

# Half Yearly Compliance report- Dec 2023

Half Yearly Compliance Report of  
Environmental Clearance of Proposed  
Housing Project (2B+G+14 High Rise  
Residential Apartment Building Project)  
**M/s Shuvam Construction (P) Ltd** for the  
period of 1<sup>st</sup> April 2023 to 30<sup>th</sup> Sep 2023  
(Dec 2023).

**Shuvam Constructions**

To

The Regional Officer,

Ministry of Environment Forest & Climate Change,

Integrated Regional Office

A/3, Chandrashekharpur, Bhubaneswar – 751023, Odisha

Date: 01.01.2023

**Sub:** Half Yearly Compliance Report of Environmental Clearance of Proposed Housing Project (2B+G+14 High Rise Residential Apartment Building Project) **M/s Shuvam Construction (P) Ltd** for the period of 1<sup>st</sup> April 2023 to 30<sup>th</sup> Sep 2023 (Dec 2023).

**Reference:** PARIVESH EC proposal number: SIA/OR/MIS/230678/2021

EC Identification Number: **EC22B038OR134759**

Sir ,

With reference to the above cited subject, the Environmental Clearance for Proposed Housing Project (2B+G+14 High Rise Residential Apartment Building Project) **M/s Shuvam Construction (P) Ltd** was granted by the SEIAA, Odisha on dated **06/05/2022**.

The detailed compliance report of the above mention project for the period of of 1<sup>st</sup> April 2023 to 30<sup>th</sup> Sep 2023 (Dec 2023) has been attached with this letter.

**It is requested to kindly acknowledge the same.**

*Jaysh Patel*

Thanking You

Yours Faithfully

Partner

**M/s Shuvam Construction (P) Ltd**

Copy to:

1. Member Secretary, Odisha State Pollution Control Board

2. Member Secretary, State Environmental Impact Assessment Authority, Odisha

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<b>Brief Summary of the Project</b>		
<b>Particular</b>	<b>Proposed</b>	<b>Permissible</b>
Project Name	Proposed Housing Project (2B+G+14 High Rise Residential Apartment Building Project) <b>M/s Shuvam Construction (P) Ltd</b>	
Plot Area	10732.17 Sqm	--
Ground Coverage (Roof top Area)	3053.12 Sqm (28.55%)	6439.3 Sqm (60% of the plot area)
Total Built up Area	56722.86 Sqm	--
Total FAR Area	44996.50 Sqm	--
FAR	4.192	1.75
Maximum Height	50.93 meter	--
No. of recharge pit	32	--
Drive Way Width	7.5 meter	--
Parking Area	22308.36 Sqm	13498.95 Sqm (30 % of Residential FAR Area)
Green Belt Area	28323 Sqm (24.61 % of Plot area)	2146.4 Sqm (20% of Plot)
Power/Electricity Requirement & Sources	1482 KW	--
No. of DG sets	2 x 500 KVA	--
Fresh Water requirement & Sources	141 KLD Source:	--
Sewage Treatment &	STP Capacity 200 KLD	--
Estimated Population- Residential, Floating/visitors	Residential Population: 1420 Nos. Floating Population: 142 Nos.	--

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**General Conditions**

<b>Sno.</b>	<b>Condition</b>	<b>Compliance</b>
1.	The project proponent shall ensure that the guidelines for building and construction projects issued vide MoEF & CC's OM No.19-2/2013-IA.III dated 9 <sup>th</sup> June, 2015, are followed to ensure sustainable environmental management.	<b>Agreed to comply</b>  Agreed, we will ensure guidelines for building and construction projects issued vide MoEF & CC's OM No.19-2/2013-IA.III dated 9 <sup>th</sup> June, 2015, are followed for sustainable environmental management.
2.	The approval of the Competent Authority shall be obtained in regard to structural safety of buildings against earthquake, adequacy of fire fighting equipment as per National Building Code including protection measures from lightning.	<b>Complied</b>  Obtained, Annexure-7
3.	The project proponent shall obtain all necessary clearance/ permission from all concerned agencies including Bhubaneswar Development authority before commencement of work. All the construction shall be done in accordance with the local building byelaws.	<b>Complied</b>  Obtained, Annexure-3
4.	Consent to Establish/Operate for the project shall be obtained from the State Pollution Control Board.	<b>Complied</b>  CTE :Obtained , Annexure-4 CTO: To be obtained
5.	Provisions shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	<b>Agreed to Comply</b>  housing facilities with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc has been provided for construction labours, these temporary shelters shall be removed after completion of construction work.
6.	A First Aid Room shall be provided in the project both during construction and operations of the project.	<b>Agreed to Comply</b>  First Aid Room will be provided with all necessary medicines



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7.	The company shall draw up and implement corporate social Responsibility plan as per the Companies Act of 2013.	<p><b>Agreed to Comply</b> The project is not falling under the criteria of project for which CSR is mandatory, therefore, there is no need to spend on CSR.</p>																											
8.	As per the MoEF&CC, Govt. of India Office Memorandum dated 30.09.2020, the project proponent is required to prepare and implement Corporate Environment Responsibility (CER) Plan. Appropriate funds shall be earmarked for the activities such as infrastructure creation for drinking water supply, sanitation, health, skill development, cross drains, solid waste management facilities, rain water harvesting, soil moisture conservation works, avenue plantation, etc. The activities proposed under CER shall be restricted to the affected area around the project. The activities proposed for CER shall be implemented and to be completed within three years and annual report of implementation of the same along with documentary proof viz. photographs, purchase documents, latitude & longitude of infrastructure developed & road constructed needs to be submitted to Regional Office MoEF&CC annually along with audited statement and to the District Collector. It should be posted on the website of the project proponent.	<p><b>Agreed to Comply</b> CER budget is as follows :</p> <table border="1"> <thead> <tr> <th colspan="3">CORPORATE ENVIROMENT RESPOSIBILITY PLAN</th> </tr> <tr> <th colspan="3">OVER ALL SUMMARY</th> </tr> <tr> <th>SL.NO</th> <th>DESCRIPTION OF WORK</th> <th>AMOUNT</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>TREE PLANTATION</td> <td>₹ 10,00,000.00</td> </tr> <tr> <td>2</td> <td>SEWARAGE TREATMENT PLANT</td> <td>₹ 50,00,000.00</td> </tr> <tr> <td>3</td> <td>HARDSCAPE (SCULPTURES, KIDS PLAY AREA, ETC.)</td> <td>₹ 5,00,000.00</td> </tr> <tr> <td>4</td> <td>INTERNAL ROAD</td> <td>₹ 10,00,000.00</td> </tr> <tr> <td>5</td> <td>INDOOR AMENITIES(SOCIETY, KITCHEN, ETC.)</td> <td>₹ 40,00,000.00</td> </tr> <tr> <td colspan="2"><b>GRAND TOTAL</b></td> <td><b>₹ 1,15,00,000.00</b></td> </tr> </tbody> </table> <p>Amount in words :</p> <p>Note: 1) Detailed estimate : the rates and quantity may vary upto ( +, - , 10% ) 2) Taxes will be extra &amp; as per actuals, will be based on the suppliers tax structure</p>	CORPORATE ENVIROMENT RESPOSIBILITY PLAN			OVER ALL SUMMARY			SL.NO	DESCRIPTION OF WORK	AMOUNT	1	TREE PLANTATION	₹ 10,00,000.00	2	SEWARAGE TREATMENT PLANT	₹ 50,00,000.00	3	HARDSCAPE (SCULPTURES, KIDS PLAY AREA, ETC.)	₹ 5,00,000.00	4	INTERNAL ROAD	₹ 10,00,000.00	5	INDOOR AMENITIES(SOCIETY, KITCHEN, ETC.)	₹ 40,00,000.00	<b>GRAND TOTAL</b>		<b>₹ 1,15,00,000.00</b>
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9.	A copy of this Environmental Clearance letter shall be displayed on the website of the Odisha State Pollution Control Board. The EC letter shall also be displayed at the Regional Office, District Industries centre and Collector's Office/ Tahsildar's office for 30 days.	<p><b>Complied</b> The copy of this Environmental Clearance letter is displayed on the website, link for the same is  <a href="http://164.100.213.216/E-Sign/Esign/ECLSEIAA_190886_2849D7_SIA_OR_MIS_227993_2021.pdf">http://164.100.213.216/E-Sign/Esign/ECLSEIAA_190886_2849D7_SIA_OR_MIS_227993_2021.pdf</a></p>																											
10.	Officials from the Regional Office of	<p><b>Agreed to Comply</b></p>																											

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	MoEF&CC, Bhubaneswar/SPCB, Odisha who would be monitoring the implementation of environmental safeguards should be given full cooperation, facilities and documents/data by the project proponents during their inspection.	full cooperation, facilities and documents/data during inspection of project by Officials from the Regional Office of MoEF&CC, Bhubaneswar/SPCB, Odisha shall be provided.
11.	In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by the SEIAA, Odisha.	<b>Agreed to Comply</b>  We may apply fresh application in SEIAA, Odisha if required. Any change(s) in scope of the project will not be done without prior approval of SEIAA, Odisha.
12.	The SEIAA, Odisha reserves the right to add additional safeguard measures subsequently, if found necessary, and to take action including revoking of the environment clearance under the provisions of the Environmental (Protection) Act, 1986, to ensure effective implementation of the suggested safeguard measures in a time bound and satisfactory manner.	<b>Agreed to Comply</b>  As mentioned in this condition we shall comply to any additional safeguard measures subsequently added by SEIAA, Odisha and ensure all EC conditions are complied within stipulated timeline.
13.	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, the Forest Conservation Act, 1980 and the Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.	<b>Agreed to Comply</b>  Will be obtained if required
14.	All EC condition stipulations would be enforced among others under the provisions of the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and the EIA Notification, 2006.	<b>Agreed to Comply</b>

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15.	The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental Clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen on the website of the SEIAA, Odisha. The advertisement shall be made within Seven days from the date of receipt of the Clearance letter and a copy of the same shall be forwarded to the Regional Office of MoEF&CC, Bhubaneswar.	<p><b>Complied</b></p> <p>The copy of EC order is available in the website link of the same is</p> <p><a href="http://164.100.213.216/E-Sign/Esign/ECLSEIAA_190886_2849D7_SIA_OR_MIS_227993_2021.pdf">http://164.100.213.216/E-Sign/Esign/ECLSEIAA_190886_2849D7_SIA_OR_MIS_227993_2021.pdf</a></p> <p>Newspaper Advertisement is not available.</p>
16.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, ZillaParisad / Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	<p><b>Complied</b></p> <p>Our Company Website URL is given below <a href="https://www.shuvamconstruction.com/">https://www.shuvamconstruction.com/</a></p>
17.	The proponent shall submit/upload six monthly reports on the status of compliance of the stipulated Environmental Clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF&CC, Govt. of India, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM, SO <sub>2</sub> , NO <sub>x</sub> (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be	<p><b>Agreed to Comply</b></p> <p>EC was granted by SEIAA, Odisha on dated 22.07.2022 , The first Half yearly Compliance report shall be submitted to the Bhubaneswar Regional Office MoEF&amp;CC, Govt. of India, and Regional office Bhubaneswar Odisha State Pollution Control Board for information and necessary action. The results of monitored data after collection of the same, shall be uploaded in the website of the company (<a href="https://www.shuvamconstruction.com/">https://www.shuvamconstruction.com/</a> ) and the criteria pollutant levels namely; SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub> (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project will be monitored and displayed at a convenient location near the main gate after collection of above mentioned data. An undertaking</p>

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	monitored and displayed at a convenient location near the main gate of the company in the public domain.	of the same is attached as Annexure _
18.	The environmental statement for each financial year ending 31 <sup>st</sup> March in Form-V as is mandated to be submitted by the project proponent to the Odisha State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF & CC, Govt. of India by E-mail.	<b>Agreed to Comply</b>  The environmental statement in Form-V for the financial year 2022-23 will be submitted to Odisha State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently on or before 31.03.2023 . The status of compliance of EC conditions shall be sent to Bhubaneswar Regional Offices of MoEF & CC, Govt. of India by E-mail and copy of the same will be uploaded in the website of the company ( <a href="https://www.shuvamconstruction.com/">https://www.shuvamconstruction.com/</a> )

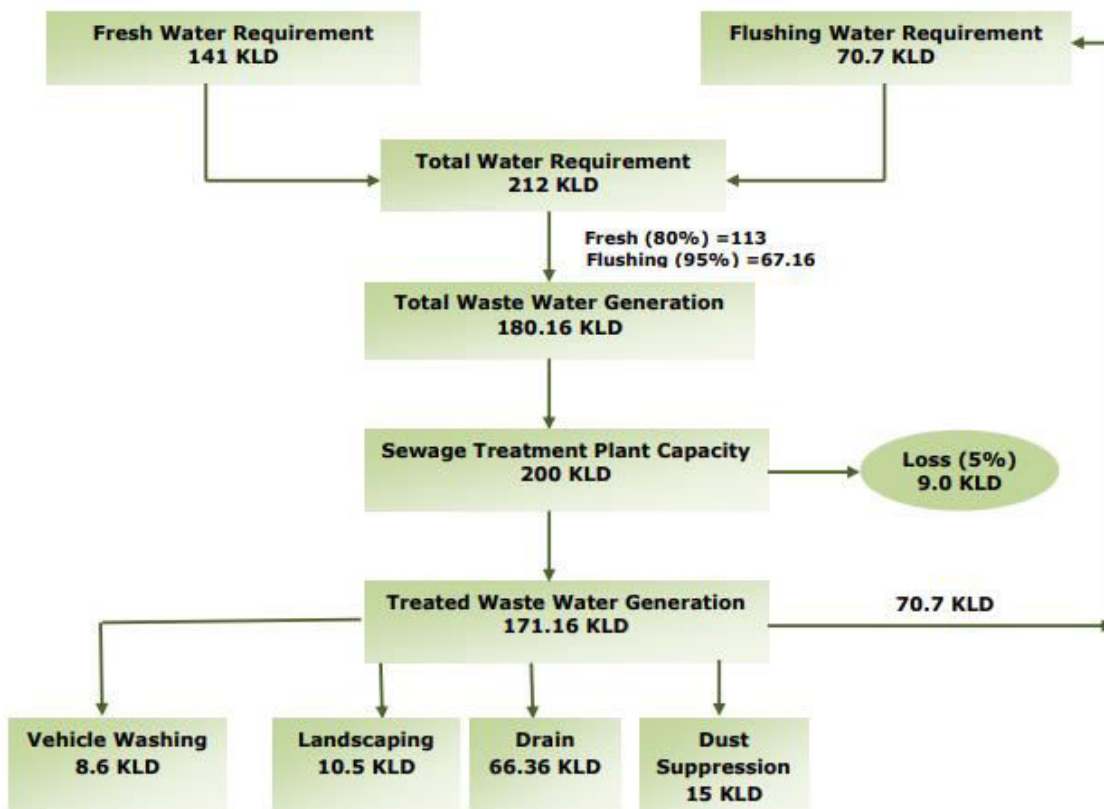
**Specific Conditions:**

Sn	Condition	Compliance
1.	The project shall adopt & implement 'Zero discharge' principle to the extent feasible, and shall maximize recycling and reuse of treated waste water generated in the project. All waste water generated shall be treated in the STP and the treated waste water shall be recycled and reused within the project so as to minimize extraction of ground water. Also ground water recharge by surplus waste water in the project plot area shall be maximized. The PP shall formulate and submit a report within two months on the final discharge point of all treated waste water after recycling and use in ground water recharge showing the points of disposal/reuse/recycling in the project. For	<b>Agreed to Comply</b>  Project activity is not yet started but the proposed plan for the same is as follows:  Total waste water generated for the proposed project is 180.16 KLD which is treated in Sewage Treatment Plant of capacity 200 KLD, after treatment in STP 171.16 KLD treated water will be available for recycled within the project for Flushing (70.7 m <sup>3</sup> /day), Landscaping (10.5 m <sup>3</sup> /day), Dust Suppression (15 m <sup>3</sup> /day), Vehicles Washing (8.6 m <sup>3</sup> /day) & 66.36 m <sup>3</sup> /day water will be discharge to drain in Non-monsoon season and during Monsoon season 76.86 m <sup>3</sup> /day water will be discharge to drain also Waste Water drain line and storm water drain line with drain dimension is showing in layout. Layout plan showing waste water & storm water line is given in Annexure-4.

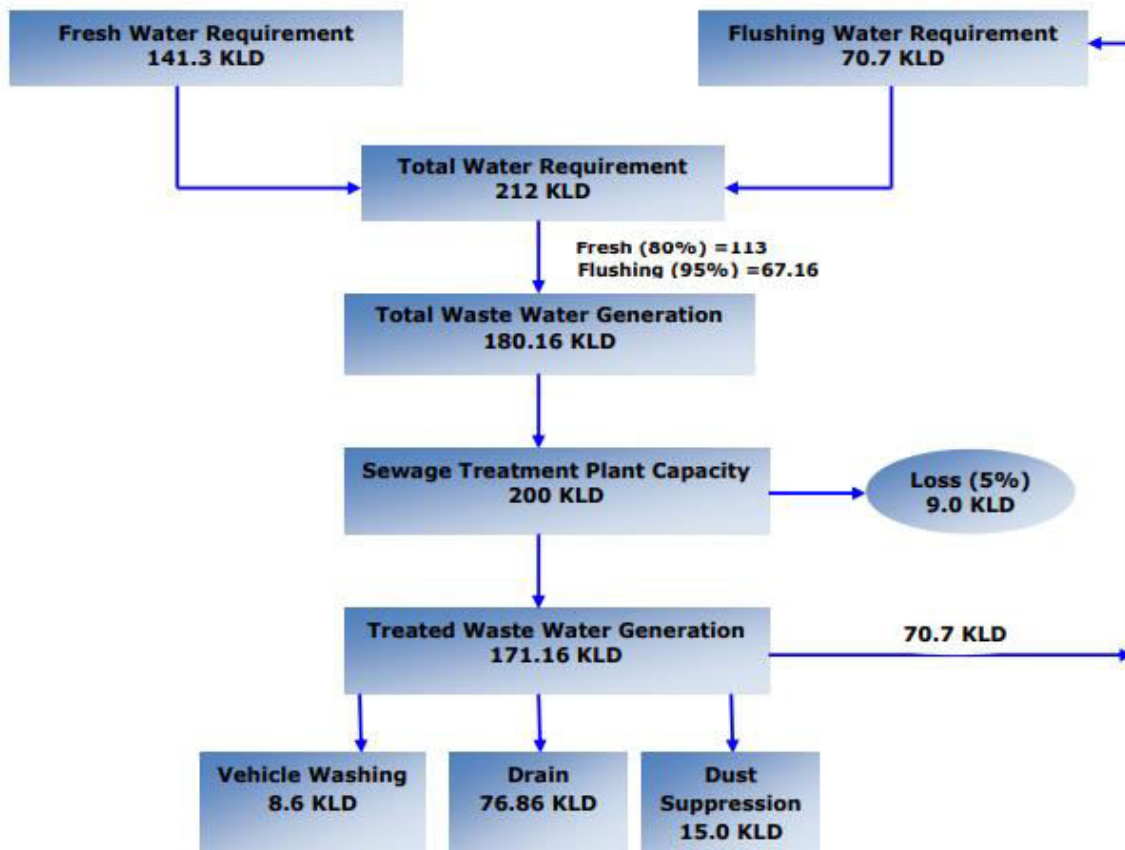
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discharge of any quantity of treated waste water to outside the project area premises, the exact location of drain, etc. to which such discharge will be made and permission of competent authority allowing such discharge have to be reported. The layout of pipe lines, etc to take the waste water to the approved discharge point has to be elaborately depicted on map and submitted. The EC is liable to be revoked if such report is not submitted within the said time period”.

**Water Balance during Non Monsoon Period**



**Water Balance during Monsoon Period**



2. The solid waste shall be duly segregated into biodegradable and non-biodegradable components and handled in separate areas earmarked for segregation of solid waste, as per Solid Waste Management Rules, 2016. The biodegradable waste generated shall be utilized through the Organic Waste Converter to be installed at the project site. Solid waste disposal shall be by micro composting of all bio degradable waste inside the premises. The inert waste (bio-non degradable components like plastics) shall be disposed off as per norms only at authorized site. The mode of disposal of all such waste at any approved site shall be reported, even if it is handed over to any authorised vendor. Construction & Demolition (C&D) waste from the project (debris) shall be segregated and managed as

**Agreed to Comply**

No construction activity has been started yet. Therefore, Construction & Demolition (C&D) waste from the project (debris) is not yet generated. After start of construction, the waste generated from Construction & Demolition (C&D) waste from the project (debris) shall be segregated and managed as per C&D Waste Management Rules, 2016 and the detailed mode of disposal to the final disposal point shall also be reported. After the operationalization of the project. The construction site wastewater would be routed through catch pit/ sedimentation basin prior to final / ultimate disposal to proper drainage system. Sewage will be treated in septic tank-soak pit system. Waste to be generated during the construction period includes construction waste and solid waste. Usable / recyclable material will be sold off to waste

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	per C&D Waste Management Rules, 2016 and the detailed mode of disposal to the final disposal point shall also be reported. The PP shall formulate a concrete implementation plan and submit a report showing on the layout plan of the final disposal point of biodegradable waste, non-biodegradable waste and debris generated during construction. These reports have to be submitted online to SEIAA within a period of two months. The EC is likely to be revoked if such report is not submitted within the said time period.	recyclers. Unusable construction will be used for land development activities within the project site, solid waste in form of food waste from kitchen and miscellaneous waste is estimated to be generated @ 0.45 kg/person/day, which will be about 639 kg/day. The waste generated from the floating population of residents will be @ 0.15 kg/day, which will be 21.3 kg/day. The generated solid waste from the residential areas will be segregated as biodegradable and non-biodegradable. This will be collected in separate coloured bins. The biodegradable waste will be sent to in house micro-composting pit and will be converted to organic fertiliser and will be used wed for plantation within the project site, excess will be sold to nearby nursery's. The Non-biodegradele waste shall be handed over to authorised vendors. The mode of disposal of all such waste with name of the authorised vendor shall be reported. A concrete implementation plan and a report showing on the layout plan of the final disposal point of biodegradable waste, non-biodegradable waste and debris generated during construction shall be submitted after start of construction activity.
3.	The Proponent before implementation of the project shall convert the land to Gharabari and shall take the ownership of the land if not already taken.	<b>Agreed to Comply</b>  The land is Grarabari and ownership of the same has been taken.
4.	The Proponent shall obtain permission/NOC from Executive Engg (PHD) and / or from the appropriate authority for disposal of excess STP treated water to the nearest drain without which the Proponent will not start construction work. Also, in case of the connecting drain passing through others land (Govt. or Private land), the Proponent shall obtain the permission and possession as the case may be.	<b>Complied</b>  Obtained, Annexure- 8
5.	The proponent shall use solar energy at least of 5% of total power requirement as proposed.	<b>Agreed to Comply</b>  Proposed Solar Lighting for Common Area: In the proposed area, we can propose 55 nos. of solar PV panels. Size of each PV solar panel = 1.560 m x 1.05 m Therefore, area covered by single PV solar panel = 1.638 m <sup>2</sup>



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		<p>Therefore, Total area covered by 55 nos. of PV solar panels = 90.09 m<sup>2</sup> (Roof Top) Total Roof Area of the project is 3053.0 sqm Each PV Solar panel generates energy through solar rays = 345 Watts-hr Therefore, total amount of electrical energy generated by 55 nos. of PV Solar panel = 18.97 KWhr.</p> <p>Assuming, only 4 hours of sunlight available throughout the day time, therefore electrical energy generated by 55 nos. of PV solar panel per day = 75.88 KW.</p> <p>Total saving from Solar System: Total Energy Saving = (75.88 + 8.9) KW = 84.78 KW Total Solar Energy saving = <math>84.78/1482.0 = 0.057 \times 100 = 5.7\%</math></p> <p>Distribution of Solar Energy: 123 Nos. of Solar Street Light poles of 8.9 KW capacities is directly connected with Solar Panel. 75.88 KW Solar energy generated from 55 nos. of PV Panel is directly connected with electric grid.</p>
6.	Trees located within the project area shall be transplanted to alongside the boundary green development area.	<p><b>Agreed to Comply</b></p> <p>Not Applicable as no trees are located within the project area.</p>
7.	To reduce discharge of treated water to open drain, the proponent shall use more water for increased number of trees proposed to be planted in the green belt area & shall also utilize this treated water for car washing, floor washing to minimize the surplus discharge to drain.	<p><b>Agreed to Comply</b></p> <p>surplus discharge to drain has been reduced to the maximum extend possible , The treated water from STP will be utilised for Green area development, washing of floors and vehicles, and Groundwater recharge.</p>
8.	As proposed,3 tier green belt/tree cover over minimum 20% of the land area should be maintained meticulously	<p><b>Agreed to Comply</b></p> <p>The greenbelt is provided all along the periphery of the proposed project site. Total 2642.18 sqm of greenbelt area, which is 24.61% of the total plot area is provided for greenbelt development.</p>
9.	The proponent shall implement the Pollution Control Measures and safeguards as proposed in the Environment Management Plan (EMP) of project report.	<p><b>Agreed to Comply</b></p> <p>The following Pollution Control measures shall be implemented after start of the project, the estimated cost of the EMP has been attached below: Air quality management Air Quality Management during Construction Phase</p> <ul style="list-style-type: none"> <li>• Water sprinkling on haulage roads &amp; stock piles to</li> </ul>



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avoid dust

- Vehicle & construction equipments will be maintained properly to reduce exhaust gas emission.
- Cement will be unloaded within covered space.
- Covering of vehicle carrying building materials.
- Trees will be planted before the construction activities.

Air Quality Management during Operation Phase

- Vehicles not having PUC certificates will be discouraged to enter the site.
- DG sets will be kept inside separate sheds and will be provided with adequate stack height as per CPCB Norms.
- Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.
- Open burning of litter and garbage will not be allowed

Water resource management Regarding the management of water quality during the construction period of the proposed complex, wastewater generation from the construction activities as most of water is used for mixing in construction materials, curing & dust suppression. However, domestic effluent generated from toilets of workers camp will be discharged to soak pit via septic tank. During the operational phase, the waste water generated from different blocks will be treated in STP. The treated waste water will be used for flushing, landscaping & dust suppression purpose. The rain water collected from building roofs will be led to suitably to rain water harvesting recharging pits. Storm water from various blocks shall be connected to adjacent drain for final disposal.

Solid waste management Separate raw material handling yard within the project site will be made. Cement will be separately stored under closed shed. Sand will be stacked neatly under tarpaulin cover. Bricks and steel will be laid in open. Recycled materials may be used in roads and land development activities, other waste like cuttings and scrap will be send to vendor. The solid waste will be segregated at source and will be stored in separate coloured bins. Proper waste management practices will be adopted during the collection, storing and disposal of the generated solid waste. The waste will be sent to Government approved agency for final disposal.

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Land Management After the completion of the project, bare surfaces within the project site will be covered with vegetation. While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion. During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete. Building materials will be stored on a platform within a covered area.

Landscape and Green Belt Development An adequate greenbelt 2641.18 m<sup>2</sup> (24.61 % of the plot area) or plantation around the project will be developed. This will minimize the effects of air pollution, noise pollution and soil erosion inside the area. Thus, the landscaping and plantation programmed within the project site will improve the aesthetic quality of the project site as well as of the surrounding environment.

Energy Conservation measures Energy efficient features will be adopted, i.e. LED lighting features, Solar Street lighting, solar water Heating and Maximum utilization of natural light. The building shall be comply to the Energy Conservation Building Code (ECBC) with proper windows to reduce heat gain but increasing light availability. The walls and roofs will be also designed suitably to reduce heat gain.

Noise management Noise Management during Construction stage:

- Rotating or imparting machines Shall be used an anti vibration mountings.
- Regular service & maintenance of equipments and machineries will be done.
- Vehicles not having proper silencer will not be allowed to site.
- Construction activities will be allowed during the day only.

Noise Management during Operation stage:

- Adequate greenbelt will be developed along the peripheral boundary walls, which will act as acoustic screen or vegetative barrier against the propagation of noise.
- DG sets will be provided with acoustic enclosure to control noise level as per CPCB prescribed norms.

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**Table No. C1-3: Estimated cost for Environmental Management**

Sl. No.	Details	Capital Cost in Lakhs (Non-recurring)	Recurring Cost per annum (in Lakhs)
1	Air Pollution Control	147	14.7
2	Waste Water Management	131	13.1
3	Water Treatment Plant	32.80	3.28
4	Solid Waste Management	82	8.2
5	Environmental Monitoring	7.64	0.764
6	Greenbelt Development	115	11.5
<b>Total</b>		<b>515</b>	<b>51.5</b>

10.	The proponent shall comply with the provision of structural stability certificate as per the bye- law of the Development Authority.	<b>Complied</b>  Obtained, Annexure-7
11.	Water Treatment Plant (WTP) shall be provided, if ground water is not potable. Adequate Number and Capacity of over head tank for fresh water and treated Water shall be made. Rain Water harvesting pits should be refreshed periodically and its number be increased for greater ground water recharge.	<b>Agreed to Comply</b>
12.	Permission of drainage division and sewerage board/WATCO shall be obtained for discharge of STP treated Water.	<b>Agreed to Comply</b>  the said permission shall be obtained.
13.	The land between the main road and the plot there is a stretch of Govt. land which is claimed to be road as per CDP 2030. The project proponent shall obtain necessary permission from the concerned authority to establish such Govt. land to be road and develop the same road at own cost if not done by BMC/BDA.	<b>Agreed to Comply</b>
14.	It was verified that few Plots belongs to Shuvam Construction, few plots to	<b>Agreed to Comply</b>

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	Satyam Construction and remaining plots of land owner. The project proponent shall make legal arrangement of land owner for development agreement with Shuvam Construction. Satyam Construction shall also take Company Board Resolution to develop the land through Shuvam Construction.	
15.	Provision shall be made for ventilation in lowest basement, light, fire safety upto roof top terrace for safety & environment health.	<b>Agreed to Comply</b>  Ventilation of lower basement will be made , Fire fighting system will be installed as per recommendation of the Fire fighting Officer, Odisha, and Bhubaneswar and as per the guideline of NBC (part-4). The fire fighting system comprises of Hose Reel, Down Comer, Manual operated electric fire alarm system, Terrace Tank, Extinguisher and Terrace pump. Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency. Terrace shall be properly fenced.
16.	Since the open drain and the sewerage line is coming up in the main road side, the proponent shall re-engineer the slope of the entire plot to main road side after construction of basement roof.	<b>Agreed to Comply</b>  The slope of the plot will be towards main road side as per the condition.
17.	Separate entry and exit gate for Residential building shall be implemented.	<b>Agreed to Comply</b>  Separate entry and exit gate will be constructed.
18.	All compliances submitted/ committed by PP(s) shall be strictly adhered to them in addition to all the conditions/ specific conditions of EC.	<b>Agreed to Comply</b>  All compliances submitted shall be strictly adhered in addition to all the conditions/ specific conditions of EC.
<b>(I) <u>Natural Drainage:</u></b>		
19.	The natural drain system should be maintained for ensuring unrestricted flow of water. No construction shall be allowed to obstruct the natural drainage through the site, on wetland and water bodies. Check dams, bio-swales, landscape and other	<b>Agreed to Comply</b>  The natural drain system will be maintained for ensuring unrestricted flow of water. No construction will be made to obstruct the natural drainage through the site, on wetland and water bodies. Check dams,

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	Sustainable Urban Drainage Systems (SUDS) are allowed for maintaining the drainage pattern and to harvest rain water. Buildings shall be designed to follow the natural topography as much as possible. Minimum cutting and filling should be done.	bio-swales, landscape and other Sustainable Urban Drainage Systems (SUDS) will not be made for maintaining the drainage pattern and to harvest rain water.
20.	The permission from competent authority will be obtained to discharge the excess storm water to drain if any. The proponent shall renovate the existing drain to accommodate the discharge and maintain it perennially.	<b>Agreed to Comply</b>  The distance of the Public Drain is 80 meter from the proposed project boundary. The permission to discharge the excess storm water to drain , drainage plan & drawing approved by Bhubaneswar Municipal Corporation (BMC) vide letter no. 10071, dated 28.01.2022.
21.	Permission for construction of drain alongside the adjacent NH under construction for allowing the proponent to discharge the treated waste water as well excess runoff water during monsoon from NH Authority shall be obtained. The construction of drains shall be synchronized with the completion of the construction of the Housing Project.	<b>Agreed to Comply</b>  Permission for construction of drain alongside the adjacent NH under construction for allowing the proponent to discharge the treated waste water as well excess runoff water during monsoon from NH Authority shall be obtained. The construction of drains shall be synchronized with the completion of the construction of the Housing Project is submitted.
<b>(II) <u>Water Requirement and Rain Water Harvesting:</u></b>		
22.	No ground water shall be extracted for the project work at any stage during the construction phase without obtaining the permission from the Water Resources Department, Govt. of Odisha/ CGWB.	<b>Agreed to Comply</b>  During the Construction Stage For major construction activities daily requirement of water will be 34 m3 (Norms Construction (Peak)@0.6m3 /1000sqm BUA) per day.  Water consumption for the resident laborers will be 34 @ 70 lpcd = 2380 liters.  Therefore, during the construction phase, total daily water requirement will be : 3400 liters + 2380 liters = 5780 liters = 5.7 m3 /day.  This will be sourced by Private tankers.
23.	<u>For meeting the total water requirement for the project upto maximum 212 KLD (fresh</u>	<b>Agreed to Comply</b>  The Public water supply is not available in the

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	<p><u>makeup water requirement is approx. 141 KLD) from ground water source, necessary prior permission has to be obtained from the Water Resources Department, Govt. of Odisha/ CGWB, failing which no ground water is allowed to be tapped. PP shall install water meter at all water drawal and intake points.</u></p>	<p>vicinity of the project area; once the public water supply is available the permission will be obtained from Public Health Division (PHD). Total 4 nos. of Borewells has been approved by CGWA vide letter no. CGWA/NOC/INF/ORIG/2021/12932, dated 16.09.2021. Ground Water Clearance letter is attached in Annexure-2</p> <p>Water Meters will be installed at all water drawal and intake points and reports from the same shall be submitted after operation.</p>
24.	<p>A certificate shall be obtained from the local body supplying water, specifying the total annual water availability with the local authority, the quantity of water already committed the quantity of water allotted to the project under consideration and the balance water available. This should be specified separately for ground water and surface water sources, ensuring that there is no impact on other users.</p>	<p><b>Agreed to Comply</b></p> <p>The Public water supply is not available in the vicinity of the project area; once the public water supply is available the permission will be obtained from Public Health Division (PHD). Total 4 nos. of Borewells has been approved by CGWA vide letter no. CGWA/NOC/INF/ORIG/2021/12932, dated 16.09.2021.</p>
25.	<p>The quantity of fresh water usage, water recycling and rainwater harvesting shall be measured and recorded to monitor the water balance as projected by the project proponent. The record shall be submitted to the Regional Office, MoEF&amp;CC and SEIAA, Odisha along with six monthly Monitoring reports.</p>	<p><b>Agreed to Comply</b></p> <p>The quantity of fresh water usage, water recycling and rainwater harvesting will be measured and recorded using water meters to monitor the water balance the record of the same shall be submitted to the Regional Office, MoEF&amp;CC and SEIAA, Odisha along with six monthly Monitoring reports.</p>
26.	<p>Installation of dual pipe plumbing for supplying fresh water for drinking, cooking and bathing etc. and other for supply of recycled water for flushing, landscape irrigation, car washing, thermal cooling, conditioning etc. shall be done.</p>	<p><b>Agreed to Comply</b></p> <p>We will install dual pipe plumbing for supplying fresh water for drinking, cooking and bathing etc. and other for supply of recycled water for flushing, landscape irrigation, car washing, thermal cooling, conditioning etc. will be done.</p>
27.	<p>Use of water saving devices/ fixtures (viz. low flow flushing systems; use of low flow faucets tap aerators etc.) for water conservation shall be incorporated in the building plan.</p>	<p><b>Agreed to Comply</b></p> <p>We will install and use water saving devices/ fixtures (viz. low flow flushing systems; use of low flow faucets tap aerators etc.) for water conservation and will be incorporated in the building plan.</p>

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28.	Separation of grey and black water should be done by the use of dual plumbing system. In case of single stack system separate recirculation lines for flushing by giving dual plumbing system be done.	<b>Agreed to Comply</b>  Separation of grey and black water will be done by the use of dual plumbing system.
29.	Water demand during construction should be reduced by use of pre-mixed concrete, curing agents and other best practices referred.	<b>Agreed to Comply</b>  Curing agents as well as other best practices has been used during construction work for reducing water demand.
30.	Any ground water dewatering should be properly managed and shall conform to the approvals and the guidelines of the CGWA in the matter. Formal approval shall be taken from the CGWA for any groundwater abstraction or dewatering. The proponent shall also obtain permission from Water Resources Department, Govt. of Odisha for drawl of water.	<b>Agreed to Comply</b>  The Public water supply is not available in the vicinity of the project area; once the public water supply is available the permission will be obtained from Public Health Division (PHD). Total 4 nos. of Borewells has been approved by CGWA vide letter no. CGWA/NOC/INF/ORIG/2021/12932, dated 16.09.2021.
31.	The proponent shall keep one bore well as standby domestic water source once municipal water supply is made available in the project area.	<b>Agreed to Comply</b>  The Public water supply is not available in the vicinity of the project area; once the public water supply is available the permission will be obtained from Public Health Division (PHD). Total 4 nos. of Borewells has been approved by CGWA vide letter no. CGWA/NOC/INF/ORIG/2021/12932, dated 16.09.2021. Once Public water supply is available one borewell will be kept as standby.
32.	A complete plan for rainwater harvesting at the proposed site shall be drawn up and implemented. The complete rainwater harvesting plan shall be submitted to SEIAA within one month from this day. As proposed, 05 nos. of rain water harvesting pits for artificial ground water recharge shall be installed as per CGWB guidelines.	<b>Agreed to Comply</b>  Rain water harvesting pits (RWHP) has been calculated as per 30 years Rainfall data (1988-2021), as per 30 years data maximum rainfall is 364 mm/day and hourly rainfall is 37 mm/hr. So total rain water available for recharging is 67 m <sup>3</sup> /hr and total 05 nos. of rain water harvesting pits has been provided for ground water recharging. Detail calculation is given in Annexure-5.

**(III) Solid Waste :**

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33.	<p>The provisions of the Solid Waste (Management) Rules, 2016, E-Waste (Management) Rules, 2016, and the Plastics Waste (Management) Rules, 2016 shall be followed.</p>	<p><b>Agreed to Comply</b></p> <p>No construction activity has been started yet. Therefore, Construction &amp; Demolition (C&amp;D) waste from the project (debris) is not yet generated. After start of construction, the waste generated from Construction &amp; Demolition (C&amp;D) waste from the project (debris) shall be segregated and managed as per C&amp;D Waste Management Rules, 2016 and the detailed mode of disposal to the final disposal point shall also be reported</p> <p>After the operationalization of the project. The construction site wastewater would be routed through catch pit/ sedimentation basin prior to final / ultimate disposal to proper drainage system. Sewage will be treated in septic tank-soak pit system. Waste to be generated during the construction period includes construction waste and solid waste. Usable / recyclable material will be sold off to waste recyclers. Unusable construction will be used for land development activities within the project site, solid waste in form of food waste from kitchen and miscellaneous waste is estimated to be generated @ 0.45 kg/person/day, which will be about 639 kg/day. The waste generated from the floating population of residents will be @ 0.15 kg/day, which will be 21.3 kg/day. The generated solid waste from the residential areas will be segregated as biodegradable and non-biodegradable. This will be collected in separate coloured bins. The biodegradable waste will be sent to in house micro-composting pit and will be converted to organic fertiliser and will be used wed for plantation withn the project site, excess will be sold to nearby nursery's. The Non-biodegradable waste shall be handed over to authorised vendors. The mode of disposal of all such waste with name of the authorised vendor shall be reported. A concrete implementation plan and a report showing on the layout plan of the final disposal point of biodegradable waste, non-biodegradable waste and debris generated during construction shall be submitted after start of construction activity.</p>
34.	<p>Disposal of muck during construction phase shall not create any adverse effect on the neighbouring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.</p>	<p><b>Agreed to Comply</b></p> <p>The construction site wastewater would be routed through catch pit/ sedimentation basin prior to final / ultimate disposal to proper drainage system. Sewage will be treated in septic tank-soak pit system. Waste to be generated during the construction period includes construction waste and solid waste. Usable /</p>



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		recyclable material will be sold off to waste recyclers. Unusable construction will be used for land development activities within the project site. Proper fencing of project area will be done before start of construction work.
35.	Separate wet and dry bins must be provided in each unit and at the ground level for facilitating segregation of waste. Solid waste shall be segregated into wet garbage and inert materials. Wet garbage shall be composted in Organic Waste Converter. Adequate area shall be provided for solid waste management within the premises which will include area for segregation, composting. The inert waste from group housing project will be sent to dumping site.	<b>Agreed to Comply</b>  The generated solid waste from the residential areas will be segregated as biodegradable and non-biodegradable. This will be collected in separate coloured bins. The biodegradable waste will be sent to in house micro-composting pit and will be converted to organic fertiliser and will be used for plantation within the project site, excess will be sold to nearby nursery's. The Non-biodegradable waste shall be handed over to authorised vendors. The mode of disposal of all such waste with name of the authorised vendor shall be reported. Separate area has been reserved for solid waste management within the project site.
36.	Any hazardous waste generated during construction phase, shall be disposed off as per applicable rules and norms with necessary approvals of the State Pollution Control Board.	<b>Agreed to Comply</b>  No hazardous waste will be generated during the construction phase. At the finishing stage, any waste related to Paints / Varnishes etc will be properly disposed off.
37.	A certificate from the competent authority handling municipal solid wastes, indicating the existing civic capacities of handling and their adequacy to cater to the Municipal Solid Waste generated from project shall be obtained.	<b>Agreed to Comply</b>  A certificate from the competent authority handling municipal solid wastes, indicating the existing civic capacities of handling and their adequacy to cater to the Municipal Solid Waste generated from project shall be submitted.
<b>(IV) Sewage Treatment Plant:</b>		
38.	STP of 200 KLD capacity shall be installed before start of the operation phase of the building. Treatment of 100% grey water by decentralized treatment should be done. The treated waste water from STP shall be recycled / reused to the maximum extent possible. Flushing, washing, watering of the lawns and gardening, filter backwash, cleaning of the floors, etc facilities are to be	<b>Agreed to Comply</b>  Will be complied with before the operationalization of project.

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	met by recycled water. Discharge of unused treated waste water shall conform to the norms and standards of the Odisha State Pollution Control Board. Necessary measures should be taken to mitigate the odour problem from STP. The sewage treatment plant shall be made functional before the completion of Building Complex.	
39.	The installation of the Sewage Treatment Plant (STP) shall be certified by an independent expert and a report in this regard shall be submitted to the SEIAA, Odisha before the project is commissioned for operation. Periodical monitoring of water quality of treated sewage shall be conducted. Necessary measures should be made to mitigate the odour problem from STP.	<b>Agreed to Comply</b>  Will be complied with before the operationalization of project.
40.	Excess treated water shall be discharged to the drain only after getting the permission from the concerned authority. The proponent shall renovate the existing drain to accommodate the discharge and maintain it perennially. To this effect the proponent has to give a legal affidavit before going for construction activity.	<b>Agreed to Comply</b>
41.	A certificate from the competent authority shall be obtained for discharging treated effluent/ untreated effluents into the Public sewer/disposal/drainage systems along with the final disposal point.	<b>Agreed to Comply</b>
42.	The wastewater generated shall not be allowed to mix with storm water. The Project Proponent shall ensure separate approved line for discharge of treated waste water and that of storm water. No sewage or untreated effluent water would be discharged through storm water drains.	<b>Agreed to Comply</b>  Separate approved line for discharge of treated waste water and that of storm water will be constructed and maintained. No sewage or untreated effluent water would be discharged through storm water drains.

