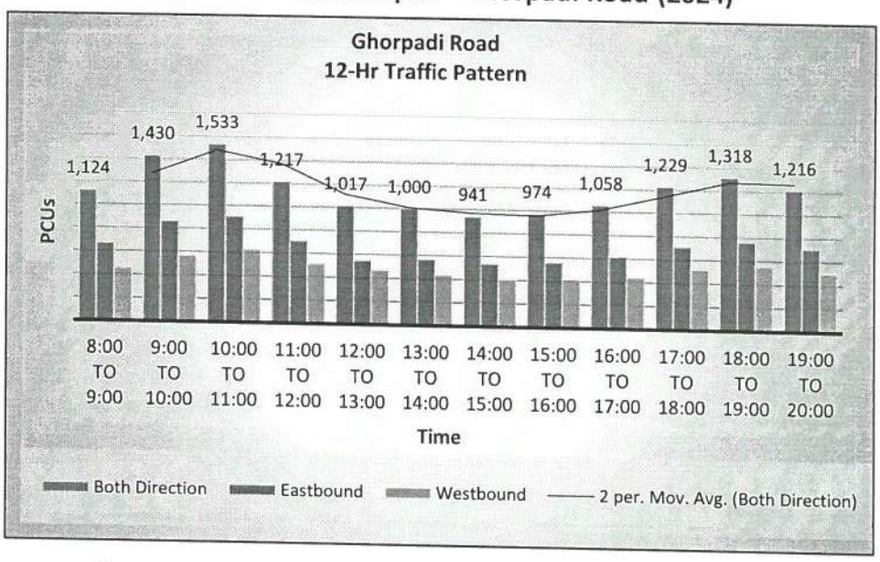


Figure 2-7 : 12 Hr Traffic Pattern – Ghorpadi Road (2024)

For Ghorpadi Road (2024), following **Table 2-2** is provided to show the classified traffic volume observed for 12-hour period on a weekday in the vicinity of the site.

Table 2-2 : 12 HR CLASSIFIED TRAFFIC VOLUME – GHORPADI ROAD (2024)

Road Name :	Ghorpadi Road								Analysis Year :	2024 Existing Conditions				
Type :	4 Lane Undivided								Direction :	Eastbound				→
Section :	Midblock								Count Method :	Manual				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	269	0	166	896	7	0	14	5	0	2	0	1,359	665	8%
9:00 to 10:00	330	0	201	1,270	7	0	24	8	0	3	0	1,843	863	11%
10:00 to 11:00	352	0	212	1,351	7	0	22	9	0	4	0	1,957	910	11%
11:00 to 12:00	286	0	183	1,015	4	0	16	4	0	3	0	1,511	707	9%
12:00 to 13:00	214	0	131	824	4	0	10	6	0	2	0	1,191	548	7%
13:00 to 14:00	223	0	127	859	5	0	14	4	0	2	0	1,234	567	7%
14:00 to 15:00	205	0	125	828	4	0	15	3	0	2	0	1,182	535	7%
15:00 to 16:00	220	0	136	809	5	0	16	2	0	3	0	1,191	559	7%
16:00 to 17:00	250	0	170	799	3	0	18	4	0	4	0	1,248	617	8%
17:00 to 18:00	318	0	177	836	4	0	18	6	0	6	0	1,365	711	9%
18:00 to 19:00	329	0	194	1,025	4	0	15	5	0	5	0	1,577	763	9%
19:00 to 20:00	281	0	193	943	3	0	23	5	0	2	0	1,450	710	9%
Total	**3,277**	**0**	**2,015**	**11,455**	**57**	**0**	**205**	**61**	**0**	**38**	**0**	**17,108**	**8,155**	**100%**

Road Name :	Ghorpadi Road								Analysis Year :	2024 Existing Conditions				
Type :	4 Lane Undivided								Direction :	Westbound				←
Section :	Midblock								Count Method :	Manual				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	118	0	163	720	5	0	15	2	0	5	0	1,028	459	8%
9:00 to 10:00	155	0	181	856	6	0	22	4	0	7	0	1,231	567	10%
10:00 to 11:00	183	0	216	907	4	0	24	3	0	5	0	1,342	624	11%
11:00 to 12:00	152	0	161	805	6	0	16	1	0	3	0	1,144	511	9%
12:00 to 13:00	129	0	148	807	4	0	14	2	0	4	0	1,108	468	8%
13:00 to 14:00	125	0	147	719	4	0	8	2	0	5	0	1,010	433	7%
14:00 to 15:00	123	0	130	683	4	0	10	0	0	2	0	952	406	7%
15:00 to 16:00	117	0	143	656	4	0	12	1	0	8	0	941	415	7%
16:00 to 17:00	131	0	160	696	5	0	8	0	0	4	0	1,004	441	7%
17:00 to 18:00	142	0	188	773	5	0	15	3	0	6	0	1,132	518	9%
18:00 to 19:00	158	0	186	783	6	0	24	2	0	6	0	1,165	556	9%
19:00 to 20:00	135	0	166	704	4	0	17	10	0	6	0	1,042	506	9%
Total	**1,668**	**0**	**1,989**	**9,109**	**57**	**0**	**185**	**30**	**0**	**61**	**0**	**13,099**	**5,902**	**100%**

Road Name :	Ghorpadi Road								Analysis Year :	2024 Existing Conditions				
Type :	4 Lane Undivided								Direction :	Eastbound + Westbound				→ ←
Section :	Midblock								Count Method :	Manual				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	387	0	329	1,616	12	0	29	7	0	7	0	2,387	1,124	8%
9:00 to 10:00	485	0	382	2,126	13	0	46	12	0	10	0	3,074	1,430	10%
10:00 to 11:00	535	0	428	2,258	11	0	46	12	0	9	0	3,299	1,533	11%
11:00 to 12:00	438	0	344	1,820	10	0	32	5	0	6	0	2,655	1,217	9%
12:00 to 13:00	343	0	279	1,631	8	0	24	8	0	6	0	2,299	1,017	7%
13:00 to 14:00	348	0	274	1,578	9	0	22	6	0	7	0	2,244	1,000	7%
14:00 to 15:00	328	0	255	1,511	8	0	25	3	0	4	0	2,134	941	7%
15:00 to 16:00	337	0	279	1,465	9	0	28	3	0	11	0	2,132	974	7%
16:00 to 17:00	381	0	330	1,495	8	0	26	4	0	8	0	2,252	1,058	8%
17:00 to 18:00	460	0	365	1,609	9	0	33	9	0	12	0	2,497	1,229	9%
18:00 to 19:00	487	0	380	1,808	10	0	39	7	0	11	0	2,742	1,318	9%
19:00 to 20:00	416	0	359	1,647	7	0	40	15	0	8	0	2,492	1,216	9%
12 Hr Total	**4,945**	**0**	**4,004**	**20,564**	**114**	**0**	**390**	**91**	**0**	**99**	**0**	**30,207**	**14,057**	**100%**

iii. Road Link 3 – East Avenue Road

Functional Use and Connectivity: It is a North-South oriented Sub Arterial Road abutting the subject plot. It runs for approximately 1.8 KM length with its end-to-end connections. The East Avenue Road connects to Vithalrao Vandekar Road and Aga Khan bridge which again meets with Koregaon Park road and N main road at intersection. East Avenue Road is a Part of Kalyani Nagar Road loop. This road provides access to different location like Bank, Medicals, Retail Stores, Commercial plazas, Food stalls, etc. along its length while connecting to other Local Roads.

Observations for Road Section and Features: As per survey conducted by Sincrono, an average total roadway width of 17.5M is observed for this 4-lane divided road. On-street parking is observed along one side of the road stretch. An approximately 2M wide footpath is observed along both the sides of road and having median with Metro Pillars of 1.5M width. Following **Figure 2-8** is shown to illustrate the typical observed road section with observed average width.

East Avenue Road (Looking North)

East Avenue Road (Looking South)

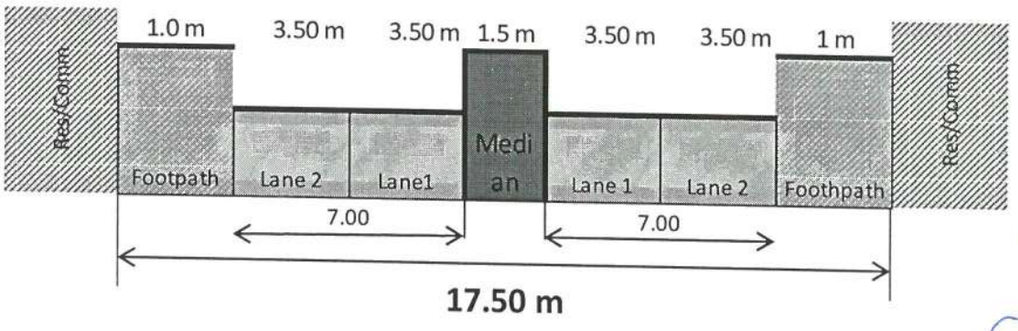


Figure 2-8 : Typical Road Section – East Avenue Road

Traffic Conditions: For East Avenue Road, **Figure 2-9** and **Figure 2-10** are provided to show the existing modal split and traffic pattern, respectively observed for 12-hour period on a weekday in the vicinity of the site. Existing traffic data shows the 2-Wheelers are predominant in the traffic mix contributing around 70% of traffic stream. Next major road users are private cars contributing around 14% of traffic stream followed by 3-Wheelers. Morning peak hour traffic is observed during 09:00 am to 10:00 am and evening peak hour traffic observed during 06:00 pm to 07:00 pm. Note that analysis has used morning and evening peak for analysis during which period the proposed land uses (Commercial) will generate most of the trips during a typical weekday.

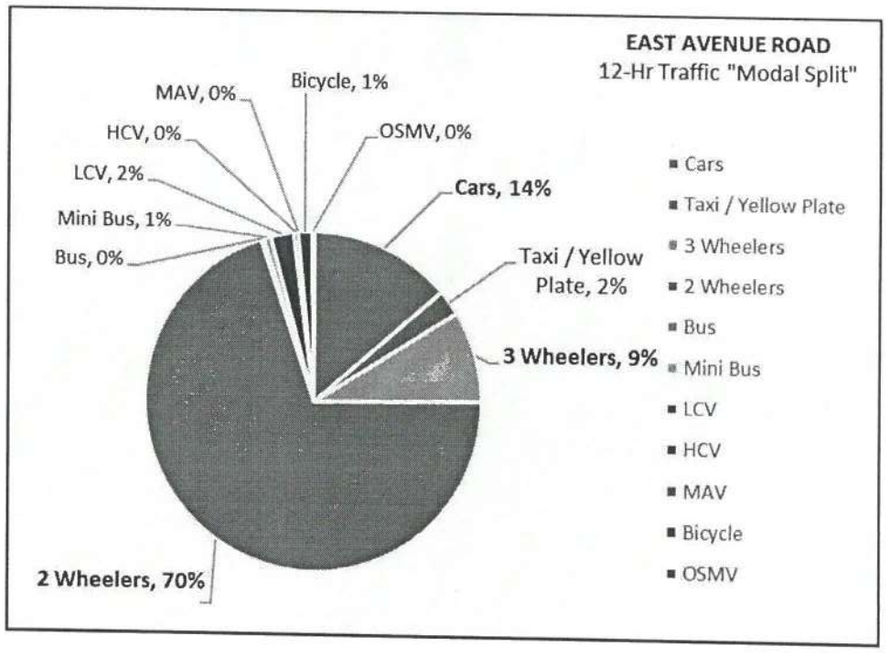


Figure 2-9 : Modal Split - East Avenue Road (2024)

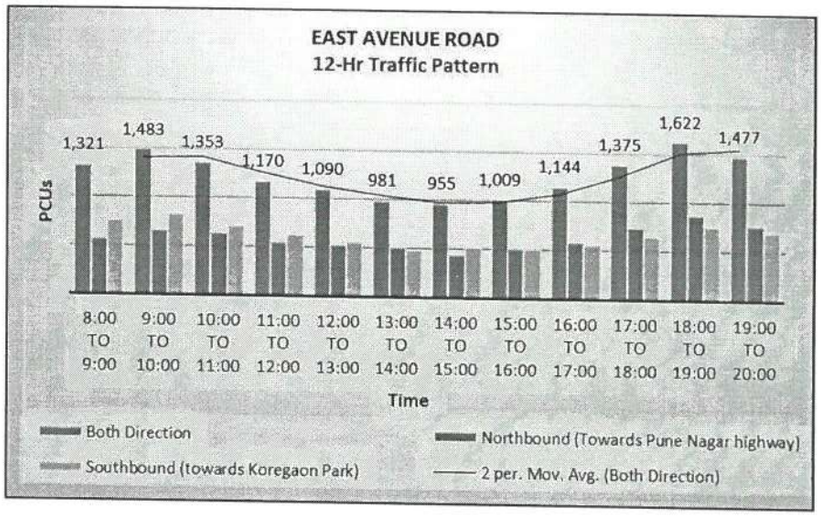


Figure 2-10 : 12 Hr Traffic Pattern – East Avenue Road (2024)

For East Avenue Road, following **Table 2-3** is provided to show the classified traffic volume observed for 12-hour period on a weekday in the vicinity of the site.

Table 2-3 : 12 HR CLASSIFIED TRAFFIC VOLUME – EAST AVENUE ROAD (2024)

Road Name :	East Avenue Road								Analysis Year :	2024 Existing Condition				↑
Type :	2-lane undivided								Direction :	Northbound				
Section :	Midblock								Count Method :	Manual				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	119	20	138	698	7	12	32	5	0	27	5	1,063	536	8%
9:00 to 10:00	166	42	142	1,100	3	5	25	4	0	32	3	1,522	637	9%
10:00 to 11:00	131	41	151	1,016	2	11	30	3	0	24	7	1,416	615	9%
11:00 to 12:00	129	24	112	944	2	10	28	3	0	15	0	1,267	523	7%
12:00 to 13:00	127	31	93	816	3	9	32	6	0	11	0	1,128	507	7%
13:00 to 14:00	118	31	107	690	4	7	30	6	0	10	0	1,003	478	7%
14:00 to 15:00	107	28	65	595	2	8	27	9	0	15	0	856	417	6%
15:00 to 16:00	135	29	78	776	5	5	26	7	0	9	0	1,070	484	7%
16:00 to 17:00	173	22	88	887	7	8	33	3	0	19	0	1,240	561	8%
17:00 to 18:00	219	25	108	1,034	4	4	47	10	0	33	3	1,487	701	10%
18:00 to 19:00	297	37	120	1,269	5	11	33	9	0	31	4	1,816	838	12%
19:00 to 20:00	265	35	99	1,022	6	11	29	9	0	22	9	1,507	747	11%
Total	**1,986**	**365**	**1,301**	**10,847**	**50**	**101**	**372**	**74**	**0**	**248**	**31**	**15,375**	**7,045**	**100%**

Road Name :	East Avenue Road								Analysis Year :	2024 Existing Condition				↓
Type :	2-lane undivided								Direction :	Southbound				
Section :	Midblock								Count Method :	Manual				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	256	42	114	1,080	6	11	21	6	0	44	3	1,583	732	10%
9:00 to 10:00	278	45	146	1,126	4	8	34	6	0	22	4	1,673	794	11%
10:00 to 11:00	233	43	121	1,051	2	8	24	6	0	8	7	1,503	691	9%
11:00 to 12:00	179	32	138	981	2	7	26	3	0	7	3	1,378	603	8%
12:00 to 13:00	144	26	107	880	4	6	33	3	0	3	3	1,209	536	7%
13:00 to 14:00	107	22	108	766	2	7	27	6	0	3	0	1,048	458	6%
14:00 to 15:00	143	22	110	651	2	11	25	3	0	10	10	987	500	7%
15:00 to 16:00	140	29	119	635	2	5	26	3	0	9	6	974	483	7%
16:00 to 17:00	159	31	113	764	2	5	34	6	0	6	0	1,120	532	7%
17:00 to 18:00	199	33	106	876	6	10	31	7	0	10	0	1,278	617	8%
18:00 to 19:00	240	42	136	1,127	5	13	22	3	0	22	6	1,616	733	10%
19:00 to 20:00	231	33	88	1,171	4	13	20	6	0	28	3	1,597	686	9%
Total	**2,309**	**400**	**1,406**	**11,108**	**41**	**104**	**323**	**58**	**0**	**172**	**45**	**15,966**	**7,366**	**100%**

Road Name :	East Avenue Road								Analysis Year :	2024 Existing Condition				↑↓
Type :	2-lane undivided								Direction :	Northbound + Southbound				
Section :	Midblock								Count Method :	Manual				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	375	62	252	1,778	13	23	53	11	0	71	8	2,646	1,268	9%
9:00 to 10:00	444	87	288	2,226	7	13	59	10	0	54	7	3,195	1,432	10%
10:00 to 11:00	364	84	272	2,067	4	19	54	9	0	32	14	2,919	1,307	9%
11:00 to 12:00	308	56	250	1,925	4	17	54	6	0	22	3	2,645	1,126	8%
12:00 to 13:00	271	57	200	1,696	7	15	65	9	0	14	3	2,337	1,043	7%
13:00 to 14:00	225	53	215	1,456	6	14	57	12	0	13	0	2,051	936	6%
14:00 to 15:00	250	50	175	1,246	4	19	52	12	0	25	10	1,843	916	6%
15:00 to 16:00	275	58	197	1,411	7	10	52	10	0	18	6	2,044	967	7%
16:00 to 17:00	332	53	201	1,651	9	13	67	9	0	25	0	2,360	1,094	8%
17:00 to 18:00	418	58	214	1,910	10	14	78	17	0	43	3	2,765	1,318	9%
18:00 to 19:00	537	79	256	2,396	10	24	55	12	0	53	10	3,432	1,572	11%
19:00 to 20:00	496	68	187	2,193	10	24	49	15	0	50	12	3,104	1,433	10%
12 Hr Total	**4,295**	**765**	**2,707**	**21,955**	**91**	**205**	**695**	**132**	**0**	**420**	**76**	**31,341**	**14,412**	**100%**

iv. Road Link 4 – Magarpatta Road

Functional Use and Connectivity: It is a North-South oriented Sub Arterial Road. It runs for an approximate length of 8.2KM with its end-to-end connections. It has a ROW of 45M. It connects Solapur-Pune Highway at its South end and Samrat Ashok Road at its North end.

Road Section and Other Features: An average total roadway width of 45M is observed along the study area. Footpaths are observed along both sides of the road having approximate width of 3M on either side. On Street parking was observed along certain stretches of the road Following **Figure 2-11** is shown to illustrate the typical observed road section observed with average width.

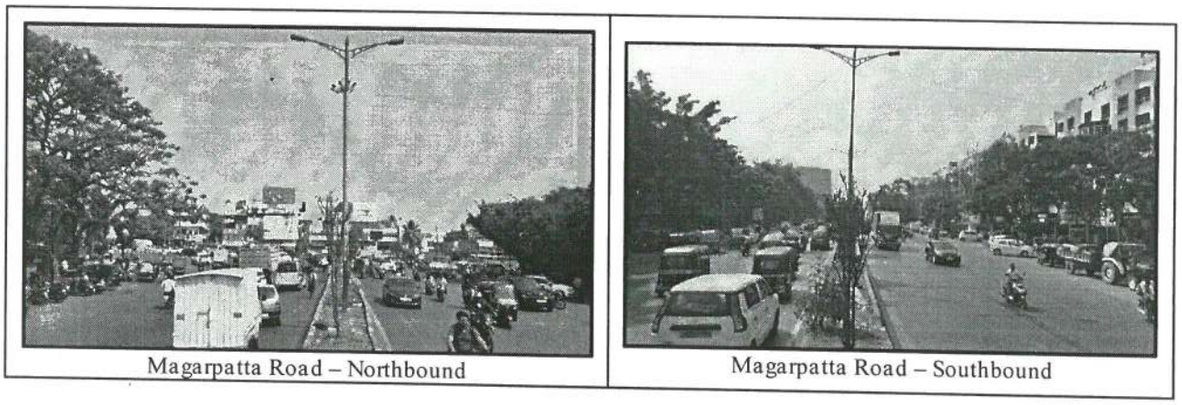


Figure 2-11 : Typical Road Section – Magarpatta Road

Traffic Conditions: **Figure 2-12** and **Figure 2-13** are provided to show the existing modal split and 12-hour traffic pattern, respectively, observed on the Magarpatta Road in the vicinity of the site. Existing traffic data shows 2-Wheelers are predominant in the traffic mix contributing around 57% to the traffic stream. Next major road users are private cars and taxis contributing around 23% of traffic stream. Morning peak hour traffic is observed from 11:00 am to 12:00 pm and evening peak hour traffic observed during 06:00 pm to 07:00 pm. Note that analysis has used morning and evening peak for analysis during which period the proposed land uses (Commercial) will generate most of the trips during a typical weekday.

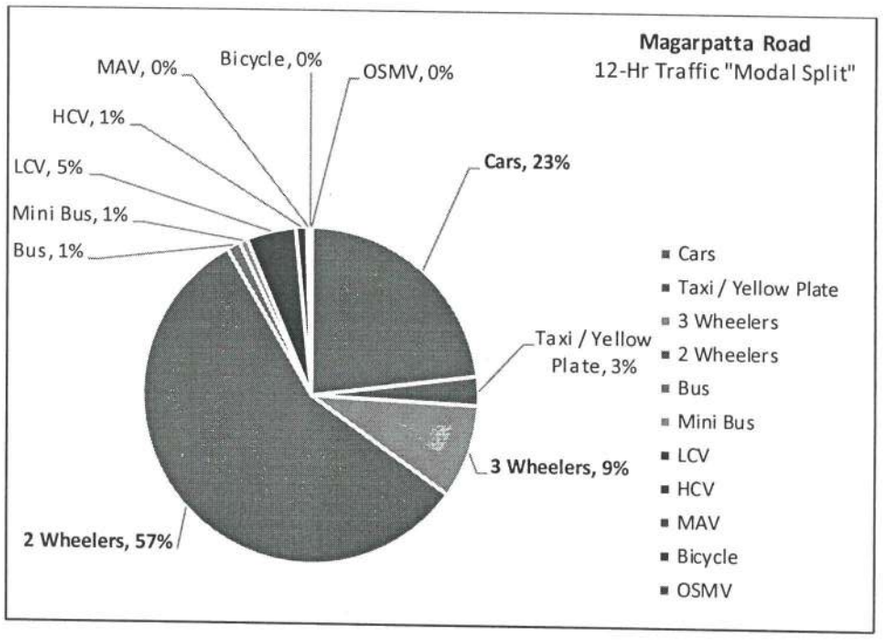


Figure 2-12 : Modal Split –Magarpatta Road (2024)

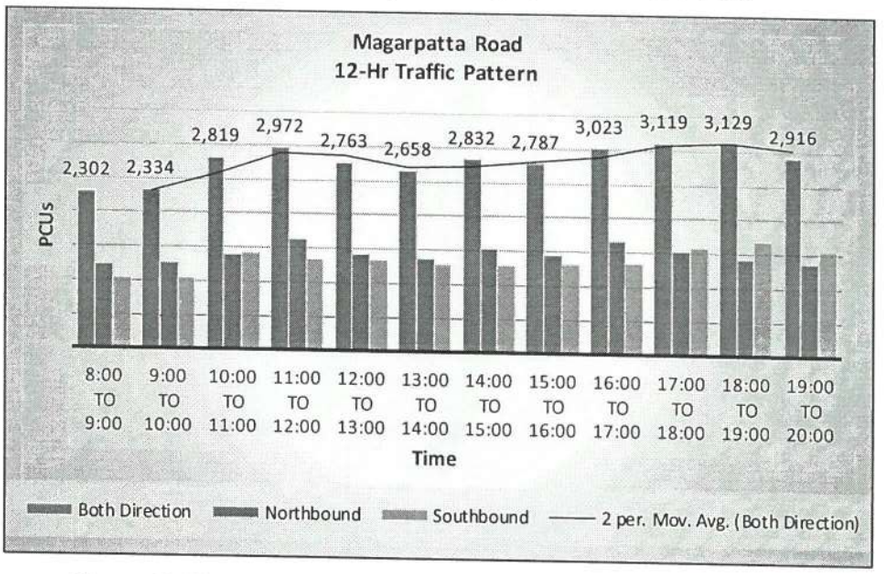


Figure 2-13 : 12 Hr Traffic Pattern – Magarpatta Road (2024)

For Magarpatta Road, following **Table 2-4** is provided to show the classified traffic volume observed for a 12-hour period on a weekday in the vicinity of the site.

Table 2-4 : 12 HR CLASSIFIED TRAFFIC VOLUME – MAGARPATTA ROAD (2024)

Road Name :	Magarpatta Road								Analysis Year :	2024 Existing Condition				
Type :	8-lane Divided								Direction :	Northbound				↑
Section :	Midblock								Count Method :	Video				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	418	75	159	1,205	26	28	107	7	2	8	0	2,035	1,425	7%
9:00 to 10:00	426	53	180	1,824	17	8	93	7	2	3	2	2,615	1,456	7%
10:00 to 11:00	533	54	161	1,418	25	12	90	27	1	6	3	2,330	1,565	8%
11:00 to 12:00	588	66	230	1,185	22	9	122	52	8	1	3	2,286	1,834	9%
12:00 to 13:00	493	41	214	1,074	15	5	84	68	8	3	1	2,006	1,596	8%
13:00 to 14:00	454	41	197	1,017	26	9	105	46	10	2	1	1,908	1,564	8%
14:00 to 15:00	482	44	195	975	25	13	145	63	9	7	1	1,959	1,746	9%
15:00 to 16:00	466	36	184	1,010	29	6	140	36	21	3	2	1,933	1,675	9%
16:00 to 17:00	593	70	172	1,144	30	19	152	46	5	1	5	2,237	1,876	10%
17:00 to 18:00	616	48	206	1,127	27	27	114	21	5	3	4	2,198	1,723	9%
18:00 to 19:00	596	49	192	1,324	30	29	90	6	1	4	2	2,323	1,612	8%
19:00 to 20:00	531	52	203	1,370	30	19	96	5	1	1	2	2,310	1,555	8%
Total	6,196	629	2,293	14,673	302	184	1,338	384	73	42	26	26,140	19,627	100%

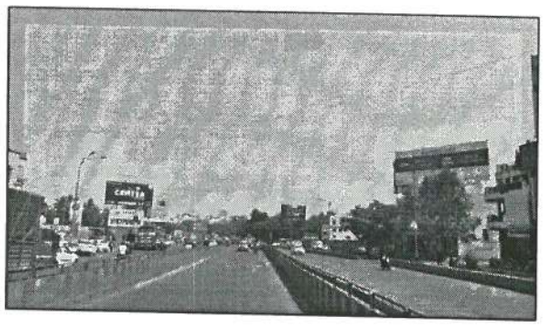
Road Name :	Magarpatta Road								Analysis Year :	2024 Existing Condition				
Type :	8-lane Divided								Direction :	Southbound				↓
Section :	Midblock								Count Method :	Video				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	359	34	139	941	28	33	75	10	3	3	0	1,625	1,204	6%
9:00 to 10:00	387	47	163	1,475	21	16	41	3	0	5	3	2,161	1,203	6%
10:00 to 11:00	517	52	257	1,490	28	13	92	9	7	2	0	2,467	1,632	9%
11:00 to 12:00	463	57	236	1,354	19	9	80	33	2	7	2	2,262	1,523	8%
12:00 to 13:00	463	72	221	1,040	13	12	131	20	9	3	0	1,984	1,532	8%
13:00 to 14:00	400	64	185	1,126	28	8	130	8	13	3	1	1,966	1,483	8%
14:00 to 15:00	422	119	192	973	17	11	104	24	8	5	3	1,878	1,465	8%
15:00 to 16:00	450	92	197	991	26	6	127	16	6	2	3	1,916	1,514	8%
16:00 to 17:00	431	83	172	1,072	36	18	105	28	6	3	0	1,954	1,545	8%
17:00 to 18:00	599	128	210	1,285	47	31	90	6	3	2	1	2,402	1,793	10%
18:00 to 19:00	659	70	225	1,580	57	38	90	3	1	5	2	2,730	1,926	10%
19:00 to 20:00	641	15	206	1,583	49	32	81	2	0	2	3	2,614	1,753	9%
Total	5,791	833	2,403	14,910	369	227	1,146	162	58	42	18	25,959	18,574	100%

Road Name :	Magarpatta Road								Analysis Year :	2024 Existing Condition				
Type :	8-lane Divided								Direction :	Northbound + Southbound				↑↓
Section :	Midblock								Count Method :	Video				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	777	109	298	2,146	54	61	182	17	5	11	0	3,660	2,629	7%
9:00 to 10:00	813	100	343	3,299	38	24	134	10	2	8	5	4,776	2,660	7%
10:00 to 11:00	1,050	106	418	2,908	53	25	182	36	8	8	3	4,797	3,198	8%
11:00 to 12:00	1,051	123	466	2,539	41	18	202	85	10	8	5	4,548	3,356	9%
12:00 to 13:00	956	113	435	2,114	28	17	215	88	17	6	1	3,990	3,128	8%
13:00 to 14:00	854	105	382	2,143	54	17	235	54	23	5	2	3,874	3,047	8%
14:00 to 15:00	904	163	387	1,948	42	24	249	87	17	12	4	3,837	3,212	8%
15:00 to 16:00	916	128	381	2,001	55	12	267	52	27	5	5	3,849	3,189	8%
16:00 to 17:00	1,024	153	344	2,216	66	37	257	74	11	4	5	4,191	3,421	9%
17:00 to 18:00	1,215	176	416	2,412	74	58	204	27	8	5	5	4,600	3,516	9%
18:00 to 19:00	1,255	119	417	2,904	87	67	180	9	2	9	4	5,053	3,538	9%
19:00 to 20:00	1,172	67	409	2,953	79	51	177	7	1	3	5	4,924	3,308	9%
12 Hr Total	11,987	1,462	4,696	29,583	671	411	2,484	546	131	84	44	52,099	38,201	100%

v. **Road Link 5 – Samrat Ashok Road:**

Functional Use and Connectivity: It is a North-South oriented Arterial Road. It runs for approximately 19 KM length with its end-to-end connections. This road connects to Lonikand towards the East Side and extends further and Yerawada bridge to its West.

Observations for Road Section and Features: As per the traffic survey, the road has a variable road section along its length. An average total roadway width of 56M which includes a small stretch of Service Road up to a small length along Westbound traffic direction which merges with Main Carriageway. A Bus Rapid transit Lane is running at the center of carriage way with bus stop and is separated by medians at the bus stops and has 2-way vehicle movement. The road is observed to be occupied with on street parking along its intermittent Stretches. Footpaths are observed along both sides of the road. Following **Figure 2-14** is shown to illustrate the typical observed road section near site vicinity. Thus, effective width meant for vehicle movement is also seen varying along the length. The study considered effective width including BRT and excluding service road as the service road is a minor stretch and ultimately merges with Main carriageway which again gets widened to accommodating BRT Bus shelter. The photographs of road along with Road sections are as shown below.



1. Samrat Ashok Road Looking East

2. Samrat Ashok Road Looking West

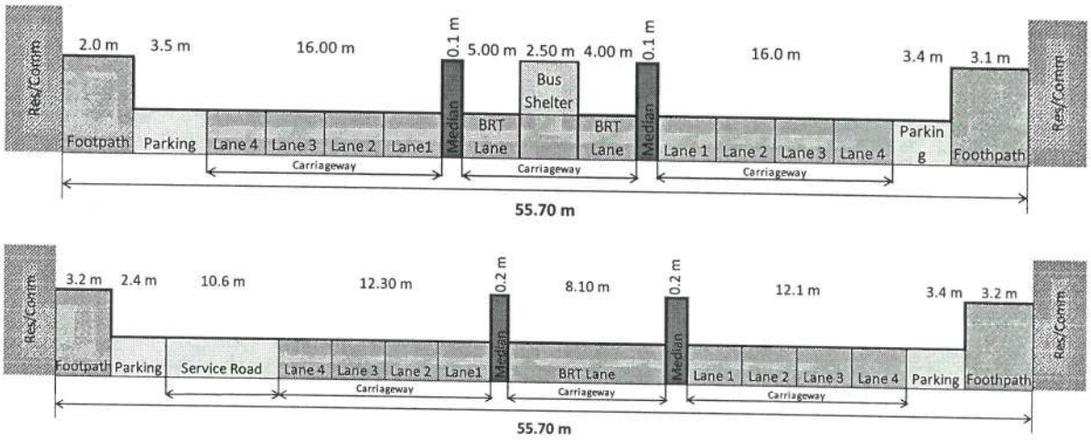


Figure 2-14: Typical Road Sections – Samrat Ashok Road

Traffic Conditions: For Samrat Ashok Road, **Figure 2-15** and **Figure 2-16** are provided to show the existing modal split and traffic pattern, respectively, observed for 12-hour period on a weekday in the vicinity of the site. Existing traffic data shows the 2-Wheelers are predominant in the traffic mix contributing around 53% of traffic stream, respectively. Next major road users are Cars/taxi contributing around 31% of traffic stream. Morning peak hour traffic is observed from 11:00 am to 12:00 Pm and evening peak hour traffic observed during 04:00 pm to 05:00 pm. Note that analysis has used morning and evening peak for analysis during which period the proposed land uses (commercial) will generate most of the trips during a typical weekday.

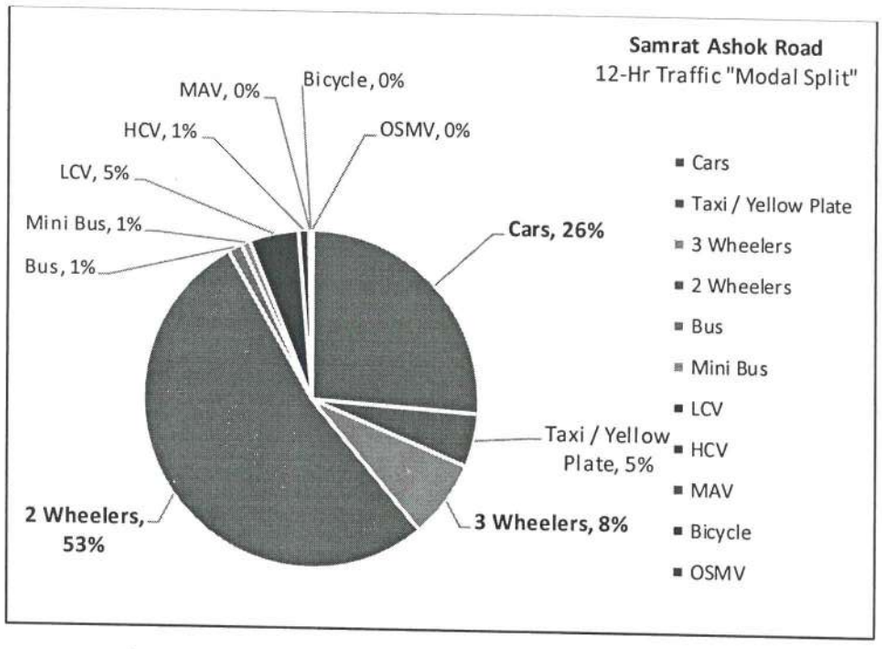


Figure 2-15 : Modal Split – Samrat Ashok Road (2024)

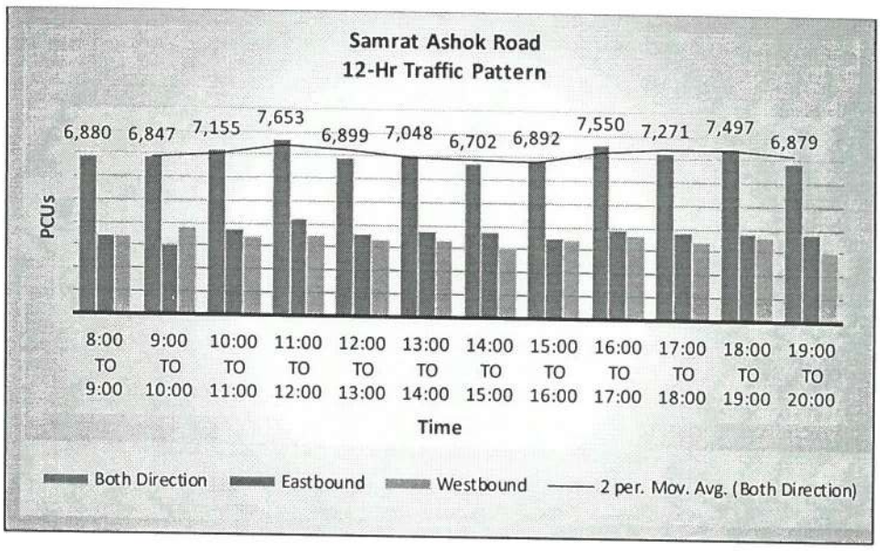


Figure 2-16 : 12 Hr Traffic Pattern –Samrat Ashok Road (2024)

For Samrat Ashok Road, following **Table 2-5** is provided to show the classified traffic volume observed for a 12-hour period on a weekday in the vicinity of the site.

Table 2-5 : 12 HR CLASSIFIED TRAFFIC VOLUME – SAMRAT ASHOK ROAD (2024)

Road Name :	Samrat Ashok Road								Analysis Year :	2024 Existing Conditions				→
Type :	8-Lane Divided								Direction :	Eastbound				
Section :	Midblock								Count Method :	Video				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	1,138	482	273	1,674	90	105	127	36	2	11	1	3,939	3,434	8%
9:00 to 10:00	1,007	357	295	2,684	42	46	127	22	2	13	5	4,600	3,025	7%
10:00 to 11:00	1,153	423	460	2,657	57	49	192	39	2	12	14	5,058	3,714	8%
11:00 to 12:00	1,153	532	456	2,262	49	123	279	71	3	3	9	4,940	4,199	9%
12:00 to 13:00	1,029	293	441	2,214	48	16	255	90	13	3	7	4,409	3,596	8%
13:00 to 14:00	1,060	313	367	2,079	78	22	325	66	6	2	8	4,326	3,732	8%
14:00 to 15:00	1,051	206	374	2,128	57	37	346	87	9	3	5	4,303	3,718	8%
15:00 to 16:00	1,048	183	354	2,052	51	21	294	70	23	1	11	4,108	3,495	8%
16:00 to 17:00	1,208	283	403	2,422	57	21	285	86	9	4	16	4,794	3,893	9%
17:00 to 18:00	1,326	290	459	2,829	45	26	265	38	4	8	7	5,297	3,838	9%
18:00 to 19:00	1,183	326	421	3,584	64	47	227	22	1	8	5	5,888	3,841	9%
19:00 to 20:00	1,261	226	451	3,880	80	32	195	13	1	4	2	6,145	3,831	9%
Total	**13,617**	**3,914**	**4,754**	**30,465**	**718**	**545**	**2,917**	**640**	**75**	**72**	**90**	**57,807**	**44,316**	**100%**

Road Name :	Samrat Ashok Road								Analysis Year :	2024 Existing Conditions				←
Type :	8-Lane Divided								Direction :	Westbound				
Section :	Midblock								Count Method :	Video				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	1,330	127	293	2,684	129	34	123	16	3	4	2	4,745	3,445	8%
9:00 to 10:00	1,646	83	375	3,853	68	33	152	5	0	8	8	6,231	3,822	9%
10:00 to 11:00	1,308	107	382	3,014	49	14	181	44	8	2	8	5,117	3,442	8%
11:00 to 12:00	1,270	111	348	2,589	45	10	216	76	6	5	12	4,688	3,454	8%
12:00 to 13:00	1,183	92	324	2,202	52	6	274	50	12	2	5	4,202	3,303	8%
13:00 to 14:00	1,270	128	306	1,865	51	18	262	47	12	0	6	3,965	3,317	8%
14:00 to 15:00	951	240	289	1,655	35	12	243	77	6	1	4	3,513	2,984	7%
15:00 to 16:00	1,096	275	299	1,639	66	26	257	70	11	2	8	3,749	3,397	8%
16:00 to 17:00	1,312	304	323	1,828	77	47	199	76	4	3	7	4,180	3,658	9%
17:00 to 18:00	1,423	165	299	1,996	76	82	184	11	2	5	7	4,250	3,434	8%
18:00 to 19:00	1,454	111	265	2,574	123	71	167	15	0	5	3	4,788	3,656	9%
19:00 to 20:00	1,348	53	192	2,688	58	47	167	7	0	0	1	4,561	3,048	7%
Total	**15,591**	**1,796**	**3,695**	**28,587**	**829**	**400**	**2,425**	**494**	**64**	**37**	**71**	**53,989**	**40,958**	**100%**

Road Name :	Samrat Ashok Road								Analysis Year :	2024 Existing Conditions				→←
Type :	8-Lane Divided								Direction :	Eastbound + Westbound				
Section :	Midblock								Count Method :	Video				
Time Period	Cars	Taxi / Yellow Plate	3 Wheelers	2 Wheelers	Bus	Mini Bus	LCV	HCV	MAV	Bicycle	OSMV	Total Vehicles	Total PCU	Hourly %
8:00 to 9:00	2,468	609	566	4,358	219	139	250	52	5	15	3	8,684	6,880	8%
9:00 to 10:00	2,653	440	670	6,537	110	79	279	27	2	21	13	10,831	6,847	8%
10:00 to 11:00	2,461	530	842	5,671	106	63	373	83	10	14	22	10,175	7,155	8%
11:00 to 12:00	2,423	643	804	4,851	94	133	495	147	9	8	21	9,628	7,653	9%
12:00 to 13:00	2,212	385	765	4,416	100	22	529	140	25	5	12	8,611	6,899	8%
13:00 to 14:00	2,330	441	673	3,944	129	40	587	113	18	2	14	8,291	7,048	8%
14:00 to 15:00	2,002	446	663	3,783	92	49	589	164	15	4	9	7,816	6,702	8%
15:00 to 16:00	2,144	458	653	3,691	117	47	551	140	34	3	19	7,857	6,892	8%
16:00 to 17:00	2,520	587	726	4,250	134	68	484	162	13	7	23	8,974	7,550	9%
17:00 to 18:00	2,749	455	758	4,825	121	108	449	49	6	13	14	9,547	7,271	9%
18:00 to 19:00	2,637	437	686	6,158	187	118	394	37	1	13	8	10,676	7,497	9%
19:00 to 20:00	2,609	279	643	6,568	138	79	362	20	1	4	3	10,706	6,879	8%
12 Hr Total	**29,208**	**5,710**	**8,449**	**59,052**	**1,547**	**945**	**5,342**	**1,134**	**139**	**109**	**161**	**1,11,796**	**85,274**	**100%**

Table 2-6 : OBSERVED TRAFFIC PEAK HOUR

No.	Road Link	Traffic Peak Hours	
		AM	PM
1	N Main Road	9:00 to 10:00	07:00 to 08:00
2	Ghorpadi Road	10:00 to 11:00	06:00 to 07:00
3	East Avenue Road	09:00 to 10:00	06:00 to 07:00
4	Magarpatta Road	11:00 to 12:00	06:00 to 07:00
5	Samrat Ashok Road	11:00 to 12:00	04:00 to 05:00

Based upon road survey and available information, the study area roadways are categorized into different types of roads for capacity analysis purposes. Recently released **Indian Highway Capacity Manual (Indo-HCM) 2017** is utilized to estimate base capacity of the study area roads. **Table 2-7** is provided below to show the study area roadways with corresponding lane configuration and maximum capacities.

Table 2-7 : ROAD CATEGORIES AND CAPACITY (EXISTING)

SURVEYED ROADS			EXISTING YEAR: 2024						
No.	Road Names	Functionality of Road	Existing/ Proposed Road	Typology of the Road	Total Road Width Available	Existing Vehicle Carriageway Width	Maximum Capacity PCU/Hr	Friction Factors for Impedance to Traffic Flow	Adjusted Road Capacity PCU/Hr
1	N Main Road	Sub-Arterial Road	Existing	4 Lane (Divided)	20.0 M	14.0 M	5325	0.8	4260
2	Ghorpadi Road	Sub-Arterial Road	Existing	4 Lane (Undivided)	22.0 M	15.0 M	5143	0.8	4120
3	East Avenue Road	Sub-Arterial Road	Existing	4 Lane (Divided)	17.5 M	13.0 M	4950	0.9	4460
4	Magarpatta Road	Sub-Arterial Road	Existing	8 Lane (Divided)	45.0 M	24.6 M	9300	0.9	8370
5	Samrat Ashok Road	Arterial Road	Existing	8 Lane (Divided)	55.7 M	41.0 M	15450	0.9	13910

Notes:

1. Road capacity and LOS estimation is based upon methodology described in Indo-HCM. Maximum capacity for the road is "Base Capacity" for that typology of the road. Base capacity is calculated for different road width with interpolation based upon standard road width of 7.5M.

2. Actual carriageway width (Paved Road) is utilized to determine the Road capacity and related LOS.

3. N Main Road - Under existing conditions,total Road width of 20M is observed in immediate site vicinity having footpath of 2.5M width on both sides and median of 1M is observed. Vehicle carriageway is observed as intended for a 4-lane divided section. Accordingly, friction factor is applied to estimate the base capacity for existing conditions.

4. Ghorpadi Road - Under existing conditions, total road width of 22M is observed having 2.5M foothpath on both side as intended for a 4-lane undivided section. On-street parking is along both sides of the road. Accordingly friction factor is applied to estimate the base capacity for existing conditions.

5. East Avenue Road - Under existing conditions, total road width of approximately 17.5M is observed in immediate site vicinity having 1.5M footpath is observed along both sides of road and having Metro Pillars acting like median of 0.5 M wide. Vehicle carriageway is observed as intended for a 4-lane divided section. On-street parking is observed along both sides of the road. Accordingly, friction factor is applied to estimate the base capacity for existing conditions.

6. Magarpatta Road- Under existing conditions, total road width of approximately 45M is observed in immediate site vicinity having foothpath of 3M on the both sides. It has a median of 2M width to segregate the bidirectional traffic. On Street Parking of 6 to 6.4M was observed on either side of the road. Accordingly, friction factor is applied to estimate the base capacity for existing conditions.

7. Samrat Ashok Road - Under existing conditions,total Road width of approxomately 56M is observed in immediate site vicinity with a variable road width. the road is having footpath of 5.1M width on both sides combined.It has a Bus Rapid Transit (BRT) Lane at center of carriageway and median of 0.1M width on either side of BRT and has a bus shelter in between. On Street parking of approximately 3.5M was obseved on either side. It has a service road on its Eastbound direction for a minor stretch which again merges with main carriageway. Vehicle carriageway is observed as intended for a 8-lane divided section with a BRT Lane. Accordingly, friction factor is applied to estimate the base capacity for existing conditions.

386

b) Capacity Analysis

Sincrono has performed capacity analysis for the existing study area roadway for observed AM and PM peak hours on a weekday. The peak hour existing traffic on study area roadway links was compared with their capacity. The ratio of peak traffic volume and capacity (V/C) is used as an index to determine the level of congestion on link under existing conditions. This study has analyzed study area roadway links in the vicinity of the site based upon "Maximum Base Capacity" values given in Indo-HCM for different lane configurations.

The following section summarizes the things observed for study area roadways during the traffic survey and LOS results based upon capacity analysis.

1. ***N Main Road:*** This is an East-West oriented Sub-Arterial Road in the site vicinity. Indo-HCM analysis shows that the road link with existing traffic volume operates with "LOS E" during peak hours for 4-lane (Divided) road section
2. ***Ghorpadi Road:*** This is an East-West oriented Sub-Arterial Road in the site vicinity. Indo-HCM analysis shows that the road link with existing traffic volume operates with "LOS B" during peak hours for 4-lane (Undivided) road section. Strict implementation of traffic rules and regularized on-street parking are required to maintain the uninterrupted traffic flow along the Ghorpadi Road.
3. ***East Avenue Road:*** This is a North-South oriented Sub Arterial Road in the site vicinity. Indo-HCM analysis shows that the road link with existing traffic volume operates with "LOS C" or better during peak hours for 4-lane (Divided) road section.
4. ***Magarpatta Road:*** This is a North-South oriented Sub- Arterial Road in the site vicinity. Indo-HCM analysis shows that the road link with existing traffic volume operates with "LOS B" or better during peak hours for 8-lane divided road section.
5. ***Samrat Ashok Road:*** This is an East-West oriented Arterial Road in the site vicinity. Indo-HCM analysis shows that the road link with existing traffic volume operates with "LOS C" during peak hours for 8-lane (Divided) road section having a divided carriageway with BRT Lanes running at the center of carriageway and thus when combined has 10 Lanes for vehicle movement

Following **Table 2-8** is provided to summarize the AM and PM peak hour traffic volume (PCU) and LOS for the study area roadways under existing conditions.

Table 2-8 : Existing Traffic Volume and LOS

							ANALYSIS YEAR	2024 Existing Conditions				
							PEAK PERIOD	Morning Peak Hour			Evening Peak Hour	
Sr. No.	Road Link	Typology of the Road	Existing/ Proposed Road	Total Road Width Available	Approx. Available Carriageway Width	Adjusted Traffic Capacity (PCU/hr)	Observed Traffic Volume (PCU/hr)	V/C Ratio	LOS	Observed Traffic Volume (PCU/hr)	V/C Ratio	LOS
1	N Main Road	4 Lane (Divided)	Existing	20.0 M	14.0 M	4260	3328	0.78	D	3662	0.86	E
2	Ghorpadi Road	4 Lane (Undivided)	Existing	22.0 M	15.0 M	4120	1533	0.37	B	1318	0.32	B
3	East Avenue Road	4 Lane (Divided)	Existing	17.5 M	13.0 M	4460	1432	0.32	B	1572	0.35	B
4	Magarpatta Road	8 Lane (Divided)	Existing	45.0 M	24.6 M	8370	3356	0.40	B	3538	0.42	B
5	Samrat Ashok Road	8 Lane (Divided)	Existing	55.7 M	41.0 M	13910	7653	0.55	C	7550	0.54	C

Notes:

1. Road capacity and LOS estimation is based upon methodology described in Indo-HCM. Maximum capacity for the road is "Base Capacity" for that typology of the road. Base capacity is calculated for different road width with interpolation based upon standard road width of 7.5M.

2. Actual carriageway width (Paved Road) is utilized to determine the Road capacity and related LOS.

3. N Main Road - Under existing conditions,total Road width of 20M is observed in immediate site vicinity having footpath of 2.5M width on both sides and median of 1M is observed. Vehicle carriageway is observed as intended for a 4-lane divided section. Accordingly, friction factor is applied to estimate the base capacity for existing conditions.

4. Ghorpadi Road - Under existing conditions, total road width of 22M is observed having 2.5M foothpath on both side as intended for a 4-lane undivided section. On-street parking is along both sides of the road. Accordingly friction factor is applied to estimate the base capacity for existing conditions.

5. East Avenue Road - Under existing conditions, total road width of approximately 17.5M is observed in immediate site vicinity having 1.5M footpath is observed along both sides of road and having Metro Pillars acting like median of 0.5 M wide. Vehicle carriageway is observed as intended for a 4-lane divided section. On-street parking is observed along both sides of the road. Accordingly, friction factor is applied to estimate the base capacity for existing conditions.

6. Magarpatta Road- Under existing conditions, total road width of approximately 45M is observed in immediate site vicinity having foothpath of 3M on the both sides. It has a median of 2M width to segregate the bidirectional traffic. On Street Parking of 6 to 6.4M was observed on either side of the road. Accordingly, friction factor is applied to estimate the base capacity for existing conditions.

7. Samrat Ashok Road - Under existing conditions,total Road width of approxomately 56M is observed in immediate site vicinity with a variable road width. the road is having footpath of 5.1M width on both sides combined.It has a Bus Rapid Transit (BRT) Lane at center of carriageway and median of 0.1M width on either side of BRT and has a bus shelter in between. On Street parking of approximately 3.5M was obseved on either side. It has a service road on its Eastbound direction for a minor stretch which again merges with main carriageway. Vehicle carriageway is observed as intended for a 8-lane divided section with a BRT Lane. Accordingly, friction factor is applied to estimate the base capacity for existing conditions.

3. FUTURE BASE TRAFFIC CONDITIONS (WITHOUT PROPOSED SITE)

a) Development Plan Road Improvements:

An extract from Pune Municipal Corporation (PMC) Development Plan is provided below to show the road network in the vicinity of the subject site. As per DP, N Main Road has a ROW of 30m, Riverdale Road has a ROW of 18m, and Proposed DP Road has a ROW of 30M upon its full pledged development in future. These improvements are considered for study area road widths in the site vicinity for future years.

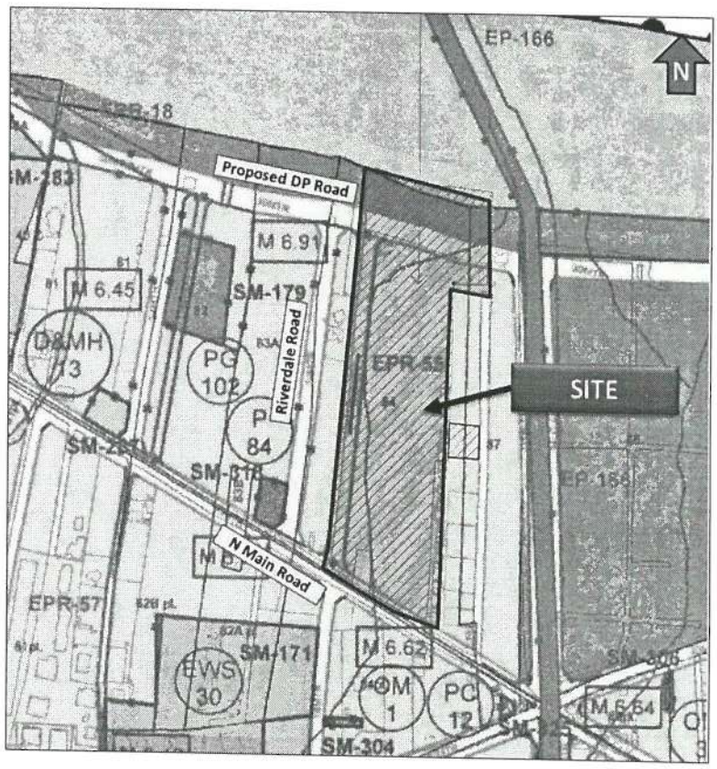


Figure 3-1 Development Plan

Table 3-1 shows the study area roads and future road widths, typology, base capacity, friction factors and adjusted road capacity to be used for further analysis.

Table 3-1 : Road Categories and Capacity (Future Years)

No.	Road Names	Functionality of Road	Existing/ Proposed Road	Typology of the Road	Total Road Width Available / DP Road Width	Approx. Carriageway Width	Maximum Capacity PCU/Hr	Friction Factors for Impedance to Traffic Flow	Adjusted Road Capacity PCU/Hr
1	N Main Road	Sub-Arterial Road	Proposed	6 Lane (Divided)	30.0 M	22.0 M	8325	0.9	7500
2	Ghorpadi Road	Sub-Arterial Road	Proposed	6 Lane (Divided)	30.0 M	22.0 M	8325	0.9	7500
3	East Avenue Road	Sub-Arterial Road	Existing	4 Lane (Divided)	17.5 M	13.0 M	4950	0.9	4460
4	Magarpatta Road	Sub-Arterial Road	Existing	8 Lane (Divided)	45.0 M	24.6 M	9300	0.9	8370
5	Samrat Ashok Road	Arterial Road	Existing	8 Lane (Divided)	55.7 M	41.0 M	15450	0.9	13910
6	Riverdale Road	Sub-Arterial Road	Proposed	6 Lane (Divided)	24.0 M	16.0 M	6075	0.9	5470
7	Proposed DP Road	Sub-Arterial Road	Proposed	6 Lane (Divided)	30.0 M	22.0 M	8325	0.9	7500

Notes:

1. Road capacity and LOS estimation is based upon methodology described in Indo-HCM. Maximum capacity for the road is "Base Capacity" for that typology of the road. Base capacity is calculated for different road width with interpolation based upon standard road width of 7.5M.

2. Actual carriageway width (Paved Road) is utilized to determine the Road capacity and related LOS.

3. N Main Road**- In future conditions, total road width of approximately 30M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

4. Ghorpadi Road** - In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and 1M wide median as intended for a 6-lane divided section. On-street parking is observed along both sides of the road at certain stretches. Accordingly friction factor is applied to estimate the base capacity for existing

5. East Avenue Road** -In future conditions, total road width of 17.5M is observed having 2M foothpath on both side and Vehicle carriageway is observed as intended for a 4-lane divided section with a 0.5M wide median. . Accordingly friction factor is applied to estimate the base capacity for existing conditions.

6. Magarpatta Road**- In future conditions, total road width of approximately 45M is observed in immediate site vicinity having foothpath of 3M on the both sides. It has a median of 2M width to segregate the bidirectional traffic. On Street Parking of 6 to 6.4M was observed on either side of the road. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

7. Samrat Ashok Road** - In future conditions,total Road width of approxomately 56M is observed in immediate site vicinity with a variable road width. the road is having footpath of 5.1M width on both sides combined.It has a Bus Rapid Transit (BRT) Lane at center of carriageway and median of 0.1M width on either side of BRT and has a bus shelter in between. On Street parking of approximately 3.5M was obseved on either side. It has a service road on its Eastbound direction for a minor stretch which again merges with main carriageway. Vehicle carriageway is observed as intended for a 8-lane divided section with a BRT Lane. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

8. Riverdale Road-In future conditions, total road width of approximately 24M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions. The traffic on this road for future conditions is assumed based on the traffic of Magarpatta road and N Main road.