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43.	Sludge from the onsite sewage treatment, including septic tanks, shall be collected, conveyed and disposed as per the Ministry of Urban Development, Central Public Health and Environmental Engineering Organization (CPHEEO) Manual on Sewerage and Sewage Treatment Systems, 2013.	<p><b>Agreed to Comply</b></p> <p>Sludge from the onsite sewage treatment, including septic tanks, will be collected, conveyed and disposed as per the Ministry of Urban Development, Central Public Health and Environmental Engineering Organization (CPHEEO) Manual on Sewerage and Sewage Treatment Systems, 2013.</p>
44.	The proponent shall obtain permission from the concerned authority to discharge the liquid waste to any drain i.e. the competent authority of the drain and “Nala” before commencement of any activity at the project site.	<p><b>Agreed to Comply</b></p>
45.	Compliance with the Energy Conservation Building Code (ECBC) of Bureau of Energy Efficiency shall be ensured. Buildings in the States which have notified their own ECBC, shall comply with the State ECBC. Outdoor and common area lighting shall be LED. Concept of passive solar design that minimize energy consumption in buildings by using design elements, such as building orientation, landscaping, efficient building envelope, appropriate fenestration, increased day lighting design and thermal mass etc. shall be incorporated in the building design. Wall, window, and roof u-values shall be as per ECBC specifications.	<p><b>Agreed to Comply</b></p> <p>We will ensure Energy Conservation Building Code (ECBC) of Bureau of Energy Efficiency is strictly followed for which Outdoor and common area lighting will be LED, building design and architecture allows good amount of sunlight to light the building during day time, 5.7% of the energy requirement will be generated from solar energy which will be used for lighting common areas.</p>
<b>(V) <u>Energy Conservation:</u></b>		
46.	Energy conservation measures like installation of CFLs / LED for the lighting the area outside the building should be integral part of the project design and should be in place before project commissioning. Used CFLs, TFL and LED shall be properly collected and disposed off/sent for recycling as per the prevailing	<p><b>Agreed to Comply</b></p> <p>Only CFLs / LED will be used for lighting the common area and area outside the building. Separate dustbins will be installed for disposal of such waste, and the waste will be collected by engaging approved recyclers, details of the same will be submitted after operationalization of the project.</p>

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	<p>guidelines/rules of the regulatory authority to avoid mercury contamination.</p>	
47.	<p>The proponent shall use renewable energy/ solar power of at least 5% of projected power requirement for the building premises.</p>	<p><b>Agreed to Comply</b></p> <p>Proposed Solar Lighting for Common Area: In the proposed area, we can propose 55 nos. of solar PV panels. Size of each PV solar panel = 1.560 m x 1.05 m Therefore, area covered by single PV solar panel = 1.638 m<sup>2</sup></p> <p>Therefore, Total area covered by 55 nos. of PV solar panels = 90.09 m<sup>2</sup> (Roof Top) Total Roof Area of the project is 3053.0 sqm Each PV Solar panel generates energy through solar rays = 345 Watts-hr Therefore, total amount of electrical energy generated by 55 nos. of PV Solar panel = 18.97 KWhr.</p> <p>Assuming, only 4 hours of sunlight available throughout the day time, therefore electrical energy generated by 55 nos. of PV solar panel per day = 75.88 KW.</p> <p>Total saving from Solar System: Total Energy Saving = (75.88 + 8.9) KW = 84.78 KW Total Solar Energy saving = <math>84.78/1482.0 = 0.057 \times 100 = 5.7 \%</math></p>
48.	<p>Solar energy shall be installed to meet electricity generation equivalent to 5% of the demand load or as per the state level/ local building bye-laws requirement, whichever is higher. Follow super ECBC requirement of ECBC 2017 and provide compliance report.</p>	<p><b>Agreed to Comply</b></p> <p>Proposed Solar Lighting for Common Area: In the proposed area, we can propose 55 nos. of solar PV panels. Size of each PV solar panel = 1.560 m x 1.05 m Therefore, area covered by single PV solar panel = 1.638 m<sup>2</sup></p> <p>Therefore, Total area covered by 55 nos. of PV solar panels = 90.09 m<sup>2</sup> (Roof Top) Total Roof Area of the project is 3053.0 sqm Each PV Solar panel generates energy through solar rays = 345 Watts-hr Therefore, total amount of electrical energy generated by 55 nos. of PV Solar panel = 18.97 KWhr.</p> <p>Assuming, only 4 hours of sunlight available throughout the day time, therefore electrical energy generated by 55 nos. of PV solar panel per day = 75.88 KW.</p>

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		<p>Total saving from Solar System: Total Energy Saving = (75.88 + 8.9) KW = 84.78 KW Total Solar Energy saving = <math>84.78/1482.0 = 0.057 \times 100 = 5.7 \%</math></p>
49.	<p>Solar power shall be used for lighting in the apartment to reduce the power load on grid. Separate electric meter shall be installed for solar power. Solar water heating shall be provided to meet 20% of the hot water demand of the commercial and institutional building or as per the requirement of the local building bye-laws, whichever is higher. Residential buildings are also recommended to meet its hot water demand from solar water heaters, as far as possible.</p>	<p><b>Agreed to Comply</b></p> <p>Proposed Solar Lighting for Common Area: In the proposed area, we can propose 55 nos. of solar PV panels. Size of each PV solar panel = 1.560 m x 1.05 m Therefore, area covered by single PV solar panel = 1.638 m<sup>2</sup></p> <p>Therefore, Total area covered by 55 nos. of PV solar panels = 90.09 m<sup>2</sup> (Roof Top) Total Roof Area of the project is 3053.0 sqm Each PV Solar panel generates energy through solar rays = 345 Watts-hr Therefore, total amount of electrical energy generated by 55 nos. of PV Solar panel = 18.97 KWhr.</p> <p>Assuming, only 4 hours of sunlight available throughout the day time, therefore electrical energy generated by 55 nos. of PV solar panel per day = 75.88 KW.</p> <p>Total saving from Solar System: Total Energy Saving = (75.88 + 8.9) KW = 84.78 KW Total Solar Energy saving = <math>84.78/1482.0 = 0.057 \times 100 = 5.7 \%</math></p> <p>Also, Solar water heaters will be installed for generating hot water.</p>
50.	<p>Use of environment friendly materials in bricks, blocks and other construction materials, shall be required for at least 20% of the construction material quantity. These include Fly Ash bricks, hollow bricks, AACs, Fly Ash Lime Gypsum blocks, compressed earth blocks, and other environment friendly materials. Fly ash should be used as building material in the construction as per the provision of Fly Ash Notification of September, 1999 and amended as on 27<sup>th</sup> August, 2003 and 25<sup>th</sup> January, 2016. Ready mixed concrete must be used in building construction.</p>	<p><b>Agreed to Comply</b></p> <p>Fly ash based cement shall be used for construction purpose.</p>

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**(VI) Air Quality Management and Noise Management:**

51.	Construction site shall be adequately barricaded before the construction begins. Dust, smoke & other air pollution prevention measures shall be provided for the building as well as the site. These measures shall include screens for the building under construction, continuous dust/ wind breaking walls all around the site (at least 3-meter height). Plastic/tarpaulin sheet covers shall be provided for vehicles bringing in sand, cement, murrum and other construction materials prone to causing dust pollution at the site as well as taking out debris from the site. Sand, murrum, loose soil, cement, stored on site shall be covered adequately so as to prevent dust pollution. Wet jet shall be provided for grinding and stone cutting. Unpaved surfaces and loose soil shall be adequately sprinkled with water to suppress dust.	<p><b>Agreed to Comply</b></p> <p>All necessary steps were taken at the project site to reduce the air pollution and to improve the air quality, Pictures of the same will be submitted after start of construction.</p>
52.	All construction and demolition debris shall be stored at the site (and not dumped on the roads or open spaces outside) before they are properly disposed. All demolition and construction waste shall be managed as per the provisions of the Construction and Demolition Waste Rules, 2016. All workers working at the construction site and involved in loading, unloading, carriage of construction material and construction debris or working in any area with dust pollution shall be provided with dust mask.	<p><b>Agreed to Comply</b></p> <p>will be complied during construction phase. Pictures of the same shall be submitted after compliance.</p>
53.	Notification GSR 94(E) dated 25.01.2018 of MoEF&CC regarding Mandatory Implementation of Dust Mitigation Measures for Construction and Demolition Activities for projects requiring	<p><b>Agreed to Comply</b></p> <p>will be complied during construction phase. Pictures of the same shall be submitted after compliance.</p>

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	<p>Environmental Clearance shall be complied with. All construction and demolition debris shall be stored at the site (and not dumped on the roads or open spaces outside) before they are properly disposed. All demolition and construction waste shall be managed as per the provisions of the Construction and Demolition Waste Rules, 2016. All workers working at the construction site and involved in loading, unloading, carriage of construction material and construction debris or working in any area with dust pollution shall be provided with dust mask.</p>	
54.	<p>The gaseous emissions from DG set shall be dispersed through adequate stack height as per CPCB standards. Acoustic enclosure shall be provided to the DG sets to mitigate the noise pollution. Low sulphur diesel shall be used. The location of the DG set and exhaust pipe height shall be as per the provisions of the Central Pollution Control Board (CPCB) norms.</p>	<p><b>Agreed to Comply</b></p> <p>DG set installed are of low Sulphur diesel type and confirm to EPA. Also, Acoustic enclosure as well as stack of adequate height as per the norms has been provided with DG sets. Photographs of DG sets will be submitted after operation.</p>
55.	<p>For indoor air quality the ventilation provisions as per National Building Code of India shall be provided.</p>	<p>Noted. NBC is followed for indoor air quality.</p>
56.	<p>Ambient noise levels shall conform to residential standard both during day and night as per Noise Pollution (Control and Regulation) Rules, 2000. Incremental pollution loads on the ambient air and noise quality shall be closely monitored during construction phase. Adequate measures shall be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB / SPCB.</p>	<p><b>Agreed to Comply</b></p> <p>Ambient noise levels will be monitored in regular intervals during construction phase. Same will be complied in operational phase also. Test Reports for ambient noise level monitoring will be submitted.</p>

**(VII) Green cover:**

Half Yearly Compliance Report of Environmental Clearance of Proposed Housing Project (2B+G+14 High Rise Residential Apartment Building Project) M/s Shuvam Construction (P) Ltd for the period of 1<sup>st</sup> April 2023 to 30<sup>th</sup> Sep 2023 (Dec 2023).

57.	Green-belt & avenue plantation of trees over the area of 2,641.18 Sqm (24.61% of plot area) shall be done using native tree species/shrubs improving greenery & keeping in view aesthetics considerations in the whole complex. The species with heavy foliage, broad leaves and wide canopy cover are desirable. Professional landscape architects should be engaged to design the green layout to provide for multi-tier plantation and green fencing all around, mitigating various environmental pollutants like dust, noise, emissions etc. A minimum of 1 tree for every 80 Sqmt of land should be planted and maintained. At the project site, at least 100 numbers of trees shall be planted and maintained at the site.	<p><b>Agreed to Comply</b></p> <p>Professional landscape architects are engaged to design the green layout, also professional person for plantation and maintenance of green are will be employed in full time basis. The green area of 24.61 % of plot area shall be developed after completion of construction activity. Pictures of the same shall be submitted.</p>
58.	Rainwater from open spaces shall be collected and reused for landscaping and other purposes. Roof top rain water harvesting shall be adopted for the proposed Buildings. Rainwater harvesting at the proposed site shall be implemented. Before recharging the surface runoff, pre-treatment must be done to remove suspended matter, oil and grease.	<p><b>Agreed to Comply</b></p> <p>Rain water harvesting pits (RWHP) has been calculated as per 30 years Rainfall data (1988-2021), as per 30 years data maximum rainfall is 364 mm/day and hourly rainfall is 37 mm/hr. So total rain water available for recharging is 67 m3 /hr and total 05 nos. of rain water harvesting pits has been provided for ground water recharging. Detail calculation is given in Annexure-5. pre-treatment will be done to remove suspended matter, oil and grease.</p>
<b>(VIII) <u>Top Soil Preservation and Reuse:</u></b>		
59.	Topsoil should be stripped to a depth of 20 cm from the areas proposed for buildings, roads, paved areas, and external services. It should be stockpiled appropriately in designated areas and reapplied during plantation of the proposed vegetation on site.	<p><b>Agreed to Comply</b></p> <p>Topsoil should be stripped to a depth of 20 cm from the areas proposed for buildings, roads, paved areas, and external services. It should be stockpiled appropriately in designated areas and reapplied during plantation of the proposed vegetation on site</p>
<b>(IX) <u>Traffic &amp; Transportation:</u></b>		
60.	A comprehensive mobility plan, as per	<b>Agreed to Comply</b>



Half Yearly Compliance Report of Environmental Clearance of Proposed Housing Project (2B+G+14 High Rise Residential Apartment Building Project) M/s Shuvam Construction (P) Ltd for the period of 1<sup>st</sup> April 2023 to 30<sup>th</sup> Sep 2023 (Dec 2023).

	<p>Ministry of Urban Development best practices guidelines (URDPFI), shall be prepared to include motorized, non-motorized, public, and private networks. Road should be designed with due consideration for environment, and safety of users. The road system can be designed with these basic criteria.</p> <ul style="list-style-type: none"> <li>• Hierarchy of roads with proper segregation of vehicular and pedestrian traffic.</li> <li>• Traffic calming measures</li> <li>• Proper design of entry and exit points.</li> <li>• Parking norms as per local regulation</li> </ul>	<p>Adequate parking space will be provided within the project premises as per the layout plan. Wide roads for the entry and exit will be provided. Parking areas are fully internalized. Thus, there is no traffic congestion. Photographs will be submitted.</p>
61.	<p>A detailed traffic management and traffic decongestion plan shall be drawn up to ensure that the current level of service of the roads within a 01 km radius of the project is maintained and improved upon after the implementation of the project. This plan should be based on cumulative impact of all development and increased habitation being carried out or proposed to be carried out by the project or other agencies in this 01 km radius of the site and the traffic management plan shall be duly validated and certified by the State Urban Development department and the P.W.D./competent authority for road augmentation and shall also have their consent to the implementation of components of the plan which involve the participation of these departments.</p>	<p><b>Agreed to Comply</b></p> <p>Traffic management and traffic decongestion plan has already prepared and same was approved by the Competent Authority. The detailed traffic management plan has been prepared in chapter 10 of the EMP, the same has been submitted with the EC application.</p> <p>The Traffic Study Report has been carried out by Indian Institute of Technology (IIT), Bhubaneswar. The vetted traffic study report is attached in Annexure-10.</p>
62.	<p>Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards be operated only during non-peak hours.</p>	<p><b>Agreed to Comply</b></p> <p>vehicles having valid PUCs shall only be permitted in the project during construction phase.</p>

Half Yearly Compliance Report of Environmental Clearance of Proposed Housing Project (2B+G+14 High Rise Residential Apartment Building Project) M/s Shuvam Construction (P) Ltd for the period of 1<sup>st</sup> April 2023 to 30<sup>th</sup> Sep 2023 (Dec 2023).

63.	A dedicated entry/exit and parking shall be provided for commercial activities.	<b>Agreed to Comply</b> dedicated entry/exit and parking will be provided.
64.	Barricades shall be provided around project boundary.	<b>Agreed to Comply</b> Proper barricades will be provided around project boundary.
65.	Speed of the vehicles shall be restricted upto 15 kmph by erecting speed bumps at regular intervals at project site and proper signage shall be provided for guided vehicular movement and speed restrictions	<b>Agreed to Comply</b> Maximum Speed of the vehicles will be restricted to 15 kmph by installing speed bumps at regular intervals at project site and proper signage will be provided for guided vehicular movement and speed restrictions.
66.	Parking shall be prohibited on the access road to the proposed project site.	<b>Agreed to Comply</b> Parking will be prohibited on the access road to the proposed project site.
67.	Footpath shall be seamless with sufficient width.	<b>Agreed to Comply</b> Footpath will be seamless with sufficient width.
68.	No vehicles shall be allowed to stop and stand in front of the gate on main access.	<b>Agreed to Comply</b> No vehicles will be allowed to stop and stand in front of the gate on main access.
69.	A buffer of minimum 10 m shall be maintained between the entry/exit gate and the road to avoid traffic congestion	<b>Agreed to Comply</b> A buffer of minimum 10 m will be maintained between the entry/exit gate and the road to avoid traffic congestion
70.	The Traffic Management Plan prepared by the proponent shall be duly validated and certified by the State Concerned Competent Authority and shall have also their consent before implementation	<b>Agreed to Comply</b> The detailed traffic management plan has been prepared in chapter 10 of the EMP, the same has been submitted with the EC application. The Traffic Study Report has been carried out by Indian Institute of Technology (IIT), Bhubaneswar. The vetted traffic study report is attached in Annexure-10.
<b>(X) <u>Environment Management Plan:</u></b>		
71.	An Environmental Management Plan (EMP) shall be prepared and implemented	<b>Agreed to Comply</b>

Half Yearly Compliance Report of Environmental Clearance of Proposed Housing Project (2B+G+14 High Rise Residential Apartment Building Project) **M/s Shuvam Construction (P) Ltd** for the period of 1<sup>st</sup> April 2023 to 30<sup>th</sup> Sep 2023 (Dec 2023).

	<p>to ensure compliance with the environmental conditions specified above. A dedicated Environment Monitoring Cell with defined functions and responsibility shall be put in place to implement the EMP. The environmental cell shall ensure that the environment infrastructure like sewage treatment plant, landscaping, rain water harvesting, energy efficiency and conservation, water efficiency and conservation, solid waste management, renewable energy etc. are kept operational and meet the required standards. The environmental cell shall also keep the record of environment monitoring and those related to the environment infrastructure.</p>	<p>The Environmental Management Plan (EMP) has been prepared and submitted along with the EC proposal, all environmental conditions specified above will be complied within stipulated time. A dedicated Environmental Monitoring Cell with defined functions and responsibilities to implement the EMP and ensure compliance of EC conditions are complied will be set up by engaging suitable personal, the details of the same will be submitted. The environmental cell will ensure that the environment infrastructure like sewage treatment plant, landscaping, rain water harvesting, energy efficiency and conservation, water efficiency and conservation, solid waste management, renewable energy etc. are kept operational and meet the required standards. The environmental cell will also keep the record of environment monitoring and those related to the environment infrastructure.</p>
72.	<p>It shall be mandatory for the project management to submit six (06) monthly compliance reports on post environmental monitoring in respect of the stipulated terms and conditions in this Environmental Clearance to the State Environment Impact Assessment Authority (SEIAA), Odisha, SPCB &amp; Regional Office of the Ministry of Environment &amp; Forest, Odisha in hard and soft copies on 1<sup>st</sup> June and 1<sup>st</sup> December of each calendar year. The proponent shall also upload the compliance report including results of monitored data, as applicable in the website of the Ministry for monitoring of EC Conditions.</p>	<p><b>Agreed to Comply</b></p> <p>project management will submit six (06) monthly compliance reports on post environmental monitoring in respect of the stipulated terms and conditions in this Environmental Clearance to the State Environment Impact Assessment Authority (SEIAA), Odisha, SPCB &amp; Regional Office of the Ministry of Environment &amp; Forest, Odisha in hard and soft copies on 1<sup>st</sup> June and 1<sup>st</sup> December of each calendar year and also upload the compliance report including results of monitored data, as applicable in the website of the Ministry for monitoring of EC Conditions.</p>

Half Yearly Compliance Report of Environmental Clearance of Proposed Housing Project (2B+G+14 High Rise Residential Apartment Building Project) M/s Shuvam Construction (P) Ltd for the period of 1<sup>st</sup> April 2023 to 30<sup>th</sup> Sep 2023 (Dec 2023).

**The list of documents required as per the above stated OM are mentioned below:**

Document	Obtained/Under process
1. Environmental Clearance	Obtained, Annexure-1
2. Form 1 and Form 1A	Obtained, Annexure-2
3. Permission Under Sub-Section (3) of the Section-16 of Odisha Development Authority Act'1982 (Odisha Act, 1982), Permission from town planning Authority, BDA/BMC	Obtained, Annexure-3
4. Consent to Establish (CTE) from State Pollution Control Board:	Obtained , Annexure-4
5. Consent to Operate (CTO) from State Pollution Control Board:	To be obtained.
6. Ground Water NOC from CGWA:	Obtained , Annexure-5
7. NOC from Airport Authority of India:	Obtained, Annexure-6
8. Structural Stability Certificate vetted:	Obtained, Annexure-7
9. Permission from Drainage Division of BMC for discharge of excess storm water and treated water	Obtained, Annexure- 8
10. Fire Safety Clearance has been recommended by Odisha Fire Services:	Obtained , Annexure-9
11. The Traffic Study Report:	Obtained, Annexure-10
12. Clearance from Chief explosives for storing diesel for DG sets:	To be obtained if required
13. A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project shall be submitted.	Under Process
14. CER Plan	Obtained
15. EMP	Obtained,

Half Yearly Compliance Report of Environmental Clearance of Proposed Housing Project  
(2B+G+14 High Rise Residential Apartment Building Project) **M/s Shuvam Construction  
(P) Ltd** for the period of 1<sup>st</sup> April 2023 to 30<sup>th</sup> Sep 2023 (Dec 2023).

	Attached as Annexure- 11
16. Constitution of Environmental Management Committee:	Under Process
17. Newspaper Advertisement photo	Not Obtained

ENVIRONMENTAL  
CLEARANCE

**Government of India**  
**Ministry of Environment, Forest and Climate Change**  
**(Issued by the State Environment Impact Assessment**  
**Authority(SEIAA), Orissa)**

To,

The Director  
 M/S SHUVAM CONSTRUCTION PVT LTD  
 Plot No.564, Vivekananda Marg, Nageswar Tangi, Old Town,  
 Bhubaneswar, Odisha. -751002

**Subject:** Grant of Environmental Clearance (EC) to the proposed Project Activity under the provision of EIA Notification 2006-regarding

Sir/Madam,

This is in reference to your application for Environmental Clearance (EC) in respect of project submitted to the SEIAA vide proposal number SIA/OR/MIS/227993/2021 dated 07 Oct 2021. The particulars of the environmental clearance granted to the project are as below.

- |   |   |
|---|---|
| 1. <b>EC Identification No.</b>                   | <b>EC22B038OR134872</b>   |
| 2. <b>File No.</b>                                | 227993/54-MIS/09-2021   |
| 3. <b>Project Type</b>                            | New   |
| 4. <b>Category</b>                                | B2  |
| 5. <b>Project/Activity including Schedule No.</b> | 8(a) Building and Construction projects   |
| 6. <b>Name of Project</b>                         | 2B+G+14 high rise residential apartment building in Mouza- Ghatikia, Bhubaneswar, Dist- Khurda, Odisha. |
| 7. <b>Name of Company/Organization</b>            | M/S SHUVAM CONSTRUCTION PVT LTD   |
| 8. <b>Location of Project</b>                     | Orissa  |
| 9. <b>TOR Date</b>                                | N/A   |

The project details along with terms and conditions are appended herewith from page no 2 onwards.

Date: 22/07/2022

(e-signed)  
**Sri Susanta Nanda**  
 Member Secretary  
 SEIAA - (Orissa)

*Note: A valid environmental clearance shall be one that has EC identification number & E-Sign generated from PARIVESH. Please quote identification number in all future correspondence.*

*This is a computer generated cover page.*

PARIVESH

*(Pro-Active and Responsive Facilitation by Interactive,  
 and Virtuous Environmental Single-Window Hub)*





# STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY ODISHA, BHUBANESWAR

(Constituted under the EP Act, 1986 and EIA Notification, 2006 by the MoEF & CC, Govt. of India)  
5RF-2/1, Unit-IX, Bhubaneswar-751022. Tel: 0674-3510075, E-mail-seiaaonssa@gmail.com

**SEIAA File No. 227993/54-MIS/09-2021**

Project: Application of M/s Shuvam Construction Pvt Ltd for Environment Clearance of Proposed Construction of Housing Project of 2B+G+14 High Rise 'Residential Apartment Building' Over a total Plot Area of 10,732.17 Sqmt with total Built Up Area of 56722.86 Sqmt. at Mouza- Ghatikia, Tahasil-Bhubaneswar, Dist-Khordha of Sri. Kantilal Patel (Director) - Environmental Clearance reg.

Ref: Your online application dated 07.10.2021 for issue of EC vide File No: SIA/OR/MIS/227993/2021

Sir,

This has reference to your online application seeking environmental clearance for the above mentioned project. The proposal falls under category "B" or activity 8 (a)' Building and Construction projects' in the schedule of EIA Notification, 2006 as amended from time to time. The proposal has been appraised on the basis of the documents enclosed with the application, such as Form-1, Form-IA, Conceptual Plan (EMP) and clarifications furnished to SEAC in response to their observations.

### **The Project Proposal in nutshell:**

1. This is a proposal of M/s Shuvam Construction Pvt Ltd for Environment Clearance of Proposed Construction of Housing Project of 2B+G+14 High Rise 'Residential Apartment Building' Over a total Plot Area of 10,732.17 Sqmt with total Built Up Area of 56722.86 Sqmt. at Mouza- Ghatikia, Tahasil-Bhubaneswar, Dist-Khordha filed by Sri. Kantilal Patel (Director).
2. M/s Shuvam Construction (P) Ltd proposed 2B+G+14 High Rise Residential Apartment Building project is 2.652 Acres/10732.17sqm. of land at Plot No.: 4016, 4023/ 9099, 4010/10999, 4010/ 9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/ 9599, 4024, 3967, 3968, 3970, 4011/9062, 4011, 4023/9086, 4010/10998, 4028, khata no-1678, 607, 988/958, 803, 720, 1101, 1678, 238, 1988/87, 1988/86, 535, 1228, 1332, 1123, 1139, 1988/957, Kissam - Gharabari, Mouza-Ghatika, Dist-Khordha. .



3. **Location and connectivity** - The proposed site is located at Ghatikia, Bhubaneswar, Dist-Khordha. The Geographical co-ordinate of the project site is Latitude - 20°16'15.78"N & Longitude - 85° 46'44.81"E. The site is easily accessible from NH-16 Road. The project site is well connected with Ghatikia main road and NH-16 is located at the distance of 0.3 Km & 1.4 km. The nearest Railway station is Bhubaneswar Railway Station at a distance of approximately 5.2 Km away from the project site. The nearest Airport is Biju Patnaik International Airport, Bhubaneswar which is at a distance of 5 Km from the project site. The site is located adjacent to the local landmarks, Kalinga Nagar, Shyampur etc. The site is coming under development plan of Bhubaneswar Development Authority.

4. The Building Area Statement of the Project.

Particular	Proposed	Permissible
Project Name	Proposed Housing Project (High Rise Residential Apartment Building Project)	
Plot Area	10,732.17 Sqm	--
Ground Coverage	3,053.12 Sqm (28.55%)	--
Total Built up Area	56,722.86 Sqm	--
Total FAR Area	44,996.50 Sqm	--
FAR	4.192	7.0
Maximum Height	50.93 meter	--
No. of recharge pit	14	--
Drive Way Width	7.5 meter	--
Parking Area	22,308.36 Sqm	13,498.95 Sqm (30 % of FAR Area)
Green Belt Area	2,641.18 Sqm (24.16 % of Plot area)	2,146.4 Sqm (20% of Plot area)
Power/Electricity Requirement & Sources	Total Power - 1482 KW Power from Solar – 78.5 KW TPCODL- 1403.5 KW	--
No. of DG sets	2 x 500 KVA	--
Fresh Water requirement & Sources	141 KLD Source: Ground Water	--
Sewage Treatment & Disposal	STP Capacity 200 KLD	--
Estimated Population- Residential, Floating/visitors	Residential Population: 1520 Nos. Floating Population: 152 Nos.	--

**Requirement for the Project:**

5. **Water requirement:** The total water requirement for the project is 212 KLD, which constitutes domestic water requirement as 141KLD & flushing water requirement as 71 KLD for the project. The PP has submitted that total fresh

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water requirement for the project will be around 141 KLD. Water will be sourced from ground water.

6. **Wastewater Generation & Treatment:** The PP has submitted that the project will generate approx. 180.16KLD (sewage load) of wastewater. The wastewater will be treated in an onsite STP of 200 KLD capacity. Out of which 171.16 KLD will be recycled within the project, for Flushing (70.7 KLD), Landscaping (10.5KLD), Dust Suppression (15KLD), Vehicles Washing (8.6KLD) & 66.36KLD of surplus water will be discharged to external sewer during non-monsoon period and 76.86 KLD of surplus water will be discharged to external sewer during monsoon period.
7. **Power requirement:** The power supply will be supplied by State Electricity Board. The requirement load for the project will be approx. 1482 KVA. In order to meet emergency power requirements during the grid failure, there is provision of DG set for power back up in the project. Hence, DG set having 500 KVA (2 Nos.) capacities for power back up will be provided in the Residential Housing Project.
8. **Rain Water Harvesting:** The project proponent has submitted that rain water will be harvested through 05 nos. of recharging pits.
9. **Parking Requirement:** Total parking area of 22308.36 Sqmt has been provided in the project.
10. **Firefighting Installations:** Firefighting system will be installed as per recommendation of the Firefighting Officer, Odisha and as per the guideline of NBC (part-4).
11. **Green Belt Development:** As proposed, out of the total area, green belt will be developed over an area of 2641.18 Sqmt (24.16 % of the plot area) by using the local species like Neem, Karang, Golden Champa, Bakul, Bela, mango, Bottle Palm, Cheekoo, Guava etc.
12. **Solid Waste Management:** The solid waste generated from the project shall be approx. 796.8kg per day. The generated solid waste from the residential complex will be segregated as biodegradable and non-biodegradable. This will be collected in separate coloured bins. Proper waste management practices will be adopted during the collection, storing and disposal of the generated solid waste.
13. The total estimated population of the project will be 1672 persons (including Residents(1520) & visitors(152)).
14. The estimated project cost is Rs.95 Crores & Environment Management Cost is Rs.204 lakhs.
15. The project proponent along with the consultant M/s Centre for Envotech & Management Consultancy Pvt. Ltd. Bhubaneswar made a detailed presentation on the proposal on 14.12.2021.
16. The sub-Committee of SEAC visited the project site on dated 25.03.2022.
17. The project proponent furnished additional information / documents on the project to SEAC on 20.05.2022.

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18. The SEAC considered the proposal for EC on 21.05.2022 and recommended for grant of Environmental Clearance for the project valid for a period of 10 years, stipulating various conditions.

The State Environment Impact Assessment Authority (SEIAA), Odisha after considering the appraisal report and recommendations of SEAC, hereby accords Environmental Clearance to the project valid for a period of 10 years under the provisions of EIA Notification 2006 and subsequent amendments thereto, subject to strict compliance of all conditions stipulated below.

Detailed half yearly compliance report of the following conditions has to be submitted by the project proponent to SEIAA on the 1<sup>st</sup> June and 1<sup>st</sup> December each year.

**Stipulated Conditions:**

**Part 'A' : General Conditions: -**

1. The project proponent shall ensure that the guidelines for building and construction projects issued vide MoEF & CC's OM No.19-2/2013-IA.III dated 9<sup>th</sup> June, 2015, are followed to ensure sustainable environmental management.
2. The approval of the Competent Authority shall be obtained in regard to structural safety of buildings against earthquake, adequacy of fire fighting equipment as per National Building Code including protection measures from lightning.
3. The project proponent shall obtain all necessary clearance/ permission from all concerned agencies including Bhubaneswar Development authority before commencement of work. All the construction shall be done in accordance with the local building byelaws.
4. Consent to Establish/Operate for the project shall be obtained from the State Pollution Control Board.
5. Provisions shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.
6. A First Aid Room shall be provided in the project both during construction and operations of the project.
7. The company shall draw up and implement corporate social Responsibility plan as per the Companies Act of 2013.
8. As per the MoEF&CC, Govt. of India Office Memorandum dated 30.09.2020, the project proponent is required to prepare and implement Corporate

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Environment Responsibility (CER) Plan. Appropriate funds shall be earmarked for the activities such as infrastructure creation for drinking water supply, sanitation, health, skill development, cross drains, solid waste management facilities, rain water harvesting, soil moisture conservation works, avenue plantation, etc. The activities proposed under CER shall be restricted to the affected area around the project. The activities proposed for CER shall be implemented and to be completed within three years and annual report of implementation of the same along with documentary proof viz. photographs, purchase documents, latitude & longitude of infrastructure developed & road constructed needs to be submitted to Regional Office MoEF&CC annually along with audited statement and to the District Collector. It should be posted on the website of the project proponent.

9. A copy of this Environmental Clearance letter shall be displayed on the website of the Odisha State Pollution Control Board. The EC letter shall also be displayed at the Regional Office, District Industries centre and Collector's Office/ Tahsildar's office for 30 days.
10. Officials from the Regional Office of MoEF&CC, Bhubaneswar/SPCB, Odisha who would be monitoring the implementation of environmental safeguards should be given full cooperation, facilities and documents/data by the project proponents during their inspection.
11. In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by the SEIAA, Odisha.
12. The SEIAA, Odisha reserves the right to add additional safeguard measures subsequently, if found necessary, and to take action including revoking of the environment clearance under the provisions of the Environmental (Protection) Act, 1986, to ensure effective implementation of the suggested safeguard measures in a time bound and satisfactory manner.
13. All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, the Forest Conservation Act, 1980 and the Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.
14. All EC condition stipulations would be enforced among others under the provisions of the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and the EIA Notification, 2006.
15. The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental Clearance and copies of clearance letters are available with the State Pollution Control Board

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and may also be seen on the website of the SEIAA, Odisha. The advertisement shall be made within Seven days from the date of receipt of the Clearance letter and a copy of the same shall be forwarded to the Regional Office of MoEF&CC, Bhubaneswar.

16. A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, ZillaParisad / Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.
17. The proponent shall submit/upload six monthly reports on the status of compliance of the stipulated Environmental Clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF&CC, Govt. of India, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub> (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.
18. The environmental statement for each financial year ending 31<sup>st</sup> March in Form-V as is mandated to be submitted by the project proponent to the Odisha State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF & CC, Govt. of India by E-mail.

**Part 'B' : Specific Conditions:**

1. The project shall adopt & implement 'Zero discharge' principle to the extent feasible, and shall maximize recycling and reuse of treated waste water generated in the project. All waste water generated shall be treated in the STP and the treated waste water shall be recycled and reused within the project so as to minimize extraction of ground water. Also ground water recharge by surplus waste water in the project plot area shall be maximized. The PP shall formulate and submit a report within two months on the final discharge point of all treated waste water after recycling and use in ground water recharge showing the points of disposal/reuse/recycling in the project. For discharge of any quantity of treated waste water to outside the project area premises, the exact location of drain, etc. to which such discharge will be made and permission of competent authority allowing such discharge have to be reported. The layout of pipe lines, etc to take the waste water to the approved discharge point has to be elaborately depicted on map and submitted. The EC is liable to be revoked if such report is not submitted within the said time period".

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2. The solid waste shall be duly segregated into biodegradable and non-biodegradable components and handled in separate areas earmarked for segregation of solid waste, as per Solid Waste Management Rules, 2016. The biodegradable waste generated shall be utilized through the Organic Waste Converter to be installed at the project site. Solid waste disposal shall be by micro composting of all bio degradable waste inside the premises. The inert waste (bio-non degradable components like plastics) shall be disposed off as per norms only at authorized site. The mode of disposal of all such waste at any approved site shall be reported, even if it is handed over to any authorised vendor. Construction & Demolition (C&D) waste from the project (debris) shall be segregated and managed as per C&D Waste Management Rules, 2016 and the detailed mode of disposal to the final disposal point shall also be reported. The PP shall formulate a concrete implementation plan and submit a report showing on the layout plan of the final disposal point of biodegradable waste, non-biodegradable waste and debris generated during construction. These reports have to be submitted online to SEIAA within a period of two months. The EC is likely to be revoked if such report is not submitted within the said time period.
3. The Proponent before implementation of the project shall convert the land to Gharabari and shall take the ownership of the land if not already taken.
4. The Proponent shall obtain permission/NOC from Executive Engg (PHD) and / or from the appropriate authority for disposal of excess STP treated water to the nearest drain without which the Proponent will not start construction work. Also, in case of the connecting drain passing through others land (Govt. or Private land), the Proponent shall obtain the permission and possession as the case may be.
5. The proponent shall use solar energy at least of 5% of total power requirement as proposed.
6. Trees located within the project area shall be transplanted to alongside the boundary green development area.
7. To reduce discharge of treated water to open drain, the proponent shall use more water for increased number of trees proposed to be planted in the green belt area & shall also utilize this treated water for car washing, floor washing to minimize the surplus discharge to drain.
8. As proposed, 3 tier green belt/tree cover over minimum 20% of the land area should be maintained meticulously.
9. The proponent shall implement the Pollution Control Measures and safeguards as proposed in the Environment Management Plan (EMP) of project report.
10. The proponent shall comply with the provision of structural stability certificate as per the bye- law of the Development Authority.
11. Water Treatment Plant (WTP) shall be provided, if ground water is not potable.

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Adequate Number and Capacity of over head tank for fresh water and treated Water shall be made. Rain Water harvesting pits should be refreshed periodically and its number be increased for greater ground water recharge.

12. Permission of drainage division and sewerage board/WATCO shall be obtained for discharge of STP treated Water.
13. The land between the main road and the plot there is a stretch of Govt. land which is claimed to be road as per CDP 2030. The project proponent shall obtain necessary permission from the concerned authority to establish such Govt. land to be road and develop the same road at own cost if not done by BMC/BDA.
14. It was verified that few Plots belongs to Subham Construction, few plots to Satyam Construction and remaining plots of land owner. The project proponent shall make legal arrangement of land owner for development agreement with Subham Construction. Satyam Construction shall also take Company Board Resolution to develop the land through Subham Construction.
15. Provision shall be made for ventilation in lowest basement, light, fire safety upto roof top terrace for safety & environment health.
16. Since the open drain and the sewerage line is coming up in the main road side, the proponent shall re-engineer the slope of the entire plot to main road side after construction of basement roof.
17. Separate entry and exit gate for Residential building shall be implemented.
18. All compliances submitted/ committed by PP(s) shall be strictly adhered to them in addition to all the conditions/ specific conditions of EC.

**(I) Natural Drainage:**

19. The natural drain system should be maintained for ensuring unrestricted flow of water. No construction shall be allowed to obstruct the natural drainage through the site, on wetland and water bodies. Check dams, bio-swales, landscape and other Sustainable Urban Drainage Systems (SUDS) are allowed for maintaining the drainage pattern and to harvest rain water. Buildings shall be designed to follow the natural topography as much as possible. Minimum cutting and filling should be done.
20. The permission from competent authority will be obtained to discharge the excess storm water to drain if any. The proponent shall renovate the existing drain to accommodate the discharge and maintain it perennially.
21. Permission for construction of drain alongside the adjacent NH under construction for allowing the proponent to discharge the treated waste water as well excess runoff water during monsoon from NH Authority shall be obtained. The construction of drains shall be synchronized with the completion of the construction of the Housing Project.

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(II) **Water Requirement and Rain Water Harvesting:**

22. No ground water shall be extracted for the project work at any stage during the construction phase without obtaining the permission from the Water Resources Department, Govt. of Odisha/ CGWB.
23. For meeting the total water requirement for the project upto maximum 212 KLD (fresh makeup water requirement is approx. 141 KLD) from ground water source, necessary prior permission has to be obtained from the Water Resources Department, Govt. of Odisha/ CGWB, failing which no ground water is allowed to be tapped. PP shall install water meter at all water drawal and intake points.
24. A certificate shall be obtained from the local body supplying water, specifying the total annual water availability with the local authority, the quantity of water already committed the quantity of water allotted to the project under consideration and the balance water available. This should be specified separately for ground water and surface water sources, ensuring that there is no impact on other users.
25. The quantity of fresh water usage, water recycling and rainwater harvesting shall be measured and recorded to monitor the water balance as projected by the project proponent. The record shall be submitted to the Regional Office, MoEF&CC and SEIAA, Odisha along with six monthly Monitoring reports.
26. Installation of dual pipe plumbing for supplying fresh water for drinking, cooking and bathing etc. and other for supply of recycled water for flushing, landscape irrigation, car washing, thermal cooling, conditioning etc. shall be done.
27. Use of water saving devices/ fixtures (viz. low flow flushing systems; use of low flow faucets tap aerators etc.) for water conservation shall be incorporated in the building plan.
28. Separation of grey and black water should be done by the use of dual plumbing system. In case of single stack system separate recirculation lines for flushing by giving dual plumbing system be done.
29. Water demand during construction should be reduced by use of pre-mixed concrete, curing agents and other best practices referred.
30. Any ground water dewatering should be properly managed and shall conform to the approvals and the guidelines of the CGWA in the matter. Formal approval shall be taken from the CGWA for any ground water abstraction or dewatering. The proponent shall also obtain permission from Water Resources Department, Govt. of Odisha for drawl of water.
31. The proponent shall keep one bore well as standby domestic water source once municipal water supply is made available in the project area.
32. A complete plan for rainwater harvesting at the proposed site shall be drawn up and implemented. The complete rainwater harvesting plan shall be submitted to

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SEIAA within one month from this day. As proposed, 05 nos. of rain water harvesting pits for artificial ground water recharge shall be installed as per CGWB guidelines.

**(III) Solid Waste :**

33. The provisions of the Solid Waste (Management) Rules, 2016, E-Waste (Management) Rules, 2016, and the Plastics Waste (Management) Rules, 2016 shall be followed.
34. Disposal of muck during construction phase shall not create any adverse effect on the neighbouring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.
35. Separate wet and dry bins must be provided in each unit and at the ground level for facilitating segregation of waste. Solid waste shall be segregated into wet garbage and inert materials. Wet garbage shall be composted in Organic Waste Converter. Adequate area shall be provided for solid waste management within the premises which will include area for segregation, composting. The inert waste from group housing project will be sent to dumping site.
36. Any hazardous waste generated during construction phase, shall be disposed off as per applicable rules and norms with necessary approvals of the State Pollution Control Board.
37. A certificate from the competent authority handling municipal solid wastes, indicating the existing civic capacities of handling and their adequacy to cater to the Municipal Solid Waste generated from project shall be obtained.

**(IV) Sewage Treatment Plant:**

38. STP of 200 KLD capacity shall be installed before start of the operation phase of the building. Treatment of 100% grey water by decentralized treatment should be done. The treated waste water from STP shall be recycled / reused to the maximum extent possible. Flushing, washing, watering of the lawns and gardening, filter backwash ,cleaning of the floors, etc facilities are to be met by recycled water. Discharge of unused treated waste water shall conform to the norms and standards of the Odisha State Pollution Control Board. Necessary measures should be taken to mitigate the odour problem from STP. The sewage treatment plant shall be made functional before the completion of Building Complex.
39. The installation of the Sewage Treatment Plant (STP) shall be certified by an independent expert and a report in this regard shall be submitted to the SEIAA, Odisha before the project is commissioned for operation. Periodical monitoring of water quality of treated sewage shall be conducted. Necessary measures should be made to mitigate the odour problem from STP.

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40. Excess treated water shall be discharged to the drain only after getting the permission from the concerned authority. The proponent shall renovate the existing drain to accommodate the discharge and maintain it perennially. To this effect the proponent has to give a legal affidavit before going for construction activity.
41. A certificate from the competent authority shall be obtained for discharging treated effluent/ untreated effluents into the Public sewer/disposal/drainage systems along with the final disposal point.
42. The wastewater generated shall not be allowed to mix with storm water. The Project Proponent shall ensure separate approved line for discharge of treated waste water and that of storm water. No sewage or untreated effluent water would be discharged through storm water drains.
43. Sludge from the onsite sewage treatment, including septic tanks, shall be collected, conveyed and disposed as per the Ministry of Urban Development, Central Public Health and Environmental Engineering Organization (CPHEEO) Manual on Sewerage and Sewage Treatment Systems, 2013.
44. The proponent shall obtain permission from the concerned authority to discharge the liquid waste to any drain i.e. the competent authority of the drain and "Nala" before commencement of any activity at the project site.

**(V) Energy Conservation:**

45. Compliance with the Energy Conservation Building Code (ECBC) of Bureau of Energy Efficiency shall be ensured. Buildings in the States which have notified their own ECBC, shall comply with the State ECBC. Outdoor and common area lighting shall be LED. Concept of passive solar design that minimize energy consumption in buildings by using design elements, such as building orientation, landscaping, efficient building envelope, appropriate fenestration, increased day lighting design and thermal mass etc. shall be incorporated in the building design. Wall, window, and roof u-values shall be as per ECBC specifications.
46. Energy conservation measures like installation of CFLs / LED for the lighting the area outside the building should be integral part of the project design and should be in place before project commissioning. Used CFLs, TFL and LED shall be properly collected and disposed off/sent for recycling as per the prevailing guidelines/rules of the regulatory authority to avoid mercury contamination.
47. The proponent shall use renewable energy/ solar power of at least 5% of projected power requirement for the building premises.
48. Solar energy shall be installed to meet electricity generation equivalent to 5% of the demand load or as per the state level/ local building bye-laws requirement, whichever is higher. Follow super ECBC requirement of ECBC 2017 and

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provide compliance report.

49. Solar power shall be used for lighting in the apartment to reduce the power load on grid. Separate electric meter shall be installed for solar power. Solar water heating shall be provided to meet 20% of the hot water demand of the commercial and institutional building or as per the requirement of the local building bye-laws, whichever is higher. Residential buildings are also recommended to meet its hot water demand from solar water heaters, as far as possible.
50. Use of environment friendly materials in bricks, blocks and other construction materials, shall be required for at least 20% of the construction material quantity. These include Fly Ash bricks, hollow bricks, AACs, Fly Ash Lime Gypsum blocks, compressed earth blocks, and other environment friendly materials. Fly ash should be used as building material in the construction as per the provision of Fly Ash Notification of September, 1999 and amended as on 27<sup>th</sup> August, 2003 and 25<sup>th</sup> January, 2016. Ready mixed concrete must be used in building construction.
51. A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project shall be submitted.

**(VI) Air Quality Management and Noise Management:**

52. Construction site shall be adequately barricaded before the construction begins. Dust, smoke & other air pollution prevention measures shall be provided for the building as well as the site. These measures shall include screens for the building under construction, continuous dust/ wind breaking walls all around the site (at least 3-meter height). Plastic/tarpaulin sheet covers shall be provided for vehicles bringing in sand, cement, murrum and other construction materials prone to causing dust pollution at the site as well as taking out debris from the site. Sand, murrum, loose soil, cement, stored on site shall be covered adequately so as to prevent dust pollution. Wet jet shall be provided for grinding and stone cutting. Unpaved surfaces and loose soil shall be adequately sprinkled with water to suppress dust.
53. All construction and demolition debris shall be stored at the site (and not dumped on the roads or open spaces outside) before they are properly disposed. All demolition and construction waste shall be managed as per the provisions of the Construction and Demolition Waste Rules, 2016. All workers working at the construction site and involved in loading, unloading, carriage of construction material and construction debris or working in any area with dust pollution shall be provided with dust mask.
54. Notification GSR 94(E) dated 25.01.2018 of MoEF&CC regarding Mandatory Implementation of Dust Mitigation Measures for Construction and Demolition Activities for projects requiring Environmental Clearance shall be complied with.

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55. The gaseous emissions from DG set shall be dispersed through adequate stack height as per CPCB standards. Acoustic enclosure shall be provided to the DG sets to mitigate the noise pollution. Low sulphur diesel shall be used. The location of the DG set and exhaust pipe height shall be as per the provisions of the Central Pollution Control Board (CPCB) norms.
56. For indoor air quality the ventilation provisions as per National Building Code of India shall be provided.
57. Ambient noise levels shall conform to residential standard both during day and night as per Noise Pollution (Control and Regulation) Rules, 2000. Incremental pollution loads on the ambient air and noise quality shall be closely monitored during construction phase. Adequate measures shall be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB / SPCB.

**(VII) Green cover:**

58. Green-belt & avenue plantation of trees over the area of 2,641.18 Sqm (24.61% of plot area) shall be done using native tree species/shrubs improving greenery & keeping in view aesthetics considerations in the whole complex. The species with heavy foliage, broad leaves and wide canopy cover are desirable. Professional landscape architects should be engaged to design the green layout to provide for multi-tier plantation and green fencing all around, mitigating various environmental pollutants like dust, noise, emissions etc. A minimum of 1 tree for every 80 Sqmt of land should be planted and maintained. At the project site, at least 100 numbers of trees shall be planted and maintained at the site.
59. Rainwater from open spaces shall be collected and reused for landscaping and other purposes. Roof top rain water harvesting shall be adopted for the proposed Buildings. Rainwater harvesting at the proposed site shall be implemented. Before recharging the surface runoff, pre-treatment must be done to remove suspended matter, oil and grease.

**(VIII) Top Soil Preservation and Reuse:**

60. Topsoil should be stripped to a depth of 20 cm from the areas proposed for buildings, roads, paved areas, and external services. It should be stockpiled appropriately in designated areas and reapplied during plantation of the proposed vegetation on site.

**(IX) Traffic & Transportation:**

61. A comprehensive mobility plan, as per Ministry of Urban Development best practices guidelines (URDPFI), shall be prepared to include motorized, non-motorized, public, and private networks. Road should be designed with due consideration for environment, and safety of users. The road system can be designed with these basic criteria.

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- Hierarchy of roads with proper segregation of vehicular and pedestrian traffic.
  - Traffic calming measures
  - Proper design of entry and exit points.
  - Parking norms as per local regulation
62. A detailed traffic management and traffic decongestion plan shall be drawn up to ensure that the current level of service of the roads within a 01 km radius of the project is maintained and improved upon after the implementation of the project. This plan should be based on cumulative impact of all development and increased habitation being carried out or proposed to be carried out by the project or other agencies in this 01 km radius of the site and the traffic management plan shall be duly validated and certified by the State Urban Development department and the P.W.D./ competent authority for road augmentation and shall also have their consent to the implementation of components of the plan which involve the participation of these departments.
63. Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards be operated only during non-peak hours.
64. A dedicated entry/exit and parking shall be provided for commercial activities.
65. Barricades shall be provided around project boundary.
66. Speed of the vehicles shall be restricted upto 15 kmph by erecting speed bumps at regular intervals at project site and proper signage shall be provided for guided vehicular movement and speed restrictions.
67. Parking shall be prohibited on the access road to the proposed project site.
68. Footpath shall be seamless with sufficient width.
69. No vehicles shall be allowed to stop and stand in front of the gate on main access.
70. A buffer of minimum 10 m shall be maintained between the entry/exit gate and the road to avoid traffic congestion.
71. The Traffic Management Plan prepared by the proponent shall be duly validated and certified by the State Concerned Competent Authority and shall have also their consent before implementation.

**(X) Environment Management Plan:**

72. An Environmental Management Plan (EMP) shall be prepared and implemented to ensure compliance with the environmental conditions specified above. A dedicated Environment Monitoring Cell with defined functions and responsibility shall be put in place to implement the EMP. The environmental cell shall ensure that the environment infrastructure like sewage treatment plant, landscaping, rain water harvesting, energy efficiency and conservation,

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water efficiency and conservation, solid waste management, renewable energy etc. are kept operational and meet the required standards. The environmental cell shall also keep the record of environment monitoring and those related to the environment infrastructure.

73. It shall be mandatory for the project management to submit six (06) monthly compliance reports on post environmental monitoring in respect of the stipulated terms and conditions in this Environmental Clearance to the State Environment Impact Assessment Authority (SEIAA), Odisha, SPCB & Regional Office of the Ministry of Environment & Forest, Odisha in hard and soft copies on 1<sup>st</sup> June and 1<sup>st</sup> December of each calendar year. The proponent shall also upload the compliance report including results of monitored data, as applicable in the website of the Ministry for monitoring of EC Conditions.

Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

Yours faithfully,

  
Member Secretary

Memo No \_\_\_\_\_ / Dt. \_\_\_\_\_

Copy to

1. **Joint Secretary (Environment)**, Ministry of Environment, Forests and Climate Change Govt. of India, Indira Paryavaran Bhavan, Jor Bagh Road, Aliganj, New Delhi-110003 for information.
2. **Additional Chief Secretary**, Forests & Environment Dept., Government of Odisha for information.
3. **Member Secretary**, State Pollution Control Board, Odisha, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-8, Bhubaneswar for information.
4. **Additional Principal Conservator** of Forests, Regional Office (EZ), Ministry of Environment & Forests, A-31, Chandrasekharapur, Bhubaneswar for information.
5. **Member Secretary**, CGWA, 18/11, Jamnagar House, ManSingh Road, New Delhi-110011 for information.
6. **Collector, District Magistrate**, Bhubaneswar, for kind information and necessary action.
7. **Secretary**, SEAC, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar for kind information.
8. Guard file for record/Website/Parivesh Portal.



  
Member Secretary

**Form-1****APPLICATION FOR PRIOR ENVIRONMENTAL CLEARANCE****1. Basic Informations**

<b>Project Name</b>	2B+G+14 high rise residential apartment building in Mouza-Ghatikia, Bhubaneswar, Dist-Khurda, Odisha.	<b>Company/Organisation Name</b>	M/S SHUVAM CONSTRUCTION PVT LTD
<b>Registered Address</b>	Plot No.564, Vivekananda Marg, Nageswar Tangi, Old Town, Bhubaneswar, Odisha Orissa 751002	<b>Legal Status of the Company</b>	Private

2.	<b>Address for the correspondence:</b>	
	(a)Name of the Applicant	Kantilal Patel
	(b)Designation (Owner/ Partner/ CEO)	Director
	(c)Address	Plot No.564, Vivekananda Marg, Nageswar Tangi, Old Town, Bhubaneswar, Odisha,Khordha,Orissa-751002
	(d)Pin code	751002
	(e)E-mail	shuvamconstruction@yahoo.co.in
	(f)Telephone No.	674-2432946
	(g)Fax No.	
	Copy of documents in support of the competence/authority of the person making this application to make application on behalf of the User Agency .	NIL

3.	<b>Category of the Project/Activity as per Schedule of EIA Notification,2006:</b>	
	(a)Major Project/Activity	<b>8(a) Building and Construction projects</b>
	(b)Minor Project/Activity	<b>NIL</b>
	(c)Category	<b>B2</b>
	(d)Proposal Number	<b>SIA/OR/MIS/227993/2021</b>
	(e)Master Proposal Number(Single Window)	<b>SW/227990/2021</b>
	(f)EAC concerned (for category A Projects only)	<b>INFRA-2</b>
	(g)Project Type(New/Expansion/Modernization)	<b>Fresh EC</b>


4.	(a)Number of States in which Project will be Executed	1
	(b)Main State of the project	Orissa

Details of State(s) of the project				
S. No.	State Name	District Name	Tehsil Name	Village Name
(1.)	Orissa	Khordha	Bhubaneswar	Ghatikia

5.	<b>Details of Public Consultation:</b>	
	(a)Whether the Project Exempted from Public Hearing?	Yes
	(c)Reason	-1
	(d)Supporting Document	NILL

**Project Profile**

<b>Location of the project</b>	Mouza- Ghatikia, Bhubaneswar, Dist- Khurdha, Odisha
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<b>Town / Village</b> (Name of more than one town may be entered by separating with)	Village- Ghatikia Town- Bhubaneswar	<b>Plot/Survey/Khasra No.</b> (Name of more than one town may be entered by separating with)	Plot No.:4016, 4023/ 9099, 4010/10999, 4010/ 9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/ 9599, 4024, 3967, 396
<b>State</b>	Orissa	<b>District</b>	Khordha
<b>Tehshil</b>	Bhubaneswar	<b>Pincode</b>	751003
<b>Nearest railway station</b>	Bhubaneswar Railway	<b>Distance from the project site</b>	5.2
<b>Nearest airport</b>	Bhubaneswar Airport	<b>Distance from the project site</b>	5
<b>Nearest Town/City/District Headquarters</b>	Bhubaneswar	<b>Distance from the project site</b>	5
<b>Village Panchayats, Zila Parishad, Municipal Corporation, Local body(Complete postal addresses with telephone nos. to be given)</b>	Bhubaneswar	<b>Upload GPS file</b>	<a href="#">Copy of Kml File</a>  <a href="#">Uploaded GPS file</a>
<b>Shape of the project land</b>	Point	<b>Site alternative under consideration(If any)</b>	<a href="#">Uploaded Site alternative under consideration</a>
<b>Brief summary of project</b>	<a href="#">Uploaded Brief summary of project</a>		
<b>Does your project location falls under out of any following areas</b>	None of above Areas		
<b>Proposed Built up area (Built up area or covered area on all the floors puttogether including its basement and other service areas which are proposed in the building or construction projects)(In Meter /Sqr)</b>	56722.86	<b>Existing Built Up Area(In Meter /Sqr)</b>	0
<b>Does it attract any of the general conditions given below?</b>	No		
<b>Does it attract the specific condition given below?</b>	No		
<b>Interlinked Projects</b>	No		
<b>Whether separate application of interlinked projects has been submitted?</b>		<b>Date of Submission</b>	
<b>Whether the proposal involves approval/clearance under the Forest (Conservation) Act,1980?</b>	No		
<b>Whether the proposal involves approval/clearance under the wildlife (Protection) Act,1972?</b>	No		
<b>Whether the proposal involves approval/clearance under the C.R.Z notification,2011?</b>	No		
<b>Whether there is any Government Order/Policy relevent/relating to the site?</b>	No		
<b>Forest land involved(hectares)</b>	NA		
<b>Is there any litigation pending against the project?</b>	No		

### Activity

**1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)**

S.No	Information/Checklist confirmation	Yes/No	Details there of (with approximate quantities/rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)	Yes	Change in land use from vacant barren land to residential Building project. Total land required for this proposed project is 10732.17 Sq meters (2.652Acre).
1.2	Clearance of existing land, vegetation and buildings?	No	There is no clearance of existing Land, vegetation and building as it is a vacant barren land.
1.3	Creation of new land uses?	Yes	Change in land use from vacant barren land to Residential Building project.
1.4	Pre-construction investigations e.g. bore houses, soil testing?	Yes	Borehole has been made and soil testing has been carried out to assess the strength of soil for laying down foundation structures.
1.5	Construction works?	Yes	Construction of residential building, STP, Solid Waste collection and processing facilities, parking, internal roads for movement inside the site will be constructed.
1.6	Demolition works?	No	There is no building or any other structure present on the site. So there is no demolition work is evolved.
1.7	Temporary sites used for construction works or housing of construction workers?	Yes	Temporary sheds will be constructed for workers, material storage, security guard post, and same will be demolished after the site development.
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations and fill or excavations	Yes	It is proposed to construct residential construction project within the site & related facilities which involves parking block, road construction, solid waste processing area, STP etc. Excavation for pile foundation of structure will be carried out.
1.9	Underground works including mining or tunneling?	No	No underground works including mining/tunneling required as it is a construction project.
1.10	Reclamation works?	No	There is no reclamation work in the project site.
1.11	Dredging?	No	No dredging work is required in the project development.
1.12	Offshore structures?	No	No offshore structure is required in the project development.
1.13	Production and manufacturing processes?	No	There is no production and manufacturing process is evolved as it is a construction project.
1.14	Facilities for storage of goods or materials?	Yes	Separate store for raw material like cement and other construction materials will be made within the project premises. Bricks and steel will be laid in open. This shall be restricted to Construction Phase only.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	The solid waste generation from the project will be in the form of construction phase & operational phase. Construction Waste: Left over cement



			and mortars, cement concrete blocks, aggregate, sand and other inorganic material will be recycled and reused. The non-biodegradable waste and other packaging material will be sold to the authorised recyclers. Operational Phase: Solid waste generation will be generate about 383 Kg/day which will be collected separately as Bio-degradable and Non-
1.16	Facilities for long term housing of operational workers?	No	NA
1.17	New road, rail or sea traffic during construction or operation?	No	There will be no new road & rail constructed.
1.18	New road, rail, air water borne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No	There will be no new road & rail is required.
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	
1.20	New or diverted transmission lines or pipelines?	No	No new or diverted external transmission lines or pipelines will be developed only internal sewage, water lines, storm water network, electricity wire lines will be developed.
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No	No impoundment, damming, culverting, realignment or other changes to the hydrology of surface water courses is proposed.
1.22	Stream crossings?	No	There are no streams crossing within the project site.
1.23	Abstraction or transfers of water from ground or surface waters?	No	During construction phase, 36.38 KLD amount of water will be required which will be sourced through Private Tanker. During operation phase, water supply will be sourced from Ground Water. About 212 KLD of fresh water will be required during operation phase of the project. Relevant permission from the respective authorities shall be obtained.
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	No	The proposed project will be carried out with well planned construction activities, to ensure no or negligible interruption of the natural drainage pattern.
1.25	Transport of personnel or materials for construction, operation or decommissioning?	Yes	Transportation of personnel/material during the construction and operation phase is envisaged. In the construction phase, approximately 6 trucks/day is envisaged for transportation of materials. Vehicles to be used will have valid PUC.
1.26	Long-term dismantling or decommissioning or restoration works?	No	NA
1.27	Ongoing activity during decommissioning which could have an impact on the environment?	Yes	NA
1.28	Influx of people to an area in either temporarily or permanently?	No	Construction Phase: During Construction phase, around 152 nos. of labourers (skilled/unskilled) will be there at site. Most of unskilled labourers will be sourced locally. However once private housing project unit is developed, 1520 nos. of population will be staying there as a permanent resident (including floating people).
1.29	Introduction of alien species?	No	Indigenous species will be planted in green belt development.
1.30	Loss of native species or genetic diversity?	No	There will be no impact on the native

species or genetic diversity.

1.31	Any other actions?	No	Not applicable
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**2 Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)	Yes	Around 10732.17 Sq meters of land has been earmarked for the development of residential project. Land is barren land.
2.2	Water (expected source & competing users) unit: KLD	Yes	Construction Phase:- The water consumption during construction phase meeting the domestic requirement of the construction laborers and for construction purposes water requirement. Total 36.38 KLD water will be used. Operational Phase:- During operation phase, water supply will be sourced from Ground Water. About 212 KLD of fresh water will be required during operation phase of the project. Relevant permission from respective authorities shall be obtained.
2.3	Minerals (MT)	No	NA
2.4	Construction material – stone, aggregates, sand / soil (expected source – MT)	Yes	Details of the construction materials are given below: Item Quantity Fly Ash Bricks 3302858 Cement 173572 Sand 23888 Chips 8466 Steel 1329
2.5	Forests and timber (source – MT)	Yes	Use of timber shall be as minimal as possible. Required quantity shall be procured from authorized vendor approved by competent authority.
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT),energy (MW)	Yes	The daily power requirement for the proposed residential project is approximately 1482 KW (maximum).
2.7	Any other natural resources (use appropriate standard units)	No	Not applicable

**3 Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)	Yes	This is a residential construction project and no storage of hazardous chemicals (as per MSIHC Rules) will be done, apart from diesel storage for D.G. Sets which will be operated only during emergency and suitable arrangement will be adopted for the same. It will be stored in HDPE drums and kept in covered rooms under lock and key.
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	Appropriate mitigation / management measures will be adopted in both the construction and operation phases which will restrict stagnation of water or accumulation of water within the site & the surroundings. This will effectively restrict the reproduction and growth of

			disease vectors. Further, proper waste management and appropriate sanitation facility will be provided at site during construction phase & operation phase. Good housekeeping and hygienic measures will be followed during construc
3.3	Affect the welfare of people e.g. by changing living conditions?	Yes	The proposed project is a residential and commercial construction project and thereby the residential facilities will improve and there will be various ancillary activities like restaurant, hotels, hospital, retail shops, convention centre, multiplex, institutions, shops, private transport facilities etc. attached to the project which will benefit to the local people and change their living conditions.
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.	No	Not applicable.
3.5	Any other causes	No	Not applicable.

#### 4 Production of solid wastes during construction or operation or decommissioning (MT/month)

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
4.1	Spoil, overburden or mine wastes	No	Only construction debris and excavated soil will be generated as spoil. The construction debris will be used for back filling purposes.
4.2	Municipal waste (domestic and or commercial wastes)	Yes	During construction phase solid waste generated in the form of construction debris's and excavated earth and in operation phase domestic waste generation in the form of biodegradable and non biodegradable waste. The total amount of solid waste generated will be approximately 383 Kg/day. This contains the domestic solid waste generated from the individual household buildings.
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	Yes	Used oil will be stored in HDPE drums in isolated covered facility. This used oil from the D.G. Sets will be sold to the SPCB approved recyclers, as per Hazardous waste Rules 2016. Also there will be discarded fuel filters and oil filters, discarded generator batteries and which will constitutes hazardous waste, which shall be managed as per Hazardous waste Rules 2016.
4.4	Other industrial process wastes	No	Not applicable.
4.5	Surplus product	No	Not applicable.
4.6	Sewage sludge or other sludge from effluent treatment	Yes	The sewage sludge generated from operation phase will be used as manure in the green belt.
4.7	Construction or demolition wastes	Yes	Construction waste will be used for roads and as fill material for leveling and road, and low lying area within the project site. <ul style="list-style-type: none"> <li>• The recyclable wastes (metal, wood, etc.) will be sold to the vendors.</li> <li>• The inert waste (brick, masonry, concrete, etc.) will be used</li> </ul>

			for road making and land filling within the site itself. • Construction waste shall be dealt in accordance to Construction and demolition waste 2016.
4.8	Redundant machinery or equipment	No	There will not be any redundant machinery or equipment used at site.
4.9	Contaminated soils or other materials	No	Proper care will be taken to avoid contaminated soil and if oil spilled soil will be found; the same will be scrapped off and stored at earmarked places and sent to disposal sites.
4.10	Agricultural wastes	No	There will be no agriculture waste.
4.11	Other solid wastes	No	Not applicable

## 5 Release of pollutants or any hazardous, toxic or noxious substances to air(Kg/hr)

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	Yes	Total capacity shall be limited to 1000 KVA (2 x 500 KVA) KVA. Vehicles shall be used with PUC.
5.2	Emissions from production processes	No	Not applicable.
5.3	Emissions from materials handling including storage or transport	Yes	The fugitive emission expected from construction phase will be dust arising during material handling and vehicular emission from transport vehicles. These include the emissions due to idling of the vehicles during loading and unloading activities. The haul road will be made moist to avoid the air borne dust & PUC certified vehicles will be used.
5.4	Emissions from construction activities including plant and equipment	Yes	Emission is generally expected from machineries to be used during construction phase. Proper maintenance will be done to ensure minimum emission.
5.5	Dust or odours from handling of materials including construction materials, sewage and waste	Yes	Dust will be generated during excavation, backfilling and transportation of construction related material activities. Water sprinkling will be done regularly to reduce the dust emission. Loose material during construction shall be transported with covered trucks.
5.6	Emissions from incineration of waste	No	Not applicable.
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No	No burning of waste in open air will be carried out.
5.8	Emissions from any other sources	No	Not applicable.

## 6 Generation of Noise and Vibration, and Emissions of Light and Heat:

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
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6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	Construction phase: The significant source of noise pollution will be due to the machinery used for construction and vehicular movement. Operation phase: During operation phase the main source of noise will be vehicular traffic and DG sets. However CPCB approved silent type DG set will be used.
6.2	From industrial or similar processes	No	Not applicable
6.3	From construction or demolition	Yes	Due to construction machinery/vehicle movement noise will be generated.
6.4	From blasting or piling	Yes	During Piling operation, latest pile installation techniques would be adopted to have negligible impact due to noise and vibration.
6.5	From construction or operational traffic	Yes	Minor disturbance due to traffic noise during construction as all these operations will be carried out in non peak hours. However during operation phase, there shall be marginal rise in Noise level, Proper traffic management shall be implemented, to avoid noise pollution at places.
6.6	From lighting or cooling systems	No	Not applicable.
6.7	From any other sources	No	Not applicable.

**7 Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials	Yes	Hazardous waste like used paints and colors containers and waste oil generate from DG Set will be disposed off as per Hazardous waste management and handling Rule 2016. Special care shall be taken to prevent spillages and health hazard during handling of this item.
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	Sewage water will be treated through proposed Sewage Treatment Plant to be developed within the premises during operation phase. There is no chance of spillage or discharge of sewage and all the sewage will be channelized properly through closed pipes to the STP. The sewage water after treatment will be utilized for toilet flushing, cleaning, and horticulture at Residential colony & toilet flushing at adjacent school, rail Corridor green belt and other operational requirements at Port.
7.3	By deposition of pollutants emitted to air into the land or into water	No	There is no emission except of D.G. sets. By use of low sulphur diesel, the emission from the D.G. sets will be within norms. However to mitigate this measures like water sprinkling, provision of covered sheds for construction materials, plantation etc. will be taken.
7.4	From any other sources	No	There are no other sources, which will contaminate land & water resources.

7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No	There will be no long term build-up pollutants in the environment from this project.
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**8 Risk of accidents during construction or operation of the Project, which could affect human health or the environment**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances	No	This is residential building project and the chances of explosions, spillages, fire are minimal. During construction, all the labours will be provided with suitable personal protective equipment (PPE) as required under the health & safety norms. Training and awareness about the safety norms will be provided to all supervisors and labours involved in construction activity. No major hazardous waste is being stored within the project site. No Industrial or process activity is involved in this p
8.2	From any other causes	No	The major risks involved in the project would be during construction phase, working at different construction heights and mishaps due to human errors, bad construction practices and associated electric hazards. All Safe construction practices & precautionary measures will be adopted and use of PPE will be mandatory. However, to meet out the minor incidences and accidents first aid measures at site will be provided. All safety measures will be in place prior to commencement of operations so as t
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?	No	Floods: • For effective functioning, pre-monsoon and post-monsoon checks of the drainage structures will be undertaken. • The project has planned storm water layout in regards to the peak intensity of the rainfall so far received as recorded by IMD. Earthquakes: The project site comes under seismic zone-III.

**9 Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting utilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: <ul style="list-style-type: none"> <li>◦ Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.)</li> <li>◦ housing development</li> <li>◦ extractive industries</li> <li>◦ supply industries</li> <li>◦ Other</li> </ul>	Yes	Appropriate infrastructure like roads, power supply, waste management and waste water treatment will be developed within the site. During construction skilled, unskilled and professional work force will be hired locally. While during the project operation stage for the purpose of day-to-day maintenance, workers will be employed. Moreover, more indirect employment will be created as a result

			of positive induced development in the immediate vicinity of project site.
9.2	Lead to after-use of the site, which could have an impact on the environment	No	Not applicable.
9.3	Set a precedent for later developments	No	Not applicable.
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	No	Not applicable.

**(III) Environmental Sensitivity**

S.No	Areas	Name/Identity	Aerial distance (within 15km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	No	Not applicable, There is no such areas existing within 15 km buffer zone.
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	No	
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	
4	Inland, coastal, marine or underground waters	No	Not applicable
5	State, National boundaries	No	Not present
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	Yes	NH 5: 1.4 Km
7	Defence installations	No	Not applicable
8	Densely populated or built-up area	Yes	Bhubaneswar Approximately 5 Km.
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	Yes	Kendriya Bidyalay: 2.5 Km, NE Utkal University: 7 Km, NE SO University: 3.4 Km, NW Capital Hospital: 7 Km Sum Hospital: 1.5 Km Kalinga Hospital: 3.2 Km
10	Areas containing important, high quality or scarce resources. (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	Yes	Not applicable.
11	Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)	No	Not applicable.
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) similar effects	No	

**Document to be attached**

1.	<b>Upload a copy of PFR</b>	<a href="#">Uploaded a copy of PFR.</a>
2.	<b>Upload a copy of EMP</b>	<a href="#">Uploaded a copy of EMP.</a>
3.	<b>Upload Scanned copy of covering letter.</b>	<a href="#">Uploaded Scanned copy of covering letter.</a>
4.	<b>Upload Additional attached if any(Single PDF)</b>	<a href="#">Uploaded Additional attached if any(Single PDF).</a>
5.	<b>Whether it is a violation case and application is being submitted under Notification No. S.O.804(E) dated 14.03.2017 ?</b>	No

**Essential Details Sought**

S. No.	EDS Sought Date	EDS Sought	Letter
(1.)	07/09/2021	The project proponent ask to mentioned the project name clearly, submit checklist and scrutiny fee and land schedule for the project.	
(2.)	07/10/2021	The correction have been made as per the instruction received	

#### Additional Details Sought

S. No.	ADS Sought Date	ADS Sought	Letter
(1.)	27/01/2022	Please comply	<a href="#">EDS Letter</a>
(2.)	20/05/2022	Point Wise Compliance with Annexures for M/s Shuvam Construction Pvt. Ltd. at Ghatikia, Bhubaneswar, Odisha	<a href="#">EDS Letter</a>

### Undertaking

**I hereby give undertaking that the data and information given in the application and enclosures are true to be best of my knowledge and belief. And I am aware that if any part of the data and information found to be false or misleading at any stage, the project will be rejected and clearance given, if any to the project will be revoked at our risk and cost. In addition to above, I hereby give undertaking that no activity/ construction/ expansion has since been taken up.**

<b>Name of Applicant</b>	Kantilal Patel
<b>Designation</b>	Director
<b>Name of Company (Applicant Name should not be given here)</b>	M/S SHUVAM CONSTRUCTION PVT LTD
<b>Address</b>	Plot No.564, Vivekananda Marg, Nageswar Tangi, Old Town, Bhubaneswar, Odisha

[Print](#)



# FORM - 1A

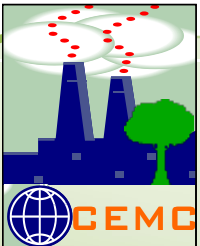
Of

## Proposed high rise Residential Apartment (2B+G+14)

FOR

*M/S SHUVAM CONSTRUCTION (P) LTD.*

At: Ghatika, Bhubaneswar, Khordha, Odisha.



**Centre For Envotech and Management Consultancy Pvt. Ltd.**

AN ISO: 9001: 2008 and BS OSHAS 18001: 2007 certified company,  
Empanelled with OCCL, Govt. Of Odisha, OSPCB as Category "A" Consultant Organization,

Accredited by NABET, Quality Council of India for EIA studies  
As Category "A" Consultant Organization.

Regd. Off: N5/305, IRC Village, Bhubaneswar, Odisha Tele: 0674 - 2360344,

E-mail: [cemc\\_consultancy@yahoo.co.in](mailto:cemc_consultancy@yahoo.co.in), [cemc122@gmail.com](mailto:cemc122@gmail.com)

Website: [www.cemc.in](http://www.cemc.in)

## **FORM-1A**

[Only for Construction projects listed under item 8 of the schedule]

### **CHECKLIST OF ENVIRONMENTAL IMPACTS**

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

<b>1.</b>	<b>LAND ENVIRONMENT</b> (Attach panoramic view of the project site and the vicinity)																																							
<b>1.1</b>	<b>Will the existing land use get significantly altered from the project that is not consistent with the surroundings? (Proposed land use must conform to the approved Master Plan/ Development Plan of the area. Change of land use if any and the statutory approval from the competent authority to be submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels &amp; contours to appropriate scales. If not available attach only conceptual plans.</b>																																							
<b>Ans:</b>	<p>The project site is vacant barren land. The land comes under Odisha Development Authority area. Total land required for this proposed project is 10732.17 sqm (2.652 Acres). Present Kisam of land is Gharbari. The Proposed Construction of Private Housing Project will be over Plot No.: over plot no:-4016, 4023/ 9099, 4010/10999, 4010/ 9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/ 9599, 4024, 3967, 3968, 3970, 4011/9062, 4011, 4023/9086, 4010/10998, 4028, khata no-1678, 607, 988/958, 803, 720, 1101, 1678, 238, 1988/87, 1988/86, 535, 1228, 1332, 1123, 1139, 1988/957, at Mouza-Ghatika, , Dist-Khurdha, Pincode-751003 Odisha.</p> <p><b>Area statement:</b></p> <table border="1"><thead><tr><th>Particular</th><th>Proposed</th><th>Permissible</th></tr></thead><tbody><tr><td>Project Name</td><td colspan="2">Proposed Housing Project (High Rise Residential Apartment Building Project)</td></tr><tr><td>Plot Area</td><td>10732.17 Sqm</td><td>--</td></tr><tr><td>Ground Coverage (Roof top Area)</td><td>3053.12 Sqm (28.55%)</td><td>6439.3 Sqm (60% of the plot area)</td></tr><tr><td>Total Built up Area</td><td>56722.86 Sqm</td><td>--</td></tr><tr><td>Total FAR Area</td><td>44996.50 Sqm</td><td>--</td></tr><tr><td>FAR</td><td>4.192</td><td>1.75</td></tr><tr><td>Maximum Height</td><td>50.93 meter</td><td>--</td></tr><tr><td>No. of recharge pit</td><td>32</td><td>--</td></tr><tr><td>Drive Way Width</td><td>7.5 meter</td><td>--</td></tr><tr><td>Parking Area</td><td>22308.36 Sqm</td><td>13498.95 Sqm (30 % of Residential FAR Area)</td></tr><tr><td>Green Belt Area</td><td>28323 Sqm (24.61 % of Plot area)</td><td>2146.4 Sqm (20% of Plot area)</td></tr><tr><td>Power/Electricity Requirement &amp; Sources</td><td>1482 KW</td><td>--</td></tr></tbody></table>	Particular	Proposed	Permissible	Project Name	Proposed Housing Project (High Rise Residential Apartment Building Project)		Plot Area	10732.17 Sqm	--	Ground Coverage (Roof top Area)	3053.12 Sqm (28.55%)	6439.3 Sqm (60% of the plot area)	Total Built up Area	56722.86 Sqm	--	Total FAR Area	44996.50 Sqm	--	FAR	4.192	1.75	Maximum Height	50.93 meter	--	No. of recharge pit	32	--	Drive Way Width	7.5 meter	--	Parking Area	22308.36 Sqm	13498.95 Sqm (30 % of Residential FAR Area)	Green Belt Area	28323 Sqm (24.61 % of Plot area)	2146.4 Sqm (20% of Plot area)	Power/Electricity Requirement & Sources	1482 KW	--
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No. of DG sets	2 x 500 KVA	--
Fresh Water requirement & Sources	141 KLD Source:	--
Sewage Treatment & Disposal	STP Capacity 200 KLD	--
Estimated Population- Residential, Floating/visitors	Residential Population: 1420 Nos. Floating Population: 142 Nos.	--

**(i) Site Location Map of the Project Site**



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

**Ans:** **Location Plot:** 4016, 4023/ 9099, 4010/10999, 4010/ 9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/ 9599, 4024, 3967, 3968, 3970, 4011/9062, 4011, 4023/9086, 4010/10998, 4028.

Khta No.: 1678, 607, 1988/958, 803, 720, 1101, 1678, 238, 1988/87, 1988/86, 535, 1228, 1332, 1123, 1139, 1988/957

Mouza-Ghatikia, Dist-Khurdha, Pincode-751003 Odisha.

**Surrounding Features and Connectivity**

The proposed site is located at Pahala, Bhubaneswar, Odisha. The Geographical co-ordinate of the project site is Latitude 20° 16' 15.78" & Longitude - 85° 46' 44.81". The project site is well connected with Ghatikia main road and The National Highway-5 is located at the distance of 0.3 Km & 1.4 km. The nearest Railway station is

Bhubaneswar Railway Station at a distance of approximately 5.2 Km from the project site. The nearest Airport is Biju Patnaik International Airport, Bhubaneswar which is at a distance of 5 Km from the project site.

Habitation nearer to the site is Shympur, Kalimga Nagr, Shankarpur, Rajiv Nagar etc.

**Power Requirement:**

The total consolidated electrical load estimate for proposed project is about **1482 KW**. The power will be entirely supplied by 11 KV source of CESU of Odisha State Electricity Board. Also, in case of power cut, 100 % power backup generator will be provided for common uses only.

**Water Requirement:**

**i) During Construction Stage**

For major construction activities daily requirement of water will be 34 m<sup>3</sup> (Norms Construction (Peak)@0.6m<sup>3</sup>/1000sqm BUA) per day. Water consumption for the resident laborers will be 34 @ 70 lpcd = 2380 liters. Therefore, during the construction phase, total daily water requirement will be 3400 liters + 2380 liters = 5780 liters = 5.7 m<sup>3</sup>/day. This will be sourced by Private tankers.

Sl. No.	Purpose	Requirement (m <sup>3</sup> /day)
1	Construction (Peak)	34
2	Residing laborers (10 @ 70 lpcd)	2.38
	<b>Total</b>	36.38

**ii) During Operation Stage**

During operation phase water will be sourced from Ground Water (Public Health Department).

1. Total Fresh Water requirement is 141 m<sup>3</sup>/day.
2. Total Flushing Water requirement is 70.7 m<sup>3</sup>/day.
3. Total Water requirement is 212 m<sup>3</sup>/day.

**Parking needs:**

Adequate parking (636 ECS) provision will be kept for vehicles parking in the proposed project. Besides this, minimum of internal road of 6m width within the proposed project will facilitate smooth traffic movement.

**Parking Proposed:**

Parking Area for Residential Areas: 22308.36 Sqm

**As per Odisha Bye-laws:**

Parking Area Required for Residential areas = 30% of FAR area of Residential

The FAR area of Residential areas: 44996.50 Sqm

$$= 44996.5 \times 30/100$$

$$= 13499 \text{ m}^2$$

**Parking as per NBC norms**

Parking Area Provided			
For Residential			
Parking (Covered/Open)			22308.36 Sqm
Equivalent Car Space Provided for Residential			
Details	Area (Sqm)	Area/ECS	
Lower Basement	5863.18	35	167 ECS

	Upper Basement	5863.18	35	167 ECS
	Visitors Parking Area	10582	35	302 ECS
	<b>Total Parking Provided</b>			<b>636 ECS</b>
<b>1.3</b>	<b>What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing land use, disturbance to the local ecology).</b>			
<b>Ans:</b>	<p>The project is situated in the Bhubaneswar City. The impact due to the proposed project may be increase in the traffic loads, increase in the noise levels during construction activities, and dust emission emanating from various construction activities. Due care will be taken during construction as well as operational phase to minimize the impact on surroundings such as piling activities, shielding of construction site, wetting of roads, stockpiles, etc. The likely beneficial and adverse impacts on the existing facilities surrounding the project site have been described below.</p> <p><b>A. <u>IMPACT ON OPEN SPACES</u></b></p> <p>While developing the proposed construction, adequate preventive measures will be adopted to control the fugitive emission, waste water discharge and construction waste disposal procedures, so that the open space around the project site do not get affected. During the operational phase also adequate preventive measures will be taken for controlling the above issues. During earth work excavation, preventive measures will be adopted in terms of vertical shaping to avoid landslides and soil erosion. Thus, impact of the proposed construction on the adjacent open spaces is expected to be minor in nature.</p> <p><b>B. <u>IMPACT ON COMMUNITY FACILITIES</u></b></p> <p>In this building construction project the peripheral i.e. road, electrification, water supply will be provided, which will provide benefits to the surrounding people. Therefore due to proposed development, the community facilities in the adjacent areas surrounding the project site will be considerably improved.</p> <p><b>C. <u>EXISTING LAND USE</u></b></p> <p>Presently the land is barren and home stead land and not used for any agriculture purpose which will be converted to high rise residential apartment.</p> <p><b>D. <u>LOCAL ECOLOGY</u></b></p> <p>The project being a well planned activity will result in organized open spaces and green areas. About 961.9 sqm (20% of Plot area) of the area is earmarked for greenbelt development. The biodiversity in the area will increase due to the proposed green areas. The project will have an overall positive impact on the existing land use and will not cause any disturbance to the local ecology. Proposed activity shall have no impact on surroundings.</p> <p>Thus, it is likely that site specific impacts have been at micro level and insignificant.</p>			
<b>1.4</b>	<b>Will there be any significant land disturbance resulting in erosion, subsidence &amp; instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc. may be given).</b>			
<b>Ans:</b>	<p>There shall be no land disturbance resulting in erosion, subsidence and instability as it is a flat land. The site falls under the zone III as per the seismic zone map of India and indicating Moderate damage risk zone. The project will be earthquake resistant taking into account the latest provisions of Indian Standards Codes.</p>			
<b>1.5</b>	<b>Will the proposal invoice alternation of natural drainage system? (Give details on a contour map showing the natural drainage near the proposed project site)</b>			
<b>Ans:</b>	<p>The drainage system to be set up will be designed taking in to consideration natural drainage pattern of the area, configuration and capacity of existing drainage channels.</p>			

	There is no change in the overall natural drainage system. However, the internal run off drainage is channelized to the well connected network of storm water drains.
<b>1.6</b>	<b>What are the quantities of earthwork involved in the construction activity-cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc.)</b>
<b>Ans:</b>	The only excavation work involved with the project is for foundation, Basement Provision in Project) filling works will be done by the excavated material and no extra material will be used. All the topsoil excavated during construction activities shall be stored for use in horticulture/landscape development within the project site. The lower strata earth is either used for filling the plinths, road substructure and leveling low lying areas.
<b>1.7</b>	<b>Give details regarding water supply, waste handling etc, during construction period.</b>
<b>Ans:</b>	Water requirement during construction phase will be sourced or through Private Water Supply. The water needed for the construction phase will be 36.38 m <sup>3</sup> . Water will be used in the construction activity like cement mixing etc also its needed for sprinkling, dust suppression and domestic purposes for the construction workers. The only source of waste water during the construction is from the labour camps and water used in construction works. The construction site wastewater would be routed through catch pit/ sedimentation basin prior to final / ultimate disposal to proper drainage system. Sewage will be treated in septic tank-soak pit system. Waste to be generated during the construction period includes construction waste and solid waste. Usable / recyclable material will be sold off to waste recyclers. Unusable construction will be used for land development activities within the project site.
<b>1.8</b>	<b>Will the low lying areas &amp; wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity.)</b>
<b>Ans:</b>	There are no low lying areas and wetlands in near vicinity of the project site.
<b>1.9</b>	<b>Whether construction debris &amp; waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labor and the means of disposal).</b>
<b>Ans:</b>	Adequate preventive measures will be taken to avoid the spreading of dust during the transportation. Effective material management and environmental management measures will be adopted in order to minimize the volume of construction waste. It is difficult to quantify the volume of construction waste because of the following factors: <ul style="list-style-type: none"> <li>• Phasing of construction activities.</li> <li>• Skilled workmanship.</li> <li>• Recycling of such waste.</li> </ul> However Cement Mortar Waste will be used for pavement making. Brick waste will be reused for preparation of sub base internal roads. Apart Good housekeeping and better sanitation facilities shall be provided to labourers to avoid any kind of health hazards.
<b>2.</b>	<b>WATER ENVIRONMENT</b>
<b>2.1</b>	<b>Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources &amp; quantities and furnish a water balance statement.</b>

**Ans:** The water requirement for the proposed project can be divided into two stages:

- i) Construction Stage
- ii) Operational Stage

**i) Water Requirement during construction stage**

For major construction activities daily requirement of water will be 34 m<sup>3</sup> (Norms Construction (Peak)@0.6m<sup>3</sup>/1000sqm BUA) per day. Water consumption for the resident laborers will be 34 @ 70 lpcd = 2380 liters. Therefore, during the construction phase, total daily water requirement will be 3400 liters + 2380 liters = 5780 liters = 5.7 m<sup>3</sup>/day. This will be sourced by Private tankers.

**Water requirement construction stage**

Sl. No.	Purpose	Requirement (m <sup>3</sup> /day)
1	Construction (Peak)	34
2	Residing laborers (10 @ 70 lpcd)	2.38
	<b>Total</b>	<b>36.38</b>

Source of Water: Private Tanker

**ii) Water requirement during operation stage**

Total fresh make up water requirement is 141.3 m<sup>3</sup>/day.

**Source of Water: Ground Water**

**Table No. C4-4: Water Balance (Non-Monsoon)**

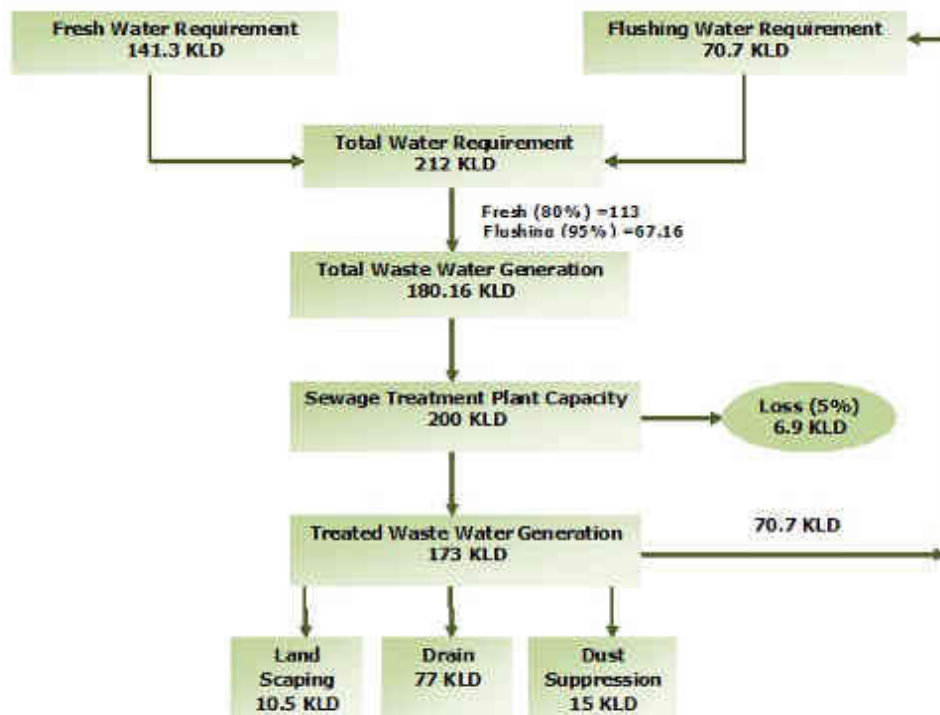
Sl. No.	Description	Quantity in m <sup>3</sup> /day		Waste water generated m <sup>3</sup> /day
		Fresh makeup	Reuse	
1	Fresh Water Requirement	141	-	113
2	Flushing	-	70.7	67.16
3	Landscaping	-	5.7	-
4	STP Loss	-	6.9	-
5	HVAC	-	49.1	-
6	Dust Suppression on roa	-	5.8	-
	<b>Total</b>	<b>141</b>	<b>--</b>	<b>180.16</b>

**Table No. C4-5: Water Balance (Monsoon)**

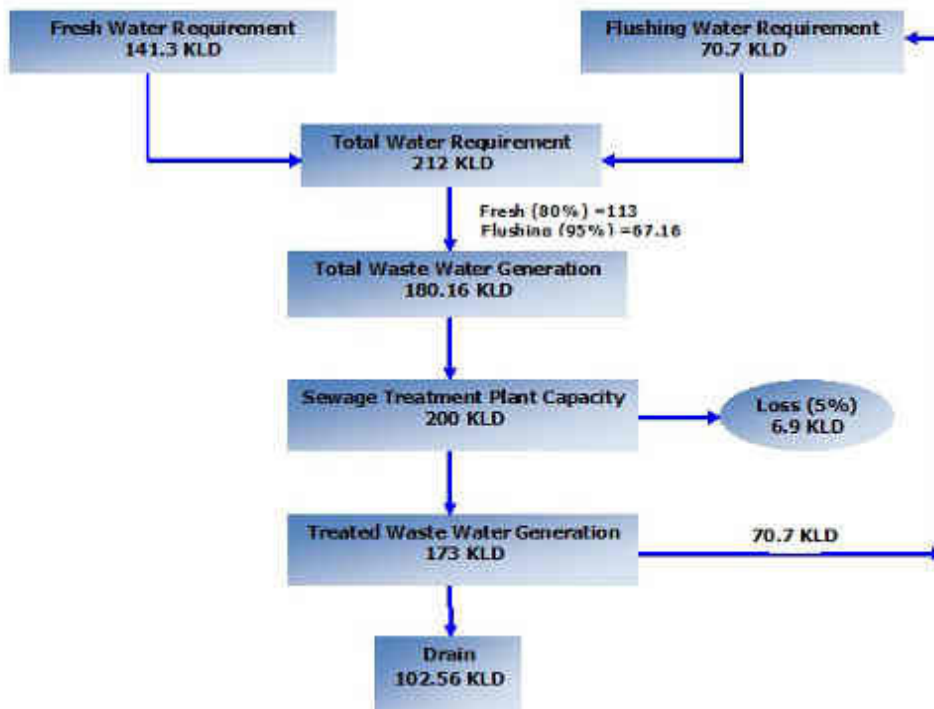
Sl. No.	Description	Quantity in m <sup>3</sup> /day		Waste water generated m <sup>3</sup> /day
		Fresh makeup	Reuse	
1	Fresh Water Requirement	103	--	113
2	Flushing	-	70.7	67.16
3	STP Loss	-	6.9	-
4	HVAC	-	49.2	-
5	Discharge to Drain	-	11.1	-
	<b>Total</b>	<b>103</b>	<b>--</b>	<b>180.16</b>

## Detail Water Balance

### Water Balance during Monsoon Period



### Water Balance during Non Monsoon Period



**2.2** What is the capacity (dependable flow or yield) of the proposed source of water?

**Ans.** During construction phase water will be sourced from Private Water Tanker and the operation phase water will be sourced from Ground Water.