9. Proposed DP Road** -In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly friction factor is applied to estimate the base capacity for existing conditions. The traffic on this road for future conditions is assumed based on the traffic of Riverdale road.

b) Traffic Volume Projection

This TIA has analyzed the future conditions for the Year 2029 as full build-out and occupancy of the proposed development, plus a 10-year scenario (Year 2034). Accordingly, base traffic is projected for the Year 2029 and 2034 by applying growth factor to existing traffic data collected on study area network. The proposed project is in the Mundhwa area. This area has seen many residential as well as Commercial developments in the last ten years and the real estate market is constantly growing because of home price affordability, good roadway connectivity of Mundhwa with other parts of the Pune. Major infrastructure projects are already completed and operational which are connected to the different parts of the city. All these factors have led to a consistent growth in the traffic pattern of the area. Considering the potential for further development, a moderate Annual Compounded Growth Rate (ACGR) of 3% to 5% is considered for future years to take into effect the traffic associated with the other developments. For the first five years i.e., 2029 5% growth rate and for next five year i.e., 2034 3% growth rate is considered. With this methodology TIA has projected the Base Traffic Conditions for the Year 2029 and 2034 on the surrounding study area network (**without proposed site traffic**).

c) Capacity Analysis

In a general context, roads are designed for handling adequate capacity of vehicles to avoid congestion and delay under average conditions which is generally based upon Average Daily Traffic (ADT). With the capacity designed only for average conditions, it is inevitable that congestion occurs in peak hour situations or worst-case scenarios. Sincrono has performed capacity analysis for AM and PM peak hours with projected base year 2029 and 2034 traffic volumes. Peak hour projected traffic on study area roadway links was compared with their capacity. The ratio of peak traffic volume and capacity (V/C) is used as an index to determine the level of congestion on link for future base year conditions (without site). **Table 3-2** and **Table 3-3** are provided to show the projected AM/PM peak hour traffic volume-V/C ratio-LOS for the study area roadways during Base Year 2029 and 2034 conditions (without site traffic), respectively.

Table 3-2 : 2029 BASE YEAR TRAFFIC CONDITIONS AND LOS

							ANALYSIS YEAR	"+5 Year Scenario - Yr 2029" WITHOUT Proposed Project				
							PEAK PERIOD	Morning Peak Hour			Evening Peak Hour	
Sr. No.	Road Link	Typology of the Road	Existing/ Proposed Road	Total Road Width Available / DP Road Width	Approx. Available Carriageway Width	Adjusted Traffic Capacity (PCU/hr)	Observed Traffic Volume (PCU/hr)	V/C Ratio	LOS	Observed Traffic Volume (PCU/hr)	V/C Ratio	LOS
1	N Main Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	4247	0.57	C	4673	0.62	C
2	Ghorpadi Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	1957	0.26	B	1682	0.22	B
3	East Avenue Road	4 Lane (Divided)	Existing	17.5 M	13.0 M	4460	1827	0.41	B	2006	0.45	B
4	Magarpatta Road	8 Lane (Divided)	Existing	45.0 M	24.6 M	8370	4284	0.51	C	4515	0.54	C
5	Samrat Ashok Road	8 Lane (Divided)	Existing	55.7 M	41.0 M	13910	9767	0.70	C	9637	0.69	C
6	Riverdale Road	6 Lane (Divided)	Proposed	24.0 M	16.0 M	5470	1531	0.28	B	1723	0.31	B
7	Proposed DP Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	893	0.12	A	1168	0.16	B

Notes:

1. Road capacity and LOS estimation is based upon methodology described in Indo-HCM. Maximum capacity for the road is "Base Capacity" for that typology of the road. Base capacity is calculated for different road width with interpolation based upon standard road width of 7.5M.
2. Actual carriageway width (Paved Road) is utilized to determine the Road capacity and related LOS.
3. N Main Road**- In future conditions, total road width of approximately 30M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions.
4. Ghorpadi Road** - In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and 1M wide median as intended for a 6-lane divided section. On-street parking is observed along both sides of the road at certain stretches. Accordingly friction factor is applied to estimate the base capacity for existing conditions.
5. East Avenue Road** -In future conditions, total road width of 17.5M is observed having 2M foothpath on both side and Vehicle carriageway is observed as intended for a 4-lane divided section with a 0.5M wide median.. Accordingly friction factor is applied to estimate the base capacity for existing conditions.
6. Magarpatta Road**- In future conditions, total road width of approximately 45M is observed in immediate site vicinity having foothpath of 3M on the both sides. It has a median of 2M width to segregate the bidirectional traffic. On Street Parking of 6 to 6.4M was observed on either side of the road. Accordingly, friction factor is applied to estimate the base capacity for future conditions.
7. Samrat Ashok Road** - In future conditions,total Road width of approxomately 56M is observed in immediate site vicinity with a variable road width. the road is having footpath of 5.1M width on both sides combined.It has a Bus Rapid Transit (BRT) Lane at center of carriageway and median of 0.1M width on either side of BRT and has a bus shelter in between. On Street parking of approximately 3.5M was obseved on either side. It has a service road on its Eastbound direction for a minor stretch which again merges with main carriageway. Vehicle carriageway is observed as intended for a 8-lane divided section with a BRT Lane. Accordingly, friction factor is applied to estimate the base capacity for future conditions.
8. Riverdale Road-In future conditions, total road width of approximately 24M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions. The traffic on this road for future conditions is assumed based on the traffic of Magarpatta road and N Main road.
9. Proposed DP Road** -In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly friction factor is applied to estimate the base capacity for existing conditions. The traffic on this road for future conditions is assumed based on the traffic of Riverdale road.

397

Table 3-3 : 2034 BASE YEAR TRAFFIC CONDITIONS AND LOS

							"+10 Year Scenario - Yr 2034" WITHOUT Proposed Project					
						ANALYSIS YEAR						
						PEAK PERIOD	Morning Peak Hour			Evening Peak Hour		
Sr. No.	Road Link	Typology of the Road	Existing/ Proposed Road	Total Road Width Available / DP Road Width	Approx. Available Carriageway Width	Adjusted Traffic Capacity (PCU/hr)	Observed Traffic Volume (PCU/hr)	V/C Ratio	LOS	Observed Traffic Volume (PCU/hr)	V/C Ratio	LOS
1	N Main Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	4923	0.66	C	5418	0.72	C
2	Ghorpadi Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	2269	0.30	B	1950	0.26	B
3	East Avenue Road	4 Lane (Divided)	Existing	17.5 M	13.0 M	4460	2118	0.47	C	2325	0.52	C
4	Magarpatta Road	8 Lane (Divided)	Existing	45.0 M	24.6 M	8370	4966	0.59	C	5234	0.63	C
5	Samrat Ashok Road	8 Lane (Divided)	Existing	55.7 M	41.0 M	13910	11323	0.81	D	11171	0.80	D
6	Riverdale Road	6 Lane (Divided)	Proposed	24.0 M	16.0 M	5470	1775	0.32	B	1997	0.37	B
7	Proposed DP Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	1035	0.14	A	1354	0.18	B

Notes:

1. Road capacity and LOS estimation is based upon methodology described in Indo-HCM. Maximum capacity for the road is "Base Capacity" for that typology of the road. Base capacity is calculated for different road width with interpolation based upon standard road width of 7.5M.

2. Actual carriageway width (Paved Road) is utilized to determine the Road capacity and related LOS.

3. N Main Road**- In future conditions, total road width of approximately 30M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

4. Ghorpadi Road** - In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and 1M wide median as intended for a 6-lane divided section. On-street parking is observed along both sides of the road at certain stretches. Accordingly friction factor is applied to estimate the base capacity for existing conditions.

5. East Avenue Road** -In future conditions, total road width of 17.5M is observed having 2M foothpath on both side and Vehicle carriageway is observed as intended for a 4-lane divided section with a 0.5M wide median. . Accordingly friction factor is applied to estimate the base capacity for existing conditions.

6. Magarpatta Road**- In future conditions, total road width of approximately 45M is observed in immediate site vicinity having foothpath of 3M on the both sides. It has a median of 2M width to segregate the bidirectional traffic. On Street Parking of 6 to 6.4M was observed on either side of the road. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

7. Samrat Ashok Road** - In future conditions,total Road width of approxomately 56M is observed in immediate site vicinity with a variable road width. the road is having footpath of 5.1M width on both sides combined.It has a Bus Rapid Transit (BRT) Lane at center of carriageway and median of 0.1M width on either side of BRT and has a bus shelter in between. On Street parking of approximately 3.5M was obseved on either side. It has a service road on its Eastbound direction for a minor stretch which again merges with main carriageway. Vehicle carriageway is observed as intended for a 8-lane divided section with a BRT Lane. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

8. Riverdale Road-In future conditions, total road width of approximately 24M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions. The traffic on this road for future conditions is assumed based on the traffic of Magarpatta road and N Main road.

9. Proposed DP Road** -In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly friction factor is applied to estimate the base capacity for existing conditions. The traffic on this road for future conditions is assumed based on the traffic of Riverdale road.

4. FUTURE TOTAL TRAFFIC CONDITIONS (WITH PROPOSED SITE)

a) Site Access and Base Circulation

As per architectural layout, the proposed plot is proposed with 1 Entry/Exit for 2W, 1 Entry/Exit for VIP and 1 Exits for 4-wheelers has provided along DP road, 1 Entry/Exit for 2-Wheeler has provided along N Main Road, 2 Entry, 1 Exit and 2 Rejection gates for 4 wheelers has been Provided along Riverdale Road. Parking for all building users, including visitors, is proposed within the subject plot's boundary on the 3 Parking Floors and 5 Basements. Internal driveways are proposed with adequate width to accommodate respective one-way and two-way circulation within plot boundary at ground level. As a traffic expert, we recommend providing a minimum 6.0-meter driveway for the two-way traffic movement and 4.5-meter driveway for one-way traffic movement within the subject plot boundary.

Figure 4-1 is provided to show the recommended circulation pattern along with access points (entry/exit), one-way and two-way vehicular movements, etc. for the Ground Floor. Please note that the circulation pattern is recommended to maintain a safe driving pattern with fewer conflict points.

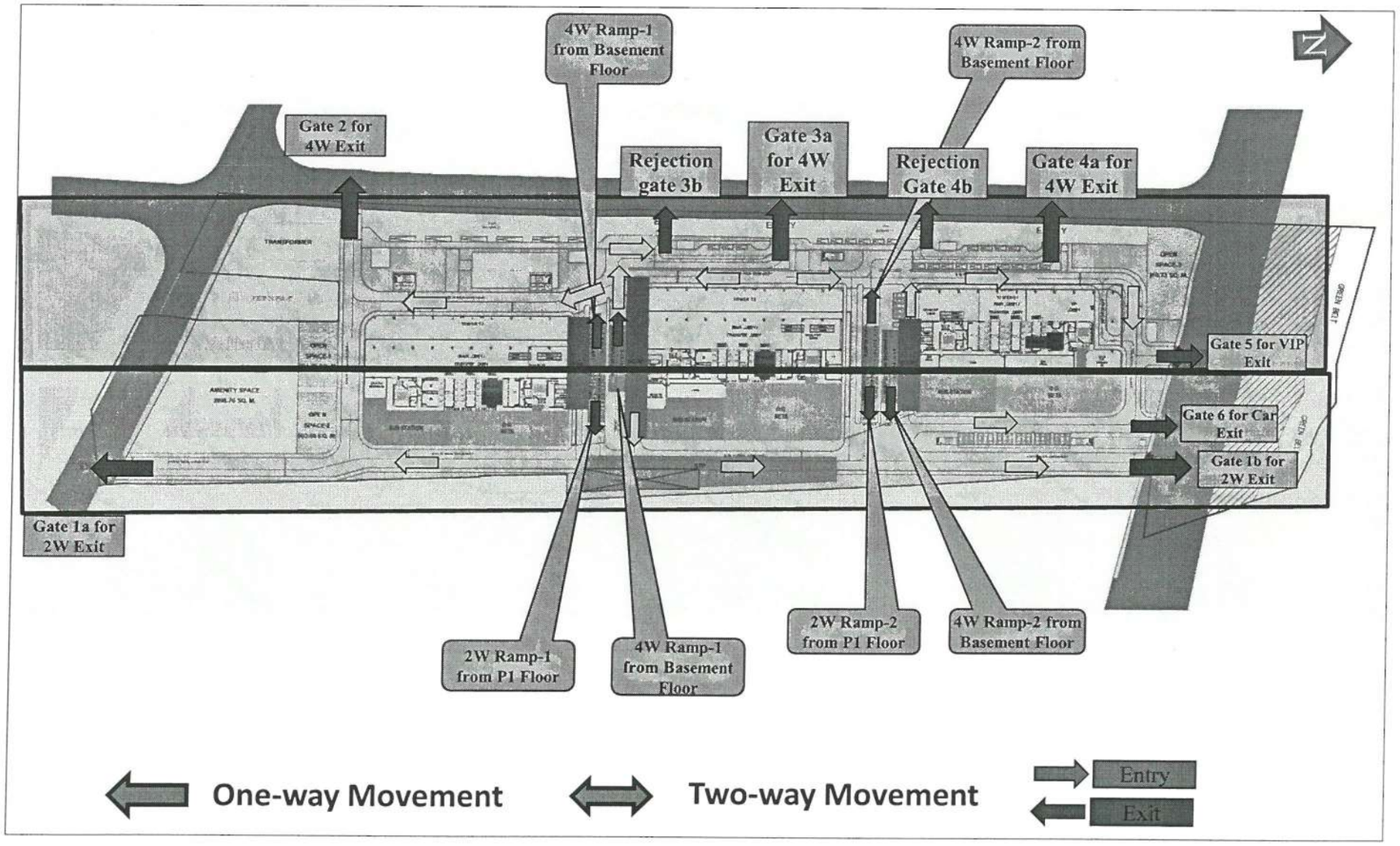


Figure 4-1 : Proposed Site Access and Circulation

b) Trip Generation and Modal Split

Trip Generation is the first step in the conventional four-step transportation forecasting process. Journey is an out-way movement from a point of origin to a point of destination, whereas the word "trip" denotes an outward and return journey. If either origin or destination of a trip is the home of the trip maker, then such trips are called home-based trips and the rest of the trips are called non-home-based trips. Trip production is defined as all the trips of home based or as the origin of the non-home-based trips.

1. ITE Trip Generation

Traffic data published in Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition, 2012 were referred to commercial facilities. Traffic generation rates for residential and commercial are used as per Indian conditions based upon historical data for Pune area. These are normally expressed as trips per residential units, trips per vehicle owned, trips per parking spaces provided, square feet of commercial space or based upon population (nos. of persons). In this study, trips are projected based upon estimated population and their preferred mode of transport in the area as observed during traffic survey. Generally Residential and commercial land use witnesses 10% to 15% of person trips during the peak hour of the day.

2. Trips Estimation in PCUs:

Based upon existing traffic survey it is observed that major mode of transportation in the area is 2-wheelers and 4-wheelers (Cars) followed by 3-wheelers. Accordingly, development-generated persons trips are divided into three categories of preferred modal split as Cars, 2-wheelers, and 4-wheelers. Higher share percentages are considered for 2-wheelers. Project is anticipated to be occupied by the lower middle-income class or middle-income class population. It is anticipated that 2-wheeler ownership will continue to be predominant than Private Car ownership. Accordingly, modal split for the expected Commercial site trips is assumed as 2-wheeler users at 40%, passenger rickshaws users at 15%, shuttle bus users at 10% and private car users at 25%. Also 10% of walking trips are considered by users. These estimated person trips by preferred modal split is then converted to vehicle trips by applying respective Vehicle Occupancy factor. Note that observed vehicle occupancy factors (based upon existing conditions) are utilized for analysis purposes. Equivalent Passenger Car Units (PCU) factors are applied on estimated vehicle trips to calculate total PCU generated by proposed development. PCU factors are considered according to Indo-HCM guidelines as mentioned in the earlier sections. These estimated PCUs are used for calculating the total traffic conditions for year 2029 and 2034 scenario. **Table 4-1** is provided to show the projected trips

to be generated with full build-out and occupancy of the subject site. **Table 4-2** is provided to show the projected **"Net External Trips"** to be generated with full build-out and occupancy of the subject site.

Table 4-1 : Proposed Development – Trip Generation (Commercial)

Commercial						
Land Use	Type	**Area(Sq.M)**	**Estimated Population**		**Peak Hour Trips (%)**	**Peak Hour Persons Trips**
Commercial	All	614387	47,015		12%	5642
Details	**2W**	**3W**	**Shuttle Bus**	**Cars**	**Walking**	**Total**
Modal Split	*40%*	*15%*	*10%*	*25%*	*10%*	*100%*
No. of Persons	2,257	846	564	1,410	564	5,642
Avg. Occupancy	*1.50*	*2.50*	*35.00*	*3.00*	*1.0*	-
No. of Trips	1,504	339	16	470	564	2,893
AM PEAK HOUR TRIPS in PCUs						**1042 PCUs**
Land Use	Type	**Area(Sq.M)**	**Estimated Population**		**Peak Hour Trips (%)**	**Peak Hour Persons Trips**
Commercial	All	614387	47015		15%	7052
Details	**2W**	**3W**	**Shuttle Bus**	**Cars**	**Walking**	**Total**
Modal Split	*40%*	*15%*	*10%*	*25%*	*10%*	*100%*
No. of Persons	2,821	1,058	705	1,763	705	7,052
Avg. Occupancy	*1.50*	*2.50*	*35.00*	*3.00*	*1.0*	-
No. of Trips	1,881	423	20	588	705	3,617
PM PEAK HOUR TRIPS in PCUs						**1302 PCUs**

Table 4-2 : Proposed Development – Trip Generation (Total)

PROPOSED DEVELOPMENT-GENERATED TRIPS						
Details	**2W**	**3W**	**Shuttle Bus**	**Cars**	**Walking**	**Total Vehicles**
Commercial	1,504	339	16	470	564	2,329
TOTAL AM PEAK HOUR TRIPS in PCUs						**1042 PCUs**
NET EXTERNAL AM PEAK HOUR TRIPS in PCUs						**1042 PCUs**

Details	**2W**	**3W**	**Shuttle Bus**	**Cars**	**Walking**	**Total Vehicles**
Commercial	1,881	423	20	588	705	2,912
PM PEAK HOUR TRIPS in PCUs						**1302 PCUs**
NET EXTERNAL PM PEAK HOUR TRIPS in PCUs						**1302 PCUs**

c) Trip Distribution

This is the second stage in the transportation forecasting model. The anticipated traffic volume generated (in and out) by the proposed development will have a defined pattern of distribution. Trip distribution essentially describes how the development generated traffic arrives and departs from the project development site to surrounding road network. For this TIA, an overall trip distribution was developed for the site-generated traffic after a review of the existing travel patterns in the area and ease of access to site. The locations of the major roadways that will serve the development also have considerable impact on trip distribution. Proposed development-generated traffic is anticipated to use the study area network as described below and shown in **Figure 4-2** to access the site in operational year.

- 60% of site traffic anticipated to/from N Main Road.
  - 60% Site Traffic from Expected Route – N main Road (E) <<←→>> Site.
- 20% of site traffic anticipated to/from Ghorpadi Road.
  - 20% Site Traffic from Expected Route – Ghorpadi Road <<←→>> N Main Road <<←→>> Site.
- 30% of site traffic anticipated to/from East Avenue Road.
  - 20% Site Traffic from Expected Route – East Avenue Road <<←→>> 30M DP Road <<←→>> Site.
  - 10% Site Traffic from Expected Route – East Avenue Road <<←→>> N Main Road <<←→>> Site.
- 20% of site traffic anticipated to/from Magarpatta Road.
  - 20% Site Traffic from Expected Route – Magarpatta Road <<←→>> 30M DP Road <<←→>> Site.
- 15% of site traffic anticipated to/from Samrat Ashok Road.
  - 15% Site Traffic from Expected Route – Samrat Asok Road <<←→>> East Avenue Road <<←→>> N Main Road/30M DP Road <<←→>> Site.

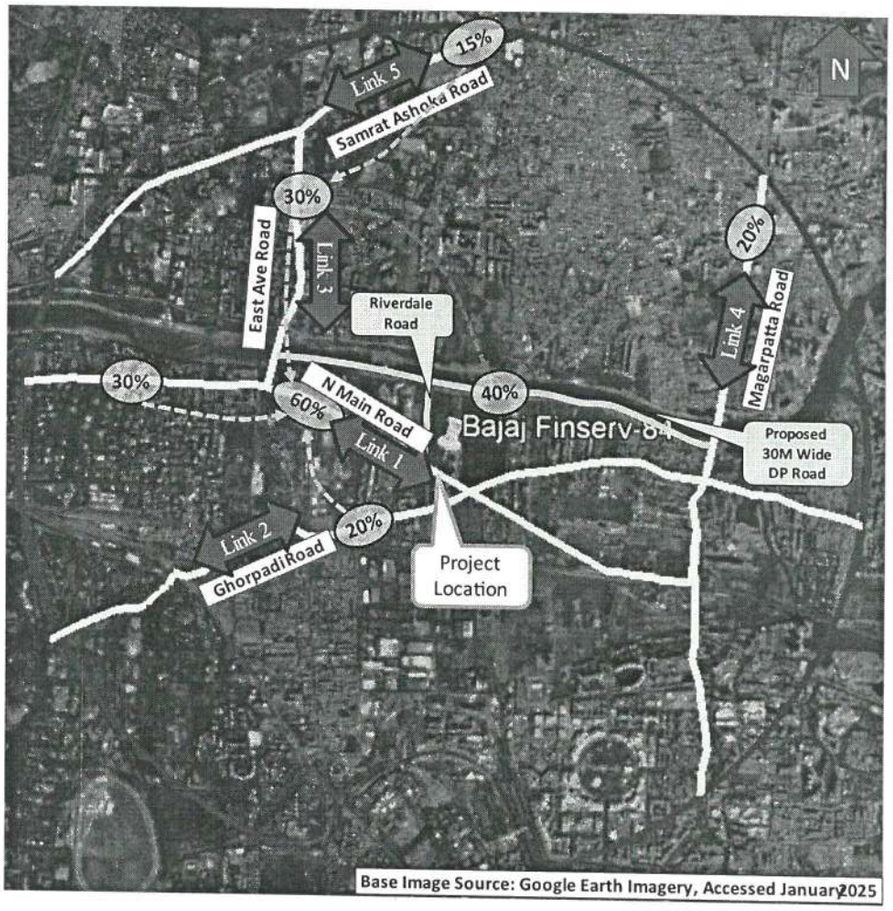


Figure 4-2 : Trip Distribution

d) Total Traffic Volume Projection with Site

The proposed development-generated traffic was added to the Base Traffic of Year 2029 and Year 2034 to arrive at Total Traffic Conditions for future years with proposed project. Full build-out and occupancy of the project is considered for the Year 2029. Total traffic volume for Year 2029 (+5-year scenario) and Year 2034 (+10-year scenario) conditions with proposed development are provided in tables below.

e) Capacity Analysis and Site Impact

Total traffic thus arrived on various links was compared with their capacity. The ratio of peak traffic volume and capacity (V/C) is used as an index to determine the level of congestion on the link which is likely to occur when projected traffic is operative on link with partial occupancy and full occupancy of the proposed project.

Road Link 1 - N Main Road: Indo-HCM analysis shows that N Main Road (near site vicinity) will operate with LOS C in future years with site traffic added considering future road widening. Strict implementation of traffic rules and no on-street parking (along one or both sides) is required to maintain the uninterrupted traffic flow along N Main Road in future years to operate the road at desired LOS. Actual traffic conditions can be verified on site in future years (5 years) with adjacent land developments to assess if any improvements are required.

Road Link 2 – Ghorpadi Road: Indo-HCM analysis shows that Ghorpadi Road will operate with LOS B in future years with site traffic added. Existing road can accommodate the future volume projected for next 10 years with anticipated growth. Strict implementation of traffic rules and no on-street parking or regularized on-street parking are required to maintain the uninterrupted traffic flow along Ghorpadi Road in future years to operate the road at desired LOS. On-street parking can be restricted along this road stretch (along one or both sides) to increase based capacity of the carriageway. If provided with on-street parking along one side of the road, a wider pavement area will be available for vehicle carriageway. It will help in improving traffic operations in future years. Actual traffic conditions can be verified on site in future years (5 years) with adjacent land developments to assess if any improvements are required

Road Link 3 – East Avenue Road: Indo-HCM analysis shows that East Avenue Road (near site vicinity) will operate with LOS D in future years with site traffic added. Existing roads can accommodate the future volume projected for the next 10 years with anticipated growth. Strict implementation of traffic rules and no on-street parking (along one or both sides) or regularized on-street parking are required to maintain the uninterrupted traffic flow along East Avenue Road in future years to operate the road at the desired LOS. Actual traffic conditions can be verified on site in future years (5 years) with adjacent land developments to assess if any improvements are required. Traffic volumes shall be reviewed periodically, and necessary modifications shall be done to cater for the increased traffic demand.

Road Link 4 – Magarpatta Road: Indo-HCM analysis shows that Magarpatta Road (near site vicinity) will continue to operate with LOS C in future years with site traffic added. Existing roads can accommodate the future volume projected for next 10 years with anticipated growth. Strict implementation of traffic rules and regularized on-street parking are required to maintain the uninterrupted traffic flow along Magarpatta Road in future years to operate the road at desired LOS. On-street parking can be restricted along this road stretch (along one or both sides) to increase based capacity of the carriageway in case of any future requirements. Actual

traffic conditions can be verified on site in future years (5 years) with adjacent land developments to assess if any improvements are required.

Road Link 5 – Samrat Ashok Road: Indo-HCM analysis shows that Samrat Ashok Road (near site vicinity) will operate with LOS D in future years with site traffic added without any future road widening. Strict implementation of traffic rules and no on-street parking (along one or both sides) is required to maintain the uninterrupted traffic flow along Samrat Ashok Road in future years to operate the road at desired LOS. Actual traffic conditions can be verified on site in future years (5 years) with adjacent land developments to assess if any improvements are required.

Riverdale Road: Indo-HCM analysis shows that Riverdale Road (near site vicinity) will operate with LOS C in future years with site traffic added. Strict implementation of traffic rules and no on-street parking (along one or both sides) is required to maintain the uninterrupted traffic flow along Riverdale Road in future years to operate the road at desired LOS. Actual traffic conditions can be verified on site in future years (5 years) with adjacent land developments to assess if any improvements are required.

Proposed DP Road: Indo-HCM analysis shows that Proposed DP Road (near site vicinity) will operate with LOS B in future years with site traffic added. Strict implementation of traffic rules and no on-street parking (along one or both sides) is required to maintain the uninterrupted traffic flow along Proposed DP Road in future years to operate the road at desired LOS. Actual traffic conditions can be verified on site in future years (5 years) with adjacent land developments to assess if any improvements are required.

Traffic volume shall be reviewed periodically, and necessary modifications shall be done to cater for the increased traffic demand. The summary results of the future traffic flow conditions on study area roadway network are shown in **Table 4-3** and **Table 4-4** for AM and PM peak hour, respectively. The summary of comparison of Level of Service (LOS) results for 2024 Existing Conditions, Future Year 2029 and 2034 *without proposed development* and *with proposed development* is shown in **Table 4-5**. Based upon Indo-HCM Road Capacity Analysis, it is observed that there is significant change in the LOS of the study area road links with site traffic added in future years.

Table 4-3 : Future Year - Total Traffic, Site Impact and LOS (AM Peak Hours)

Morning - AM Peak Hour Traffic Analysis																		
Road Names	Typology of the Road	Existing/ Proposed Road	Total Road Width Available / DP Road Width	Approx. Carriageway Width	Maximum Capacity PCU/Hr	without Proposed Development					Traffic from Proposed Development	+5 Years with Proposed Development			+10 Years with Proposed Development		
						Existing Traffic (PCU/Hr)	V/C Ratio	LOS	Future Year Base Traffic (PCU/Hr)			Total Traffic (PCU/hr)	V/C Ratio	LOS	Total Traffic (PCU/hr)	V/C Ratio	LOS
						2024			2029	2034		2029			2034		
N Main Road	4 Lane (Divided)	Existing	20.0 M	14.0 M	4260	3328	0.78	D	4247	4923	625	4872	1.14	F	5549	1.30	F
N Main Road (As per Pune DP Plan)**	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	-	-	-	4247	4923	625	4872	0.65	C	5549	0.74	C
Ghorpadi Road	4 Lane (Undivided)	Existing	22.0 M	15.0 M	4120	1533	0.37	B	1957	2269	208	2165	0.53	C	2477	0.60	C
Ghorpadi Road (As per Pune DP Plan)**	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	-	-	-	1957	2269	208	2165	0.29	B	2477	0.33	B
East Avenue Road	4 Lane (Divided)	Existing	17.5 M	13.0 M	4460	1432	0.32	B	1827	2118	313	2140	0.48	C	2431	0.54	C
East Avenue Road (As per Pune DP Plan)**	4 Lane (Divided)	Existing	17.5 M	13.0 M	4460	-	-	-	1827	2118	313	2140	0.48	C	2431	0.54	C
Magarpatta Road	8 Lane (Divided)	Existing	45.0 M	24.6 M	8370	3356	0.40	B	4284	4966	208	4492	0.54	C	5174	0.62	C
Magarpattai Road (As per Pune DP Plan)**	8 Lane (Divided)	Existing	45.0 M	24.6 M	8370	-	-	-	4284	4966	208	4492	0.54	C	5174	0.62	C
Samrat Ashok Road	8 Lane (Divided)	Existing	55.7 M	41.0 M	13910	7653	0.55	C	9767	11323	156	9923	0.71	C	11479	0.83	D
Samrat Ashoka Road (As per Pune DP Plan)**	8 Lane (Divided)	Existing	55.7 M	41.0 M	13910	-	-	-	9767	11323	156	9923	0.71	C	11479	0.83	D
Riverdale Road (As per Pune DP Plan)**	6 Lane (Divided)	Proposed	24.0 M	16.0 M	5470	-	-	-	1531	1775	521	2052	0.38	B	2296	0.42	B
Proposed DP Road (As per Pune DP Plan)**	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	-	-	-	893	1035	417	1309	0.17	B	1452	0.19	B

Notes:

1. Road capacity and LOS estimation is based upon methodology described in Indo-HCM. Maximum capacity for the road is "Base Capacity" for that typology of the road. Base capacity is calculated for different road width with interpolation based upon standard road width of 7.5M.
2. Actual carriageway width (Paved Road) is utilized to determine the Road capacity and related LOS.
3. N Main Road**- In future conditions, total road width of approximately 30M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions.
4. Ghorpadi Road** - In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and 1M wide median as intended for a 6-lane divided section. On-street parking is observed along both sides of the road at certain stretches. Accordingly friction factor is applied to estimate the base capacity for existing conditions.
5. East Avenue Road** -In future conditions, total road width of 17.5M is observed having 2M foothpath on both side and Vehicle carriageway is observed as intended for a 4-lane divided section with a 0.5M wide median. . Accordingly friction factor is applied to estimate the base capacity for existing conditions.
6. Magarpatta Road**- In future conditions, total road width of approximately 45M is observed in immediate site vicinity having foothpath of 3M on the both sides. It has a median of 2M width to segregate the bidirectional traffic. On Street Parking of 6 to 6.4M was observed on either side of the road. Accordingly, friction factor is applied to estimate the base capacity for future conditions.
7. Samrat Ashok Road** - In future conditions,total Road width of approxomately 56M is observed in immediate site vicinity with a variable road width. the road is having footpath of 5.1M width on both sides combined.It has a Bus Rapid Transit (BRT) Lane at center of carriageway and median of 0.1M width on either side of BRT and has a bus shelter in between. On Street parking of approximately 3.5M was obseved on either side. It has a service road on its Eastbound direction for a minor stretch which again merges with main carriageway. Vehicle carriageway is observed as intended for a 8-lane divided section with a BRT Lane. Accordingly, friction factor is applied to estimate the base capacity for future conditions.
8. Riverdale Road-In future conditions, total road width of approximately 24M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions. The traffic on this road for future conditions is assumed based on the traffic of Magarpatta road and N Main road.
9. Proposed DP Road** -In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly friction factor is applied to estimate the base capacity for existing conditions. The traffic on this road for future conditions is assumed based on the traffic of Riverdale road.

Table 4-4 : FUTURE YEAR - TOTAL TRAFFIC, SITE IMPACT AND LOS (PM PEAK HOURS)

Evening - PM Peak Hour Traffic Analysis																	
Road Names	Typology of the Road	Existing/ Proposed Road	Total Road Width Available / DP Road Width	Approx. Carriageway Width	Maximum Capacity PCU/Hr	without Proposed Development					Traffic from Proposed Development	+5 Years with Proposed Development			+10 Years with Proposed Development		
						Existing Traffic (PCU/Hr)	V/C Ratio	LOS	Future Year Base Traffic (PCU/Hr)			Total Traffic (PCU/hr)	V/C Ratio	LOS	Total Traffic (PCU/hr)	V/C Ratio	LOS
						2024			2029	2034		2029			2034		
N Main Road	4 Lane (Divided)	Existing	20.0 M	14.0 M	4260	3662	0.86	E	4673	5418	781	5455	1.28	F	6199	1.46	F
N Main Road (As per Pune DP Plan)**	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	-	-	-	4673	5418	781	5455	0.73	C	6199	0.83	D
Ghorpadi Road	4 Lane (Undivided)	Existing	22.0 M	15.0 M	4120	1318	0.32	B	1682	1950	260	1943	0.47	C	2211	0.54	C
Ghorpadi Road (As per Pune DP Plan)**	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	-	-	-	1682	1950	260	1943	0.26	B	2211	0.29	B
East Avenue Road	4 Lane (Divided)	Existing	17.5 M	13.0 M	4460	1572	0.35	B	2006	2325	391	2396	0.54	C	2716	0.61	C
East Avenue Road (As per Pune DP Plan)**	4 Lane (Divided)	Existing	17.5 M	13.0 M	4460	-	-	-	2006	2325	391	2396	0.54	C	2716	0.61	C
Magarpatta Road	8 Lane (Divided)	Existing	45.0 M	24.6 M	8370	3538	0.42	B	4515	5234	260	4776	0.57	C	5495	0.66	C
Magarpattai Road (As per Pune DP Plan)**	8 Lane (Divided)	Existing	45.0 M	24.6 M	8370	-	-	-	4515	5234	260	4776	0.57	C	5495	0.66	C
Samrat Ashok Road	8 Lane (Divided)	Existing	55.7 M	41.0 M	13910	7550	0.54	C	9637	11171	195	9832	0.71	C	11367	0.82	D
Samrat Ashoka Road (As per Pune DP Plan)**	8 Lane (Divided)	Existing	55.7 M	41.0 M	13910	-	-	-	9637	11171	195	9832	0.71	C	11367	0.82	D
Riverdale Road (As per Pune DP Plan)**	6 Lane (Divided)	Proposed	24.0 M	16.0 M	5470	-	-	-	1723	1997	651	2374	0.43	B	2648	0.48	C
Proposed DP Road (As per Pune DP Plan)**	6 Lane (Divided)	Proposed	30.0 M	22.0 M	7500	-	-	-	1168	1354	521	1689	0.23	B	1875	0.25	B

Notes:

1. Road capacity and LOS estimation is based upon methodology described in Indo-HCM. Maximum capacity for the road is "Base Capacity" for that typology of the road. Base capacity is calculated for different road width with interpolation based upon standard road width of 7.5M.

2. Actual carriageway width (Paved Road) is utilized to determine the Road capacity and related LOS.

3. N Main Road**- In future conditions, total road width of approximately 30M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

4. Ghorpadi Road** - In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and 1M wide median as intended for a 6-lane divided section. On-street parking is observed along both sides of the road at certain stretches. Accordingly friction factor is applied to estimate the base capacity for existing conditions.

5. East Avenue Road** -In future conditions, total road width of 17.5M is observed having 2M foothpath on both side and Vehicle carriageway is observed as intended for a 4-lane divided section with a 0.5M wide median. . Accordingly friction factor is applied to estimate the base capacity for existing conditions.

6. Magarpatta Road**- In future conditions, total road width of approximately 45M is observed in immediate site vicinity having foothpath of 3M on the both sides. It has a median of 2M width to segregate the bidirectional traffic. On Street Parking of 6 to 6.4M was observed on either side of the road. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

7. Samrat Ashok Road** - In future conditions,total Road width of approxomately 56M is observed in immediate site vicinity with a variable road width. the road is having footpath of 5.1M width on both sides combined.It has a Bus Rapid Transit (BRT) Lane at center of carriageway and median of 0.1M width on either side of BRT and has a bus shelter in between. On Street parking of approximately 3.5M was obseved on either side. It has a service road on its Eastbound direction for a minor stretch which again merges with main carriageway. Vehicle carriageway is observed as intended for a 8-lane divided section with a BRT Lane. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

8. Riverdale Road-In future conditions, total road width of approximately 24M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions. The traffic on this road for future conditions is assumed based on the traffic of Magarpatta road and N Main road.

9. Proposed DP Road** -In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly friction factor is applied to estimate the base capacity for existing conditions. The traffic on this road for future conditions is assumed based on the traffic of Riverdale road.

403

Table 4-5 : LEVEL OF SERVICE (LOS) COMPARISON

No.	Road Names	Typology of the Road	Existing/ Proposed Road	Total Road Width Available / DP Road Width	Approx. Carriageway Width	Details	Level of Service (LOS)										Site Traffic Impact on Public Roads	
							2024 Existing Conditions		+5 Year Scenario (Year 2029)				+10 Year Scenario (Year 2034)					
									without Proposed Development		with Proposed Development		without Proposed Development		with Proposed Development			
							AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1**	N Main Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	LOS	D	E	C	C	C	C	C	C	C	D	11.3%	12.6%
						V/C	*0.78*	*0.86*	*0.57*	*0.62*	*0.65*	*0.73*	*0.66*	*0.72*	*0.74*	*0.83*		
2**	Ghorpadi Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	LOS	B	B	B	B	B	B	*B*	*B*	*B*	*B*	8.4%	11.8%
						V/C	*0.37*	*0.32*	*0.26*	*0.22*	*0.29*	*0.26*	*0.30*	*0.26*	*0.33*	*0.29*		
3**	East Avenue Road	4 Lane (Divided)	Existing	17.5 M	13.0 M	LOS	B	B	B	B	C	C	C	C	C	C	12.9%	14.4%
						V/C	*0.30*	*0.33*	*0.41*	*0.45*	*0.48*	*0.54*	*0.47*	*0.52*	*0.54*	*0.61*		
4**	Magarpatta Road	8 Lane (Divided)	Existing	45.0 M	24.6 M	LOS	B	B	C	C	C	C	C	C	C	C	4.0%	4.7%
						V/C	*0.40*	*0.42*	*0.51*	*0.54*	*0.54*	*0.57*	*0.59*	*0.63*	*0.62*	*0.66*		
5**	Samrat Ashok Road	8 Lane (Divided)	Existing	55.7 M	41.0 M	LOS	C	C	C	C	C	C	D	D	D	D	1.4%	1.7%
						V/C	*0.55*	*0.54*	*0.70*	*0.69*	*0.71*	*0.71*	*0.81*	*0.80*	*0.83*	*0.82*		
6**	Riverdale Road	6 Lane (Divided)	Proposed	24.0 M	16.0 M	LOS	_	_	B	B	B	B	B	B	B	C	22.7%	24.6%
						V/C	_	_	*0.28*	*0.31*	*0.38*	*0.43*	*0.32*	*0.37*	*0.42*	*0.48*		
7**	Proposed DP Road	6 Lane (Divided)	Proposed	30.0 M	22.0 M	LOS	_	_	A	B	B	B	A	B	B	B	28.7%	27.8%
						V/C	_	_	*0.12*	*0.16*	*0.17*	*0.23*	*0.14*	*0.18*	*0.19*	*0.25*		

Notes:

1. Road capacity and LOS estimation is based upon methodology described in Indo-HCM. Maximum capacity for the road is "Base Capacity" for that typology of the road. Base capacity is calculated for different road width with interpolation based upon standard road width of 7.5M.

2. Actual carriageway width (Paved Road) is utilized to determine the Road capacity and related LOS.

3. N Main Road**- In future conditions, total road width of approximately 30M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

4. Ghorpadi Road** - In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and 1M wide median as intended for a 6-lane divided section. On-street parking is observed along both sides of the road at certain stretches. Accordingly friction factor is applied to estimate the base capacity for existing conditions.

5. East Avenue Road** -In future conditions, total road width of 17.5M is observed having 2M foothpath on both side and Vehicle carriageway is observed as intended for a 4-lane divided section with a 0.5M wide median. . Accordingly friction factor is applied to estimate the base capacity for existing conditions.

6. Magarpatta Road**- In future conditions, total road width of approximately 45M is observed in immediate site vicinity having foothpath of 3M on the both sides. It has a median of 2M width to segregate the bidirectional traffic. On Street Parking of 6 to 6.4M was observed on either side of the road. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

7. Samrat Ashok Road** - In future conditions,total Road width of approxomately 56M is observed in immediate site vicinity with a variable road width. the road is having footpath of 5.1M width on both sides combined.It has a Bus Rapid Transit (BRT) Lane at center of carriageway and median of 0.1M width on either side of BRT and has a bus shelter in between. On Street parking of approximately 3.5M was obseved on either side. It has a service road on its Eastbound direction for a minor stretch which again merges with main carriageway. Vehicle carriageway is observed as intended for a 8-lane divided section with a BRT Lane. Accordingly, friction factor is applied to estimate the base capacity for future conditions.

8. Riverdale Road-In future conditions, total road width of approximately 24M is considered in immediate site vicinity having 2.5M wide footpath on either side. Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly, friction factor is applied to estimate the base capacity for future conditions. The traffic on this road for future conditions is assumed based on the traffic of Magarpatta road and N Main road.

9. Proposed DP Road** -In future conditions, total road width of 30M is observed having 2.5M foothpath on both side and Vehicle carriageway is observed as intended for a 6-lane divided section with a 1M wide median. Accordingly friction factor is applied to estimate the base capacity for existing conditions. The traffic on this road for future conditions is assumed based on the traffic of Riverdale road.

404

5. SWEPT PATH ANALYSIS

It is the analysis of the movement and path of the design vehicle undertaking a movement and/or a turning maneuver. It allows us to predict the path of steered vehicles in a variation of scenarios. The swept path analysis traces the path taken by each wheel, and calculates the space taken by the vehicle's body to ensure that there are no obstacles present. At a basic level this includes calculating the thread of each wheel during the turn and calculating the maneuvering space needed by the vehicle body (front and rear overhang). Swept Path Analysis benefits Planners, Architects, Engineers, Developers, and site owners as it provides them with the means to assess the turning implications of a wide variety of vehicle types on design layouts at an early stage in the design process without the need of physically driving or undertaking the maneuvers. This study has performed swept path analysis for the ground floor of the proposed project. **Please note that the Swept Path Analysis has been offered only and purely from traffic operation and maneuvering point of view, without any prejudice to the status of structures, if any, and without reference to the ownership and without carrying out actual site inspection, and without reference agreement/power of attorney for development if any. Parking Layout is analyzed for Swept Path based upon information provided, related NOCs, ACAD drawings and considering location of structural members as shown on respective parking floor plans prepared and provided by the Project Proponent/ Architect in month of May 2024.**

a) Objectives

The objectives of performing swept path analysis are as follows:

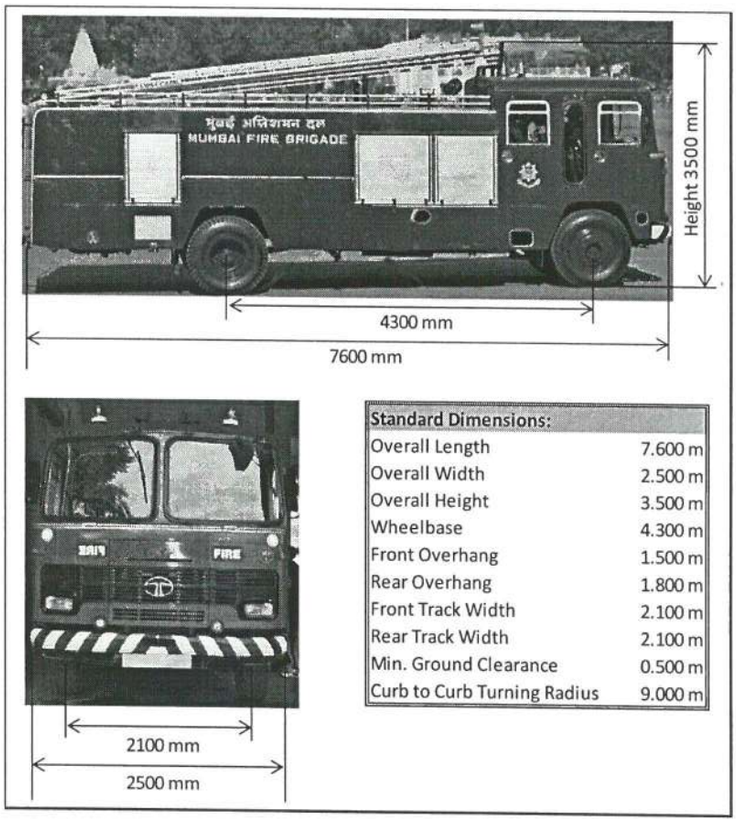
- To provide a Swept Path Analysis of vehicles overlaid on the proposed site layout to demonstrate that the vehicles can maneuver safely and efficiently within the site layout and recommend any changes required.

b) Design Vehicle

A design vehicle is a vehicle whose dimensions and operational characteristics are used to establish layout geometry. *From an optimal design perspective, it is beneficial to select the design vehicle, which is near to 85% percentile, i.e., 15% of vehicles can have larger dimensions. This helps in optimizing the space requirements.* Another factor to be considered is the socio-economic profile of residents of the complex. This complex is likely to be habituated by middle, upper middle class, and upper class with an affordability of

sedan/compact cars and two wheelers. In case of a fire emergency inside the premises, it is imperative that access be provided to fire fighting vehicles. Fire tender vehicle movement shall require complete one-way movement during its operation. Based upon the above-mentioned criteria, Sincrono has utilized following design vehicles for swept path analysis:

- Fire Vehicle: Typical Fire Engine – Tata 1613 Fire Tender Model (Refer **Figure 5-1**)



Standard Dimensions:	
Overall Length	7.600 m
Overall Width	2.500 m
Overall Height	3.500 m
Wheelbase	4.300 m
Front Overhang	1.500 m
Rear Overhang	1.800 m
Front Track Width	2.100 m
Rear Track Width	2.100 m
Min. Ground Clearance	0.500 m
Curb to Curb Turning Radius	9.000 m

Figure 5-1 : Fire Tender Dimensions

c) Swept Path

As mentioned above the swept path analysis was carried out for ground level internal roads with a Standard Fire Tender. Also swept path analysis was carried out for ground floor with passenger car design vehicles. For swept path analysis of passenger car, a forward speed of 10 km/hr. and reverse speed of 2.5-5 km/hr. is considered. The following observations are made during swept path analysis.

Ground Floor Internal Roads/ Driveway with Fire Tender -

- ✓ It is recommended to maintain a minimum 6.0M driveway around the habitable building structures for easy maneuvering of Fire Tender in case of emergency.
- ✓ It is recommended to maintain a minimum of 6.0M of entrance clear of any obstruction to allow uninterrupted entry of fire engine.
- ✓ Sufficient turning space shall be available (9.0-meter radius) at Entry for easy ingress of the fire tender.
- ✓ Sufficient turning space shall be available (9.0-meter radius) at intersecting point of driveways along Fire Tender path.
- ✓ It is advisable to carry out a fire drill post construction to verify the provided space around the building on ground and parking level for fire tender movement.

6. RETRIEVAL ANALYSIS

This study of retrieval analysis has been performed to find out the retrieval time for parking facility of the proposed project. Retrieval time is the total time required to evacuate the entire parking structure during an emergency. As per proposed master plan, parking is planned within the plot boundary and no on-street parking is proposed. Parking for the project is provided on the 3 Parking Floor, and 5 Basements for with total 6186 car parking and 14943 2-wheeler parking. It is important to ensure the safety of each of the occupants of the proposed building during an emergency via a disaster management plan. In addition to this safety aspect of residents, the vehicles from each parking level should also be retrieved in a systemic and planned manner. The planning of vehicle retrieval is necessary for the proposed parking facility to ensure smooth evacuation of vehicles in the shortest possible time. In this study, retrieval is proposed to be executed via driveways on Ground Floor, via ramps on Basement floors and parking floors. Proper planning of sequence of retrieval is equally important as the actual retrieval. This study has looked into a number of different possibilities of sequential or simultaneous retrieval sequence of the parking levels and has presented the most suitable option for Retrieval Plan to get shortest possible time. The maximum overall time required for retrieval will be the maximum retrieval times required for evacuating vehicles from these parking levels. **Retrieval analysis have been offered only and purely from traffic operation and maneuvering point of view, without any prejudice to the status of structures, if any, and without reference to the ownership and without carrying out actual site inspection, and without reference agreement/power of attorney for development if any. Parking Layout is analyzed for Retrieval Time based upon parking statement and ACAD drawings and project information provided by the Project Proponent. Retrieval analysis is based upon various assumptions such as vehicle speed, headway during evacuation, quick response from users, assigned route following and driver discipline maintained during evacuation, intensity of chaos, etc. The retrieval time calculation is purely based upon statistical analysis and may vary on-field if not properly implemented. It is recommended that occupants carry out a mock drill of the vehicle evacuation once the project is built and fully occupied.** The following sections describe in detail about typical floor circulation and proposed retrieval plan for evacuating the parking facility during an emergency.

a) Typical Floor Circulation

Typical circulation on ground floor is discussed in the earlier section.

b) Basic Specifications and Assumptions

- **Table 6-1** is provided below to show the technical assumptions considered in calculating the retrieval time for the parking facility of the proposed project.

Table 6-1 : RETRIEVAL ANALYSIS ASSUMPTIONS

No.	Details	Value
1.	Parking Occupancy	100%
2.	Maximum Speed on Driveways (Car/2W) (km/hr)	10/15
3.	Maximum Speed on Ramp (km/hr)	10
4.	Maximum Speed on Curves/ Turns (km/hr)	8
5.	Average Speed for Retrieval Calculations (km/hr)	~10
6.	Time to pull out car from parking bay (sec)	15-30
7.	Average Headway (Car/2W) (meter)	8/4.5

In addition to the above-mentioned items the following ***assumptions*** are also considered while deriving a plan for the retrieval of the parking facility.

- Intimation will be sent to each occupant with centralized system during an emergency to evacuate the parked vehicles.
- All occupants will react to the emergency alert and drivers/owners of parked vehicles will be able to reach their respective vehicles within an average of 15 minutes after the alert.
- It is assumed that all owners/ residents of the subject building are aware of the evacuation procedure during emergencies. An emergency route shall be assigned to each parking space at the time of handover to the respective owner. It is recommended that society or developers educate the residents about emergency evacuation of vehicles during emergencies. It is advisable to carry out a mock drill of emergency evacuation once the building is occupied in future. This will help to minimize the chaos during emergencies.
- Every driver of the vehicle is on the seat and ready to move the car once evacuation has begun.
- Vehicle retrieval operations will be managed by trained personnel or emergency response coordinators as per evacuation plan. Traffic discipline will be maintained during the evacuation operation.
- It is assumed that all access points at ground level, including ramps will operate as "Exit Only" during emergency. No private vehicles should enter the premises during emergencies, except fire engines and ambulances.

- Full occupancy (100%) is considered as a worst-case scenario, assuming an evening or nighttime during parking lot is expected to occupy near its capacity.
- A parking statement shown in **Table 6-2** shows the parking occupancy considered for retrieval analysis.

Table 6-2 : PARKING STATEMENT – 100% OCCUPANCY

Parking Floor	4W	2W
Third Floor	-	4936
Second Floor	-	4936
First Floor	-	4936
Ground Floor	-	-
Basement 1	990	-
Basement 2	990	-
Basement 3	990	-
Basement 4	990	-
Basement 5	991	-
Total	4951	14808

c) Retrieval Plan

This study has analyzed the different options for evacuating the cars proposed in the parking facility. This report presents the most suitable option for the Retrieval Plan to be adopted for the parking evacuation. As mentioned above, this analysis has assumed that emergency response personnel will control the retrieval operation as per an emergency retrieval plan. This will help to minimize panic and chaos among the occupants and maintain traffic discipline to smoothen the operation. Intimation should be sent to each occupant through a centralized system to make them aware of any emergency.

Strategic Procedure

The owner or resident of each unit shall be instructed and well informed to follow the procedure during evacuation of the parking lot and use the assigned route during emergencies. This operation shall be managed by trained personals during evacuation procedure.

1. **Ground Floor Evacuation**
   - There are 8 Gates for vehicles to exit onto the abutting road on the Ground Floor.
   - Ground Floor will start evacuating first.
   - All Vehicles on the Ground Floor will evacuate from Rejection Gate 4b and Gate 6.
   - Cars on Basement Floors will be evacuated from Rejection Gate 3b and Gate 6.
   - 2-Wheeelers on 1st, 2nd &3rd will be evacuated form Gate 1a and Gate 1b.
   - **Figure 6-1** is provided to show the Retrieval plan on the Ground Floor.
2. **Basement 1 Evacuation**
   - After evacuation of the Ground Floor, section A & section B of Basement 1 and 1st floor will start evacuating simultaneously.
   - Basement 1 vehicles will exit via 4W Ramp 1 & Ramp 2 and ultimately via Gate 3b and Gate 6.
   - While evacuating Basement 1, Basement 2 level will be restricted from evacuating.
   - **Figure 6-2** is provided to show the Retrieval plan at Basement 1.
3. **Basement 2 Evacuation**
   - After evacuation of Basement 1, section A & section B of Basement 2 and 2nd floor will start evacuation simultaneously.
   - **Figure 6-3** is provided to show the Retrieval plan at Basement 2.
4. **Basement 3 Evacuation**
   - After evacuation of Basement 2, section A & section B of Basement 3 and 3rd floor will start evacuation simultaneously.
   - **Figure 6-4** is provided to show the Retrieval plan at Basement 3.
5. **Basement 4 Evacuation**
   - After evacuation of Basement 3, section A & section B of Basement 4 will start evacuation simultaneously.
   - **Figure 6-5** is provided to show the Retrieval plan at Basement 4.
6. **Basement 5 Evacuation**
   - After evacuation of Basement 4, section A & section B of Basement 5 will start evacuation simultaneously.
   - **Figure 6-6** is provided to show the Retrieval plan at Basement 5.
7. **1st, 2nd &3rd Floors Evacuation**
   - Section A and B of the 1st, 2nd & 3rd Floor has only 2-Wheeler parking and will exit via 2W Ramp 1 and Ramp 2 and ultimately via Gate 1a and Gate 1b.

- After evacuation of P1 Floor, section A & section B of P2 Floor will start evacuation simultaneously.
- **Figure 6-7, Figure 6-8 & Figure 6-9** are provided to shows the Retrieval plan at P1, P2 & P3 Floors.