2.3	<b>What is the quality of water required in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality).</b>																																																																																																																																																																																																														
<b>Ans:</b>	<p>Required water will be sourced from Ground Water. Analysis report reviews that water is portable however as prevention raw water treatment facilities consist of sand filtration and chlorination will be provided to treat the ground water.</p> <p><b>Water Quality Analysis</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Sl. No</th> <th rowspan="2">Parameter</th> <th rowspan="2">Unit of measurement</th> <th colspan="2">Standard as per IS: 10500, 2012</th> <th rowspan="2">Result</th> </tr> <tr> <th>Acceptable Limit</th> <th>Permissible Limit</th> </tr> </thead> <tbody> <tr><td>1</td><td>Colour</td><td>Hazen</td><td>5</td><td>15</td><td>&lt;5</td></tr> <tr><td>2</td><td>Odour</td><td>--</td><td>AL</td><td>AL</td><td>AL</td></tr> <tr><td>3</td><td>Taste</td><td>--</td><td>AL</td><td>AL</td><td>AL</td></tr> <tr><td>4</td><td>Turbidity</td><td>NTU</td><td>1</td><td>5</td><td>&lt;1</td></tr> <tr><td>5</td><td>pH Value @ 25°C</td><td>--</td><td>6.5-8.5</td><td>No Relaxation</td><td>6.84</td></tr> <tr><td>6</td><td>Total Hardness (as CaCO<sub>3</sub>)</td><td>mg/l</td><td>200</td><td>600</td><td>168</td></tr> <tr><td>7</td><td>Iron (as Fe)</td><td>mg/l</td><td>0.3</td><td>No Relaxation</td><td>0.22</td></tr> <tr><td>8</td><td>Chloride (as Cl)</td><td>mg/l</td><td>250</td><td>1000</td><td>13.9</td></tr> <tr><td>9</td><td>Residual, free Chlorine</td><td>mg/l</td><td>0.2</td><td>1.0</td><td>ND</td></tr> <tr><td>10</td><td>Total Dissolved Solids</td><td>mg/l</td><td>500</td><td>2000</td><td>248.4</td></tr> <tr><td>11</td><td>Calcium (as Ca)</td><td>mg/l</td><td>75</td><td>200</td><td>44.89</td></tr> <tr><td>12</td><td>Magnesium (as Mg)</td><td>mg/l</td><td>30</td><td>100</td><td>13.61</td></tr> <tr><td>13</td><td>Copper (as Cu)</td><td>mg/l</td><td>0.05</td><td>1.5</td><td>&lt;0.03</td></tr> <tr><td>14</td><td>Manganese (as Mn)</td><td>mg/l</td><td>0.1</td><td>0.3</td><td>&lt;0.05</td></tr> <tr><td>15</td><td>Sulphate (as SO<sub>4</sub>)</td><td>mg/l</td><td>200</td><td>400</td><td>5.74</td></tr> <tr><td>16</td><td>Nitrate (as NO<sub>3</sub>)</td><td>mg/l</td><td>45</td><td>No Relaxation</td><td>2.23</td></tr> <tr><td>17</td><td>Fluoride (as F)</td><td>mg/l</td><td>1.0</td><td>1.5</td><td>0.15</td></tr> <tr><td>18</td><td>Phenolic Compounds (as C<sub>6</sub>H<sub>5</sub>OH)</td><td>mg/l</td><td>0.001</td><td>0.002</td><td>&lt;0.001</td></tr> <tr><td>19</td><td>Mercury (as Hg)</td><td>mg/l</td><td>0.001</td><td>No Relaxation</td><td>&lt;0.001</td></tr> <tr><td>20</td><td>Cadmium (as Cd)</td><td>mg/l</td><td>0.003</td><td>No Relaxation</td><td>&lt;0.003</td></tr> <tr><td>21</td><td>Selenium (as Se)</td><td>mg/l</td><td>0.01</td><td>No Relaxation</td><td>&lt;0.001</td></tr> <tr><td>22</td><td>Arsenic (as As)</td><td>mg/l</td><td>0.01</td><td>0.05</td><td>&lt;0.001</td></tr> <tr><td>23</td><td>Cyanide (as CN)</td><td>mg/l</td><td>0.05</td><td>No Relaxation</td><td>ND</td></tr> <tr><td>24</td><td>Lead (as Pb)</td><td>mg/l</td><td>0.01</td><td>No Relaxation</td><td>&lt;0.01</td></tr> <tr><td>25</td><td>Zinc (as Zn)</td><td>mg/l</td><td>5</td><td>15</td><td>&lt;0.05</td></tr> <tr><td>26</td><td>Chromium (as Cr)</td><td>mg/l</td><td>0.05</td><td>No Relaxation</td><td>&lt;0.05</td></tr> <tr><td>27</td><td>Mineral Oil</td><td>mg/l</td><td>0.5</td><td>No Relaxation</td><td>&lt;0.05</td></tr> <tr><td>28</td><td>Total Alkalinity (as CaCO<sub>3</sub>)</td><td>mg/l</td><td>200</td><td>600</td><td>174</td></tr> <tr><td>29</td><td>Aluminium (as Al)</td><td>mg/l</td><td>0.03</td><td>0.2</td><td>&lt;0.01</td></tr> <tr><td>30</td><td>Boron (as B)</td><td>mg/l</td><td>0.5</td><td>1.0</td><td>&lt;0.2</td></tr> <tr><td>31</td><td>Total Coliform</td><td>MPN/100 ml</td><td>Absent in 100 mL Sample</td><td>Absent</td><td>Absent</td></tr> <tr><td>32</td><td>Faecal Coliform</td><td>MPN/100 ml</td><td>Absent in 100 mL Sample</td><td>Absent</td><td>Absent</td></tr> <tr><td>33</td><td>E.Coli</td><td>MPN/100 ml</td><td>Absent in 100 mL Sample</td><td>Absent</td><td>Absent</td></tr> </tbody> </table>	Sl. 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2.4	<b>How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage).</b>																																																																																																																																																																																																														

**Ans:** Every building generates wastewater amounting about (80 % of fresh water consumed + 95 % of flushing water). The major source of wastewater includes the grey water from kitchens, bathrooms and black water from toilets. It is expected that the project will generate approx. 141 m<sup>3</sup>/day of wastewater. The wastewater will be treated in the STP of capacity of 140 m<sup>3</sup>/day provided within the area. Out of which 131 m<sup>3</sup>/day will be recycled within the project for flushing (70.7 m<sup>3</sup>/day), landscaping (5.7 m<sup>3</sup>/day), STP loss (6.9 m<sup>3</sup>/day) & Dust suppression in Road Area(5.8 m<sup>3</sup>/day). 49.2m<sup>3</sup>/day will be used as HVAC system in case of non-monsoon period. In case of Monsoon period 131 m<sup>3</sup>/day will be recycled within the project for flushing (70.7 m<sup>3</sup>/day), 49.2 m<sup>3</sup>/day will be used as HVAC system, STP loss will be 6.9 m<sup>3</sup>/day and 11.2 m<sup>3</sup>/day surplus will be generated which will be discharged to the drain.

**Waste water generation**

Sl. No.	Source	Quantity m <sup>3</sup> /day
1	Fresh Water effluent (Without Flushing)	113
2	Flushing	67.16
<b>Total</b>		<b>180.16</b>

**2.5 Will there be diversion of water from the users? (Please assess the impacts of the project on other existing uses and quantities of consumption).**

**Ans:** No. There will not be any diversion of water from other users. Artificial recharge measures and roof top water recharging will be taken up to negate the impact of ground water extraction in the area and sustainability of the sources in future. Hence there will be negligible adverse impact on the ground water resources within the area.

**2.6 What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity).**

**Ans:** Approximately, 180.16 m<sup>3</sup>/day of waste water will be generated during the operational phase from domestic use and other uses. This wastewater generated will be treated in well designed sewage treatment plant.

**2.7 Give details of the water requirements met from water harvesting? Furnish details of the facilities created.**

**Ans:**

Rational formula for calculating run-off = CIA

Q = Runoff in m<sup>3</sup>

A = Area in sqm

C = Co-efficient of run-off based on Manual on norms and standards for environment clearance of large construction projects, Ministry of Environment and Forests, Government of India.

I = Intensity of rainfall in mm based on IMD Data

Yearly rainfall : 1505 mm/yr

Monsoon Months : June – September

For determination of no. of Rain Water Harvesting pits maximum rainfall value has been taken.

Maximum hourly rainfall = 120 mm/hr

### **Calculations for storm water load for recharging in Max. Rainfall**

#### **Total Run-off: Roof Top**

Intensity of rainfall = 120 mm/hr

Drainage area in Sqm = 3053.12 m<sup>2</sup>

Coefficient of run-off = 0.90

Therefore, runoff = 0.90 x 0.12 x 3015 = **329.73 m<sup>3</sup>/hr**

#### **Total Run-off: Paved Surface**

Intensity of rainfall = 120 mm/hr

Drainage area in Sqm = 20643.95 m<sup>2</sup>

Coefficient of run-off = 0.70

Therefore, runoff = 0.70 x 0.12 x 2483 = **1734 m<sup>3</sup>/hr**

#### **Total Run-off: Unpaved Surface**

Intensity of rainfall = 120 mm/hr

Drainage area in Sqm = 28323 m<sup>2</sup>

Coefficient of run-off = 0.15

Therefore, runoff = 0.15 x 0.12 x 28323 = **509.8 m<sup>3</sup>/hr**

**Total Runoff Load = (329.73+1734+509.8) m<sup>3</sup>/hr**

**= 2573 m<sup>3</sup>/hr**

### **Typical Rain Water Recharge Pit Details:**

⇒ Considering coefficient for Evaporation/ Spillage and first flush etc.

= 0.700

⇒ Total Storm Water Flow = 2573 X 0.700 m<sup>3</sup>/Hour

= 1801.1 m<sup>3</sup>/Hour

SAY = 1801 m<sup>3</sup>/Hour

#### **VOLUME OF STORM WATER**

Total Storm Water Flow = 1801 m<sup>3</sup>/hr

Considering 15 minutes (0.25 Hr) Retention Period.

Volume Required = 1801 x 0.25

= 450.25 m<sup>3</sup>

Volume = 450 m<sup>3</sup>

Considering 1 No. Rain Water Harvesting Pit of size 4 m dia and 2.5 m effective

depth.

Volume of One No. Rain Water Harvesting Pit

Diameter of Pit (d) = 4 m

Radius (r) = 2 m

Water Depth (h) = 2.5 m

Volume of 1 No. Rain Water Harvesting Pit

$$= 1.0 \times \pi r^2 h$$

$$= 1.0 \times 3.14 \times (2)^2 \times 2.5$$

$$= 31.4 \text{ m}^3$$

No. of Rain Water Harvesting Pit

Total No. of rain water harvesting pit required

$$= \text{Total Volume} / \text{Volume of One Rain Water Harvesting Pit}$$

$$= 450 / 31.4$$

$$= 14.33 \text{ Nos.} \approx 14 \text{ Nos.}$$

**Total no. of Rain Water Harvesting Pit Required = 14 Nos.**

**Actual Rain Water Available on Normal Rainfall**

Rainfall during monsoon = 1505 mm/yr (in 54 days)

Average daily rainfall during monsoon = 27.8 mm/day say 28 mm/day

**Total Run-off: Roof Top**

Intensity of rainfall = 28 mm/day

Drainage area in Sqm = 3053.12 m<sup>2</sup>

Coefficient of run-off = 0.90

Therefore, runoff = 0.90 x 0.028 x 3053.12 = **76.93 m<sup>3</sup>/day**

**Total Run-off: Paved Surface**

Intensity of rainfall = 28 mm/day

Drainage area in Sqm = 20643.95 m<sup>2</sup>

Coefficient of run-off = 0.70

Therefore, runoff = 0.70 x 0.028 x 20643.95 = **404.6 m<sup>3</sup>/day**

**Total Run-off: Unpaved Surface**

Intensity of rainfall = 28 mm/day

Drainage area in sqm = 28323 m<sup>2</sup>

Coefficient of run-off = 0.15

Therefore, runoff = 0.15 x 0.028 x 28323 = **118.9 m<sup>3</sup>/day**

**Total Runoff Load = (76.93+404.6+118.9) m<sup>3</sup>/day**

	<p style="text-align: right;"><b>= 600.43 m<sup>3</sup>/day ≈ 600 m<sup>3</sup>/day</b></p> <p>Actual Rain Water for 4 Months = 600 x 120 = 72000 m<sup>3</sup></p> <p><b>Actual Rain Water Available on Normal Rainfall = 72000 m<sup>3</sup></b></p> <p>Fresh Water Requirement = 141.3 m<sup>3</sup>/day</p> <p>Fresh Water Requirement per year = 141.3 x 365 = 51574.5 m<sup>3</sup>/Year</p> <p>Rain Water Available during Monsoon Season = 72000 m<sup>3</sup></p> <p><b>Actual Rain Water Harvesting = 51574/72000 = 0.71 x 100= 71 %</b></p>
<b>2.8</b>	<b>What would be the impact of the land use change occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding of water logging in any way?</b>
<b>Ans:</b>	The project will involve construction of rooftop & paved areas and hence, quantity of runoff will increase due to reduced infiltration & increase in surface run off coefficient in post construction phase as compared to the pre-construction phase. The overflow during abnormally heavy rains will follow the run off patterns. The proposed rainwater structures have been designed for accommodating peak rainfall intensity (120 mm/hr), which will not aggravate the problem of flooding in the project area.
<b>2.9</b>	<b>What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, regarding capacity, and approvals obtained from competent authority, if any)</b>
<b>Ans:</b>	During operation phase, it is proposed that water shall be sourced from Ground Water. Required permissions shall be obtained from concerned authorities.
<b>2.10</b>	<b>What precautions/measures are taken to prevent the run-off from construction stage of the project?</b>
<b>Ans:</b>	<p>There are effective measures adapted to reduce the storm water run-off from the construction site</p> <ul style="list-style-type: none"> <li>• Ensuring vehicles stick to the access track.</li> <li>• Cleaning all mud and dirt deposited on roads from construction-related activities.</li> <li>• Constructing a fence around the site to trap sediment whilst allowing water to flow through.</li> <li>• Diverting up-slope water with turf and not mixing mortar in locations that will drain into storm water system.</li> <li>• Preventing wastewater from brick cutting activities and stockpiles entering the storm water system.</li> <li>• Construction material will be stored at the earmarked places and will be covered with a temporary shed ensuring that no leach ate or spoilage of land occurs.</li> <li>• Curing water will be sprayed and, after liberal curing, all concrete structures will be painted &amp; covered with gunny bags, then the water will be sprayed. This will help to save water.</li> <li>• The construction waste water shall be routed through sedimentation tank. After sedimentation, comparatively clean water shall be partially reused and rest part will be discharged to drain system.</li> </ul>

<b>2.11</b>	<b>How is the storm water from within the site managed? (State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels)</b>
<b>Ans:</b>	The storm water from paved surfaces and landscaped surfaces will be properly channelized to the rain water harvesting sumps through efficient storm water network. The storm water drain has been designed to cater the flow during peak intensity of rain (120 mm/hr). The water recharge structure has also been designed for peak intensity and for maximum capture of surface run off. The roof top rain water stored will be used for flushing and landscaping purpose. The storm water drains will be cleaned in the pre-monsoon phase so that the possibility of the ground water pollution & water logging can be minimized / avoided.
<b>2.12</b>	<b>Will the deployment of construction laborers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)</b>
<b>Ans:</b>	Proper on-site sanitation facilities will be provided for the construction laborers so as to avoid defecation in and around project site. Septic tank and soak pits will also be constructed for collection and treatment of domestic waste water generated from the construction laborers use. Moreover, on-site sanitation facilities, water supply for drinking and other domestic uses will also provided during the construction stage of the project.
<b>2.13</b>	<b>What on-site facilities are provided for the collection, treatment &amp; safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology &amp; facilities for recycling and disposal).</b>
<b>Ans:</b>	It is expected that the project will generate approx. 180.16 KLD of waste water. Out of which 131 KLD of recoverable water from STP which will be used within the project. STP is designed to treat 200 KLD waste water. Treatment plant proposed here is completely MBBR Technology.
<b>2.14</b>	<b>Give details of dual plumbing system it treated waste used for flushing of toilet or any other use.</b>
<b>Ans:</b>	There will be separate pipelines for the supply of the fresh water and treated water from STP. Treated water will be used for the flushing purposes, and landscaping purposes, while the fresh water will be used for other domestic consumption.
<b>3.</b>	<b>VEGETATION</b>
<b>3.1</b>	<b>Is there any threat of the project to the bio diversity? (Give a description of the local ecosystem with its unique features, if any)</b>
<b>Ans:</b>	The project is not expected to pose any threat to the biodiversity of the locality. Moreover, plantation along the periphery of the project site will posses positive impact on biodiversity.
<b>3.2</b>	<b>Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees &amp; vegetation affected by the project).</b>
<b>Ans:</b>	The construction activity involves removal of few bushes and scrubs as preliminarily assessed. It is proposed to develop peripheral greenbelt of native plant species to enhance the aesthetic value of the region and also provide an excellent habitat for various faunal groups.
<b>3.3</b>	<b>What are the measures proposed to be taken to minimize the likely impacts on</b>

	<b>important site features (Give details of proposal for tree plantation, landscaping, creation or water bodies etc along with a layout plan to an appropriate scale)</b>
<b>Ans:</b>	Total green area measures about 28323 Sqm (24.61% of Plot area)of the plot area which will be area under tree plant ation within periphery of the residential plots. Evergreen tall and ornamental trees and ornamental shrubs have been proposed to be planted inside the premises.
<b>4.</b>	<b>FAUNA</b>
<b>4.1</b>	<b>Is there likely to be any displacement of fauna-both terrestrial and aquatic or creation of barriers for their movement? Prove the details.</b>
<b>Ans:</b>	No. The existing land use around the site is urban and does not provide a habitat.
<b>4.2</b>	<b>Any direct or indirect impacts on the avifauna of the area? Provide details.</b>
<b>Ans:</b>	The project will not have any direct or indirect impacts on the avifauna of the area. However, planting of fruit bearing trees in the proposed greenbelt will be an attraction to the local bird population.
<b>4.3</b>	<b>Prescribe measures such as corridors, fish ladders etc to mitigate adverse on fauna</b>
<b>Ans:</b>	Not applicable
<b>5.</b>	<b>AIR ENVIRONMENT</b>
<b>5.1</b>	<b>Will the project increase atmospheric concentration of gases &amp; result in heat island? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increase traffic generation as a result of the proposed constructions)</b>
<b>Ans:</b>	There will be no emission of dust, fumes or gas during the operational stage, However, as there will be building blocks, there might remain a possibility of slight increase in heat island effect, which can be mitigated in the following means: <b>Impact:</b> <ul style="list-style-type: none"> <li>• Urban Heat island effect due to increase in the paved areas (Roof &amp; Non Roof)</li> <li>• Emissions due to traffic load.</li> </ul> Emission due to DG set <b>Mitigation Measures:</b> <b>Heat Island Effects: Roof</b> <ul style="list-style-type: none"> <li>• The roof will be covered with solar panels which will reduce the exposed roof area.</li> <li>• The other exposed roof will be covered with white china mosaic tiles to reduce the heat gains inside the building.</li> </ul> <b>Heat Island Effects: Non Roof</b> <ul style="list-style-type: none"> <li>• Stilt parking has been envisaged to reduce the onsite hard paved areas to the best possible extent.</li> <li>• About (24.61 %) of the area will be under green area, which will mitigate heat island effect.</li> </ul> <b>Fugitive dust emission:</b> <b>Sources:</b> <ul style="list-style-type: none"> <li>• Construction activities</li> <li>• Vehicular movement</li> <li>• Road construction</li> <li>• Paved and unpaved area emission</li> </ul> <b>Mitigation:</b>

	<ul style="list-style-type: none"> <li>• Screening the construction site with the help of tarpaulin to contain the emissions within the site.</li> <li>• Water spraying on the haul roads.</li> <li>• Storage of construction material and waste at earmarked places and well covered.</li> </ul>
<b>5.2</b>	<b>What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.</b>
<b>Ans:</b>	<p>General micro-meteorological data of the study area confirms that the climate status of study area is consistent with the regional meteorology.</p> <p>The impacts of dust and gaseous pollutants due to different construction activities will be localized and will not affect the surrounding environment. All necessary measures will be taken.</p> <ul style="list-style-type: none"> <li>• During Construction, water spraying at dust generation sources.</li> <li>• During Construction, All transportation vehicles will be suitably covered to prevent dust dispersion from the trucks, and overloading of the vehicles will be avoided and must be PUC certified vehicle.</li> <li>• The D.G. set will be provided with adequate safe stack height as per the norms of CPCB, above the roof of the D.G. house to regulate the emission within the permissible norms.</li> <li>• Low sulphur content fuel will be used which will help to contain the emission within the permissible range.</li> </ul>
<b>5.3</b>	<b>Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure &amp; measures proposed for improvement including traffic management at the entry &amp; exit to the project site.</b>
<b>Ans:</b>	There will be no shortage of parking space for vehicles. Details given in Chapter-10 of EMP.
<b>5.4</b>	<b>Provide details of the movement patterns with internal roads, bicycles tracks, and pedestrian pathways, footpaths etc., with areas under each category.</b>
<b>Ans:</b>	The movement pattern inside the project area will be guided traffic ways. There will not be any separate bicycle tracks or pedestrian pathways on the periphery (driveway). The details given in Traffic Circulation plan of EMP.
<b>5.5</b>	<b>Will there be significant increase in traffic noise &amp; vibration? Give details of the sources and the measures proposed for mitigation of the above.</b>
<b>Ans:</b>	<p>There might be marginal increase in movement of light vehicles, private cars and 2 wheelers in the area due to the proposed project. The movement of such vehicles in the area and blowing of their horns may marginally contribute to the noise levels.</p> <p>The following measures will be adopted to reduce the noise:</p> <ol style="list-style-type: none"> <li>1. Trees with heavy foliage will be planted at the periphery so as to restrict the noise levels within the permissible norms.</li> <li>2. Adequate guards/ traffic controllers will be posted at the entry and exit to supervise smooth traffic flow and avoid traffic congestion.</li> <li>3. Road markings, Stop lines, parking lanes are painted to guide the internal road user.</li> <li>4. Speed of the vehicles will be limited to 15-20 km/h to minimize noise and vibration.</li> </ol> <p><b>Recommended Plants by CPCB for developing green belt</b></p> <p>All tolerant plants are not necessarily good for green belts e.g. Xerophytes with sunken stomata can withstand pollution by avoidance but are poor absorbers of pollutants due</p>



to low gaseous exchange capacity. Therefore selection of plants is very important in green belt development for effective removal of suspended particulate matter and for absorption of gases.

TYPE	Botanical Name	Common Name
<b>SCHEDULES OF TREES</b>		
T1	<i>Saraca indica</i>	Ashok
T2	<i>Azadirachta indica</i>	Neem
T3	<i>Peltophorum ferrugineum</i>	Radhachuda
T4	<i>Pongamia pinnata</i>	Karanj
T5	<i>Aegle marmelos</i>	Bela
T6	<i>Michelia champaca</i>	Champa
T7	<i>Mimusops elengi</i>	Boul
T8	<i>Mesua feria</i>	Nageswar
T9	<i>Calophyllum inophyllum</i>	Polango
T10	<i>Caesalpinia pulcherrima</i>	Godibana
T11	<i>Millingtonia hortensis</i>	Akash mali
<b>SCHEDULES OF PALMS</b>		
P1	<i>Hyophorbe lagenicaulis</i>	Palm
<b>SCHEDULES OF FRUIT TREE</b>		
F1	<i>Phyllanthus emblica</i>	Amla
F2	<i>Psidium guava</i>	Guava
F3	<i>Mangifera indica</i>	Mango
F4	<i>Caryota urens</i>	Salap
<b>SCHEDULES OF LARGE SHRUB</b>		
S1	<i>Ervatamia divaricata</i>	Tagar
S2	<i>Cestrum nocturnum</i>	Hena
S3	<i>Thevetia nerrifolia</i>	Kamia
S4	<i>Nerium oleander</i>	Karabir
S5	<i>Spathodea campanulata</i>	Mysore queen
S6	<i>Cassia fistula</i>	Sunari
S7	<i>Hibiscus chinensis</i>	Mandar
S8	<i>Murraya paniculata</i>	Kamini

**5.6 What will be the impact of DG sets & other equipment noise levels & vibration in and ambient air quality around the project site? Prove details.**

**Ans: Impacts on Air Quality due to DG sets:**

**Impacts :**

- Emission from the stacks attached to stand DG sets during grid power failure.
- Generation of Noise during Operation of DG sets.

**Mitigation Measures**

**On Ambient Air Quality**

- Back up DG sets will comply the applicable emission norms.
- Adequate stack height for DG sets will be provided as per norms.
- Back up DG sets will be used only during power failure only.
- Regular monitoring of emission from DG sets and ambient air quality will be carried out as per norms.

**On Noise Control**

DG sets will be installed away from habitation, so that reduce the impact on ambient noise and habitation.

DG room will be provided with acoustic enclosures / treatment to insure 25 dB (A) insertion loss as per the regulations.

Adequate exhaust mufflers will be provided as per norms to limit the noise.

<b>6.</b>	<b>AESTHETICS</b>
<b>6.1</b>	<b>Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?</b>
<b>Ans:</b>	The maximum height of the Residential building block of the proposed project will be 50.93 mtr. Sufficient inter building open spaces will also be kept so that natural scenic view and natural air movement do not get disturbed. Green cover provided will not only act as pollution sink but also overall increase the aesthetic view of that area.
<b>6.2</b>	<b>Will there be any adverse impacts from new construction on the existing structures? What are the considerations taken into account?</b>
<b>Ans:</b>	No. Since the plot is vacant in nature, and there are no nearby exists structures, no impacts on the existing structure is envisaged.
<b>6.3</b>	<b>Whether there are any local considerations or urban form &amp; urban design influencing the design criteria? They may be explicitly spelt out.</b>
<b>Ans:</b>	The entire project will be developed by abiding the local rules and regulations set by, the regulatory authority. The urban form and urban design of the proposed project will be influenced by the local consideration and simultaneously most contemporary from aesthetic and user point of view.
<b>6.4.</b>	<b>Are there any anthropological or archaeological sites or artifacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.</b>
<b>Ans:</b>	No anthropological or archaeological sites or artifacts are located nearby the project site.
<b>7.</b>	<b>SOCIO-ECONOMICS ASPECTS</b>
<b>7.1</b>	<b>Will the proposal result in any changes to the demographic structure of local population? Provide the details.</b>
<b>Ans:</b>	Some local people will be economically benefited in terms of employment, support services etc during the construction phase of the project. Some manpower and services shall also be extended when residential apartment and is developed and under usage. A beneficial impact is envisaged due to operation of proposed residential apartment.
<b>7.2</b>	<b>Give details of the existing social infrastructure around the proposed project.</b>
<b>Ans:</b>	As already stated that the land use of the project surroundings is mixed in nature. The existing social infrastructure of the area is well developed. Areas occupied by sensitive man-made land uses like hospitals, schools, places of worship, community facilities found within a distance of 7-12 km from the project site.
<b>7.3</b>	<b>Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?</b>
<b>Ans:</b>	The project will not cause any adverse impact on local community during the construction or operational stage. No sacred site is located surrounding the project site. Construction activities will not cause any harm to the local inhabitants in terms of emission, waste generation, effluent generation, noise etc. During the operational phase also, the generated waste water and solid waste from the apartment will be properly managed so that the local community as well as the existing physical infrastructure does not feel any stress. The safeguards are mentioned in the Environmental

	Management Plan. However Construction phase will generate jobs that relate to unskilled, semi skilled as well as skilled labour category & boost the local economy.
<b>8.</b>	<b>BUILDING MATERIALS</b>
<b>8.1</b>	<b>May involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)</b>
<b>Ans:</b>	The basic materials viz. cement, steel, bricks, stones, ready mix concrete, sand, gypsum, plywood, hard wood, aluminum, glass, etc. will be used <ul style="list-style-type: none"> <li>• Low energy embodied materials will be given preference.</li> <li>• Ready Mix concrete will be used.</li> <li>• Minimizing the transport of temporary structures, scaffolding, formwork, consumables and building product to the construction site.</li> <li>• Minimizing overall waste and the transport of waste from site.</li> <li>• Use of energy efficient lighting.</li> <li>• Ensuring idle construction equipment is throttled down or switched off.</li> <li>• Wherever possible, eco friendly and convention construction material shall be used</li> </ul>
<b>8.2</b>	<b>Transport and handling of materials during construction may result in pollution, noise &amp; public nuisance. What measures are taken to minimize the impacts?</b>
<b>Ans:</b>	During the construction phase, the following measures will be taken to prevent pollution: <ul style="list-style-type: none"> <li>• Covering of the construction site from all four sides to a substantial height to prevent dust emissions and other pollutants into surrounding area.</li> <li>• Covering loads to limit materials or litter blowing off and reducing smells.</li> <li>• Ready mix concrete will be used for concreting. This avoids cement and aggregate handling fugitive emissions and noises.</li> <li>• No construction material or debris will be stored outside the site premises.</li> <li>• Noise machines will be preferred after 10.00 am. Loading and unloading will be done with low height.</li> <li>• Light pollution will be restricted using cut-off shield fixtures on site.</li> <li>• Water spraying to prevent dust pollution from different sources of construction.</li> <li>• Speed restriction of all the vehicles approaching the site and within the site.</li> <li>• All transportation vehicles will be suitably covered with tarpaulin &amp; overloading of the vehicles will be avoided and must be pollution checked vehicle.</li> <li>• Traffic controllers will be engaged to control movement of the construction vehicles.</li> </ul>
<b>8.3</b>	<b>Are recycled materials used in roads and structure? State the extent of savings achieved?</b>
<b>Ans:</b>	Yes, the waste generated as PUC cement, reinforced steel, ceramic tiles will be used as a construction material. This will also help to achieve the primary energy efficiency. The excavated soil will be used for backfilling as well as for creating landscaped areas.
<b>8.4</b>	<b>Give details of the methods of collection, segregation and disposal of the garbage generated during the operation phases of the project.</b>

<b>Ans:</b>	From the proposed housing project solid waste in form of food waste from kitchen and miscellaneous waste will be generated @ 0.45 kg/person/day, which will be about 639 kg/day. The waste generated from floating population in residents will be @ 0.15 kg/day, which will be 21.3 kg/day. The generated solid waste from the residential areas will be segregated as biodegradable and non-biodegradable. This will be collected in separate colored bins. Proper waste management practices will be adopted during the collection, storage and disposal of the generated solid waste and construction and demolition waste.
<b>9.</b>	<b>ENERGY CONSERVATION</b>
<b>9.1</b>	<b>Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?</b>
<b>Ans;</b>	During the operational phase of the project, power requirement will be around <b>817 KW</b> is energy consumption assumed. The power will be entirely supplied by 11 kV source of Odisha State Electricity Board. In case of power cut, 100% power backup generators will be provided for lobby and building peripheral lighting. To minimize energy consumption following Energy efficient features will be adopted, <ul style="list-style-type: none"> <li>• Provision of LED lighting features</li> <li>• Roof top thermal insulation</li> <li>• Maximum utilization of natural light</li> <li>• Provision of Solar street lighting and Solar Power generation on terrace</li> <li>• Use of energy efficient appliances</li> </ul>
<b>9.2</b>	<b>What type of and capacity of power back-up to you plan to provide?</b>
<b>Ans:</b>	There is provision of 2 nos. of DG sets of 500 KVA capacities for power back up in the Proposed Housing Project.
<b>9.3</b>	<b>What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short and long wave radiation?</b>
<b>Ans:</b>	The project, being Housing Project, the interior wall will be made by using eco-friendly Autoclaved Aerated Concrete Panels using fly ash and cement having U-factor of overall assembly of 3.35 W/ m <sup>2</sup> -°C and Opaque walls shall comply with the maximum U-factor overall assembly of 2.440 W/ m <sup>2</sup> -°C
<b>9.4</b>	<b>What passive solar architectural features are being used in the building? Illustrate the application made in the proposed project.</b>
<b>Ans:</b>	Passive solar design refers to use of the sun's energy for the heating and cooling of living spaces. The position of windows in proposed building such that, there will be maximum utilization of natural sun light. The following passive features will be adopted, <ul style="list-style-type: none"> <li>• The width to height ratio between the apartments is achieved as per BDA rules.</li> <li>• All window openings are provided with chajjas and wall projections as specified by design standards.</li> <li>• The full heights openings have been designed for better lighting in the apartment units.</li> <li>• Use of large fenestration in buildings reduces the use of mechanical light energy during time thereby reducing the energy consumption.</li> </ul>

9.5	<b>Does the layout of streets &amp; buildings maximize the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building ? Substantiate with details.</b>
Ans:	Layout of buildings has been done as per the sun path analysis so that the design cuts off direct radiations of critical hours which are specific to the orientation. Solar energy will be harnessed to meet various energy requirements of the project such as: Solar street lighting.
9.6	<b>Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of walls on the East and the West and the Roof? How energy saving has been effected?</b>
Ans:	Yes. The shading devices of the building blocks will be designed in such a way that it cuts the glare but allow maximum amount of diffused sunlight. Also, the roofs of the building blocks will have adequate thermal insulation. Green area and open areas will be so spaced that a reduction in temperature is achieved.
9.7	<b>Do the structures use energy efficient space conditioning lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air conditioning load assumption? Are you using CFC &amp; HCFC free chillers? Provide specifications.</b>
Ans:	Appliances with relatively high operating efficiencies will be used for proper utilization of power and to avoid power losses. However, higher efficiency appliances provide a measure of less air pollution and noise pollution.
9.8	<b>What are the likely affects of the building activity in altering the micro climates? Provide a self assessment on the likely impacts of the proposed construction creation of heat island &amp; inversion effects?</b>
Ans.	During the operational stage, the proposed apartment will not generate any emission of dust, fumes or gas so that atmospheric concentration of gases increase. However, as there will be building blocks, there might remain a possibility of slight increase in heat island effect. Heat emissions from the proposed construction may be from the following sources: <ul style="list-style-type: none"> <li>• Heat absorbed from the paved and concrete structures</li> <li>• Heat generated from equipment/appliances</li> <li>• Heat increase due to population increase in the proposed Residential flats project.</li> </ul> However, the heat generated will not be significant and will be dissipated in the green and open areas provided within the project area. Ambient air quality in and around the project site has been monitored. The traffic movement also will be controlled within the apartment.
9.9	<b>What are the thermal characteristics of the building envelope? (a) roof, (b) external walls; and (c) fenestration? Give details of the material used and the U-Values or the R-Values of the individual components.</b>
Ans	Roofs are provided with insulation suitable to achieve a maximum of U-factor of overall assembly of 3.35 W/ m <sup>2</sup> -°C and Opaque walls shall comply with the maximum U-factor overall assembly of 2.440 W/ m <sup>2</sup> -°C.
9.10	<b>What precautions and safety measures are proposed against fire hazards? Furnish details of emergency plans.</b>



<b>Ans:</b>	<p>The details of the fire fighting installations are given below:</p> <p><b>Management &amp; fire prevention hazard:-</b></p> <p>The entire fire safety installations shall be compliant with the codes/ standards for the entire project site to ensure the highest safety standard and uniformity of the system. Fire protection system shall be fully operated and tested under simulated conditions to demonstrate compliance with the standards, codes and guidelines. Firefighting system will be provided keeping in view guidelines of following:-</p> <p>a) National Building Code 2016- Part IV, Fire and Safety.  b) Relevant BIS codes  c) Consultation with local Chief fire officer</p> <p><b>(FOR BUILDINGS)</b> As per NBC 2016, Following are the requirements:-</p> <p>a) Fire extinguishers  b) First aid hose reel  c) Down comer  d) Manually operated electronic fire alarm system  e) 25,000 liters overhead separate water storage tank at each terrace.  f) 900 lpm booster at each terrace.  g) Fire system as per requirements of Chief fire officer.</p> <p><b>DISASTER MANAGEMENT PLAN</b></p> <p>Details of the Risk Assessment and Disaster Management Plan given in the EMP Report</p>
<b>9.11</b>	<b>If you are using glass as a material provides details and specifications including emissive and thermal characteristics.</b>
<b>Ans:</b>	The project being Residential flats So glass will not be used as wall material.
<b>9.12</b>	<b>What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.</b>
<b>Ans:</b>	<p>To minimize air leakage, the exterior facade of the proposed building will be fixed and sealed in nature. Operable window area within the building will be comparatively low, which will be opened during humid conditions for ventilation. Thus, scope of air infiltration into the building is minimum in this project.</p> <p>The project footprint has been so placed in the site plan to ensure enough air circulation around the building by natural air movement. This will help in cooling the building in summer and thus help in conservation of energy.</p>
<b>9.13</b>	<b>To what extent in the non-conventional energy technologies are utilized in the overall energy consumption? Provide details of the renewable energy technologies.</b>
<b>Ans:</b>	<p>Solar energy will be variedly used as:</p> <ul style="list-style-type: none"> <li>• Solar street lights.</li> <li>• Solar Water System.</li> <li>• Solar Lighting.</li> <li>• LEDs will be used in buildings to minimize the energy consumption.</li> <li>• Green area is provided along with tree plantation which will result in natural air cooling and will reduce the load on conventional energy sources.</li> </ul>
<b>10.</b>	<b>ENVIRONMENTAL MANAGEMENT PLAN</b>
<b>Ans:</b>	Details of the Environmental Management Plan given in the EMP Report.



# Bhubaneswar Municipal Corporation, Bhubaneswar

Vivekananda Marg, Near Kalpana Square, Bhubaneswar, PIN-751014

No. 51179/BMC

dt. 01.11.2022,

Annexure-3

FORM-II

[See Rule-10(5) Rule-2020]

## File No MBP-BMC-02-0023/2017

Permission Under Sub-Section (3) of the Section-16 of the Odisha Development Authorities Act'1982 (Odisha Act, 1982) is hereby granted in favour of **M/s Shuvam Construction Pvt. Ltd. Mr. Dillip Kumar Majhi , Mrs. Kiran Bala Majhi, Mr.Tuku Ojha, Mrs. Madhusmita Majhi ,Mrs. Sarita Jayanti Pradhan Alias Majhi, Mrs. Sasmita Majhi, Mrs. Puspalata Barishal, M/S Satyam Construction Co. Partner Sri. Mohan Lal Patel, Mrs. Manasi Sahoo, Mrs.Binodini Sahoo** represented through GPA Holder **M/s Shuvam Construction Pvt. Ltd Director Sri. Jayesh Patel** for Proposed **Multi Storied Residential Apartment Building Block - A & C (2B+G+14) , Block-B & E (2B+G+13) & Block-D (2B+G+12)** storied over **Plot No-4016, 4023/9099, 4010/10999, 4010/9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/9599, 4024,3967, 3968, 3970,4011/9062,4011,4010/10998 & 4028, Khata No. 607 , 1988/958 , 803 , 720 , 1101 , 1678 , 238 , 1988/87 , 1988/86 , 535 , 1228,1332,1123 &1988/957 , Mouza- Ghatikia** under **Bhubaneswar Municipal Corporation** in the Development Plan area of **Bhubaneswar** with the following parameters and conditions;

### 1. Parameters:

**Total Recorded Area - Ac 3.075 Dec. = 12443.97 Sqm.**

**Future Development Area - Ac 0.332. Dec = 1,343.54 Sqm.**

**Total Road Area - Ac 0.147 Dec. = 594.88 Sqm.**

**Acquisition Area of Sewerage Board - Ac0.090Dec. = 364.21 Sqm.**

**Project Plot Area - Ac 2.506 Dec. = 10141.34 Sqm**

### • Basement Area :

Particulars	Built-Up Area	FAR Area	Parking Area	Proposed use	No.of Dwelling Units
Lower Basement	6151.82 sqm	259.41 sqm.	5892.41 sqm.	Parking+Service area	Nil
Upper Basement	6151.82 sqm	259.41 sqm.	5892.41 sqm.	Parking+Service area	Nil
SUB-TOTAL	12303.64 sqm	518.82 sqm.	11784.82 sqm.	-	-

### I. Block - A (2B+G+14) :

Particulars	Built-Up Area	FAR Area	Proposed use	No.of Dwelling Units
Ground Floor	821.60 Sqm	783.57 sqm.	Society Room + Gym + Aerobics + Entrance Lobby	Nil
1 <sup>st</sup> floor	780.18 Sqm	742.15sqm.	Society Room + Meeting Room + Game Room	Nil
Typical Floor-(2 <sup>nd</sup> to 5 <sup>th</sup> )	3286.40 Sqm	3134.28sqm.	Residential	4 nos x 13 =
Typical Floor-(6 <sup>nd</sup> to 14 <sup>th</sup> )	7394.40 Sqm	6807.69sqm.		52 nos (Fifty Two)
SUB-TOTAL	12282.58 Sqm.	11467.69 sqm	-	52 nos (Fifty Two)





# Bhubaneswar Municipal Corporation, Bhubaneswar

Vivekananda Marg, Near Kalpana Square, Bhubaneswar, PIN-751014

## II. Block - B (2B+G+13) :

Particulars	Built-Up Area	FAR Area	Proposed use	No. of Dwelling Units
Ground Floor	490.55 Sqm	450.76 sqm.	Residential+ Entrance Lobby	3 nos (Three)
Typical Floor- (1 <sup>st</sup> to 5 <sup>th</sup> )	2438.00sq m.	2239.05sqm.	Residential	4 nos x 13 =
Typical Floor- (6 <sup>nd</sup> to 13 <sup>th</sup> )	3900.80 Sqm	3456.40 sqm.		52 nos (Fifty Two)
SUB-TOTAL	6829.35 Sqm.	6146.21 sqm	-	55 nos (Fifty Five)

## III. Block-C (2B+G+14) :

Particulars	Built-Up Area	FAR Area	Proposed use	No. of Dwelling Units
Ground Floor	665.63 Sqm	628.28 sqm.	Residential+ Entrance Lobby	3 nos (Three)
Typical Floor- (1 <sup>st</sup> to 5 <sup>th</sup> )	3284.45 Sqm	3097.7sqm.	Residential	4 nos x 14 =
Typical Floor- (6 <sup>nd</sup> to 14 <sup>th</sup> )	5912.01 Sqm	5362.74sqm.		56 nos (Fifty Two)
SUB-TOTAL	9862.09 Sqm.	9088.72 sqm	-	59 nos (Fifty Nine)

## IV. Block-D (2B+G+12) :

Particulars	Built-Up Area	FAR Area	Proposed use	No. of Dwelling Units
Ground Floor	490.55 Sqm	450.76 sqm.	Residential+ Entrance Lobby	3 nos (Three)
Typical Floor- (1 <sup>st</sup> to 5 <sup>th</sup> )	2438.00Sq m	2239.05sqm.	Residential	4 nos x 12 =
Typical Floor- (6 <sup>nd</sup> to 12 <sup>th</sup> )	3413.20 Sqm	3024.35sqm.		48 nos (Forty Eight)
SUB-TOTAL	6341.75 Sqm.	5714.16 sqm	-	51 nos (Fifty One)

## V. Block-E (2B+G+13) :

Particulars	Built-Up Area	FAR Area	Proposed use	No. of Dwelling Units
Ground Floor	665.63 Sqm	628.28 sqm.	Residential+ Entrance Lobby	3 nos (Three)
Typical Floor- (1 <sup>st</sup> to 5 <sup>th</sup> )	3284.45 Sqm.	3097.70sqm.	Residential	4 nos x 13 =
Typical Floor- (6 <sup>nd</sup> to 13 <sup>th</sup> )	5255.12 Sqm	4766.88 sqm.		52 nos (Fifty Two)
SUB-TOTAL	9205.20 Sqm.	8492.86 sqm	-	55 nos (Fifty Five)





# Bhubaneswar Municipal Corporation, Bhubaneswar

Vivekananda Marg, Near Kalpana Square, Bhubaneswar, PIN-751014

## • Total Area (Basement+I+II+III+IV+V) :

Particulars	Built-Up Area	FAR Area	Proposed use	No.of Dwelling Units
SUB-TOTAL (Basement)	12303.64 sqm	518.82 sqm. (Service)	11784.82 sqm. (Parking)	-
SUB-TOTAL (I+II+III+IV+V)	44520.97 Sqm.	40909.64 sqm.	Residential	272 nos (Two Seventy Two)
<b>Total</b>	56824.61 Sqm.	41428.46 Sqm.	-	272 nos (Two Seventy Two)

## • Height:

A	<b>Block - A &amp; C (2B+G+14)</b>	49.68 mtr
B	<b>Block-B &amp; E (2B+G+13)</b>	46.63 mtr
C	<b>Block-D (2B+G+12)</b>	43.58 mtr

## • Parking:

Lower Basement	5982.41 Sqm
Upper Basement	5982.41 Sqm
Stack Parking	765.00 Sqm.
Total Parking	12549.82 Sqm.

## • Setbacks (Building) :

Front Set back	9.03 Mtr.
Rear Set back	8.06 Mtr
Left side	8.38 Mtr
Right side	9.12 Mtr

2. The building shall be used exclusively for **Residential Apartment** purpose and the use shall not be changed to any other use without prior approval of this Authority.
3. The development shall be undertaken strictly according to plans enclosed with necessary permission endorsement.
4. Parking space measuring **12549.82 Sqm** as shown in the approved plan shall be left for parking of vehicles and no part of it shall be used for any other purpose and shall not be partitioned/closed in any manner.
5. The land over which construction is proposed is accessible by an approved means of access of **18.29 M (Eighteen point Two Nine mtr)** in width.
6. The land in question must be in lawful ownership and peaceful possession of the applicant.
7. The permission granted under these regulations shall remain valid up to three years from the date of issue .However the permission shall have to be revalidated before the expiry of the above period on payment of such fee as may be prescribed under rules and such revalidation shall be valid for one year.
8.
  - i) Approval of plans and acceptance of any statement or document pertaining to such plan shall not exempt the owner or person or persons under whose supervision the building constructed from their responsibilities imposed under ODA (Planning & Building Standards) Rules-2020, or under any other law for the time being in force.
  - ii) Approval of plan would mean granting of permission to construct under these Rules in force only and shall not mean among other things;







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- (a) The title over the land or building;
  - (b) Easement rights;
  - (c) Variation in area from recorded area of a plot or a building;
  - (d) Structural stability
  - (e) Workmanship and soundness of materials used in the construction of the buildings
  - (f) Quality of building services and amenities in the construction of the building,
  - (g) the site/area liable to flooding as a result of not taking proper drainage arrangement as per the natural lay of the land, etc and
  - (h) Other requirements or licenses or clearances required to be obtained for the site /premises or activity under various other laws.
  - (i) In case of any dispute arising out of land record or in respect of right, title, interest after this permission is granted, the permission so granted shall be treated as automatically cancelled during the period of dispute.
  - (j) Neither granting of the permit nor the approval of the drawing and specifications, nor inspections made by the Authority during erection of the building shall in any way relieve the owner of such building from full responsibility for carrying out the work in accordance with the requirements of NBC 2016 and these Rules.
9. **The owner /applicant shall;**
- a. Permit the Authority to enter the building or premises, for which the permission has been granted at any reasonable time for the purpose of enforcing the regulations;
  - b. Obtain, wherever applicable, from the competent Authority permissions/clearance required in connection with the proposed work;
  - c. Ensure that the PMO (project manager organization) engaged by him shall take up site & field verification and submit stage wise report as required under Rule 14 of ODA (P & BS) Rules-2020.
  - d. Obtain an Occupancy Certificate from the Authority prior to occupation of building in full or part.
  - e. Register the said Apartment project over scheduled property under the Real Estate (Regulation & Development)-Act-2016
10. Wherever tests of any material are made to ensure conformity of the requirements of the regulations in force, records of the test data shall be kept available for inspection during the construction of building and for such period thereafter as required by the Authority.
11. The persons to whom a permit is issued during construction shall keep pasted in a conspicuous place on the property in respect of which the permit was issued;
- (a) A copy of the building permit; and
  - (b) A copy of approved drawings and specifications.
12. If the Authority finds at any stage that the construction is not being carried in accordance to the sanctioned plan or is in violation of any of the provisions of these regulations, it shall notify the owner and no further construction shall be allowed until necessary corrections in the plan are made and the corrected plan is approved.





# Bhubaneswar Municipal Corporation, Bhubaneswar

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13. This permission is accorded on deposit /submission of the following; This permission is accorded on deposit /submission of the following;

Item	Amount (in Rs)	Amount in words
Sanction fee	28,41,231.00	(Rupees Twenty Eight Lakh Forty One Thousand Two hundred Thirty One) only.
Scrutiny fee	5,68,496.00	(Rupees Five Lakh Sixty Eight Thousand Four Hundred Ninety Six) only.
CWWC fee	37,12,777/-1 <sup>st</sup> installment (Out of 1,11,38,331/-	(Rupees Thirty Seven Lakh Twelve Thousand Seven Hundred Seventy Seven) only.
EIDP fee	27,84,583/-1 <sup>st</sup> installment (Out of 1,11,38,331/-	(Rupees Twenty Seven Lakh Eighty Four Thousand Five Hundred Eighty Three) only.
Purchasable FAR	1,01,92,266/-1 <sup>st</sup> installment (Out of 4,07,69,064/-	(Rupees One Crore One Lakh Ninety Two Thousand Two Hundred Sixty Six) only.
Shelter fee	46,96,200/-1 <sup>st</sup> installment (Out of 1,87,84,800/-	(Rupees Forty Six Lakh Ninety Six Thousand Two Hundred) only.

14. The applicant /Developers shall deposit the subsequent installments of CWCC as detailed bellow:-
- 1<sup>st</sup> installment before issue of permission letter (**already deposited**)
  - 2<sup>nd</sup> & 3<sup>rd</sup> installment of CWCC will be deposited on or before 2<sup>nd</sup>& 3<sup>rd</sup> year ending date of approval in respectively. As per order No10141/HUD,dt.28.04.2016.
15. The applicant /Developers shall deposit the subsequent installments of EIDP/purchasable FAR/Shelter Fees as detailed bellow:-
- 1<sup>st</sup> installment before issue of permission letter (**already deposited**)
  - 2<sup>nd</sup> installment at the time of submission of 3<sup>rd</sup> party verification report at plinth level.
  - 3<sup>rd</sup> installment at the time of submission of 3<sup>rd</sup> party verification report at after casting of ground floor roof.
  - 4<sup>th</sup> instilment at the time of submission of application for Occupancy certificate.
16. **Other conditions to be complied by the applicant are as per the following;**
- The owner/applicant/Technical Person shall strictly adhere to the terms and conditions imposed in the NOC from PHED vide Letter No- 10823 dt. 31.08.2021 , & NOC from CGWA vide letter No-CGWA/NOC/INF/ORIG/2021/12932/dt.16.09.2021, FIRE SAFETY RECOMMENDATION vide letter No-RECOMM1204130012021000178/dt.19.07.2021 , NOC from Airport Authority of India vide letter No-BHUB/EAST/B/010821/522056/dt.16.02.2022 , Structural Vetting Certificate from INDIAN INSTITUTE OF TECHNOLOGY, GUWAHATI on Dt.21.10.2022 , SEIAA NOC vide EC Identification No.EC22B038OR134872 on Dt.22/07/2022, Drainage vetting Letter No.10071 on Dt.28.01.2022 respectively.
  - The road Area of Ac.0.147 Dec.( 594.88 Sqm.) of the project shall be free gifted to BMC before occupancy.
  - Roof top rain water shall be conveyed and discharged to the rain water Harvesting structure in the premises as per Rule-47 of ODA (Planning & Building Standards) Rules-2020.





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- iv) Provisions of green building norms are to be strictly followed as per Rule-51 of ODA (Planning & Building Standards) Rules, 2020.
- iv) Plantation as required under Rule 30 of ODA (Planning & Building Standards) Rules, 2020 shall be strictly adhered.
- v) At least 10% of the parking shall be earmarked for visitors and 30% of the parking space shall have facility for Electrical Vehicle Charging points.
- vi) The Owner/ Applicant/Architect/Structural Engineer/PMO are fully and jointly responsible for any structural failure of building due to any earthquake/ cyclone/any other natural disaster, structural/construction defects. Authority will be no way be held responsible for the same in what so ever manner.
- vii) The applicant shall get the EIDP approved towards development of External infrastructure, execute it and obtain clearance from Engineering Wing of BMC before Occupancy.

The nos. of dwelling units so approved shall not be changed in any manner.

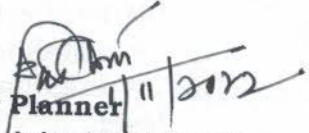
By order


  
City Planner

 Bhubaneswar Municipal Corporation

Memo No. 51180 /BMC, Bhubaneswar, Dated 01.11.2022

Copy forwarded along with **two copies** of the approved plan to **Mr. Jayesh Patel Director M/s Shuvam Construction Pvt. Ltd,** Plot no-564, Vivekananda Marg, Bhubaneswar-02, Dist- Khurda, for information and necessary action.

  
City Planner

 Bhubaneswar Municipal Corporation

Memo No. \_\_\_\_\_ /BMC, Bhubaneswar, Dated \_\_\_\_\_

Copy with a copy of the approved plan forwarded to the Commissioner, Bhubaneswar Municipal Corporation for information.

-sd-  
City Planner

Bhubaneswar Municipal Corporation

Memo No. \_\_\_\_\_ /BMC, Bhubaneswar, Dated \_\_\_\_\_

Copy forwarded to the Land Officer, G.A. Department, Bhubaneswar (in case of lease plot)/Director of Town Planning, Odisha, Bhubaneswar.

-sd-  
City Planner

Bhubaneswar Municipal Corporation





Tel : 0674-2564033

E-mail: paribesh1@ospboard.org

Website: [www.ospboard.org](http://www.ospboard.org)

# STATE POLLUTION CONTROL BOARD, ODISHA

[DEPARTMENT OF FOREST, ENVIRONMENT &amp; CLIMATE CHANGE, GOVERNMENT OF ODISHA]

Paribesh Bhawan, A/118, Nilakantha Nagar, Unit - VIII

Bhubaneswar - 751012

No. 7925 /

IND-II-CTE-6916

Date: 17.05.2023Through online/  
By speed post

## CONSENT TO ESTABLISH ORDER

In consideration of the online application no. **4303327** for obtaining Consent to Establish of **M/s Shuvam Construction Pvt. Ltd.**, the State Pollution Control Board is pleased to convey its Consent to Establish under Section 25 of Water (Prevention & Control of Pollution) Act, 1974 and under Section 21 of Air (Prevention & Control of Pollution) Act, 1981 for **construction of Housing Project of 2B+G+14 High Rise Residential Apartment Building over a total Plot Area of 10,732.17 Sqmt with total Built up Area of 56722.86 Square Meter along with installation of 2 nos. of DG set having 500 KVA capacity each with total project cost of Rs. 95 Crore** with following particulars;

Description	Project Details
Built up area	56722.86 Sqmt.
D.G Set	2x500 KVA
STP with MBBR & ACF Technology	200 KLD
Project Cost including land and building	Rs. 95 Crore

At Plot No. 4016, 4023/9099, 4010/10999, 4010/9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/9599, 4024, 3967, 3968, 3970, 4011/9062, 4011, 4023/9086, 4010/10998, 4028 Khata No. 607, 1988/958, 803, 720, 1101, 1678, 238, 1988/87, 1988/86, 535, 1228, 1332, 1123, 1139, 1988/957 At-Mouza-Ghatikia, Tahasil-Bhubaneswar in the district of **Khordha**, Odisha with the following conditions:

### GENERAL CONDITIONS:

1. This Consent to Establish is valid for the construction project as mentioned in the application form and for a period of **five** years from the date of issue of this letter. If the proponent fails to do substantial physical progress of the project within five years, then a renewal of this Consent to Establish shall be sought by the proponent.
2. The Project has to apply for grant of Consent to Operate under section 25 / 26 of Water (Prevention & Control of Pollution) Act, 1974 & under Section 21 of Air (Prevention & Control of Pollution) Act, 1981 at least 3 (three) months before the occupancy and obtain Consent to Operate from this Board.



3. This Consent to Establish is subject to statutory and other clearances from Govt. of Odisha and/or Govt. of India, as and when applicable.

**SPECIAL CONDITIONS:**

**A. GENERAL CONDITIONS:**

1. The proponent shall comply with the stipulations and carry out construction activity as per the Environmental Clearance granted by MoEF&CC, Govt. of India vide EC Identification No.EC22B038OR134872 & File No. 227993/54-MIS/09-2021, Dtd. 22.07.2022.
2. The unit shall obtain NOC from CGWA for using of ground water for getting Consent to Operate of State Pollution Control Board, Odisha.
3. The proponent shall obtain permission from Department of Water Resources, Govt. of Odisha for drawl of ground water and surface water.
4. The proponent shall implement the pollution control measures and safeguards as proposed in the Environment Management Plan (EMP).
5. Solar or other Renewable Energy shall be installed to meet electricity generation equivalent to 5% of the demand load or 20 W/Sqft. for available roof space, whichever is less.
6. A green belt of adequate width and density preferably with local species along the periphery of the project area shall be raised so as to provide protection against particulates and noise. It must be ensured that at least 20% of the total land area shall be under green cover. The proponent shall ensure the maintenance of green belt throughout the year and for all time to come. It is advised that they may engage professionals in this field for creation and maintenance of the green belt. An action plan for this purpose shall be prepared and shall be submitted accordingly.
7. Adequate drinking water and sanitary facilities shall be provided for construction workers at the site. Provision shall be made for mobile toilets. The safe disposal of wastewater and solid wastes generated during the construction phase shall be ensured.
8. All vehicles carrying construction materials to the site shall be covered to avoid spreading of dust. Vehicles hired for bringing construction material at site shall be in good condition and shall have valid Pollution Under Check (PUC) certificate and to confirm to applicable air and noise emission standards and shall be operated only during non-peaking hours.
9. The project shall use fly ash bricks and other building materials made out of fly ash in construction.
10. The construction shall be carried out with the fly ash bricks. If the fly ash bricks are not available locally the construction may be carried out with other bricks with prior intimation to the concerned Regional Office of SPC Board. A statement indicating use of fly ash bricks during construction period shall be submitted to the Board quarterly for record.



11. Use of glass shall be reduced by upto 40% to reduce the electricity consumption and load on air conditioning. If necessary, high quality double glass with special reflective coating in windows shall be used.
12. Traffic congestion near the entry and exit points from the roads adjoining the proposed project site must be avoided. Parking shall be inside the campus and no public space shall be utilized.
13. Noise shall be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with the prevalent regulations.
14. The proponent shall comply to the provisions of E-waste (Management) Rules, 2016 and shall handover E-waste to authorized collection centers / register dismantlers / recyclers for proper disposal of E-waste.
15. Separate collection bin shall be provided inside the building complex for collection of E- waste.
16. The construction and demolition wastes to be generated from the proposed project shall be disposed of in accordance with the provision under "Construction & Demolition Wastes Management Rules 2016".
17. The proponent shall comply with the provision made under Plastic Waste Management Rules, 2016 and amendment made thereafter and shall ensure prohibition on use of Single Use Plastics within the premises.
18. All the plastic waste generated from the premises shall be collected and sent for co-processing to the nearby cement kilns and / or registered recyclers under Plastic Waste Management Rules, 2016.
19. Municipal Solid Waste shall be disposed off as per the Solid Waste Management Rules, 2016 and amendment thereafter.
20. The Board may impose further condition or modify the conditions are stipulated in this order during installation and / or at the time of obtaining Consent to Operate and may revoke this order in case the stipulated conditions are not implemented and / or information is found to have been suppressed / wrongly furnished in the application form.

**B. WATER POLLUTION:**

21. Water Sprinkling shall be carried out in stockpiles and haulage roads in the construction area to suppress fugitive dust emission.
22. Weep holes in the compound walls shall be provided to ensure natural drainage of rain water in the catchment area during the monsoon period.
23. Fixtures for showers, toilet flushing, and drinking shall be of low flow either by use of aerators or pressure reducing devices or sensor based control.
24. Rainwater harvesting structure inside the premises shall be developed as per the proposal submitted to the Board, (05 Nos. of Recharging pit) to recharge the ground water. Rainwater harvesting structure shall be included from the construction stage itself.



25. The domestic wastewater generated shall be treated in Sewage Treatment Plant of capacity 200 KLD to meet the following standards as notified by the MoEF&CC, Govt. of India vide G.S.R. 1265 (E), dated 13.10.2017. The treated water shall be reused for flushing, gardening and plantation to the maximum possible extent.

Sl. No.	Parameters	Standards
1.	pH	6.5-9.0
2.	BOD(mg/l)	20
3.	TSS(mg/l)	<50
4.	Fecal Coliform (MPN/100ml)	< 1000

26. The surplus treated waste water from STP (Sewage Treated Plant) after meeting the above prescribed standard may be discharged to the Existing Municipal Drain as shown in Service Site Plan (EIDP Plan) during monsoon months with due permission from competent authority as proposed and steps shall be taken to utilize the treated waste water in the premises during non-monsoon period. The STP shall be made functional before the completion of housing project.
27. A corpus fund of adequate value shall be created and be kept in a separate account for operation and maintenance of STP and MSW Converter and this fund shall not be utilized for any other purpose.
28. The safe disposal of wastewater and solid wastes generated from washing of painting equipment during the construction phase shall be ensured.

### C. AIR POLLUTION:

29. The diesel generator sets to be used during construction phase shall be low Sulphur diesel type and shall confirm to Environment (Protection) Rules prescribed for air and noise emission standards.
30. All vehicles carrying building materials to the site shall be covered to avoid spreading of dust.
31. Diesel power generating sets proposed as source of backup power for elevators and common area illumination during operation phase shall be of enclosed type and confirm to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets shall be equal to the height needed for the combined capacity of all proposed DG sets. Only low sulphur diesel will be used. The location of the DG sets may be decided in consultation with State Pollution Control Board.
32. The height of the stack attached to the D.G set shall confirm to the following:  

$$H = h + 0.2\sqrt{KVA}$$
(Where, h = Height of the building where it is installed in meter  
KVA = Capacity of D.G Set and H = Height of the stack in meter above ground level).
33. The proponent shall take adequate measures to prevent noise during loading and unloading of the construction materials in night.
34. The proponent shall also take adequate measures during construction phase to prevent noise and dust pollution to surrounding area.



**D. SOLID WASTE:**

35. Intermediate storage area of adequate capacity for temporary storage of Municipal Solid Waste (MSW) shall be developed inside the premises before handing over the MSW to the approved agency for final disposal.
36. The solid waste generated from the complex shall be segregated as biodegradable and non-biodegradable. This shall be collected in separate colored bins. Proper waste management practices shall be adopted during the collection, storing and disposal of the generated solid waste.
37. The proponent shall establish Mechanized Organic Waste Converter for processing of Municipal Solid Waste generated from the complex under covered shed to produce organic manure which may be used for development of green belt.
38. Bio-degradable solid waste shall be sent to the organic waste converter for preparation of manure. Non-biodegradable wastes like polythene bags, metal, ceramic waste, glass etc. shall be stored in separate garbage bin and will be sent to approved agency for final disposal. The details of solid waste segregation and disposal method shall be submitted along with CTO application.
39. All required sanitary and hygienic measures shall be in place before starting construction activities and to be maintained throughout the construction phase.
40. All the topsoil excavated during construction activities shall be stored for use in horticulture / landscape development within the project site and shall be covered.
41. Disposal of muck during construction phase shall not create any adverse effect on the neighboring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.
42. Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they shall not leach into the ground water.
43. The Project proponent shall dispose of hazardous waste materials such as tarry products, lead containing products, paints & pigments residues, broken fluorescent and mercury lamps during construction and operational phase as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and amended thereafter.
44. The proponent shall submit a separate application for obtaining authorization under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and amended thereafter.

  
**MEMBER SECRETARY**

To

**The Director,  
M/s Shuvam Construction Pvt. Ltd.,  
Plot No. 564, Vivekanand Marg, Tahasil-Bhubaneswar,  
Dist- Khordha**

Memo No. \_\_\_\_\_ / Date \_\_\_\_\_ /

Copy forwarded to:

1. The Collector & District Magistrate, **Khordha**
2. The Commissioner, BMC Bhubaneswar
3. The DFO, **Khordha**
4. Consent to Operate Cell, SPC Board, Bhubaneswar
5. Hazardous Waste Management Cell, SPC Board, Bhubaneswar
6. The Regional Officer, SPC Board, Bhubaneswar
7. Copy to Guard file.



ADDL. CHIEF ENV. ENGINEER



भारत सरकार  
जल शक्ति मंत्रालय  
जल संसाधन, नदी विकास  
और गंगा संरक्षण विभाग  
केन्द्रीय भूमि जल प्राधिकरण  
Government of India  
Ministry of Jal Shakti  
Department of Water Resources,  
River Development & Ganga Rejuvenation  
Central Ground Water Authority

(भूजल निकासी हेतु अनापत्ति प्रमाण पत्र)

**NO OBJECTION CERTIFICATE (NOC) FOR GROUND WATER ABSTRACTION**

Project Name:	M/s Satyam Construction Co		
Project Address:	Plot No-4016, 4023/ 9099, 4010/10999, 4010/ 9061 And Others, Mouza-ghatikia, Bhubvaneswar		
Town:	Bhubaneswar	Block:	Bhubaneswar
District:	Khordha	State:	Odisha
Pin Code:			
Communication Address:	Satyam Construction Co, Plot No-2754/4187, Vivekananda Marg, Bhubaneswar, Bhubaneswar, Khordha, Odisha - 751002		
Address of CGWB Regional Office :	Central Ground Water Board South Eastern Region, Bhujal Bhawan, Khandagiri Square, Nh-5, Bhubaneswar, Khordha, Odisha - 750001		

1. <b>NOC No.:</b>	CGWA/NOC/INF/ORIG/2021/12932												
2. Application No.:	21-4/2881/OR/INF/2021						3. Category: (GWRE 2020)	Semi Critical					
4. Project Status:	New Project						5. NOC Type:	New					
6. <b>Valid from:</b>	16/09/2021						7. <b>Valid up to:</b>	15/09/2026					
8. Ground Water Abstraction Permitted:													
	Fresh Water		Saline Water				Dewatering		Total				
	m <sup>3</sup> /day	m <sup>3</sup> /year	m <sup>3</sup> /day	m <sup>3</sup> /year		m <sup>3</sup> /day	m <sup>3</sup> /year	m <sup>3</sup> /day	m <sup>3</sup> /year				
	144.09	52592.85											
9. Details of ground water abstraction /Dewatering structures													
	<b>Total Existing No.:0</b>						<b>Total Proposed No.:4</b>						
	DW	DCB	BW	TW	MP	MPu	DW	DCB	BW	TW	MP	MPu	
Abstraction Structure*	0	0	0	0	0	0	0	0	4	0	0	0	
*DW- Dug Well; DCB-Dug-cum-Bore Well; BW-Bore Well; TW-Tube Well; MP-Mine Pit;MPu-Mine Pumps													
10. Ground Water Abstraction/Restoration Charges paid (Rs.):							105185.70						
11. Number of Piezometers(Observation wells) to be constructed/ monitored & Monitoring mechanism.	No. of Piezometers						Monitoring Mechanism						
							Manual	DWLR**	DWLR With Telemetry				
**DWLR - Digital Water Level Recorder	1						0	1	0				

(Compliance Conditions given overleaf)

This is an auto generated document & need not to be signed.

18/11, जामनगर हाउस, मानसिंह रोड, नई दिल्ली - 110011 / 18/11, Jamnagar House, Mansingh Road, New Delhi-110011

Phone: (011) 23383561 Fax: 23382051, 23386743

Website: cgwa-noc.gov.in

पानी बचाये - जीवन बचाये  
SAVE WATER - SAVE LIFE

**Validity of this NOC shall be subject to compliance of the following conditions:**

**Mandatory conditions:**

- 1) Installation of tamper proof digital water flow meter with telemetry on all the abstraction structure(s) shall be mandatory for all users seeking No Objection Certificate and intimation regarding their installation shall be communicated to the CGWA within 30 days of grant of No Objection Certificate.
- 2) Proponents shall mandatorily get water flow meter calibrated from an authorized agency once in a year.
- 3) Construction of purpose-built observation wells (piezometers) for ground water level monitoring shall be mandatory as per Section 14 of Guidelines. Water level data shall be made available to CGWA through web portal. Detailed guidelines for construction of piezometers are given in Annexure-II of the guidelines.
- 4) Proponents shall monitor quality of ground water from the abstraction structure(s) once in a year. Water samples from bore wells/ tube wells / dug wells shall be collected during April/May every year and analysed in NABL accredited laboratories for basic parameters (cations and anions), heavy metals, pesticides/ organic compounds etc. Water quality data shall be made available to CGWA through the web portal.
- 5) In case of mining projects, additional key wells shall be established in consultation with the Regional Director, CGWB for ground water level monitoring four (4) times a year (January, May, August and November) in core as well as buffer zones of the mine.
- 6) In case of mining project the firm shall submit water quality report of mine discharge/ seepage from Govt. approved/ NABL accredited lab.
- 7) The firm shall report compliance of the NOC conditions online in the website ([www.cgwa-noc.gov.in](http://www.cgwa-noc.gov.in)) within one year from the date of issue of this NOC.
- 8) Industries abstracting ground water in excess of 100 m<sup>3</sup>/d shall undertake annual water audit through certified auditors and submit audit reports within three months of completion of the same to CGWA. All such industries shall be required to reduce their ground water use by at least 20% over the next three years through appropriate means.
- 9) Application for renewal can be submitted online from 90 days before the expiry of NOC. Ground water withdrawal, if any, after expiry of NOC shall be illegal & liable for legal action as per provisions of Environment (Protection) Act, 1986.
- 10) This NOC is subject to prevailing Central/State Government rules/laws/norms or Court orders related to construction of tube well/ground water abstraction structure / recharge or conservation structure/discharge of effluents or any such matter as applicable.

**General conditions:**

- 11) No additional ground water abstraction and/or de-watering structures shall be constructed for this purpose without prior approval of the Central Ground Water Authority (CGWA).
- 12) The proponent shall seek prior permission from CGWA for any increase in quantum of groundwater abstraction (more than that permitted in NOC for specific period).
- 13) Proponents shall install roof top rain water harvesting in the premise as per the existing building bye laws in the premise.
- 14) The project proponent shall take all necessary measures to prevent contamination of ground water in the premises failing which the firm shall be responsible for any consequences arising thereupon.
- 15) In case of industries that are likely to contaminate the ground water, no recharge measures shall be taken up by the firm inside the plant premises. The runoff generated from the rooftop shall be stored and put to beneficial use by the firm.
- 16) Wherever feasible, requirement of water for greenbelt (horticulture) shall be met from recycled / treated waste water.
- 17) Wherever the NOC is for abstraction of saline water and the existing wells (s) is /are yielding fresh water, the same shall be sealed and new tubewell(s) tapping saline water zone shall be constructed within 3 months of the issuance of NOC. The firm shall also ensure safe disposal of saline residue, if any.
- 18) Unexpected variations in inflow of ground water into the mine pit, if any, shall be reported to the concerned Regional Director, Central Ground Water Board.
- 19) In case of violation of any NOC conditions, the applicant shall be liable to pay the penalties as per Section 16 of Guidelines.
- 20) This NOC does not absolve the proponents of their obligation / requirement to obtain other statutory and administrative clearances from appropriate authorities.
- 21) The issue of this NOC does not imply that other statutory / administrative clearances shall be granted to the project by the concerned authorities. Such authorities would consider the project on merits and take decisions independently of the NOC.
- 22) In case of change of ownership, new owner of the industry will have to apply for incorporation of necessary changes in the No Objection Certificate with documentary proof within 60 days of taking over possession of the premises.
- 23) This NOC is being issued without any prejudice to the directions of the Hon'ble NGT/court orders in cases related to ground water or any other related matters.
- 24) Proponents, who have installed/constructed artificial recharge structures in compliance of the NOC granted to them previously and have availed rebate of upto 50% (fifty percent) in the ground water abstraction charges/ground water restoration charges, shall continue to regularly maintain artificial recharge structures.
- 25) Industries which are likely to cause ground water pollution e.g. Tanning, Slaughter Houses, Dye, Chemical/ Petrochemical, Coal washeries, pharmaceutical, other hazardous units etc. (as per CPCB list) need to undertake necessary well head protection measures to ensure prevention of ground water pollution as per Annexure III of the guidelines.
- 26) In case of new infrastructure projects having ground water abstraction of more than 20 m<sup>3</sup>/day, the firm/entity shall ensure implementation of dual water supply system in the projects.
- 27) In case of infrastructure projects, paved/parking area must be covered with interlocking/perforated tiles or other suitable measures to ensure groundwater infiltration/harvesting.
- 28) In case of coal and other base metal mining projects, the project proponent shall use the advance dewatering technology (by construction of series of dewatering abstraction structures) to avoid contamination of surface water.
- 29) The NOC issued is conditional subject to the conditions mentioned in the Public notice dated 27.01.2021 failing which penalty/EC/cancellation of NOC shall be imposed as the case may be.
- 30) This NOC is issued subject to the clearance of Expert Appraisal Committee (EAC) (if applicable).

**(Non-compliance of the conditions mentioned above is likely to result in the cancellation of NOC and legal action against the proponent.)**





भारतीय विमानपत्तन प्राधिकरण  
AIRPORTS AUTHORITY OF INDIA

No.AAI/ER/NOC(36/21)/09-10

Date: 16.02.2022

To  
Kantilal Patel  
M/s Shuvam Construction Pvt. Ltd.  
564, Vivekananda Marg  
Bhubaneswar – 751002

**No Objection Certificate for Revised Height Clearance**

1. This NOC is issued by Airports Authority of India(AAI) in pursuance of responsibility conferred by and as per the provisions of Govt. of India (Ministry of Civil Aviation) Order GSR751(E) dated 30<sup>th</sup> September, 2015 amended by GSR770(E) dated 17<sup>th</sup> December, 2020 for Safe and Regular Aircraft Operations.

2. This office has no objection to the construction of the proposed structure as per the following details:

<b>NOCID</b>	<b>BHUB/EAST/B/010821/522056</b>
<b>Owner/Applicant Name*</b>	<b>KANTILAL PATEL</b>
<b>Type of structure*</b>	<b>Building</b>
<b>Site Address*</b>	4016, 4015, 4023/9099, 4010, 4010/9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/9599, 4024, 3967, 4023/9086, 3968, 3970, 4011/9062, 4011, Ghatikia/Bhubaneswar, Bhubaneswar, Orissa
<b>AAI Reference</b>	CHQ letter No. ATM-16019/90/2021-ATM-DoAS dated 25.01.2022.

<b>Building*</b>	<b>Coordinates*</b>		<b>Permissible Top Elevation (P.T.E) Above Mean Sea Level (AMSL)</b>
<b>BLOCK – A</b>	20° 16' 16.60" N 085° 46' 44.14" E 20° 16' 16.61" N 085° 46' 45.22" E 20° 16' 15.41" N 085° 46' 45.23" E 20° 16' 15.41" N 085° 46' 45.97" E 20° 16' 14.52" N 085° 46' 45.97" E 20° 16' 14.52" N 085° 46' 46.79" E	20° 16' 13.79" N 085° 46' 46.81" E 20° 16' 13.79" N 085° 46' 45.94" E 20° 16' 14.49" N 085° 46' 45.93" E 20° 16' 14.49" N 085° 46' 45.20" E 20° 16' 15.41" N 085° 46' 45.19" E 20° 16' 15.40" N 085° 46' 44.15" E	<b>99.81 meter (Ninety Nine Decimal Eight One meter)</b>
<b>BLOCK – B</b>	20° 16' 16.49" N 085° 46' 45.46" E 20° 16' 16.50" N 085° 46' 46.39" E 20° 16' 15.73" N 085° 46' 46.40" E 20° 16' 15.74" N 085° 46' 47.19" E	20° 16' 14.76" N 085° 46' 47.20" E 20° 16' 14.75" N 085° 46' 46.22" E 20° 16' 15.71" N 085° 46' 46.22" E 20° 16' 15.71" N 085° 46' 45.47" E	<b>99.43 meter (Ninety Nine Decimal Four Three meter)</b>

\* Details as provided by the appellant.

[Page 01 of 03]

3. This NOC is subject to the terms and conditions as given below:
- a. Permissible Top elevation has been issued on the basis of Site coordinates and Site Elevation submitted by Applicant. AAI neither owns the responsibility nor authenticates the correctness of the site coordinates & site elevation provided by the applicant. If at any stage it is established that the actual data is different, this NOC will stand null and void and action will be taken as per law. The office in-charge of the concerned aerodrome may initiate action under the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules, 1994.
  - b. Airport Operator or his designated representative may visit the site (with prior coordination with applicant or owner) to ensure that NOC terms & conditions are complied with.
  - c. The Structure height (including any superstructure) shall be calculated by subtracting the Site elevation in AMSL from the Permissible Top Elevation in AMSL i.e Maximum Structure Height = Permissible Top elevation (-) Site Elevation.
  - d. The issue of the 'NOC' is further subject to provisions of Section 9-A of the Indian Aircraft Act, 1934 and any notifications issued there under from time to time including the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules, 1994.
  - e. No radio/TV Antenna, lighting arresters, staircase, Mumtee, Overhead water tank and attachments of fixtures of any kind shall project above the Permissible Top Elevation mentioned in para 2.
  - f. Use of oil, electric or any other fuel which does not create smoke hazard for flight operation is obligatory, within 8 KM of the Aerodrome Reference Point.
  - g. **The certificate is valid for a period of 8 years from the date of its issue.**
  - h. No light or a combination of lights which by reason of its intensity, configuration or colour may cause confusion with the aeronautical ground lights of the Airport shall be installed at the site at any time, during or after the construction of the Building. No activity shall be allowed which may affect the safe operation of the flights.
  - i. The applicant will not complain/claim compensation against aircraft noise, vibrations, damages etc. caused by aircraft operations at or in the vicinity of the airport.
  - k. Day markings & night lighting with secondary power supply shall be provided as per the guidelines specified in chapter 6 and Appendix 6 of Civil Aviation Requirement Series 'B' Part I Section 4, available on DGCA India website: [www.dgca.nic.in](http://www.dgca.nic.in).
  - l. The applicant is responsible to obtain all other statutory clearances from the concerned authorities including the approval of building plans as this NOC for height clearance is to ensure the safe and regular aircraft operations and shall not be used as document for any other purpose/claim whatsoever, including ownership of land etc.
  - m. This NOCID has been assessed w.r.t. **Bhubaneswar Airport**. NOC has been issued w.r.t the AAI Aerodromes and other licensed Civil Aerodromes as listed in Scheduled III, Schedule - IV (Part - I), Schedule -IV (Part-2; RCS Airports only) and Schedule - VII of GSR751(E).
  - n. Applicant needs to seek separate NOC from Defence, if the site lies within the jurisdiction of Defence Aerodromes as listed in Schedule-V of GSR751(E). As per Rule 13 of GSR751(E), applicants also need to seek NOC from the concerned State Govt. for sites which lies in the jurisdiction of unlicensed aerodromes as listed in Schedule - IV (Part - 2: other than RCS airports) of GSR751(E).
  - o. In case of any discrepancy/interpretation of NOC letter, English version shall be valid.
  - p. In case of any dispute w.r.t site elevation and/or AGL height, top elevation in AMSL shall prevail.



**Additional condition as per CHQ letter No. ATM-16019/90/2021-ATM-DoAS dated 25.01.2022.:**

1. This authorization is issued as per the approval of the Appellate Committee of Ministry of Civil Aviation in its meeting held on 28.12.2021.
2. The Permissible Top Elevation (P.T.E) being authorized vide this letter is restricted to the building coordinates mentioned above.
3. The Permissible Top Elevation (P.T.E) has been cleared through Aeronautical Study.
4. The mitigation measures as mentioned under sub para (a), (b) & (c) shall be adopted to fulfill the requirements of.
  - i. A pilot's need to be made aware of potentially hazardous conditions; and
  - ii. The responsibility of the state to publish deviations from standards that would otherwise be assumed under licensing status.
    - a) The Airport Operator should publish the obstacle, to fulfill the above requirement, before its penetration of the Obstacle Limitation Surface. It is the responsibility of the applicant/owner to notify the Airport Operator/Airport Director accordingly.
    - b) The day marking and night lighting shall be provided by the applicant/owner as per the guidelines specified in DGCA Civil Aviation Requirement Series B Part -1 Section 4, in co-ordination with and to the satisfaction of the Airport Operator/Airport Director.
    - c) Any Temporary structure such as crane, being used for the purpose of construction, should not exceed the permissible top elevation without the written permission of the Airport Operator/Airport Director.

Designated Officer

Region Name: EAST

Address: General Manager Airports  
 Authority of India, Regional  
 Headquarter, Eastern Region,  
 N.S.C.B.I Airport,  
 Kolkata-700052

Email ID: [gmatmer@aai.aero](mailto:gmatmer@aai.aero)

Contact No:033-25111293

*S. Basu*  
 17.02.22

Prepared by  
 (S. Basu, Jt.GM(ATM)ER)

*J. Choudhury*  
 13.02.22

Verified by  
 (J.Choudhury, Jt.GM(ATM)ER)

**Copy for information to:**

The Vice-Chairman, Bhubaneswar Development Authority, Akash Shova Building, Sachivalaya Marg, Bhubaneswar, Odisha - 751001.

*R.S. Lahauria*  
 17/02/22  
 (R.S.Lahauria)  
 General Manager(Aero)ER  
 Airports Authority of India

**Note: In case of any discrepancy in NOC letter, applicant may intimate the office within 30 days after issuance of this letter.**



36/21

# भारतीय विमानपत्तन प्राधिकरण AIRPORTS AUTHORITY OF INDIA

KANTILAL PATEL

M/s Shuvam Construction Pvt. Ltd., Plot No.  
564, Vivekananda Marg, Bhubaneswar -  
751002, Odisha

Date: 25-01-2021

Valid Upto: 23-01-2029

## No Objection Certificate for Height Clearance

1. This NOC is issued by Airports Authority of India (AAI) in pursuance of responsibility conferred by and as per the provisions of Govt. of India (Ministry of Civil Aviation) order GSR751 (E) dated 30th Sep. 2015 amended by GSR770(E) dated 17th Dec 2020 for Safe and Regular Aircraft
2. This office has no objection to the construction of the proposed structure as per the following details:

NOC ID :	BHUB/EAST/B/010821/522056
Applicant Name*	Sangram Keshari Parida
Site Address*	4016, 4015, 4023/9099, 4010, 4010/9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/9599, 4024, 3967, 4023/9086, 3968, 3970, 4011/9062, 4011, Ghatikia/Bhubaneswar, Bhubaneswar, Orissa
Site Coordinates*	20 16 16.42N 85 46 42.27E, 20 16 15.31N 85 46 42.55E, 20 16 14.79N 85 46 42.59E, 20 16 14.50N 85 46 43.08E, 20 16 15.97N 85 46 43.10E, 20 16 17.34N 85 46 43.54E, 20 16 17.27N 85 46 43.71E, 20 16 17.67N 85 46 44.16E, 20 16 14.94N 85 46 44.25E, 20 16 17.05N 85 46 44.44E, 20 16 14.26N 85 46 45.39E, 20 16 13.35N 85 46 45.88E, 20 16 16.87N 85 46 45.99E, 20 16 13.82N 85 46 47.15E, 20 16 15.35N 85 46 48.21E
Site Elevation in mtrs AMSL as submitted by Applicant*	45.29 M
Permissible Top Elevation in mtrs Above Mean Sea Level(AMSL)	88 M (Restricted)

\*As provided by applicant

3. This NOC is subject to the terms and conditions as given below:

- a. Permissible Top elevation has been issued on the basis of Site coordinates and Site Elevation submitted by Applicant. AAI neither owns the responsibility nor authenticates the correctness of the site coordinates & site elevation provided by the applicant. If at any stage it is established that the actual data is different, this NOC will stand null and void and action will be taken as per law. The office in-charge of the concerned aerodrome may initiate action under the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules, 1994"
- b. The Site coordinates as provided by the applicant in the NOC application has been plotted on the street view map and satellite map as shown in ANNEXURE. Applicant/Owner to ensure that the plotted coordinates corresponds to his/her site. In case of any discrepancy, Designated Officer shall be requested for cancellation of the NOC.
- c. Airport operator or his designated representative may visit the site (with prior coordination with applicant or owner) to ensure that NOC terms & conditions are complied with.
- d. The Structure height (including any superstructure) shall be calculated by subtracting the Site elevation in AMSL from the Permissible Top Elevation in AMSL i.e. Maximum Structure Height = Permissible Top Elevation minus (-) Site Elevation.
- e. The issue of the 'NOC' is further subject to the provisions of Section 9-A of the Indian Aircraft Act, 1934 and any notifications issued there under from time to time including the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules, 1994.

क्षेत्रीय मुख्यालय पूर्वी क्षेत्र, नेताजी सुभाष चन्द्र बोस अंतराष्ट्रीय हवाई अड्डा - 700052 दूरभाष संख्या: 91-33-2511 9 616  
Regional headquarter Eastern Region, Netaji Subhash Chandra Bose International Airport - 700052, Tel : 91-33-25119616





# भारतीय विमानपत्तन प्राधिकरण AIRPORTS AUTHORITY OF INDIA

- f. No radio/TV Antenna, lighting arresters, staircase, Mumtee, Overhead water tank and attachments of fixtures of any kind shall project above the Permissible Top Elevation of 88 M (Restricted) (AMSL), as indicated in para 2.
- g. Use of oil, electric or any other fuel which does not create smoke hazard for flight operations is obligatory, within 8 KM of the Aerodrome Reference Point.
- h. The certificate is valid for a period of 8 years from the date of its issue. One time revalidation without assessment may be allowed, provided construction work has commenced, subject to the condition that such request shall be made within the validity period of the NOC and the delay is due to circumstances which are beyond the control of the developer.
- i. No light or a combination of lights which by reason of its intensity, configuration or colour may cause confusion with the aeronautical ground lights of the Airport shall be installed at the site at any time, during or after the construction of the building. No activity shall be allowed which may affect the safe operations of flights
- j. The applicant will not complain/claim compensation against aircraft noise, vibrations, damages etc. caused by aircraft operations at or in the vicinity of the airport.
- k. Day markings & night lighting with secondary power supply shall be provided as per the guidelines specified in chapter 6 and appendix 6 of Civil Aviation Requirement Series B Part I Section 4, available on DGCA India website: www.dgca.nic.in
- l. The applicant is responsible to obtain all other statutory clearances from the concerned authorities including the approval of building plans. This NOC for height clearances is to ensure the safe and regular aircraft operations and shall not be used as document for any other purpose/claim whatsoever, including ownership of land etc.
- m. This NOCID has been assessed w.r.t Bhubaneshwar Airport(s). NOC has been issued w.r.t. the AAI aerodromes and other licensed civil aerodromes as listed in Schedule-III, Schedule-IV(Part-1), Schedule-IV(Part-2;RCS Airports Only) and Schedule-VII of GSR751(E) amended by GSR770(E).
- n. Applicant needs to seek separate NOC from Defence, if the site lies within the jurisdiction of Defence Aerodromes as listed in Schedule-V of GSR751(E) amended by GSR770(E). As per Rule 13 of GSR751(E) amended by GSR770(E), applicants also need to seek NOC from the concerned State Govt. for sites which lies in the jurisdiction of unlicensed aerodromes as listed in Schedule-IV (Part-2:other than RCS airports) of GSR751(E) amended by GSR770(E).
- o. In case of any discrepancy/interpretation of NOC letter, English version shall be valid.
- p. In case of any dispute w.r.t site elevation and/or AGL height, top elevation in AMSL shall prevail.