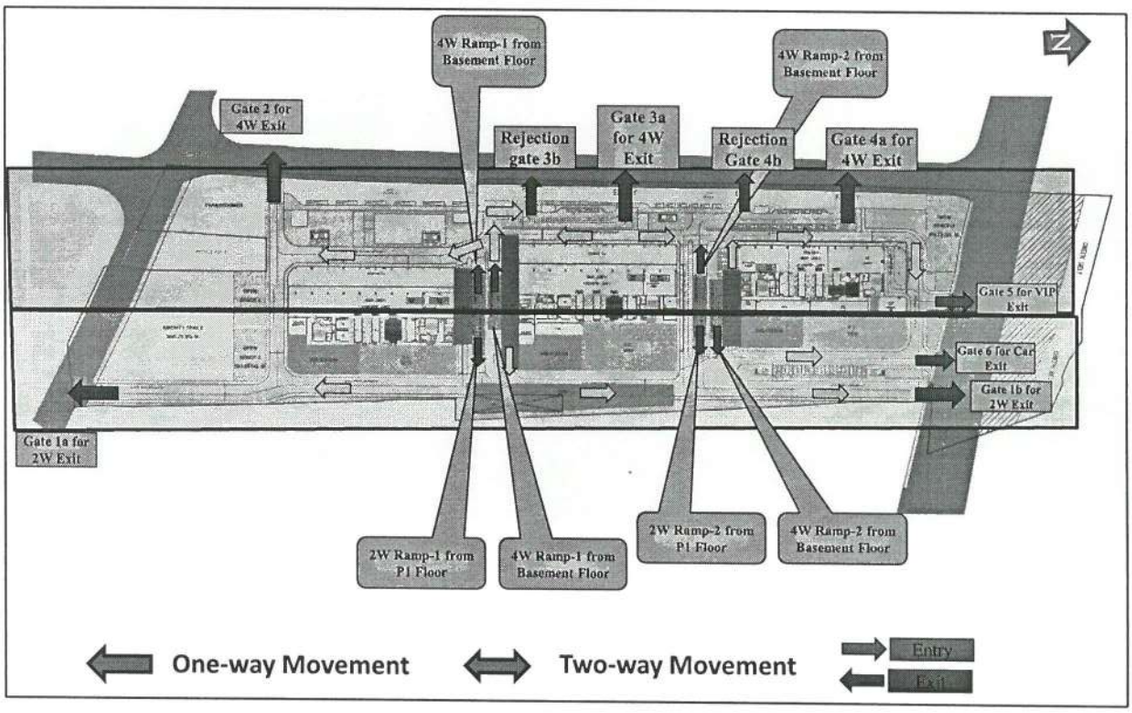


Figure 6-1 : Retrieval Plan – Ground Floor

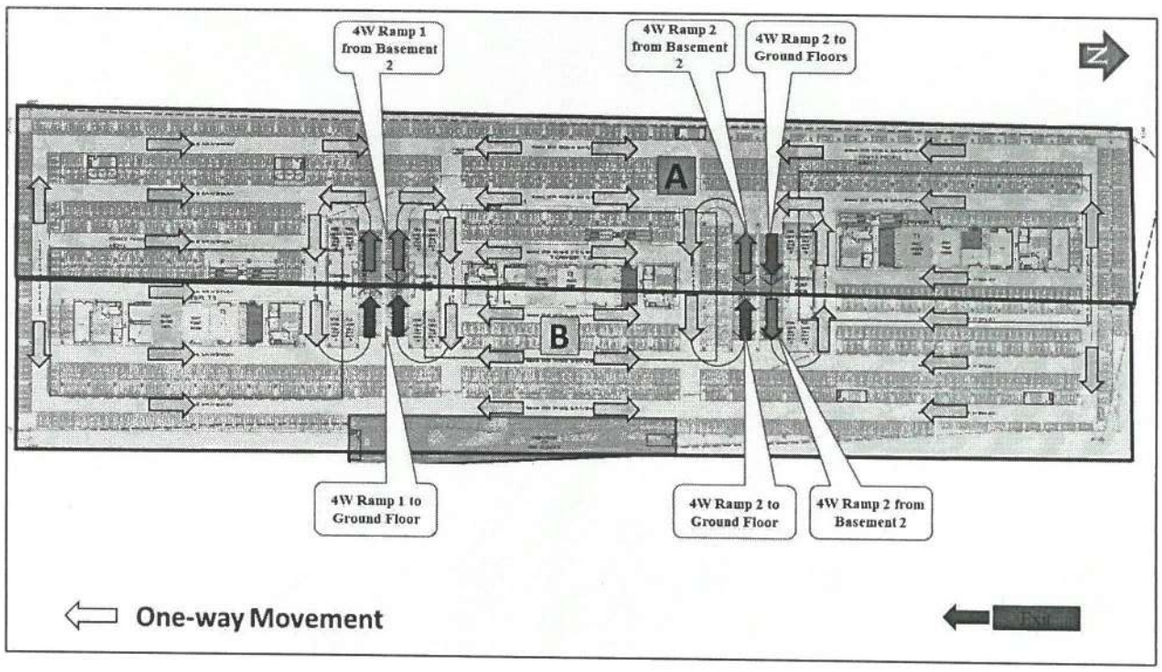


Figure 6-2 : Retrieval Plan – Basement 1

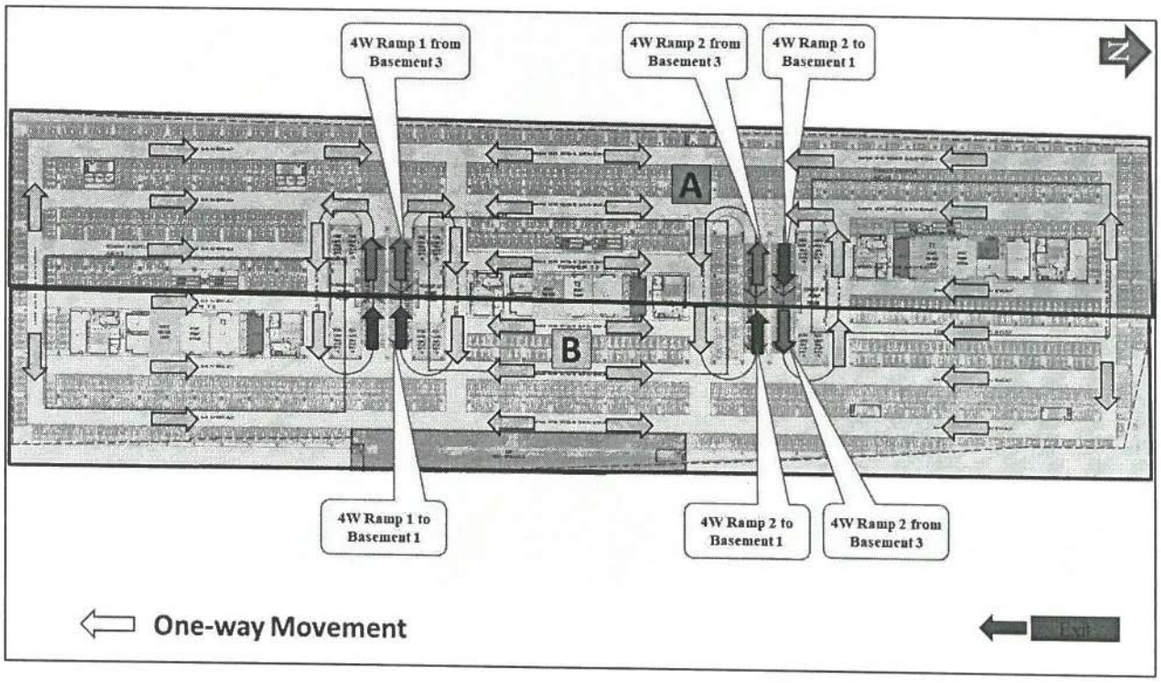


Figure 6-3 : Retrieval Plan – Basement 2

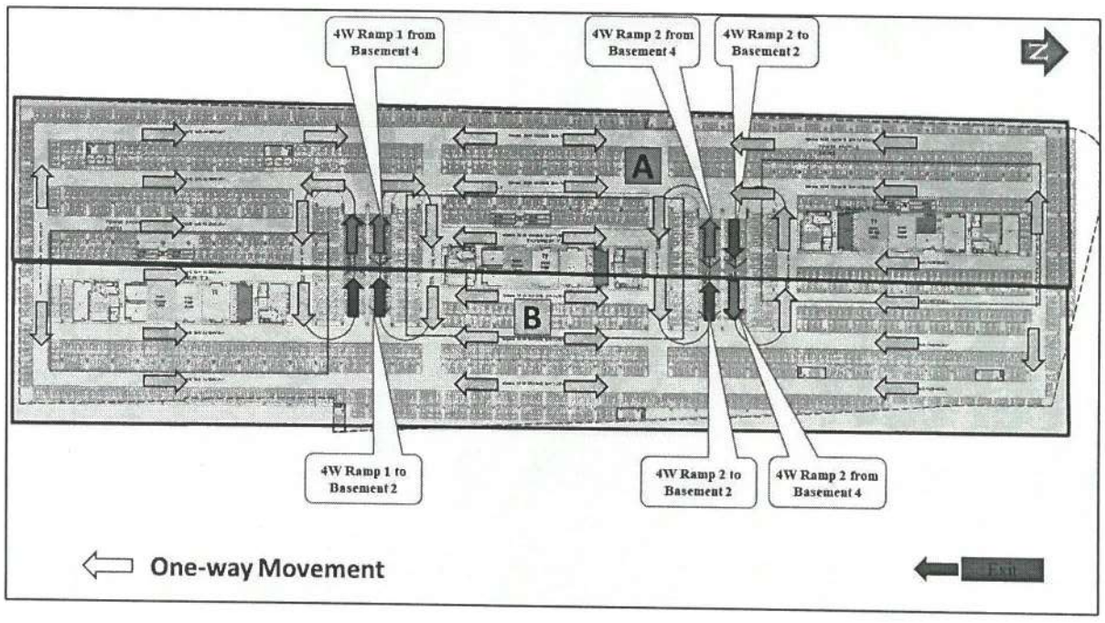


Figure 6-4 : Retrieval Plan – Basement 3

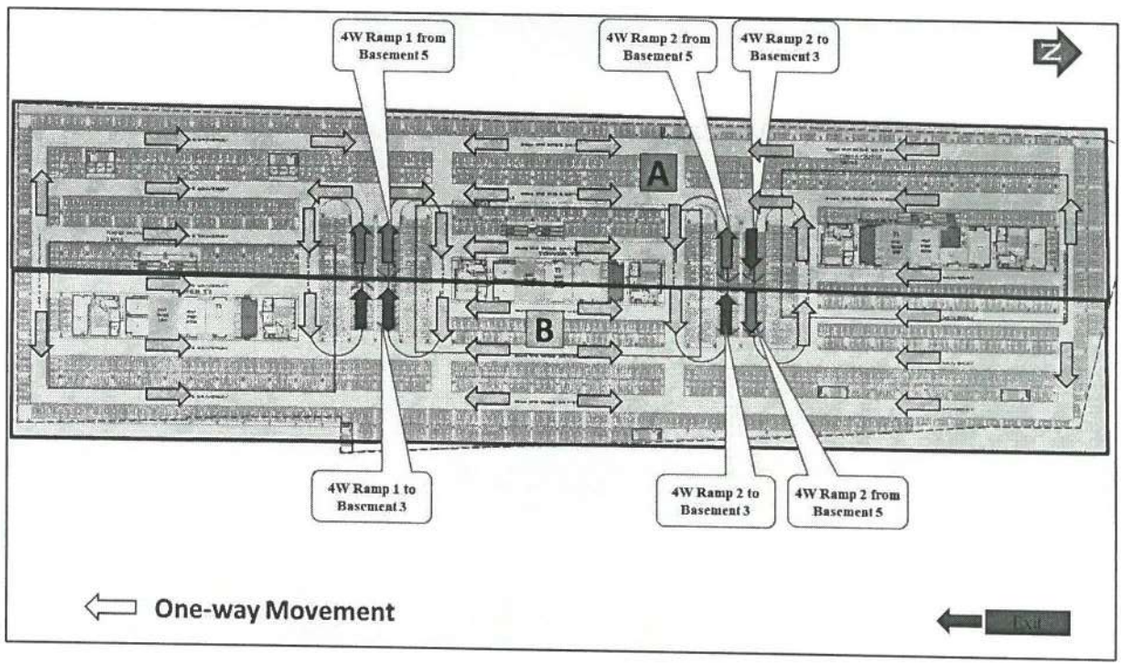


Figure 6-5 : Retrieval Plan – Basement 4

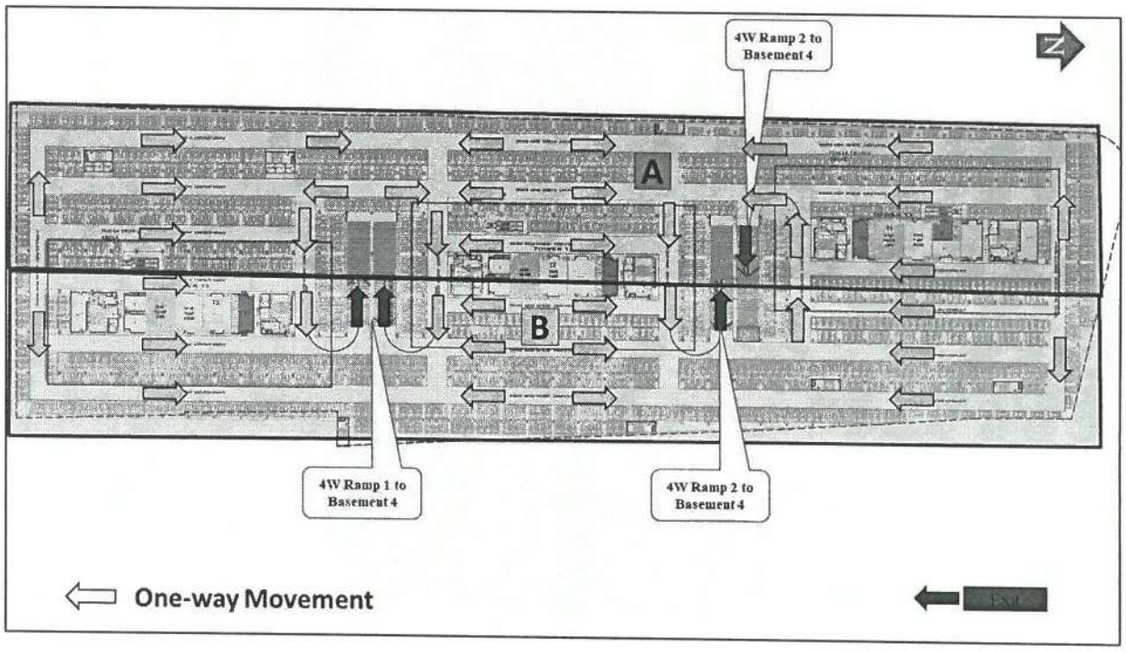


Figure 6-6 : Retrieval Plan – Basement 5

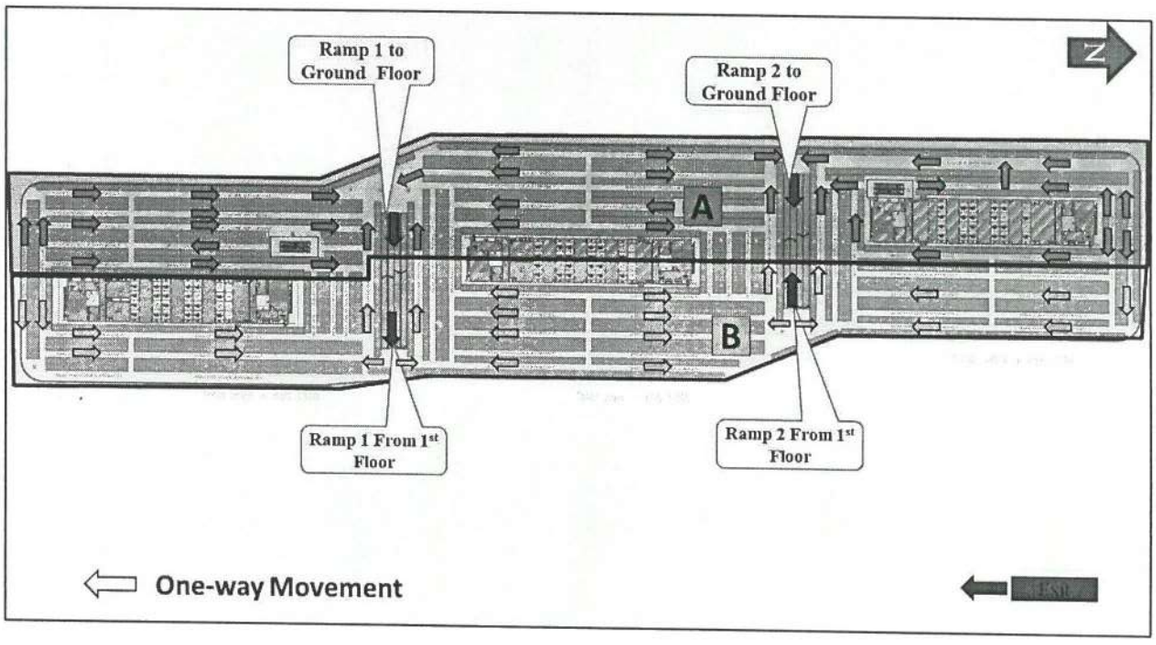


Figure 6-7 : Retrieval Plan – 1st Floor

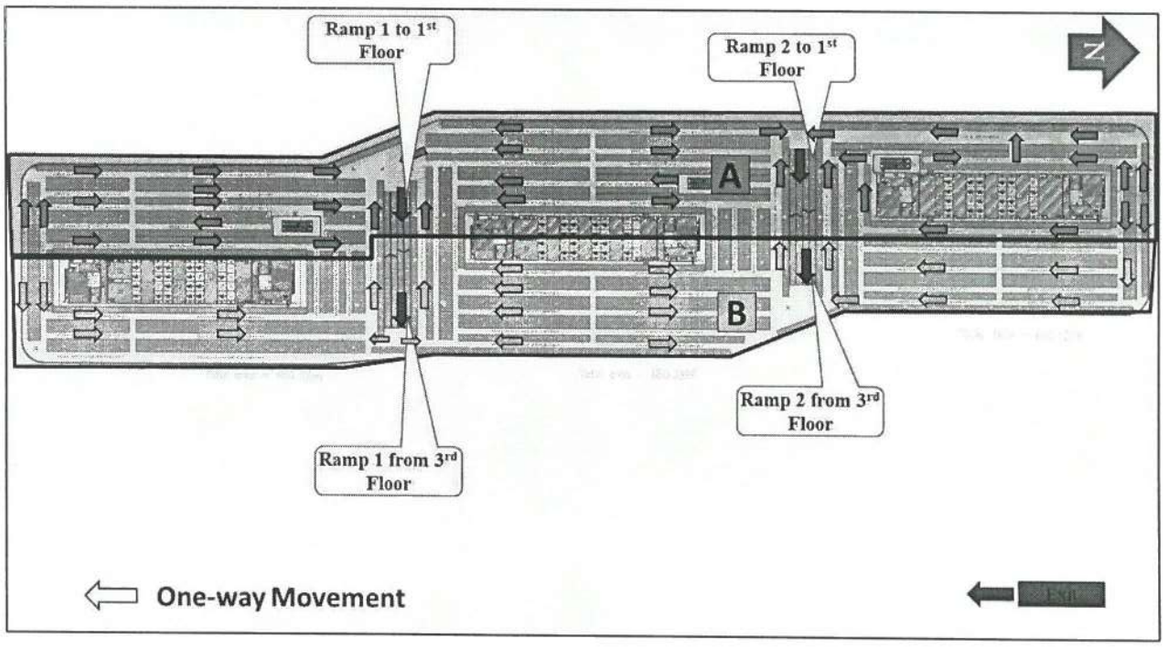


Figure 6-8 : Retrieval Plan – 2nd Floor

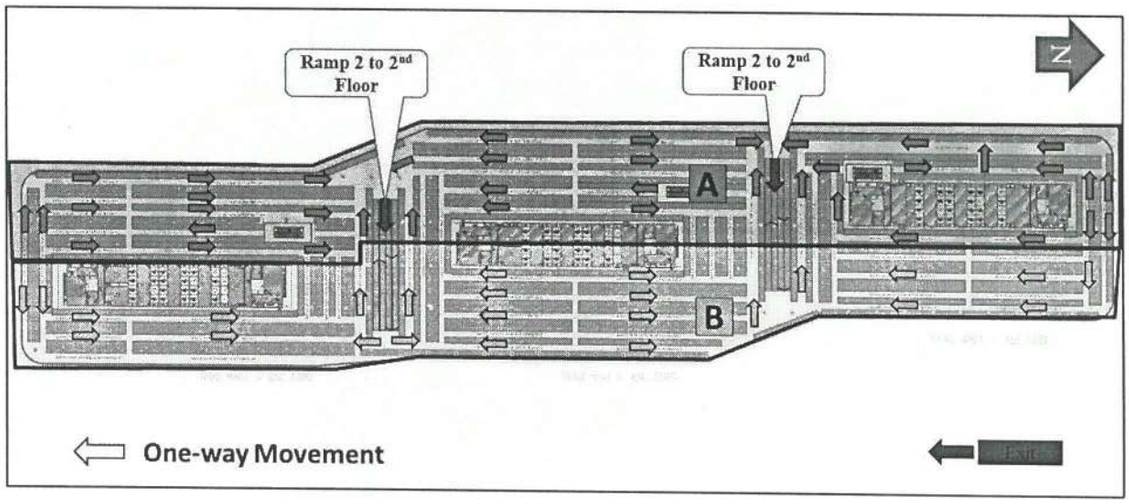


Figure 6-9 : Retrieval Plan – 3rd Floor

d) Retrieval Time

The path of retrieval for ground floor and other parking floors are indicated in the previous section. The time taken by the farthest parked car is calculated based upon distance and average speed. Maximum distance required to travel from parking bay to exit point or farthest car on each floor is calculated. An average travel speed of 10-15km/hr is utilized considering different speeds on driveway/aisle. With an average car speed and distance, the retrieval time, i.e., time required by the first vehicle to exit the development via ground level exits is calculated. The remaining cars on that floor will follow the first car with a headway distance of 8 meters (i.e., ~3 seconds headway with 12 km/hr). And the remaining two wheelers on that floor will follow the first two-wheeler with a headway distance of 4.5 meters (i.e., ~2 seconds headway with 15 km/hr). All parking floors will be retrieved as mentioned in the earlier section. As soon as the last car on that level is being retrieved, the next level is intimated to descend via vehicular ramp as mentioned in the strategic procedure section. **Table 6-3** is provided to show the retrieval time calculations for each parking level and total retrieval time required to evacuate the entire parking facility for 100% occupancy. **An initial average delay would vary depending upon time which might require responding after emergency intimation and to arrive at the car parking location as well as arranging for evacuation procedure. Based upon the analysis, it observed that the retrieval time will be 36 minutes for 100% occupancy under proposed retrieval plan, which less than 120 minutes is and are within fire ratings and emergency evacuation limits.**

Table 6-3 : RETRIEVAL PLAN - TIME CALCULATIONS

FROM	Section	Veh. Type	TO	VIA	Evacuation Start Time	Time required by 1st Vehicle to exit	For "Overall 100% Occupancy"	Time to Evacuate	Total Clearing Time for Level	Total Clearing Time for Floor/ Part	Total Clearing time for Simultaneous Floors	Total Clearing Time
Level					(min)	(min)	(units)	(min)	(min)	(min)		(min)
3rd Floor	A	2-W	Gate 1a	Ramp A	24.0	1.6	1234	10.3	35.9	35.9	36.0	
	B	2-W	Gate 1a		24.0	1.6	1234	10.3	35.8	35.8	36.0	
	A	2-W	Gate 1b	Ramp B	23.0	1.4	1234	10.3	34.7	34.7	35.0	
	B	2-W	Gate 1b		23.0	1.3	1234	10.3	34.6	34.6	35.0	
2nd Floor	A	2-W	Gate 1a	Ramp A	12.0	1.3	1234	10.3	23.5	23.5	24.0	
	B	2-W	Gate 1a		12.0	1.2	1234	10.3	23.5	23.5	24.0	
	A	2-W	Gate 1b	Ramp B	11.0	1.1	1234	10.3	22.3	22.3	23.0	
	B	2-W	Gate 1b		11.0	0.9	1234	10.3	22.2	22.2	23.0	
1st Floor	A	2-W	Gate 1a	Ramp A	0.0	0.9	1234	10.3	11.2	11.2	12.0	
	B	2-W	Gate 1a		0.0	0.9	1234	10.3	11.2	11.2	12.0	
	A	2-W	Gate 1b	Ramp B	0.0	0.7	1234	10.3	11.0	11.0	11.0	
	B	2-W	Gate 1b		0.0	0.6	1234	10.3	10.9	10.9	11.0	
Basement 1	A	Car	Gate 2	Ramp A	0.0	0.9	248	2.1	2.9	2.9	3.0	
	B	Car	Rejection Gate 3b		0.0	0.7	248	2.1	2.7	2.7	3.0	
	A	Car	Rejection Gate 4b	Ramp B	0.0	0.4	248	2.1	2.5	2.5	3.0	
	B	Car	Gate 6		0.0	0.7	248	2.1	2.8	2.8	3.0	
Basement 2	A	Car	Gate 2	Ramp A	3.0	1.4	248	2.1	6.5	6.5	7.0	36
	B	Car	Rejection Gate 3b		3.0	1.2	248	2.1	6.2	6.2	7.0	
	A	Car	Rejection Gate 4b	Ramp B	3.0	1.0	248	2.1	6.0	6.0	7.0	
	B	Car	Gate 6		3.0	1.3	248	2.1	6.3	6.3	7.0	
Basement 3	A	Car	Gate 2	Ramp A	7.0	1.9	248	2.1	11.0	11.0	11.0	
	B	Car	Rejection Gate 3b		7.0	1.7	248	2.1	10.8	10.8	11.0	
	A	Car	Rejection Gate 4b	Ramp B	7.0	1.5	248	2.1	10.6	10.6	11.0	
	B	Car	Gate 6		7.0	1.8	248	2.1	10.9	10.9	11.0	
Basement 4	A	Car	Gate 2	Ramp A	11.0	2.5	248	2.1	15.5	15.5	16.0	
	B	Car	Rejection Gate 3b		11.0	2.3	248	2.1	15.3	15.3	16.0	
	A	Car	Rejection Gate 4b	Ramp B	11.0	2.0	248	2.1	15.1	15.1	16.0	
	B	Car	Gate 6		11.0	2.3	248	2.1	15.4	15.4	16.0	
Basement 5	A	Car	Gate 2	Ramp A	16.0	3.0	248	2.1	21.0	21.0	22.0	
	B	Car	Rejection Gate 3b		16.0	2.7	248	2.1	20.8	20.8	21.0	
	A	Car	Rejection Gate 4b	Ramp B	16.0	2.6	248	2.1	20.6	20.6	21.0	
	B	Car	Gate 6		16.0	2.9	248	2.1	20.9	20.9	21.0	

418

e) Pendulum Analysis

As mentioned earlier, this report has presented the best suitable option for the Retrieval Plan for the proposed parking facility. The proposed plan has assumed that emergency response personnel will control the retrieval operation as per an emergency retrieval plan. This will help to avoid or minimize panic and chaos among the occupants and maintain traffic discipline to smoothen the operation. Intimation should be sent to each occupant through a centralized system to make them aware of any emergency. Considering the different scenarios of the parking occupancy and average speed during evacuation, following **Table 6-4** is provided to show the observations made for clearance time.

Table 6-4 : RETRIEVAL PLAN – PENDULUM ANALYSIS

Parking Occupancy (%)	Total Cars	Total 2W	Average Speed during Evacuation	Total Clearance Time
	Nos	Nos	(km/hr)	(min)
%	4951	14808	15	**36**
%	4456	13327	15	**32**
%	3961	11846	15	**29**

7. TRAFFIC MANAGEMENT PLAN (TMP)

Traffic Management Plan (TMP) typically indicates the traffic routes and measures for traffic regulation. It indicates the roads for use of certain classes of traffic, the location of traffic control i.e., signage and markings and the directions in which traffic should move. These are necessary for safe and efficient movement of vehicles and pedestrians. Traffic calming is intended to slow or reduce motor-vehicle traffic to improve safety for pedestrians and bicyclists. Traffic calming measures are of various types like speed tables, speed humps, rumble strips, guiding cones etc. These are mitigation measures to ensure safety. Better traffic management can be achieved with a combination of education and enforcement of traffic rules. Road signage, markings and way-finding signs can be implemented to educate the motorist.

a) Internal Roads/ Layout TMP

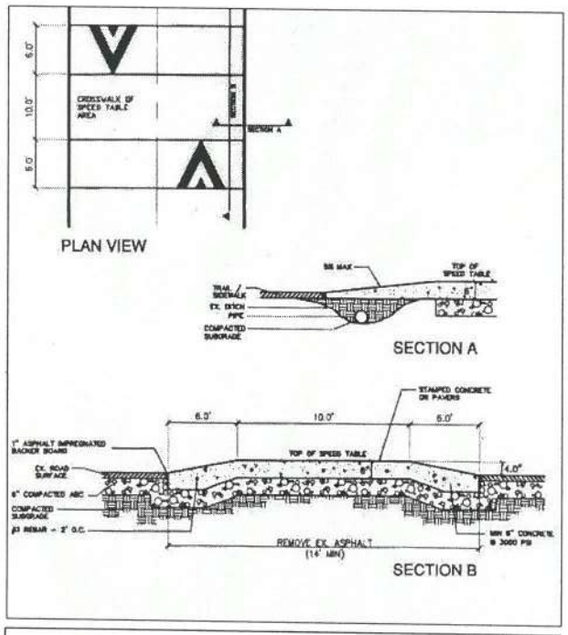
Items	Details
Access Points	➢ Nine access Gates (2 Entry/Exit for 2W, 1 Entry/Exit for VIP, 2 Entry-2 Exit and 2 Rejection gates for 4 wheelers) are proposed for the subject plot along Arterial Road. ➢ Access point is recommended to maintain minimum 6.0-meter clear driveway. ➢ Posting of traffic warden is always recommended for enforcement of traffic rules at these gates in peak hours. For the subject site, actual traffic conditions can be reviewed in future with full build-out/occupancy of the project and need for the traffic personnel during peak hours can be reassessed. ➢ Strict enforcement for "no pick-up and drop-off" zones at turning points of proposed access points. ➢ Sufficient intersection sight distance shall be available for outbound vehicles from the subject site at all the gates.
Vehicle Entry Check	➢ If manual vehicle check is introduced in future, then checking points shall be strategically located to avoid queue spill over on public road during peak hours.
Pedestrian Entry	➢ A wicket gate or a separate entry gate of minimum 1.2-meter width is recommended for pedestrian access to each building's premises. It is recommended for safe movement of pedestrians and to avoid any

	conflicts with vehicular traffic. It should be planned in such a way that entrance will help to get direct access for walking trips from an adjacent road. e.g., people who will use public transit/ bus and other non-work-based walking trips in the vicinity.
Speed	➢ It is recommended to install low-speed limit signs (10 km/hr) on internal roads from a pedestrian safety perspective. Speed limit sings shall be maintained on internal road in future years as well.
Traffic Calming	➢ Considering safety aspect, speed bumps are proposed on internal roads near drop-off areas. ➢ It is recommended to install a rubber speed bump of maximum height of 2 to 3 inch shall be provided at midblock portions to keep the vehicle speed in control.
Signages	➢ It is recommended to install guide signs *(Entry/ Exit Demarcation, Directional Arrows, Visitors Parking, No-parking, etc.)* for building users to implement the suggested vehicle circulation. ➢ Directional guidance arrows (left/ right) shall be installed on driveways to enforce the recommended circulation.
Fire Tender Pathway	➢ "No parking zone" shall be clearly marked or painted with cross marks on internal fire tender route in yellow color to avoid any future use after handover to the society. ➢ Also, fire tender pathway shall be maintained with a minimum of 6.0 meter of clear carriageway. Developers and subsequently the society shall implement all majors to keep the intended fire tender path at minimum 6.0-meter width on ground floor.
Parking Floors	➢ Convex mirrors shall be installed at turning points on the internal driveway and ramp landing points at Ground Floor, Basement and Parking Floors.
Other Miscellaneous	➢ Standby Arrangement of generator/ alternative electric supply of requisite capacity shall be made in case of failure of electric supply. ➢ It is recommended to review the Internal Traffic Management Plan in future with full build-out of the project with actual traffic conditions to

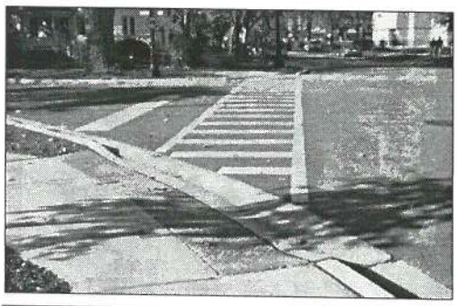
	modify or maintain the locations of traffic calming devices from a safety perspective.

b) External Roads

During traffic survey on study area network, it is observed that major roads in the vicinity need to be provided with adequate traffic calming measures to facilitate the pedestrian crossings. Speed humps shall be installed in such a way that it will reduce the speed of the vehicles at crossing points without causing hindrance/ bottleneck to the traffic flow. It is recommended to install warning signs at least 10.0 to 20.0 meter in advance of the speed humps on study area public roads. Also speed humps made of asphalt shall be painted with cross white bars (retroreflective material) to be visible in the nighttime. An illustrative diagram is provided in **Figure 7-1** to show the details of a typical speed table and typical speed hump with marking. Also, road markings and signage need to be installed on study area roadways. It is recommended that the road signage should be implemented as per IRC Codes and Institute of Urban Transport (IUT) guidelines for Speed Limit, Road Names, Stop Control, Yield Control, Pedestrian Crossings, School Ahead Signs, etc. Similarly, road markings shall be implemented as per IRC codes and IUT guidelines for Lanes, Directional Lane Arrows, Stop Bars, Road Crossings, etc.



Typical Speed Table Details



Crosswalk with Ramp Example

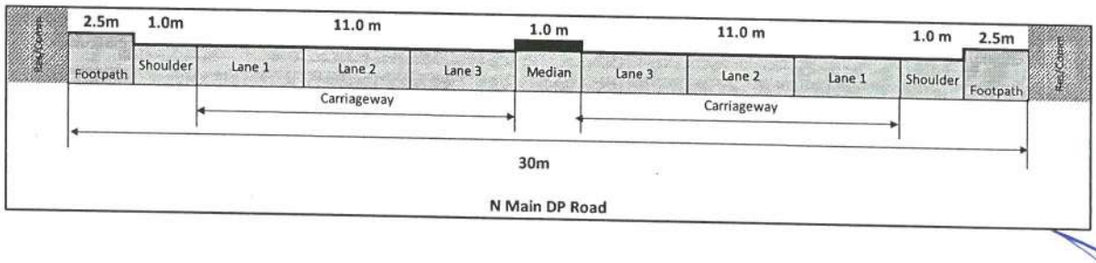
Asphalt Speed Hump Example

Figure 7-1 : Typical Traffic Calming and Crosswalk Details

Following section describes the TMP along with recommendations for study area road network.

1. **N Main Road:**

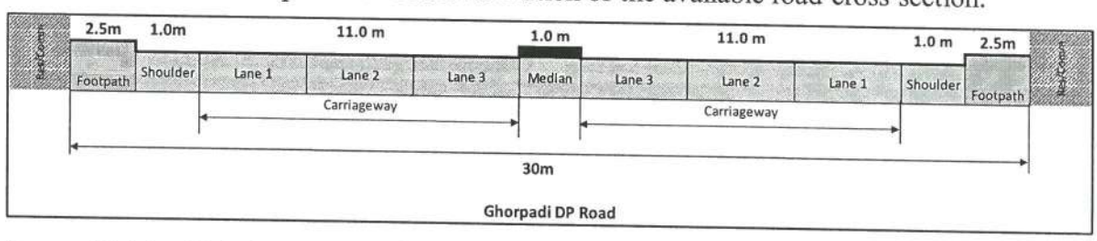
- **Cross Section:** Based upon analysis, it is observed that the existing road section can accommodate the future projected traffic at desired LOS. It is required to maintain the road section with a minimum of 22M of vehicle carriageway. Finally, traffic enforcement shall be in place for better utilization of the available road cross section.



- **Access Points:** Existing access points to the adjacent developments need to be reviewed in future years with increased traffic. Since it is a Sub- Arterial Road, full access intersections can be allowed at entry/ exit points of the adjacent developments.
- **Traffic Movement:** Significant congestion is observed under exiting conditions.
- **Traffic Calming:** Devices such as speed bumps can be installed near major residential/ commercial complex entrances, to slow down the traffic along the Road with advance warning signs. No random placement of speed breakers shall be allowed.
- **Road Markings**: Faint Road markings are observed along this road stretch. It is recommended to install lane and directional arrow markings on the entire stretch of the road for motorist guidance. Pedestrian crosswalks shall be painted at mid-block (preferably 100M apart) and road intersection approaches.
- **Road Signages**: No major road signages are observed along the study area stretch. It is recommended that a Road Signage Plan should be prepared and accordingly installed by local jurisdiction for this study area road.
- **Speed Limit:** A detailed speed data study is recommended to be carried out by the local jurisdiction in future years with build-out of nearby developments to decide on the Speed Limit along the Road

2. Ghorpadi Road:

- **Cross Section:** Based upon analysis, it is observed that the existing road section can accommodate the future projected traffic at desired LOS. But it is required to maintain the road section with a minimum 22M wide vehicle carriageway. Also, on-street parking shall be regularized to allow for clear carriageway width for vehicle movement. Sidewalks need to be upgraded or clearly marked with continuity for the safety of pedestrians. Finally, traffic enforcement shall be in place for better utilization of the available road cross section.



- **Access Points:** Existing access points to the adjacent developments need to be reviewed in future years with increased traffic.
- **Traffic Movement:** No major congestion points are observed under exiting conditions, except at a few bottlenecks near road intersection points.

- **Road Markings**: Road markings are observed along this road stretch. It is recommended to install lane and directional arrow markings on the entire stretch of the road for motorist guidance.
- **Road Signages**: No major road signages are observed along the study area stretch. It is recommended that a Road Signage Plan should be prepared and accordingly installed by local jurisdiction for the Road.
- **Speed Limit:** A detailed speed data study is recommended to be carried out by the local jurisdiction in future years with build-out of nearby developments to decide on the Speed Limit along the Road.

3. **East Avenue Road:**

- **Cross Section:** Based upon analysis, it is observed that the existing road section can accommodate the future projected traffic at LOS C. Traffic enforcement shall be in place for better utilization of the available road cross section.
- **Access Points:** Existing access points to the adjacent developments need to be reviewed in future years with increased traffic.
- **Traffic Movement:** No major congestion points are observed under exiting conditions.
- **Road Markings**: Road markings are observed along this road stretch. It is recommended to install lane and directional arrow markings on the entire stretch of the road for motorist guidance.
- **Road Signages**: No major road signages are observed along the study area stretch. It is recommended that a Road Signage Plan should be prepared and accordingly installed by local jurisdiction for this study area road.
- **Speed Limit:** A detailed speed data study is recommended to be carried out by the local jurisdiction in future years with a building-out of nearby developments to decide on the Speed Limit along the Road

4. **Magarpatta Road:**

- **Cross Section:** Existing Road section can accommodate the future projected traffic at desired LOS. Traffic enforcement shall be in place for better utilization of the available road cross section.
- **Access Points:** Existing access points to the adjacent developments need to be reviewed in future years with increased traffic.
- **Traffic Movement:** No major congestion points are observed under exiting conditions.

- **Road Markings**: Faint Road markings are observed along this road stretch. It is recommended to install lane and directional arrow markings on the entire stretch of the road for motorist guidance. Pedestrian crosswalks shall be painted at mid-block (preferably 100M apart) and road intersection approaches.
- **Road Signages**: No major road signages are observed along the study area stretch. It is recommended that a Road Signage Plan should be prepared and accordingly installed by local jurisdiction for the Road.
- **Speed Limit:** A detailed speed data study is recommended to be carried out by the local jurisdiction in future years with a building-out of nearby developments to decide on the Speed Limit along the Road

5. <u>Samrat Ashok Road:</u>

- **Cross Section:** Based upon analysis, it is observed that the existing road section can accommodate the future projected traffic at desired LOS. Finally, traffic enforcement shall be in place for better utilization of the available road cross section.
- **Access Points:** Existing access points to the adjacent developments need to be reviewed in future years with increased traffic. Since it is a Arterial Road, restricted access intersections can be allowed at entry/ exit points of the adjacent developments.
- **Traffic Movement:** Significant congestion is observed under exiting conditions.
- **Traffic Calming:** Devices such as speed bumps can be installed near major residential/ commercial complex entrances, to slow down the traffic along the Road with advance warning signs. No random placement of speed breakers shall be allowed.
- **Road Markings**: Faint Road markings are observed along this road stretch. It is recommended to install lane and directional arrow markings on the entire stretch of the road for motorist guidance. Pedestrian crosswalks shall be painted at mid-block (preferably 100M apart) and road intersection approaches.
- **Road Signages**: No major road signages are observed along the study area stretch. It is recommended that a Road Signage Plan should be prepared and accordingly installed by local jurisdiction for this study area road.
- **Speed Limit:** A detailed speed data study is recommended to be carried out by the local jurisdiction in future years with build-out of nearby developments to decide on the Speed Limit along the Road.

8. CONCLUSION AND RECOMMENDATIONS

The conclusion and recommendations of this Traffic Impact Study are summarized as below:

a) Site Traffic

i. The existing traffic data on neighboring study area roads were collected in May 2024. The subject site-generated traffic has been calculated for Year 2029 and this has been superimposed along with projected future base traffic to arrive at total traffic conditions when the project is expected to be fully built and occupied in Year 2029. Also, future traffic is calculated for the Year 2034 as a plus 10-year scenario.

ii. It is anticipated that the proposed project with its full build-out and occupancy will generate a total of 1042 AM peak hour and 1302 PM peak hour trips (in PCUs). These trips are calculated based upon guidelines presented in ITE Trip Generation Manual (9th Edition), estimated population of the project, anticipated trip percentages, expected modal split, vehicle occupancy factor and PCUs based upon typical Indian city conditions.

b) Capacity Analysis

i. Based upon Existing Conditions analysis (Indo-HCM recommended road capacities), study area roads in Study area are operating at LOS "C" or better.

ii. In future conditions without site traffic, all study area roads will operate at LOS "D" or better considering future road improvements.

iii. In future conditions with site traffic added, no significant change in LOS is observed from base traffic conditions on study area network. All study area roads will continue to operate with LOS "D" or better. On-street parking is restricted on Samrat Ashok Road if required.

c) Swept Path Analysis

Based upon the Swept Path Analysis performed for the proposed project layout, it is recommended that the proposed access point and its associated driveways at ground level should be accessible for a standard Fire Tender. Internal roads on ground level shall be adequate to accommodate the one-way movement of standard fire tender during emergencies. Sufficient turning space (minimum 9.0 m radius) shall be provided on ground level for easy access and turning of the fire tender. It is recommended to always maintain a clear carriageway of a minimum of 6.0 meters along the intended fire tender path.

d) Retrieval Analysis

The parking facility of the proposed project is planned on 3 Parking Floor and 5 Basements Floors. All Parking Floors have 2-Wheeler parking, and 5 Basement Floors have only car parking spaces. This study has analyzed different evacuation options for this parking facility during an emergency. Based upon retrieval analysis, it is observed that in case of full occupancy (i.e., 100% occupancy), total clearing time would be **36 minutes** to evacuate the entire parking facility under proposed retrieval plan. An initial average delay would vary depending upon time which might require responding after emergency intimation and to arrive at the car parking location. Traffic operation and evacuation sequence as indicated with arrows in earlier shall be maintained during emergency evacuation. The retrieval time calculation is purely based upon statistical analysis and may vary on-field if not properly implemented. Also, analysis results may yield a different outcome if applied with another queuing models.

e) Suggested Improvements

- As mentioned in the Traffic Management Plan (TMP) section that a better traffic management can be achieved with a combination of education and enforcement of traffic rules. Road signages and markings can be implemented to educate and guide the motorist. During the traffic survey it is observed that the traffic lanes and major/ minor junctions in the site vicinity are not adequately provided with road markings. It is recommended that the road signages and marking should be implemented as per IRC codes and IUT guidelines along study area roads.
- It is recommended to enforce no parking and loading-unloading zones on all approaches (at least 10–25-meter distance) at intersections in the vicinity to avoid bottlenecks and maintain uninterrupted traffic flow in the peak hours.
- Also "on-street" parking shall be regularized to avoid haphazard and double lane parking and to have a wider pavement area available for vehicular traffic movement.
- Strict traffic enforcement shall be in place to avoid queueing of the rickshaws for loading and off-loading of passengers at designated places only for minimum disturbance to traffic flow.
- Sidewalk connectivity, continuity and clear demarcation shall be maintained for pedestrian use and safety.

f) Access Road - Traffic Control, Circulation and Safety

The proposed development has access points along an East-West oriented N Main Road. Safety is of paramount importance when planning for circulation of vehicles and pedestrians internally

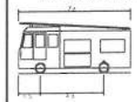
as well as externally. Pedestrian safety also needs to be considered with due importance. Controlling traffic and incorporating safety measures are proposed at site entrances along access road with implementation of:

- ✓ Design with sufficient turning radius and intersection sight distance.
- ✓ Wicket gates for building users/ pedestrian traffic of the site.
- ✓ Connection to the external sidewalks.
- ✓ Signage and pavement markings.

-X-X-X-

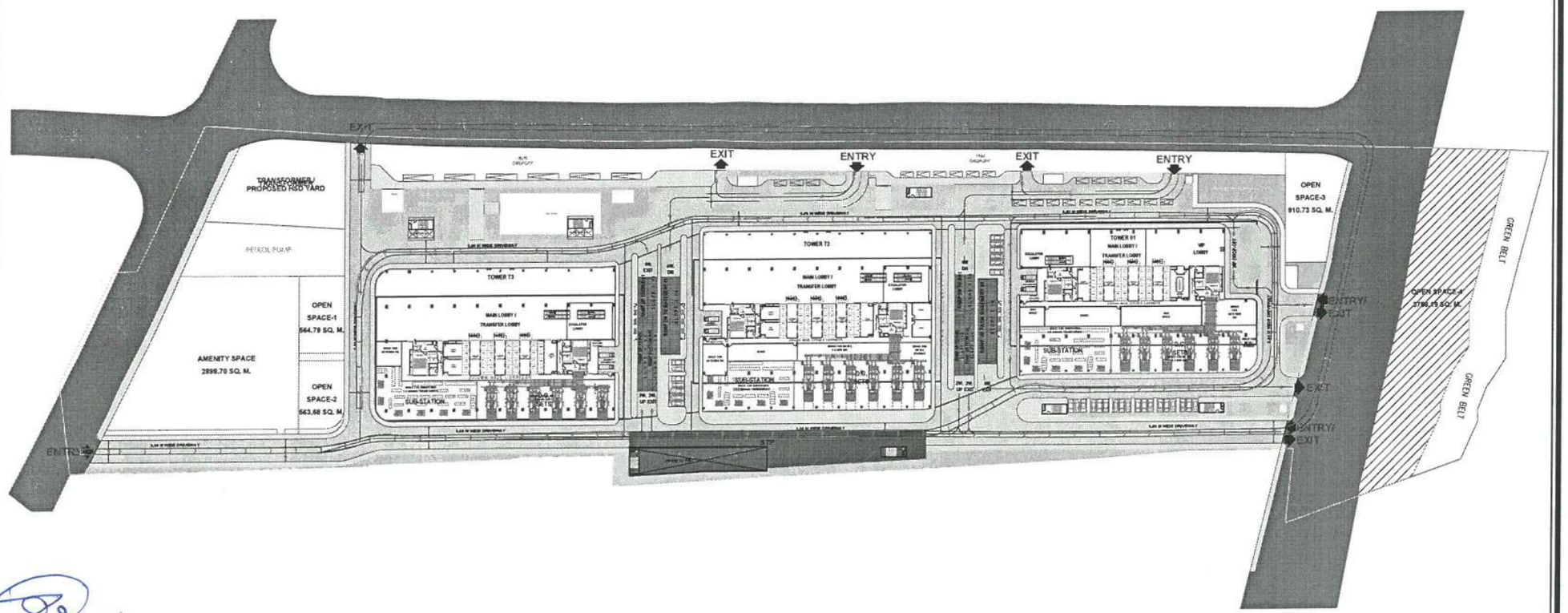
- **ANNEXURES- SHEET 1 -FIRE TENDER MOVEMENT**

DESIGN VEHICLE



Fire Tender 9m

Overall Length	7.600m
Overall Width	2.500m
Overall Body Height	3.463m
Min Body Ground Clearance	0.348m
Track Width	2.100m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	9.0m



SWEPT PATH ANALYSIS NOTES:

1. SWEPT PATH ANALYSIS IS PERFORMED FOR FIRE TENDER ALONG INTENDED FIRE TENDER MOVEMENT PATH ALONG GROUND LEVEL USING VEHICLE TRACKING TOOL.
2. STANDARD FIRE TENDER (9M TURNING RADIUS) IS UTILIZED AS A DESIGN VEHICLE WITH A FORWARD SPEED OF 10 KMPH.
3. DESIGN VEHICLE'S PATH, AS GENERATED FROM SWEPT PATH ANALYSIS TOOL, IS SHOWN WITH VEHICLE BODY OUTLINE AND VEHICLE OVERHANG (IN GREEN AND RED LINES) FOR RESPECTIVE TURNING MOVEMENTS.

TITLE :	SWEPT PATH ANALYSIS		
PROJECT :	Proposed Commercial Development at Mundhwa		
CLIENT :	M/s Bajaj Finserv Ltd		
ARCHITECT :	-		
SCALE :	N.T.S (A3)	DWN BY :	MT
DATE :	06-02-2025	CKD BY :	ARA

TRAFFIC CONSULTANT

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ANNEXURE – 5

Carbon Foot print Report

Carbon Footprint Analysis

Report for

Commercial Project

At

Mundhwa

In

Pune, Maharashtra

Prepared for:

M/s. Bajaj Finserv Ventures Limited & others

S.No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others

Prepared by:

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TABLE OF CONTENTS

I. INTRODUCTION 4

II. ABOUT CARBON FOOTPRINT 5

III. INTERNATIONAL CONSORTIUMS AND AGREEMENTS 6

A. Kyoto Protocol 6

B. Paris Agreement 6

C. Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) 7

IV. BUILDINGS AND ITS IMACT OM CLIMATE CHANGE 8

V. SYSTEM BOUNDARY AND SCOPE 10

D. Based on Life-Cycle stages 10

E. Based on ownership and control of reporting entity 11

VI. METHODOLOGY 12

VII. CARBON FOOTPRINT OF PROPOSED TOWNSHIP 14

F. Project Brief 14

VIII. QUANTIFICATION OF CO2 ANALYSIS AS PER GHG PROTOCOL 16

IX. DIRECT GHG EMISSION 17

G. Emissions from use of machinery and equipment 17

X. SAVINGS FROM COMMERCIAL BUILDINGS 18

H. ENERGY 18

I. WATER 19

J. MATERIALS 20

XI. EMISSIONS FROM USE OF TRANSPORT OF CONSTRUCTIONAL MATERIALS 22

XII. EMISSIONS FROM USE OF CONSTRUCTIONAL WORKFORCE 22

XIII. Indirect GHG Emission- Electricity (Constructional and Operational Phase) 23

K. Emissions from use of electricity during construction (Construction phase) 23

L. Emissions from use of electricity during operation (Operational Phase) 24

XIV. Indirect GHG Emission- Others 25

XV. CARBON EMISSIONS DUE TO DEBRIS MANAGEMENT 28

XVI. FINDING AND RESULTS ..... Error! Bookmark not defined.

XVII. CO2 REDUCTION MEASURES 30

XVIII. CONCLUSION 39

XIX. REFERENCES 40

I. INTRODUCTION

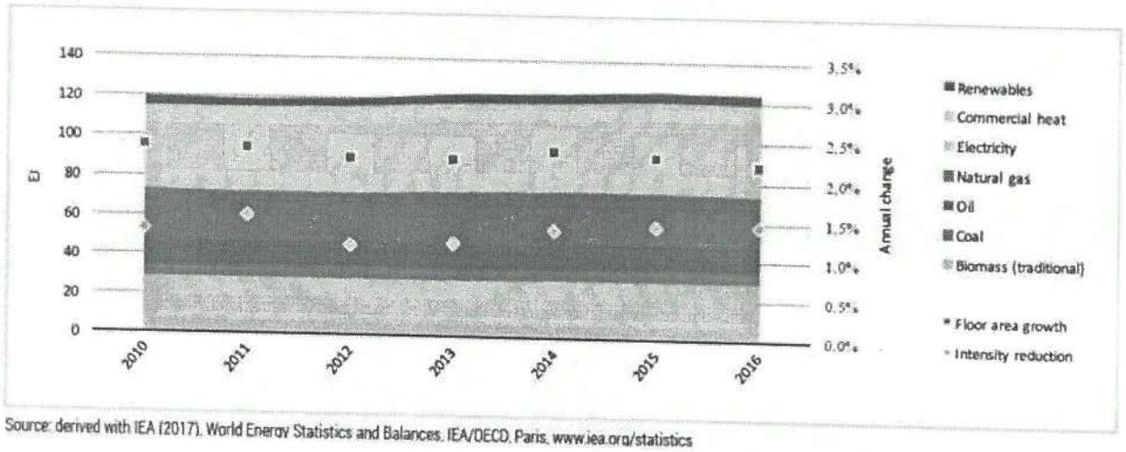
Cities are facing unprecedented growth with an increase in population and urbanization. The United Nations estimates that the global population will increase to 9.3 billion by 2050. , urban area will grow faster and are anticipated to increase by 2.6 billion people. Urbanization requires development of extensive infrastructure that imposes heavy loads on the environment in various forms, namely depletion of resources and contamination of air, water, and land.

BACKGROUND

Construction companies must seek to offer the best value to clients. Construction is an industry with a high turnover, but with relatively low margins. Energy costs, which make up a significant proportion of construction costs, have increased over the years. By measuring and managing GHG emissions, organizations can reduce energy consumption and therefore reduce costs, directly benefiting the bottom line. GHG emissions from buildings primarily arise from their consumption of fossil-fuel based energy, both through the direct use of fossil fuels and through the use of electricity which has been generated from fossil fuels. GHG emissions are also generated during the production of construction materials and running of appliances, in particular insulation and refrigeration materials as well as cooling systems. Energy is primarily consumed during the following activities: manufacturing of building materials, transport of these materials from production plants to building sites, construction of the building, operation of the building, and demolition of the building (and recycling of their parts, where this occurs). The construction industry is complex, with different types of companies operating at different points in the value chain, spanning across finance, design, materials manufacture, construction and life cycle maintenance. Many governments are taking steps to reduce GHG emissions through national policies that include the introduction of emissions trading programs, carbon or energy taxes, and regulations and standards on energy efficiency and emissions.

II. ABOUT CARBON FOOTPRINT

Carbon footprint is the total set of GHG emissions caused directly and indirectly by an individual, organization, event or product. It is a measure of GHG emissions associated with an activity or a group of activities or a product. Globally, awareness about the environmental impact of our activities has increased tremendously. Carbon footprints are a tangible parameter to assess this impact in terms of mass of emissions resulting from various sectors. Virtually all human activities cause the CO2 emissions that lead to climate change.



Source: derived with IEA (2017), World Energy Statistics and Balances, IEA/OECD, Paris, www.iea.org/statistics

Figure 1 Global buildings sector energy consumption by fuel type, 2010 – 2016

Definitions of carbon footprint vary in terms of activities and GHGs which should be included within the scope of a carbon footprint assessment. In the context of buildings, it is acceptable to assume CO2 as the primary emission from two stages:

- Production of materials and their consumption in building construction
- Emissions from energy use to maintain comfortable indoor environments

Carbon Foot printing is a phrase that is increasingly becoming a common word in the modern lexicon of the corporate World. The definition as provided by Carbon Trust, UK is as follows: "The total set of greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organization, event or product, is commonly called their carbon footprint". Carbon footprints are usually expressed in equivalent tons of carbon dioxide (tCO2e).

III. INTERNATIONAL CONSORTIUMS AND AGREEMENTS

The Intergovernmental Panel on Climate Change (IPCC) was setup in 1988 by two United Nation (UN) organizations, the World Meteorological Organization (WMO) and the United Nations Environment program (UNEP). IPCC is the foremost authoritative international body for assessing the science related to climate change, its impacts and future risks, and options for adaptation and mitigation. IPCC assessment reports assist policymakers worldwide to develop climate-related policies, and they underlie the negotiations at the UN Climate Conference – the United Nations Framework Convention on Climate Change (UNFCCC). The United Nations Framework Convention on Climate Change (UNFCCC), adopted in 1992, is an international environmental treaty with the objective to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [i.e., human-induced] interference with the climate system". Although the framework does not have any enforcement mechanisms, it outlines the potential "protocols" or "agreements" that may be negotiated to prevent dangerous anthropogenic interference with the climate system.

A. Kyoto Protocol

The Kyoto Protocol is an international treaty that extends the 1992 UNFCCC's commitment to reduce greenhouse gas emissions. This protocol deals with reducing greenhouse gas concentrations in the atmosphere to a "level that would prevent dangerous anthropogenic interference with the climate system." This Protocol was adopted in 1997, and as of December 2012, 192 parties have ratified this Protocol. The central aim of Kyoto Protocol is: **"to reduce greenhouse gas emissions, based on the fact that (a) global warming exists and (b) human-made CO2 emissions have caused it."** This Protocol is a "small but essential first step towards stabilizing atmospheric concentrations of greenhouse gases.

B. Paris Agreement

The Paris Agreement deals with greenhouse gas emissions mitigation, adaptation, and finance mechanisms. Although this Agreement, within the United National Framework Convention on Climate Change (UNFCCC), was signed by 195 countries globally, it was ratified i.e., confirmed the agreement for adoption by 148 countries as of June 2017. The central goal of the Paris Agreement is: "To strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius." Paris Agreement was enforced on 4th November,

2016 after at least 55 Parties to the Convention - accounting for at least an estimated 55% of the total global greenhouse gas emissions deposited their instruments of ratification, acceptance, approval or accession with the Depository. Although voluntary, the United States has submitted a report titled, 'Mid-Century Strategy for Deep DE carbonization' in November 2016.8 This report listed three major categories of action to achieve deep economy-wide net greenhouse gas emissions reduction:

1. Transitioning to a low-carbon energy system, by cutting energy waste, decarbonizing the electricity system and deploying clean electricity and low carbon fuels in the transportation, buildings, and industrial sectors.

2. Sequestering carbon through forests, soils, and CO2 removal technologies, by bolstering the amount of carbon stored and sequestered in U.S. lands ("the land sink") and deploying CO2 removal technologies like carbon beneficial bio-energy with carbon capture and storage (BECCS), which can provide "negative emissions"

3. Reducing non-CO2 emissions, such as methane, nitrous oxide, and fluorinated gases, which result mainly from fossil fuel production, agriculture, waste, and refrigerants?"

C. Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol)

The Montreal Protocol is an international treaty that deals with substances that deplete the stratospheric ozone layer by phasing out the production of ozone depleting substances. This Protocol has been ratified by 197 countries making it the first international treaty of the United Nations that achieved a universal ratification and considered by many as the most successful global action on an environmental issue. The central aim of Montreal Protocol is: "To protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion." In particular, this treaty focused on ozone depleting substances that contain either chlorine or bromine, and implemented Phase-out Management Plans for (1) Chloro-Fluoro-Carbons (CFCs), (2) Hydro-Chloro-Fluoro-Carbons (HCFCs), and (3) Hydro-Fluoro-Carbons (HFCs). Studies have shown that since the treaty was signed in 1987, the atmospheric concentrations of ozone depleting substances that contain chlorine has decreased or levelled-off.

IV. BUILDINGS AND ITS IMACT OM CLIMATE CHANGE

The building sector is one of the major causes or contributors of greenhouse gas emissions to climate change. The operating energy use during the service life of the building has been the highest contributor and the major focus of reduction in the past few decades with a high proportion of attainment towards low or zero energy and emissions buildings, that too at very competitive price tags in comparison to conventional buildings largely due to regulatory requirements, policy instruments, technological advancements and declining costs. The building sector heavily uses raw materials, chemical processes, energy and equipment thereby contributing to 40% of greenhouse gas emissions. There is a pressing need for the sector to develop pathways to mitigate the impacts of climate change as well as adapt to the impacts of climate change on the built environment, owing to the fact that people spend most of the time inside buildings. The embodied energy and emissions of building materials and products is the second major contributor and has gained recent attention, especially with the advent of low energy buildings taking down life cycle operational energy use. With the spotlight on holistic environmental performance of buildings, an approach to a whole life assessment of buildings is gaining momentum. All the direct and indirect processes in the various stages of a building project that contribute to greenhouse gas emissions and removals are accounted. Major sources and sinks of direct and indirect emissions and removals that occur and span over various stages of the life cycle of building projects can be generally categorized as follows:

Emission From	• Energy use • material use • Water use • Land use • Transportation use • Chemical processes • Construction processes • Fugitive gas leakage • Storage and distribution • Waste processing • Other sources
Removals From	• Sequestration, capture and utilization • Other sinks

While the building sector is one of the major causes or contributors of these emissions. the building sector can also substantially reduce the amount of these emissions through a combination of strategies i.e., by understanding the emission types and their global warming potential, accounting and reducing the greenhouse gas emissions, using methods to remove the uncalled- for greenhouse gases, using non-polluting renewable energy and fuels, using offsetting mechanisms, and last but not the least building a resilient environment to adapt to the perils of an impending climate change. In order to take all the necessary actions to reduce the amount of emissions and enhance removals, an understanding is required of all the processes associated with the building project that causes these emissions.

V. SYSTEM BOUNDARY AND SCOPE

The building project as a 'system' is a vast set of interacting or interdependent components and processes developing into (an intricate functioning whole in the course of its service life and an extricate zilch or zippo at the end of its service life. What becomes more convoluted is the interminable progression of delineating the boundary of the 'system' for assessing environmental impacts.

A universally agreed upon procedure has long been absent until reputed organizations like International Standards Organization (ISO), European Standards (EN) on the one hand and Greenhouse Gas Protocol on the other hand laid the foundations for system boundary conditions. The former group focused on a life-cycle stages approach specifically for buildings and the latter group focused on a control and ownership approach specifically from a reporting entity viewpoint.

D. Based on Life-Cycle stages

There are five distinct life cycle stages for buildings namely: Product Stage, Construction Stage, Use Stage, End-of-Life Stage and Beyond Stage. Each life cycle stage consists of several attributes or elements that increase or decrease concentrations of heat trapping greenhouse gases in the atmosphere, thereby influencing climate change.

Stage	System Boundary
Product Stage	Includes processes from extraction / refinement of raw materials to manufacturing of construction products. Includes emissions from raw material supply, transport and manufacturing.
Construction Stage	Includes processes from factory gate of construction products to practical completion of construction works. Includes emissions from transport and construction - installation process.
Use Stage	Includes processes from the practical completion of construction works to the point of deconstruction or demolition of building. Includes emissions from use, maintenance, repair, replacement, refurbishment, operational energy and water use.
End-of-Life Stage	Begins when the building is decommissioned and not meant for further use. Includes emissions from deconstruction / demolition, transport, waste processing and disposal.
Beyond Stage	Potential resources for future use. Includes reuse, recovery and

	recycling potential.

E. Based on ownership and control of reporting entity

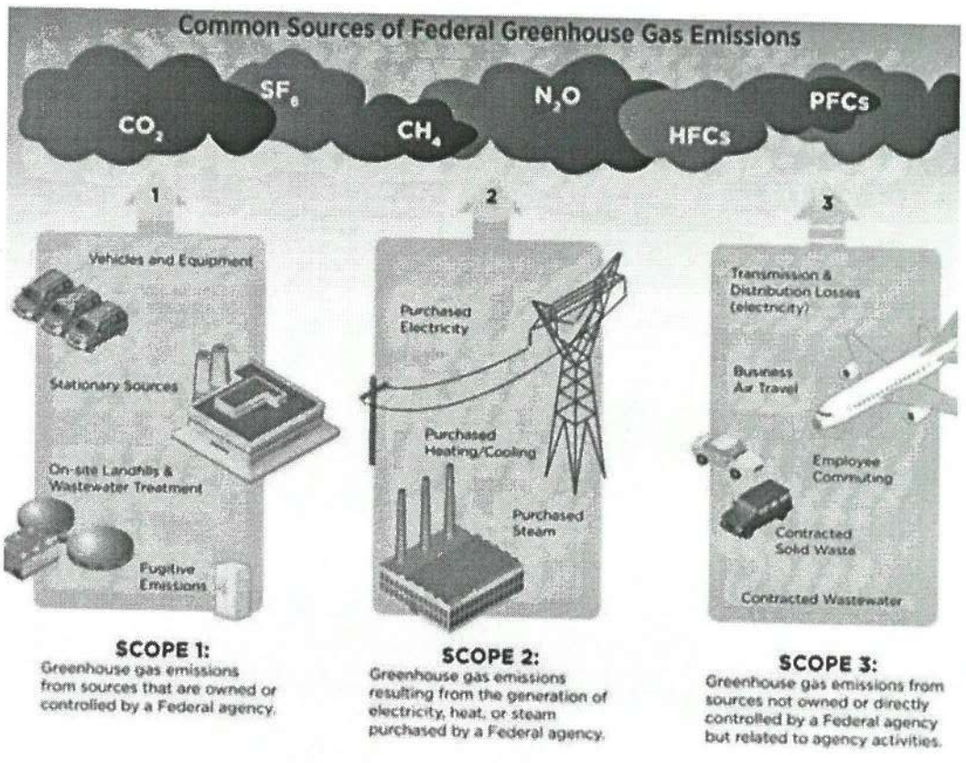
The GHG emissions boundary conditions are set based on the ownership and control of the reporting entity. This approach provides a strong accounting approach of emissions across board and is apt for proposed commercial reporting. This emissions accounting method has primarily been formulated by the Greenhouse Gas Protocol and has been widely accepted by business and government entities worldwide. The Greenhouse Gas Protocol (GHGP) provides standards, guidance, tools and trainings for business and government leaders to quantify and manage GHG emissions and become more efficient, resilient and prosperous.

According to GHGP, there are three distinct GHG accounting scopes namely:

Scope 1 – Direct GHG Emissions,

Scope 2 – Indirect GHG Emissions (Electricity) and

Scope 3 – Other Indirect GHG Emissions.



VI. METHODOLOGY

The table below explicates with examples the three scope levels with the building in mind. It is not an exhaustive list and many elements and attributes related to other aspects of a reporting entity which is typically included such as downstream activities etc.

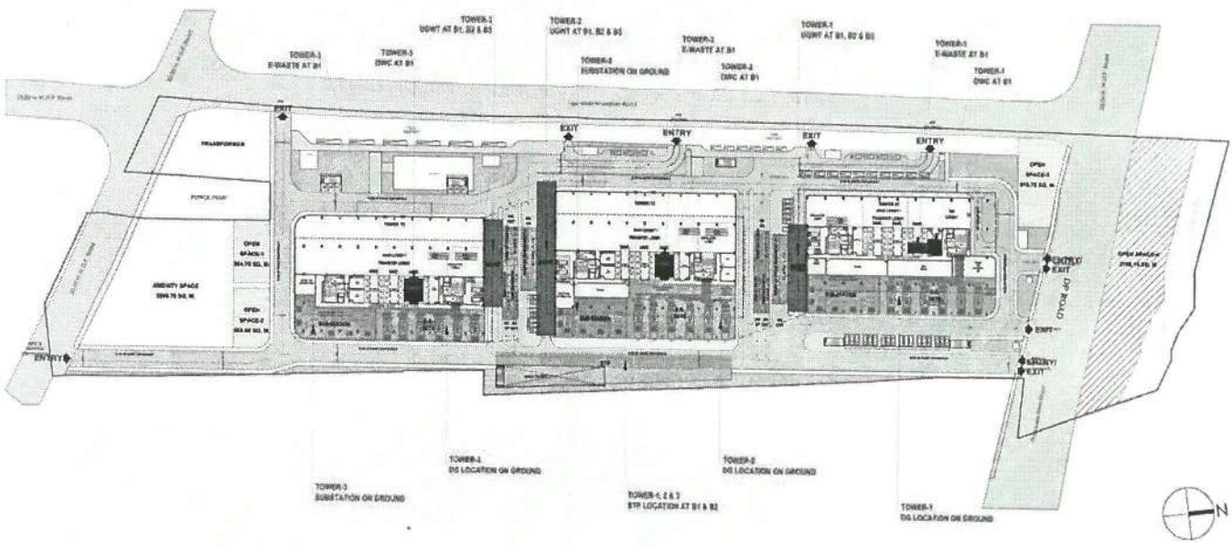
Scope and Boundary Condition		Examples
Scope 1: Direct greenhouse gas emissions or removal	Emissions or removals of GHGs from sources controlled or owned by the reporting entity, as a result of using a product system.	• Stationary Combustion of natural gas and petroleum for heating and cooking emits carbon dioxide, methane and nitrous oxide. • Combustion of fuels in facility vehicles can emit carbon dioxide and in small amounts methane and nitrous oxide. • Organic waste sent to landfill emits methane. • Wastewater treatment plants emit methane and nitrous oxide. • Fluorinated gas used in air conditioning and refrigeration may leak during service or due to leaking equipment.
Scope 2: Indirect greenhouse gas emissions or removals – Purchased Energy	Emissions and removals of GHGs from sources that are not directly controlled or owned by reporting entity, as a result of purchasing energy for consumption.	• Emissions associated with generation of purchased energy for consumption.
Scope 3: Indirect greenhouse gas emissions or removals – Others	Emissions and removals of GHGs from sources that are not directly controlled or owned by reporting entity,	• Construction materials release various types of GHGs based on the energy type and chemical process

	as a result of using a product system other than purchased energy for consumption.	used at the time of manufacture. • Construction processes release various types of GHGs based on the energy type and chemical process used at the time of construction. • Extraction, production and transportation of fuels used to generate electricity such as coal mining processes release methane, petroleum refining processes may emit carbon dioxide and methane, drilling and extraction of natural gas may leak methane, and production of hydrogen (if used as fuel) may release carbon dioxide. • Transmission and Distribution (T&D) emission losses of purchased electricity from systems and sources not owned by the business. • End-of-Life process such as demolition, transportation and combustion of materials in land-fill release GHGs.
Carbon Removal	From tree sequestration	

VII. CARBON FOOTPRINT OF PROPOSED TOWNSHIP

F. Project Brief

The project Commercial is located at Mundhwa, Pune. It is a new project and is located in the developed area of the city. The orientation of the project is EW elongated which will be a positive point in terms of its passive design strategies. The project is a commercial building with total plot area of **70631.81 m2** and proposed built up area of **266686.68 sq.m**. Yes it may involve building material with high embodied energy used for construction. However, there is very little scope for selecting building material as not many alternatives are available in the market. Therefore, in terms of ecology and carbon footprint, the project will have adverse impact. Hence, it needs total analysis of carbon emission which will return with the mitigation measures to reduce it. However, the building will be designed in an energy efficient measure, such as use of maximum daylight, use of solar water heaters and solar street lights which will help in reduction of energy in the operation phase. All windows and doors facing South & west are provided with weather shed for sun protection and Roof will be insulated with application of Heat Reflective Paint.



Project Master Plan

Building Configuration and tenements:

Proposed Configuration		
Building Name	**Configuration**	**Height (m)**
TOWER 1	B5+B4+B3+B2+B1+GR + Mz +1st Floor Parking + 2nd Floor Parking +3rd Floor Parking +4th & 5th Floor (comprising of Food Court and Training Rooms) + 22 Floors	125.25
TOWER 2	B5+B4+B3+B2+B1+GR + Mz +1st Floor Parking + 2nd Floor Parking +3rd Floor Parking +4th & 5th Floor (comprising of Food Court and Training Rooms) + 22 Floors	125.25
TOWER 3	B5+B4+B3+B2+B1+GR + Mz +1st Floor Parking + 2nd Floor Parking +3rd Floor Parking +4th & 5th Floor (comprising of Food Court and Training Rooms) + 22 Floors	125.25
1 VISITOR CENTRE	Ground Floor	8.40

Total number of Population	Expected Users – 43,945

VIII. QUANTIFICATION OF CO2 ANALYSIS AS PER GHG PROTOCOL

Commercial project is consisting of 3 IT towers. Throughout the project execution GHG emission (carbon dioxide (CO2); methane (CH4); nitrous oxide (N2O); hydro-fluoro-carbons (HFCs); perfluorocarbons (PFCs); and sulphur hexafluoride (SF6).) is carried out. We are calculating GHG emission through following steps:

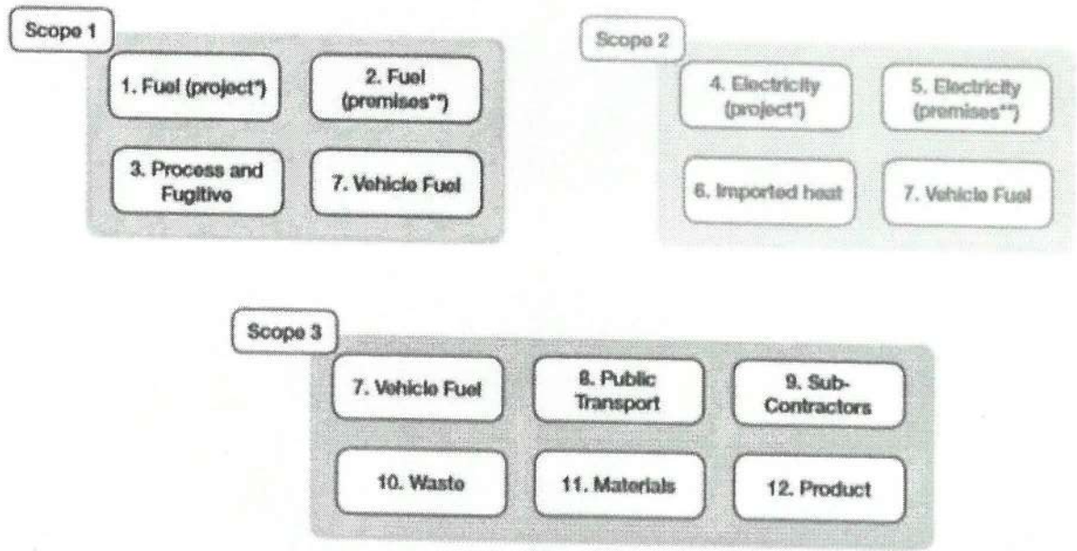
1. DIRECT GHG EMISSION

2. INDIRECT GHG EMISSION – ELECTRICITY

3. INDIRECT GHG EMISSION – OTHERS

For calculating we have used EDGE "Excellence in Design for Greater Efficiencies." Software by IFC (International Finance Corporation). EDGE is comprised of a web based software application, a universal standard and a certification system.

The figure shows the most significant construction process emissions against GHG Protocol scope.



IX. DIRECT GHG EMISSION

We have given all project related inputs to this software for calculating direct emission from the project execution: All the results are calculated differently for Commercial buildings as well as for commercial buildings.

Project report GHG emissions from sources they own or control as scope. Direct GHG emissions are principally the result of the following types of activities undertaken by the company:

• Generation of electricity, heat, or steam. These emissions result from combustion of fuels in stationary sources, e.g., boilers, furnaces, turbines

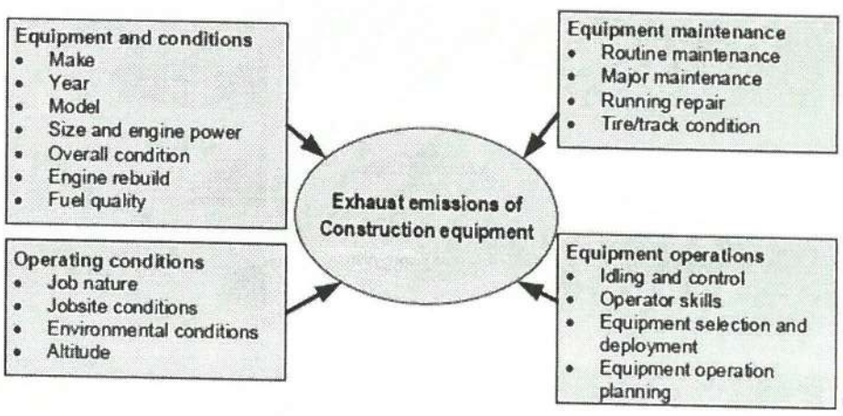
• Physical or chemical processing. Most of these emissions result from manufacture or processing of chemicals and materials, e.g., cement, aluminum, adipic acid, ammonia manufacture, and waste processing

• Transportation of materials, products, waste, and employees. These emissions result from the combustion of fuels in company owned/controlled mobile combustion sources (e.g., trucks, trains, ships, airplanes, buses, and cars)

• Fugitive emissions. These emissions result from intentional or unintentional releases, e.g., equipment leaks from joints, seals, packing, and gaskets; methane emissions from coal mines and venting; hydro-fluoro-carbon (HFC) emissions during the use of refrigeration and air conditioning equipment; and methane leakages from gas transport.

G. Emissions from use of machinery and equipment

There are a large number of factors affecting the exhaust emissions of construction equipment, many are difficult to measure and quantify their degree of impact on the rate of emissions. Overall the factors can be categorized into four groups as shown in the following figure.



SAVINGS FROM COMMERCIAL BUILDINGS

H. ENERGY

Results

Final Energy Use (kWh/Month)
2,769,485

Final Water Use (m³/Month)
68,962

Final Operational CO_2 Emissions (tCO_2/Month)
221,724,772.10

Final Embodied Carbon (Kg CO_2e/m^2)
225

Final Utility Cost (INR/Month)
90,338,179

Subproject Floor Area (m²)
138,014.18

Energy Savings (MWh/Year)
72,190.49

Water Savings (m³/Year)
1,079,638.39

Operational CO_2 Savings (tCO_2/Year)
1,219,980,159.71

Embodied Carbon Savings (tCO_2e)
61,158.29

Utility Cost Savings in USD (USD/Year)
10,120,899.02

Utility Cost Savings in Local Currency (Crore/Year)
724.049

Base Case EPI (kWh/m²/year)
359.0

Improved Case EPI (kWh/m²/year)
241.0

Total Building Construction Cost (Crore INR)
456,361,834.0

Incremental Cost (Crore INR)
103.27

% Increase in cost
0.00%

Payback in Years (Yrs.)
1.4

Number of People Impacted (No./Year)
151,816

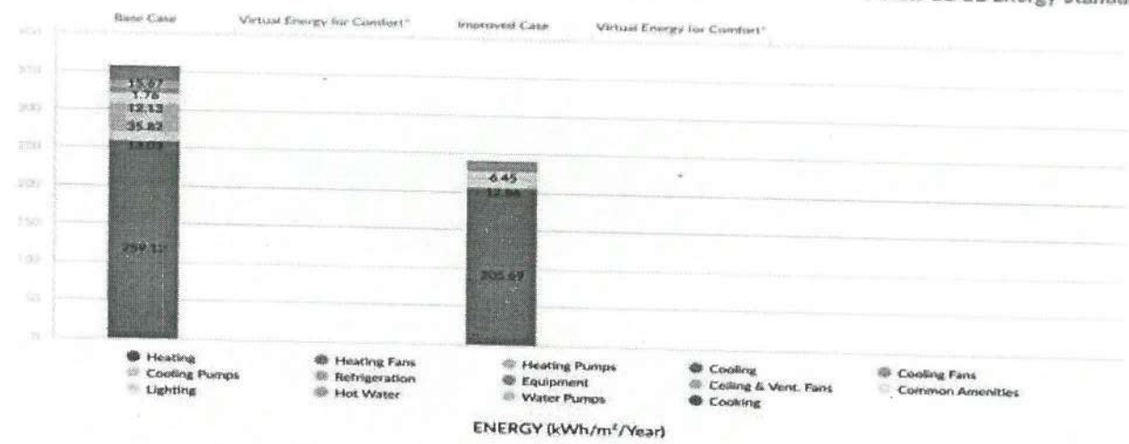
Base Case - Refrigerant Global Warming Potential (tCO_2e/Year)
1,083.6

Improved Case - Refrigerant Global Warming Potential (tCO_2e/Year)
1,083.6

ENERGY SAVINGS

Energy Efficiency Measures 32.81%

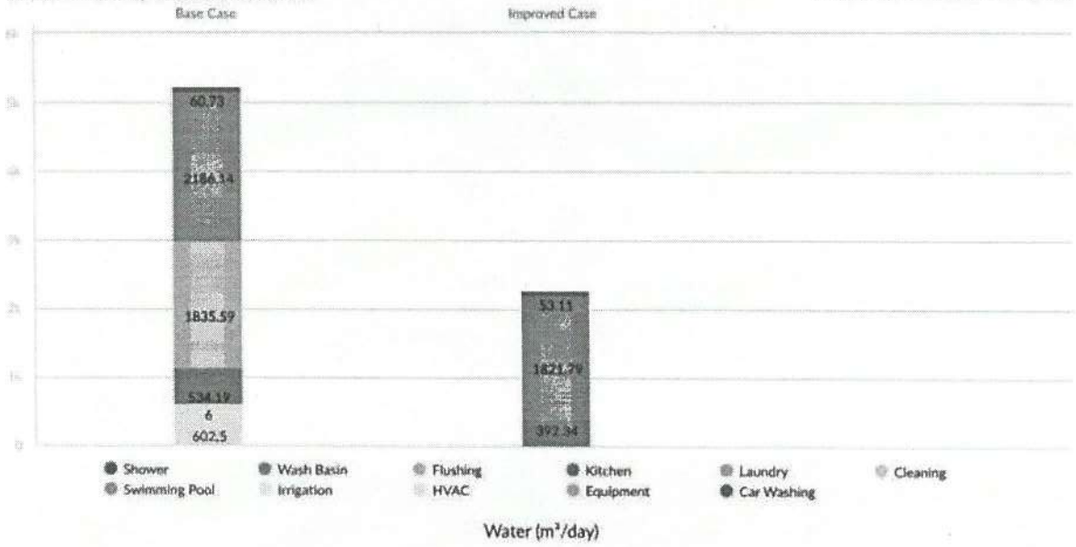
Meets EDGE Energy Standard



I. WATER

WATER SAVINGS

Water Efficiency Measures 56.61% Meets EDGE Water Standard



Water Efficiency Measures 56.61%

✓ WEM01 Water-efficient Showerheads: 7 L/min
Base Case Value: 8 L/min
Bath Type: Showeheads Flow Rate (L/min): 7 Hot Water Provision: Yes

✓ WEM02* Water-efficient Faucets for all Bathrooms: 5 L/min
Base Case Value: 6 L/min
Faucet Type: Faucets with Aerators Flow Rate (L/min): 5 Hot Water Provision: Yes

✓ WEM04* Efficient Water Closets for All Bathrooms: 5 L/High volume flush and 3 L/Low volume flush
Base Case Value: Dual Flush,6 L/High volume flush and 4 L/Low volume flush
Type Of Water Closet: Dual Flush High Volume Flush (L/min): 5 Low Volume Flush (L/min): 3

✓ WEM06 Water-efficient Bidet: 1.5 L/min
Base Case Value: 6 L/min
Flow Rate (L/min): 1.5

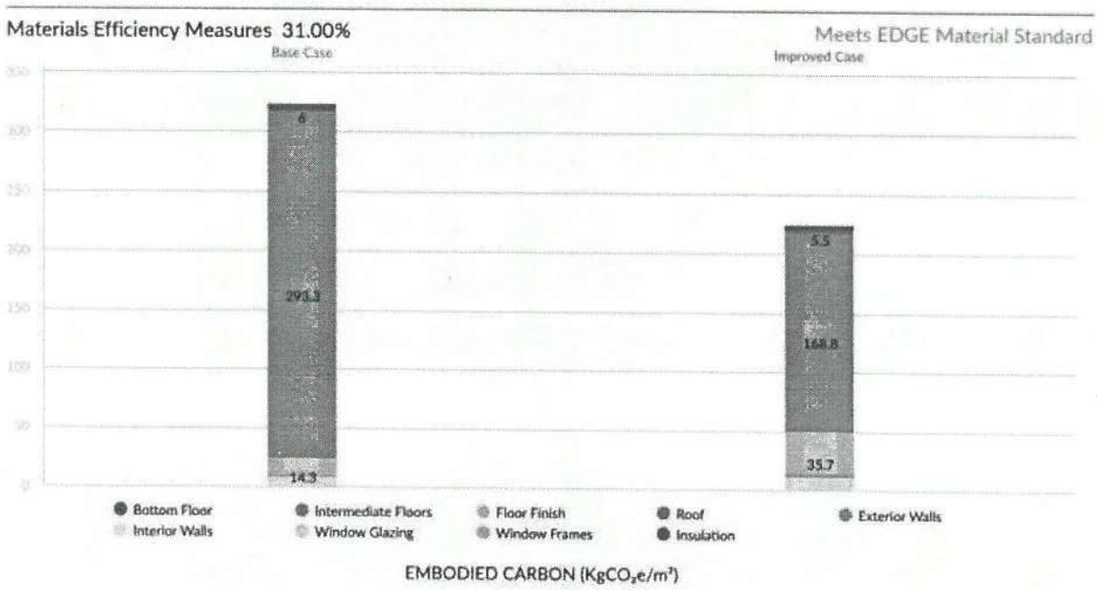
✓ WEM07 Water-efficient Urinals: 1.5 L/flush
Base Case Value: 4 L/flush
Flush Volume (L/flush): 1.5

✓ WEM08* Water-efficient Faucets for Kitchen Sinks: 0 L/min
Base Case Value: 8 L/min
Hot Water Provision: Yes Flow Rate (L/min): 0

✓ WEM09 Water-efficient Dishwashers: 2 L/Rack
Base Case Value: 5 L/Rack
Hot Water Provision: Yes

J. MATERIALS

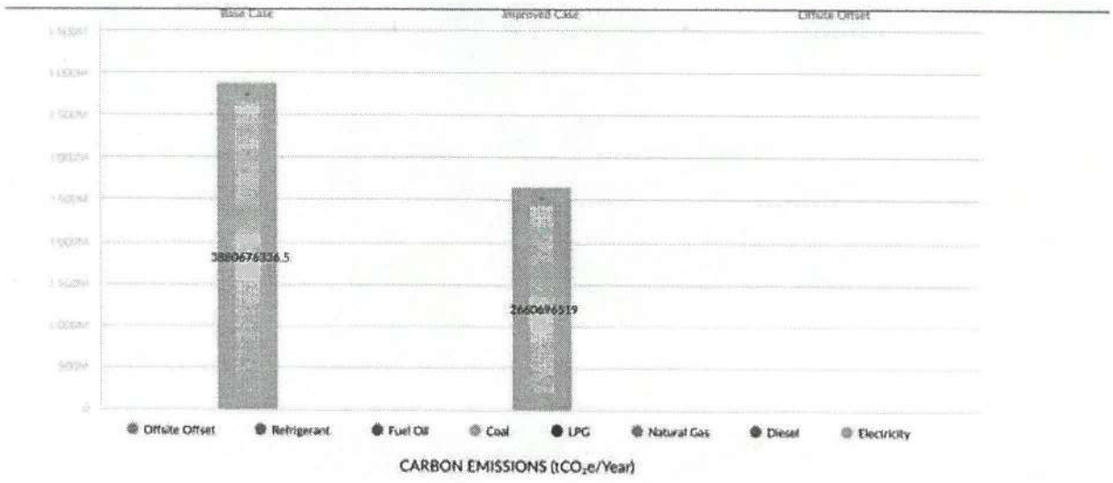
EMBODIED CARBON SAVINGS



Materials Efficiency Measures 31.00%

Improved Case Selection		Building Material	Proportion %	Thickness (mm)	U-Value (W/m^2-K)	Embodied Carbon(kg/m^2)
MEM01*	Bottom Floor Construction Base Case Material: Concrete Slab | In-situ Reinforced Conventional Slab Thickness : 100mm & Steel : 35kg/m^3	Type 1 Concrete Slab | In-situ Reinforced Slab with >25% GGBS	100 %	200	5.00	
MEM02*	Intermediate Floor Construction Base Case Material: Concrete Slab | In-situ Reinforced Conventional Slab Thickness : 300mm & Steel : 35kg/m^3	Type 1 Concrete Slab | In-situ Reinforced Slab with >25% GGBS	100 %	200		
MEM03*	Floor Finish Base Case Material : Tiled | Ceramic Tiles Thickness : 10mm	Type 1 Tiled | Ceramic Tiles	100 %	25		
MEM04*	Roof Construction Base Case Material : Concrete Slab | In-situ Reinforced Conventional Slab Thickness : 300mm & Steel : 35kg/m^3	Type 1 Concrete Slab | In-situ Reinforced Slab with >25% GGBS	100 %	200	0.31	
MEM05*	Exterior Walls Base Case Material: Concrete Blocks | Solid Blocks of Dense Concrete Thickness : 250mm	Type 1 Concrete Blocks | Hollow Blocks of Medium-Weight	100 %	200	3.00	
MEM06*	Interior Walls Base Case Material: Concrete Blocks | Solid Blocks of Dense Concrete	Type 1 Concrete Blocks | Hollow Blocks of Medium-weight	100 %	100		

Net Carbon Emissions: 2,660,698,691.0 tCO_2e/Year



TOTAL CARBON EMISSION FOR COMMERCIAL BUILDINGS IS 2660698691.0 tCO2e/Year/ Unit

X. EMISSIONS FROM USE OF TRANSPORT OF CONSTRUCTIONAL MATERIALS

This has a varied result in terms of carbon emission as various amounts of materials are manufactured and their distance becomes one of the reasons to quantify it for carbon emission. In this project, due to the project under proposal and mostly manufacturers not yet decided for the project, it becomes difficult to evaluate. The same shall be taken into consideration for the carbon emission and it would be ensured that the distance of the manufacturer is within 400km of the site radius as it eases the accessibility, and encourages local available materials and manufacturers for employment.

XI. EMISSIONS FROM USE OF CONSTRUCTIONAL WORKFORCE

Carbon emissions of the workforce are rarely considered in the general carbon emission assessments of the building. In fact, a reduction in labor force can make a project more environmentally beneficial and cost effective. As a result, it should be considered when setting up a carbon inventory. Various constructions require various manpower in the project. For this project, 50 labors per day has been considered and assuming that the constructional work will be taken a period of 5 years. It has also been assumed that workforce will living within 1km of the site radius.

No. of workforce	No. of constructional days	Mode of transportation used to reach site	No. Of workforce using respective transport typology (assuming equals of 12)	Emission factor of the transportation mode (kg/CO2/km)	Total carbon emission (per day)
200	1825	Bicycle	50	0.021	1.05
		Bus	25	0.015	0.379025
		Truck	25	0.738	18.4375
		Car	50	0.103	5.15
		Scooter	50	0.035	1.755
Total Carbon Emissions					**26.77**
					48858.03

The total carbon emission from the use of constructional workforce and transportation into consideration for **5 years** span is **48858.03 CO2e.**

XII. Indirect GHG Emission- Electricity (Constructional and Operational Phase)

K. Emissions from use of electricity during construction (Construction phase)

In order to calculate carbon emission for electricity usage in the constructional period, the client data was considered. The power supply has been taken from MSEDCL with the demanded load of 65 KVA and use of one D.G Set up Backup as 1820 kVA. Project being located in Pune, the emission factor the state was considered for it.

3.1 State wise Emission Factor of Electricity

	Total Electricity Generated (All Sources)[1]	AT&C Loss % (Excluding Aux. Power Consumption)[2]	Emission Factors (Generation based)	A) Emission Factor for End-User Consumption with adjusted Import & Export of Electricity	B) Emission Factors for AT&C Losses	Combined Emission Factor for End-User Consumption (A+B)
	GWH	GWH	(kgCO2e/kWh)	(kgCO2e/kWh)	(kgCO2e/kWh)	(kgCO2e/kWh)
All India	795176	25	0.89	0.89	0.30	1.19
South Grid	207995	19	0.90	0.90	0.35	1.25
NEWNE Grid	555418	28	0.85	0.85	0.19	1.04
State/U.T.'s						
Haryana	18105	31	0.87	0.91	0.37	1.27
Himachal Pradesh	4138	21	0.00	0.21	0.05	0.26
Jammu & Kashmir	3988	67	0.00	0.28	0.52	0.81
Punjab	28630	23	0.68	0.76	0.21	0.97
Rajasthan	26572	30	0.79	0.87	0.34	1.21
Uttar Pradesh	25936	33	1.05	1.11	0.50	1.61
Uttarakhand	6392	25	0.00	0.09	0.03	0.12
Delhi	4597	22	0.69	0.84	0.21	1.05
Chandigarh[3]	0	23	0.00	1.03	0.28	1.30
Central Sector (NR)	101894		0.66			
Northern Region (NR)	220251	30	0.70			
Gujarat	54129	23	0.73	0.81	0.21	1.02
Madhya Pradesh	19670	38	0.98	1.08	0.60	1.68
Chhattisgarh	24518	19	1.03	1.13	0.23	1.37
Maharashtra	72807	25	0.88	0.97	0.29	1.26
Goa	398	17	0.40	0.60	0.11	0.71
D.& N. Haveli[4]	0	11	0.00	0.76	0.09	0.84
Daman & Diu	0	17	0.00	0.76	0.14	0.90
Central Sector (WR)	82952		0.76			
Western Region (WR)	254475	26	0.83			
Andhra Pradesh	51758	18	0.63	0.76	0.14	0.91
Karnataka	37385	19	0.49	0.59	0.11	0.70
Kerala	8090	20	0.07	0.11	0.02	0.13
Tamil Nadu	44259	18	0.82	0.95	0.18	1.13
Lakshadweep	29	12	1.01	1.20	0.13	1.33
Pondicherry	227	12	0.67	0.86	0.10	0.96
Central Sector (SR)	55460		0.96			
Southern Region (SR)	197208	19	0.72			

[1] Data Source : CEA – All India Electricity Statistics – General Review 2011
[2] Data Source : CEA – All India Electricity Statistics – General Review 2011
[3] Chandigarh is exporting more quantity than total generation so on the conservative principal assumed that one State whatever is importing within that it is consuming electricity embedded with higher emission.
[4] Dadra & Nagar Haveli and Daman & Diu Electricity GHG EF (except AT&C Loss GHG EF) is same because it has been calculated on combined level due to non availability of quantity of exported and imported electricity.

Stage	Power Supply	Demand Load	Amount of electricity used (Kwh/m2)	Carbon emission factor from electricity (kgCO2e/kWh)	Total Emission (CO2e)
Constructional Stage	MSEDCL	500	5820	0.88	5121.6
	DG Set	7735	45017.7	0.88	39615.576
Total Carbon Emission per day					**44737.176**
Total Carbon Emission per 5 years					**81645346.2**

L. Emissions from use of electricity during operation (Operational Phase)

In order to calculate carbon emission for electricity usage in the operational period, the client data was considered. The power supply has been taken from MSEDCL with the connected load of 11316 KVA and use of many D.G Set up Backup as 2 x 500 KVA, 125 KVA capacity each. Project being located in Pune, the emission factor the state was considered for it.

Stage	Power Supply	Demand Load	Amount of electricity used (Kwh/m2)	Carbon emission factor from electricity (kgCO2e/kWh)	Total Emission (CO2e)
Operational Stage	MSEDCL	18254	212476.56	0.88	186979.3728
	DG Set	36000	209520	0.88	184377.6
Total Carbon Emission per day					**371356.9728**
Total Carbon Emission per year					**135545295.1**

Total Carbon emission through constructional & Operation Phase is **135545295.1 CO2 e/year.**

XIII. Indirect GHG Emission- Others

SOLID WASTE MANAGEMENT – CONSIDERATIONS:

Labor

Total Solid Waste 0.2kg/day/person

Organic Waste- 60% kg/day

Inorganic Waste- 40% kg/day

Commercial

Total Solid Waste 0.15 kg/day/person

Organic Waste- 40% kg/day

Inorganic Waste- 60% kg/day

CONSTRUCTION PHASE:

Labor waste generation:

a) Total waste generation = 50 kg/day

b) Total wet waste generation = 30 kg/day

c) Total dry waste generation = 20 kg/day

OPERATION PHASE:

a) Total Municipal solid waste generation – 2774.64 kg/day

b) Wet waste generation: 20 kg/day

c) Dry waste generation: 10 kg/day

d) E-waste- 10 kg/day

e) STP Sludge- 53.2 kg/day

In this project, below is the carbon emission from organic waste

Type	No. Of Occupants	Total waste generation	Carbon emission factor from electricity ((kgCO2e/(kg/day))	Total Emission (CO2e)
Wet Waste	43945	2673	10.286	27494.48
Dry Waste	43945	6238.00	10.286	64164.07
Total Carbon Emission				**91658.55**

MANAGEMENT:

Organic waste- Will be treated in Organic Waste Convertor. Total 3 OWCs are provided for different clusters & commercial buildings.

Inorganic waste- Dry waste will be segregated into recyclable and non-recyclable waste. Non degradable waste will be handed over to authorized vendor.

STP Sludge- Dried sludge from STP will be used as manure

E- waste- Will be sent to authorized vendor

XIV. TRANSPORTATION OF BUILDING MATERIALS: CONSTRUCTION PHASE

The overall picture must also take into account the carbon footprints created by the transit of building materials. Transportation-related project emissions vary based on the material chosen, the production facility, the project site, etc. Additionally, a project of this size has variable carbon footprints for the same materials because the availability of the materials from the same brand or supplier is unpredictable throughout the entire construction period. Other significant variables that affect carbon emission are travel distance, method of transportation, and fuel type.

Trucks are typically used to transfer building materials from the supplier to the construction site. Diesel is the most popular form of fuel and the fuel used by trucks. As a result, it is impractical to propose any other method of transportation in addition to the most effective one while using it as the base case. The material will be purchased from the closest or local producer whenever possible. We took into account the typical distance from the site for several producers of the same material.

Sr. No.	Building Materials	Distance	Total Emission	Emission Factor
1	AAC Blocks	45	58.61	0.59
2	Fly Ash	450	586.09	0.59
3	Fine and Coarse Aggregate	70	91.17	0.59
4	Cement	52	67.73	0.59
5	Steel	350	564.02	0.73
6	Gypsum	340	225.17	0.3
7	Tiles	48	31.79	0.3
8	Stone	47	75.74	0.73
9	Glass	110	36.42	0.3
10	Aluminium	270	89.40	0.3
11	Sand	86	112.01	0.59
12	Wood	95	31.46	0.3
		Total emissions (tCO2e)		**1969.60**

Hence, the carbon footprint of the building due to transportation of materials during construction phase is approximate **1969.60 tCO2e**

XVI. CARBON EMISSIONS DUE TO DEBRIS MANAGEMENT

According to the debris management report, the truck considered for the calculation can carry almost 800 cu.ft. Of material from the site to the relocation site.

Figure 2 Travel distance from the site to relocation site.

Sr. No.	Item	Quantity of debris	Unit	Relocation distance	Number of trips required	gCO2/km
1	Soft Murum	427,703.00	Cum	4 km	18883.13	10242212.24
CARBON EMISSION						10242212.24
TOTAL CARBON EMISSION						**10.24 tCO2e/km**

Hence, total **10.24 tCO2e/km** will be emitted in relocation of the debris.

1. Responsible Travelling

One of the easiest ways to reduce carbon footprint is through driving, or doing it less. Carpooling and opting for public transport is quite common and effective way to shrink carbon footprint. Even change in driving style can also serve the purpose. Aggressive driving which means speeding, unnecessary acceleration and frequently braking waste both gas and money and reduce mileage and increase carbon foot print.

2. Smart Lighting

The electric energy used to light up homes, schools, offices are generated from thermal power plants that combust fossil fuels to produce the energy, releasing carbon emissions into the atmosphere. Conserving energy, adopting energy efficient bulbs and electrical devices can all help in reducing carbon emissions but cutting down the energy demand.

3. Go Green

It won't be wrong to say that trees and plants are natural air purifiers and source of oxygen. Planting more and more trees can help in purification of air and reduce the heat effect. Growing vegetables and fruits in one's garden cans serve the dual purpose of providing fresh air along with fresh farm produce and if it organically grown then even better. Resolve to plant at least two trees a month.

4. Reduce, Reuse and Recycle

Even as efforts should to reduce dependency on environmentally hazardous products like plastic should be made, the need of the hour is to inculcate the habit of reusing and recycling old plastic bottles, plastic bags, and so on. Purchasing up cycled or recycled products is good way to cut carbon footprints.

5. Purchase and Consume Local Food

Are you someone who likes to eat mangoes year-round? While procuring mangoes in off season is so mean feat, it has an adverse impact on the environment. Transporting these from where it is available to where it's not has a huge cost in terms of carbon emissions. It is always advisable to opt for locally sourced and produced and preferably, organic food. It is healthy for the local economy and environment.

XVII. CO2 REDUCTION MEASURES

Emissions can be lowered by becoming energy efficient and by switching to low-carbon fuels. Both will be necessary to meet Indian carbon targets, along with action to tackle non-energy emissions.

Carbon Sequestration Measures

Carbon sequestration could be a major tool for reducing carbon emissions from various parameters dealing to it. Carbon sequestration can be defined as the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere. The idea is to keep carbon emissions produced by human activities from reaching the atmosphere by capturing and diverting them to a secure storage or to remove carbon from the atmosphere by various means and storing it.

According to estimation, agro forestry trees, planted in tropical climates, has a capacity of sequester atmospheric carbon dioxide at an average of 50 pounds of carbon dioxide per tree per year. The rate of carbon sequestration depends on the growth characteristics of the tree species, the conditions for growth where the tree is planted, and the density of the tree's wood. It is greatest in the younger stages of tree growth, between 20 to 50 years. Further complicating the issue is the fact that far less research has been done on tropical tree species as compared to temperate tree species.

462

Carbon sequestration of proposed trees:

PROPOSED MANDATORY TREE LIST											
Name of the Trees Existing Plantation	Avg DBH(m)	Avg Radius(m)	Avg Height (m)	Volume(m3)	Above Ground Biomass (kg/tree)	Below ground biomass(kg/tree)	Total Biomass (kg/tree)	Carbon(kg/tree)	CO2 sequestrated (kg/tree)	Tree count	Carbon Sequestrated by trees in kg
Chafa	0.2	1	5	15.70	9.42	2.45	11.87	5.93	21.78	35	762.30
Tamhan	0.3	1.5	4	28.26	16.96	4.41	21.36	10.68	39.20	35	1372.14
Sita Ashok	0.25	1.25	5	24.53	14.72	3.83	18.55	9.27	34.03	35	1191.09
Son Chafa	0.2	1	6	18.84	11.30	2.94	14.24	7.12	26.14	35	914.76
Pichkari	0.15	0.75	10	17.66	10.60	2.76	13.35	6.68	24.50	40	980.10
Indian Willow	0.2	1	8	25.12	15.07	3.92	18.99	9.50	34.85	40	1393.92
Arjun Tree	0.25	1.25	10	49.06	29.44	7.65	37.09	18.55	68.06	40	2722.50
Kadamb	0.15	0.75	10	17.66	10.60	2.76	13.35	6.68	24.50	40	980.10
Badam	0.3	1.5	12	84.78	50.87	13.23	64.09	32.05	117.61	35	4116.42
Shisham	0.2	1	12	37.68	22.61	5.88	28.49	14.24	52.27	35	1829.52
Rubber Tree	0.15	0.75	5	8.83	5.30	1.38	6.68	3.34	12.25	35	428.79
Bakul	0.15	0.75	5	8.83	5.30	1.38	6.68	3.34	12.25	35	428.79
Neem	0.3	1.5	10	70.65	42.39	11.02	53.41	26.71	98.01	40	3920.40
Ashoka	0.45	2.25	15	238.44	143.07	37.20	180.26	90.13	330.78	35	11577.42
Foxtail Palm	0.35	1.75	12	115.40	69.24	18.00	87.24	43.62	160.08	41	6563.40
Total Carbon Sequestrated by trees in kg										**556**	**39181.64**

Total Carbon sequestrated by proposed trees is **39181.64 e CO2/ year.**

463

EXISTING TREES TO BE RETAIN											
Name of the Trees Existing Plantation	Avg DBH(m)	Avg Radius(m)	Avg Height (m)	Volume(m3)	Above Ground Biomass (kg/tree)	Below ground biomass(kg/tree)	Total Biomass (kg/tree)	Carbon(kg/tree)	CO2 sequestrated (kg/tree)	Tree count	Carbon Sequestrated by trees in kg
Babul	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	25	24.50
Rain Tree	0.9	0.45	12	7.63	4.58	1.19	5.77	2.88	10.59	1	10.59
Sitaphal	0.25	0.125	10	0.49	0.29	0.08	0.37	0.19	0.68	1	0.68
Neem	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	3	2.94
Kanchan	0.3	0.15	8	0.57	0.34	0.09	0.43	0.21	0.78	1	0.78
Coconut	0.35	0.175	12	1.15	0.69	0.18	0.87	0.44	1.60	2	3.20
Dead	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	2	1.96
Nilgiri	0.3	0.15	8	0.57	0.34	0.09	0.43	0.21	0.78	4	3.14
Umbar	0.3	0.15	12	0.85	0.51	0.13	0.64	0.32	1.18	1	1.18
Pimpal	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	3	2.94
Silver Oak	0.25	0.125	12	0.59	0.35	0.09	0.45	0.22	0.82	1	0.82
Vavla	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	2	1.96
Subabul	0.5	0.25	10	1.96	1.18	0.31	1.48	0.74	2.72	37	100.73
Mango	0.25	0.125	8	0.39	0.24	0.06	0.30	0.15	0.54	4	2.18
Chikku	0.2	0.1	10	0.31	0.19	0.05	0.24	0.12	0.44	2	0.87
Shevga	0.15	0.075	10	0.18	0.11	0.03	0.13	0.07	0.25	6	1.47
Panchara	0.35	0.175	10	0.96	0.58	0.15	0.73	0.36	1.33	1	1.33
Vilayti Chinch	0.25	0.125	8	0.39	0.24	0.06	0.30	0.15	0.54	5	2.72
Karanj	0.5	0.25	12	2.36	1.41	0.37	1.78	0.89	3.27	1	3.27
Vilayti Babul	0.25	0.125	13	0.64	0.38	0.10	0.48	0.24	0.88	3	2.65
Peru	0.15	0.075	14	0.25	0.15	0.04	0.19	0.09	0.34	2	0.69
Chandan	0.45	0.225	15	2.38	1.43	0.37	1.80	0.90	3.31	3	9.92
Pichkari	0.15	0.075	16	0.28	0.17	0.04	0.21	0.11	0.39	4	1.57
Jambhul	0.15	0.075	17	0.30	0.18	0.05	0.23	0.11	0.42	4	1.67
Chinch	0.2	0.1	18	0.57	0.34	0.09	0.43	0.21	0.78	1	0.78
Total Carbon Sequestrated by trees in kg										**119**	**184.54**

Total Carbon sequestrated by retaining trees is **184.54 e CO2/ year.**

464

EXISTING TREES TO BE CUT											
Name of the Trees Existing Plantation	Avg DBH(m)	Avg Radius(m)	Avg Height (m)	Volume(m3)	Above Ground Biomass (kg/tree)	Below ground biomass(kg/tree)	Total Biomass (kg/tree)	Carbon(kg/tree)	CO2 sequestrated (kg/tree)	Tree count	Carbon Sequestrated by trees in kg
Babul	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	17	16.66
Rain Tree	2	1	12	37.68	22.61	5.88	28.49	14.24	52.27	4	209.09
Sitaphal	0.25	0.125	10	0.49	0.29	0.08	0.37	0.19	0.68	1	0.68
Neem	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	16	15.68
Palas	0.3	0.15	8	0.57	0.34	0.09	0.43	0.21	0.78	2	1.57
Dandus	0.45	0.225	12	1.91	1.14	0.30	1.44	0.72	2.65	1	2.65
Dead	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	2	1.96
Gulmohar	0.25	0.125	8	0.39	0.24	0.06	0.30	0.15	0.54	1	0.54
Nilgiri	0.3	0.15	12	0.85	0.51	0.13	0.64	0.32	1.18	6	7.06
Payar	0.25	0.125	10	0.49	0.29	0.08	0.37	0.19	0.68	1	0.68
Vad	0.2	0.1	12	0.38	0.23	0.06	0.28	0.14	0.52	1	0.52
Pimpal	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	6	5.88
Vavla	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	4	3.92
Subabul	0.5	0.25	8	1.57	0.94	0.24	1.19	0.59	2.18	153	333.23
Mango	0.3	0.15	10	0.71	0.42	0.11	0.53	0.27	0.98	2	1.96
Vilayati Chinch	0.25	0.125	10	0.49	0.29	0.08	0.37	0.19	0.68	2	1.36
Vilayati Babhul	0.25	0.125	10	0.49	0.29	0.08	0.37	0.19	0.68	92	62.62
Putranjiva	0.25	0.125	8	0.39	0.24	0.06	0.30	0.15	0.54	1	0.54
Chandan	0.3	0.15	12	0.85	0.51	0.13	0.64	0.32	1.18	5	5.88
Pichkari	0.15	0.075	10	0.18	0.11	0.03	0.13	0.07	0.25	8	1.96
Jambhul	0.15	0.075	10	0.18	0.11	0.03	0.13	0.07	0.25	1	0.25
Total Carbon Sequestrated by trees in kg										**326**	**674.69**

Total Carbon sequestrated by cutting trees is **674.69 e CO2/ year.**

XVIII. CARBON SAVING AND MITIGATION MEASURES

The project has decided to use renewable energy; based on this, the project can avail carbon offset.

Scope	Description	Emission Factor	Total Quantity	GHG Emission (CO2/ kg)	Metric ton of CO2 emission
Offset	Solar Power Generation	2.66	913000	2428580	2428.58

Total Carbon savings due to Solar Generation is **2428580 e CO2/ year.**

M. Mitigation measures for scope 1 during construction phase

If the following mitigation measures are followed carbon emissions will be reduced in the construction phase as well as the operation phase.

Scope	Description	Mitigation measures
1	Fuel Combusted by Construction equipment.	Regular checkups are a must to ensure that the heavy equipment gives optimal performance. Poorly maintained equipment consumes more fuel for the same amount of work. -train the operators to be able to operate the machine at its optimal levels -Limiting idle times - maintaining proper tire pressure is critical to maintaining efficient operation.
	Fuel Combusted by DG Set.	Less power cuts will ensure less usage of DG sets. -natural gas generator sets are optimized to run between 70 to 100 percent of total load rating. - Remaining within its optimal load bearing recommendations is the key to an efficient diesel generator.

	Wet waste generated by laborers.	Alternative to reduces methane production and provides a series of economic and environmental co-benefits. - Cutting down on consumption reduces the emissions caused by waste decomposition.
	Dry Waste generated by laborers.	segregate the waste -recycle as much of the remaining waste as possible
	Waste generated because of construction activities.	Use standard sizes and quantities of materials, and plan to reduce off cuts - Arrange deliveries to match work stages, to avoid materials being stored on site longer than necessary. Co-ordinate trades so left-over materials from one can be used by another

Scope	Description	Mitigation measures
2	Grid Electricity	Solar panels can be installed in the construction phase of the project to reduce the strain on grid electricity.

Scope	Description	Mitigation measures
3	Steel	Use steel with recycled content -Procure materials from local manufacturers to reduce emissions due to transportation
	Concrete	Use concrete with recycled content, which thus reduces the strain on landfill and the need to use virgin materials. -Avoid wastage due to overuse of materials -Procure from a local vendor

	AAC Blocks	AAC blocks is the sustainable alternative to bricks -Use of AAC blocks reduces the need of structural steel thus reducing emissions due to the usage of steel. -Procuring AAC blocks from local manufacturers reduce the CO2emissions due to transportation.

N. Mitigation measures for during operational phase

Scope	Description	Mitigation measures
1	Fuel Combusted by DG Set.	Less power cuts will ensure less usage of DG sets. -natural gas generator sets are optimized to run between 70 to 100 percent of total load rating.
	Dry Waste generated on site	Segregate the waste -recycle as much of the remaining waste as possible
	Wet waste generated on site.	Efficient working of all OWC machine. -Reduce wastage of food -Convert surplus food waste in animal feed

Scope	Description	Mitigation measures
2	Grid Electricity	Switch off lights when not use -switch to compact florescent light bulbs -Choose energy efficient LED bulbs -install automatic light sensors -install sufficient solar panels to carry the load of required electricity. -unplug devices when not in use. -install solar powered external lighting

XIX. CONSTRUCTION MATERIALS TO REDUCE CARBON FOOTPRINT

The following manufacturers offer recycled construction materials, and these will be considered for use in the project at the time of construction and planning.

Steel: Steel retains an extremely high overall recycling rate; the metallurgical properties of steel allow it to be recycled continually with no degradation in performance, and from one product to another. The following manufacturers have recycled content in their steel products:

- Jindal Steel
- ArcelorMittal Steel

Cement: Recycling concrete provides sustainability in different ways it reduces the amount of material that must be land filled, concrete itself becomes aggregate and any embedded metals can be removed and recycled and it helps in reducing the economic impact of the project.

- Ambuja Cement
- JSW Cement

AAC Blocks: Autoclaved Aerated Concrete (AAC) is a certified green building material, which can be used for commercial, industrial and Commercial construction. It is porous, non-toxic, reusable, renewable and recyclable. The following manufacturers have high fly ash content making it ecofriendly.

- Siporex
- Citadel Blocks

Glass: Glass is recyclable and can be recycled endlessly without loss in quality or purity.

- Saint Gobain
- Pilkington.

XX. BASECASE VS DESIGN CASE

Sr. No.	PARTICULARS	BASECASE	DESIGN CASE	REDUCTION
1	Material	2205.95	1969.60	236.35
2	Transportation of Construction materials	54720.99	48858.03	5862.96
3	Energy Use	80853.34	72190.49	8662.85
4	Water Use	1209194.99	1079638.39	129556.60
	TOTAL	**1346975.27**	**1202656.51**	**144318.76**

A reduction of 144318.76 Tons Co2e i.e., 12 % of carbon dioxide equivalent emissions from the project were achieved.

XXI. CONCLUSION

The overall reduction comes up to **217406569.72 Co2/ year** through the use of carbon sequestration measures and other energy efficient measures. The overall emission was from operational phase due to various usages. It was shown that the CO2 emissions during the life cycle of Commercial buildings mainly came from energy consumption and land footprint. Buildings of masonry-concrete architectural structure created more CO2 emissions than the steel-concrete structure with the same area. The keys to reduce CO2 emissions of urban building system are to promote the recycling of constructive materials, transformation of patterns of citizens' consumption and improvement of building floor area ratio in a proper extent.

CARBON FOOTPRINT ANALYSIS DURING CONSTRUCTION PHASE				
SR.NO.	COMPONENT	TOTAL EMISSION CO2 e/ kg/ year	TOTAL EMISSION tCO2e	PERCENTAGE
1	Emission from Energy, water & Material use	2660698.69	2660.70	3.15
2	Emission from Tree Cutting	674.69	0.67	0.00
3	TRANSPORTATION OF CONSTRUCTION MATERIAL	1969.60	1.97	0.00
4	TRANSPORTATION OF WORKERS	48858.03	48.86	0.06
5	ELECTRICITY	81645346.2	81645.35	96.78
	TOTAL(A)	**84357547.22**	**84357.55**	**100**
CARBON FOOTPRINT ANALYSIS DURING OPERATION PHASE				
1	ELECTRICITY	135545295.1	135545.30	99.93
2	ORGANIC WASTE	91658.55	91.66	0.07
	TOTAL(B)	**135636953.6**	**135636.95**	**100**
	TOTAL (A+B)	**219994500.8**	**219994.50**	
CARBON FOOTPRINT REDUCTION DUE				
1	TREE PLANTATION AND LANDSCAPE (EXISTING+PROPOSED)	39366.18	39.37	1.60
2	USE OF SOLAR PV PANEL	2428580.00	2428.58	98.40
	TOTAL (C)	**2467946.18**	**2467.95**	**100**
	TOTAL(A+B)-C	**217526554.6**	**217526.55**	

		5		
	TOTAL EMISSION PER CAPITA	4947.24	4.95	

Hence, total emission per capita **4.95 t CO2 e/ capita/ year**

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ANNEXURE – 6

ECBC Report along with Shadow analysis

ECBC report for

Proposed Commercial Building

At

Mundhwa

In

Maharashtra

Prepared for:

M/s. Bajaj Finserv Ventures Limited & others

S.No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others

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TABLE OF CONTENT

I. INTRODUCTION 3

a. About the Project 3

b. Building Configuration 4

II. SHADOW ANALYSIS 6

c. Terrace Area Calculation 6

d. Shadow Analysis- 15th March 7

e. Shadow Analysis- 15th June 8

f. Shadow Analysis- 15th September 9

g. Shadow Analysis- 15th December 11

III. BUILDING ENVELOPE 11

IV. USEFUL DAYLIGHT ILLUMINANCE (UDI) 13

V. FENESTRATIONS- WALL TO WINDOW RATIO 17

V. NATURAL VENTILATION 19

VI. COMPLIANCE TO ECBC 21

VII. EXTERIOR BUILDING LIGHTING POWER 24

IX. EPI CALCULATIONS 25

X. HEAT ISLAND EFFECT 26

I. INTRODUCTION

a. About the Project

The Proposed Commercial Project at Mundhwa, Pune, Maharashtra, India. The project having Building configuration as follows:

1	**Total Site Area**	70631.81	SQ.M.
2	**Total Built-up Area**	614387.19	SQ.M.
3	**WWR**	0.58	%
4	**No. Of Units**	22 Office floors each tower	Nos.
5	**No. Of Population**	43945	Nos.
6	**Transformer Capacity**	2000X18	KVA
7	**Connected load**	45442	KW
8	**Demand load**	18254	KW

b. Building Configuration

The projected Proposed Commercial development would be built at Mundhwa, Maharashtra. According to ECBC, this area has a hot and humid climate. The concept includes open spaces nearby 3 IT buildings.

The project's energy analysis and solar passive analysis are covered in detail in this study. For the suggested design, analyses of wind, shadows, and solar isolation are carried out. The study supports the incorporation of energy-saving strategies into the design and design decisions.

Sr. No.	Building Name	Configuration	Height (m)
1.	Tower A	B5+B4+B3+B2+B1+GR + Mz +1st Floor Parking + 2nd Floor Parking +3rd Floor Parking +4th & 5th Floor (comprising of Food Court and Training Rooms) + 22 Floors	125.25
2.	Tower B	B5+B4+B3+B2+B1+GR + Mz +1st Floor Parking + 2nd Floor Parking +3rd Floor Parking +4th & 5th Floor (comprising of Food Court and Training Rooms) + 22 Floors	125.25
3.	Tower C	B5+B4+B3+B2+B1+GR + Mz +1st Floor Parking + 2nd Floor Parking +3rd Floor Parking +4th & 5th Floor (comprising of Food Court and Training Rooms) + 22 Floors	125.25
4.	Visitor Centre	Ground Floor	8.40

C. SOLAR INSOLATION

The solar insolation analysis gives the daily average intensity of radiation on the surfaces of the buildings.