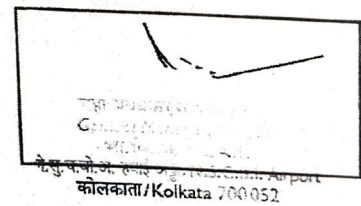
Chairman NOC Committee

Region Name: EAST

Address: General Manager Airports Authority of  
India, Regional Headquarter, Eastern  
Region, N.S.C.B.I Airport,  
Kolkata-700052

Email ID: gmatmer@aai.aero

Contact No: 033-25111293



Name / Designation / Sign with Date	
Prepared By :	<i>[Signature]</i> 25.01.21
Verified By :	<i>[Signature]</i> 25.01.21

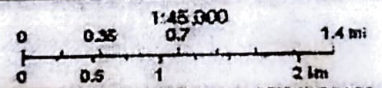
क्षेत्रीय मुख्यालय पूर्वी क्षेत्र, नेताजी सुभाष चन्द्र बोस अंतराष्ट्रीय हवाई अड्डा - 700052 दूरभाष संख्या: 91-33-2511 9 616

Regional headquarter Eastern Region, Netaji Subhash Chandra Bose International Airport - 700052, Tel : 91-33-25119616



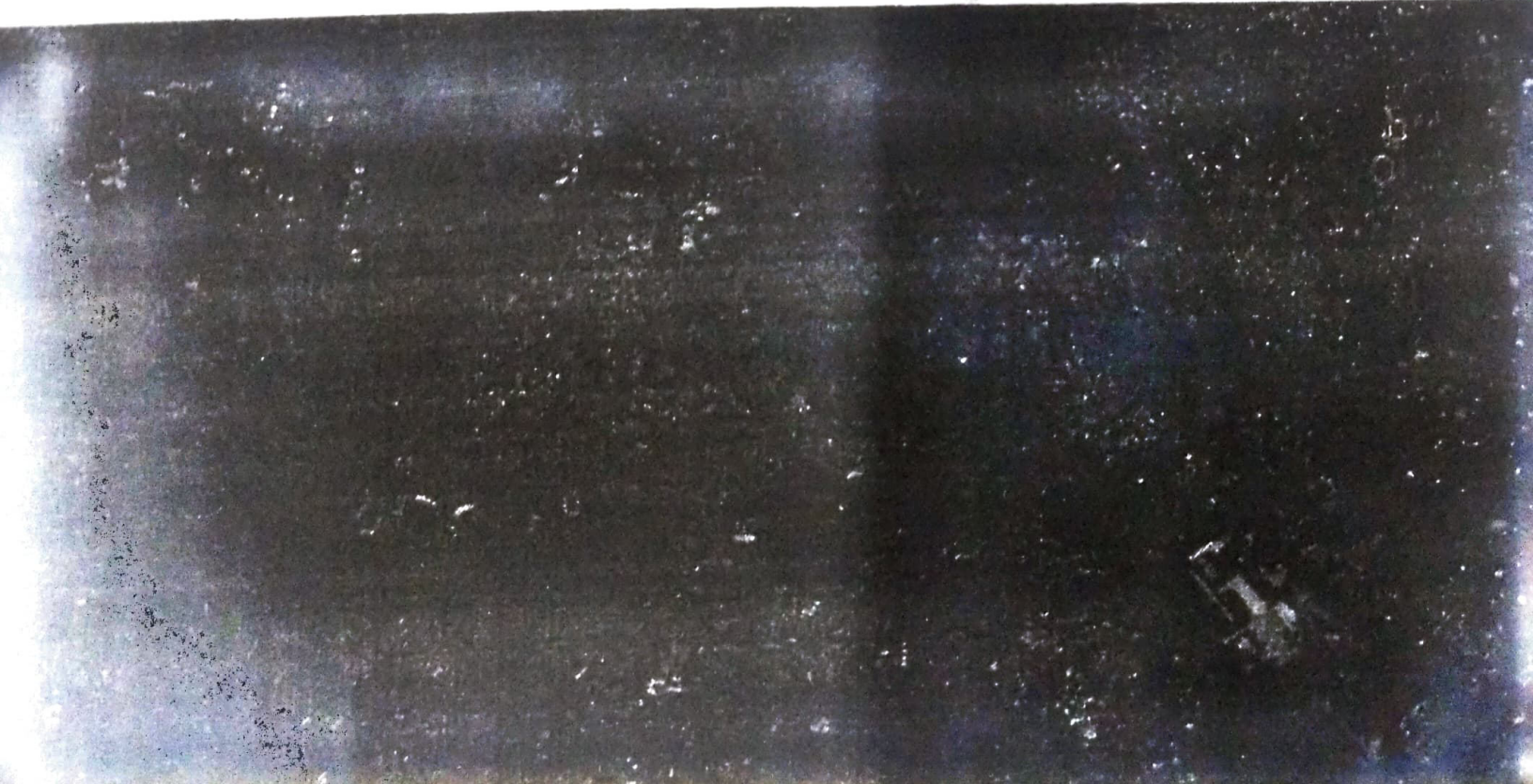


January 8, 2021



Source: USGS, OpenStreetMap, NCEM, and other contributors. All rights reserved. No warranty is made for the use of this data.

Satellite View





**Dr. H. Sharma**  
Associate Professor

Indian Institute of Technology,  
Guwahati,  
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DEPT. OF CIVIL  
ENGINEERING

st

This is to certify that the Structural Design work of Proposed 2B+SG+14 High-rise Residential Apartment Building of Sri. Jayesh Patel (Director) M/S. Shuvam Construction (P) Ltd., G.P.A Holder of 01. M/S. Satyam Construction Co., 02. Sri. Dillip Kumar Majhi, 03. Smt. Madhusmita Majhi, 04. Smt. Sarita Jayanti Pradhan alias Majhi , 05. Smt. Sasmita Majhi, 06. Smt. Pushpalata Barishal, 07. Smt. Kiranbala Majhi, 08. Tuku Ojha 09. Manasi Sahoo 10. Binodini Sahoo over plot no:-4016, 4023/ 9099, 4010/10999, 4010/ 9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/ 9599, 4024, 3967, 3968, 3970, 4011/9062, 4011, 4023/9086, 4010/10998, 4028, KHATA NO- 607, 1988/958, 803, 720, 1101, 1678, 238, 1988/87, 1988/86, 535, 1228, 1332, 1123, 1139, 1988/957, Mouza-Ghatika, Bhubaneswar, Dist-Khorda. as done by **M S Structural Consultants** has been checked with respect to the requirement of the Indian Standards, IS800:2007, IS 456:2000, IS 1893 (Part 1):2016, IS 13920:2016, and where ever required, revisions to the structural design and drawings have been recommended to the structural designer of the building. The structural designer has confirmed compliance with required revisions following which the structural design and drawings stand approved.

The project consists of five nos. of towers viz. Block- A, Block- B, Block-C, Block-D & Block-E including integrated double basement, Podiums and Ramp.

We have reviewed the design and drawings of above proposed building structure as per architectural drawing sheet no 1 to 8 and state that:

1. The structure design has been carried out in accordance with the provisions of NBC, IS codes, Standard Codes of Practice, Manuals and Hand-books issued by Bureau of India Standards and or any amendments thereof, building bye-laws and specifications as stipulated by Bureau of Indian Standards.
2. All towers of high rise building structures have been designed as per Seismic consideration for Zone-III.
3. The building / structures have been designed for appropriate wind loads, dead loads, live loads etc.
4. The site conditions, such as conditions of the soil, its load bearing capacity and the underground water table etc. has been considered while designing.
5. The building / structures are stable and meet all the safety, serviceability, durability, fire rating etc. and all relevant design criteria as stipulated in the latest statutory code as mentioned above.

The scope of this certificate is limited only to the structural design of the above mentioned building and IIT Guwahati assumes no responsibility for the compliance with local, state or national building bye-laws or with any other legal requirements or of safety aspects during construction of the said building.

Any deviation from the approved layout, design and intended occupancy of the proposed building invalidates this certificate.

With regards

Dr. Hrishikesh Sharma  
Associate Professor/সহ প্রাক্ষয়ক  
Department of Civil Engineering  
সিভিল অভিযান্ত্রিক বিভাগ  
Indian Institute of Technology Guwahati  
भारतीय प्रौद्योगिकी संस्थान गुवाहाटी

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2. All towers of high rise building structures have been designed as per Seismic consideration for Zone-III.
3. The building / structures have been designed for appropriate wind loads, dead loads, live loads etc.
4. The site conditions, such as conditions of the soil, its load bearing capacity and the underground water table etc. has been considered while designing.
5. The building / structures are stable and meet all the safety, serviceability, durability, fire rating etc. and all relevant design criteria as stipulated in the latest statutory code as mentioned above.

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With regards

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Indian Institute of Technology Guwahati  
भारतीय प्रौद्योगिकी संस्थान गुवाहाटी





# Bhubaneswar Municipal Corporation

Phone : 0674 - 2431253  
 Fax : 0674 - 2432895  
 E\_mail : [info@bmc.gov.in](mailto:info@bmc.gov.in)  
 Web : [www.bmc.gov.in](http://www.bmc.gov.in)

No 10071 /Date. 29.01.2022  
 XXXXXV-Drainage-431/2021

To

Sri Mohan Lal Patel, (Partner)  
 Plot No:- 2754/4187, Vivekananda Marg, Bhubaneswar -751002  
 Phone No:- 0674 2436976 email:- satyamconstructionbbsr@yahoo.co.in

Sub:- Proposal of Approval of 2B+~~6~~+14 storied Residential Apartment Building over Plot No 4016,4023/9099,4010/10999,4010/9061 and others in Mouza Ghatikia

Ref: - Your Letter No. Nil dated 13.09.2021

Sir,

With reference to the subject cited above and letter under reference it is to intimate that the drainage plan showing the recharge pit details, calculation sheet of storm water runoff generation from roof top, land area, paved area and landscape have been checked and found to be adequate for smooth disposal of the storm water into the twelve numbers of recharge pits shown in the drainage plan. You are requested to make arrangement so that no contamination will be done in the aquifer. You are requested to dispose the surplus storm water into the natural drainage Channel named Storm Water Drain No 9 near CET by constructing a RCC covered drain. All these arrangements are only meant for disposal of storm water and for no other purposes.

The drainage plan and scheme provided by you is vetted and found correct and are enclosed for submission to the City Planner, Bhubaneswar Municipal Corporation to make it a part of Building Plan Approval to ascertain it's implementation at the site at the time of issuing of occupancy certificate.

Encl:- As above

Yours Faithfully

  
 Superintending Engineer  
 Drainage Division  
 Bhubaneswar Municipal Corporation

Memo No.....10072...../BMC, Dt. 29.01.2022

Copy submitted to the City Planner, Bhubaneswar Municipal Corporation, for favour of information and necessary action.

  
 Superintending Engineer  
 Drainage Division  
 Bhubaneswar Municipal Corporation

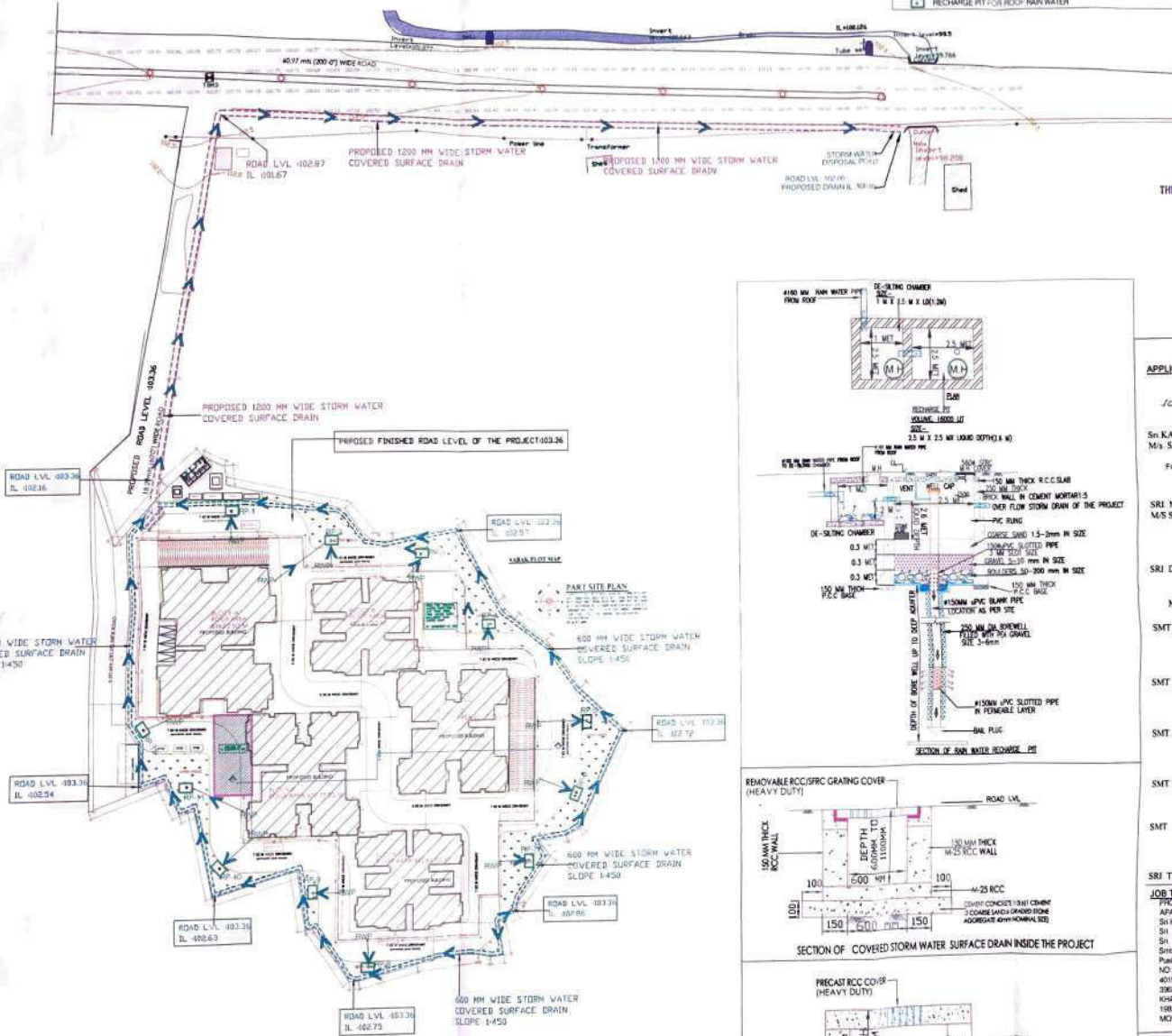


RWP = RAIN WATER PIPE FROM ROOF CONNECT TO RECHARGE PIT

PROPOSED 600 MM WIDE STORM WATER SURFACE DRAIN INSIDE THE PROJECT

PROPOSED 1200 MM WIDE STORM WATER SURFACE DRAIN OUTSIDE THE PROJECT

RECHARGE PIT FOR ROOF RAIN WATER



*Dr. Rajat*  
**THE DRAINAGE PLAN IS VETTED AND APPROVED**

Superintending Engineer  
 Drainage Division, BMC  
 Bhubaneswar

**APPLICANT**

For Shri Kantilal Patel  
*Kantilal Patel*  
 Director

Sri KANTILAL PATEL (DIRECTOR)  
 M/s SHIVAM CONSTRUCTION (P) Ltd.

For Satyam Construction Co.  
*Satyam Construction Co.*  
 Partner

SRI MOHANLAL PATEL (PARTNER)  
 M/S SATYAM CONSTRUCTION CO

*Dr. Dilip Kumar Mahto*

SRI DILIP KUMAR MAHTI

*Madhushmita Mahto*

SMT MADHUSMITA MAHTI

*Sarita Jayanti Mahto*

SMT SARITA JAYANTI MAHTI

*Sasmita Mahto*

SMT SASMITA MAHTI

*Poojapala Barishal*

SMT PUSHPALATA BARISHAL

*Kiran Bal Mahto*

SMT KIRANBALA MAHTI

*Tuku Ora*

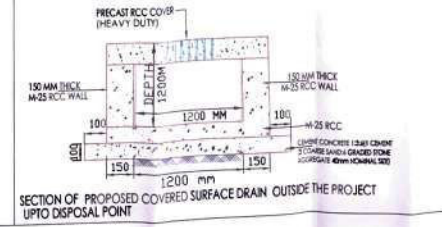
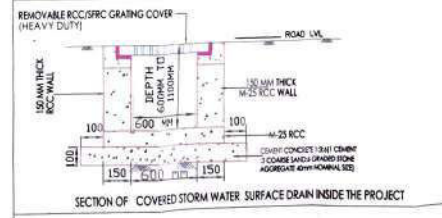
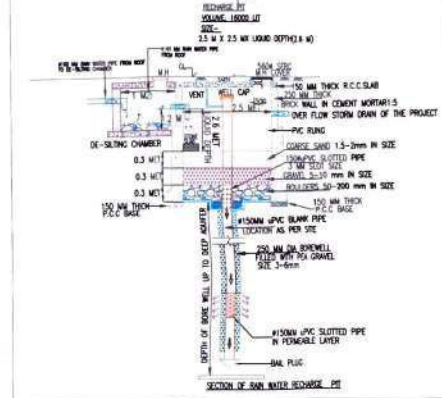
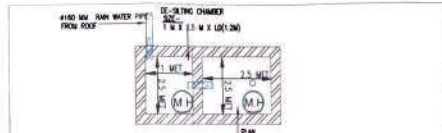
SRI TUKU ORHA

**JOB TITLE**  
 PROPOSED 2B+G+14 HIGH RISE RESIDENTIAL APARTMENT BUILDING OF Sri Kantilal Patel/Director/ M/S Shivam Construction (P) Ltd., Sri Mohanlal Patel (Partner), M/S Satyam Construction Co., Sri Dilip Kumar Mahto, Sri Madhushmita Mahto, Sri Sarita Jayanti Mahto, Sri Poojapala Barishal, Sri Kiranbala Mahto, Sri Tuku Ora OVER PLOT NO- 4016, 4017, 4022, 4025, 4021, 4027, 4018, 4023, 3967, 3930, 4244, 3967, 3968, 3970, 4011/4022, 4011, 4023/3926, 4016/1000A, 4023, KHATA NO-1678, 607, 1988/58, 603, 722, 1101, 1678, 238, 1988/87, 1988/88, 635, 1225, 1332, 1123, 1139, 1988/87, MOJZA-GAATHKA, DIST-KHORDHA.

**DRAWING TITLE**

STORM WATER DRAINAGE PLAN

PHE CONSULTANT  
 INDRAJEET SAMAL  
 Indrajeet Samal  
 PHE Consultant  
 Bhubaneswar-751026











## ODISHA FIRE SERVICE FIRE SAFETY RECOMMENDATION

### FORM-II

[Under Rule-12 (5)]



<b>RECOMMENDATION No:</b>	RECOMM1204130012021000178	<b>APPLICATION No:</b>	FSR1204130012021000146
<b>Date of Issue:</b>	19-07-2021	<b>Date of Receipt of Application:</b>	26-06-2021

1.	Name & Address of the proposed Building/Premises:	Shuvam Royale 2 i.e. Block-A, B, C, D & E (Residential Buildings consisting of B+G+14 floors each), situated over Plot No. – 4016, 4015, 4023/9099, 4010/10999, 4010/9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/9599, 4024, 3967, 3968, 3970, 4011/9062, 4011, 4023/9086, 4010/10998, 4028, Khata No. – 1678, 607, 1988/958, 803, 720, 1101, 1678, 238, 1988/87, 1988/86, 535, 1228, 1332, 1123, 1139, 1988/957 of Mouza – Ghatikia, Bhubaneswar, Dist-Khurda of Shuvam Constructions Pvt. Ltd.
2.	Name and Address of the Applicant(s):	Sri Kantilal Patel, Director, Shuvam Constructions Pvt. Ltd., 564, Vivekanand Marg, Bhubaneswar - 751002
3.	Proposed Occupancy (Type of Building):	As per the plan five blocks of B+G+14 floors each (i.e. Block-A, B, C, D & E) are coming under "Residential Building" as per Odisha Development Authorities (Planning and Building Standards) Rules, 2020 and Residential Building Group-A, Sub-Division A-4 as per NBCI-2016.
4.	Area with Plot Number and Khata Number:	Plot Area - 10732.17 sqm. (2.652 Acre) Plot No.4016, 4015, 4023/9099, 4010/10999, 4010/9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/9599, 4024, 3967, 3968, 3970, 4011/9062, 4011, 4023/9086, 4010/10998, 4028, Khata No.1678, 607, 1988/958, 803, 720, 1101,



1678, 238, 1988/87, 1988/86, 535, 1228, 1332, 1123, 1139, 1988/957, Mouza-Ghatikla, Bhubaneswar, Dist-Khurda.

5.

Date of inspection:

10-07-2021

## 6. Recommendation:

The Fire Safety Recommendation for the following building(s) is/are as follows: -

A.	Structural and construction site requirements:	
i.	Details of the building(s) like height, no. of floors, area on each floor, built up area, etc	<p>Common Basement Lower Basement- 6237.39 sqm. (Parking and services) Upper Basement- 6237.39 sqm. (Parking and services)</p> <p>B+G+14 floors Residential Building (Block-A) 1) Ground floor – 783.72 sqm. – Facilities, Utility and Society Hall. 2) 1st floor – 783.72 sqm. – Facilities &amp; Society Hall 3) 2nd to 4th floor – 802.58 sqm. (each) – Apartments 4) 5th to 14th floor – 774.99 sqm. (each) – Apartments 5) Terrace floor – Open to sky</p> <p>B+G+14 floors Residential Building (Block-B) 1) Ground floor – 491.45 sqm. – Apartments 2) 1st to 4th floor – 475.28 sqm. (each) – Apartments 3) 5th to 14th floor – 459.21 sqm. (each) – Apartments 4) Terrace floor – Open to sky</p> <p>B+G+14 floors Residential Building (Block-C) 1) Ground floor – 643.25 sqm. – Apartments 2) 1st to 4th floor – 633.87 sqm. (each) – Apartments 3) 5th to 14th floor – 609.81 sqm. (each) – Apartments 4) Terrace floor – Open to sky</p> <p>B+G+14 floors Residential Building (Block-D) 1) Ground floor – 491.45 sqm. – Apartments 2) 1st to 4th floor – 475.28 sqm. (each) – Apartments 3) 5th to 14th floor – 459.21 sqm. (each) – Apartments 4) Terrace floor – Open to sky</p> <p>B+G+14 floors Residential Building (Block-E) 1) Ground floor – 643.25 sqm. – Apartments 2) 1st to 4th floor – 633.87 sqm. (each) – Apartments 3) 5th to 14th floor – 609.81 sqm. (each) – Apartments 4) Terrace floor – Open to sky</p> <p>The height of proposed buildings shall be as under: - 1) B+G+14 floors Residential Building (Block-A) shall be 46.63 mtrs. from ground level. 2) B+G+14 floors Residential Building (Block-B) shall be 46.63 mtrs. from ground level. 3) B+G+14 floors Residential Building (Block-C) shall be 46.63 mtrs. from ground level. 4) B+G+14 floors Residential Building (Block-D) shall be 46.63 mtrs. from ground level. 5) B+G+14 floors Residential Building (Block-E) shall be 46.63 mtrs. from ground level.</p>
ii.	Parking	<p>Provision of parking area at both lower &amp; upper basement floor of aforesaid buildings have been proposed in the plan.</p> <p>Provision of parking shall be made in accordance to Rule-37 of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.</p>
iii.	Access To The Building	<p>As shown in the plan there is provision of abutting road of width 18.29 meters to the proposed plot, which shall be made as per Rule – 31 of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.</p>

		<p>The main entrance to the premises shall not be less than 06 (six) meters in width in order to allow easy access to fire engine and the gate shall fold back against the compound wall of the premises, thus leaving the exterior access way, within the plot, free for the movement of fire service vehicles. If archway is provided over the main entrances, the height of the archway shall not be less than 5 (five) meters. Besides, there is provision an entry/exit gate of width 6 meters, which shall be made as per Rule - 71 of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.</p>
iv.	Open spaces (In Mtrs.)	<p>The provision of required open space around each block has not been reflected as per Odisha Development Authorities (Planning and Building Standards) Rules, 2020. Besides, in front side of Block-A, there is provision of DG-1, 2 &amp; 3 has been proposed, which shall be made available excluding clear open space of minimum 9 mtrs. from building line.</p> <p>Further, as per Rule-33 of Odisha Development Authorities (Planning and Building Standards) Rules, 2020, minimum 9 meters compulsory open space is required for aforesaid blocks.</p> <p>Out of the compulsory open space around the aforementioned blocks/buildings for a width of 7.5 mtrs. shall be kept un-built and it shall be constructed of hard surfaced capable of taking load of fire engine weighting up to 45 tonnes.</p> <p>However, as shown in the plan 7.62 mtrs. of drive way have been provided around the each blocks. Besides, all blocks have been interconnected in common basement with 9 meters of open space and 6 meters of driveway in every one side of the blocks (i.e. right side of Block-A, left side of Block-B, left side of Block-C, right side of Block-E and front side of Block-D). Moreover, the roof of the basement extends beyond the plinth line into the driveway, hence roof of the basement shall be constructed of hard surface capable of taking load of fire engine weighing up to 45 tonnes and load bearing capacity certificate from the competent authority shall be obtained to that effect. The open space and driveway around the aforesaid building shall be made as per Rule-33 &amp; 34 of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.</p>
v.	Exits (Type, Number, Dimension & Ramp Arrangement)	<p>As shown in the plan provision of following staircases shall be made in the buildings.</p> <p>1) B+G+14 floors Residential Building (Block-A) 04 Nos. of staircases have been proposed in the plan for the aforesaid Residential Building. Out of which one staircase is continuing from lower basement to ground floor. Besides, another one staircase is continuing from ground floor to 1st floor. Further, the rest two staircases, having connectivity from ground floor to terrace floor.</p> <p>B+G+14 floors Residential Building (Block-B) 03 Nos. of staircases have been proposed in the plan for the aforesaid Residential Building. Out of which one staircase is continuing from lower basement to ground floor. Besides, another two staircases are continuing from ground floor to terrace floor.</p> <p>B+G+14 floors Residential Building (Block-C) 03 Nos. of staircases have been proposed in the plan for the aforesaid Residential Building. Out of which one staircase is continuing from lower basement to ground floor. Besides, another two staircases are continuing from ground floor to terrace floor.</p> <p>B+G+14 floors Residential Building (Block-D) 03 Nos. of staircases have been proposed in the plan for the aforesaid Residential Building. Out of which one staircase is continuing from lower basement to ground floor. Besides, another two staircases are continuing from ground floor to terrace floor.</p> <p>B+G+14 floors Residential Building (Block-E) 03 Nos. of staircases have been proposed in the plan for the aforesaid Residential Building. Out of which one staircase is continuing from lower basement to ground floor. Besides, another two staircases are continuing from ground floor to terrace floor.</p> <p>The width of stairway shall be minimum 01 mtr. for Residential purpose. Further, the width of tread for Residential Buildings shall be 0.25 meters and the maximum height of riser shall be 0.19 meters in the case of aforesaid blocks.</p> <p>Moreover, the exits/staircases must be placed as remote from each other as possible and also comply to other provisions i.e. permissible travel distance, dead end corridor length in exit access etc, as per the provisions of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.</p> <p>2) A staircase shall not be arranged round a lift shaft.</p> <p>3) All the exits required to be accessible from the entire floor area at all floor levels.</p> <p>4) No exit doorway shall be less than 01 meter in width. Doorways shall be not less than 02</p>

		<p>meter in height. Doorways for bathrooms, water closet and stores shall be not less than 0.75 meter wide.</p> <p>5) The minimum number of exit and their width required on every floor of the buildings and their dimensions must be in accordance to Clause-4.2.1 to 4.4.2.4.2 of Part-IV, NBCI-2016 and exit requirements of Annexure-IX of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.</p> <p>6) The escape routes should be well ventilated and provided with safety lighting and free from obstructions.</p> <p>7) Exits must be clearly visible and all routes to reach the exit have to be clearly marked and sign posted to guide the population of the floor concerned. Signages required to be illuminated and wired to an independent electrical circuit on an alternative source of supply.</p> <p>8) Access to the staircases be gained through automatic closing fire check doors of 02 hrs rating and certificate of same shall be obtained to that effect.</p> <p>9) The internal staircases not with external wall of the aforesaid blocks shall be pressurized and the internal staircases constructed with external wall shall be cross ventilated or pressurized. Wherever pressurized staircase is to be connected to unpressurized area, the two areas shall be segregated by 120 min fire resistant wall. Pressurization of the staircases shall be done as per Clause-4.4.2.5, 4.6, 6.1.1.3 &amp; Annexure-E of Part-4, NBCI-2016.</p> <p>In addition to above all other provisions for exits / doorways / stairways, means of escape and exit shall be made as per Clause 4.2 to 4.6.2 of NBCI-2016, Annexure- IX of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.</p>
vi.	Firefighting Shaft	<p>1) Fire fighting shaft is required for aforesaid all residential blocks i.e. Block-A, B, C, D &amp; E. However, as shown in the plan the provision of fire fighting shaft in each block have not been made as per NBCI-2016, which shall be made as per Clause-2.24 &amp; Annexure-E of Part-IV, NBCI-2016.</p> <p>2) The protected area of the firefighting shaft shall have 120 min. fire resistance rating &amp; comprising of protected lobby, staircase &amp; fireman's lift.</p> <p>3) It shall have connectivity directly to exit discharge or through exit passageway with 120 min fire resistance walls at the level of exit discharge to exit discharge.</p> <p>4) Besides, it shall have provision of fireman talk back, wet riser &amp; landing valve in its lobby. Staircase &amp; fire lift lobby of firefighting shaft shall be smoke controlled.</p> <p>5) Firefighting shaft (fire tower) shall be made as per Clause-2.24 and Annexure-E of Part-IV, NBCI-2016.</p>
vii.	Lifts	<p>1) As shown in the plan provision of following lifts shall be made in the buildings.</p> <p>B+G+14 floors Residential Building (Block-A) 03 Nos. of lifts have been proposed in the plan for the aforesaid Residential Building which are continuing from lower basement floor to top floor.</p> <p>B+G+14 floors Residential Building (Block-B) 03 Nos. of lifts have been proposed in the plan for the aforesaid Residential Building which are continuing from lower basement floor to top floor.</p> <p>B+G+14 floors Residential Building (Block-C) 03 Nos. of lifts have been proposed in the plan for the aforesaid Residential Building which are continuing from lower basement floor to top floor.</p> <p>B+G+14 floors Residential Building (Block-D) 03 Nos. of lifts have been proposed in the plan for the aforesaid Residential Building which are continuing from lower basement floor to top floor.</p> <p>B+G+14 floors Residential Building (Block-E) 03 Nos. of lifts have been proposed in the plan for the aforesaid Residential Building which are continuing from lower basement floor to top floor.</p> <p>2) Provision of firemen lift shall be made in aforesaid all blocks i.e. Block-A, B, C, D &amp; E as per Clause 4.4.2.5 of Part-4 of NBCI-2016 and "Building Services, Section 5 Installation of Lifts, Escalators and Moving Walks, Sub-Section 5-A Lifts of Part-8" of National Building Code of India, 2016.</p> <p>3) The Lifts shall not open in staircase landing. Grounding switch (es) at ground floor level shall</p>



be provided to enable the fire service to ground the lifts. Besides, telephone / talk back communication facilities shall be provided. Collapsible gates shall not be permitted for lifts and shall have solid doors with fire resistance of at least 1 hour and certificate of same shall be obtained to that effect.

4) Lift lobby shall be cross ventilated or pressurized in all towers i.e. Tower-1, 2, 3 & 4 as per Clause-4.4.2.5 of Part-IV, NBCI-2016. The mechanism for pressurization shall act automatically with the fire alarm and it can also be operated mechanically. The lift lobbies at basement floor shall be pressurized with self-closing fire rated doors. Telephone or other communication facilities shall be provided in lift cars and to be connected to fire control room for the building.

5) Construction and provisions of fire and life safety measures of lifts shall be in accordance with Annexure – IX of Odisha Development Authorities (Planning and Building Standards) Rules, 2020 and Clause 4.4.2.5 of Part-4 and Building Services, Section 5 Installation of Lifts, Escalators and Moving Walks, Sub-Section 5 A Lifts of Part-8 of National Building Code of India, 2016.

viii.

### Building Services

#### Electrical Services

1) An independent, ventilated or air conditioned MV panel room must be provided on the ground level. This room required to be provided with access from outside. The MV panel room must be provided with fire resistant walls and doors of fire resistance of not less than 120 min.

2) A substation or a switch station with oil filled equipment must not be allowed to be functional inside the building.

3) All transformers must be protected by high velocity water spray systems or nitrogen injection system. As per the plan the placement of transformer has not been clearly shown.

4) The sub-station must not be located below the 1st basement and above the ground floor.

5) A stand-by electric generator must be installed to supply power to staircase and corridor lighting circuits, fire lifts, the stand-by fire pumps, pressurization fans and blowers, smoke extraction and damper system in case of failure of normal electric supply.

6) The staircase and corridor lighting must be on separate service and must be independently connected so as it could be operated by one switch installation on the ground floor, easily accessible to firefighting shaft at any time irrespective of the position of the individual control of the light points, if any.

7) Staircase and corridor lighting required to be connected to alternate supply from parallel high-tension supply or to the supply from the stand-by generator. All wires and other accessories used for emergency light must have fire retardant property.

8) The electric distribution cables or wiring shall be laid in separate duct which shall be sealed at every floor with non-combustible materials having the same fire resistance as that of the duct. Low and medium voltage wiring running in shaft and in false ceiling run in separate conduits. Water mains, telephone cables, intercom cables, gas pipes or any other service line need not be laid in the duct for electric cables.

9) All the transformers shall be protected with high velocity water spray system / Nitrogen injection System Carbon Dioxide total flooding system in case of oil filled transformer. In addition to this, manual control of auto high velocity spray system for individual transformers shall be located outside the building at ground floor.

10) Electric substation transformer shall have clearance on all sides as per BBL/relevant electric rules.

11) Electrical Installations in the building must be comply to the provisions given in Clause 3.4.6 to 3.4.7.4 of Part-4 NBCI-2016 and Annexure-IX of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.

12) The electric substation shall have electric supply from alternate source for operation of vent System lighting arrangements.

13) Cable trenches shall be filled with sand.

14) Party walls shall be provided between two transformers as per the rules.

15) Electric control panels shall be segregated.

16) Provision for lightning protection must be made in the proposed building as per IS/IEC 62305-4:2010.

Air Conditioning	<p>1) Air conditioning systems circulating air to more than one floor area should be provided with dampers designed to close automatically in case of fire and thereby prevent spread of fire or smoke.</p> <p>2) Escape routes like staircases, common corridors, lift lobbies must not be used as return air passage.</p> <p>3) Air ducts serving main floor areas, corridors, must not pass through the staircase enclosure.</p> <p>4) The air-handling units must be separate for each floor and air ducts for every floor must be separated and in no way inter-connected with the ducting of any other floor.</p> <p>5) Wherever the ducts pass through fire walls or floors, the opening around the ducts must be sealed with materials having fire resistance rating of the compartment. Such duct required to be provided with fire dampers at all fire walls and floors unless such ducts are required to perform for fire safety operation.</p> <p>6) The Air Conditioning required to be coupled with fire detection and alarm system.</p> <p>7) Metallic ducts must be used even for the return air instead of space above the false ceiling.</p> <p>8) The materials used for insulating the duct system (inside or outside) must be of non-combustible material.</p> <p>9) Air Conditioning &amp; mechanical ventilation requirements of different rooms or areas of the building must be as per the provisions given in Part-8, NBCI-2016 and Annexure-IX of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.</p>
Fire Command Centre	<p>1) There must be a Fire Command Centre on entrance floor of the building having direct access. The Fire Command Centre must have the main fire alarm panel with communication system (suitable public-address system). All controls and monitoring of fire alarm systems, Detection system, pressurization systems, smoke management systems must be operated from this room. integrated building management system must be provided for Fire Command Centre.</p> <p>2) Fire Command Centre must have provisions in accordance with Clause-3.4.12 of Part-4, NBCI-2016.</p> <p>3) The owner/occupier shall provide any additional fire requirements in future if the recommendation is issued by this department.</p> <p>4) The site is suitable for construction of above proposed structure subject to condition that the owner/occupier shall provide any additional fire requirements in future if the recommendation is issued by this department.</p>
<b>B.</b>	<b>Fixed Fire Fighting Installations :</b>
i.	<p>Fire Extinguisher</p> <p>Provision of fire extinguishers must be made in entire buildings of all blocks i.e. Block-A, B, C, D &amp; E as per BIS:2190:2010.</p>
ii.	<p>First- Aid Hose Reel</p> <p>First-aid hose reel must be provided on each floor of all blocks i.e. Block-A, B, C, D &amp; E in accordance with BIS 884:1985 &amp; BIS 3844:1989.</p> <p>Adequate Hose reels shall be provided so that the same shall be available within 30 mtrs. from any point at each floor level and the horizontal distance between any two adjacent points need not exceed 50 mtrs on each floor and Hose reels hose must be directly connected to Wet riser.</p>
iii.	<p>Wet Riser</p> <p>The aforementioned proposed blocks i.e. Block-A, B, C, D &amp; E are required to be provided with risers adequately so that available within 30 mtrs. from any point at each floor level and horizontal distance between any two adjacent risers must not exceed 50 mtr. Provision of wet riser shall be made conforming to BIS standards.</p>
iv.	<p>Yard Hydrant</p> <p>Yard hydrant required to be provided around the aforesaid blocks i.e. Block-A, B, C, D &amp; E. The yard hydrant installation should be in accordance to relevant BIS specifications.</p>
v.	<p>Automatic Sprinkler System</p> <p>Automatic water sprinkler system with sprinkler heads shall be provided in all floors including corridors, lobbies and rooms of aforesaid blocks i.e. Block-A, B, C, D &amp; E along with both the basement floors. Sprinkler shall fed water from both underground static water storage tank and</p>

		terrace tank.
vi.	Manually Operated Electronic Fire Alarm System	Manually operated electronic fire alarm system at conspicuous places in each floor of all blocks i.e. Block-A, B, C, D & E including both the basement floors shall be provided. (IS/ISO 7240-11:2011).
vii.	Underground Static Water Storage Tank	The proposed aforesaid both the basement floors are required to be provided with Underground Static Water Storage Tank of capacity 1,50,000 ltrs. All static tanks must entirely be accessible to fire appliances of the local Fire Service. Provision of suitable manhole shall be made available for inspection, repair and insertion of suction hose etc. Provision of additional water shall be made if basement floor is compartmented through water curtain. Static Underground tank must be constructed in accordance to Clause-5.1.2.1 of Part-IV, NBCI-2016.
viii.	Terrace Tank	Terrace tank of 10,000 ltrs. capacity must be provided at the top of all the blocks i.e. Block-A, B, C, D & E for firefighting purpose. It should be ensured that water in the tank is not utilized for any other purpose other than firefighting.
ix.	Pump Near Underground Static Water Storage Tank	<p>Pump house should preferably be installed at ground level. It shall be situated so as to be directly accessible from the surrounding ground level. When installed in the basement staircase with direct accessibility or through enclosed passageway with 120 min fire rating from the ground shall be provided. Required number of sets of pumps each consisting of two Electric &amp; one Diesel pumps (Stand by) of capacity 2280 LPM &amp; two electric pumps of capacity 180 LPM shall be provided for entire building. The pumps are to be automatic in action. Installation of negative suction arrangement and submersible pumps shall not be allowed. In addition to above provision of another pump of desired capacity shall be provided for basement floor compartmentation through water curtain. In addition to above provision of another pump of desired capacity shall be provided if basement floor is compartmented through water curtain. Lower levels in high rise buildings 60 m or above in height are likely to experience high pressure and therefore, it is recommended to consider multi-stage, multi-outlet pumps (creating pressure zones) or variable frequency drive pumps or any other equivalent arrangement. Further, one set of pumps shall be provided for each 100 hydrants or part thereof, with a maximum of two sets. In case of more than one pump set installation, both pump sets shall be interconnected at their delivery headers. Moreover, alternative to provisions of additional set of pumps, the objective can be met by providing additional diesel pump of the same capacity and doubling the water tank capacity as required for one set of pumps.</p> <p>Installation of pumps shall be made in accordance to Clause-5.1.2.2 of Part-IV, NBCI-2016.</p>
x.	Fire Safety Supervisor	As the aforementioned Residential blocks are of height more than 45 mtrs. and if there is provision of more than 400 dwelling units a Fire Safety Supervisor shall be appointed before occupancy as per Rule – 15 (e) of Odisha Fire Prevention and Fire Safety Rules, 2017.
xi.	Basement	<p>1) Basement shall be separately ventilated. Vents with cross-sectional area (aggregate) not less than 2.5 percent of the floor area spread evenly round the perimeter of the basement shall be provided in the form of grills or breakable stall board lights or pavement lights or by way of shafts. Alternatively, a system of mechanical ventilation shall be provided so as to permit 12 air changes per hour in case of fire or distress call. Ventilation system shall start automatically on actuation of detector provided in the basement area in addition to provision of manual control. Doors provided in such exit passageway shall be fire rated doors of 2 hrs rating. Smoke exhaust and pressurization of areas shall be done as per the provisions given in clause- 4.6 of part-4, NBCI-2016.</p> <p>2) The basement shall be used for designated purpose only. Adequate provision of exits and ramps shall be made in the basements as per Odisha Development Authorities (Planning and Building Standards) Rules, 2020 and NBCI-2016. The ramp providing access to basement shall be constructed leaving required open space around the building. Door openings leading from upper floors to basement shall need to be protected with fire doors with 120 min. fire rating except for exit discharge doors from the basements. Adequate arrangement shall be made, so that surface drainage does not enter the basement. The wall and floors of the basement shall be water-tight and be so designed that the effect of the surrounding soil and moisture, if any, are taken in to account in design and adequate damp proofing treatment is given.</p> <p>3) All floors shall be compartmented/zoned with area of each compartment being not more than 750 m<sup>2</sup>. The maximum size of the compartment shall be as follows, in case of sprinklered basement/building:  i) Basement car parking - 3000 m<sup>2</sup>  ii) Residential Building - 750 m<sup>2</sup></p> <p>4) Basement floor of the building shall be compartmented / zoned into two compartments with</p>



		<p>fire barrier or with water curtain nozzle (K-23) or with combination thereof. The fire barrier of each compartment shall have fire resistance rating of 120 min. Automatic deluge system comprising deluge valve, piping nozzles, etc shall be used to zone the compartment in case of water curtain system. In case of water curtain, required additional provision of water with independent electric pump of adequate capacity shall be made. Compartmentation of floors in the building shall be done as per the provisions given in clause 4.5 and Annexure-H of Part-IV, NBCI-2016.</p> <p>5) As per Odisha Development Authorities (Planning and Building Standards) Rules, 2020 in case of parking spaces provided in basement and upper storey of parking floors, at least two ramps of one way of width 03 mtrs. each and the minimum one ramp of two way of width 06 mtrs. shall be provided to the parking floors.</p> <p>6) In Multi-Level basements, independent air intake and smoke exhaust shafts (masonry or reinforced concrete) for respective basement levels and compartments therein shall be planned with its make-up air and exhaust air fans located on the respective level and in the respective compartment. Alternatively, in multi-level basements, common intake masonry (or reinforced cement concrete) shaft may serve respective compartments aligned at all basement levels. Similarly, common smoke exhaust/outlet masonry (or reinforced cement concrete) shafts may also be planned to serve such compartments at all basement levels. All supply air and exhaust air fans on respective levels shall be installed in fire resisting room of 120 min. Exhaust fans at the respective levels shall be provided with back draft damper connection to the common smoke exhaust shaft ensuring complete isolation and compartmentation of floor isolation to eliminate spread of fire and smoke to the other compartments/floors.</p> <p>7) The use and construction of the basement shall confirm to the provisions given in Clause-41 of Odisha Development Authorities (Planning and Building Standards) Rules, 2020 and Clause – 4.4.2.5, 4.5 &amp; 4.6 of NBCI – 2016.</p>
xii.	Refuge Area	<p>1) Refuge area shall be provided of height more than 24 meters. Refuge area shall be approachable from the space they serve by an accessible means of egress. Refuge area (s) shall be provided at/or immediately above 24 mtrs. and thereafter at every 15 mtrs or so. The refuge area shall always be kept clear. No storage of combustible products and materials, electrical and mechanical equipment, etc. shall be allowed in such areas. High rise apartment buildings with apartments having balcony, need not be provided with refuge area; however, apartment buildings without balcony shall provide refuge area as mentioned in Annexure-E (E-4). Besides, refuge areas for apartment buildings of height above 60 m while having balconies shall be provided at 60 m and thereafter at every 30 m.</p> <p>2) Refuge area shall be made as per Annexure-E-4 of Part-IV, NBCI-2016.</p>
xiii.	Construction	<p>1) Non-combustible materials with appropriate fire resistance rating shall be used for construction of the buildings. During construction of the buildings the following fire protection measures shall be provided.</p> <ol style="list-style-type: none"> <li>Dry riser of minimum 100 mm diameter pipe with hydrant outlets on the floors.</li> <li>Drums of 2,000 liters capacity filled with water with O2 fire buckets on each floor.</li> <li>A water storage tank of minimum 20,000 ltrs. capacity.</li> </ol> <p>2) Installation of chimney &amp; heating apparatus shall be in accordance to relevant BIS specification. All kitchens should have one or more opening such as windows and ventilators opening directly to the external air or into an open veranda for the admission of light and air.</p> <p>3) The basement and upper floors shall be compartmented / zoned with area of each compartment should be not more than 3,000 sqm. The fire barrier of such compartments shall have fire resistance rating of 120 min.</p> <p>4) Smoke exhaust system having make-up air and exhaust air system shall be planned for large lobbies and which have exit through staircase leading to exit discharge. All exit passageways (from exit to exit discharge) shall be pressurized or naturally ventilated. The mechanical pressurization system shall be automatic in action with manual controls in addition. Doors provided in such exit passageway shall be fire rated doors of 2 hrs rating. Smoke exhaust and pressurization of areas shall be done as per the provisions given in clause- 4.6 of part-4, NBCI-2016.</p>
xiv.	Service Ducts and Shafts	<p>Openings in walls or floors which are necessary to be provided to allow passages of all building services like cables, electrical wirings, telephone cables, plumbing pipes, etc. must be protected by enclosure in the form of ducts /shafts and such shaft and inspection doors fitted thereto must have fire resistance rating not less than as specified in Clause 3.4.5.4 of NBCI-2016 and Annexure-IX of Odisha Development Authorities (Planning and Building Standards) Rules, 2020.</p>

xv.	Stand-By Source of Power Supply	There shall be provision for dedicated emergency power supply to fire pumps, lifts, fire alarm system, pressurization system, emergency lighting, escape route lighting, exit signage, public address system, lighting in fire command centre, magnetic door hold open devices, etc. The power supply to the panel /distribution board of these fire and life safety systems shall be through fire proof enclosures or circuit integrity cables or through alternate route in the adjoining fire compartment to ensure supply of power is reliable to these systems and equipment. Cables for fire alarm and PA system shall be laid in metal conduits or armoured to provide physical segregation from the power cables.
xvi.	Lightning Protection	Provision for lightning protection shall be made in the proposed building as per NBCI-2016 and in corporate to relevant BIS specifications. Routing down of conductors (Insulated or Un-Insulated) of lightning protection shall not be made through electrical or other service shafts and certificates of the same provisions shall be obtained to that effect.
G.	Opinion :	<p>After completion of the construction work including installation of fixed firefighting measures as suggested, the applicant shall be required to apply for Fire Safety Certificate as per Rule-13 (1) of Odisha Fire Prevention and Fire Safety Rules, 2017 along with following documents: -</p> <p>i) The applicant shall produce a certificate to be issued by the office/person concerned to the effect that all the provisions of Bye-laws / Regulations of Odisha Development Authority and Recommendations issued from Chief Fire Officer, Fire Prevention Wing, Cuttack have been incorporated in the building.</p> <p>ii) The applicant shall produce a certificate of the Competent Authority concerned to the effect that electrical installations have been done as recommended and as per provisions given in Part-8 "Building Services, Section-2 Electrical and allied installations" of NBCI-2016 and Section-7 of National Electrical Code, 2011.</p> <p>iii) The Applicant shall produce a certificate of the agency concerned to the effect that installation of firefighting measures has been done as recommended and as per provisions given in Part-4 of National Building Code of India-2016 and relevant BIS specifications.</p>

Signature valid

Signed by : SHRI  
SUKANT K. SINGH  
Date : 19-07-2021 12:17:24

Chief Fire Officer, Odisha

**NOTE**

- (i) It is a digitally signed electronically generated certificate and therefore needs no ink-signed signature.
- (ii) This Certificate is issued as per section 4, 5, & 6 of Information Technology Act 2000 and its subsequent amendments in 2008.
- (iii) For any Query or Verification, Agency /Department / Office may visit <http://agnishamaseva.odisha.gov.in>
- (iv) Tampering of this Certificate will attract penal action.




**भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर**  
**INDIAN INSTITUTE OF TECHNOLOGY BHUBANESWAR**  
 School of Infrastructure/आधारिक संरचना विद्यापीठ

Date: 24.03.2022

**To whom it may concern**

The Traffic Assessment Report for the "Proposed Housing Project At Mouza - Ghatikia, Bhubaneswar, Dist- Khurda, Odisha, by M/s Shuvam Construction (P) Ltd." prepared by Centre for Envotech and Management Consultancy Pvt. Ltd. is vetted as per the primary data and secondary data provided by Centre for Envotech and Management Consultancy Pvt. Ltd.

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24/03/2022  
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# TRAFFIC ASSESSMENT REPORT

## PROPOSED HOUSING PROJECT

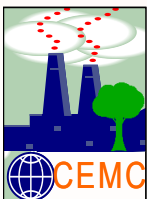
AT MOUZA - GHATIKIA, BHUBANESWAR,  
DIST- KHURDA, ODISHA

Project By:

M/s SHUVAM CONSTRUCTION (P) LTD.

### CENTRE FOR ENVOTECH AND MANAGEMENT CONSULTANCY PVT. LTD.

AN ISO: 9001: 2015, ISO: 14001:2015 and ISO 45001: 2018 certified company,  
Empanelled in OSPCB as Category "A" Consultant Organization,  
Accredited by NABET, Quality Council of India for EIA studies  
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## CUMMULATIVE TRAFFIC ASSESSMENT STUDY

### 1.0 SITE DETAILS

The proposed residential project site is located at Mouza - Ghatikia, Bhubaneswar, Dist – Khurda, Odisha. The Geographical co-ordinate of the project site is Latitude 20°16'15.78"N & Longitude 85°46'44.81"E. The project site is well connected with Ghatikia main road and The National Highway-16 is located at the distance of 0.3 Km & 1.4 km. The nearest Railway station is Bhubaneswar Railway Station at a distance of approximately 5.2 Km from the project site. The nearest Airport is Biju Patnaik International Airport, Bhubaneswar which is at a distance of 5 Km from the project site. The site is located adjacent to the local landmarks, Kalinga Nagar, Shympur etc. There is no structure or encroachments on the site. The site is easily accessible from NH-16 Road.

Site Location:

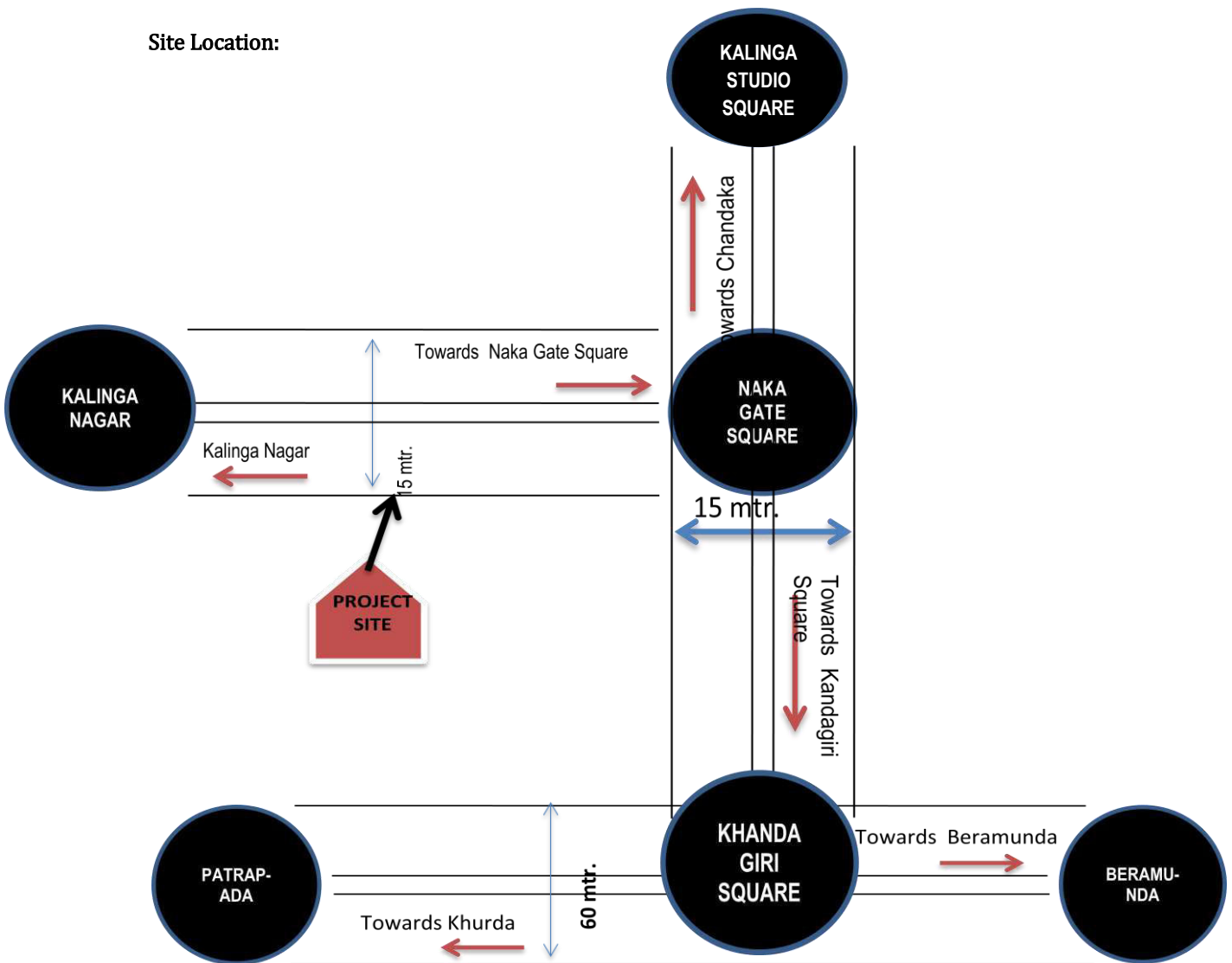


Fig. No.-1: Road Network for Project Site



**Fig. No.-2: Google Map of Project Location**

### 1.1 Project Details and Its Connected Road:

The proposed project is for developing residential as per international standards and being transparent and fair in every dealing with its customers. With its prestigious projects, the company strives to create maximum value for its customers. There are several housing and commercial projects coming up in Bhubaneswar. The project stipulate 3053 Sq.m land area allocation for Housing, while remaining land will be utilized for private development based on the market dynamics and development guidelines.

The proposed residential projects is connected to the Urban arterial Road commonly known as Ghatikia main Road. This Ghatikia Main Road is start from the Naka gate Square of Ghatikia or commonly known as Ghatikia Square. This Ghatikia Square is connects towards NH-16 in the right side and Kalinga Studio Square on the left side of the Ghatikia Square. As the Proposed Building project is in a residential area with moderate to high density of population is staying in that area for which traffic congestion will be happen at the peak hours. Although the Residential complex has a six meter road with entry and exit from separate lane from the same end there might be a possibility of traffic congestion at the peak hours.

### 1.2 Road Assessment at the Proposed Project Location

Normally four categories of road are in Practice

1. Local Road
2. Collector Road
3. Sub Arterial
4. Arterial

With different width and lane consideration depending on the traffic volume and traffic density.

### Study Carried Out

The study is carried out for Main Road to test the traffic adequacy of the roads as per IRC (Indian Roads Congress) and Indo-HCM guidelines.

### 1.3 Traffic Studies

After site visit of the proposed project, it is found out to be the road connected to the project is an Urban road and it comes under Arterial Road classification which is commonly known as Ghatikia Main Road:

The road configuration & crossing is shown below

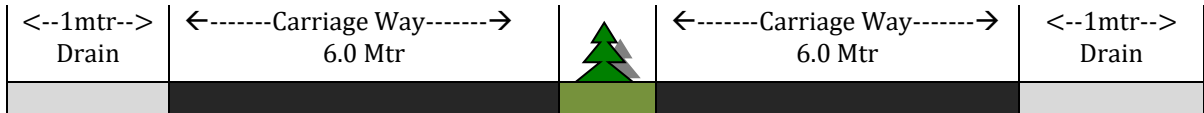


Fig. No.-3 4-lane Divided Urban Road Cross section

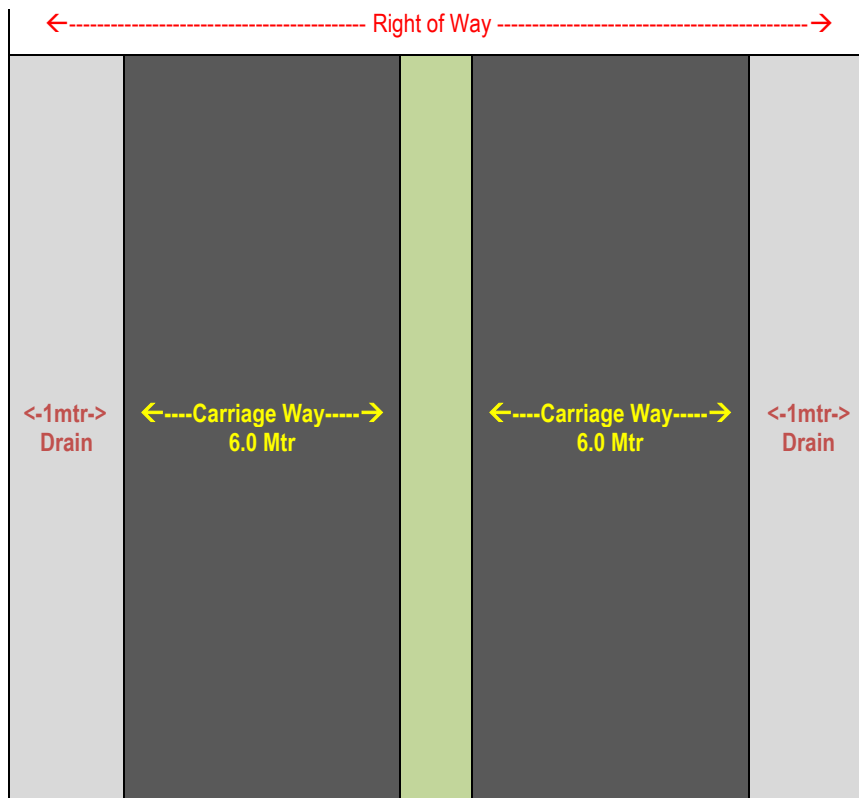


Fig. No. - 4: 4-lane Divided Urban Road Top View



## 2.0 EXISTING TRAFFIC VOLUME

The existing traffic volume was measured in the urban road (Arterial road) and it was carried out from 09.00 AM to 09.00 PM for 7 days from 07.01.2022 to 13.01.2022. The hourly traffic volume for different category of vehicles plying on the road (i.e. 2 Wheeler, 3 Wheeler, Light Motor Vehicle & Heavy Motor Vehicles) were counted and recorded. We have considered Car of type small and big, LCV and Mini bus in LMV and all types of bus, trucks, tractor trailer are considered in HMV.

The traffic volume is recorded for 12 hours and then it is converted to PCU (Passenger Car Unit). For PCU values and capacity of multilane divided interurban highways, Indo-HCM, 2017 document has been referred. The recommended PCU values are shown table below (Table 5.2, page 5-5, Indo-HCM, 2017). For PCU values, the median values have been considered in this study and summarized in Table 1.

**Table 5.2: Suggested PCU Values for Undivided and Divided Roads**

S.No.	Vehicle Type	Undivided Roads		Divided Roads	
		Range	Median	Range	Median
<b>Motorized Traffic</b>					
1	Two Wheeler (TW)	0.10 - 0.31	0.20	0.10 - 0.45	0.22
2	Auto rickshaw (Auto)	0.33 - 2.65	0.73	0.38 - 2.11	0.90
3	Car (Small and Big Car)	1.00	1.00	1.00	1.00
4	Bus (B)	1.79 - 6.5	3.77	1.99 - 6.0	4.60
5	Mini Bus (MB)	1.36 - 3.11	1.80	1.62 - 4.10	2.07
6	Light Commercial Vehicle (LCV)	2.10 - 3.49	2.30	2.10 - 4.50	2.38
7	Two / Three Axle Truck (TAT)	2.70 - 4.81	3.70	2.70 - 7.50	3.90
8	Multi Axle Truck (MAT)	-	-	3.30 - 7.90	5.90
9	Tractor Trailer Combination	-	4.50	2.51 - 5.89	5.40
<b>Non Motorized Traffic</b>					
10	Bicycle	0.34 - 0.50	0.39	0.30 - 0.80	0.42
11	Cycle Rickshaw	-	1.80	0.88 - 3.16	2.04

**Table No. 1: PCU values used in this report**

<i>Vehicles</i>	<i>PCU values</i>
Two Wheeler	0.22
Three Wheeler	0.90
LMV	1.82
HMV	4.95

**Table No.2: The Average Existing Traffic Volume on Ghatikia Road (from Kalinga Nagar Square towards Naka gate Square)**

Date↓	Source	Time→	0900-1000 HRS	1000-1100 HRS	1100-1200 HRS	1200-1300 HRS	1300-1400 HRS	1400-1500 HRS	1500-1600 HRS	1600-1700 HRS	1700-1800 HRS	1800-1900 HRS	1900-2000 HRS	2000-2100 HRS	Average
07.01.2022	Ghatikia Road	2W	55	62	67	60	42	38	45	57	73	86	68	57	59
		3W	35	48	42	35	33	28	30	42	47	44	38	34	38
		LMV	39	44	37	34	34	39	39	44	45	41	44	36	40
		HMV	8	9	8	7	7	8	7	7	7	8	8	7	8
08.01.2022	Ghatikia Road	2W	57	64	69	62	44	40	47	59	75	88	70	59	61
		3W	33	46	40	33	31	26	28	40	45	42	36	32	36
		LMV	41	46	39	36	36	41	41	46	47	43	46	38	42
		HMV	7	8	7	6	6	7	6	6	6	7	7	6	7
09.01.2022	Ghatikia Road	2W	49	56	61	54	36	32	39	51	67	80	62	51	53
		3W	40	53	47	40	38	33	35	47	52	49	43	39	43
		LMV	42	47	40	37	37	42	42	47	48	44	47	39	43
		HMV	9	10	9	8	8	9	7	7	8	7	6	5	8
10.01.2022	Ghatikia Road	2W	59	66	71	64	46	42	49	61	77	90	72	61	63
		3W	32	45	39	32	30	25	27	39	44	41	35	31	35
		LMV	44	49	42	39	39	44	44	49	50	46	49	41	45
		HMV	5	7	7	8	7	9	8	7	7	8	6	5	7
11.01.2022	Ghatikia Road	2W	50	57	62	55	37	33	40	52	68	81	63	52	54
		3W	41	54	48	41	39	34	36	48	53	50	44	40	44
		LMV	44	49	42	39	39	44	44	49	50	46	49	41	45
		HMV	8	9	8	7	7	8	7	7	7	8	8	7	8
12.01.2022	Ghatikia Road	2W	60	67	72	65	47	43	50	62	78	91	73	62	64
		3W	25	38	32	25	23	18	20	32	37	34	28	24	28
		LMV	29	34	27	24	24	29	29	34	35	31	34	26	30
		HMV	8	7	7	8	7	7	7	8	7	8	8	7	7
13.01.2022	Ghatikia Road	2W	50	57	62	55	37	33	40	52	68	81	63	52	54
		3W	28	41	35	28	26	21	23	35	40	37	31	27	31
		LMV	34	39	32	29	29	34	34	39	40	36	39	31	35
		HMV	7	6	6	7	6	6	8	7	7	8	6	5	7

**Table No. 3: Average traffic volume of Ghatikia Road in from 07.01.2022 to 13.01.22  
(Base year 2022)**

Date	2Wheeler	3Wheeler	Light Motor Vehicle (LMV)	Heavy Motor Vehicle (HMV)
07.01.2022	59	38	40	8
08.01.2022	61	36	42	7
09.01.2022	53	43	43	8
10.01.2022	63	35	45	7
11.01.2022	54	44	45	8
12.01.2022	64	28	30	7
13.01.2022	54	31	35	7
Average (veh/hr)	58	36	40	7
PCU Values	0.22	0.9	1.82	4.95
PCU/Hr	13	32	73	35

Therefore, the total existing traffic volume on Ghatikia Road is **153 PCU/ hr.**



Table No.4: The Average Existing Traffic Volume on Khandagiri Chandaka Road (from Naka Gate Square towards Khandagiri Square)

Date↓	Source	Time→	0900-1000 HRS	1000-1100 HRS	1100-1200 HRS	1200-1300 HRS	1300-1400 HRS	1400-1500 HRS	1500-1600 HRS	1600-1700 HRS	1700-1800 HRS	1800-1900 HRS	1900-2000 HRS	2000-2100 HRS	Average	
07.01.2022	Chandaka Khandagiri Road	2W	73	78	71	68	68	73	73	78	79	75	78	70	74	
		3W	57	60	55	52	52	50	52	52	57	54	55	53	54	
		LMV	69	70	67	64	61	62	64	67	64	67	67	66	64	65
		HMV	18	17	16	17	17	18	16	18	17	16	17	17	20	17
08.01.2022	Chandaka Khandagiri Road	2W	78	83	76	73	73	78	78	83	84	80	83	75	79	
		3W	62	65	60	57	57	55	57	57	62	59	60	58	59	
		LMV	74	75	72	69	66	67	69	72	69	72	72	71	69	70
		HMV	19	18	17	18	18	19	17	19	18	17	18	18	21	18
09.01.2022	Chandaka Khandagiri Road	2W	78	83	76	73	73	78	78	83	84	80	83	75	79	
		3W	60	63	58	55	55	53	55	55	60	57	58	56	57	
		LMV	67	68	65	62	59	60	62	65	62	65	64	62	63	
		HMV	20	19	18	19	19	20	18	20	19	18	19	19	22	19
10.01.2025	Chandaka Khandagiri Road	2W	68	73	66	63	63	68	68	73	74	70	73	65	69	
		3W	59	62	57	54	54	52	54	54	59	56	57	55	56	
		LMV	74	75	72	69	66	67	69	72	69	72	71	69	70	
		HMV	23	22	21	22	22	23	21	23	22	21	22	22	25	22
11.01.2022	Chandaka Khandagiri Road	2W	81	86	79	76	76	81	81	86	87	83	86	78	82	
		3W	58	61	56	53	53	51	53	53	58	55	56	54	55	
		LMV	75	76	73	70	67	68	70	73	70	73	72	70	71	
		HMV	22	21	20	21	21	22	20	22	21	20	21	21	24	21
12.01.2022	Chandaka Khandagiri Road	2W	71	76	69	66	66	71	71	76	77	73	76	68	72	
		3W	63	66	61	58	58	56	58	58	63	60	61	59	60	
		LMV	76	77	74	71	68	69	71	74	71	74	73	71	72	
		HMV	17	16	15	16	16	17	15	17	16	15	16	16	19	16
13.01.2022	Chandaka Khandagiri Road	2W	76	81	74	71	71	76	76	81	82	78	81	73	77	
		3W	54	57	52	49	49	47	49	49	54	51	52	50	51	
		LMV	66	67	64	61	58	59	61	64	61	64	63	61	62	
		HMV	21	20	19	20	20	21	19	21	20	19	20	20	23	20

**Table No. 5: Average traffic volume of Chandaka – Khandagiri Road in from 07.01.2022 to 13.01.22  
(Base year 2022)**

Date	2Wheeler	3Wheeler	Light Motor Vehicle (LMV)	Heavy Motor Vehicle (HMV)
07.01.2022	74	54	65	17
08.01.2022	79	59	70	18
09.01.2022	79	57	63	19
10.01.2022	69	56	70	22
11.01.2022	82	55	71	21
12.01.2022	72	60	72	16
13.01.2022	77	51	62	20
Average (veh/hr)	76	56	68	19
PCU Values	0.22	0.9	1.82	4.95
PCU/Hr	17	50	124	94

Therefore, the total existing traffic volume Chandaka - Khanadagiri is **285 PCU/ hr**.

Table No.6: The Average Existing Traffic on Service Road of NH-16 from Patrapada towards Beramunda

Date↓	Source	Time→	0900-1000 HRS	1000-1100 HRS	1100-1200 HRS	1200-1300 HRS	1300-1400 HRS	1400-1500 HRS	1500-1600 HRS	1600-1700 HRS	1700-1800 HRS	1800-1900 HRS	1900-2000 HRS	2000-2100 HRS	Average
07.01.2022	NH-16	2W	105	110	98	97	86	92	107	103	111	128	135	122	108
		3W	58	63	61	58	53	55	56	57	58	61	63	60	59
		LMV	80	77	78	75	75	73	70	72	68	69	75	73	74
		HMV	51	56	53	49	51	51	48	49	49	51	53	62	52
08.01.2022	NH-16	2W	110	115	103	102	91	97	112	108	116	133	140	127	113
		3W	60	65	63	60	55	57	58	59	60	63	65	62	61
		LMV	81	78	79	76	76	74	71	73	69	70	76	74	75
		HMV	52	57	54	50	52	52	49	50	50	52	54	63	53
09.01.2022	NH-16	2W	108	113	101	100	89	95	110	106	114	131	138	125	111
		3W	62	67	65	62	57	59	60	61	62	65	67	64	63
		LMV	83	80	81	78	78	76	73	75	71	72	78	76	77
		HMV	54	59	56	52	54	54	51	52	52	54	56	65	55
10.01.2022	NH-16	2W	102	107	95	94	83	89	104	100	108	125	132	119	105
		3W	63	68	66	63	58	60	61	62	63	66	68	65	64
		LMV	85	82	83	80	80	78	75	77	73	74	80	78	79
		HMV	55	60	57	53	55	55	52	53	53	55	57	66	56
11.01.2022	NH-16	2W	100	105	93	92	81	87	102	98	106	123	130	117	103
		3W	57	62	60	57	52	54	55	56	57	60	62	59	58
		LMV	79	76	77	74	74	72	69	71	67	68	74	72	73
		HMV	50	55	52	48	50	50	47	48	48	50	52	61	51
12.01.2022	NH-16	2W	101	106	94	93	82	88	103	99	107	124	131	118	104
		3W	55	60	58	55	50	52	53	54	55	58	60	57	56
		LMV	78	75	76	73	73	71	68	70	66	67	73	71	72
		HMV	49	54	51	47	49	49	46	47	47	49	51	60	50
13.01.2022	NH-16	2W	109	114	102	101	90	96	111	107	115	132	139	126	112
		3W	54	59	57	54	49	51	52	53	54	57	59	56	55
		LMV	77	74	75	72	72	70	67	69	65	66	72	70	71
		HMV	48	53	50	46	48	48	45	46	46	48	50	59	49



**Table No. 7: Average traffic volume of Service Road on NH-16 in from 07.01.2022 to 13.01.22  
(Base year 2022) from Patrapada towards Beramunda**

Date	2Wheeler	3Wheeler	Light Motor Vehicle (LMV)	Heavy Motor Vehicle (HMV)
07.01.2022	108	59	74	52
08.01.2022	113	61	75	53
09.01.2022	111	63	77	55
10.01.2022	105	64	79	56
11.01.2022	103	58	73	51
12.01.2022	104	56	72	50
13.01.2022	112	55	71	49
Average (veh/hr)	108	59	74	52
PCU Values	0.22	0.9	1.82	4.95
PCU/Hr	24	53	135	257

Therefore, the total existing traffic volume of Service Road on NH-16 towards Beramunda is **469 PCU/hr**.

Table No. 8: The Average Existing Traffic on Service Road of NH-16 from Beramunda towards Patrapada

Date↓	Source	Time→	0900 1000 HRS	1000 1100 HRS	1100 1200 HRS	1200 1300 HRS	1300 1400 HRS	1400 1500 HRS	1500 1600 HRS	1600 1700 HRS	1700 1800 HRS	1800 1900 HRS	1900 2000 HRS	2000 2100 HRS	Average	
07.01.2022	NH-16	2W	87	92	80	79	68	74	89	85	93	110	117	104	90	
		3W	40	45	43	40	35	37	38	39	40	43	45	42	41	
		LMV	62	59	60	57	57	55	52	54	50	51	57	55	56	
		HMV	66	71	68	64	66	66	63	64	64	64	66	68	77	67
08.01.2022	NH-16	2W	93	98	86	85	74	80	95	91	99	116	123	110	96	
		3W	45	50	48	45	40	42	43	44	45	48	50	47	46	
		LMV	70	67	68	65	65	63	60	62	62	58	59	65	63	64
		HMV	69	74	71	67	69	69	66	67	67	67	69	71	80	70
09.01.2022	NH-16	2W	85	90	78	77	66	72	87	83	91	108	115	102	88	
		3W	38	43	41	38	33	35	36	37	38	41	43	40	39	
		LMV	61	58	59	56	56	54	51	53	49	50	56	54	55	
		HMV	64	69	66	62	64	64	61	62	62	64	66	75	65	
10.01.2022	NH-16	2W	98	103	91	90	79	85	100	96	104	121	128	115	101	
		3W	51	56	54	51	46	48	49	50	51	54	56	53	52	
		LMV	73	70	71	68	68	66	63	65	61	62	68	66	67	
		HMV	77	82	79	75	77	77	74	75	75	77	79	88	78	
11.01.2022	NH-16	2W	92	97	85	84	73	79	94	90	98	115	122	109	95	
		3W	45	50	48	45	40	42	43	44	45	48	50	47	46	
		LMV	67	64	65	62	62	60	57	59	55	56	62	60	61	
		HMV	71	76	73	69	71	71	68	69	69	71	73	82	72	
12.01.2022	NH-16	2W	82	87	75	74	63	69	84	80	88	105	112	99	85	
		3W	35	40	38	35	30	32	33	34	35	38	40	37	36	
		LMV	57	54	55	52	52	50	47	49	45	46	52	50	51	
		HMV	61	66	63	59	61	61	58	59	59	61	63	72	62	
13.01.2022	NH-16	2W	94	99	87	86	75	81	96	92	100	117	124	111	97	
		3W	47	52	50	47	42	44	45	46	47	50	52	49	48	
		LMV	69	66	67	64	64	62	59	61	57	58	64	62	63	
		HMV	73	78	75	71	73	73	70	71	71	73	75	84	74	

**Table No. 9: Average traffic volume of Service Road on NH-16 in from 07.01.2022 to 13.01.22 (Base year 2022) from Beramunda towards Patrapada**

Date	2Wheeler	3Wheeler	Light Motor Vehicle (LMV)	Heavy Motor Vehicle (HMV)
07.01.2022	90	41	56	67
08.01.2022	96	46	64	70
09.01.2022	88	39	55	65
10.01.2022	101	52	67	78
11.01.2022	95	46	61	72
12.01.2022	85	36	51	62
13.01.2022	97	48	63	74
Average (veh/hr)	93	44	60	70
PCU Values	0.22	0.9	1.82	4.95
PCU/Hr	20	40	109	347

Therefore, the total existing traffic volume of Service Road towards Patrapada is **516 PCU/hr**.

Table No. 10: Average traffic volume (PCU/hr) from 07.01.2022 to 13.01.22 (Base year 2022)

Road	PCU / hr				Total (PCU/hr)
	2Wheeler	3Wheeler	Light Motor Vehicle (LMV)	Heavy Motor Vehicle (HMT)	
Ghatikia Road	13	32	73	35	<b>153</b>
Chandaka – Khandagiri Road	17	50	124	94	<b>285</b>
NH-16 Service Road (Patrapada – Beramunda)	24	53	135	257	<b>469</b>
NH-16 Service Road (Beramunda- Patrapada)	20	40	109	347	<b>516</b>



Fig. No. - 5: Layout of the Proposed Residential Use Type Building



**3.0 PROJECTION OF TRAFFIC VOLUME AFTER TEN YEARS:**

To calculate the traffic volume after 10 years, we have referred to the traffic volume data of Transport and communication, Motor Vehicles registered in Khordha District (Reference: District Statistical handbook, Khordha) for the year 2012-13 to the year 2017-18. Details are given in TableNo.11.

The past trend (2012-2013 to 2017-2018) of traffic growth has been considered for the estimation of growth rate and summarized in Table No. 11.

**Table No.11: Total Traffic Volume from 2012-13 to 2017-18 per Year**

Year	2Wheeler Including Total Motorcycles, Scooters and Mopeds on Road	3Wheeler Including Total Three Wheelers and Auto rickshaw on Road	Light Motor Vehicle (LMV) Including Total Jeeps, station wagons, Private cars and Taxies on Road	Heavy Motor Vehicle (HMV) Including Total Buses, Trucks, Lorries, Tractors and Tailors on Road
2012-2013	636198	25041	114431	46712
2013-14	700947	28783	130561	51266
2014-15	767375	31911	145983	55117
2015-16	843382	35004	162467	60922
2016-17	932117	38249	181382	56446
2017-18	1033661	40825	206337	71552
<b>Total Average</b>	<b>818947</b>	<b>33302</b>	<b>156860</b>	<b>57003</b>

(Reference-District Statistical Handbook, Khordha) Attached as Annexure-1

**Estimation of Traffic Growth Rate**

For establishing reliable growth rate, the data should be for a number of years. The analysis has been carried out for the entire period as explained below. The best way to arrive at the rate of growth is through regression analysis. The formula for expressing for the compound rate of growth of traffic is

$$P_n = P_0(1 + r)^n$$

Where,

$P_n$  = Traffic in the  $n^{\text{th}}$  year

$P_0$  = Traffic flow in the base year

$n$  = number of years

$r$  = annual rate of growth of traffic, expressed in decimal.

Taking logs on both sides,

$$\begin{aligned} \text{Log}_e(P_n) &= \text{Log}_e(P_0) + n \times \text{Log}_e(1 + r) \\ Y &= A_0 + A_1 \times n \end{aligned}$$

Where,

$Y = \text{Log}_e(P_n)$

$A_0 = \text{Log}_e(P_0)$

$A_1 = \text{Log}_e(1 + r)$

The above equation can be established from the data set of n values. This procedure has been used to estimate the annual rate of growth of traffic. The data for 2-Wheeler, 3-wheeler, LMV, and HMV are tabulated in Tables 12 through 15. Finally, the average growth rate for each category of vehicle type is summarized in Table16.

**Table No.12 Annual rate of growth of 2-wheeler**

Year	n	2 Wheeler, Including Total Motorcycles, Scooters and Mopeds on Road (P)	Y = Log <sub>e</sub> (P)
2012-13	0	636198	13.36327
2013-14	1	700947	13.46019
2014-15	2	767375	13.55073
2015-16	3	843382	13.64518
2016-17	4	932117	13.74521
2017-18	5	1033661	13.84862

**Table No.13 Annual rate of growth of 3-wheeler**

Year	n	3 Wheeler on Road (P)	Y = Log <sub>e</sub> (P)
2012-13	0	25041	10.12827
2013-14	1	28783	10.26754
2014-15	2	31911	10.37071
2015-16	3	35004	10.46322
2016-17	4	38249	10.55187
2017-18	5	40825	10.61705

**Table No. 14 Annual rate of growth of LMV**

Year	n	Light Motor Vehicle on Road (P)	Y = Log <sub>e</sub> (P)
2012-13	0	114431	11.64773
2013-14	1	130561	11.7796
2014-15	2	145983	11.89125
2015-16	3	162467	11.99823
2016-17	4	181382	12.10836
2017-18	5	206337	12.23727

Table No. 15 Annual rate of growth of HMV

Year	n	Heavy Motor Vehicle on Road (P)	$Y = \text{Log}_e(P)$
2012-13	0	46712	10.75176
2013-14	1	51266	10.84478
2014-15	2	55117	10.91721
2015-16	3	60922	11.01735
2016-17	4	56446	10.94104
2017-18	5	71552	11.17818

Table No.16 Annual rate of growth for each category of vehicles

Year	2 Wheeler Including Total Motorcycles, Scooters and Mopeds on Road	3 Wheeler Including Total Three Wheelers and Auto rickshaw on Road	Light Motor Vehicle (LMV) Including Total Jeeps, station wagons, Private cars and Taxies on Road	Heavy Motor Vehicle (HMV) Including Total Buses, Trucks, Lorries, Tractors and Trailors on Road
Annual rate of growth	0.10131	0.10164	0.122435	0.074655

The expected traffic in the existing roads are calculated for the year 2031-2032 considering only the growth factor (as mentioned in Table 16) and without considering any traffic to be generated from proposed project. The detailed calculations are shown in Tables 17 to 20. Furthermore, the expected LOS are also calculated for all the roads and are presented in Table 21.

Table No. 17 Projected traffic volume in Ghatikia Road near project side in the year 2031-2032 (Excluding any traffic from proposed project)

	2 Wheeler Including Total Motorcycles, Scooters and Mopeds on Road	3 Wheeler Including Total Three Wheelers and Auto rickshaw on Road	Light Motor Vehicle (LMV) Including Total Jeeps, station wagons, Private cars and Taxies on Road	Heavy Motor Vehicle (HMV) Including Total Buses, Trucks, Lorries, Tractors and Trailors on Road
Traffic flow in the base year 2022, (P <sub>0</sub> ) (veh/hr)	58	36	40	7
annual rate of growth of traffic, (r)	0.10131	0.10164	0.122435	0.074655
Traffic in the 10 <sup>th</sup> year 2031-2032, (P <sub>n</sub> ) (Veh/hr)	152	95	127	14
PCU values	0.22	0.90	1.82	4.95
Traffic in the 10 <sup>th</sup> year 2031-2032,	33	86	231	69



(P <sub>n</sub> ) (PCU/hr)				
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**Table No. 18 Projected traffic volume in Khandagiri Chandaka Road (from Naka Gate Square towards Khandagiri Square) (Excluding any traffic from proposed project)**

	<b>2 Wheeler Including Total Motorcycles, Scooters and Mopeds on Road</b>	<b>3 Wheeler Including Total Three Wheelers and Auto rickshaw on Road</b>	<b>Light Motor Vehicle (LMV) Including Total Jeeps, station wagons, Private cars and Taxies on Road</b>	<b>Heavy Motor Vehicle (HMV) Including Total Buses, Trucks, Lorries, Tractors and Trailors on Road</b>
Traffic flow in the base year 2022, (P <sub>0</sub> ) (veh/hr)	76	56	68	19
annual rate of growth of traffic, (r)	0.10131	0.10164	0.122435	0.074655
Traffic in the 10 <sup>th</sup> year 2031-2032, (P <sub>n</sub> ) (Veh/hr)	200	147	216	39
PCU values	0.22	0.90	1.82	4.95
Traffic in the 10 <sup>th</sup> year 2031-2032, (P <sub>n</sub> ) (PCU/hr)	44	132	393	193

**Table No. 19 Projected traffic volume in on NH-16 (Patrapada to Beramunda) (Excluding any traffic from proposed project)**

	<b>2 Wheeler Including Total Motorcycles, Scooters and Mopeds on Road</b>	<b>3 Wheeler Including Total Three Wheelers and Auto rickshaw on Road</b>	<b>Light Motor Vehicle (LMV) Including Total Jeeps, station wagons, Private cars and Taxies on Road</b>	<b>Heavy Motor Vehicle (HMV) Including Total Buses, Trucks, Lorries, Tractors and Trailors on Road</b>
Traffic flow in the base year 2022, (P <sub>0</sub> ) (veh/hr)	108	59	74	52
annual rate of growth of traffic, (r)	0.10131	0.10164	0.122435	0.074655
Traffic in the 10 <sup>th</sup> year 2031-2032, (P <sub>n</sub> ) (Veh/hr)	284	155	235	107
PCU values	0.22	0.90	1.82	4.95
Traffic in the 10 <sup>th</sup> year 2031-2032, (P <sub>n</sub> )	63	140	428	530

(PCU/hr)				
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**Table No. 20 Projected traffic volume in on NH-16 (Beramunda to Patrapada) (Excluding any traffic from proposed project)**

	<b>2 Wheeler Including Total Motorcycles, Scooters and Mopeds on Road</b>	<b>3 Wheeler Including Total Three Wheelers and Auto rickshaw on Road</b>	<b>Light Motor Vehicle (LMV) Including Total Jeeps, station wagons, Private cars and Taxies on Road</b>	<b>Heavy Motor Vehicle (HMV) Including Total Buses, Trucks, Lorries, Tractors and Trailors on Road</b>
Traffic flow in the base year 2022, (P <sub>0</sub> ) (veh/hr)	93	44	60	70
annual rate of growth of traffic, (r)	0.10131	0.10164	0.122435	0.074655
Traffic in the 10 <sup>th</sup> year 2031-2032, (P <sub>n</sub> ) (Veh/hr)	244	116	190	144
PCU values	0.22	0.90	1.82	4.95
Traffic in the 10 <sup>th</sup> year 2031-2032, (P <sub>n</sub> ) (PCU/hr)	54	104	346	713

#### **Base capacity of the urban road**

Base capacity is the maximum number of vehicles that can pass a given point on a lane or roadway during one hour, under the most nearly ideal roadway and traffic conditions, which can possibly be attained. For the estimation of base capacity, the table suggested by Indo-HCM has been referred in this report and summarized below.

**Table 5.4: Capacity and Recommended Design Service Volume of Base Sections of Urban Roads**

<b>S. No.</b>	<b>Typology of the Road</b>	<b>Capacity (PCUs/hr)</b>	<b>Lane Capacity (PCUs/hr)</b>	<b>Design Service Volume (PCUs/hr)</b>
1	Two-lane Undivided	2400	1200	1680
2	Four-lane Divided	5400 (2700)	1350	3780 (1890)
3	Six-lane Divided	8400 (4200)	1400	5880 (2940)
4	Eight-lane Divided	13600 (6800)	1700	9520 (4760)
5	Ten-lane Divided	20000 (10000)	2000	14000 (7000)

*Note: The values in parenthesis / brackets represent PCUs per hour per direction'*

**Table 5.7: LOS of Multilane Divided Urban Roads based on Stream Speed, V/C Ratio and FFS**

LOS	Volume/Capacity Ratio	Percentage of Free Flow Speed
LOS A	≤ 0.15	≥ 84
LOS B	0.15 - 0.45	83 - 76
LOS C	0.46 - 0.75	75 - 59
LOS D	0.76 - 0.85	58 - 41
LOS E	0.86 - 1.00	40 - 22
LOS F	> 1.00	< 22

The base capacity values for all the roads are calculated and tabulated below. Also, the expected LOS (excluding any traffic from the proposed project) of all the roads in the year 2031-2032 are mentioned in the following table. The road sections have been considered as base road section and therefore the LOS values have been calculated considering the base capacity without any adjustment factors.

**Table No. 21: Expected LOS in the year 2031-2032 (Excluding any traffic from the proposed project)**

Road	Width of road in one direction, m	Projected traffic in 2031-2032 (PCU/hr)	Capacity (PCU/hr)	Volume/Capacity	LOS (Excluding any traffic from the proposed project)
Ghatikia Road (Divided road)	5	419	1930	0.217	B
Chandaka - Khandagiri Road	7	762	2700	0.282	B
NH-16 Service Road (Patrapada - Beramunda)	9	1161	3600	0.323	B
NH-16 Service Road (Beramunda - Patrapada)	9	1217	3600	0.338	B

Table No. 22 gives the expected total PCU/day that will be generated from residential complex. This traffic will meet the main road i.e., from Project site, to Naka gate Square followed by Khandagiri Square.

**Table No.22: Expected traffic from the Residential Building**

Sl. No.	Item Description	Total No Population	Type of vehicles	No of vehicles	Equivalent passenger Car Unit (PCU) factor	Total passenger Car Unit
1	Residential Flats	1520	Two Wheeler	290	0.22	64
			Three Wheeler	92	0.90	83
			Light Motor Vehicle (4 Wh)	132	1.82	240
			Heavy Motor Vehicle	--	4.95	--
2	Floating Population	80	Two Wheeler	132	0.22	29
			Three Wheeler	53	0.90	48
			Light Motor Vehicle (4 Wh)	152	1.82	277
			Heavy Motor Vehicle	--	4.95	--
	Total					<b>741 PCU/Day</b>
The Total Average PCU will be increased by approximately <b>741 PCU/day</b> .						