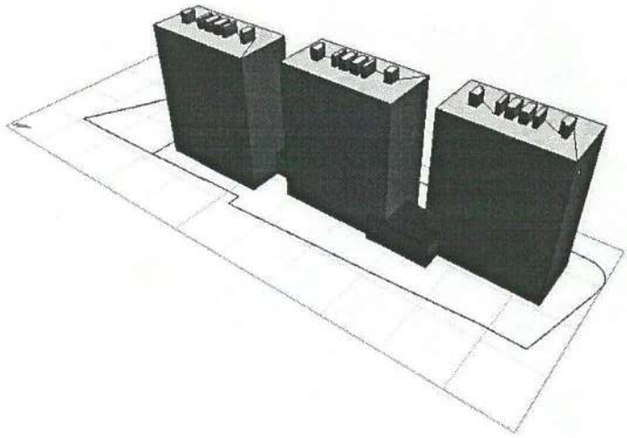
Incident Solar Radiation was studied for each facade of the building.

As seen from the results, the yellow color represents higher intensity of radiation while blue CLIMATOLOGY- SOLAR INSOLATION NORTH-EAST VIEW Range- 200 Wh/m2 to 5000 Wh/m2 color indicates lower radiation intensities.

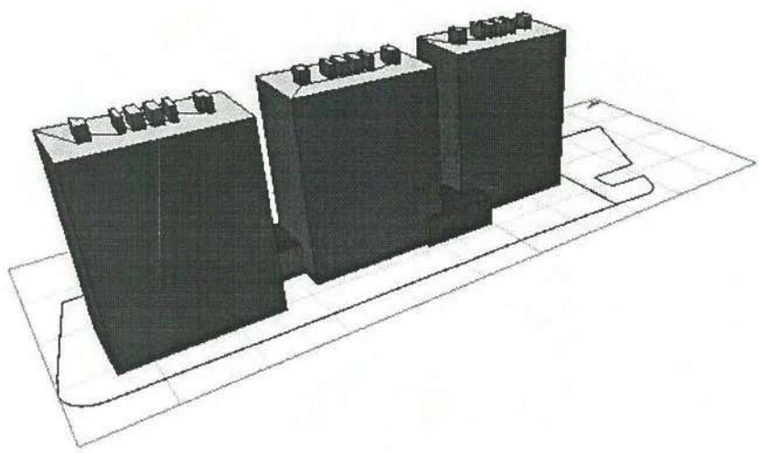
Shaded facades exhibit lower radiation intensities.

The order of high intensity surfaces are observed at roof, south, west, east and north.

NORTH-EAST VIEW Range- 200 Wh/m2 to 5000 Wh/m



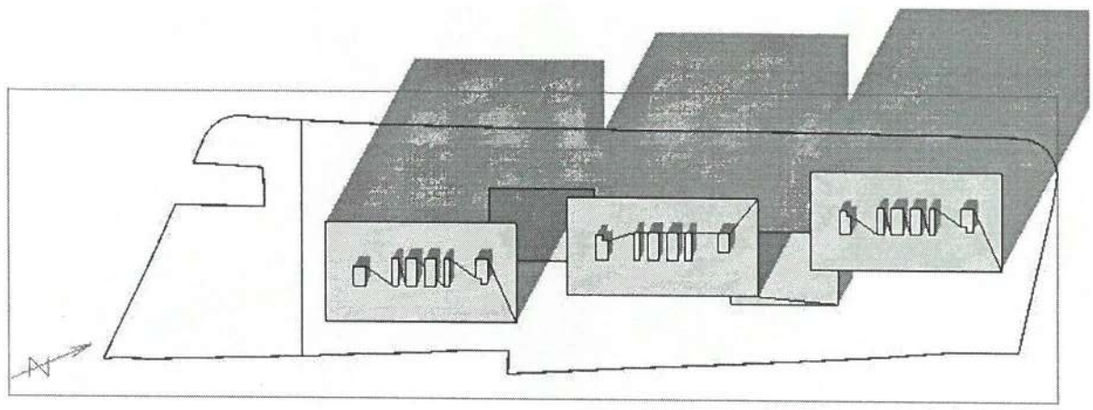
SOUTH-WEST VIEW Range- 200 Wh/m2 to 5000 Wh/m2



I. SHADOW ANALYSIS

The buildings are oriented along the South-East axis. Due to the form of the building, mutual shading is achieved for the facades. The building also has terraces and balconies which shade the windows thus reducing heat gain. The adjacent diagram shows the longest shadow cast in the month of December on the proposed solar panels area. As seen from the diagram, majority of the solar panels are located in a shadow free zone on the terrace.

c. Terrace Area Calculation



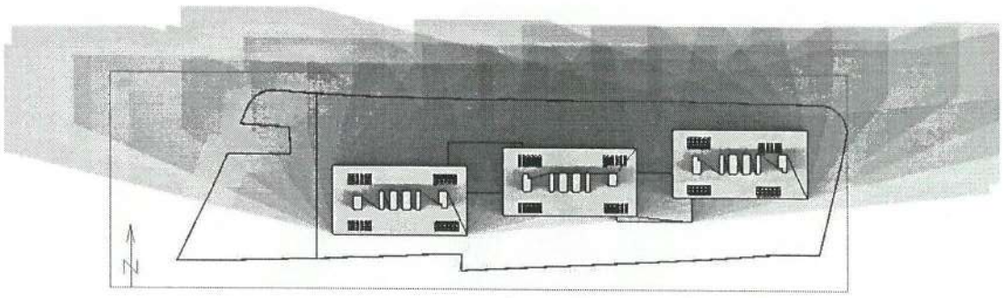
Total Terrace Area – 13,814.88 Sq.M.

Shadow Free Area – 12661.09 Sq.M.

HOURLY SHADOW PATTERN

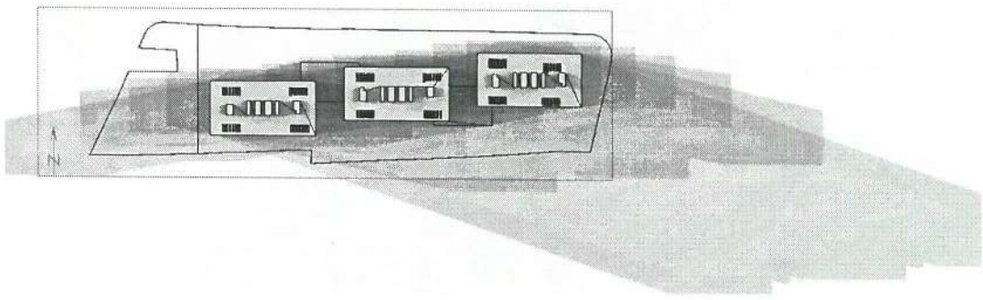
SHADOW RANGE 8:00 Hrs. – 18:00 Hrs.

Day: 15th March



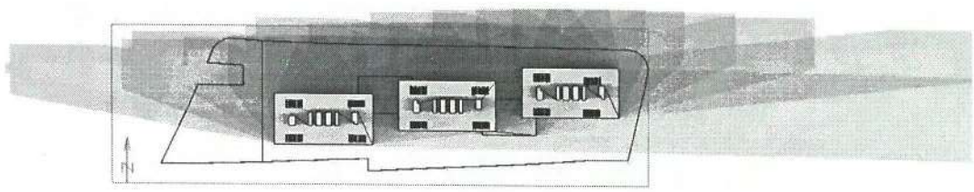
SHADOW RANGE 8:00 Hrs. – 18:00 Hrs.

Day: 15th June



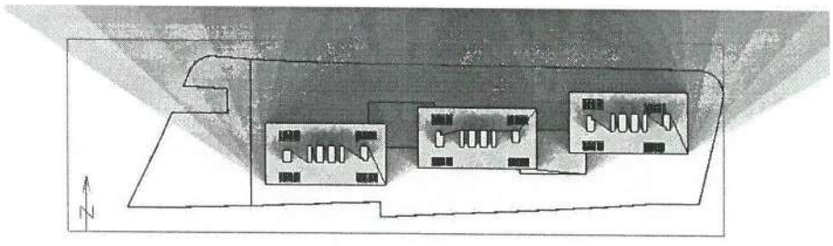
SHADOW RANGE 8:00 Hrs. – 18:00 Hrs.

Day: 15th September

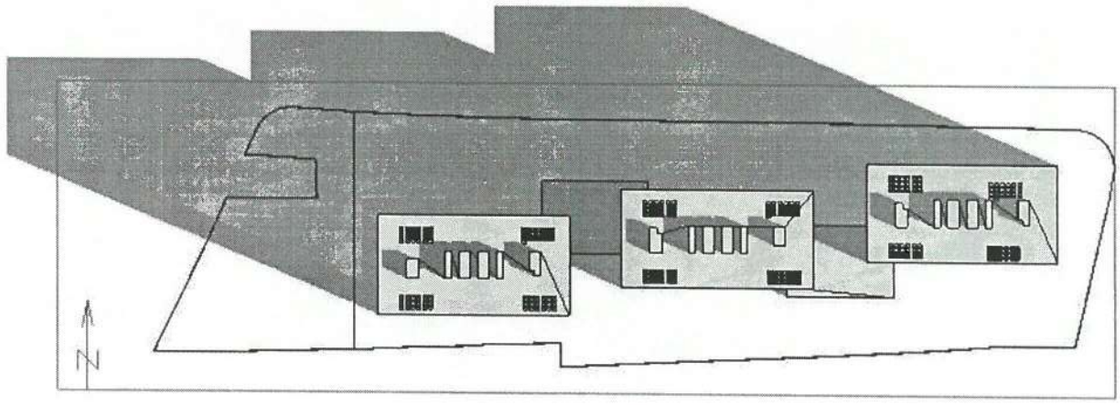


SHADOW RANGE 8:00 Hrs. – 18:00 Hrs.

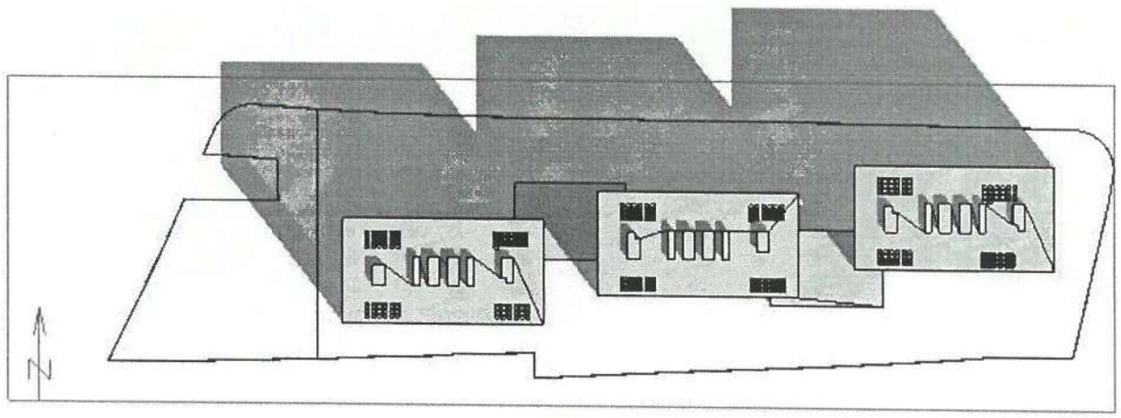
Day: 15th December



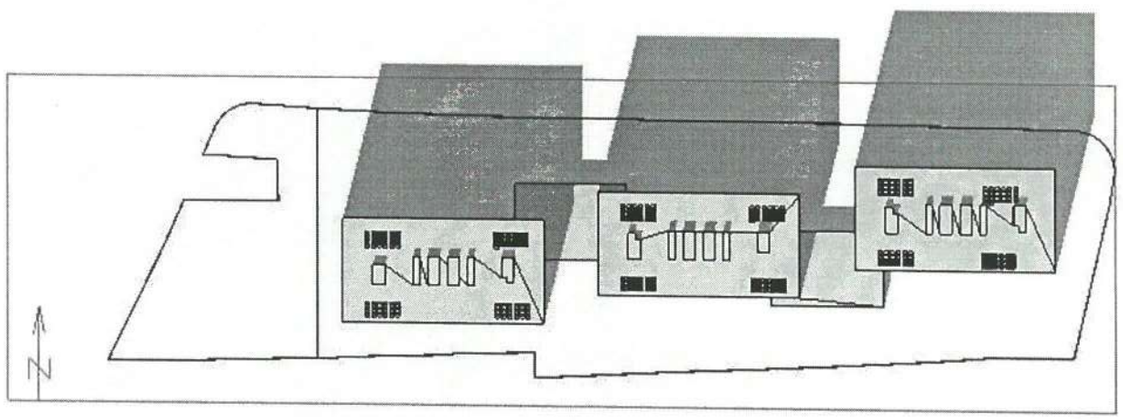
d. Shadow Analysis- 15th March



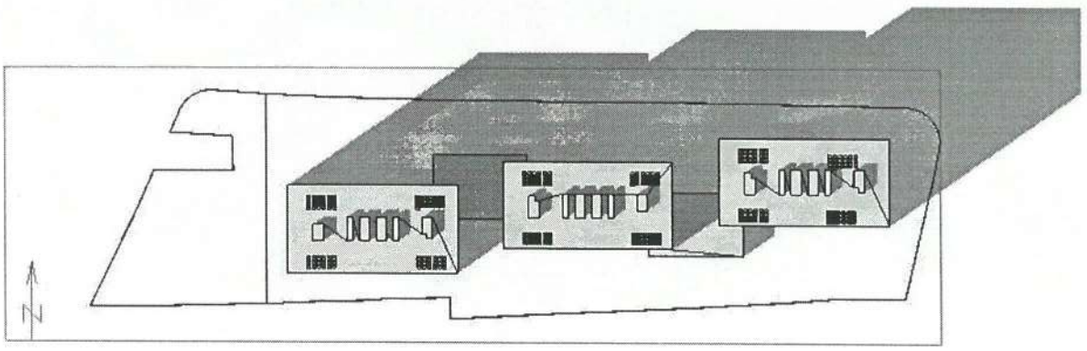
TIME- 9.00 AM



TIME- 11.00 AM

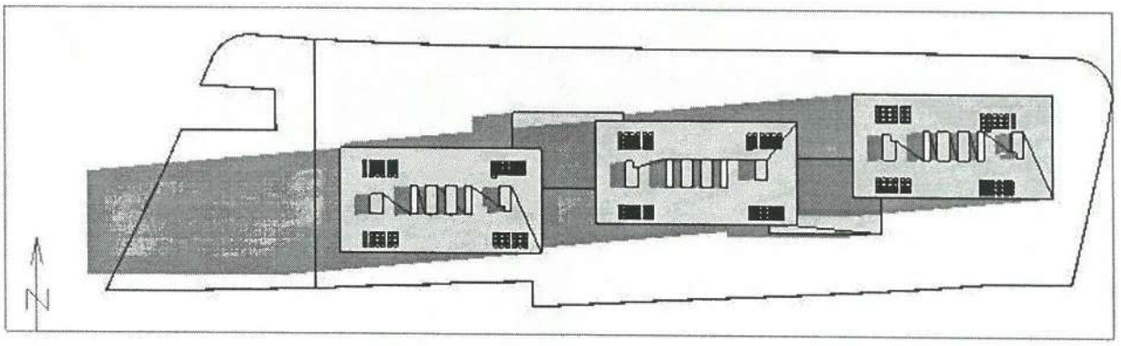


TIME- 13.00 PM

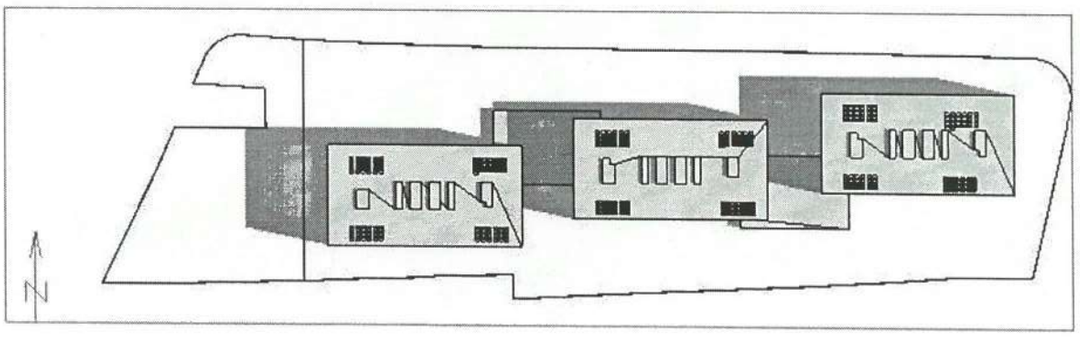


TIME- 15.00 PM

e. Shadow Analysis- 15th June



TIME- 9.00 AM



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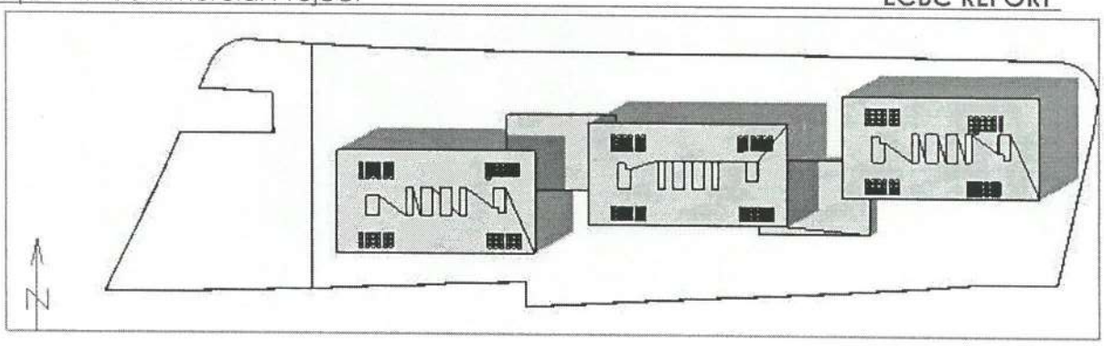
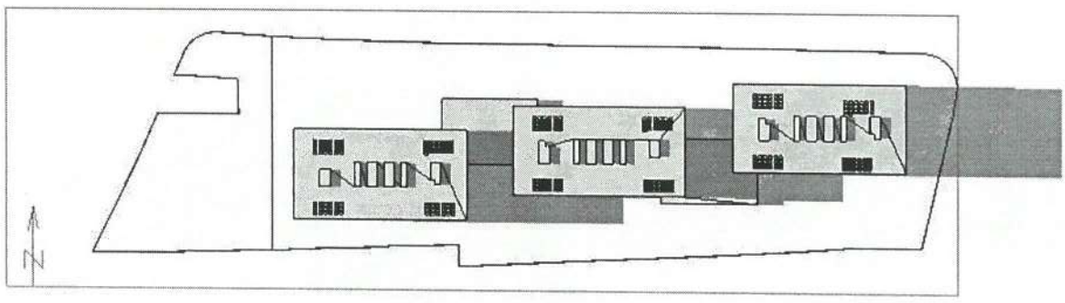
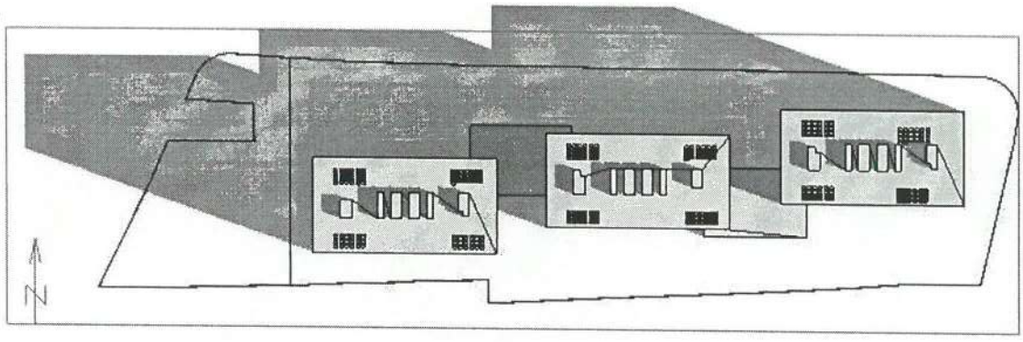


TIME- 13.00 PM

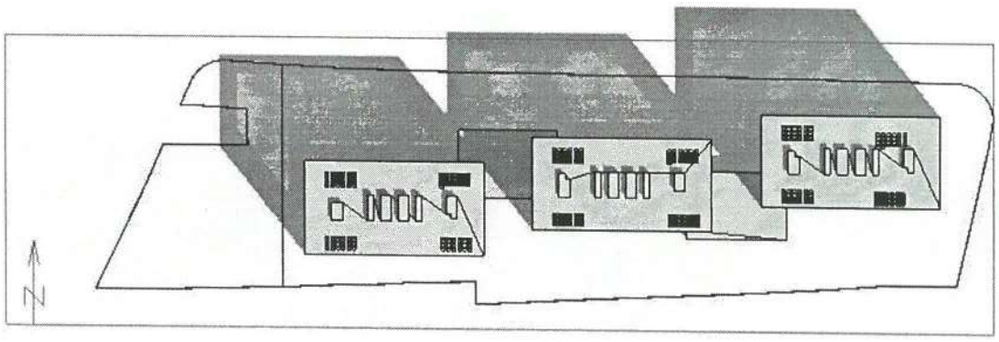


TIME- 15.00 PM

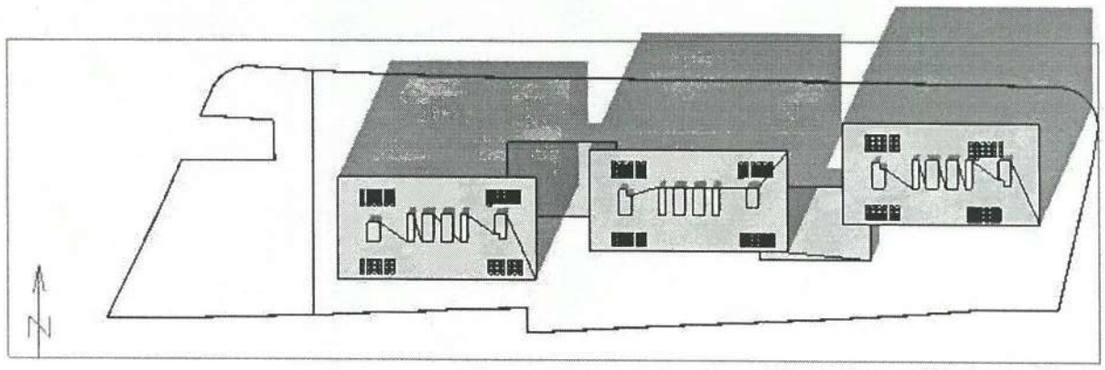
f. Shadow Analysis- 15th September



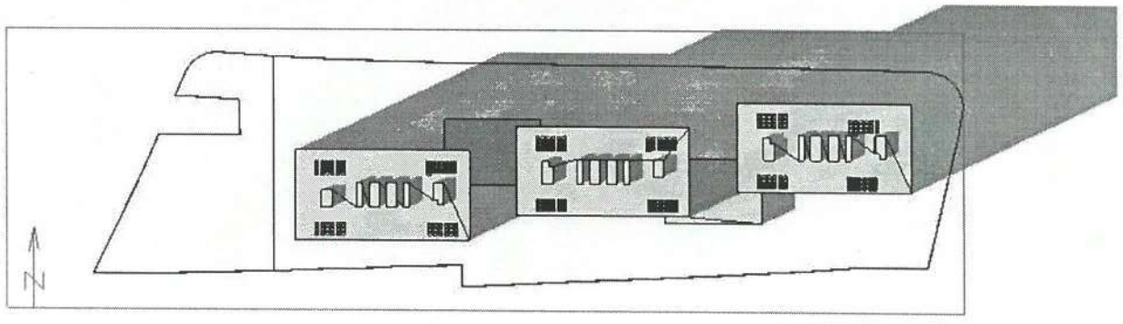
TIME- 9.00 AM



TIME- 11.00 AM

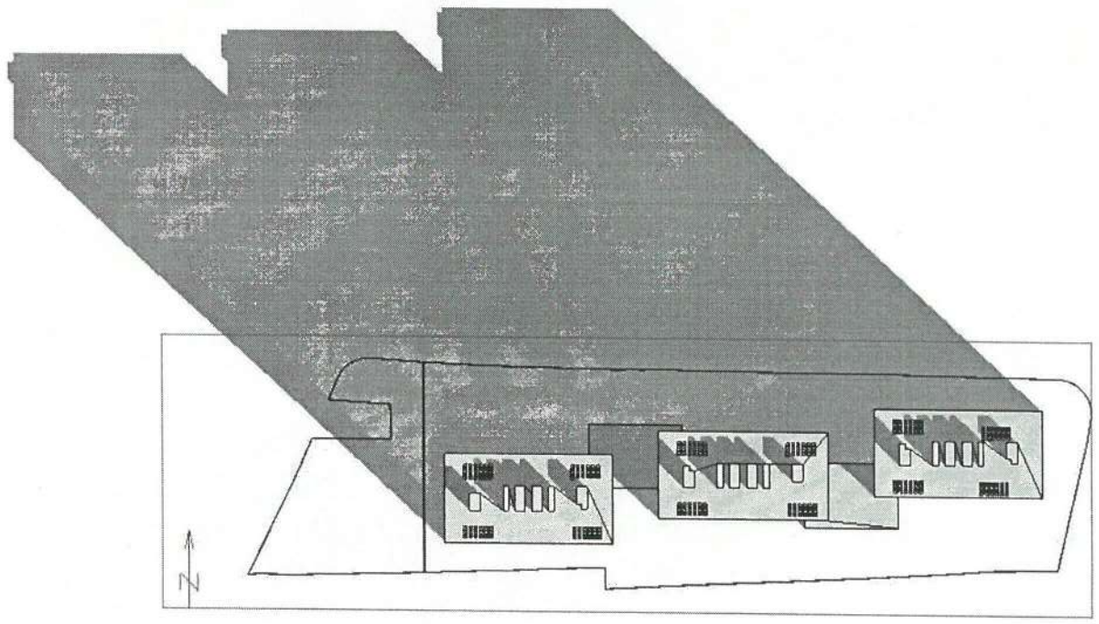


TIME- 13.00 PM

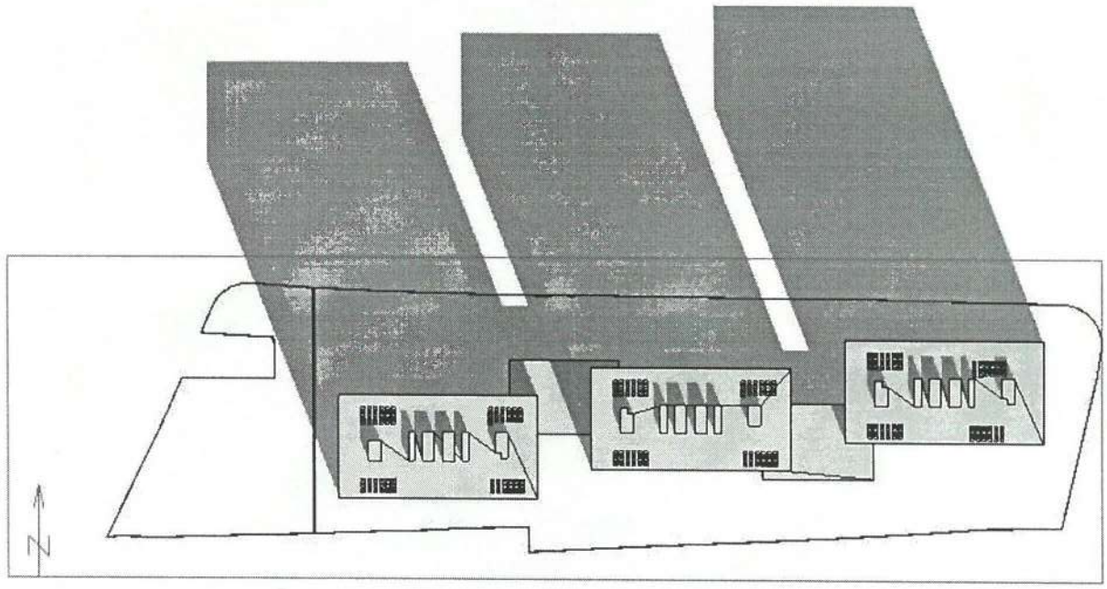


TIME- 15.00 PM

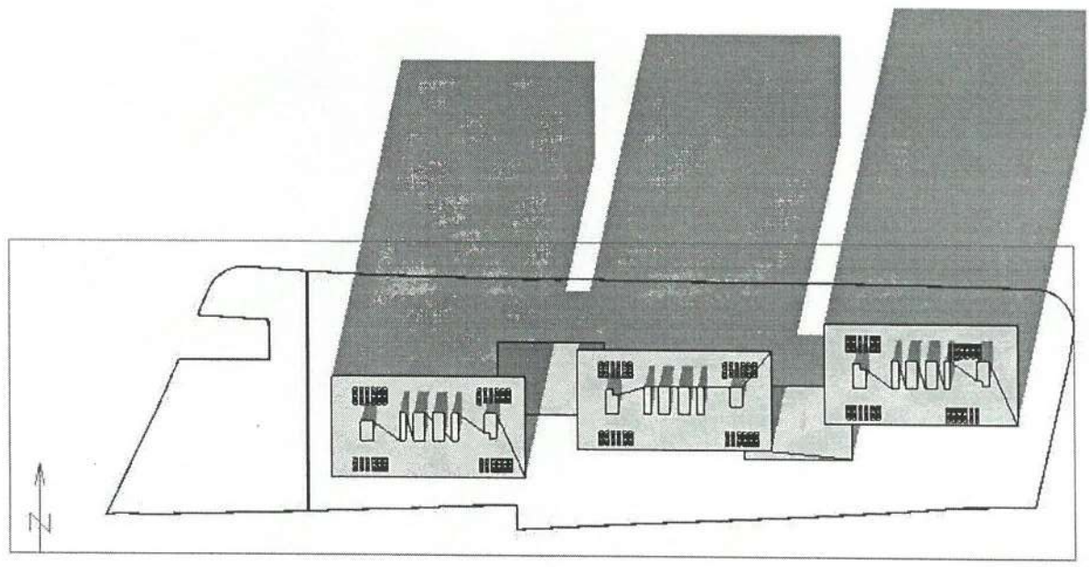
g. Shadow Analysis- 15th December



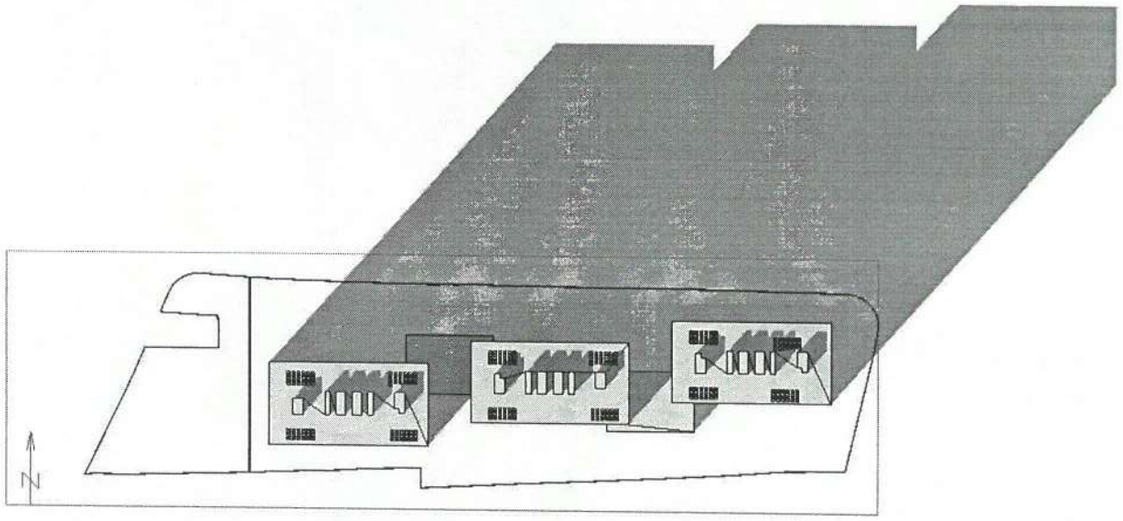
TIME- 9.00 AM



TIME- 11.00 AM



TIME- 13.00 PM



TIME- 15.00 PM

II. WIND ANALYSIS

The wind analysis shows that the building layout corresponds to the prevailing wind direction. The prevailing wind direction is north-east.

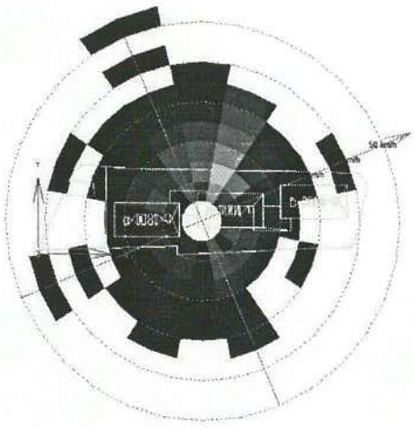
The average wind speed is 45 km/h.

The layout is such that it allows wind flow to all the buildings without causing obstructions from any building. The windows face the wind direction thus allowing ventilation in all regularly occupied spaces.

h. SUMMER (MARCH- MAY)

Prevailing wind directions are West, and North-west.

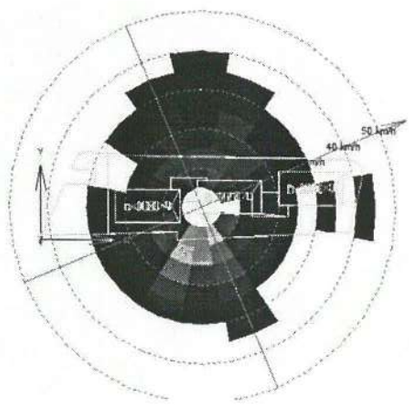
Average wind speed is 40 km/h



i. MONSOON (JUNE- AUGUST)

Prevailing wind direction is West and North-west.

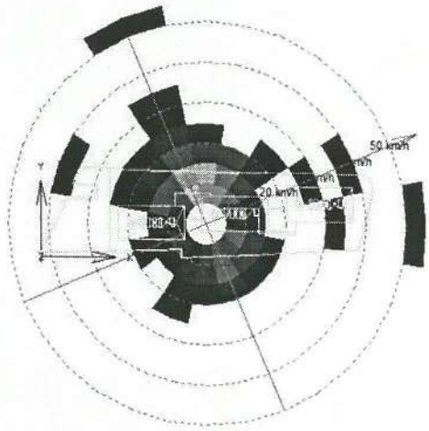
Average wind speed is 40 km/h



j. SPRING (SEPTEMBER-NOVEMBER)

Prevailing wind direction is North-east.

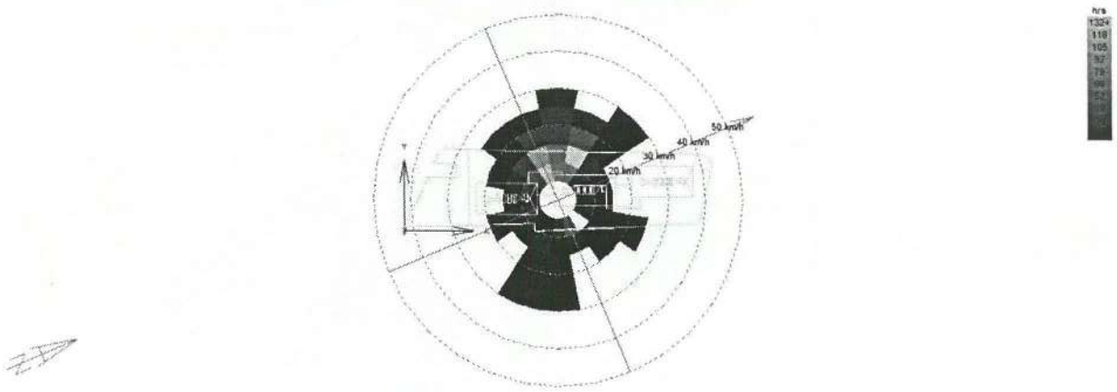
Average wind speed is 35 km/h



k. WINTER (DECEMBER- FEBRUARY)

Prevailing wind direction is south -east.

Average wind speed is 30 km/h


hrs
1324
118
105
92
79
66
53
40
27
14
1
50 km/h
40 km/h
30 km/h
20 km/h

Building Envelope

Fenestration: -

Exterior Wall Construction

U Value = 0.85 W/sm.K (6'' External AAC Wall)

Roof Construction

U Value = 0.47 W/sm.K (6''RCC Slab with 2'' XPS Insulation)

Glazing

U Value = 4.60 W/sm.K

SHGC= 0.42

VLT = 45 %

Useful Daylight Illuminance (UDI)

Useful daylight illuminance (UDI) is a measure of daylight availability that represents the proportion of time that is occupied when daylight meets the desired range of illuminance at a particular location in a place.

TOWER 1,2&3							
Orientation	Type of Fenestration	DEF	Window/ Fenestration Width	Xm (Distance Perpendicular to fenestration	Ym (Distance parallel to fenestration)	(X x Y m2) Above grade area meeting the UDI requirement for 90% of the time in an year	Total
NORTH	GLAZING						605.22
	OP	3.5	50.40	11.55	52.40	605.22	
EAST	GLAZING						699.93
	OP	2.1	99.00	6.93	101.00	699.93	
WEST	GLAZING						599.94
	OP	1.8	99.00	5.94	101.00	599.94	
SOUTH	GLAZING						518.76
	OP	3.0	50.40	9.90	52.40	518.76	
Total daylight area per floor meeting UDI requirement during 90% of the year							2423.85
Total daylight area in building meeting UDI requirement during 90% of the year							65443.95

B/up Area of 1 floor	4989.6
No of floors	27
B/up area for all floors (After Deductions)	134719.2
UDI for Building	49%

As a result, the building will meet UDI requirements.

Wall to Window Ratio

The non-opaque building envelope component area to the envelope area (excluding roof) of Residential & Commercial units is known as the WWR ratio.

TOWER 1,2&3	VERTICAL FENESTRATION (TYPE OF WINDOW)	NO. OF WINDOW	LENGTH	HEIGHT	WINDOW AREA	TOTAL WINDOW AREA	SUM OF WINDOW AREA	WALL AREA IN SQ.M.	WWR
NORTH	OP	22	50.40	3.30	166.32	3659.04	3659.04	6312.60	0.58
EAST	OP	22	99.00	3.30	326.70	7187.40	7187.40	12399.75	0.58
SOUTH	OP	22	50.40	3.30	166.32	3659.04	3659.04	6312.60	0.58
WEST	OP	22	99.00	3.30	326.70	7187.40	7187.40	12399.75	0.58
GROSS WWR							21692.88	37424.70	**0.58**

The wall to window ratio for the building is calculated.
It is observed that the gross WWR is below 40% for Residential & below 60% for Commercial i.e. within ECBC limit

III. EXTERIOR BUILDING LIGHTING POWER

EXTERIOR LIGHTING APPLICATION	POWER LIMITS
Building entrance (canopy)	10 W/m2 of canopied area
Building entrance (w/o canopy)	90 W/ linear m of door width
Building exit	60W/ Lin m of door width
Building façade	5.0 W/ m2 of vertical façade
Emergency signs, ATM kiosks, Security area façade	1.0 W/m2
Driveways and parking (open/external)	1.6 W/m2
Pedestrian walkways	2.0 W/m2
Stairways	10.0 W/m2
Landscaping	0.5 W/m2
Outdoor sales area	9.0 W/m2

I. EPI CALCULATIONS

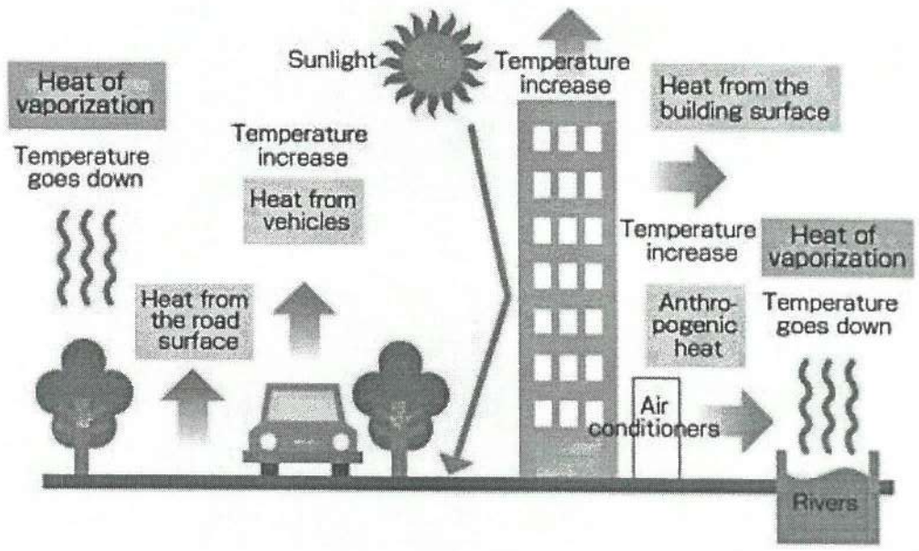
The EPI of buildings demonstrate compliance through whole building performance. It is observed via various analysis tools that the buildings are properly Shaded, Naturally ventilated & has sufficient Daylight. Following is the final outcome of energy simulation of the proposed buildings.

Building Type	Commercial
Occupancy	24x7
Total Built-up Area	614387.19 m2

Total Proposed Energy Consumption	126087936.00 Kwh/year
Benchmark EPI	208.21kWh/m2/year
Proposed EPI	233.94 kWh/m2/year
EPI Ratio	**0.89**

II. HEAT ISLAND EFFECT

The heat island effect is a phenomenon caused due to human activity and land alteration which causes the metropolitan areas to be warmer than the surrounding areas. The temperature difference is usually larger at nights than during the day. This is majorly caused due to the absorption and emissivity properties of the materials. The hard surfaces absorb heat during the day and emit heat at night when the temperatures are lower. A shaded or a reflective surface will absorb lesser solar heat during the day and hence will emit less heat during the night. Thus, shaded and reflective surfaces contribute in mitigating the heat island effect.



HIGH SRI FINISH AND SHADE FROM SOLAR PANELS

All roof tops shall have a finish with high SRI (solar reflective index) value. White reflective paints or tiles shall be used. This will help in reflecting the heat. This is also help in achieving lower temperatures in the top floors of the buildings. The roof shall be covered with solar panels partly thus shading the roof from solar radiation.

LIGHT COLOURED PAVING MATERIALS FOR PAVED SURFACES ON SITE

The materials used for paving shall be light in color. Open grid pavers shall also be used wherever feasible such as in open parking areas. Light colored materials shall help in reflecting the heat rather than absorbing it. The open grid pavers help in reducing the paved area percentage and allow percolation

SHADED PAVED AREAS

The driveways shall be shaded by tree canopies and shade from the building. This shall help in reducing the incident heat on the paved surfaces.

COVERED PARKING

Majority of the parking is provided under cover. This helps in reducing the paved areas on site which contribute to the heat island effect.

ANNEXURE – 7

Geo Hydrology Report

Hydro-Geological Investigation for Assessment of Rainwater Harvesting Potential

Prepared for

Proposed IT/ITES/Commercial Building Project

Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra

by M/s. Bajaj Finserv Ventures Limited & Others

Prepared by

Bhumi Envirotech Solutions

Gat No 1252, Spine Road, Chikhali, Pune,
Maharashtra, 411062, India

September 2024

Contents

Executive Summary 3

1: Introduction 4

2: Project site 4

3: Climate and Rainfall 4

4: Regional Geology 5

5: Electrical Resistivity Method (IS: 1892-1979 Appendix B clause 3.3 B-2): 7

6. Results 11

7. Conclusions 21

Conceptual RWH Rooftop Unit Plan 22

Conceptual RWH Rooftop Unit Section 23

Conceptual RWH Surface Unit Plan 24

Conceptual RWH Surface Unit Section 25

Executive Summary

A	Net Plot area	**55075.24 Sqm.**
B	Water Available for Rainwater Harvesting **(before development)**	**12590.20 Cum/year**
C	Water Available for Rainwater Harvesting **(After development)**	**31560.79 Cum/year**
D	Water Level –Pre-Monsoon Post-monsoon	20.0 Mtr. to 22.0 Mtr. BGL 18.0 Mtr. to 20.0 Mtr. BGL
E	**Long term Average Rainfall** and **rainy days**	**762 mm and 76 days**
F	Water that can be accommodated in the aquifer	**=Area of aquifer (sqm.) x Thickness of Confined Aquifer (M) x Specific Yield of aquifer.** **= 55075.24 sq. m.x 4 M x 0.10** **=22030.10 Cum**
G	Terrace Rainwater That Can be Harvested Via Terrace Recharge Pits – 22 No pits	**16623.02 Cum/year**
H	Balance Availability in Aquifer	**5407.07 Cum**
I	Surface Rainwater That Can be Harvested Via Surface Recharge Pits –10 No pits	**7555.92 Cum/year**
J	Total Rainwater Harvested(annually) **(G+I)**	**24178.94 Cum/year**
K	Incremental Runoff	**18,970.59 Cum/year**
L	Percentage of Rainwater Harvest	**127 %**
M	Percentage of Aquifer Filled	**110 %**

1: Introduction

The present study was carried out to identify various litho-sections for **Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others.** The purpose of study is to find out various subsurface strata such as soil layer, weather layer, fractured layer and starting depth of hard rock strata.

For this, electrical resistivity method was adopted as geophysical survey to identify the various subsurface layers.

- Entire stretch of the proposed area and small sections exposed were observed to understand geological conditions.
- Observations were made in the entire area to infer the role of local geological, geomorphological and climatological factors leading to weathering of the rock.
- Electrical Resistivity Surveys were conducted to infer subsurface geological conditions in general and thickness / depth of different layers in particular besides geotechnical strata classification for estimating the extent and thickness of different layers.

2: Project site

The present site is **located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others.** The site is situated in the eastern side of Pune city.

3: Climate and Rainfall

The climate of the district is overall agreeable. The winter season is from December to about the middle of February followed by the summer season which lasts up to May.

June to September is the south-west monsoon season, whereas October and November constitute the post-monsoon season. The mean minimum temperature is about 12°C and mean maximum temperature is about 39°C.

Table 1: Long term Rainfall data

Month	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Sum
Rainfall	0	0	0	1.34	0.66	149	204	314	78	15	0	0	762
Rainy days	0	0	0	0	0	11	24	25	13	2	0	0	76

https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.imdpune.gov.in/cmpg/Griddata/Rainfall_1_NetCDF.html&ved=2ahUKEwiRue_8go3-AhVrS2wGHSnfBM4QFnoECBgQAQ&usg=AOvVaw1OIcRORTDbyqA9HP0Uquj7

Yearly Gridded Rainfall (1.0 x 1.0) data Binary File

Rainfall:

IMD New High Spatial Resolution (0.25 X 0.25 degree) Long Period (1901-2022) Daily Gridded Rainfall Data Set Over India. This data product is a very high spatial resolution daily gridded rainfall data (0.25 x 0.25 degree). The unit of rainfall is in millimeter (mm). Data available for 122 years, 1901 to 2022. Data is arranged in 135x129 grid points. The first data in the record is at 6.5N & 66.5E, the second is at 6.5N & 66.75E, and so on. The last data record corresponds to 38.5N & 100.0E. The yearly data file consists of 365/366 records corresponding to non leap/ leap years.

Click here for sample Fortran code To read the data.

Click here for sample C code to read the data.

Click here for sample grads control file for reading the data in grads software .

For comments and questions on the data or for any other clarificaltons regarding the data set, please contact:

Climate Prediction Group,
Office of Head, Climate Research and Services,
India Meteorological Department
Pune, INDIA. 411 005.
Phone : 091-20-2553 5211 / 2553 5877
Fax : 091-20-2553 5435.
E-Mail : lrfimdpune@gmail.com, ncc@imd.gov.in
WEB-SITE : http://www.imdpune.gov.in

Gridded Rainfall (1.0 x 1.0) NetCDF File 2021 Download

CITATION (for Rainfall 1 x 1):

The relevant reference research paper is : Rajeevan, M., Jyoti Bhate, A.K.Jaswal, 2008 : Analysis of variability and trends of extreme rainfall events over India using 104 years of gridded daily rainfall data, Geophysical Res. Ltrs, Vol.35, L18707, doi:10.1029/2008GL035143.

DISCLAIMER:

Although every care has been taken in preparing and testing the data set, India Meteorological Department cannot guarantee that the data are correct in all circumstances. India Meteorological Department also does not accept any liability whatsoever for any error or omission in the data, or for any loss or damage arising from its use.

4: Regional Geology

The entire area of the district is underlain by the basaltic lava flows of upper Cretaceous to lower Eocene age. The shallow alluvial formation of recent age also occurs as narrow stretches along the major rivers flowing in the area.

Basaltic lava flows occupy more than 95% of the area of the district. These flows are normally horizontally disposed over a wide stretch and give rise to table land type of topography also known as a plateau. These flows occur in layered sequences ranging in thickness from 7 to 45 m and represented by massive units at the bottom and vesicular unit at the top of the flow. These flows are separated from each other by a marker bed known as 'bole bed'.

The ground water in the district occurs under phreatic, semi – confidence and confined conditions. Generally, the shallower zones down to the depth of 20 to 22 m bgl form the phreatic aquifer. The water bearing zones occurring between the depth 20 and 40 m bgl when weathered or having shear zones yield water under semi-confined condition. The deep confined aquifers generally occur below the depth of 40 m bgl.

The vesicular unit of lava flow when exposed or lying just few meters below the surface forms a potential aquifer in the district. However, the vesicular portion of different lava flows varies in thickness from few m to 10 m and nature and density of vesicles, their distribution, interconnection, and weathering are the decisive factors for occurrence and movement of water in these units. The massive portions of basaltic flows are normally devoid of water, but when it is weathered, fractured, and joined forms potential aquifer.

The water bearing properties of these flows depend upon the intensity of weathering, fracturing, and jointing which provides availability of open space within the rock for storage and movement of ground water. The thickness of weathering in the district varies widely up to 20 m bgl. However, the weathered and fractured trap occurring in topographic lows forms the potential aquifer in the district.

Alluvium occurs in small areas along banks and flood plains of major rivers like Bhima, Ghod, Mula, Mutha and their tributaries. In alluvium the granular detrital material like sand and gravel usually occurring as thin layer in the district yields water. But due to its limited extent the ground water potential in this formation is negligible.

Based upon the geological data available in the literature and that collected during projects carried out in the area, the regional geology is known to comprise of black cotton soil followed by Deccan Flood Basalt. The black cotton soil originated mainly due to in situ decomposition of the basalts. The thickness of soil-cap is highly variable, from 30 cm to 1.5 m. The soil is highly argillaceous, calcareous, and very fine grained. Calcium and magnesium carbonate disseminates are present as kankar among its accessory constituents. The base-exchange capacity of this soil is high. The Deccan Flood Basalts are dark grayish green to black coloured, homogeneous, and cryptocrystalline vesicular rock of Cretaceous to Paleogene age. The bulk of the basalt is composed of plagioclase and augite. The amygdaloidal cavities are generally filled up by secondary minerals like calcite, quartz, and zeolite. The continuity of basalt stratigraphy is generally intervened by sedimentary beds of small vertical as well as horizontal extent, known as inter-trappean beds. The basalt is highly fractured and jointed; however, it has been extremely weathered to a residual soil of grey to brown low plasticity gravelly clay. The occurrence and availability of groundwater in this region is controlled mainly by the shrinkage jointing, presence of vesicle and fracture interconnection between fracture, joints and vesicles and presences of inter trappean beds within the Deccan Floods basalt, which forms the aquifer. The aquifer is generally unconfined and receives across the site.

5: Electrical Resistivity Method (IS: 1892-1979 Appendix B clause 3.3 B-2):

By applying this method, the resistance to the flow of an electric current through the subsurface materials is measured at intervals on the ground surface. Resistivity is usually defined as the resistance between opposite phases of a unit cube of the material.

Each material has its own resistivity depending upon the water content, compaction, and composition. The test is conducted by driving four metal spikes to serve as electrodes into the ground along a straight line at equal distances. A direct voltage is imposed between the two outer potentiometer electrodes and the potential drop is

measured between the inner electrodes. To interpret the resistivity data for knowing the nature and distribution of the subsurface formations, it is necessary to make preliminary trial on known formations. The potential 'V' thus obtained divided by the current 'I' applied gives the resistance 'R' of the ground. The product of the resistance and the spacing factor, which is depending upon the disposition of the electrodes, is the resistivity of the ground.

This method is routinely used for:

a. Determining the sub-surface strata classification

b. Determination of hard rock foundation

c. Estimation of overburden thickness and hard rock quantities and

d. Determination of the suitability of the area for quarrying and excavation

A great variety of electrode arrangements have been used to measure the earth resistivity but essentially they may be grouped into three classes.

1. Arrangements in which the potential differences between two widely spaced measuring electrodes are recorded.

2. Arrangements in which, a potential gradient or electric field intensity is measured using closely spaced pair of measuring electrodes.

3. Arrangements in which the curvature of the potential function is measured using a closely spaced current electrode pair as well as a closely spaced measuring electrode pair.

Any one of these arrays may be used to study variations in resistivity with depth or in lateral condition. In studying the variation of resistivity with depth, as in the case of a layered medium the spacing between the various electrodes is gradually increased.

With larger spacing, the effect of material at depth on the measurements becomes more pronounced is sown in table below.

In studying the lateral as well as vertical variations, various electrode configurations are adopted and the array is moved as a whole along a traverse line. The first type of measurement is called as 'Vertical Electrical Sounding' (VES) and second is Horizontal Profile.

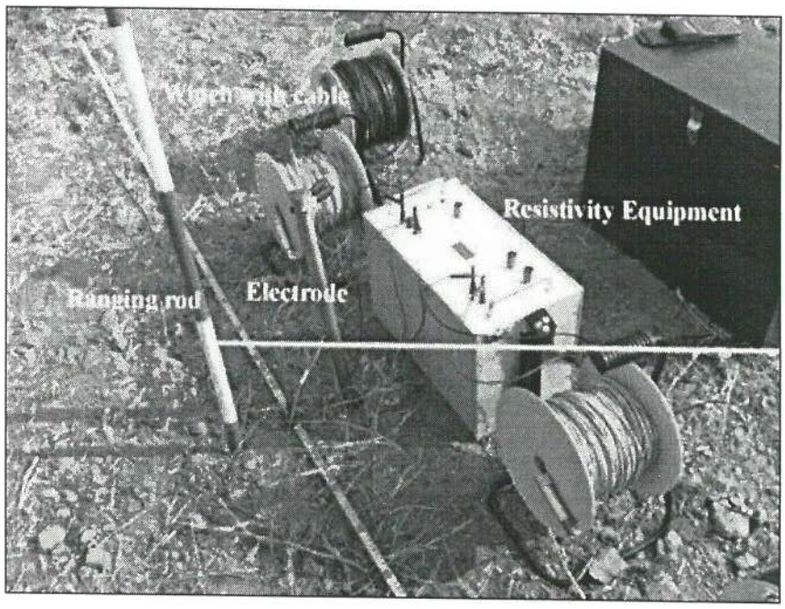


Fig. Resistivity equipment used for present study

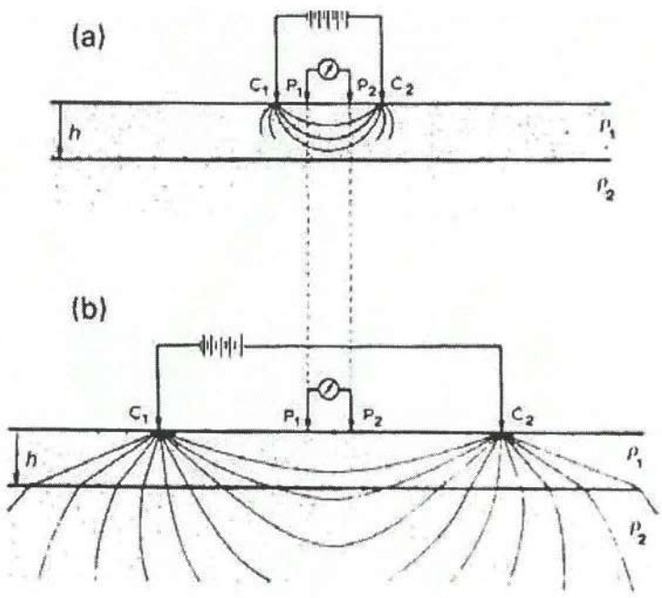


Fig. Typical Vertical Electrical Sounding curves at unsaturated zone

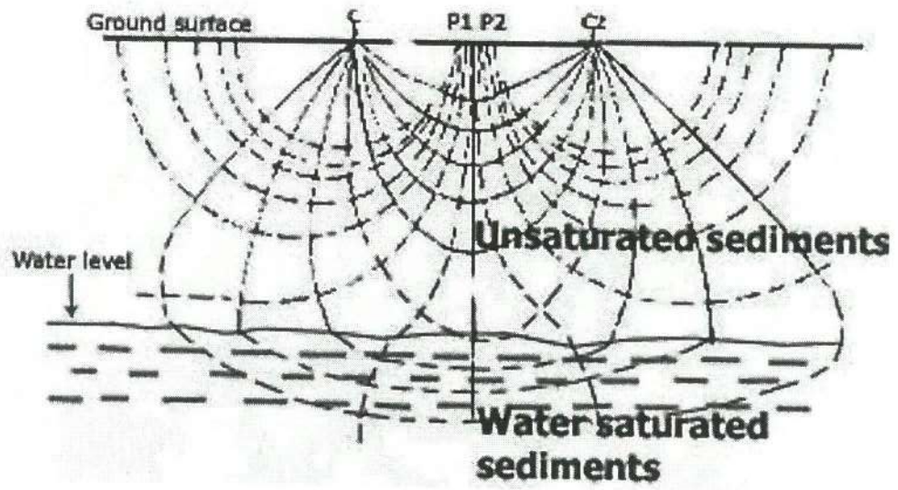


Fig. Vertical Electrical Sounding curves in water-saturated sediments

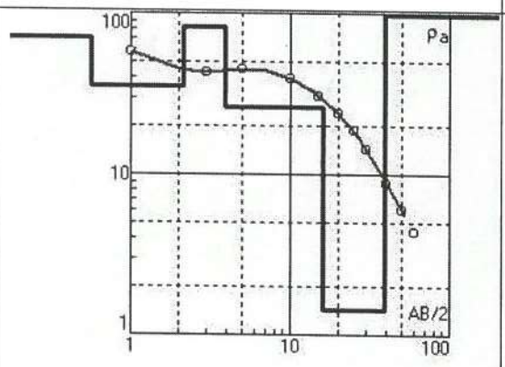
Table: Ranges of resistivity values for various litho units from Deccan Basalt

Sr. No.	*Litho Unit*	Resistivity in Ohm m
1	Black cotton soil and Bole bed	5-30
2	Weathered/fractured vesicular basalt saturated with water	31-80
3	Moderately weathered/fractured basalt/vesicular basalt saturated with water	81-150
4	Hard and massive basalt	> 150

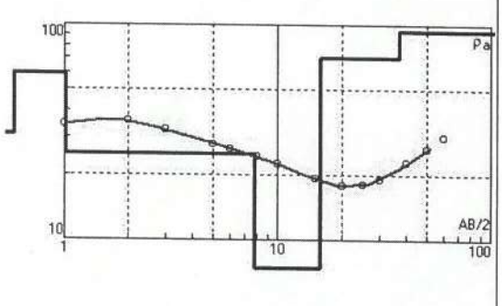
(Source: http://cgwb.gov.in)

6. Results

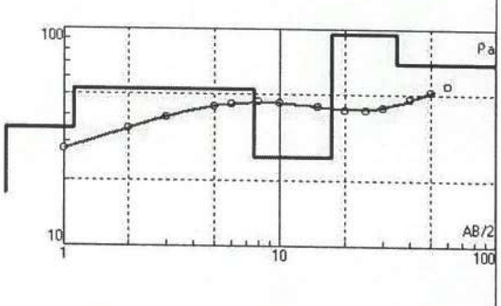
In the area to understand the shallow subsurface geological and aquifer conditions extending up to 70-100 meters depth, vertical electrical soundings were conducted at five different locations. Using IPI2 WINDOW based software the data obtained from the field was processed. This software helps in interactive semi-automated interpretation of the field data. All the sounding data were modeled for the existing sections. The VES data on apparent resistivity values was modeled by using IPI2 WINDOW based software to get different layers depicting their thickness, depth and true resistivity. In nutshell, the above interpretation gives generalized geological situation with depth wise variations. As discussed above the sounding points with typical curves at selected sites give point information, which was further utilized to build comprehensive picture of subsurface geological situation depth-wise by preparing 2-D geo-electrical sections.

Sr	Graph	Value
1		

N	ρ	h	d	Alt
1	70.11	0.5594	0.5594	-0.5594
2	34.88	1.591	2.15	-2.1504
3	81.41	1.761	3.911	-3.9114
4	26.25	12.2	16.11	-16.111
5	1.416	23.3	39.41	-39.411
6	107.6			

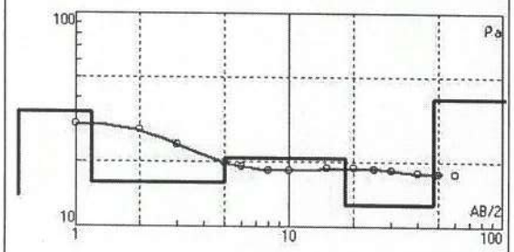
2	

N	ρ	h	d	Alt
1	30.96	0.5779	0.5779	-0.5779
2	58.92	0.4359	1.014	-1.0138
3	25	6.828	7.842	-7.8418
4	7.403	7.864	15.71	-15.706
5	70.21	21.29	37	-36.996
6	93.66			

3	

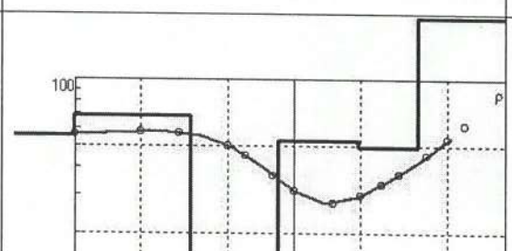
N	ρ	h	d	Alt
1	17.23	0.2579	0.2579	0.2579
2	34.86	0.8483	1.106	-1.1063
3	52.57	6.529	7.635	-7.6355
4	25.72	9.644	17.28	-17.279
5	94.7	17.36	34.64	-34.639
6	69.06			

4



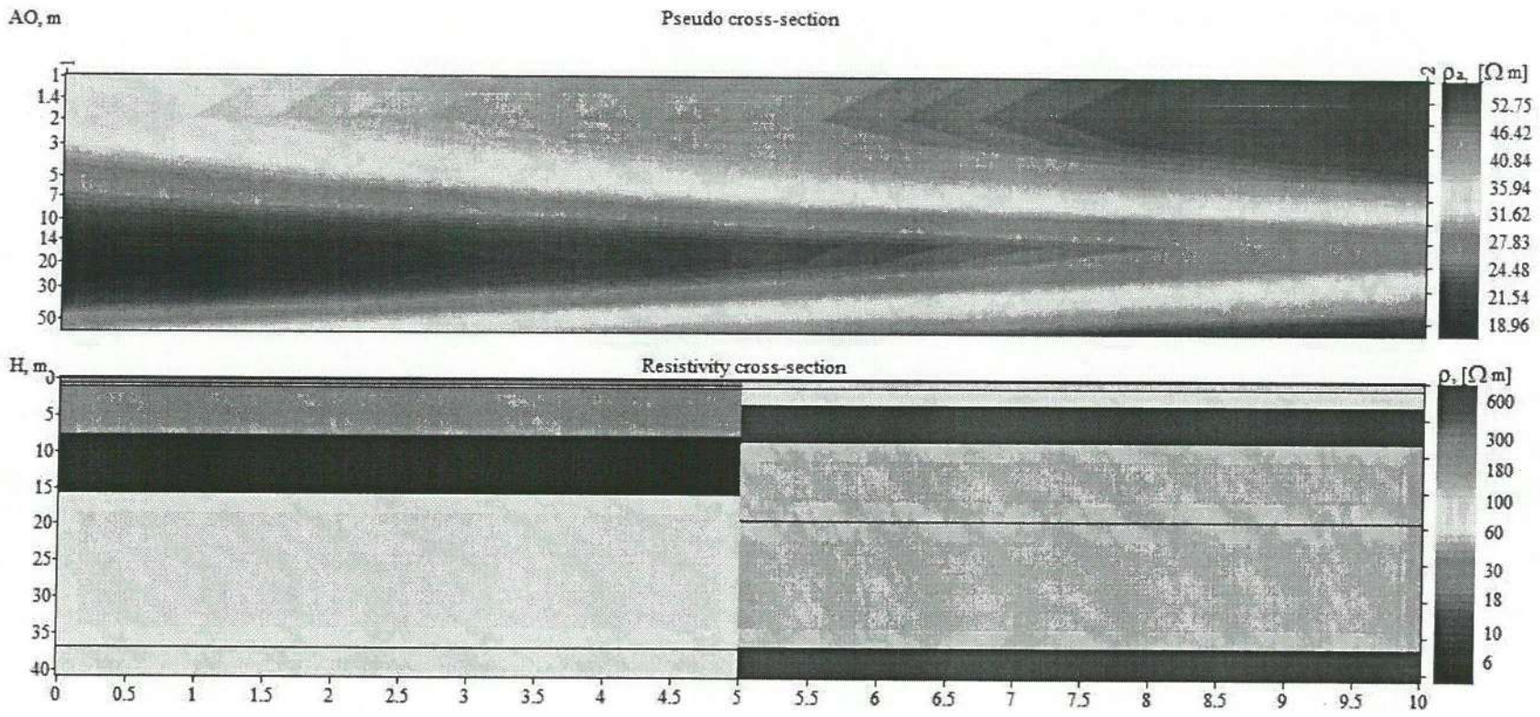
N	ρ	h	d	Alt
1	13.8	0.0951	0.0951	0.0951
2	34.05	1.086	1.181	-1.181
3	16	3.806	4.988	-4.987
4	20.81	13.15	18.14	-18.13
5	12.62	29.49	47.63	-47.63
6	39.74			

5

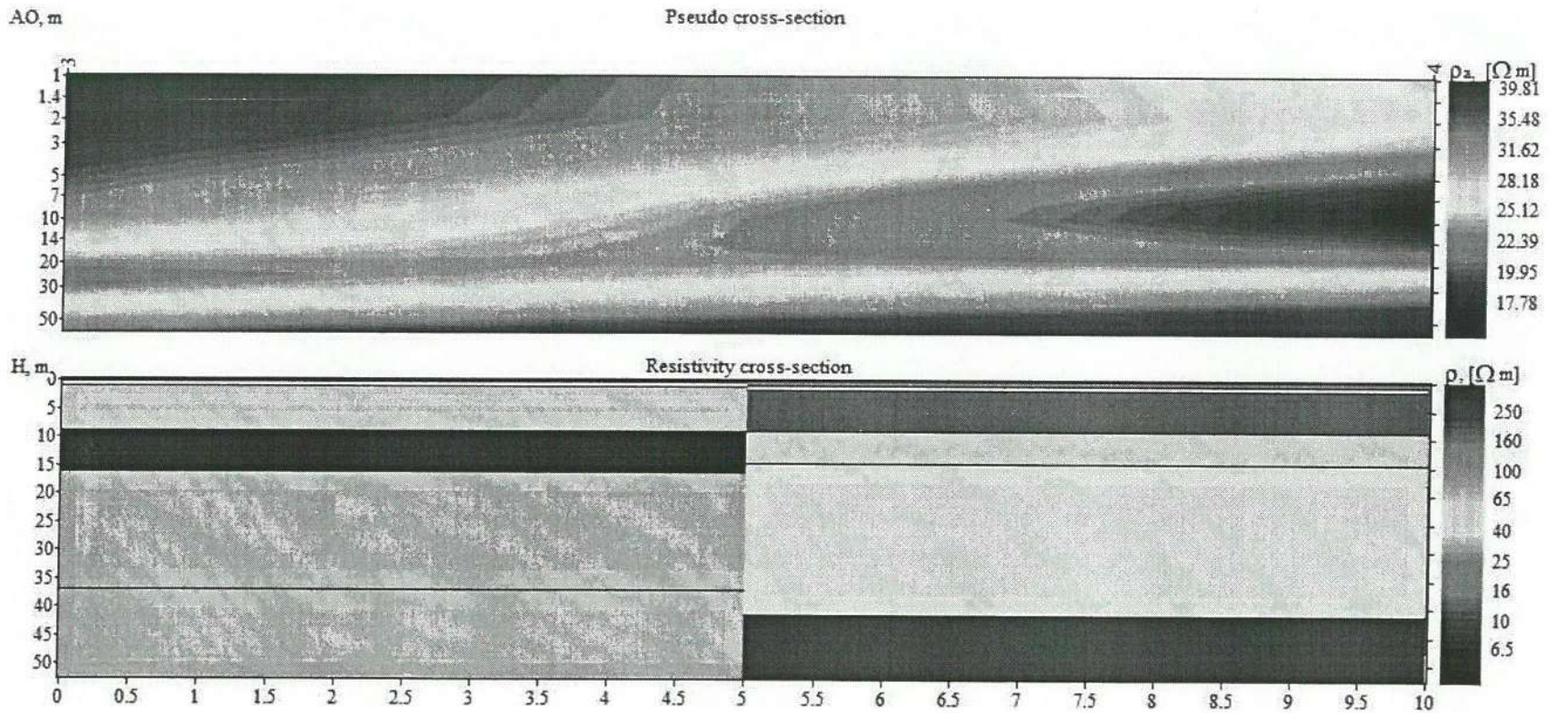


N	ρ	h	d	Alt
1	55.39	0.987	0.987	0.9870
2	67.99	2.382	3.369	-3.3691
3	13.31	5.08	8.449	-8.4494
4	52.46	10.94	19.38	-19.385
5	49.21	17.22	36.61	-36.608
6	7029			

Profile 1J: 1-2

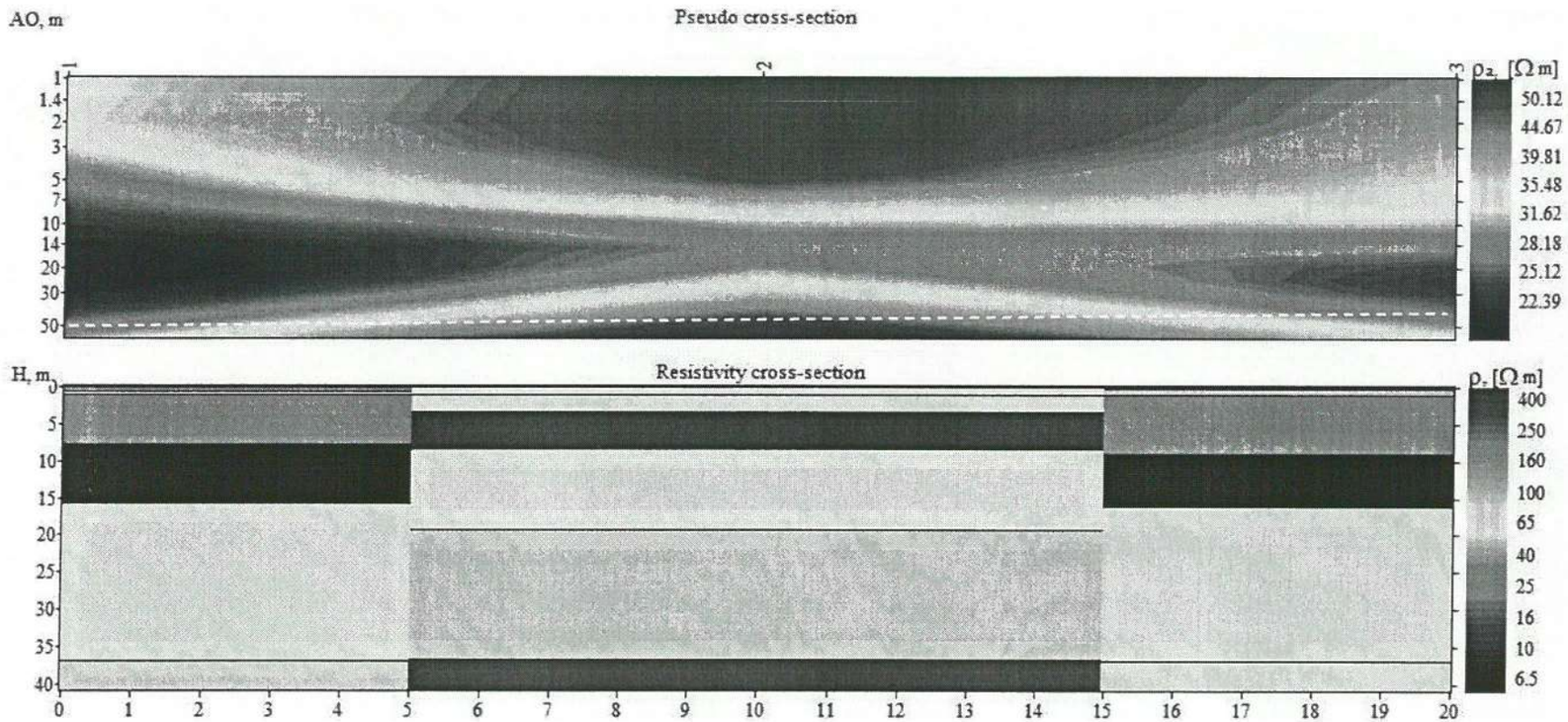


PROFILE 2] 3-4



513

PROFILE 3]: 1-2- 3



Seasonal Variation:

Post monsoon water Table: 18-20m BGL

Pre-monsoon water table: 20-22m BGL

Plot details and Run off Calculations:

A] Before Construction

		1	2	3	1×2×3
Sr. No.	**Area type**	**Area in sq. meter**	**Average annual Rainfall in meters**	**Runoff coefficient**	**Rainfall Runoff potential generalized (m^3/year)**
1	Open area	55075.24	0.762	0.3	**12590.20**

B] After Construction

		1	2	3	1×2×3
Sr. No.	**Area type**	**Area in sq. meter**	**Average annual Rainfall in meters**	**Runoff coefficient**	**Rainfall Runoff potential generalized (m^3/year)**
1	Roof Area	14163.43	0.762	0.9	9713.28
2	Paved Area	35114.42	0.762	0.8	21405.75
3	Green Area	5797.39	0.762	0.1	441.76
	Total	**55075.24**			**31,560.79**

Total increased in runoff after construction

Increased runoff = After Construction (B) - Before Construction (A)

= 31,560.79 – 12590.20

= 18970.59 m^3/year.

Since for monsoon we consider 76 rainfall days

Therefore, per day incremental runoff is **18970.59** / 76 = **249.61 m^3/day**.

915

QUANTITATIVE ASSESSMENT OF RECHARGE:

Quantitative assessment of recharge is not an easy job, especially in the area covered by Basaltic rock formation. This is due to the heterogeneous physical characteristics of Basalt. However, since the aquifer is dynamic in nature, the water conservation measures ensure downward percolation and thereby always leaving a space to accommodate additional quantity of recharge.

The quantification would be as under:

(1) Filter pit with bore of 30 Mt. at the bottom.

Dimensions – 1.5 MT x 1.5 MT x 4.0 MT

Bore well - Dia. – 200 mm Depth – 30 Mt.

Quantification would be

1.5 MT x 1.5 MT x 4.0 MT (with a layer of filter media)

= 9.0 M^3

For Bore

= $\prod r^2h$

= 3.14 $(0.1)^2$ x 30 Mt.

= 0.942 M3

The capacity of one RWH pit is **9.942** (At one time filling). Total capacity of Three-Two recharge pits will be around **318.144 m^3/day** (At one time filling). So, the one-year **recharge** will be = 318.144 x 76 days = **24,178.944 m^3/year.**

L15

Rooftop Runoff That Can be Harvested Via Rooftop Recharge Pits – 22 pits.

= **Recharge pit size** x No of recharge pits x No of rainy days

=**9.942** x 22 x 76 days

= 16623.02 Cum/year

Surface Runoff That Can be Harvested Via Surface Recharge Pits – 10 pits.

= **Recharge pit size** x No of recharge pits x No of rainy days

=**9.942** x 10 x 76 days

= 7555.92 Cum/year

Total Rainwater harvested.

= Rooftop pit recharge + Surface pit recharge

= 16623.66 + 7555.92

= 24,178.94 Cum/year

8/9

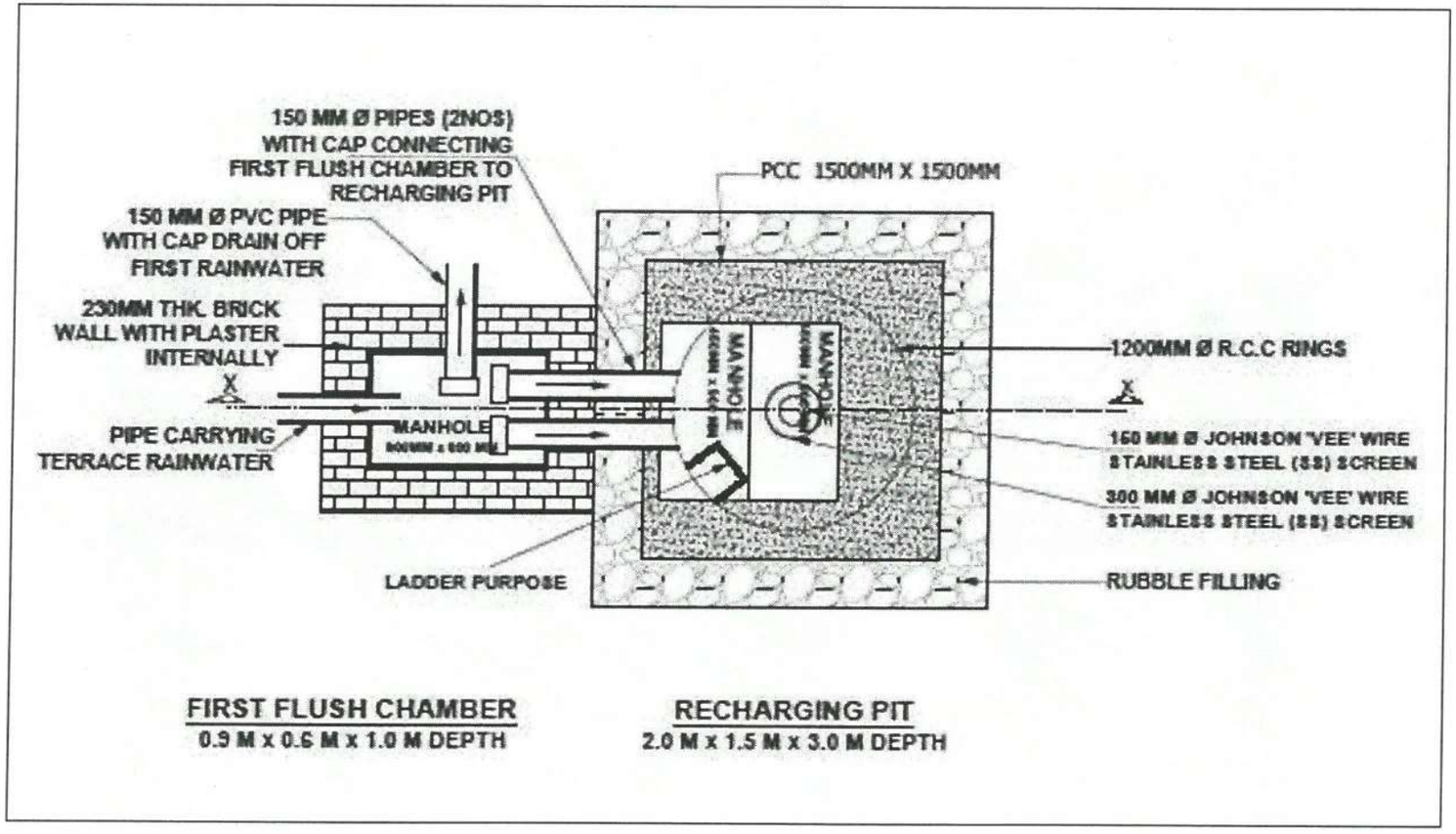
7. Conclusions

1) The VES survey of **Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others.** shows that the majority of area is levelled for previous land use.
2) Total depth was investigated for hydrogeological study is 60 meters.
3) The average depth of unconfined aquifer on **Proposed IT/ITES/Commercial Building Project Located at S. No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundwa Tal. Haveli, Dist. Pune, Maharashtra by M/s. Bajaj Finserv Ventures Limited & Others.** is limited up to 18 to 24 meters, however, first aquifers begin averagely from 26 meters and exceed up to 32 meters.
4) We recommend **Thirty-Two** recharging pits are required for rainwater harvesting.
5) **Thirty-Two** shallow bores of 150 mm diameter are recommended on site up to 30 m depth.
6) Total **Thirty-Two** recharge pit is suggested out of that 10 is surface recharge pit and 22 is rooftop recharge pit.
7) The site is suitable for rainwater harvesting.

Report prepared by

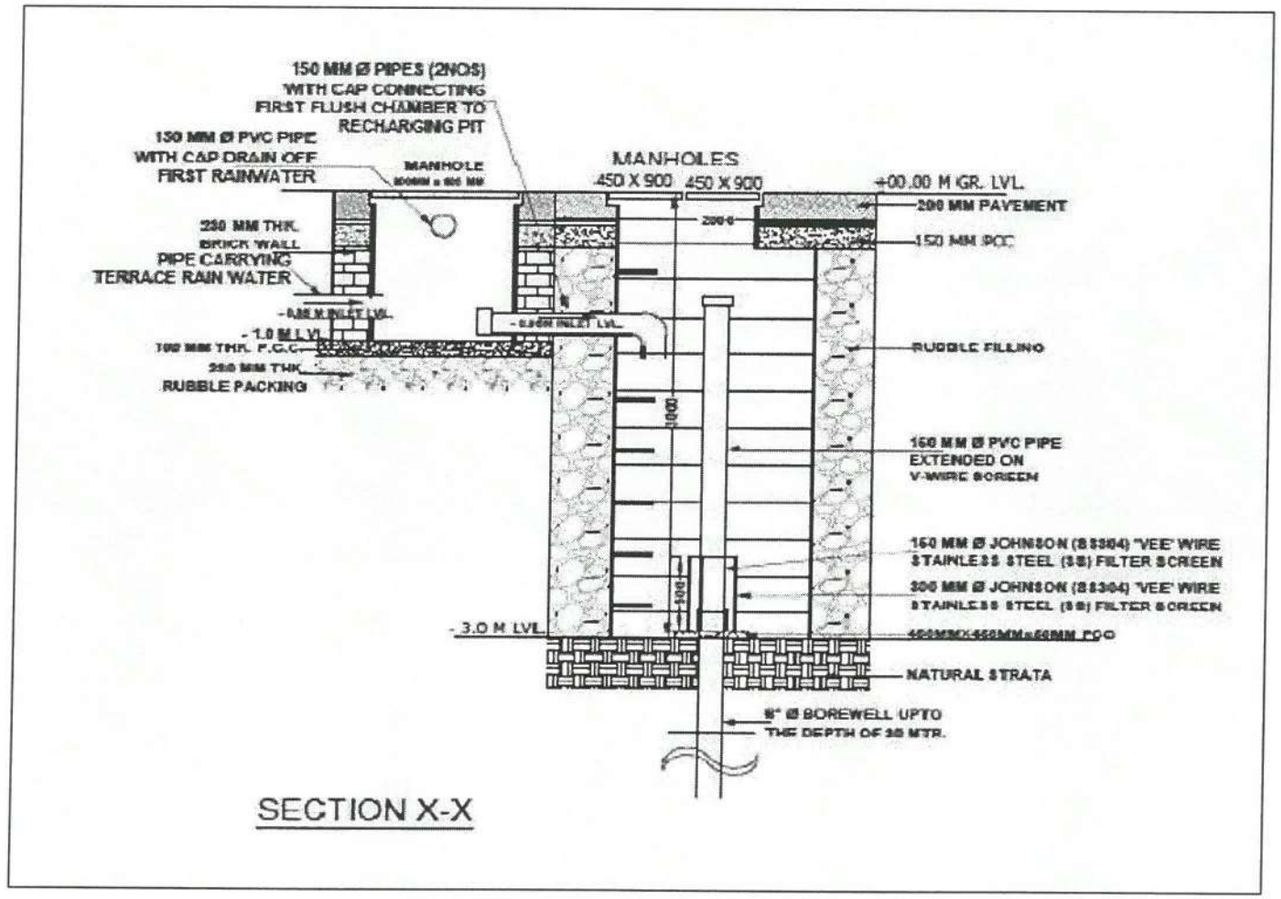
Authorized Signatory
Bhumi Envirotech Solutions

Conceptual RWH Rooftop Unit Plan



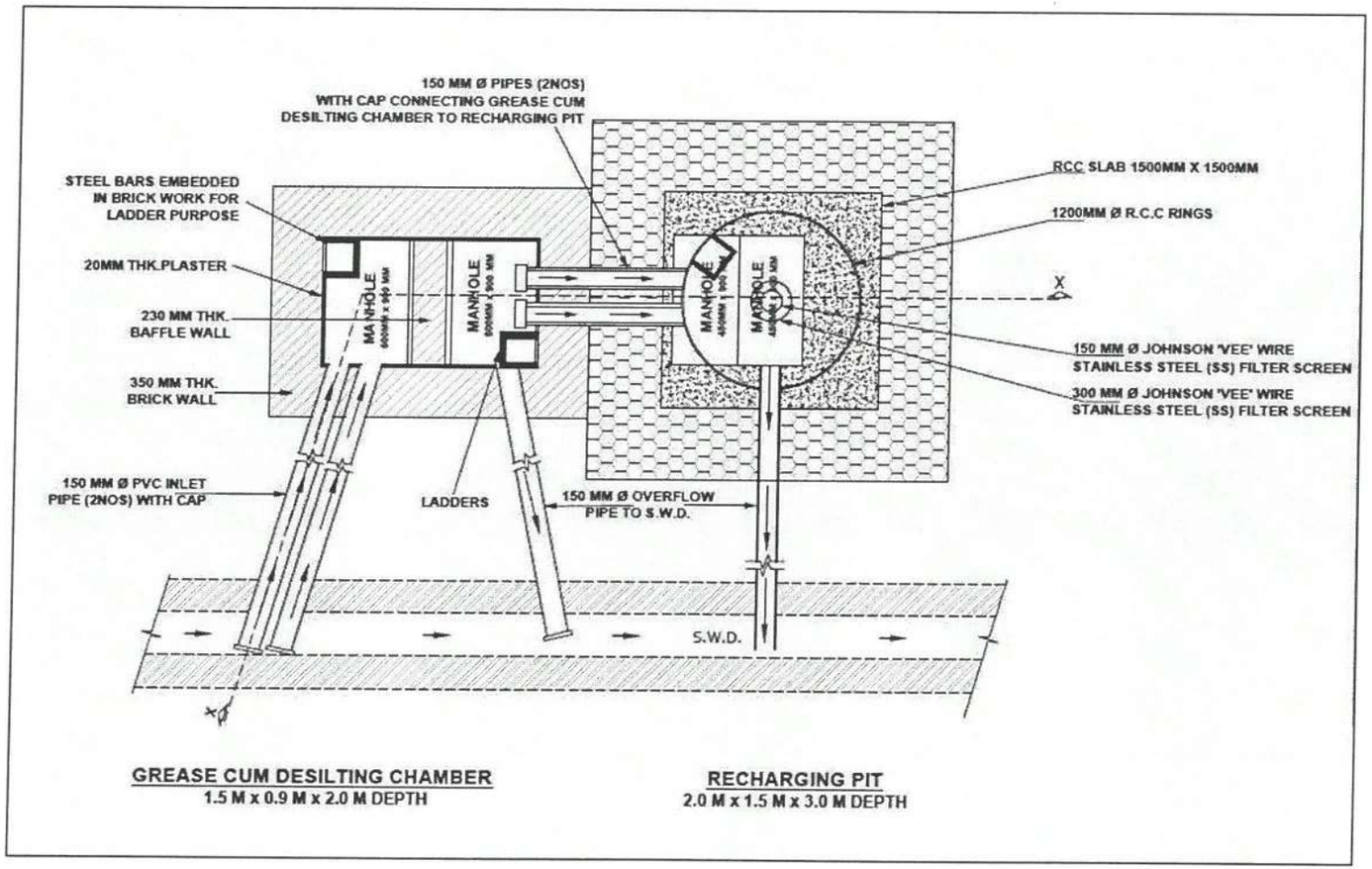
525

Conceptual RWH Rooftop Unit Section

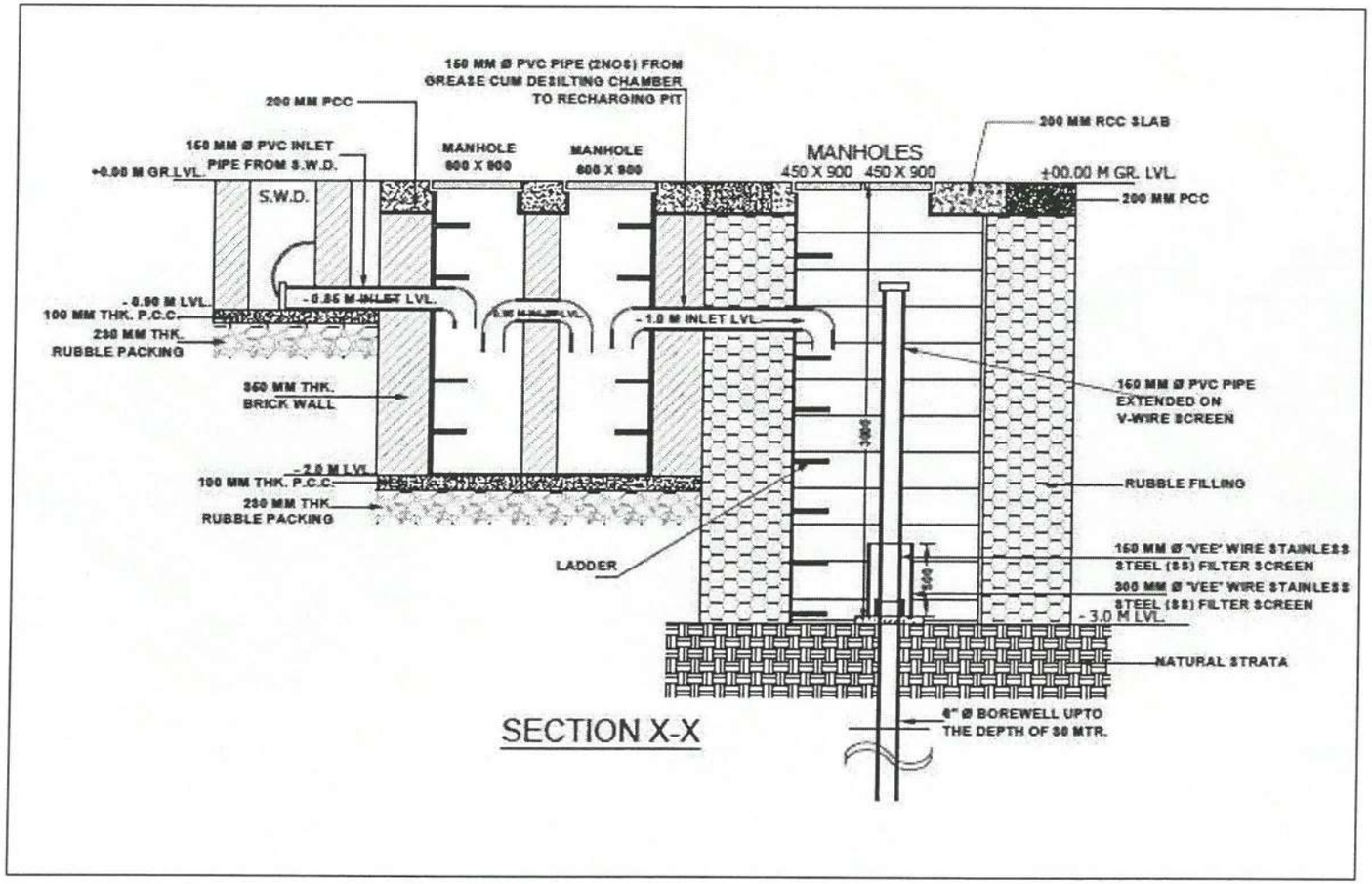


125

Conceptual RWH Surface Unit Plan



Conceptual RWH Surface Unit Section



523

ANNEXURE – 8

Water NOC

525

पुणे महानगरपालिका

कार्यकारी अभियंता कार्यालय
लष्कर पाणीपुरवठा विभाग
पुणे महानगरपालिका
जावक क्र.:- 2405
दिनांक 05 DEC 2024

PROVISIONAL WATER NOC FOR EC (ENVIRONMENT CLEARENCE)

बजाज फिनसर्व लि. व इतर
६ वा मजला,अहमदनगर रोड,विमाननगर,
पुणे ४११०१४.

विषय :- मौजे- मुंढवा, स. न. ८४/३,८४/४A, ८४/४B/१,८४/५, ८४/६,८४/३४, ८४/३५/A,८४/३५/B, ८४/३५/C, ८४/३५/D,८४/३६/A,८४/३७/A आणि ८४/३८/G, सी.टी.एस.न.१२१५, १२१७,१२१८,१२३४, १२५७,१२५८, १२६८,१२७१(p), मुंढवा, पुणे.या मिळकतीवर होणाऱ्या व्यावसायिकप्रकल्पासाठी पर्यावरण ना- हरकत प्रमाणपत्रासाठी पाणीपुरवठा विभागाचे अभिप्रायाबाबत.

संदर्भ :- १. लष्कर पाणीपुरवठा विभागास प्राप्त झालेले पत्र आ.क्र.३३२५, दि.२७/११/२०२४ .

संदर्भ क्र. १ चे पत्रान्वये विषयांकित नियोजित व्यावसायिकप्रकल्पास पर्यावरण ना हरकत प्रमाणपत्र मिळण्यासाठी पाणीपुरवठा विभागाचे प्राथमिक ना हरकत दाखल्याची मागणी केली आहे. सदर व्यावसायिकप्रकल्प ७०६३१.८१ चौ.मी. क्षेत्रावर एकूण क्षेत्राचा प्रस्तावित बांधकाम – ३४७७००.५१ चौ.मी. केले असून सदर टावर –१,२,३, मध्ये एकूण ऑफिस ६९ व व्हिजिटर सेंटर असून त्यासाठी १११३ KLD प्रति दिवस पाण्याची मागणी आहे. त्या अन्वये विषयांकित मिळकतीस पाणीपुरवठा विभागाचे प्राथमिक ना हरकत दाखला खालील १ ते १४ अटीवर देण्यात येत आहे.

१) विषयांकित मिळकतीवरील गृह प्रकल्पासाठी भोगवटा पत्राच्या प्रमाणात पाणीपुरवठा करण्याकरिता नळजोड प्रस्ताव सादर करावा लागेल.
२) विकासकामे स्वखर्चाने मनपाचे सूचनेनुसार जलवाहिनी विकसित करावी लागेल.
३) एस.टी.पी.बाबत स्वतंत्र माहिती खात्यास सादर करावी लागेल.
४) जागेवर बांधकाम चालू करण्यापूर्वी मिळकती मधील मनपाच्या नळ जोडावरील थकबाकी भरून घेऊन सदर नळजोड बंद केले जाईल.
५) इमारतीचे पिण्याचे पाणी, वापरायचे पाणी,फ्लशिंगचे पाणी इ.कारणासाठी स्वतंत्र व्यवस्था करणे आवश्यक.
६) सदर प्रकल्पाकरिता पाण्याच्या उपलब्धतेनुसार पुणे मनपाकडून होणारा पाणीपुरवठा वगळता जादा पाण्याची व्यवस्था विकासक यांस स्वतः च्या खर्चाने करावी लागेल.
७) अंतर्गत वापरण्यात येणाऱ्या फिटिंग्ज ५ लिटर्स प्रती मिनिटा पेक्षा कमी डिस्चार्ज असणाऱ्या आवश्यक.
८) सर्व कामे सक्षम कन्सल्टंट यांचे कडून डिझाईन करून त्यांचे सुपरव्हिजन अंतर्गत पूर्ण करणार.
९) व्यापारी पाणी वापरासाठी स्वतंत्र संपवेल.
१०) प्रवर्तकाचे तज्ञ सल्लागार यांनी प्रस्तावित प्रकल्पात . सदर व्यावसायिकप्रकल्पास पर्यावरण ना हरकत प्रमाणपत्र मिळण्यासाठी पाणीपुरवठा विभागाचे प्राथमिक ना हरकत दाखल्याची मागणी केली आहे. सदर व्यावसायिकप्रकल्प ७०६३१.८१ चौ.मी. क्षेत्रावर एकूण क्षेत्राचा प्रस्तावित बांधकाम – ३४७७००.५१ चौ.मी. केले असून सदर टावर –१,२,३, मध्ये एकूण ऑफिस ६९ व व्हिजिटर सेंटर असून त्यासाठी १११३ KLD प्रति दिवस पाण्याची मागणी केली असून सध्यस्थितीत सदर ठिकाणी पुणे महानगरपालिकेचे पाणीपुरवठा **नेटवर्क उपलब्ध असून** तत्कालीन पाण्याच्या परिस्थिती नुसार मनपाकडील नियमांनुसार धोरणानुसार यापुढील कार्यवाही तत्कालीन वेळी निश्चित करण्यात येईल.
११) मिळकतीची ले आउट मान्य झाल्यानंतर काम चालू करण्याचा दाखला व ले आउट मान्यतेची प्रत खात्यास सादर करणार व वॉटर लाईन डेव्हलपमेंटचा फरक किंवा वॉटर लाईन शुल्क, मीटर ना हरकत प्रमाणपत्र मागण्यापुर्वी मनपा कोषागरात भरावा लागेल अथवा वॉटर लाईन डेव्हलपमेंट करावी लागेल.
१२) भोगवटा पत्र प्राप्त झाल्यानंतर व भोगवटा पत्राच्या प्रमाणात त्यावेळेच्या मान्य धोरणानुसार व नियमानुसार पाणीपुरवठा उपलब्ध केला जाईल.
१३) सदर प्रकरणी अपुऱ्या पाणीपुरवठ्याबाबत विकसक हे खात्याकडील सादर केलेल्या हमीपत्रास नोटरी बजाज फिनसर्व लि. व इतर, ६ वा मजला,अहमदनगर रोड,विमाननगर, पुणे ४११०१४, यांचे नोटरी रजिस्टर अ.क्र.A२०००८/२०२४ दि.११/१०/२०२४ अधीन राहणार आहे.
१४) प्रस्तुत प्रकरणी मनपा मार्फत काही भागात अत्यल्प स्वरूपाचा पाणीपुरवठा करण्यात येत आहे. तसेच सदर परिसरात जलवाहिनी विकसनाची कामे पूर्ण झाले नंतर व मनपा मार्फत पाणीपुरवठा करण्याचे नियोजन त्यावेळेसचे परिस्थिती नुसार करणेत येईल.भविष्यात पाणीसाठा मनपा नियम, नैसर्गिक परिस्थिती व उपलब्ध पाणीसाठा यावर अवलंबून असेल.

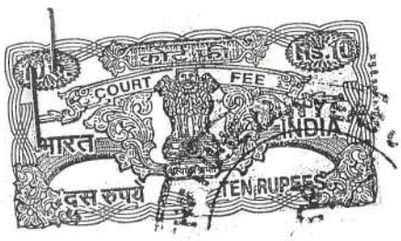
कळावे.

(शाहीदरखा पठाण)
कनिष्ठ अभियंता
लष्कर पाणीपुरवठा विभाग
पुणे महानगरपालिका

28/11/24
(दत्तात्रय टकले)
उप अभियंता
लष्कर पाणीपुरवठा विभाग
पुणे महानगरपालिका

(राजेश शिंदे)
कार्यकारी अभियंता
लष्कर पाणीपुरवठा विभाग
पुणे महानगरपालिका

Annexure R-2.



RTI To PIO, Irrigation Dept.

Akshay Sunil Jagtap
211, Datta Chowk Road, Mundhawa, Pune 36
Mobile No: 7776081234
akshayjagtap117@gmail.com

Application under Section 6(1) of the RTI Act, 2005

Date :14/05/2025

To,
The Public Information Officer,
Executive Engineer,
Khadakwasla Irrigation Department (Water Resources Department)
Sinchan Bhavan, Shivajinagar, Pune – 411005

Subject: RTI request regarding water body or naala clearance for construction at Survey No. 84, Mundhwa, Pune – 411036

Dear Sir/Madam,
Under Section 6(1) of the RTI Act, 2005, I request the following information related to the above-referenced site:

1. Whether a **naala, seasonal watercourse, or natural stream** under the jurisdiction of the Water Resources Department passes through or adjacent to Survey No. 84, Mundhwa.
2. Has any application been submitted by the developer for **diversion, encasement, or realignment of this naala**?
3. If yes, provide:
   - A copy of the application and approval letter.
   - Hydrological or flood risk assessment submitted by the project proponent.
   - Any condition or guidelines issued by the department.
4. As per department norms, what is the **minimum buffer zone/setback**required from such water bodies?
5. Whether the project is located in a **flood-prone or environmentally sensitive area**under the Irrigation/WRD mapping.
6. Copies of correspondence, if any, with Pune Municipal Corporation or State Environment Department on this matter.
7. Has the department issued any **NOC or rejection**related to this survey number?
8. Whether any complaints or objections have been filed by citizens or third parties regarding potential water flow obstruction due to this project.

Mode of Receiving Information: I request that the information be provided in **certified hard copy** at my address **and** as a **scanned copy via email** at **akshayjagtap117@gmail.com**. I am an Indian citizen and request this information for public awareness. A postal order of ₹10 is enclosed as per RTI norms.

Sincerely,

Akshay Sunil Jagtap

14 MAY 2025
आवक लिपीक
खडकवासला पाटबंधारे विभाग
मंगळवार पेठ, सिंचनभवन, पुणे-११

527

"सिंचनात् राष्ट्रोध्दार"
दुरध्वनी क्र.०२०२६१२७३०९
EmailID:eekidpune@gmail.com

महाराष्ट्र शासन
कार्यकारी अभियंता, खडकवासला पाटबंधारे विभाग,
सिंचन भवन, बारणे रोड, मंगळवार पेठ, पुणे - ४११ ०११.

जा.क्र.:खपावि/२३३१ /सन २०२५ दिनांक : /०५/२०२५ 30 MAY 2025

प्रति,
श्री.अक्षय सुनिल जगताप,
२११, दत्त चौक रोड, मुंढवा,
पुणे-३६
(मो.नं. ७७७६०८१२३४)

विषय:- माहिती अधिकार अधिनियम-२००५ अन्वये माहिती देणेबाबत...

संदर्भ:- १) आपला दि.१४/०५/२०२५ रोजीचा माहिती अधिकार अधिनियम-२००५ अन्वये अर्ज
२) विभागीय कार्यालयाचे पत्र जा.क्र.३०४९, दि.२०/०५/२०२५.

उपरोक्त संदर्भ क्र.१ नुसार माहितीचा अधिकार अधिनियम-२००५ अंतर्गत आपला अर्ज या कार्यालयास प्राप्त झालेला होता. त्यानुसार आपण माहितीचा अधिकार अर्जात मागणी केलेल्या माहितीनुसार आपणांस खालील माहिती कळविण्यात येत आहे.

अ.क्र.	विषय	माहिती
१.	Whether a nala, seasonal watercourse or natural stream under the jurisdiction of water rosources department passes through or adjacent to survey no ८४ Mundhwa.	मौजे मुंढवा गट नं.८४ मधील नाल्याच्या सरळीकरण व सुशोभिकरणाकरीता कोणताही अर्ज या कार्यालयास प्राप्त झालेला नाही, व अशी कोणतीही परवानगी या कार्यालयाकडुन देण्यात आलेली नाही.
२	Has any application has submitted by the developer for diversion, encasement or realignment of this nala?	

(ह.गो.जाधव)
जनमाहिती अधिकारी तथा
उपकार्यकारी अभियंता
खडकवासला पाटबंधारे विभाग
पुणे-११

प्रत:- प्रशा १ (विभागीय कार्यालय) यांना माहितीसाठी.

(528)

English Translation of RTI, Khadakwasla Irrigation Dept.

Government of Maharashtra
Executive Engineer, Khadakwasla Irrigation Division,
Sinchan Bhavan, Bharne road, Mangalwar peth, Pune – 411011
Email: eekidpune@gmail.com
Phone No.: 020-26127309

Ja,kra.: kha pa vi/3331 / year 2025

Date: 30 May 2025

To,
Mr. Akshay Sunil Jagtap,
122/2, Ram Chowk Road,
Mundhawa, Pune – 411036.
(Mob. No. 7776081234)

Subject: Regarding Information under the Right to Information Act, 2005

Reference:

1. Your application dated 14/05/2025 under the Right to Information Act, 2005.
2. Office letter No.Ja.Kra. 3049, dated 20/05/2025.

With reference to the above-mentioned subject and your RTI application under the Right to Information Act, 2005, received in this office, please find below the information sought as per the records available with this office:

Sr. No.	Particulars	Information
1	Whether a nala, seasonal watercourse or natural stream under the jurisdiction of the Water Resources Department passes through or adjacent to Survey No. 84, Mundhawa.	No application has been received in this office for the realignment or beautification of the nala situated in Gat No. 84, Mauje Mundhawa, and no such permission has been granted by this office.
2	Has any application been submitted by the developer for diversion, encasement or realignment of this nala?	

(H. R. Jadhav)
Deputy Engineer,
For Executive Engineer,
Khadakwasla Irrigation Division,
Pune – 37.

Copy to:
Shri. Pra sha 1 (for divisional office record).

Annexure R-3.

529

RTI to PIO, Storm Water Drainage,PMC

Akshay Sunil Jagtap
211, Datta Chowk Road, Mundhawa, Pune 36
Mobile No: 7776081234
akshayjagtap117@gmail.com

Application under Section 6(1) of the RTI Act, 2005

Date :14/05/2025

To,
The Public Information Officer,
Storm Water Drainage Department,
Pune Municipal Corporation, Shivajinagar, Pune – 411005

Subject: RTI request for naala-related permissions and flood risk clearance for Survey No. 84, Mundhwa, Pune – 411036

Dear Sir/Madam,
I seek the following information under Section 6(1) of the RTI Act, 2005:
1. Whether a **naala or stormwater channel** has been officially recorded as passing through or adjacent to Survey No. 84, Mundhwa, Pune.
2. Whether any **application or proposal** has been submitted by a builder for **covering, diverting, or constructing near the naala** at this location.
3. If yes, provide:
   - NOC or conditional approval issued by PMC.
   - Drainage plans submitted.
   - Cross-sectional drawings or flow modeling reports (if available).
4. What are the **minimum setback distances** mandated by PMC for construction near a naala or stormwater drain?
5. Has PMC conducted any **flood zone or waterlogging assessment** for the said survey number in the last 5 years?
6. Whether any **grievances or complaints** from citizens have been recorded regarding naala blockage, flooding, or construction activity in this plot.
7. Whether the proposed project has been **inspected or reviewed** by the Storm Water Drainage Department during layout sanction.
8. Provide any correspondence between PMC and the project proponent regarding the naala issue.

Mode of Receiving Information: I request that the information be provided in **certified hard copy** at my address **and** as a **scanned copy via email** at **akshayjagtap117@gmail.com**.

I am an Indian citizen and request this information for public awareness. A postal order of ₹10 is enclosed as per RTI norms.

Sincerely,
Akshay Sunil Jagtap

14/5/2025
मलनि:सारण विभाग
पुणे महानगरपालिका

(530)

कार्यकारी अभियंता कार्यालय
मलनिःसारण देखभाल व दुरुस्ती विभाग
पुणे महानगरपालिका
जावक क्र. :- ८३१
दिनांक :- २७/७/२०२५

प्रति
श्री. अक्षय सुनिल जगताप
२११, दत्ता चौक रोड, मुंढवा,
पुणे- ४११०३६.

अपिल अधिकारी तथा कार्यकारी अभियंता यांचे कार्यालय
पुणे महानगरपालिका

अपिल क्र. :- पुणे मनपा/ अ.प्रा. तथा कार्यकारी अभियंता/ आ.क्र. २६३०, दि. २३.०६.२०२५.

अपिलकर्त्याचे नाव व पत्ता :- श्री. अक्षय सुनिल जगताप, २११, दत्ता चौक रोड, मुंढवा, पुणे- ४११०३६.
जनमाहिती अधिकारी यांचे नाव व हुद्दा:- श्री. गणेश पुरम, जनमाहिती अधिकारी तथा उप अभियंता

श्री. अक्षय सुनिल जगताप
विरुद्ध
जन माहिती अधिकारी तथा उप अभियंता, मलनिःसारण देखभाल व दुरुस्ती विभाग
पुणे महानगरपालिका

माहितीचा अधिकार अधिनियम २००५ चे कलम १९ (१) अन्वये प्रथम अपिल

प्रथम अपिलकर्ता यांनी माहितीचा अधिकार अधिनियम २००५ अन्वये आ.क्र.१३७१ दि. १४.०५.२०२५ रोजी श्री. गणेश पुरम, जनमाहिती अधिकारी तथा उप अभियंता यांचेकडे अर्ज करून माहिती अधिकारात माहिती मागविणेत आली आहे.

सदर अर्जावर जनमाहिती अधिकारी यांचेकडून उत्तर न मिळाल्याने आ.क्र.२६३० दि. २३.०६.२०२५ रोजी माहितीचा अधिकार अधिनियम २००५ कलम १९ (१) अन्वये प्रथम अपिल दाखल केले आहे. त्यानुसार दि. १५.०७.२०२५ रोजी अपिल सुनावणी घेणेत आलेली आहे.

प्रथम अपिल सुनावणीस अपिलकर्ता:- हजर होते.

प्रथम अपिल सुनावणीस जन माहिती अधिकारी:- हजर होते.

(531)

प्रथम अपिल सुनावणी दरम्यान अपिलकर्ता श्री. अक्षय सुनिल जगताप यांनी माहितीचा अधिकार अधिनियम २००५ रोजी सादर केलेल्या अर्जास उत्तर न मिळाल्याने प्रथम अपिल दाखल केल्याचे सांगितले असे.

जनमाहिती अधिकारी तथा उप अभियंता श्री. गणेश पुरम यांनी सदर माहितीचा अधिकार अधिनियम २००५ अन्वये मागविणेत आलेली माहिती हि विस्तृत स्वरुपाची असल्याने संकलित करणेत येत असल्याने दि.१६.०६.२०२५ रोजी कळविणेत आले असल्याचे सांगितले.

आदेश

माहितीचा अधिकार अधिनियम २००५ अन्वये आ.क्र.१३७१ दि.१४.०५.२०२५ अन्वये मागविणेत आलेल्या अर्जात नमूद अ.क्र.१ ते ८ बाबत मलनिःसारण देखभाल व दुरुस्ती विभागाशी संबंधित माहिती आदेशाच्या दिनांकापासून कार्यालयीन कामकाजाच्या आठ दिवसांत अपिलकर्त्यास विनामुल्य उपलब्ध करून देणेत यावी व बांधकाम विकास विभागाकडील संबंधित माहिती हि आदेशाच्या दिनांकापासून १५ दिवसांत संबंधित जनमाहिती अधिकारी तथा उप अभियंता, झोन क्र.४ यांनी अपिलकर्त्यास विनामूल्य उपलब्ध करून द्यावी.

वरीलप्रमाणे सूचना करून प्रथम अपिल अर्ज निकाली काढणेत आला.

कळावे,

(सुभाष पावरा)
प्रथम अपिलीय अधिकारी तथा
कार्यकारी अभियंता
मलनिःसारण देखभाल व दुरूस्ती
पुणे महानगरपालिका

प्रत:-

१) श्री. गणेश पुरम, जनमाहिती अधिकारी तथा उप अभियंता, मलनिःसारण देखभाल व दुरूस्ती विभाग, पुणे महानगरपालिका.

२) मा. जनमाहिती अधिकारी तथा उप अभियंता, झोन क्र.४ बांधकाम विकास विभाग, पुणे महानगरपालिका.

टीप:- सदर माहितीने अपिलार्थी यांचे समाधान न झाल्यास ९० दिवसांच्या मुदतीत राज्य माहिती आयोग पुणे खंडपीठ, पुणे नवीन प्रशासकीय इमारत, ४ था मजला, पुणे १ यांचेकडे द्वितीय अपील दाखल करता येईल.

English Translation of RTI Appeal Order. (532)

Office of the Executive Engineer
storm water drainage Department
Pune Municipal Corporation
outward No.: 931
Date: 17/07/2025

To,
Shri. Akshay Sunil Jagtap
211, Dutta chowk Road, Mundhwa,
Pune – 411036

Office of the First Appeal under the Right to Information Act
Pune Municipal Corporation
Appeal No.: P.M.C./A.Pra. & Executive Engineer/A.kra.. 2630, Date: 23.06.2025

Name and address of the applicant:
Shri. Akshay Sunil Jagtap, 211, Dutta chowk Road, Mundhwa, Pune – 411036

Name and address of P.I.O.:
Shri. Ganesh Puram, Public Information Officer and Deputy Engineer, Pune Municipal Corporation

Shri. Akshay Sunil Jagtap

VS.

Public Information Officer and Deputy Engineer,
Pune Municipal Corporation

First Appeal under Section 19(1) of the Right to Information Act, 2005

The original application seeking information under the Right to Information Act, 2005, submitted under Ref. No. 1371 dated 14.05.2025 to Shri. Ganesh Puram, Public Information Officer and Deputy Engineer.

Since the Public Information Officer did not provide a reply within the stipulated period, First Appeal was filed on 23/06/2025 under Section 19(1) of the Right to Information Act, 2005. The appeal was taken on 15.07.2024.

For First Appellate hearing:
Appellant : Present.

Public Information Officer: Present

(533)

During the hearing of the First Appeal, Appellant Shri. Akshay Sunil Jagtap informed that the Public Information Officer has not provided the requested information under RTI Act, 2005.

The hearing revealed that Public Information Officer Shri. Ganesh Puram did not provide necessary information properly within the timeframe prescribed under the Right to Information Act, 2005.

Order:

As per the Right to Information Act, 2005, application received under Ref. No. 1371 dated 14.05.2025 requesting information about the Storm water Drainage Department, The Public Information Officer is directed to provide the information within 8 days free of cost. Public Information Officer & Building approval department, zone 4, directed to give related details within **15 days**.

The First Appeal is disposed of with these instructions.

Sd/-
(Subhash Pawara)
First Appellate Authority &
Executive Engineer
Storm water Drainage Department
Pune Municipal Corporation

Copy to:

1. Shri. Ganesh Puram, Public Information Officer and Deputy Engineer, Storm water Drainage Dept., Pune Municipal Corporation
2. Public Information Officer and Deputy Engineer, Zone 4, building Construction Department, Pune Municipal Corporation

Note:

If the Appellant does not receive the information within the stipulated 90 days, he may file a Second Appeal before the State Information Commission, Pune, New Administrative Building, 4th floor, Pune – 1.

(534)

VOUSSOIRS

ARCHITECTS INTERIOR DESIGNERS

दि. ०३/०६/२०२४

मा. उप. अभियंता.
बांधकाम विकास विभाग झोन क्र. (आय. टी. सेल)
पुणे महानगरपालिका
पुणे.

विषय :- पुणे पेठ मुंढवा स.नं. ८४/३, ८४/४अ, ८४/४ब/१, ८४/५, ८४/६, ८४/३४/, ८४/३५/अ, ८४/३५/ब, ८४/३५/क, ८४/३५/ड, ८४/३६/अ, ८४/३७/अ, आणि ८४/३८/ग, न.भू.क्र. १२१५, १२१७ १२१८, १२३४, १२५७, १२५८, १२६८, १२७१(पै.), या विभागाचा नाला स्थलांतरित करण्याबाबत.

महोदय,
वरिल विषयांकित मिळकती मधून डीपी नुसार नाला जात आ तो स्थलांतरित करण्याकरिता आपल्या विभागाकडे प्रस्ताव दाखल करीत आहोत.
तसेच आवश्यक ती कागदपत्रे प्रस्तावासोबत दखल करीत आ कृपया लवकरात लवकर प्रस्ताव मान्य करून मिळावा हि विनंती

मलनिःसारण देखभाल दुरुस्ती विभाग
पुणे महानगरपालिका
माहिती अधिकार अधिनियम २००५ अन्वये
देण्यात आलेली

शहर अभियंता कार्यालय
आय टी सेल विभाग
पुणे महानगरपालिका
आवक क्र. ६०३०
दिनांक:- ०३/०६/२०२४

(File No. 384)

आपला विश्वासू

आर्के. समिर वाळींबे

श्री संजय शिंदे
क.तपासून पुढे
मा. आयुक्त साहेब
यांस्तव सादर

10, JANHAVI, 40/22 BHONDE COLONY,
ERANDWANE, PUNE 411 004.
TELEPHONE. : 25457052 / 25456399
E-MAIL : info@voussoirs.in

(535)

English Translation of Application of Arch. Samir Walimbe regarding Nala Relocation

VOUSSOIRS

Date: 03/07/2024

To,

Hon'ble deputy Engineer,

Building Development Department, Zone (I.T. Cell),

Pune Municipal Corporation,

Pune.

Subject: Regarding **relocation of the nala** for Pune Water Supply Survey No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271(part), Mundhwa, pune.

Sir,

The above-mentioned nala passes through the property as per the Development Plan (DP). A proposal is being submitted to your department for its relocation. The necessary documents are also being submitted along with the proposal.

Therefore, you are kindly requested to review the proposal and grant necessary approval as early as possible.

Yours faithfully,

Architect Samir Walimbe

(With signature)

Office Of City Engineer,

IT cell department,

Pune Municipal Corporation,

Inward No.: 6030

Date: 03/07/2024

File Number :384

(Office stamps and acknowledgment markings at bottom)

536

शहर अभियंता कार्यालय
पुणे महानगरपालिका
आय टी.सेल विभाग
जावक क्र. शाअना/आ/६४४२
दिनांक ०५/०७/२०२४

मा. कार्यकारी अभियंता
मलनि:सारण व देखभाल दुरुस्त
पुणे महानगरपालिका

विषय :–पुणे, पेठ मुंढवा सी.टी.सर्व्हे न. ८४/३, ८४/४अ, ८४/४/ब/१, ८४/५ , ८४/६, ८४/३४, ८४/३५/अ, ८४/३५/ब, ८४/३५/क, ८४/३५/ड, ८४/३५/ड, ८४/३६/अ, ८४/३७/अ आणि ८४/३८/ग न.भू. क्र. १२१५, १२१७, १२१८, १२३४ १२३७, १२५८, १२८६, १२७१ पैकी या मिळकती मध्ये डी.पी नकाशा मध्ये दर्शविलेला नाला स्थलांतरीत करणेच्या प्रस्तावाबाबत आपल्या विभागाचा अभिप्राय मिळणे बाबत.

संदर्भ:–विकासक/ मालक बजाज फायनान्स लिमिटेड व इतर तर्फेआर्की. श्री. समीर वाळिंबे आवक क्र.६०३० दि. ०३/०७/२०२४

संदर्भीय विषयांकित पुणे, पेठ मुंढवा सी.टी.सर्व्हे न. ८४/३, ८४/४अ, ८४/४/ब/१, ८४/५ , ८४/६, ८४/३४, ८४/३५/अ, ८४/३५/ब, ८४/३५/क, ८४/३५/ड, ८४/३५/ड, ८४/३६/अ, ८४/३७/ अ आणि ८४/३८/ग न.भू. क्र. १२१५, १२१७, १२१८, १२३४ १२३७, १२५८, १२८६, १२७१ मिळकतीकरिता.लायसन्स आर्किटेक्ट समीर वाळिंबे यांनी संदर्भाकित पत्रामन्वये आपले विभागाकडे अभिप्राय मागविला आहे मा.विकास आराखडा २०१७ नुसार विषयांकित मिळकतीमध्ये जलप्रवाह/ नाला असल्याचे आढळ होत आहे. युडीसीपीआर २०२० मधील विनिमय क्रमांक ३.१.१(ii) नुसार विषयांकित मिळकतीमधील नाला स्थालांतरीत करण्याचे प्रस्तावित असून नकाशे सोबत जोडले आहेत.

तरी या संदर्भात आपल्या विभागाचा अभिप्राय मिळण्यास विनंती आहे
मा.स. कळावे,

(अमोल बहाडकर)
उप अभियंता
आय. टी. सेल
शहर अभियंता कार्यालय
पुणे महानगरपालिका

सोबत:–
१) ७/१२ उतारा
२) डी.पी. नकाशा प्रत
३) प्रायमो नकाशा प्रत
४) झोनिंग
५) प्रस्तावित नकाशा प्रत

श्री. जाधव (उप अभि)

कार्यकारी अभियंता
मलनि:सारण व दुरुस्ती विभाग
पुणे महानगरपालिका
आवक क्र. 3283
दिनांक 22/07/2024

मलनि:सारण देखभाल दुरुस्ती विभाग
पुणे महानगरपालिका
माहिती अधिकार अधिनियम 2005 अन्वये
देण्यात आलेली माहिती

F:\CE-Word File\आय टी सेल\COMPLITOIN\kalyaninear (2).docx 28.06.24.docx

English translation of letter from City engineer, P.M.C. to Executive engineer, Storm water Drainage Dept

Office Of City Engineer,
IT cell department,
Pune Municipal Corporation,
Outward No.: sha.a.ja./ja/6446
Date: 05/07/2024

Resp. Executive Engineer,
Storm water drainage department,
Pune Municipal Corporation

Subject: **Regarding obtaining the opinion of your department on the proposal for relocation of the nala shown in the DP plan within Survey No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A & 84/38/G (part) and CTS No. 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271 (part), Mundhwa, Pune.**

Reference: Architect Shri Samir Walimbe on behalf of the developer/owner Bajaj Finance Limited and others, Inward No. 6030 dated 03/07/2024.

Subject matter referred, For the property located at Peth Mundhwa, Pune bearing Survey No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A & 84/38/G (part) and CTS No. 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271 (part), the licensed architect Shri Samir Walimbe has sought the opinion of your department vide the above-referred letter.

As per the sanctioned development plan of 2017, it is observed that there exists a watercourse/nala within the said property. As per UDCPR 2020 Regulation No. 3.1.1(ii), a proposal has been submitted for the relocation of the nala within the said property and the relevant drawings have been enclosed.

Therefore, you are requested to provide your department's opinion in this regard.

(Amol Bahadkar)
Deputy Engineer
IT Cell, City Engineer's Office
Pune Municipal Corporation

(Office stamps and acknowledgment markings at bottom)

(538)

कार्यकारी अभियंता कार्यालय
मलनि:सारण देखभाल दुरुस्ती विभाग
पुणे महानगरपालिका
जावक क्र. : ३२५४
दिनांक : २१/८/२०२४

मे. प्रायमुव्ह इन्फ्रास्ट्रक्चर डेव्हलपमेंट कन्सलटंट प्रा. लि.
सी.३, ३०४ बी सौदामीनी कॉम्पलेक्स
भुसारी कॉलनी, पौड रोड,
पुणे ४११ ०३८.

यांजकडेस ---------

विषय : पुणे पेठ मुंढवा सी.टी. सर्व्हे नं.८४/३, ८४/४अ, ८४/४/ब/१, ८४/५, ८४/६, ८४/३४, ८४/३५/अ, ८४/३५/ब, ८४/३५/क, ८४/३५/ड, ८४/३५/ड, ८४/३६/अ, ८४/३७/अ आणि ८४/३८/ग न.भू.क्र.१२१५, १२१७, १२१८, १२३४, १२३७, १२५८, १२८६, १२७१ पैकी या मिळकती मध्ये डी.पी. नकाशा मध्ये दर्शविलेला नाला स्थलांतरीत करणेच्या प्रस्तावाबाबत आपल्या विभागाचा अभिप्राय मिळणेबाबत.

संदर्भ : आय.टी. सेल, शहर अभियंता यांचे पत्र आ.क्र.३२८३ दि.२२/०७/२०२४

पुणे पेठ मुंढवा सी.टी. सर्व्हे नं.८४/३, ८४/४अ, ८४/४/ब/१, ८४/५, ८४/६, ८४/३४, ८४/३५/अ, ८४/३५/ब, ८४/३५/क, ८४/३५/ड, ८४/३५/ड, ८४/३६/अ, ८४/३७/अ आणि ८४/३८/ग न.भू.क्र.१२१५, १२१७, १२१८, १२३४, १२३७, १२५८, १२८६, १२७१ पैकी या ठिकाणचा नाला शिफ्टींग बाबत परवानगी मिळणेसाठीचा प्रस्ताव आर्कि. समीर वाळिंबे यांनी मलनि:सारण विभागाकडे पाठविला आहे.

तरी सदरील नाला शिफ्टींग व हायड्रॉलिक डिझाईन बाबतचा आपला अभिप्राय मलनि:सारण विभागास त्वरीत मिळणेबाबत विनंती आहे.

कळावे,

उप अभियंता
मलनि:सारण देखभाल दुरुस्ती
पुणे महानगरपालिका

सोबत : संपुर्ण प्रकरण.

मलनि:सारण देखभाल दुरुस्ती विभाग
पुणे महानगरपालिका
माहिती अधिकार अधिनियम २००५ अन्वये
देण्यात आलेली माहिती

(539)

English translation of Executive Engineer, Storm water dept to Consultant regarding getting opinion for nala relocation.

Office of Executive Engineer,
Storm Water Drainage Department,
Pune Municipal Corporation
Outward no.: 1254
Date : 14/08/2024

M/S. Primove Infrastructure Development Consultant Pvt. Ltd.
C-3, 304 B, Saudamini complex,
Bhusari colony, Paud road,
Pune 411038

Subject: Regarding obtaining the opinion of your department on the proposal for relocation of the nala shown in the DP plan within Survey No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A & 84/38/G (part) and CTS No. 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271 (part), Mundhwa, Pune.

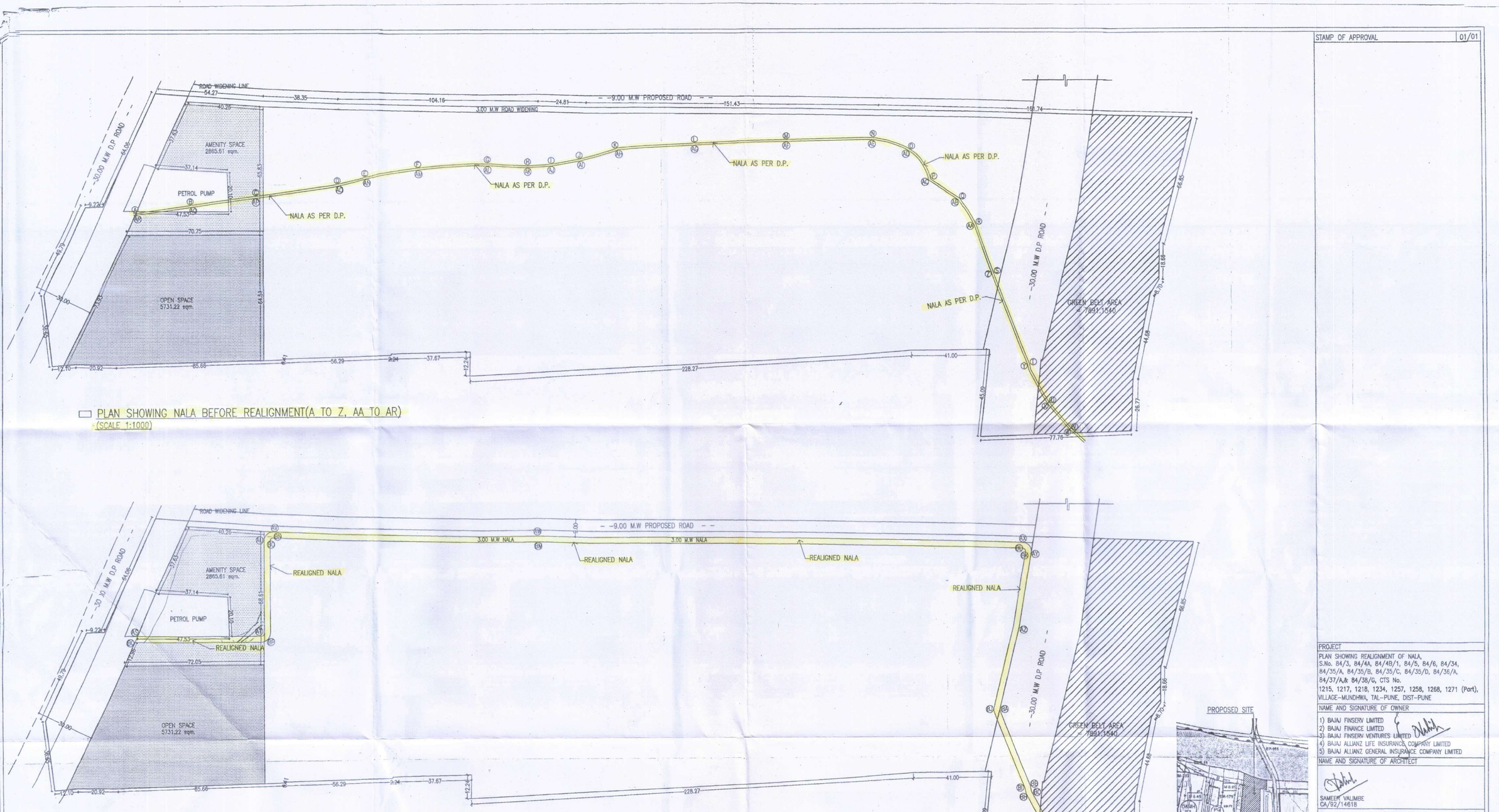
Reference: letter from IT cell,City Engineer, with inward number 3283 dated 22/07/2024

For the property located at Peth Mundhwa, Pune bearing Survey No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A & 84/38/G (part) and CTS No. 1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271 (part), the licensed architect Shri Samir Walimbe has submitted a proposal to the Storm Water Department seeking permission for the shifting of the nala. Therefore, it is requested that your opinion regarding the proposed nala shifting and hydraulic design be conveyed to the Storm Water Drainage Department at the earliest.

Yours faithfully,
Deputy Engineer
Storm Water Drainage Department
Pune Municipal Corporation

(Office stamps and acknowledgment markings at bottom)

540



STAMP OF APPROVAL | 01/01

PROJECT

PLAN SHOWING REALIGNMENT OF NALA,
S.No. 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A& 84/38/G, CTS No.
1215, 1217, 1218, 1234, 1257, 1258, 1268, 1271 (Part),
VILLAGE–MUNDHWA, TAL–PUNE, DIST–PUNE

NAME AND SIGNATURE OF OWNER

1) BAJAJ FINSERV LIMITED
2) BAJAJ FINANCE LIMITED
3) BAJAJ FINSERV VENTURES LIMITED
4) BAJAJ ALLIANZ LIFE INSURANCE COMPANY LIMITED
5) BAJAJ ALLIANZ GENERAL INSURANCE COMPANY LIMITED

NAME AND SIGNATURE OF ARCHITECT

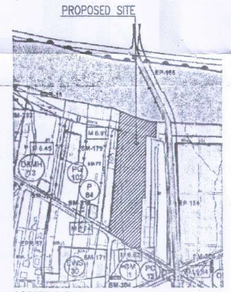
SAMEER VALIMBE
CA/92/14618

VOUSSOIRS
ARCHITECT AND INTERIOR DESIGNERS.
10 JANHAVI APPT., BHONDE COLONY, NR. OLD KARNATAK H. SC., ERANDAVANA PUNE–4 TEL:–41406399

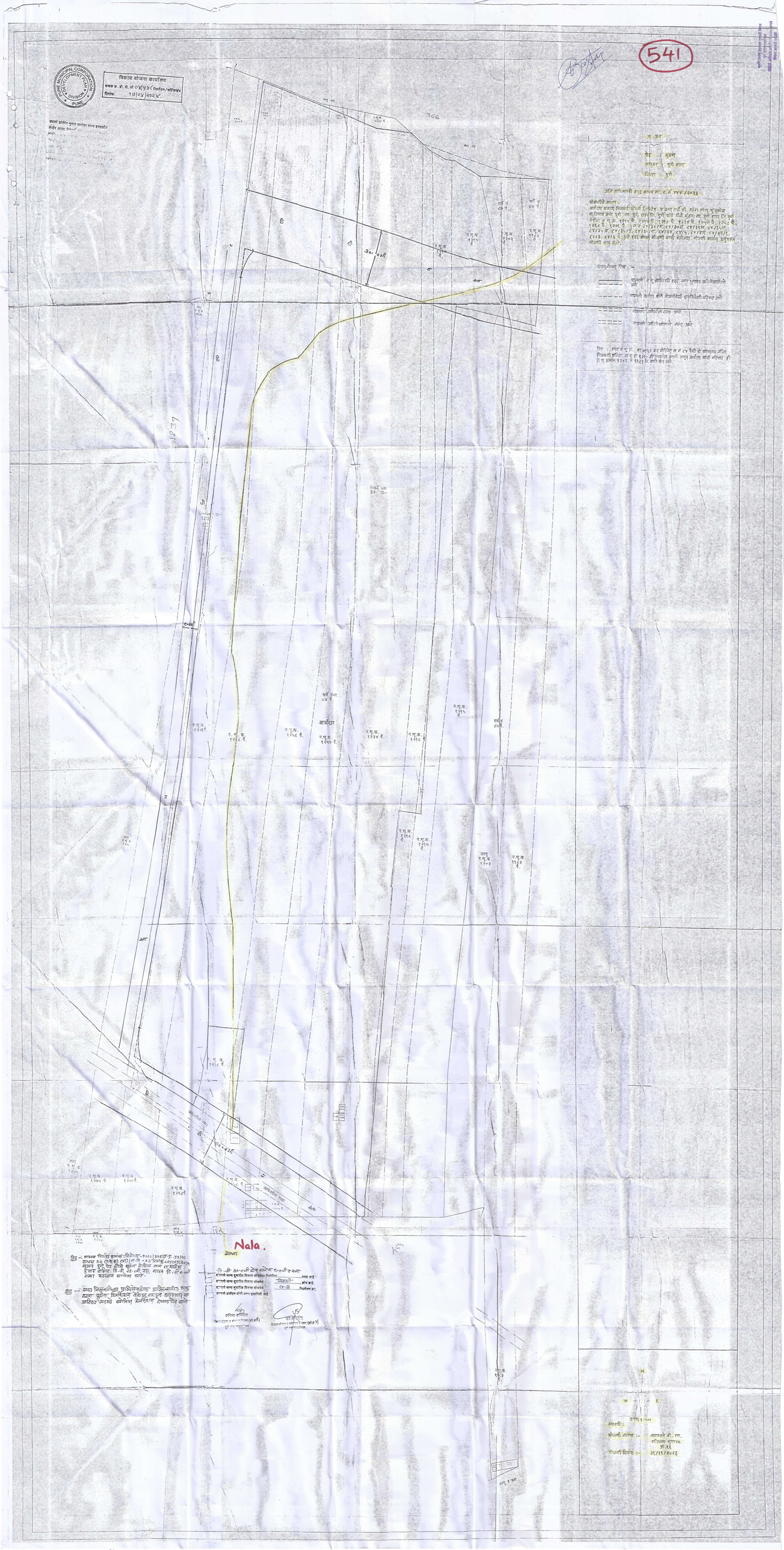
NORTH	SCALE 1:1000	SHEET NO.
N	DEALT BY – PRIYANKA CHK BY – TRUPTI DATE 20.05.2024	01/01

FILE NO : INWD/WDD/WKD/ / /
SUBJECT TO APPROVAL FROM COMPETENT AUTHORITY

PROPOSED SITE



LOCATION PLAN


541
PUNE MUNICIPAL CORPORATION
DEVELOPMENT PLAN
DIVISION
PUNE
विकास योजना कार्यालय
मनपा क. प्र. पी. सं. ०४/४५८ दिनांक/वर्ष२०२२
दिनांक: १७/०५/२०२८
अधिसूचना क्रमांक जमाबंदी संकीर्ण/टि-१/४४ /२०२३
मौजे : मुंढवा
तालुका : पुणे शहर
जिल्हा : पुणे
सर्वेक्षण क्रमांक १२३५ पै, १२३६ पै, १२३७ पै, १२३८ पै, १२३९ पै, १२४० पै, १२४१ पै, १२४२ पै, १२४३ पै, १२४४ पै, १२४५ पै, १२४६ पै, १२४७ पै, १२४८ पै, १२४९ पै, १२५० पै, १२५१ पै, १२५२ पै, १२५३ पै, १२५४ पै,

542

Annexure R-4.

UNIFIED DEVELOPMENT CONTROL AND PROMOTION REGULATIONS FOR MAHARASHTRA STATE

(Updated as on 30th January, 2025)

Applicable to all Planning Authorities and Regional Plan Areas except Municipal Corporation of Greater Mumbai, Other Planning Authorities / Special Planning Authorities / Development Authorities within the limit of Municipal Corporation of Greater Mumbai, MIDC, NAINA, Jawaharlal Nehru Port Trust, Hill Station Municipal Councils, Eco-sensitive / Eco-fragile region notified by MoEF & CC and Lonavala Municipal Council, in Maharashtra.

GOVERNMENT OF MAHARASHTRA

URBAN DEVELOPMENT DEPARTMENT

1. **These Unified Development Control and Promotion Regulations are sanctioned by the State Government under Section 37(1AA)(c) and Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 vide Notification No.TPS-1818/C.R.236/18/DP&RP/Sec.37(1AA)(c) & Sec.20(4)/UD-13, Dated 02nd December, 2020.**
2. **These Unified Development Control and Promotion Regulations are published by the State Government under Section 20(3) of the Maharashtra Regional &Town Planning Act, 1966 vide Notice No.TPS-1818/ C.R.236/18/ Sec.20(3)/UD-13, Dated 02nd December, 2020.**
3. **Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18/Sec.20(3)/UD-13, Dated 02nd December, 2020.**
4. **These Unified Development Control and Promotion Regulations are published by the State Government under Section 37(1AA) of the Maharashtra Regional & Town Planning Act, 1966 vide Notification No.TPS-1818/C.R.236/18/ Sec.37(1AA)/UD-13, Dated 02nd December, 2020.**
5. **Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18/Sec.37(1AA)/UD-13, Dated 02nd December, 2020.**
6. ***Corrigendum under section 37(1AA)(c) & 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18/D.P. and R.P./Sec.37(1AA)(c)/Sec.20(4)/ Corrigendum/UD-13, Dated 9th December, 2020.***
7. ***Notification under Regulation No.1.10 of the Unified Development control and Promotion Regulations issued by the State Government vide Resolution No.TPS-1818/C.R.236/18/Sec.37(1AA) & Sec.20(3)(Part 1)/Addendum/ UD-13, Dated 14th January, 2021.***
8. ***Government Order No.TPS-1818/C.R.236/18/(Part 1)/UD-13, Dated 1st March, 2021.***
9. ***Notification under Section 37(1AA)(c) & 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18(Part3)/Sec.37(1AA)(c) & Sec.20(4)/ Modification/UD-13, Dated 16th June, 2021.***
10. ***Notification under Regulation No.1.10 of the Unified Development control and Promotion Regulations issued by the State Government videResolution No.TPS-1818/C.R.236/18(Part1)/Addendum/UD-13, Dated 23rd June, 2021.***
11. ***Government Order No.TPS-1818/C.R.236/18(Part1)/UD-13, Dated 26th July, 2021.***
12. ***State Government Resolution No.TPS-1818/C.R.236/18(Part1)/Addendum/UD-13, Dated 8th October, 2021.***
13. ***Addendum under Regulation No.1.10 of Unified Development Control and Promotion Regulations issued by State Government vide Addendum No.TPS-1821/575/C.R.121/21/Addendum/UD-13, Dated 27th October, 2021.***
14. ***Guidelines issued by the State Government vide Order No.TPS-1818/C.R.236/18(Part-1)/UD-13, Dated 02nd December 2021.***
15. ***Notification under Section 37(1AA)(c) & 20(4) of the Maharashtra Regional &Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18(Part-3)/Sec.37(1AA)(c) & Sec.20 (4)/ Modification/UD-13, Dated 02nd December, 2021.***
16. ***Corrigendum / Addendum under Regulation No.1.10 of Unified Development Control and Promotion Regulations issued by State Government vide Corrigendum / Addendum No.TPS-1820/614/C.R.79/2021/ UD-13, Dated 02nd December, 2021.***
17. ***Corrigendum / Addendum under Regulation No.1.10 of Unified Development Control and Promotion Regulations issued by the State Government vide Corrigendum / Addendum No.TPS-1821/575/C.R.121/21/ UD-13, Dated 02nd December, 2021.***

(Kishor Gokhale)
Under Secretary
Government of Maharashtra

(N. R. Shende)
Director of Town Planning and Joint Secretary
Government of Maharashtra

18. *Notice under Section 20(3) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1216/3196/C.R.421/16/UD-12, Dated 21st December, 2021 & Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution Dated 21st December, 2021*
19. *Notification under Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1919/436/C.R.83/19/Sec.20(4)/UD-13, Dated 23rd December, 2021.*
20. *Notification under Section 37(1AA)(c) & Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18(Part-3)/Section 37(1AA)(c) & Section 20(4)/ Modification/UD-13, Dated 3rd February, 2022.*
21. *Order issued by Director of Town Planning under Note below Regulation No.4.2 vide No.URC/1939, Dated 7th April, 2022.*
22. *Notice under Section 37(1) & Section 20(3) with Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1822/C.R.04/2022/UD-13, Dated 2nd June, 2022.*
23. *Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1222/1089/C.R.70/22/UD-12, Dated 27th June, 2022.*
24. *Notification under Section 37(1AA)(c) & Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/950/C.R.158/19/Sec.37(1AA)(c) & Sec.20(4)/UD-13, Dated 10th October, 2022.*
25. *Notification under Section 37(1AA)(c) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18/Section 37(1AA)(C)/UD-13(Part-6), Dated 12th October, 2022.*
26. *Notification under Section 37(2) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18(Part-5)/Section 37(2)/UD-13, Dated 16th December, 2022.*
27. *Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18(Part-5)/UD-13, Dated 16th December, 2022.*
28. *Notification under Section 37(1AA)(c) & Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18(Part-4)/Sec.37(1AA)(c) & Section 20(4)/ Modification/UD-13, Dated 28th December, 2022.*
29. *Corrigendum for Notification Dated 28th December, 2022 vide Government Resolution No.TPS-1818/C.R.236/18 (Part-4)/Sec.37(1AA)(c) & Sec.20(4)/Modification/UD-13, Dated 11th January, 2023.*
30. *Corrigendum for Notification Dt.28th December, 2022 vide Government Resolution No.TPS-1818/C.R.236/18 (Part-4)/ Sec.37(1AA)(c) & Sec.20(4)/Corrigendum/UD-13, Dated 12th January, 2023.*
31. *Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1823/CR.07/2023/UD-13, Dated 27th February, 2023 regarding Class – 2 lands.*
32. *Order issued by Director of Town Planning under Note below Regulation No.4.2 vide No. परिपत्रक क्र.1/२०२३/नासंघ/ 4274, Dated 25th August, 2023.*
33. *Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1822/1818/C.R.179/2022/UD-13, Dated 25th August, 2023 regarding inclusion of Addendum to Model Building Bye-Laws – 2016.*
34. *Notification under Section 37(1AA)(c) & Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1818/C.R.236/18(Part-3)/Section 37(1AA)(c) & Section 20(4)/ Modification/UD-13, Dated 27th October, 2023.*
35. *Notification under Section 37(2) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1822/251/C.R.09/2023/UD-13, Dated 05th December, 2023.*
36. *Notification under Section 37(1AA)(c) & Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1823/UOR-54/CR.97/2023/UD-13, Dated 12th January, 2024.*
37. *Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1823/VIP-53/C.R.94/2023/Directives/UD-13, Dated 01st March, 2024 regarding applicability of UDCPR to Ratnagiri District.*
38. *Revised Addendum No.TPS-1823/VIP-53/C.R.94/2023/UD-13, Dated 01st March, 2024 issued by the State Government to Addendum No.TPS-1818/C.R.236/18/Sec.37(1AA) & Sec.20(3)(Part-1)/Addendum/UD-13, Dated 14th January, 2021.*
39. *Notification under Section 37(1AA)(c) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1219/2172/C.R.110/19/UD-12, Dated 15th March, 2024.*

40. *Notice under Section 37(1AA)(a) with Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1824/1075/C.R.87/2024/UD-13, Dated 23rd July, 2024 regarding Regulation No.3.8.2(b).*
41. *Notification under Section 37(1AA)(c) & Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1824/225/C.R.96/2024/UD-13, Dated 05th September, 2024 regarding Regulation No.11.2.5.*
42. *Notification under Section 37(1AA)(c) & Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1821/452/C.R.105/2022/(Part-2)/UD-13, Dated 05th September, 2024 regarding ITP Policy.*
43. *Order issued by Director of Town Planning under Note below Regulation No.4.2 vide No.Order No.1/Equivalency of Zones/2024/TPV-7/4946, Dated 10th September, 2024.*
44. *Notice under Section 37(1AA)(a) & Section 20(3) alongwith Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1824/UOR-31/2024/ C.R.100/2024/UD-13, Dated 25th September, 2024 regarding Regulation No.6.10.1.*
45. *Notification under Section 37(1AA)(c) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1224/1175/C.R.53/24/Sec.37(1AA)(c)/UD-12, Dated 04th October, 2024 regarding Regulations No.10.3, 10.4, 11.2.*
46. *Notification under Section 37(1AA)(c) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1224/1018/C.R.15/24/UD-12, Dated 07th October, 2024 regarding New Regulation No.10.16.*
47. *Notice under Section 37(1AA)(a) & Section 20(3) alongwith Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1824/UOR-38/C.R.118/2024/ UD-13, Dated 07th October, 2024 regarding Regulation No.7.6.*
48. *Notification under Section 37(1AA)(c) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPB-4322/10/C.R.45/2022/UD-11, Dated 10th October, 2024 regarding New Regulation No.13.6.*
49. *Corrigendum issued by the State Government vide Resolution No.TPS-1824/1264/C.R.116/2024/UD-13, Dated 11th October, 2024 regarding Regulation No.11.2.5.*
50. *Order No.TPS-1824/1264/C.R.116/2024/(Part-2)/Order/UD-13, Dated 11th October, 2024 under clause (c) - RoD in Notification under Section 37(2) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1822/251/C.R.09/2023/UD-13, Dated 05th December, 2023 regarding Regulation No.14.6.*
51. *Notice under Section 37(1AA)(a) alongwith Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1824/1264/C.R.116/2024/UD-13, Dated 11th October, 2024 regarding Regulation No.14.6.16(2).*
52. *Notice under Section 37(1AA)(a) & Section 20(3) alongwith Directives under Section 154 of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1824/1159/C.R.94/2024/UD-13, Dated 11th October, 2024 regarding Regulation No.2.2.14.*
53. *Notification under Section 37(1AA)(c) & Section 20(4) of the Maharashtra Regional & Town Planning Act, 1966 issued by the State Government vide Resolution No.TPS-1823/C.R.35/2023/UD-13, Dated 27th November, 2024 regarding New Regulation No.6.15.*

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INDEX

Regulation No.	Particulars		Page No.
	CHAPTER - 1 ADMINISTRATION		
1.0	Short Title, Extent and Commencement		1
1.1 *	Extent and Jurisdiction		1
1.2	Commencement of Regulations		1
1.3 * #	Definitions		1
1.4	Applicability of Regulations		16
1.5 **	Saving		17
1.6	Applicability of Other Regulations		18
1.7 *	Power to Prescribe the Proformas		19
1.8	Power to Decide Charges		19
1.9	Meanings as in Acts, Rules & Interpretations		19
1.10	Removal of Difficulties		20
	CHAPTER - 2 DEVELOPMENT PERMISSION AND COMMENCEMENT CERTIFICATE		
2.1	Permission from the Planning Authority is Mandatory		21
	2.1.1	Necessity of Obtaining Permission	21
	2.1.2 * **	Permission Not Necessary	21
	2.1.3	Development Undertaken on Behalf of Government	22
	2.1.4	Operational Constructions	22
	2.1.5	Constructions not Covered Under the Operational Constructions	23
	2.1.6	Temporary Constructions	23
	2.1.7	Repairs to Building	24
2.2	Procedure for Obtaining Development Permission / Building Permission / Commencement Certificate		24
	2.2.1	Notice / Application	24
	2.2.2	Information Accompanying Notice / Application	24
	2.2.3 * #	Ownership Title and Area	24
	2.2.4	Key Plan or Location Plan	25
	2.2.5	(a) Sub-division Layout Plan	25
	2.2.5	(b) Amalgamation Plan	26
	2.2.6	Site Plan	26
	2.2.7	Building Plan	26
	2.2.8 #	Building Plans for Special Buildings	27
	2.2.9	Service Plan	28
	2.2.10	Supervision	28
	2.2.11 #	Clearance From Other Departments	28
	2.2.12 #	Building / Layout Permission Scrutiny Fee	29
	2.2.13 * #	Development Charges	29

	2.2.14 * #	Premium Charges and Fire Infrastructure Charges.	30
	2.2.15	Structural Stability Certificate	31
	2.2.16	Signing the Plan	31
	2.2.17	Size of Drawing Sheets	31
	2.2.18	Colouring Notations for Plans	32
	2.2.19	Qualification and Competence of the Architect / Licensed Engineer / Structural Engineer / Town Planner / Supervisor	32
2.3 #	Discretionary Powers - Interpretation		33
2.4	Discretionary Powers - Relaxations in Specific Cases		33
2.5 #	Drafting Error		34
2.6	Grant or Refusal of Permission		34
	2.6.1	General	34
	2.6.2	Deemed Permission	34
	2.6.3	Approval of building permission on Risk Based Classification	35
	2.6.4	Display of Sanctioned Permissions on Authority's Web-Site.	35
2.7	Commencement of Work		35
	2.7.1 * #	Commencement	35
	2.7.2	Development of Land Subdivision / Group Housing Schemes	35
2.8	Procedure During Construction		36
	2.8.1	Owner / Developer / Architect / Town Planner / Engineer / Structural Engineer / Supervisor or any licensed technical person's Responsibilities in Their Respective Domain.	36
	2.8.2	Results of Test	36
	2.8.3 *	Display Board	36
	2.8.4	Plinth Checking	37
	2.8.5	Deviation during Construction	37
2.9	Completion Certificate		37
2.10	Occupancy Certificate		37
2.11	Part Occupancy Certificate		37
2.12	Inspection		38
2.13	Unsafe Buildings		38
2.14 *	Offences and Penalties		38
2.15	Revocation of Permission		38
	CHAPTER - 3 GENERAL LAND DEVELOPMENT REQUIREMENTS		
3.1	Requirements of Site		39
	3.1.1	Site Not Eligible For Construction of Building	39
	3.1.2 *	Distance of Site From Electric Lines	40
	3.1.3	Construction Within Blue and Red Flood Line	41
	3.1.4	Development Within 30 m. Distance From Railway Boundary	41
	3.1.5	Environmental Clearance	41
	3.1.6 * #	Development Along Highways / Classified Roads.	41
	3.1.7	Development Within Certain Distance from the Prison Premises	41

	3.1.8	Distances from Land Fill Sites	41
	3.1.9	Restrictions in the Vicinity of Airport	41
	3.1.10	Restrictions in the Vicinity of Ancient Monuments	42
	3.1.11	Restriction under the Works of Defense Act, 1903	42
	3.1.12	Distance from Natural Lake and Dam.	42
	3.1.13	Authorities to Supply Complete Information about Restrictions to the Authority	42
3.2	Means of Access		43
3.3	Regulations for Land Sub-division and Layout		43
	3.3.1	Obligation to Prepare Layout	43
	3.3.2	Roads / Streets in Land Sub-division or Layout	43
	3.3.3	Length of Internal Roads, How to be Measured	44
	3.3.4	Co-ordination of Roads in Adjoining Lands	45
	3.3.5	Narrow Roads in Congested Areas (Core area in case of Nashik Municipal Corporation)	45
	3.3.6	Development of Street	45
	3.3.7	Development of Private Street, if neglected	45
	3.3.8 * #	Access from the Highways / Classified Roads	45
	3.3.9 *	Access Provision for Special Buildings of Regulation No.1.3(93)(xiv)	46
	3.3.10	Cul-de-sacs	46
	3.3.11	Handing Over of Layout Roads	46
	3.3.12 #	Intersection of Roads	46
	3.3.13	Acute Angled Junctions	47
	3.3.14	Land-locked Plot	47
	3.3.15	Approach by Underpass or Over Bride for Adjoining Properties.	47
3.4	Recreational Open Spaces		48
	3.4.1 * #	Recreational Open Space	48
	3.4.2	Recreational Open Space - Owner's Undertaking	49
	3.4.3	Recreational Open Space - Rearrangement	50
	3.4.4	Recreational Open Space - Exclusive	50
	3.4.5	Recreational Open Space in Green Belt	50
	3.4.6	Minimum Dimensions	50
	3.4.7	Structures Permitted in Open Space	50
	3.4.8	Recreational Open Space and Means of Access	51
3.5	Provision for Amenity Space		51
	3.5.1 * #	In the areas of Local Authorities, Special Planning Authorities and Metropolitan Region Authorities	51
	3.5.2	In case of Regional Plan Areas.	52
	3.5.3	Development of Amenity Spaces in Earlier Sanctioned Layout	52
3.6	Provision for Electric Sub-station		52
3.7	Minimum Plot Area for Various Uses		53
3.8 *	Provision for Inclusive Housing		54

3.9	Net Plot Area and Computation of FSI		56
3.10	Transfer of DP Sites (other than DP road) in lieu of FSI		57
3.11	Relocation of DP-RP Sites / Roads		57
3.12	Amalgamation of Plots		58
3.13	Development of Cycle Track Along River and Nallah		58
	3.13.1	For Nashik Municipal Corporation.	58
	3.13.2	For Other Municipal Corporations.	58
	CHAPTER - 4 LAND USE CLASSIFICATION AND PERMISSIBLE USES		
4.1	General		59
4.2 * +	Land Use Classification and Equivalency of Zones		59
4.3	Residential Zone - R-1		61
4.4 *	Residential Zone - R-2		63
4.5	Low Density Residential Zone		65
4.6	Future Urbanisable Zone		65
4.7	Commercial Zone		65
4.8	Industrial Zone		65
	4.8.1*	Allowing Residential / Commercial Uses in Industrial Zone	66
4.9	Loom Industry cum Residential Zone.		69
4.10	Public / Semi Public Zone		69
4.11 * #	Agricultural Zone		70
4.12 *	Green Belt Zone / River Protection Belt		75
4.13	Traffic and Transportation Zone		76
4.14	Regional Park Zone.		76
4.15	Tourism Development Zone		77
4.16 *	Afforestation Zone		77
4.17	Hill Top - Hill Slope Zone / Hilly Area		77
4.18	Green Zone-2		77
4.19	Forest Zone		77
4.20	Defense Zone		77
4.21	Mines and Quarry Zone		78
4.22	Public Utility Zone		78
4.23	Woodland Corridor		78
4.24	Special Economic Zone.		78
4.25	Airport and Allied Activities / Service Zone.		78
4.26	Additional Uses.		78
4.27 *	Uses Permissible in Development Plan Reservations.		79
	CHAPTER - 5 ADDITIONAL PROVISIONS FOR REGIONAL PLAN AREAS		
5.0	General		83
5.1	For all Regional Plan Areas		83
	5.1.1 *	Development Permissible Adjacent to Gaothan.	83

	5.1.2	Regulations for Development of Tourist Resorts / Holiday Homes / Township in Hill Stations Type Areas under Hill Station Policy.	84
	5.1.3	Committed Development	84
	5.1.4	Rectification of Draftsman's Error.	84
	5.1.5	Highways notified by State / Central Government.	85
	5.1.6 *	Station Area Development.	85
	5.1.7	Modification Proposals Already Sanctioned.	85
	5.1.8 *	Provision of Amenity Space.	85
	5.1.9	Residential Zone with Payment of Premium	86
5.2.	For Thane - Raigad - Palghar Regional Plan.		86
	5.2.1 ***	Development in Tarapur - Boisar Area.	86
5.3	For Ratnagiri - Sindhudurg Regional Plan		87
	5.3.1	Area within Ratnagiri District	87
	5.3.2	Area within SindhudurgDistrict	87
5.4	For Kolhapur Regional Plan		89
5.5 *	For Satara Regional Plan		90
5.6	For Hingoli, Buldhana, Washim, Yawatmal, Nanded Regional Plan		100
5.7	For Raigad Regional Plan		101
5.8	For Solapur Regional Plan		101
5.9	For Pune Regional Plan		101
5.10	Certain Regulations cease to operate in future.		103
5.11 *	Board of Appeals		103
5.12 *	Aurangabad Regional Plan		103
	CHAPTER - 6 GENERAL BUILDING REQUIREMENTS - SETBACK, MARGINAL DISTANCE, HEIGHT AND PERMISSIBLE FSI		
6.0	General		105
6.1	Regulations for Congested Area in Development Plans / Gaothan of Village Settlements in Metropolitan Region Development Authorities and Regional Plans		105
	6.1.1 *	Residential Buildings / Residential Buildings with mixed-use	105
	6.1.2	Other buildings like Public / Semi-Public, Educational, Medical, Institutional, Commercial, Mercantile, etc.	107
	6.1.3	Width of Pathway	107
	6.1.4	Front Setback	107
6.2	Regulations for Outside Congested Area (Non-Congested Area).		107
	6.2.1 *	Marginal Distances and Set-back for Residential Buildings and Mixed Use	107
	6.2.2 #	Other Building.	110
	6.2.3 * #	Marginal Distances for Buildings of Higher Heights	114
	6.2.4	In the cases of layouts of two or more buildings in a plot for any uses	115
	6.2.5	In case of group housing scheme	115

	6.2.6	Building Abutting Two or More Streets	115
6.3 * #	Permissible FSI		115
6.4	Industrial Buildings		119
6.5 *	FSI of Green Belt		119
6.6	Calculation of Built-up area for the Purposes of FSI		120
6.7	Permissible Projections in Marginal Open Spaces / Distances		120
6.8 *	Exclusion of Structures / Projections for FSI Calculation		121
6.9 *	Interior and Exterior chowk		122
6.10 *	Height of Building		122
6.11	Height Exemptions		123
6.12	Requirements in case of Building more than 70 m. Height		123
6.13	FSI of Lands Affected by HEMRL or Other Restrictions		123
6.14	Provision of Recreational Floor		123
6.15	Provision of Hirkani Kaksha (Ladies Room)		124
	CHAPTER - 7 HIGHER FSI FOR CERTAIN USES		
7.0	General		125
7.1 *	Higher F.S.I.		126
7.2	Entitlement of FSI for Road Widening or Construction of New Roads / Surrender of Reserved Land		129
7.3	Development / Redevelopment of Staff Quarters of the State Government or its Statutory Bodies or Planning Authority		129
7.4*	Development / Redevelopment of Housing Schemes of Maharashtra Housing and Area Development Authority		131
7.5	Protection of FSI in Redevelopment of Existing Buildings		134
7.6	Redevelopment of Old Dilapidated / Dangerous Buildings		134
	7.6.1*	Redevelopment of Multi-dwelling Buildings of Owner / Owners	135
	7.6.2	Redevelopment of Tenanted Buildings	135
7.7 *	Development of Housing for EWS / LIG		136
7.8	Regulations for Development of Information Technology Establishment		137
	7.8.1	For Municipal Corporation, Area Development Authority and Special Planning Authority area.	137
	7.8.2	For Municipal Council, Nagar Panchayat and Non-Municipal Town Development Plan Area	139
	7.8.3	For Regional Plan Area	139
7.9	Regulation for Development of Biotechnology Parks		140
7.10 *	Incentive for Green Buildings		141
7.11	Development of Public Toilet		142
7.12	Buildings of Smart Fin-Tech Centre		142
7.13	Commercial Building in CBD, Commercial, Residential Zone in Planning Authorities Area.		143

	CHAPTER - 8 PARKING, LOADING AND UNLOADING SPACES		
8.1 *	Parking Spaces		145
8.2	Off Street Parking Requirement		146
	8.2.1 *	Off Street Parking Requirement	146
	8.2.2	Off Street Parking Requirement for Various Planning Authorities / Areas.	152
	CHAPTER - 9 REQUIREMENTS OF PART OF BUILDING		
9.0	Standard Requirement of Various Parts of Buildings		153
9.1	Plinth		153
9.2	Habitable Rooms		153
9.3	Kitchen		154
9.4	Bath Rooms, Water Closets, Combined Bath Room and Water Closet		154
9.5	Ledge or Tand / Loft		154
9.6	Cupboard		155
9.7 *	Mezzanine Floor		155
9.8	Store Room		156
9.9	Garage		156
9.10	Roofs		156
9.11	Basements		157
9.12 *	Ramp		158
9.13 #	Podium		158
9.14	Balcony		159
9.15	Supported Double Height Terraces		159
9.16	Stilt		159
9.17	Chimneys		159
9.18	Letter Box		160
9.19	Meter Room		160
9.20	Lighting and Ventilation of Room		160
9.21	Overhead Tanks		161
9.22	Parapet		161
9.23	Cabin		161
9.24	Wells		161
9.25	Septic Tanks		161
9.26	Boundary / Compound Wall		161
9.27 #	Provision of Lift		162
9.28 * #	Exit Requirements		162
9.29 *	Other Requirements of Individual Exit at Each Floor		165
9.30	Architectural Projections.		169
9.31 *	Additional Requirements in case of Housing Schemes		169
9.32	Fire Protection Requirement		169
9.33	Service Floor		170

	CHAPTER - 10 CITY SPECIFIC REGULATIONS		
10.0	General		171
10.1	Pune City Municipal Corporation.		171
10.2 *	Thane Municipal Corporation area.		174
10.3	Nagpur Municipal Corporation		180
10.4 * #	Nagpur Metropolitan Region Development Authority		181
10.5 *	Nashik Municipal Corporation		185
10.6	Vasai-Virar City Municipal Corporation		185
10.7	Mira-Bhayandar Municipal Corporation		186
10.8	Ulhasnagar City Municipal Corporation		186
10.9 *	Kolhapur Municipal Corporation		186
10.10 #	Navi Mumbai Municipal Corporation		192
10.11	National Park and Tungareshwar Eco Sensitive Zone.		198
10.12	Maharashtra Airport Development Company Notified Area.		198
10.13	Bhiwandi Surrounding Notified Area		198
10.14	CIDCO Area Excluding NAINA Area		202
10.14 A	CIDCO Area within Panvel Municipal Corporation		204
10.15 *	Certain Regulations Cease to Operate in Future.		204
10.16	Area Within Panvel Municipal Corporaton		204
	CHAPTER - 11 ACQUISITION AND DEVELOPMENT OF RESEVED SITES IN DEVELOPMENT PLANS		
11.0	General		205
11.1 *	Manner of Development of Reserved Site in Development Plan (Accommodation Reservation Principle)		205
11.2	Regulations for Grant of Transferable Development Rights		219
	11.2.1	Transferable Development Rights	219
	11.2.2	Cases Eligible for Transferable Development Rights (TDR)	219
	11.2.3	Cases not Eligible for Transferable Development Rights (TDR)	219
	11.2.4 *	Generation of the Transferable Development Rights (TDR)	220
	11.2.5 #	Transferable Development Rights (TDR) against Construction of Amenity	221
	11.2.6	Utilisation of Transferable Development Rights (TDR)	223
	11.2.7 *	Utilisation of Transferable Development Rights (TDR) and Road Width Relation	223
	11.2.8	Areas Restricted from Utilisation of Transferable Development Rights (TDR)	223
	11.2.9 *	General Stipulation	224
	11.2.10	Transfer of DRC	224
	11.2.11	Infrastructure Improvement Charges	225
	11.2.12	Vesting of Land	225
	11.2.13	Effect of this Regulation	225

11.3	Reservation Credit Certificate (RCC)		225
	CHAPTER - 12 **STRUCTURAL SAFETY, WATER SUPPLY, DRAINAGE AND SANITARY REQUIREMENTS, OUTDOOR DISPLAY AND OTHER SERVICES.**		
12.1	Structural Design		227
12.2	Quality of Materials and Workmanship		227
12.3	Alternative Materials, Methods of Design & Construction and Tests		227
12.4	Building Services		228
12.5 *	Water Supply, Drainage and Sanitary Requirements		228
12.6	Drainage and Sanitation Requirements		230
	12.6.1	General	230
	12.6.2	For Residences	230
	12.6.3	For Buildings other than Residences	230
12.7	Signs and Outdoor Display Structures		237
	CHAPTER - 13 **SPECIAL PROVISIONS FOR CERTAIN BUILDINGS**		
13.0	General		237
13.1	Provisions for Barrier Free Access		237
	13.1.1	Definitions	237
	13.1.2	Scope	237
	13.1.3	Site Development	237
	13.1.4	Building Requirements	238
13.2	Installation of Solar Assisted Water Heating (SWH) System / Roof Top Photovoltaic (RTPV) System		240
13.3	Rain Water Harvesting		241
13.4	Grey Water Recycling and Reuse		242
13.5	Solid Waste Management		244
	CHAPTER – 14 **SPECIAL SCHEMES**		
14.1	Integrated Township Project (ITP)		247
	14.1.1 *	For Regional Plan Area	247
	14.1.2	For Development Plan Area	247
14.2	Transit Oriented Development (TOD)		265
	14.2.1 #	For Pune Municipal Corporation Area	265
	14.2.2	Pune Metropolitan Region Development Authority area.	270
	14.2.3 *	For Nagpur Municipal Corporation and Nagpur Metropolitan Region Development Authority.	270
	14.2.4	For Other Municipal Corporations and Other Metropolitan Region Development Authority Area	275
	14.2.5	Regulations for BRT Corridor in Pimpri-Chinchwad Municipal Corporation.	275
14.3 *	Affordable Housing Scheme		276
14.4	Pradhan Mantri Awas Yojana		278

	14.4.1 #	For Development Plan Area.	278
	14.4.2	For Regional Plan Area.	280
14.5	Conservation of Heritage Buildings / Precincts / Natural Features		280
14.6	Slum Rehabilitation Scheme for Pune, PCMC, PCNTDA and Nagpur.		286
14.7 *	Slum Rehabilitation Scheme for Other Municipal Corporations.		318
14.8 * #	Urban Renewal Scheme		333
14.9	Development of Tourism and Hospitality Services under Community Nature Conservancy Around Wild Life Sanctuaries and National Parks.		349
14.10	Integrated Information Technology Township (IITP)		350
14.11	Integrated Logistic Park (ILP)		354
14.12	Industrial Township Under Aerospace and Defense Manufacturing Policy		357
14.13	Development of Integrated Industrial Area		357
	CHAPTER - 15 REGULATIONS FOR SPECIAL ACTIVITIES / PLANS		
15.1	Quarrying Operations		359
15.2 ***	Erection of Mobile Towers		360
15.3	Preparation of Local Area Plan		360
15.4 *	Guidelines for Street Design in City / Town.		360
	APPENDICES		
Appendix A-1 *	Form for Construction of Building or Layout of Buildings / Group Housing		363
Appendix A-2 *	Form for Sub-Division of Land as Plotted Layout		372
Appendix B *	Form for Supervision		378
Appendix C * # +	Qualification, Competence, Duties and Responsibilities etc. of Licensed Technical Personnel or Architect for Development Permission and Supervision.		379
Appendix D-1 *	Form for Sanction of Building Permission and Commencement Certificate		387
Appendix D-2	Form for Tentative Approval for Demarcation of Land / Sub-Division Layout		388
Appendix D-3	Form for Final Approval to the Land Sub-Division / Layout		389
Appendix E-1	Form for Refusal of Building Permit / Commencement Certificate		390
Appendix E-2	Form for Refusal of Land Sub-Division / Layout		391
Appendix F	Form for Intimation of Completion of Work up to Plinth Level		392
Appendix G *	Form for Completion Certificate		393
Appendix H	Form for Full / Part Occupancy Certificate		394
Appendix I	Form for Refusal of Occupancy Certificate		395
Appendix J	Form of Indemnity for Part Occupancy Certificate		396
Appendix K	Approvals of Building Permission Based on Risk Based Categorization		397
Appendix K-1	Form for Permission of Construction of Building on a plot upto 150 sq.m.		399
Appendix K-2	Approvals of Building Permission for Construction Upto 8 Rooms for Agro Tourism Center and Allied Activities as per Tourism Policy - 2016		400

Appendix L	Heritage List Card (Town & Region)	402
Appendix M	Typical Plans & Cross-section of the Road.	407
	PLANS	
Plan - A	Nallahs Identified for Cycle Track in Nashik Municipal Corporation Area.	420
	Clarifications & Directions by Government	
14/01/2021	**क्र.टिपीएस-१८१८/प्र.क्र.२३६/१८(भाग-२)/नवि-१३** - मंजूर नियमावलीमधील विनियम क्र.१४.२.१ संदर्भात स्पष्टीकरण देणेबाबत.	422
10/05/2021	**क्र.टिपीएस-१८२१/३४०/प्र.क्र.६८/२०२१/नवि-१३** - विनियम क्र.६.२.२ मधील Table No.6E(6) नुसार वर्गीकृत रस्त्यावरील पेट्रोल पंपाचेसाठी जंक्शनपासून सोडावयाच्या अंतराबाबत.	423
10/06/2021	**क्र.टिपीएस-१२२१/९९०/प्र.क्र.४४/२१/नवि-१२** - विनियम क्र.११.२.५ नुसार बांधीव सुविधांतर्गत विकास हक्क हस्तांतरण संदर्भातील बाबींच्या अंमलबजावणीकामी मार्गदर्शन.	425
14/06/2021	**क्र.टिपीएस-१२२१/१०३९/प्र.क्र.४२/२१/नवि-१२** - सिडको प्राधिकरणाकडून पनवेल महानगरपालिकेकडे वर्ग झालेल्या भूखंडावर मंजूर एकत्रिकृत विकास नियंत्रण व प्रोत्साहन नियमावलीनुसार (UDCPR) बांधकाम परवानगी देतेवेळी अनुसरावयाच्या पध्दतीचे मार्गदर्शन.	427
02/08/2021	**क्र.टिपीएस-१८२१/प्र.क्र.१०३/२०२१/नवि-१३** - विनियम क्र.२.२.१४(ii) तरतुदीनुसार Fire Infrastructure Charges संदर्भात आदेश.	432
17/09/2021	**क्र.टिपीएस-१८१८/प्र.क्र.२३६/१८(भाग-२)/नवि-१३** - मंजूर एकत्रिकृत विकास नियंत्रण व प्रोत्साहन नियमावलीप्रमाणे भूखंडाच्या कमाल बांधकाम क्षमतेच्या गणनेसंदर्भात येणाऱ्या अडचणींबाबत मार्गदर्शन.	434
08/12/2021	**क्र.UDCPR/Appendix-C/परवाना/५७२९** - मंजूर नियमावलीतील Appendix-C, C-7.1 Technical personnel to be licensed या तरतुदींच्या अनुषंगाने अधिकार प्रत्यायोजन आदेश.	436
23/12/2021	**क्र.टिपीएस-१८१८/प्र.क्र.२३६/१८(भाग-२)/नवि-१३** - विनियम क्र.१.९(v) अन्वये स्पष्टीकरण.	438
23/12/2021	**क्र.टिपीएस-१८२१/९३३/नवि-१३** - विनियम क्र.२.५ -आरेखकीय त्रुटीसंदर्भाने चुक दुरुस्ती करण्याचे अधिकारांबाबत स्पष्टीकरण.	451
06/09/2022	**क्र.टिपीएस-२४२२/७३१/प्र.क्र.६७/२०२२/नवि-०९** - नागपूर महानगर प्रदेश विकास प्राधिकरणासाठी लागू असलेल्या विनियम क्र.१०.४.३ बाबत मार्गदर्शन.	453
26/09/2022	**आदेश क्र.८ - क्र.टिपीएस-१८१८/प्र.क्र.२३६/१८(भाग-२)/नवि-१३** - विनियम क्र.२.३(vi) बाबत स्पष्टीकरण.	455
26/09/2022	**क्र.टिपीएस-१२२२/१५४४/प्र.क्र.१२८/२२/नवि-१२** - विनियम क्र.२.३(vi) बाबत स्पष्टीकरण.	458
26/09/2022	**शासन निदेश क्र.टिपीएस-१८१८/प्र.क्र.२३६/१८(भाग-२)/नवि-१३** - विनियम क्र.२.३(vi) बाबत कलम १५४ चे निदेश.	460

12/10/2022	**आदेश क्र.९ - टिपीएस-१८१८/प्र.क्र.२३६/१८(भाग-२)/नवि-१३** - नवनगर विकास प्राधिकरण या नात्याने सिडको क्षेत्रासाठी आणि विशेष नियोजन प्राधिकरण या नात्याने MADC क्षेत्रासाठी UDCPR लागू करणेबाबत.	463
12/10/2022	**आदेश क्र.१० - टिपीएस-१८१८/प्र.क्र.२३६/१८(भाग-२)/नवि-१३** - विनियम क्र.१०.१०.१, नोट क्र.३ बाबत स्पष्टीकरण.	466
29/11/2022	**आदेश क्र.११ - टिपीएस-१८२१/२०२३/प्र.क्र.१०४/२०२२/नवि-३०** -विनियम क्र.३.४.१ व विनियम क्र.३.५.१ बाबत स्पष्टीकरण.	469
27/02/2023	**क्र.टिपीएस-१८२३/प्र.क्र.०७/२०२३/नवि-१३** - भोगवटा वर्ग-२ जमिनी भोगवटा वर्ग-१ मध्ये रुपांतरित करण्यासंदर्भात - राज्यातील ज्या नियोजन प्राधिकरणांना UDCPR लागू आहे, अशा सर्व नियोजन प्राधिकरणांना कलम १५४ अन्वये निदेश.	473
02/06/2023	**शुध्दीपत्रक क्र.टिपीएस-१८२१/२०२३/प्र.क्र.१०४/२०२२/नवि-३०** - विनियम क्र.३.४.१ व विनियम क्र.३.५.१ बाबत स्पष्टीकरणासंदर्भात आदेश क्र.११ ला शुध्दीपत्रक	477
24/07/2023	**क्र.टिपीएस-१८२३/प्र.क्र.३१/२०२३/नवि-१३** - विनियम क्र.१०.१०.१, नोट क्र.३ व विनियम क्र.१०.१०.१(b) बाबत स्पष्टीकरण.	480
25/08/2023	**आदेश क्र.१२ - टिपीएस-१२२३/६०३/प्र.क्र.७२/२३/नवि-१२** - विनियम क्र.४.८.१(b)(xvi) बाबत स्पष्टीकरण.	481
25.08.2023	**आदेश क्र.टिपीएस-१८२२/१८१८/प्र.क्र.१७९/२०२२/नवि-१३** - विनियम क्र.१५.२ बाबत **निदेश**	483
28/08/2023	**आदेश क्र.१२ - टिपीएस-१८१८/प्र.क्र.५४/२०२३/नवि-१३** - विनियम क्र.१४.२.१.२.४(ii) बाबत स्पष्टीकरण.	488
04/09/2023	**आदेश क्र.१३ - टिपीएस-१२२१/२१७४/प्र.क्र.५८/२२/नवि-१२** - विनियम क्र.११.२.५ बाबत स्पष्टीकरण.	491
18/10/2023	**आदेश क्र.१४ - टिपीएस-१२२३/९०५/प्र.क्र.१००/२३/नवि-१२** - विनियम क्र.७.७ बाबत स्पष्टीकरण.	493
26/10/2023	**स्पष्टीकरण क्र.टिपीएस-१२२३/१४८०/प्र.क्र.१२२/२३/नवि-१२** - विनियम क्र.३.४.५ व विनियम क्र.४.१२ बाबत स्पष्टीकरण.	495
21/02/2024	**आदेश क्र.१५ - टिपीएस-१२२३/१३१२/प्र.क्र.१४०/२३/नवि-१२** - विनियम क्र.१०.१४.२(ii) बाबत स्पष्टीकरण.	497
03/04/2024	**पत्र क्र. टिपीएस -१८२३/१७२/प्र.क्र.४२/२०२३/नवि-१३** — विनियम क्र.१०.१५ बाबतच्या निदेशास स्थगितीबाबत.	499
22/08/2024	**आदेश क्र.१६ - टिपीएस-१२२२/१३९८/प्र.क्र.११७/२२/नवि-१२** - विनियम क्र.५.१.१(vi) व ५.१.६ बाबत स्पष्टीकरण.	501
26/09/2024	**आदेश क्र.१७ - टिपीएस-१२२४/१२०५/प्र.क्र.७०/२४/नवि-१२** - विनियम क्र.५.१.४(ii) बाबत स्पष्टीकरण.	504

562

10.10.2024	अधिसूचना क्र.टिपीबी-४३२२/१०/प्र.क्र.४५/२०२२/नवि-११ - विनियम क्र.१३.६ बाबतची परिशिष्टे.	507

Note –

(*) **Indicates Corrigendum / Addendum sanctioned by the Government from time to time under Regulation No. 1.10.**

(**) **Indicates Guidelines issued by the Government from time to time under Regulation No 1.5.**

(***) **Indicates Notice published by the Government under Section 20(3) & 37(1) with Directives issued under section 154.**

(#) **Indicates the Clarifications issued by the Government from time to time.**

(+) **Indicates the order issued by the Director of Town Planning, Maharashtra State, Pune.**

CHAPTER - 3
GENERAL LAND DEVELOPMENT REQUIREMENTS.

3.1 REQUIREMENTS OF SITE

3.1.1 Site not Eligible for Construction of Building

No piece of land shall be used as a site for the construction of building,

i) If the Authority considers that the site is insanitary, incapable of being well drained or is dangerous to construct a building on it;

ii) If the entire site is within a distance of 6.0 m. from the edge of water mark of a minor water course (like nallah, canal) and 15.0 m. from the edge of water mark of a major water course (like river) shown on Development Plan / Regional Plan or village / city survey map or otherwise;

Provided that where a minor water course passes through a low lying land without any well-defined banks, the owner of the property may be permitted by the Authority to canalise water course within the same land without changing theoverall alignment and the position of the inlet and outlet of the water course according to cross section as determined by the Authority. In such case, marginal open space shall beas stipulated under these regulation and shall be measured from edge of the trained nallah;

iii) If the site is hilly and having gradient more than 1:5;

iv) If the site is not drained properly or is incapable of being well drained;

v) If the owner of the building has not proposed appropriate measures required to safeguard the construction from constantly getting damp to the satisfaction of the Authority;

vi) In case the building is proposed on any area filled up with carcasses, excreta, filth and offensive matter, then certificate from the Authority to the effect that it is safe from the health and sanitary point of view, to be built upon, is required;

vii) If the use of the site is for the purpose, which in the opinion of the Authority will be a source of annoyance to the health and comfort of the inhabitants of the neighbourhood;

viii) If the proposed occupancy of the building on the site does not conform to the land use proposals in the development plans / Regional Plan or Zoning Regulations;

ix) If the level of the site is less than prescribed datum level depending on topography and drainage aspects;

x) If it doesn't derive access from an authorized street/means of access of adequate width as described in these Regulations;

xi) If it is within the river and blue flood line of the river (prohibitive zone), unless otherwise specified in these regulations;

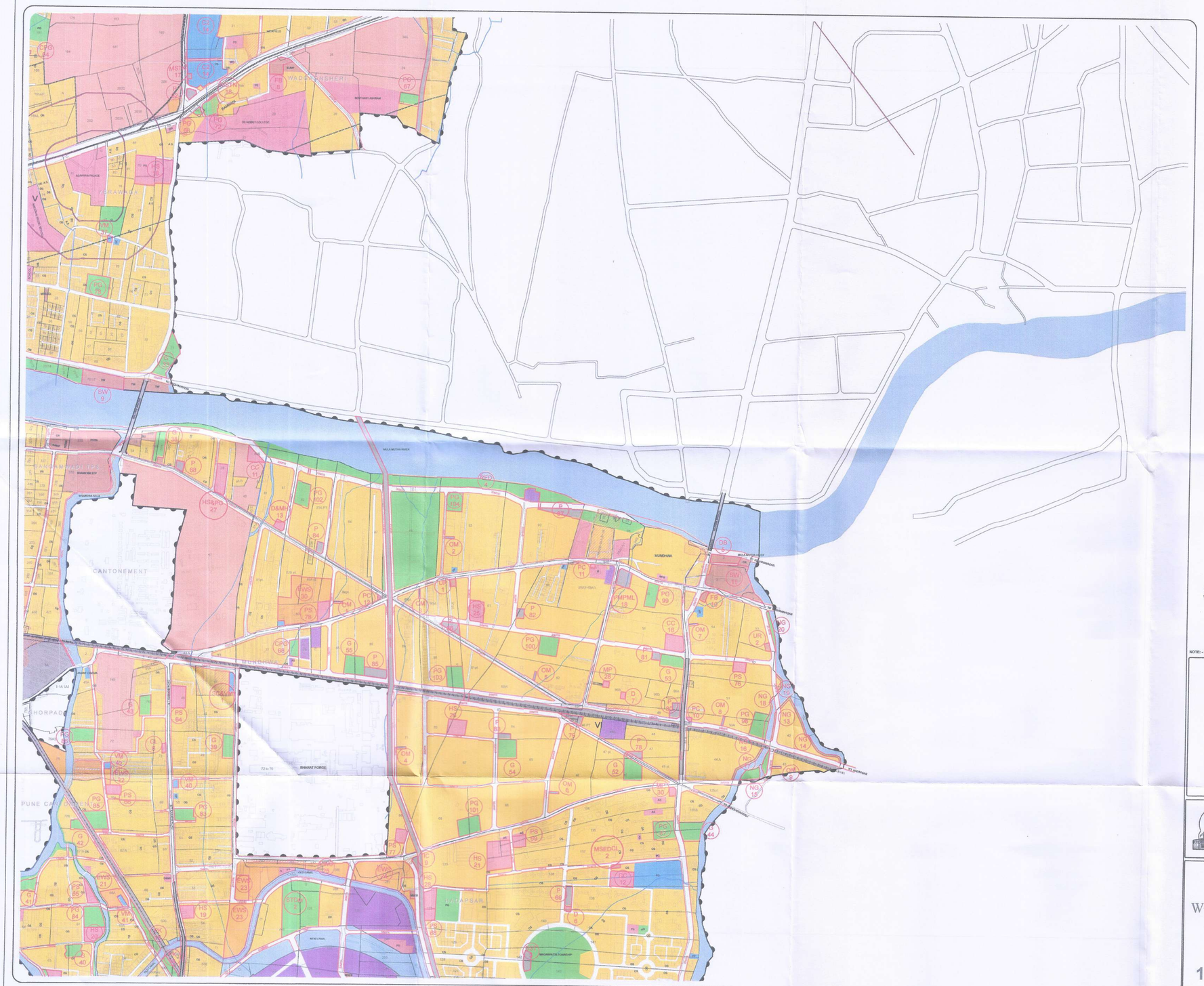
xii) If the site is within the boundary of Coastal Regulation Zone where CRZ Regulation does not allow development;

xiii) If the site is not developable by virtue of restrictions imposed under any law or guidelines of any Government Department;

xiv) If the entire site is within a distance of 50.0 m. from the mean high flood level of a wetland. The mean shall be calculated as per the provisions of Wetlands (Conservation and Management) Rules, 2017.

Annexure R-5

564


WADGAONSHERI
TERAWADA
YERAWADA
MUNDHWA
KHORPADI
BHARAT FORGE
MUNDHWA
MULA MUTHA RIVER
MULA MUTHA RIVER
CANTONEMENT
PUNE CANTONMENT
KHADKI
MUNDHWA
MUNDHWA
MUNDHWA

565

LEGEND

LANDUSE

- AGRICULTURE
- LOCAL COMMERCIAL DISTRICT (C-1)
- COMMERCIAL ZONE (C-1)
- COMMERCIAL
  AGRICULTURAL PRODUCE MARKET COMMITTEE (APMC), BAMBOO TRADE AND FLEA MARKET (BT & FM), COMMERCIAL CENTRE (C-2), MARKET (M), OTTA MARKET (OM), SHOPPING CENTRE (SC),VEGETABLE MARKET (VM), FARMER'S MARKET (FMKT), FISH MARKET (FM), SHOPPING CENTRE & VEGETABLE MARKET (SC&VM)
- DEFENCE
- ECONOMICALLY WEAKER SECTION (EWS) / SLUM IMPROVEMENT (SI)
  HOUSING THE DISHOUSED (HDH), PUNE HOUSING AND AREA DEVELOPMENT AUTHORITY (PHADA), PUBLIC HOUSING (PUH), SLUM IMPROVEMENT (SI), ECONOMICALLY WEAKER SECTION (EWS)
- FOREST
- HILL TOP HILL SLOPE (HTHS)
- INDUSTRIAL
  TIMBER INDUSTRY (TI)
- PUBLIC SEMI-PUBLIC ZONE (PSP)
  CHILD CARE CENTRE (CCC), CIVIC & CULTURAL CENTRE (CC), CITY LIBRARY (CL), DISPENSARY (D), DISPENSARY & MATERNITY HOME (D & MH),MATERNITY HOME (MH), FILM CITY (FC), HIGH SCHOOL (HS), KALAGRAM (KGM), MUSEUM AND ART GALLERY (MU & AG), MUNICIPAL KOTHI (MK),HOSPITAL (H), HEALTH CENTRE (HC),OCTROY NAKA (ON) MUNICIPAL PURPOSE (MP), MUNICIPAL HOUSING (MUH), PRIMARY SCHOOL AND CHILDREN PLAY GROUND (PS & CPG), PRIMARY SCHOOL AND HIGH SCHOOL (PS & HS), PUNE METROPOLITAN REGION DEVELOPMENT AUTHORITY (PMRDA), POST OFFICE (PO), PRIMARY SCHOOL (PS), NIGHT SHELTER (NS), OLD AGE HOME (OAH), POLICE CHOWKY (PC), POLICE STATION (PSTN),SPASTIC AND HADICAPPED REHABILITATION CENTRE (S & HRC), SCIENCE CENTRE AND PLANETARIUM (SCP), YOUTH GUIDANCE CENTRE (YGC),CIVIC CULTURAL & WATER TANK (CC&WT), INDUSTRIAL TRAINING INSTITUTE (ITI), HIGH SCHOOL & PLAY GROUND (HS&PG), MUNICIPAL PURPOSE & POLICE CHOWKY (MP&PC), MUNICIPAL PURPOSE & VEGETABLE MARKET (MP&VM), WARD OFFICE (WO)
- RECREATIONAL
  BOAT CLUB (BC), CHILDREN PLAY GROUND (CPG), GARDEN (G), MULTI PURPOSE GROUND (MPG), NALA GARDEN (NG), PLAY GROUND (PG), PARK (PK),STADIUM (STDM), RIVER FRONT DEVELOPMENT (RFD), RECREATIONAL PURPOSE (RP), WATER SPORTS (WS), AQUARIUM (AQRM), AQUA SPORTS COMPLEX (AQSC) GARDEN AND PLAY GROUND (G&PG)
- RESIDENTIAL
- SERVICES
  BURIAL GROUND (BU), BURIAL GROUND FOR ANIMALS (BUA), CREMATION AND BURIAL GROUND (CR & BU), CREMATION (CR), DHOBI GHAT (DB), FIRE BRIGADE (FB), MAHARASHTRA STATE ELECTRICITY DEVELOPMENT CORPORATION LIMITED (MSEDCL), SEWAGE WORKS (SW), TELEPHONE EXCHANGE (TEL), UTILITY RESERVATION (UR), WATER WORKS (WW), , BIO-GAS (BGAS), WASHING HAUD (WH),
- TRAFFIC AND TRANSPORTATION (T AND T)
  BUS TERMINUS (BST), BUS TERMINAL AND TRUCK PARKING (BST & TP), INTER CHANGE (IC), METRO STATION AND DEPOT (MSTN & DT), METRO STATION (MSTN), PARKING (P), PUNE MAHANAGAR PARIVAHAN MAHAMANDAL LIMITED (PMPML), PUNE MAHANAGAR PARIVAHAN MAHAMANDAL LIMITED AND TRUCK PARKING (PMPML & TP), STATE TRANSPORT (ST), TRANSPORTATION HUB (TH), TRANSPORT PARKING (TRP), VEHICLE DEPOT (VD),PARKING & METRO STATION (P&MSTN)
- WATERBODY
- RESTRICTION ZONE
- BUSINESS HUB
- SPECIAL COMMERCIAL ZONE

Nala shown as Blue line

- AIR FUNNEL
- RAIL OVERBRIDGE/FLYOVERS
- FLYOVERS & BRIDGES
- BRIDGES
- PROPOSED SUBWAY
- CYCLE & JOGGING TRACK
- SUBWAYS
- METRO ALIGNMENT
- METRO INFLUENCE LINE
- HIGH CAPACITY MASS TRANSPORT ROUTE
- NALA
- UNDERGROUND NALA
- CANAL
- DEVELOPMENT PLANNING ROAD
- EXISTING ROAD
- PROPOSED TUNNEL
- RAILWAY LINE
- PLOTS
- EXTENT OF SHEET
- DEVELOPMENT RESTRICTIONS
- CONGESTED BOUNDARY IN SECTOR I
- CITY SURVEY BOUNDARY
- SURVEY BOUNDARY
- FINAL PLOT BOUNDARY
- VILLAGE BOUNDARY
- SLUM
- BUILDINDS IN SECTOR I
- BUILDINGS IN SECTOR II TO VI
- SECTOR BOUNDARY
- CONGESTED AREA IN SECTOR II TO VI
- PMC BOUNDARY

SITES RESERVED FOR PUBLIC PURPOSES ARE SHOWN WITH THE RESPECTIVE LAND USES AND BOUNDED BY A RED VERGE.

NOTE :

METRO ALIGNMENT SHOWN IN THE DRAFT DEVELOPMENT PLAN (2007-2027) IS INDICATIVE AND MAY CHANGE AS PER THE ACTUAL SITE CONDITIONS.

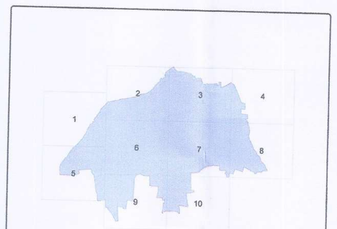
INDEX SHEET

FOR

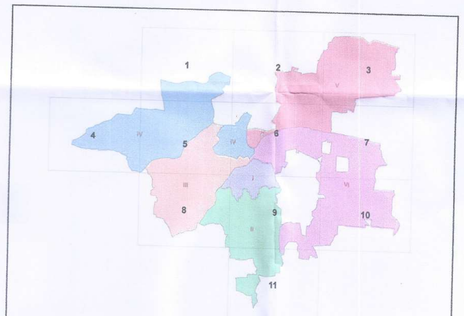
DRAFT DEVELOPMENT PLAN 2007-2027

FOR OLD LIMITS OF PUNE MUNICIPAL CORPORATION

TOTAL 22 SHEETS (INDEX + 10 + 11)



SECTOR I - 10 SHEETS SCALE 1:2000



SECTOR II TO VI - 11 SHEETS SCALE 1:10000

PRASHANT M.WAGHMARE
TOWN PLANNING OFFICER
AND CITY ENGINEER
PUNE MUNICIPAL CORPORATION

MAHESH PATHAK
MUNICIPAL COMMISSIONER
PUNE MUNICIPAL CORPORATION

PUNE MUNICIPAL CORPORATION
SHIVAJINAGAR,PUNE-411005

N W E S

TITLE-

DRAFT DEVELOPMENT PLAN (2007-2027)

FOR OLD PMC LIMIT OF

PUNE MUNICIPAL CORPORATION

PUBLISHED U/S 26(1) OF M.R.T.P. ACT 1966

566

SHEET NO - 7

NOTE: - METRO ALIGNMENT SHOWN IN THIS MAP IS INDICATIVE AND MAY CHANGE AND MAY CHANGE AS PER THE SITE CONDITION.

PRASHANT M.WAGHMARE
TOWN PLANNING OFFICER
AND CITY ENGINEER
PUNE MUNICIPAL CORPORATION

MAHESH PATHAK
MUNICIPAL COMMISSIONER
PUNE MUNICIPAL CORPORATION

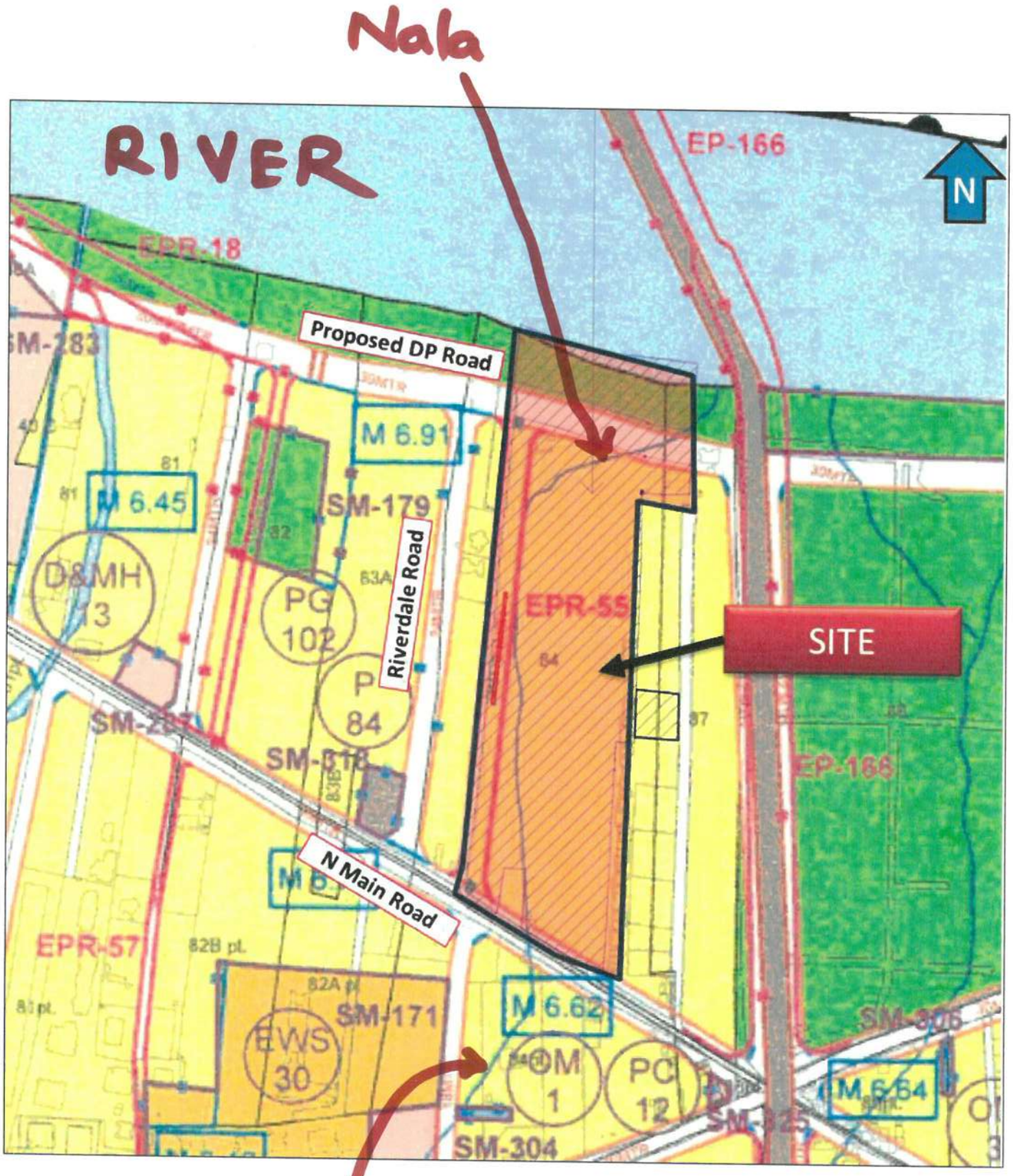
PUNE MUNICIPAL CORPORATION
SHIVAJINAGAR,PUNE-411005

N
W E
S

1:10,000

TITLE-

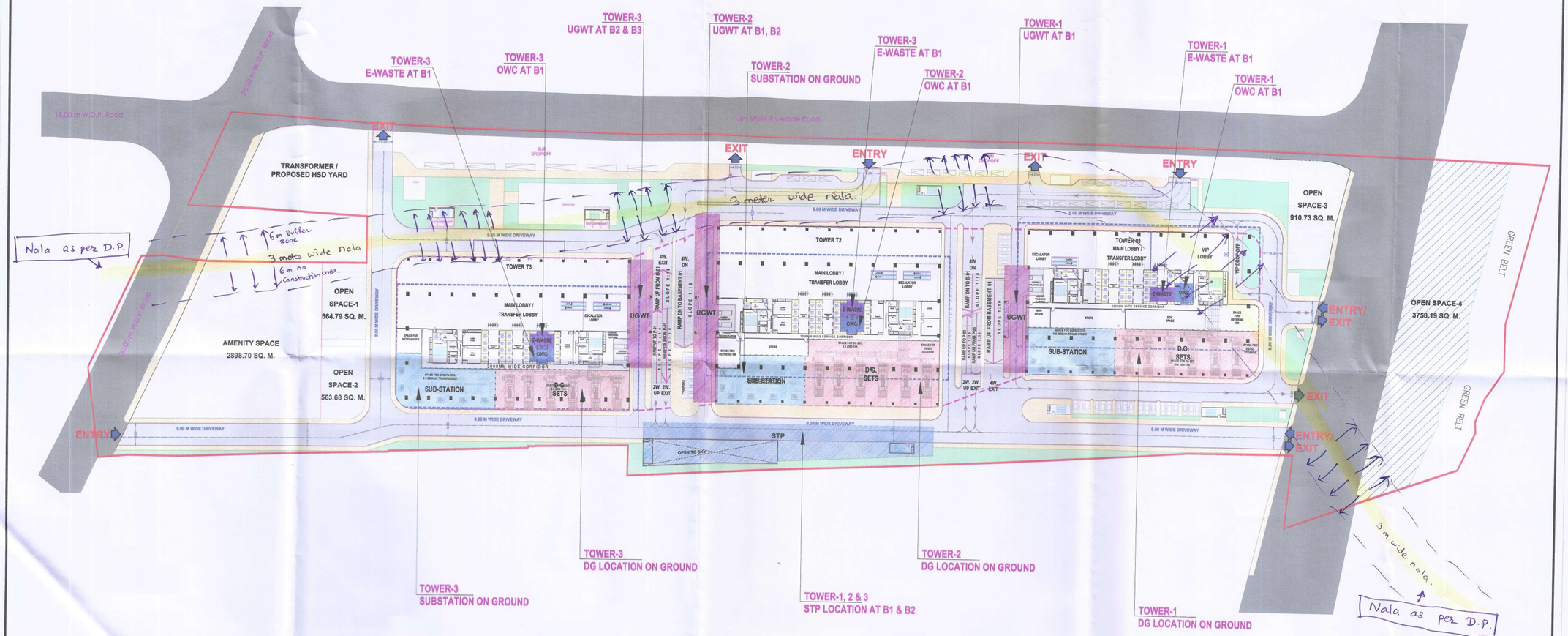
DRAFT DEVELOPMENT PLAN (2007-2027)
FOR OLD PMC LIMIT OF
PUNE MUNICIPAL CORPORATION
PUBLISHED U/S 26(1) OF M.R.T.P.ACT 1966



Development Plan
(site specific)

Annexure R-6.

568



PROJECT ARCHITECT

Panchshil

PROPOSED OFFICE BUILDING FOR BAJAJ AT MUNDHWA, PUNE

NORTH

N

COMPANY : M/s. Bajaj Finserv Ventures Limited & Others

PROJECT : AT S.No - 84/3, 84/4A, 84/4B/1, 84/5, 84/6, 84/34, 84/35/A, 84/35/B, 84/35/C, 84/35/D, 84/36/A, 84/37/A, & 84/38/G(part), CTS No 1215, 1217, 1218, 1234,1257, 1258, 1268, 1271(part), Village Mundhwa, Pune Maharashtra.

DRAWING TITLE :

MASTER LAYOUT PLAN

569

Annexure R-7.

Item No. 04 Court No. 1

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

(By Hybrid Mode)

Original Application No. 16/2014
(M.A. No. 63/2022)

Shri Hazi Ariff Applicant

Versus

State of U.P. & Ors. Respondent(s)

Date of hearing: 10.02.2023

CORAM: **HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON**
HON'BLE MR. JUSTICE SUDHIR AGARWAL, JUDICIAL MEMBER
HON'BLE MR. JUSTICE ARUN KUMAR TYAGI, JUDICIAL MEMBER
HON'BLE DR. AFROZ AHMAD, EXPERT MEMBER

Applicant: Mr. R. Venkataraman, Advocate

Mr. Raj Panjwani, Senior Advocate (Amicus Curiae) with Ms. Esha Dutta, Advocate

Respondent: Mr. D.N. Goburdhun, Senior Advocate with Mr. Aakash Kamra, Advocate for NCRPB
Mr. Daleep Dhyani, Advocate for UPPCB
Mr. Sandeep Singh, Advocate for the State of UP
Mr. Tanmay Arora, Advocate for M/s Tata Steel Limited

ORDER

1. The issue for consideration is legality of constructions in the bed and within the buffer zone (12 meters from the edge of the drain[1]) of Sahibabad Drain No. 1 in Ghaziabad by private respondents herein and failure of the Ghaziabad Nagar Nigam to prevent discharge of untreated sewage and waste in the said drain. Infact, the matter stands disposed of vide order dated 13.5.2022 except for limited issue for which further consideration is required today. We may give brief background of the matter.

[1] In terms of Functional Plan on Drainage for National Capital Region

2. At the outset we may mention that the matter is to be examined in the light of statutory mandate under section 24(1)(b) of the Water (Prevention and Control of Pollution) Act, 1974 (Water Act) and judgments of Hon'ble Supreme Court inter alia in MC Mehta vs. Kamal Nath, (1997) 1 SCC 388 laying down that flow of water could not be obstructed by permitting any commercial construction by the State and the State has to act as trustee for protecting environment, Vellore Citizens Forum (1996) 5 SCC 647 to the effect that sustainable development is part of Indian common law, *Mantri Techzone Pvt. Ltd. v. Forward Foundation and Ors.* (2019) 18 SCC 494 (para 44,45 and 52) to the effect that constructions could be prohibited in buffer zones of drains in view of sections 15 and 33 of the NGT Act and requirements for protection of environment.

3. As the record shows, the matter was earlier considered inter alia by orders dated 7.10.2016 and 26.2.2020. The Hon'ble Supreme Court vide order dated 22.10.2021 set aside the said orders and remanded the matter for fresh consideration, giving further opportunity to the alleged encroachers/violators.

4. Accordingly, the Tribunal took up the matter for consideration in terms of order of Hon'ble Supreme Court dated 22.10.2021 and disposed of the same vide order dated 13.5.2022.

5. As order dated 13.5.2022 would show, the Tribunal considered the report dated 12.4.2014 by the Committee constituted by the Tribunal. It also referred to earlier order dated 7.10.2016 to the effect that there was encroachment of the buffer zone of the drain by various establishments, with the permission of Nagar Nigam which permission was against section 24(1)(b) of the Water Act prohibiting obstruction of flow of water and thus the constructions were liable to be removed. The Tribunal considered the

submissions that there was no illegality in covering the drain and raising constructions in the buffer zone and rejected the said objections. It was held that the buffer zone of the drain was required to be left free. Reference was also made to the provision incorporated in the plan prepared by the National Capital Region (NCR) Planning Board under the NCR Planning Board Act, 1985. Reference was made to observations of the Hon'ble Supreme Court in *Mantri Techzone Pvt. Ltd. v. Forward Foundation and Ors.* (2019) 18 SCC 494 that restrictions could be placed against constructions in buffer zone of a drain in the interest of environment even beyond a State statute in view of entry 13 of List I of the Constitution and sections 15 and 33 of the NGT Act. The Tribunal held that public trust doctrine required the State (including the Nagar Nigam) act as a trustee and also to follow the mandate of section 24 of the Water Act to prevent obstruction of flow of water. Reliance was also placed on judgment of the Hon'ble Supreme Court in *M.I. Builders (P) Ltd. v. Radhey Shyam Sahu* (1999) 6 SCC 464 (Paras 45 to 50). The Tribunal also referred to recommendations of the Study Group of the NCR Planning Board which defined the buffer zone of the drains in NCR for efficient drainage system. The Expert Committee made specific recommendations against covering of drains and leaving of buffer zone around the water bodies and drains. Inspite of this finding, the Tribunal taking a pragmatic view, instead of straightaway directing demolition of illegal constructions, obstructing flow of the drain and occupying its buffer zone, directed exploring of a viable alternative. The Tribunal constituted a joint Committee for the purpose. Some extracts from the order dated 13.05.2022 are reproduced below for ready reference:

> ***"Finding & directions***
>
> *22. From the above narrative, it is clear that part of the drain has been covered and constructions raised within the buffer zone from the edge of the drain. This obstructs flow and maintenance of the drain against statutory mandate of section 24 of the Water Act as*

well as plan of the NCR Board. Further, the drain is polluted. Some of the Respondents have claimed permission for such covering while many coverings/constructions are without such permission. The objections do not in any manner show how such constructions/covering of drain is legally sustainable in view of Water Act, NCR Act and other environmental consideration which cannot be overridden merely on the basis of any permission of the Nagar Nigam or property rights of such violators. There is no proposal for remedial action. Recommendations of the fact finding/expert Committees have thus to be accepted.

23. We find that covering of a drain obstructs flow of the river and is not environmentally permissible with or without permission of a Nagar Nigam. Not only drain, but reasonable buffer area from its edge has to be left free as held in Mantri Techzone Pvt. Ltd. v. Forward Foundation and Ors. (2019) 18 SCC 494 (Para 21). Preferably such buffer zone should be covered by dense forest. Section 24(1)(b) of the Water Act prohibits any obstruction of the flow of water of a stream which may add to pollution. 'Stream' is defined under Section 2(j) to include a water course, whether flowing or dry. It is, thus, clear that storm water drain falls in the definition of 'stream', whether man made or natural. Covering of the drain and constructions affect the flow and drainage. In Mantri Techzone, supra, the Hon'ble Supreme Court upheld the directions of this Tribunal to maintain buffer zone on all drains - primary, secondary and tertiary. Some of the observations therein are:

> *"xxx .....xxx.....xxx*
> *21. It is evident from the above orders that the Tribunal had granted opportunity to the parties to address it "limited question", as aforementioned. The Tribunal after hearing the parties passed an order dated 04.05.2016 as under:*
>
> ***" General Conditions or directions:***
>
> *1. In view of our discussion in the main Judgment, we are of the considered view that the fixation of distance from water bodies (lakes and Rajkalewas) suffers from the inbuilt contradiction, legal infirmity and is without any scientific justification. The RMP - 2015 provides 50m from middle of the Rajkalewas as buffer zone in the case of primary Rajkalewas, 25m in the case of secondary Rajkulewas and 15m in the tertiary Rajkulewas in contradiction to the 30m in the case of lake which is certainly much bigger water body and its utility as a water body/wetland is well known certainly part of wet land. Thus, we direct that the distance in the case of Respondents Nos. 9 and 10 from Rajkulewas, Waterbodies and wetlands shall be maintained as below:-*
>
> *(i) In the case of Lakes, 75m from the periphery of water body to be maintained as green belt and buffer zone for all the existing water bodies i.e. lakes/wetlands.*
>
> *(ii) 50m from the edge of the primary Rajkulewas.*
>
> *(iii) 35m from the edges in the case of secondary Rajkulewas*

(iv) 25m from the edges in the case of tertiary Rajkulewas

This buffer/green zone would be treated as no construction zone for all intent and purposes. This is absolutely essential for the purposes of sustainable development particularly keeping in mind the ecology and environment of the areas in question.

All the offending constructions raised by Respondents Nos. 9 and 10 of any kind including boundary wall shall be demolished which falls within such areas. Wherever necessary dredging operations are required, the same should be carried out to restore the original capacity of the water spread area and/or wetlands. Not only the existing construction would be removed but also none of these Respondents - Project Proponent would be permitted to raise any construction in this zone.

All authorities particularly Lake development Authority shall carry out this operation in respect of all the water bodies/lakes of Bangalore.

xxx .....xxx.....xxx

24. It was also argued that buffer zone laid down by the NGT is substantially higher as compared to buffer zone which is required to be maintained as per the Revised Master Plan, 2015 issued on 22.06.2007. This is contrary to the Karnataka Town and Country Planning Act, 1961 (for short 'the Planning Act').

xxx

.....xxx.....xxx

47. Section 33 of the Act provides an overriding effect to the provisions of the Act over anything inconsistent contained in any other law or in any instrument having effect by virtue of law other than this Act. This gives the Tribunal overriding powers over anything inconsistent contained in the KIAD Act, Planning Act, Karnataka Municipal Corporations Act, 1976 ("KMC Act"); and the Revised Master Plan of Bengaluru, 2015 ("RMP"). A Central legislation enacted under Entry 13 of List I Schedule VII of the Constitution of India will have the overriding effect over State legislations. The corollary is that the Tribunal while providing for restoration of environment in an area, can specify buffer zones around specific lakes & water bodies in contradiction with zoning regulations under these statutes or the RMP."

24. Mere fact that the permission has been granted by the GNN cannot be of any consequence to remedy such illegality. It is well settled that protecting and maintaining drains is covered by the doctrine of public trust under which certain environmental assets vest in the people. The State has to act as a trustee. Storm water drain has important ecological functions in augmenting water supply. Discharge of untreated sewage in such drains is prohibited under the Water Act. So is obstructing its flow. The Nagar Nigam is thus not only under an obligation to prevent discharge of any pollutant into

the drains (whether natural or manmade) but also prevent impeding its flow. In view of section 24 of the Water Act, it is not possible to accept that the Nagar Nigam can, in exercise of its contract making power or authority responsible for maintaining the drain, allow either impeding of flow or polluting of the drain. The Nagar Nigam is to act as a trustee in respect of the drain. The powers of the Nagar Nigam are not unlimited so as to either by itself or through anyone else violate the mandate of the Water Act. Reference may inter-alia be made to M.I. Builders (P) Ltd. v. Radhey Shyam Sahu (1999) 6 SCC 464 (Paras 45 to 50). Relevant observations are:

> *"xxx .....xxx.....xxx*
>
> *50. ..... The Mahapalika is the trustee for the proper management of the park. When the true nature of the park, as it existed, is destroyed it would be violative of the doctrine of public trust as expounded by this Court in Span Resort case[2]. Public trust doctrine is part of Indian law. In that case the respondent who had constructed a motel located at the bank of River Beas interfered with the natural flow of the river. This Court said (at SCC p. 413, para 35) that the issue presented in that case illustrated "the classic struggle between those members of the public who would preserve our rivers, forests, parks and open lands in their pristine purity and those charged with administrative responsivities who, under the pressures of the changing needs of an increasingly complex society, find it necessary to encroach to some extent upon open lands heretofore considered in violate to change".*
> *51. In the treatise Environmental Law and Policy: Nature, Law, and Society by Plater Abrams Goldfarb (American Casebook Series, 1992) under the Chapter on Fundamental Environmental Rights, in Section 1 [The Modern Rediscovery of the Public Trust Doctrine) it has been noticed that "long ago there developed in the law of the Roman Empire a legal theory known as the 'doctrine of the public trust' ". In America public trust doctrine was applied to public properties, such as shore lands and parks. As to how that doctrine works it was stated:*
> *"The scattered evidence, taken together, suggests that the idea of a public trusteeship rests upon three related principles. First, that certain interests 'like the air and the sea' have such importance to the citizenry as a whole that it would be unwise to make them the subject of private ownership. Second, that they partake so much of the bounty of nature, rather than of individual enterprise, that they should be made freely available to the entire citizenry without regard to economic status. And, finally, that it is the principal purpose of a Government to promote the interests of the general public rather than to redistribute public goods from broad public uses to restricted private benefit...."*

With reference to a decision in Illinois Central Railroad Co. v. Illinois[3] it was stated that

"the Court articulated in that case the principle that has become the central substantive thought in public mist litigation. When a

[2] M.C. Mehta v. Kamal nath, (1997) 1 SCC 388
[3] 146 US 387: 36 Led 1018 (1892)

State holds a resource which is available for the free use of the general public, a court will look with considerable scepticism upon any governmental conduct which is calculated either to reallocate the resource to more restricted uses or to subject public uses to the self-interest of private parties".

This public trust doctrine in our country, it would appear, has grown from Article 21 of the Constitution."

25. Accordingly, on admitted facts and even after considering all objections of the PP, we conclude that constructions on the drain and its buffer zone either with or without permission of the Nagar Nigam are illegal. Buffer zone has to be fixed either by the authorities or may be determined by the Tribunal. In the present case, buffer zone stands defined by the NCR Planning Board, Ministry of Urban Development, Govt. of India, which applies to the present case.

Functional Plan on Drainage for National Capital Region

26. NCR Planning Board, Ministry of Urban Development, Govt. of India in its meeting held on 28.04.2016 approved Functional Plan on Drainage for National Capital Region (NCR)[4]. The issues considered in the said plan include protection of natural drainage system and allied issues. The plan has been prepared in the light of recommendations of a study group under the chairmanship of Engineer-in-Chief, Department of Irrigation, Govt. of Haryana with the Chief Regional Planner, NCRPB as the co-chairman. Other members of the Study Group includes Director, Central Water Commission (CWC), Govt. of India; Chief Engineers of Deptt. of Irrigation of the NCR participating States, U.P. Jal Nigam, Delhi Jal Board; Chief Town Planners/ Chief Co-ordinator Planners of the NCR participating States, etc. The plan has examined various aspects having impact on the drainage system of an area, such as geology, geomorphology, physical features, hydro-meteorology as well as the existing drainage system of various subregions, pollution, etc., besides studying various norms & standards e.g. design criteria of drainage system in the participating States, CPHEEO norms, recommendations by National Disaster Management Authority (NDMA) on Drainage, etc. In order to ensure an efficient drainage system in NCR, the Functional Plan has given important recommendations on protection of natural drainage system; promotion of recreational use along drainage channels; preparation of Master Plan of inter-state regional drainage and for individual cities/towns; segregation of sewage and drainage, etc. Some of the discussion in the report is quoted below:

"xxx .....xxx.....xxx

8.2.4 Encroachment on Natural Drainage Channels in Urban Areas

Natural streams and watercourses have formed over thousands of years due to the forces of flowing water in the respective watersheds. Habitations started growing into towns and cities alongside rivers and watercourses. As a result of this, the flow of water has increased in proportion to the urbanization of the

[4] http://ncrpb.nic.in/pdf_files/FunctionalPlanondriangeforNCR.pdf

watersheds. Ideally, the natural drains should have been widened (similar to road widening for increased traffic) to accommodate the higher flows of storm water. But on the contrary, there have been large scale encroachments on the natural drains and the river flood plains. Consequently the capacity of the natural drains has decreased, resulting in flooding.

Generally the drains and linear patch of land on either side of the drain are neglected due to foul smell and filthy look due to drain. Because of this reason the land value along drain is lower compared to other lands in the city. Local authorities also neglect the nallah land and its surroundings because this land does not provide any source of income to them. The negligence by local authorities provides an opportunity for the encroachers to carry out construction activities on the lands along the nallahs. The encroachment also reduces the effective width of the drain, which further aggravates the problem in monsoon.

xxx .....xxx.....xxx

iv) Covering of Drains/Construction over the Drainage Channels

A new phenomenon has been observed that in urban areas drains and natural nallahs are covered for urban activities use mainly for transportation and commercial activities due to scarcity of land in the cities. The covering of drains poses difficulty in cleaning and leads to reduction in the carrying capacity of the drains."

xxx .....xxx.....xxx

vi) Silting of Drains

During the rain the velocity of water is high. This high speed flowing water washes the earth and carries with it soil, leaves, wood logs, dead bodies etc. The soil carrying capacity of water decreases with the reduction in velocity of water. After reduction in velocity of water, floodwater leaves behind this material in the drain. This reduces the carrying capacity of Drain. And to carry the same quantity of water wider drain is required. Otherwise the water spread (flooding) takes place. To maintain the same carrying capacity in a limited width, the drain need to be cleaned periodically.

xxx .....xxx.....xxx

(i) Mixing of Sewage and Drainage

Storm water drainage is meant to carry storm water (rain water) or any other clean surface water. It is fundamentally neither suitable nor designed for carrying sewage or industrial wastewater or even septic tank effluent. Even the effluent from the sewage treatment plant cannot be discharged into drain unless it meets the norms set by the Bureau of Indian Standards (BIS) code and the Central Pollution Control Board. In urban areas

it is desirable to have separate system for carrying the sewage and storm water. In accordance with this principle in cities, the drainage and sewerage systems are provided separately. The problem arises due to blockage in sewerage system resulting the back flow in houses and in nearby areas. In order to avoid back flow and immediate relief is given by puncturing the sewerage line and diverting the sewage to nearby drains. Thus in urban areas the drains also serves as a substitute to sewerage system, for which the drains are not designed. The raw sewage mixed with storm water directly flow to the major drains and ultimately to the rivers cause serious water pollution in rivers which are the major source of drinking water of supply effects the aquatic life. There is a need to plan and construct separate sewerage and drainage system and necessary measures may be taken so that sewage are not punctured during floods and drained into the drains.

xxx .....xxx.....xxx

"8.3.4 Buffer Along/Around Water Bodies

Expert Committee constituted by Ministry of Home Affairs, GOI had proposed amendments to Rules and Bylaws, relating to Layout approvals and Building Permissions, to address disaster management issues. The following recommendations of the Expert Committee relating to restrictions of building activity in the vicinity of areas may be adopted which will help in conservation of water bodies and prevent them from pollution:

The water bodies and watercourses be maintained as recreational/green buffer zone and no building activity other than recreational use be carried out within;

i) 100 m from the river edge outside Municipal Corporation / Municipal limits and 50 m within Municipal Corporation / Municipal limits. No permanent construction be permitted within the buffer zone.

ii) 50 m. from the boundary of lakes of surface area for 10 ha. and above,

iii) 30 m. from the boundary of lakes of an area of less than 10 ha/ponds/tank bed lands

iv) 12 m. from boundary of major canal, streams nallahs, canals, etc."

xxx .....xxx.....xxx

8.3.10 Regulation for Covering of Drain

In urban areas drains run along the roads and public is allowed to cover drains in front of their entrances for access from roads. It has been observed that the drains are covered along the property boundary especially in the commercial property. This results into covering of drains for a longer distance and cleaning becomes difficult which ultimately leads to blockage of drain and flooding on roads. A standard design for the drain for removable cover at regular interval should be incorporated in building byelaws so that the above problem can be avoided. It should be

checked by the agency while granting building permission or at the time of providing occupancy certificate. A provision for recovering the demolition costs from the property owners, if any, should be integral part of Bye laws.

It is recommended that the practice of covering the drains for construction of roads should be stopped. Even the bridge/elevated road running over the drain along the alignment of the drain should also be discouraged as pillars obstruct the flow and movement of cleaning machines/ equipment's."

27. Even though the Hon'ble Supreme Court in Mantri Techzone, supra, has approved larger buffer zones ranging from 25 meters to 50 meters from the edge of the drain (depending upon size of the drain), the buffer zone laid down by the NCR Planning Board which is lesser area, must be followed in the NCR, which includes Ghaziabad. Thus, all constructions within the buffer zone of 12 meters from the edge of any drain have to be held illegal and liable to be removed. This will include constructions raised by the project proponents who have filed objections before this Tribunal. No further construction can be allowed in the buffer zone. Preferably, it should be covered by forest. There can be no estoppel against law and mere fact of construction having already been made can be no defence to need for protection of environment in the larger interest of the society.

28. However, in the peculiar facts and circumstances, we are not averse to exploring viable alternative such as laying of a proper sewer line, enabling pollution and obstruction free flow of the storm water drain. If any such plan is found viable and prepared with cost being recovered entirely or partly from the PPs or any other violators /beneficiaries within a period of one year, the demolition can be reconsidered, though not an ideal situation. Thus, while holding and directing demolition of illegal constructions, we leave it open to consider a viable alternative by a Joint Committee headed by the Member Secretary, NCR Planning Board, Ministry of Urban Development, GoI with nominee of Ministry of Jal Shakti (MoJS) not below the rank of Joint Secretary, Additional Chief Secretary, Urban Development, UP Commissioner, GNN, District Magistrate, Ghaziabad and UP PCB as members, with Additional Chief Secretary, Urban Development, UP being the nodal agency for coordination and compliance. Meeting of the Committee may be held within one month and its interim report prepared within two months thereafter. In case it is found that a sewer line can be duly constructed, enabling pollution and obstruction free flow of storm water drain, with or without contribution or such private parties, a report be filed within four months. The affected parties are free to represent to concerned authorities for such consideration offering the full or part of the cost involved. The Committee is free to meet online or otherwise and associate any other individual/department/expert.

29. In case option suggested is not found workable, all coverings of drain and constructions within buffer zone of the drain may be demolished after four months and drain with buffer zones maintained free of pollution and covering/encroachments. This will be the responsibility of the Commissioner, GNN, District Magistrate, Ghaziabad and SSP, Ghaziabad. Needless to say, that in case if an

alternative is found viable, the Tribunal may pass further order considering the report of the committee.

Directions

30. To sum-up, our directions are:

(i) All constructions/encroachments in the bed and 12 meter buffer zone from the edge of Sahibabad Drain No. 1 in Ghaziabad and all its coverings are per se illegal and are liable to be demolished, irrespective of any permission by the Nagar Nigam. The drain is liable to be restored and allowed to flow without obstruction and pollution which will be the responsibility of the Nagar Nigam with oversight of higher authorities and regulators.

(ii) Demolition of above illegal constructions may be carried out unless viable and acceptable alternative to restore environment and Drain by a suitable sewer line enabling free flow and unpolluted storm water open drain is worked out upto 01.10.2022

(iii) In case of representation in terms of direction (ii), a Joint Committee headed by the Member Secretary, NCR Planning Board, Ministry of Urban Development, GoI, with nominee of Secretary, MoJS, GoI, Additional Chief Secretary, Urban Development, UP, Commissioner, Ghaziabad Nagar Nigam, District Magistrate, Ghaziabad, and UP PCB as members may consider the matter and give its report to the Tribunal by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF on or before 15.09.2022 about a viable alternative for sewer line being laid and simultaneously storm water drain being allowed to flow unpolluted and uninterrupted. This may be with full or partial financial contribution of affected/benefited parties, to be executed within the outer limit of one year from today.

(iv) If any such report is filed, the same may be simultaneously placed on the website of the UP PCB for being accessed by any of the affected parties.

(v) The report, if filed, be placed before the Tribunal on 28.09.2022 for consideration.

Subject to above, the application is disposed of.

A copy of this order be forwarded to NCR Planning Board, Ministry of Urban Development, GoI, MoJS, GoI, Additional Chief Secretary, Urban Development, UP, Commissioner, Ghaziabad Nagar Nigam, District Magistrate, Ghaziabad, SSP, Ghaziabad and UP PCB by e-mail for compliance."

6. It is in above background that the matter is to be further considered in the light of report submitted. However, before proceeding further, we may note that aggrieved by the order of this Tribunal dated 13.05.2022,

M/s Tata Steel Limited filed Civil Appeal No(s). 6811/2022, *M/s. Tata Steel Limited vs. Hazi Arif & Ors.* which was dismissed as withdrawn with liberty to file review application before the Tribunal vide order dated 28.09.2022 as follows:

> *"Learned Senior counsel for the appellant seeks leave to withdraw the Appeal with liberty to file Review before the National Green Tribunal.*
>
> *Consequently, the Appeal is dismissed as withdrawn with liberty as prayed."*

7. However, no review application has been filed in pursuance of the said order.

8. We now proceed to deal with report dated 28.11.2022 filed by the NCR Planning Board as a nodal agency of the joint Committee in terms of order dated 13.05.2022. It is stated that parallel sewer line is not feasible and instead the drain can be kept clean by installing cleaning chambers at intervals of 30 meters or after confluence of additional drains into the Sahibabad Drain whichever is earlier. However, with regard to illegal constructions, there is no recommendations in terms of order dated 13.5.2022 beyond saying that NCR regulation is of 2016 while constructions are of 2012. Operative part of the report is reproduced below:

> *"19(a) The Committee on 14.10.2022 has discussed the following directions of Hon'ble NGT:-*
>
> *i) All constructions/encroachments in the bed and 12 meter buffer zone from the edge of Sahibabad Drain No. 1 in Ghaziabad and all its coverings are per se illegal and are liable to be demolished, irrespective of any permission by the Nagar Nigam.*
>
> *(ii) Demolition of above illegal constructions may be carried out unless viable and acceptable alternative to restore environment and Drain by a suitable sewer line enabling free flow and unpolluted storm water open drain is worked out.*
>
> *19(b) Regarding viable and acceptable alternative for sewer line, extensive deliberations have been held by the Office of District Magistrate, Ghaziabad in the meeting held on 01.07.2022 and by the Committee as*

well. Technical inputs from concerned Agencies highlight that laying down of parallel Drain is not feasible due to lack of land along the drain in question and lack of 100% tapping by means of sewer in upstream region of the Sahibabad Drain. As no contradictory views of DM has been received on this technical inputs, the Committee felt that DM seems to be in broad agreement with stakeholders that parallel sewer line is not feasible. Committee accordingly agreed with views of DM Ghaziabad and stakeholders.

19(c) With regard to constructions/encroachments in the bed and 12 meter buffer zone, it was observed by the Committee that DM has conveyed that all permissions given by GNN are prior to 2012 and Functional Plan on Drainage was implemented from 2016. The same was confirmed in meeting on 14.10.2022 by representative of GNN and DM Ghaziabad as well.

20(a) Committee further deliberated the following provision of Functional Plan on drain which is quoted by the Hon'ble NGT as alternative parallel sewer line does not seen feasible:

> ***8.3.10 Regulation for Covering of Drain***
>
> *In urban areas drains run along the roads and public is allowed to cover drains in front of their entrances for access from roads. It has been observed that the drains are covered along the property boundary especially in the commercial property. This results into covering of drains for a longer distance and cleaning becomes difficult which ultimately leads to blockage of drain and flooding on roads. A standard design for the drain for removable cover at regular interval should be incorporated in building byelaws so that the above problem can be avoided. It should be checked by the agency while granting building permission or at the time of providing occupancy certificate. A provision for recovering the demolition costs from the property owners, if any, should be integral part of Bye laws.*
>
> *It is recommended that the practice of covering the drains for construction of roads should be stopped. Even the bridge/elevated road running over the drain along the alignment of the drain should also be discouraged as pillars obstruct the flow and movement of cleaning machines/ equipment's."*

20(b) In order to ensure smooth flow in Sahibabad Drain, Committee has deliberated upon the suggestions of local association received from the office of the District Magistrate, Ghaziabad. Committee is of the view that the cleaning chambers should be made at intervals of 30 mtr. or after confluence of additional drains into the Sahibabad Drain whichever is earlier. Also mechanised screens should be installed in these cleaning chambers and its efficacy should be monitored by the Ghaziabad Nagar Nigam. The size of these chambers should be decided after due consideration of size of the Drain and machines required for its cleaning. Financial burden for making these cleaning chambers and installations of mechanised screens should be borne by the concerned private parties in the said matter.

21. Committee recollected that ACS, Urban Development Government of UP had already nominated Ghaziabad officers as his representative in this Committee in first meeting and decided to send this to ACS, Urban Development, Government of UP for further necessary action as per the order of Hon'ble NGT and to file, status report in Hon'ble NGT thereafter accordingly since time has been requested by Committee from NGT for this matter. It was decided that status report be filed by Committee."

9. We have heard learned Counsel for the applicant and Shri Raj Panjwani, Senior Advocate who has assisted the Tribunal as amicus. We have also heard Mr. Tanmay Arora, Advocate appearing for one of the encroachers – M/s. Tata Steel Limited (earlier Bhushan Steel), learned Counsel for State PCB and also learned Counsel for NCR Planning Board.

10. From the above background, it is clear that there are two issues – stopping pollution of drain by discharge of sewage so that the drain carries only unpolluted storm water which is its function and not to allow encroachment of buffer zone of the drain to keep flow of the drain unobstructed and to use the buffer zone for plantations to prevent soil erosion and land degradation as per mandate of section 24 of the Water Act and section 15 of the NGT Act.

11. The Tribunal has already held vide order dated 13.05.2022 that all constructions in the bed and within the buffer zone (12 meters from the edge of the drain[5]) and all its covering are illegal are liable to be demolished so as to restore the drain and its buffer zone free of pollution and obstruction. Only alternative for demolition could be a viable and acceptable alternative to restore environment and enable free flow of unpolluted storm water open drain which has not been found viable. Storm water drain in question is not to carry sewer for which proper conveyance system terminating to sewage treatment plant is to be set up. In present

[5] In terms of Functional Plan on Drainage for National Capital Region

case, drain is also carrying sewer which is not permissible and only part of flow of waste water in the drain is being diverted to the Indirapuram Sewage Treatment Plant having capacity of 74 MLD. Thus, sanctity of Sahibabad drain as storm water drain is not being maintained before its confluence in Shahdara drain, Delhi. This needs to be remedied by laying the close conduit within the drain or by other suitable means. Since buffer zone of the drain has environmental functions, the same has to be left free for environmental purposes such as containing overflow, plantations etc on the pattern of floodplain zone of a river. Observations in the report about constructions being prior to report of NCR Planning Board are not of any consequence. Requirement of maintaining buffer zone does not flow from the said report but from section 24 of the Water Act and section 15 of the NGT Act, as already held by the Hon'ble Supreme Court inter alia in MC Mehta and *Mantri Techzone*, supra. Report merely clarifies the extent of buffer zone. Constructions are even covering drain or bed of the drain which is not permissible by any environmental norm/law and is to the detriment of environment. Merely providing cleaning chambers will neither enable preventing of pollution nor enable free flow of water or leave the buffer zones free. Rather on this pattern, there may be more encroachments and encourage all buffer zones to be occupied on the principle of parity which will not be conducive to the environment. Sustainable Development and Precautionary Principles are accepted norms of environment law in view of authoritative judgment of the Hon'ble Supreme Court in Vellore Citizens Forum, supra and have been later incorporated in section 20 of the NGT Act.

12. Thus, in absence of any other option, the directions of the Tribunal dated 13.05.2022 have to be carried out for removing illegal constructions falling in the buffer zone (12 meters from the edge of the drain) and

preventing pollution of the drain by stopping discharge of untreated sewage, maintaining drain as exclusively storm water. Instead, the intercepted and diverted sewage needs to be treated and treated water utilized for secondary purposes such as agriculture, horticulture, industrial, parks, gardens or any other such non-contact purposes.

13. The District Magistrate and SSP, Ghaziabad, Ministry of Jal Shakti, Govt. of U.P. and Ghaziabad Nagar Nigam may accordingly take action expeditiously and restore the drain free from pollution and encroachments within six months from today.

The proceedings will stand disposed of.

MA No. 63/2022 filed by the applicant will also stand disposed of.

A copy of this order be forwarded to Chief Secretary, UP, Additional Chief Secretary, Ministry of Jal Shakti, Govt. of U.P., Ghaziabad Nagar Nigam, District Magistrate, SSP and District Forest Officer, Ghaziabad by e-mail for compliance.

Adarsh Kumar Goel, CP

Sudhir Agarwal, JM

Arun Kumar Tyagi, JM

Dr. Afroz Ahmad, EM

February 10, 2023
Original Application No. 16/2014
(M.A. No. 63/2022)
DV