Total expected traffic (veh/hr) that will be generated (year 2024) from the Residential building is summarized as follows:

**Table No.23: Summary of expected traffic from the Residential Building**

Two Wheeler	Three Wheeler	Light Motor Vehicle	Total
422/day	145/day	284/day	851 veh/day
PCU = 0.22	PCU = 0.90	PCU = 1.82	--
93 PCU/day	131 PCU/day	517 PCU/day	741 PCU/day
35 veh/hr	12 veh/hr	24 veh/hr	71 veh/hr
8 PCU/hr	11 PCU/hr	44 PCU/hr	63 PCU/hr



Assuming that the construction will be completed by 2024, the traffic that will be generated from the project site is calculated as follows.

Table No.24: Summary of expected traffic in the tear 2031-2032 from the Residential Building

	2 Wheeler Including Total Motorcycles, Scooters and Mopeds on Road	3 Wheeler Including Total Three Wheelers and Auto rickshaw on Road	Light Motor Vehicle (LMV) 4 Wh- Standard car and Big car	Heavy Motor Vehicle (HMV), Including Total Buses, Trucks, Lorries, Tractors and Trailors on Road
Traffic flow in the base year 2024, (P <sub>0</sub> ), (veh/hr)	35	12	24	0
annual rate of growth of traffic, ®	0.10131	0.10164	0.122435	0.074655
Traffic in the 8 <sup>th</sup> year 2031- 2032, (P <sub>n</sub> ) (veh/hr)	76	26	61	0
PCU values	0.22	0.90	1.82	4.95
Traffic in the 8 <sup>th</sup> year 2031- 2032, (P <sub>n</sub> ) (PCU/hr)	17	23	111	0
<b>Total</b>	<b>151 PCU/hr</b>			

This traffic (151 PCU/hr) is expected to be generated in the year 2031-2032 from proposed project and will contribute to the existing traffic volume on the surrounding roads and for this reason the expected increase in LOS values are shown in the following table.

(100% of 151 PCU/hr will meet in the first two roads and thereafter 60 % towards BBS and rest 40% towards Khurda. Flow towards city has been ignored).

**Table No. 25 : LOS values for different roads in the year 2031-2032**

Road	Width of road in one direction, m	Capacity (PCU/hr)	(Excluding any traffic from the proposed project)			(Including traffic from the proposed project)		
			Projected traffic in 2031-2032 (PCU/hr)	$\frac{\text{Volume}}{\text{Capacity}}$	LOS in 2031-2031	Projected traffic in 2031-2032 (PCU/hr)	$\frac{\text{Volume}}{\text{Capacity}}$	LOS in 2031-2031
Ghatikia Road (Divided road)	5	1930	419	0.217	<b>B</b>	(419+151) = 570	0.295	<b>B</b>
Chandaka - Khandagiri Road	7	2700	762	0.282	<b>B</b>	(762+151) = 913	0.338	<b>B</b>
NH-16 Service Road (Patrapada - Beramunda)	9	3600	1161	0.323	<b>B</b>	(1161+60% of 151) = 1252	0.348	<b>B</b>
NH-16 Service Road (Beramunda-Patrapada)	9	3600	1217	0.338	<b>B</b>	(1217+40% of 151) = 1278	0.355	<b>B</b>

#### 4.0 Conclusion

A detailed traffic study was carried from Project site Near Naka Gate Square or Near CET College, Bhubaneswar found to be adequate. As per Comprehensive Development Plan 2030 (CDP) prepared by IIT Kharagpur for greater Bhubaneswar, the road will be expanded, which will make the road more comfortable for the users.

**XI. TRANSPORT AND COMMUNICATION****11.04 : Motor Vehicles Registered & On road in Khordha district**

( In number )

Sl. No.	Vehicles	Number registered during			M.V on Road		
		2012-13	2013-14	2014-15	2012-13	2013-14	2014-15
1	2	3	4	5	6	7	8
1	Motor Cycles, Scooters and Mopeds	64749	63048	66428	636198	700947	767375
2	Three Wheelers and Auto Rickshaw	439	3565	3789	25041	28783	31911
3	Jeeps and Station Wagons	568	1146	133	10782	11378	11511
4	Private Cars	15499	12544	14682	88040	101068	115770
5	Taxis	35	1410	570	15609	18115	18702
6	Buses(Contract Carriage & State Carriage)	233	179	152	2319	2552	2704
7	Trucks and Lorries	6319	2304	1731	32130	35146	37538
8	Tractors and Trailors	1305	1298	1307	12263	13568	14875
9	Miscellaneous Vehicles	131	41	2299	6543	6646	8908
Total		89278	85535	91091	828925	918203	1009294

Source : State Transport Authority, Odisha, Cuttack.

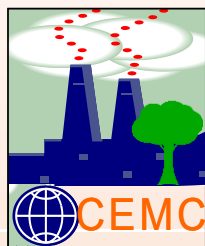
**XI. TRANSPORT AND COMMUNICATION****11.03. Motor Vehicles Registered & Motor Vehicle on Road  
in Khordha district**

( In Number )

Sl. No.	Vehicles	M.V. Registered during			Motor Vehicle on Road		
		2015-16	2016-17	2017-18	2015-16	2016-17	2017-18
1	2	3	4	5	6	7	8
1	Motor Cycles, Scooters and Mopeds	76007	88735	101544	843382	932117	1033661
2	Three Wheelers & Auto Rickshaws	3811	4208	3380	35004	38249	40825
3	Jeeps and Station Wagons	81	108	537	11592	11550	12087
4	Private Cars	15564	17674	23065	131334	149060	172125
5	Taxis	839	1231	1353	19541	20772	22125
6	Buses Contract Carriages & Stage Carriages	204	293	361	2908	3201	3562
7	Trucks and Lorries	2025	2307	2334	40281	43551	46689
8	Tractors and Trailors	2858	1851	1717	17733	9694	21301
9	Miscellaneous Vehicles	2013	3134	2325	10921	24043	16478
Total		103402	119541	136616	1112696	1232237	1368853

Source : State Transport Authority, Odisha, Cuttack





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**ENVIRONMENTAL MANAGEMENT PLAN**

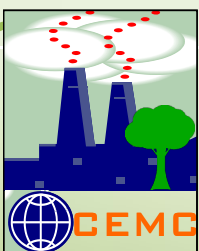
Of

**Proposed high rise Residential Apartment  
(2B+G+14)**

FOR

*M/S SHUVAM CONSTRUCTION (P) LTD.*

At: Ghatika, Bhubaneswar, Khordha, Odisha.

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## **CHAPTER-1**

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# **EXECUTIVE SUMMARY**

### **1.0 INTRODUCTION**

**M/s Shuvam Construction (P) Ltd** has proposed for Development of housing project of 2B+G+14 High Rise Residential Apartment Building over an area of 2.652 Acres at Plot No.: 4016, 4023/ 9099, 4010/10999, 4010/ 9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/ 9599, 4024, 3967, 3968, 3970, 4011/9062, 4011, 4023/9086, 4010/10998, 4028, KHATA NO-1678, 607, 988/958, 803, 720, 1101, 1678, 238, 1988/87, 1988/86, 535, 1228, 1332, 1123, 1139, 1988/957, Mouza-Ghatika, Dist-Khordha Odisha.

### **1.1 BACK GROUND OF PROMOTER**

The land comes under Odisha Development Authority area. The project is for developing residential projects as per international standards and being transparent and fair in every dealing with its customers. With its prestigious projects, the company strives to create maximum value for its customers. The project stipulate 2.652 acres land area allocation for Housing, while remaining land will be utilized for private development based on the market dynamics and development guidelines.

### **1.2 SITE AND SURROUNDING**

The proposed site is located at Ghatikia, Bhubaneswar, Odisha. The Geographical co-ordinate of the project site is: Latitude -20° 16' 15.78" N & Longitude - 85° 46' 44.81" E. The project site is well connected with Ghatikia main road and The National Highway-16 is located at the distance of 0.3 Km & 1.4 km. The nearest Railway station is Bhubaneswar Railway Station at a distance of approximately 5.2 Km from the project site. The nearest Airport is Biju Patnaik International Airport, Bhubaneswar which is at a distance of 5 Km from the project site. The site is located adjacent to the local landmarks, Kalinga Nagar, Shympur etc. There is no structure or encroachments on the site. The site is easily accessible from NH-16 Road.

### **1.3 AREA DETAILS OF THE PROJECT**

**Table No. C1-1: Area Detail**

<b>Particular</b>	<b>Proposed</b>	<b>Permissible</b>
Project Name	Proposed Housing Project (High Rise Residential Apartment Building Project)	
Plot Area	10732.17 Sqm	--



Ground Coverage	3053.12 Sqm (28.55%)	--
Total Built up Area	56722.86 Sqm	--
Total FAR Area	44996.50 Sqm	--
FAR	4.192	7.0
Maximum Height	50.93 meter	--
No. of recharge pit	32	--
Drive Way Width	7.5 meter	--
Parking Area	22308.36 Sqm	13498.95 Sqm (30 % of Residential FAR Area)
Green Belt Area	2641.18 Sqm (24.61 % of Plot area)	2146.4 Sqm (20% of Plot area)
Power/Electricity Requirement & Sources	Total Power - 1482 KW Power from Solar – 78.5 KW TPCODL- 1403.5 KW	--
No. of DG sets	2 x 500 KVA	--
Fresh Water requirement & Sources	141 KLD Source: Ground Water	--
Sewage Treatment & Disposal	STP Capacity 200 KLD	--
Estimated Population- Residential, Floating/visitors	Residential Population: 1520 Nos. Floating Population: 152 Nos.	--

#### **1.4 REQUIREMENT FOR THE PROJECT:**

- **Area requirement:** For this project 10732.17 Sqm (2.652 Acres) of land is required, which has already been acquired.
- **Power requirement:** The daily power requirement for the proposed Private Developer Project is preliminarily assessed as **1482 KW (Solar- 78.5 KW & TPCODL- 1403.5 KW)** source from TPCODL of Odisha State Electricity Board. In order to meet emergency power requirements during the grid failure, there is provision of 2 nos. of DG set having 500 KVA (2 Nos.) capacities for power back up in the Private Housing Project.
- **Water requirement:** Fresh make up of 141 m<sup>3</sup>/day will be required for the project which will be sourced from Ground Water Supply.

**Table No. C1-2: Construction Material requirement**

<b>Sl. No.</b>	<b>Materials</b>	<b>Unit</b>	<b>Quantity</b>
1	Fly Ash Bricks	No	3302858
2	Cement	Bags	173572
3	Sand	Cum	23888
4	Chips	Cum	8466

5	Steel	Ton	1329
---	-------	-----	------

## **1.5 ENVIRONMENTAL MANAGEMENT PLAN**

### **I. Air quality management**

#### **Air Quality Management during Construction Phase**

- Water sprinkling on haulage roads & stock piles to avoid dust.
- Vehicle & construction equipments will be maintained properly to reduce exhaust gas emission.
- Cement will be unloaded within covered space.
- Covering of vehicle carrying building materials.
- Trees will be planted before the construction activities.

#### **Air Quality Management during Operation Phase**

- Vehicles not having PUC certificates will be discouraged to enter the site.
- DG sets will be kept inside separate sheds and will be provided with adequate stack height as per CPCB Norms.
- Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.
- Open burning of litter and garbage will not be allowed

### **II. Water resource management**

Regarding the management of water quality during the construction period of the proposed complex, wastewater generation from the construction activities as most of water is used for mixing in construction materials, curing & dust suppression. However, domestic effluent generated from toilets of workers camp will be discharged to soak pit via septic tank. During the operational phase, the waste water generated from different blocks will be treated in STP. The treated waste water will be used for flushing, landscaping & dust suppression purpose. The rain water collected from building roofs will be led to suitably to rain water harvesting recharging pits. Storm water from various blocks shall be connected to adjacent drain for final disposal.

### **III. Noise management**

#### **Noise Management during Construction stage:**

- Rotating or imparting machines can be used an anti vibration mountings.
- Regular service & maintenance of equipments and machineries will be done.
- Vehicles not having proper silencer will not be allowed to site.
- Construction activities will be allowed during the day only.

**Noise Management during Operation stage:**

- Adequate greenbelt will be developed along the peripheral boundary walls, which will act as acoustic screen or vegetative barrier against the propagation of noise.
- DG sets will be provided with acoustic enclosure to control noise level as per CPCB prescribed norms.

**IV. Solid waste management**

Separate raw material handling yard within the project site will be made. Cement will be separately stored under closed shed. Sand will be stacked neatly under tarpaulin cover. Bricks and steel will be laid in open. Recycled materials may be used in roads and land development activities, other waste like cuttings and scrap will be send to vendor.

The solid waste will be segregated at source and will be stored in separate coloured bins. Proper waste management practices will be adopted during the collection, storing and disposal of the generated solid waste. The waste will be sent to Government approved agency for final disposal.

**V. Land Management**

After the completion of the project, bare surfaces within the project site will be covered with vegetation. While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion. During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete. Building materials will be stored on a platform within a covered area.

**VI. Landscape and Green Belt Development**

An adequate greenbelt 2641.18 m<sup>2</sup> (24.61 % of the plot area) or plantation around the project will be developed. This will minimize the effects of air pollution, noise pollution and soil erosion inside the area. Thus, the landscaping and plantation programmed within the project site will improve the aesthetic quality of the project site as well as of the surrounding environment.

**VII. Energy Conservation measures**

Energy efficient features will be adopted, i.e. LED lighting features, Solar Street lighting, solar water Heating and Maximum utilization of natural light.

The building shall be comply to the Energy Conservation Building Code (ECBC) with proper windows to reduce heat gain but increasing light availability. The walls and roofs will be also designed suitably to reduce heat gain.

**VIII. Fire Fighting measures:**

Fire fighting system will be installed as per recommendation of the Fire fighting Officer, Odisha, and Bhubaneswar and as per the guideline of NBC (part-4). The

**Environmental Management Plan**  
**M/s. Shuvam Construction (P) Ltd.**

fire fighting system comprises of Hose Reel, Down Comer, Manual operated electric fire alarm system, Terrace Tank, Extinguisher and Terrace pump. Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.

**Table No. C1-3: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs (Non-recurring)</b>	<b>Recurring Cost per annum (in Lakhs)</b>
1	Air Pollution Control	147	14.7
2	Waste Water Management	131	13.1
3	Water Treatment Plant	32.80	3.28
4	Solid Waste Management	82	8.2
5	Environmental Monitoring	7.64	0.764
6	Greenbelt Development	115	11.5
<b>Total</b>		<b>515</b>	<b>51.5</b>



## **CHAPTER-2**

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# **PROJECT DESCRIPTION**

### **2.0 INTRODUCTION**

**M/s Shuvam Construction (P) Ltd** proposed 2B+G+14 High Rise Residential Apartment Building project is 2.652 Acres of land at Plot No.: 4016, 4023/ 9099, 4010/10999, 4010/ 9061, 3971, 3969, 4020, 4025, 4019, 4017, 4022, 4026, 4021, 4027, 4018, 4023, 3967/ 9599, 4024, 3967, 3968, 3970, 4011/9062, 4011, 4023/9086, 4010/10998, 4028, khata no-1678, 607, 988/958, 803, 720, 1101, 1678, 238, 1988/87, 1988/86, 535, 1228, 1332, 1123, 1139, 1988/957, Mouza-Ghatika, Dist-Khordha Odisha in favour of M/s Shuvam Construction (P) Ltd.

### **2.1 BACKGROUND OF PROMOTOR**

The land comes under Odisha Development Authority area. The project is for developing residential projects as per international standards and being transparent and fair in every dealing with its customers. With its prestigious projects, the company strives to create maximum value for its customers. The project stipulate 2.652 acres land area allocation for Housing, while remaining land will be utilized for private development based on the market dynamics and development guidelines.

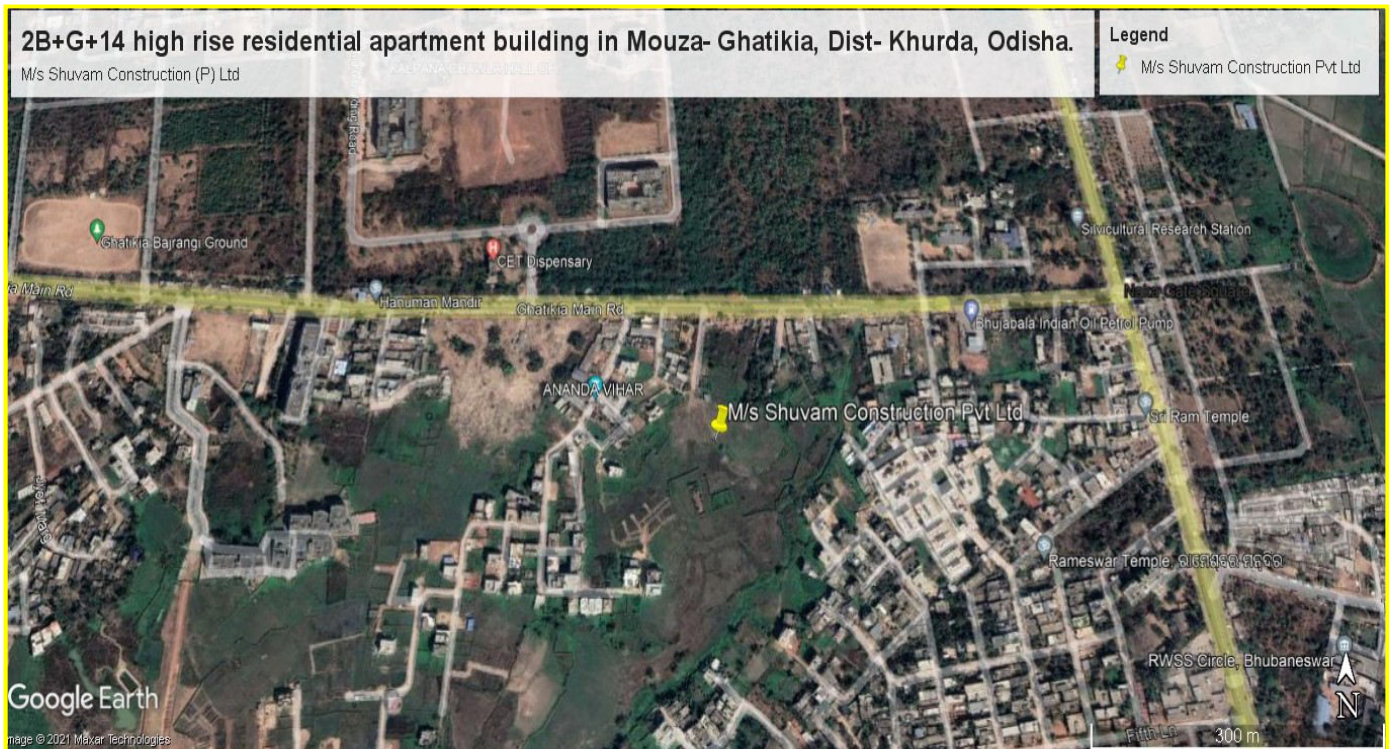
### **2.2 JUSTIFICATION OF THE PROJECT**

It is clear that the strengths of the location and opportunities provide great incentive for the development. Further availability of required infrastructure facilities, enhances the potential for the proposed development. As a result, the city life and city culture is farming its character towards a cosmopolitan nature. So due to space constraint and to accommodate more people in a small space with all common facilities the proposed project is of the latest additions to offer this kind of opportunities towards the people of the city.

### **2.3 SITE AND SURROUNDINGS**

The proposed site is located at Ghatikia, Khordh, Odisha. The Geographical co-ordinate of the project site is: Latitude -20° 16' 15.78" & Longitude - 85° 46' 44.81". The project site is well connected with Ghatikia main road and The National Highway-16 is located at the distance of 0.3 Km & 1.4 km. The nearest Railway station is Bhubaneswar Railway Station at a distance of approximately 5.2 Km from the project site. The nearest Airport is Biju Patnaik International Airport, Bhubaneswar which is at a distance of 5 Km from the project site.

**Fig. No. C2-1: Google Map of the Site**



### 2.3.1 Connectivity

**2.3.1.1 Road Connectivity:** The project site is well connected with AH-45 and The National Highway-16 is located at the distance of 2 Km & 1.4 Km respectively.

**2.3.1.2 Rail Connectivity:** The nearest Railway station is Bhubaneswar Railway Station which is approx 5.2 Km from the project site.

**2.3.1.3 Airport:** The nearest Airport is Biju Patnaik International Airport, Bhubaneswar which is 5 Km from the project site.

### 2.3.2 Nearby Habitation and Facilities:

Habitation nearer to the site is Shympur, Kalinga Nagr, Shankarpur, Rajiv Nagar etc.

**Table No. C2-1: Details of facilities Nearer To the Site**

Name	Distance in Km	Direction
<b>Hospital near to the project site</b>		
Sum Hospital	1.5	NW
Kalinga Hospital	3.2	N
Capital Hospital	7	S
<b>Educational Institutions Nearer To the Site</b>		
Kenriya Bidyalaya	2.5	NE

SOA University	3.4	NW
DAV School	5	N
Utkal University	7	NE
<b>Banks/Post Offices Nearer To the Site</b>		
Axis Bank	6.8	N
Bank of India	4.5	N

## **2.4 SITE SELECTION**

Site selection and analysis should be carried out to create living spaces for people in harmony with the local environment. The process of site selection for sustainable development involves identifying and weighing the appropriateness of the site with respect to sustainable building criteria. Appropriate Site selection procedure reduces the negative impacts and requirement for mitigation measures for large constructions projects.

### **2.4.1 Land Use Pattern**

The Land use/Land cover map of the study area is prepared based on the satellite imagery as well as secondary information along with field survey. The various land use/land cover classes identified within the buffer zone these includes Agricultural land, Urban habitation, Scrub Forest, Water body, Plantation, Waste land and River /Water bodies etc. Rapid development taking place in the area with respect to setting up Business centers, Educational Institutions and trading activities. Hence lot of demand has been generated for Residential plots in the area and degraded waste agricultural land near the roadsides are being converted to Residential plots.

### **2.4.2 Soil Characteristics:**

Two Soil type can be found in the buffer zone of the project area. These are Alfisols and Ultisols. Red black soils covers majority of the area including patches in the south east part of the buffer zone. Red sandy soils area present in the south and south east part of the buffer zone. Red sandy soils and lateritic soils in the south western part of the buffer zone occurring in patches in uplands, especially as capping over weathered country rocks.

### **2.4.3 Ground Water Level:**

The availability of ground water resource in this area is sufficient. During pre-monsoon the depth of ground water level is 4-6 m.

### **2.4.4 Environmental Consideration:**

Before implementation of the project the environmental quality study has been made which is reflecting the present status of air, water and noise quality. From

the environmental baseline study the environmental quality of the area was found within the permissible limits.

#### **2.4.5 Infrastructure Availability:**

The feature which should influence site selection for the development of a project is the infrastructure and utilities available to the site. The project site having good communication network with accessible road facility, railway station, there is also easy availability of construction materials, water resource and power supply for the project. The site is accessible by Ghatikia Main Road.

#### **2.4.6 Waste Disposal facility:**

There is availability of enough space and road network for storage, handling and transportation of solid waste. As the site is coming under Bhubaneswar Municipal Corporation development area all the solid waste generated will be handed over to a BMC approved vendor. Treated waste water will be dispose to the nearest nala after maintaining the waste disposal standard.

#### **2.4.7 Drainage Pattern:**

The waste water generated from different blocks of residential apartment will go to the sewage treatment plant through the waste water disposal channel. After treatment of waste water the surplus waste water will go to the nearby national highway drain. The surplus storm water generated after rain water harvesting process will go the nearest national highway drain through separated storm water channel. For discharge of waste water and surplus storm water to drain, Permission has been granted from National Highway Authority of India.

### **2.5 MICRO-METEOROLOGY:**

#### **2.5.1 Climate**

Bhubaneswar experiences three main seasons (i.e. summer, winter and monsoon). The Summer season with hot climate commences during March to June month, July to October month represents the Monsoon season, Whereas The Winter season last for four months (from November to February). Out of the three seasons Bhubaneswar enjoys a tropical climate with high humidity during summer due to the proximity to the sea. May is the hottest and January is the coldest month of the year.

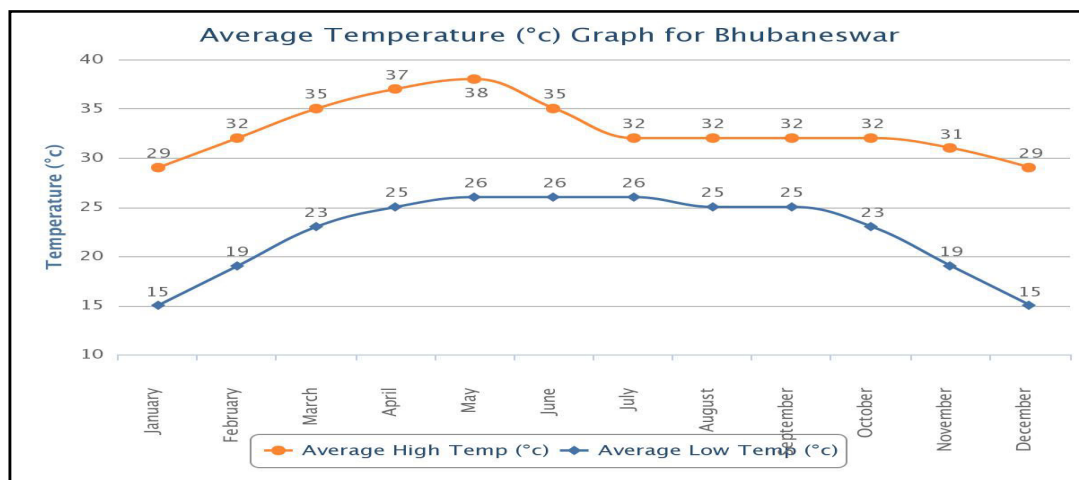
#### **2.5.2 Temperature**

The month wise average maximum and minimum temperatures for the period 2002 to 2012, recorded at IMD station Bhubaneswar, have been furnished in **Table No. C2-4** and visualized in **Fig. No.C2-2**.



**Table No. C2-4: Average Monthly Max. and Min. Temperature**

Months	Temperature (°C)	
	Maximum	Minimum
January	29	15
February	32	19
March	35	23
April	37	25
May	38	26
June	35	26
July	32	26
August	32	25
September	32	25
October	32	23
November	31	19
December	29	15
<b>Average</b>	<b>33</b>	<b>22</b>



**Fig. No.C2-2: Monthly Avg. Max. & Min. Temperature (°C)**

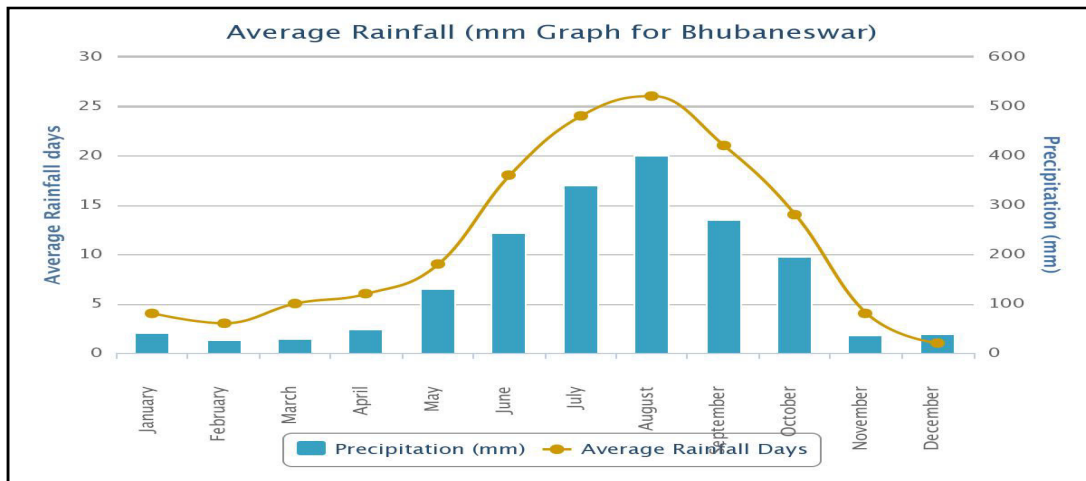
For the period of 2009-18, the mean of minimum temperature ranges from 15°C in December to 26°C in May and the mean maximum temperature ranges from 29°C in December to 38°C in May.

### **2.5.3 Rainfall**

The yearly total rainfall (mm) from 2009-18 recorded at IMD Station Bhubaneswar is summarized in **Table No C2-5**. The monthly average rainfall variation and annual total rainfall is presented in **Fig. No.C2-3**. The figures shows that June to September are the months of heaviest rainfall while October to May is very low rainfall. As observed from the table, the annual rainfall varies from the lowest value of 923.1 mm in 2015 to a maximum of 1730.4 mm in 2013. The annual average being 1320.96 mm.

**Table No C2-5: Annual Rainfall Observed at Bhubaneswar**

Year	Rainfall (mm)
2009	1516.1
2010	1423.7
2011	1071.4
2012	1216.7
2013	1730.4
2014	1352.1
2015	923.1
2016	1107.4
2017	1363.5
2018	1505.2
<b>Average</b>	<b>1320.96</b>



**Fig. No.C2-3: Monthly Average Rainfall (mm) IMD Station, Bhubaneswar**

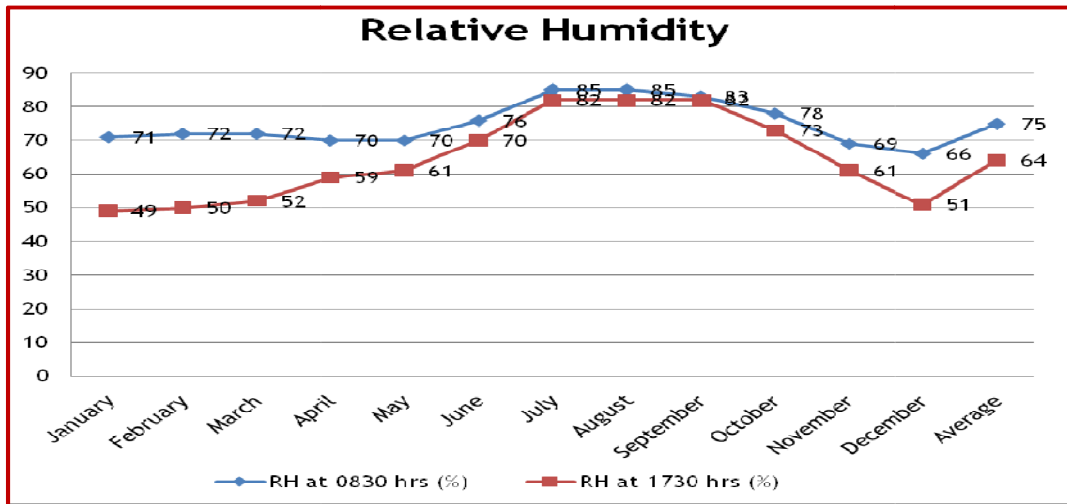
### 2.5.4 Relative Humidity

The average monthly relative humidity data for Bhubaneswar have been studied and given in **Table No C2-6** and shown in **Fig. No. C2-4**.

**Table No. C2-6: Monthly Average Relative Humidity (%)**

Months	RH at 0830 hrs (%)	RH at 1730 hrs (%)
January	71	49
February	72	50
March	72	52
April	70	59
May	70	61
June	76	70
July	85	82

<b>Months</b>	<b>RH at 0830 hrs (%)</b>	<b>RH at 1730 hrs (%)</b>
August	85	82
September	83	82
October	78	73
November	69	61
December	66	51
<b>Average</b>	<b>75</b>	<b>64</b>



**Fig. No.C2-4: Monthly Relative Humidity (%)**

As observed from the above table, the relative humidity is higher in the morning hours averaging 75 % compared to night hours scoring 64 % of average. During June to October it is observed higher and lower during other months it remains low.

**Fig No.C2-5: Topomap showing 10 kms Buffer zone of project site**

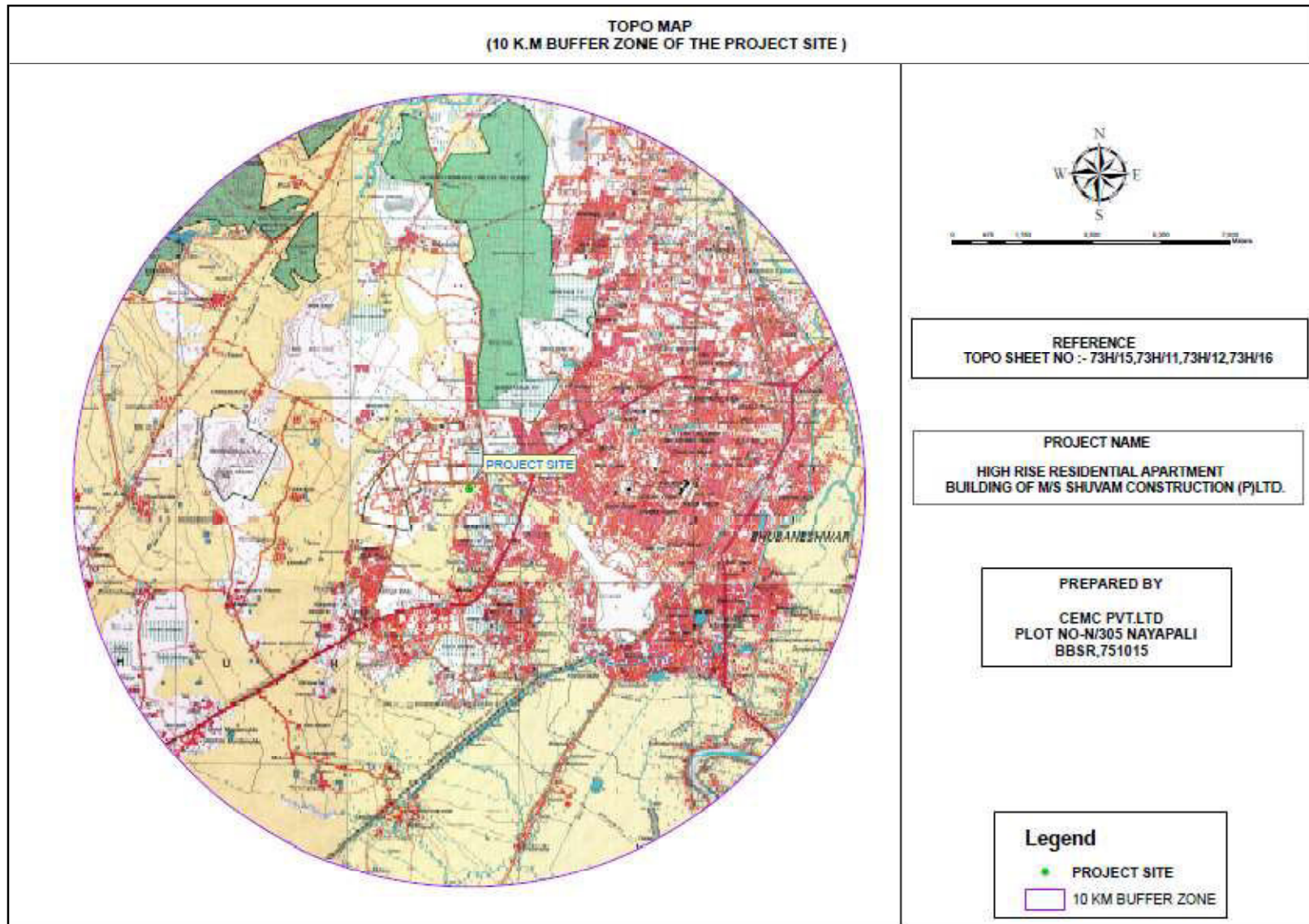




Fig No.C2-6: Drainage map of project site

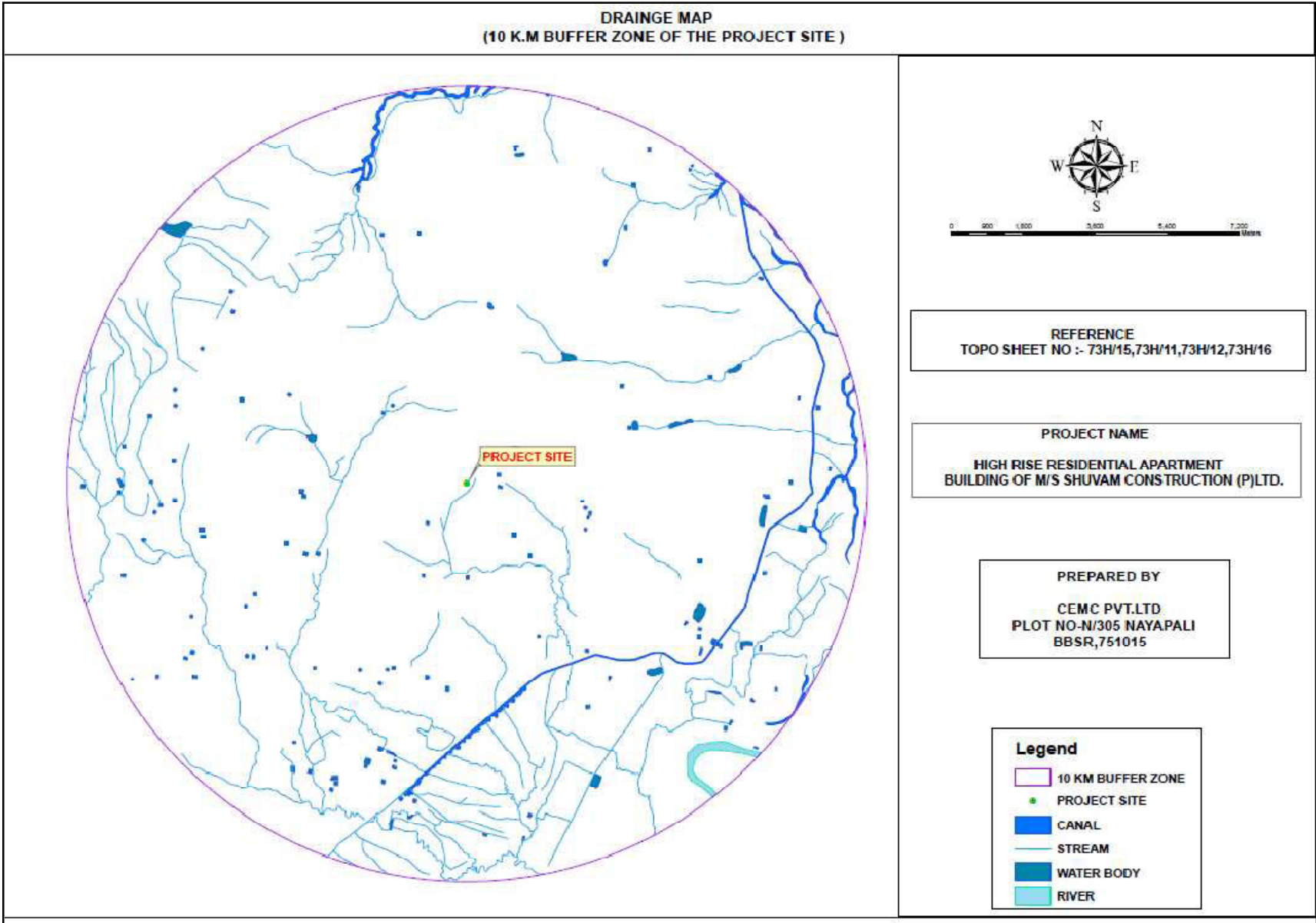
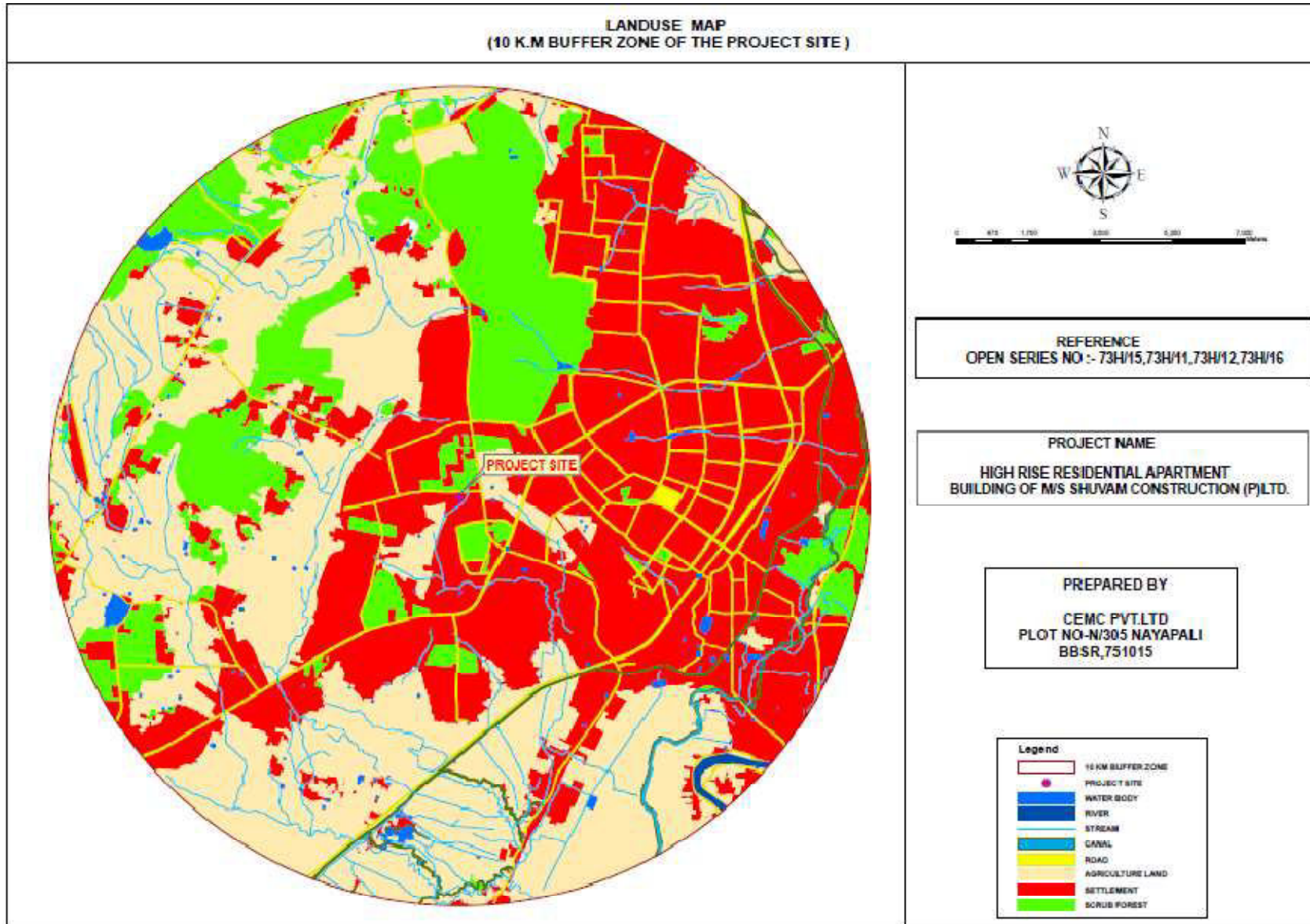


Fig No.C2-7: Land use map of project site



## CHAPTER-3

# SITE AND LAND MANAGEMENT

### 3.0 DESCRIPTION OF PROPOSED DEVELOPMENT

The development of the Private Housing Project comprises of 284 flats and infrastructure facilities including social infrastructure and community facilities, structures and utilities. The Building is most sound and advances of its type in architecture and amenities (like Parking, STP and Gardening etc.). Advanced building materials will be utilized in construction, adequate parking space and landscaping planning also taken into consideration. In a nutshell, it can be said the proposed development will enhance the regional aesthetics.

### 3.1 AREA DETAILS

Total Net plot area is 10732.17 Sqm (2.652 Acres). Total Built up area is 56722.86 Sqm. The detailed Area statement is provided below in Table No.C3-1.

**Table No. C3-1: Area Details**

Particular	Proposed	Permissible
Project Name	Proposed Housing Project (High Rise Residential Apartment Building Project)	
Plot Area	10732.17 Sqm	--
Ground Coverage (Roof top Area)	3053.12 Sqm (28.55%)	6439.3 Sqm (60% of the plot area)
Total Built up Area	56722.86 Sqm	--
Total FAR Area	44996.50 Sqm	--
FAR	4.192	1.75
Maximum Height	50.93 meter	--
No. of recharge pit	32	--
Drive Way Width	7.5 meter	--
Parking Area	22308.36 Sqm	13498.95 Sqm (30 % of Residential FAR Area)
Green Belt Area	2641.18 Sqm (24.61 % of Plot area)	2146.4 Sqm (20% of Plot area)
Power/Electricity Requirement & Sources	1478 KW	--
No. of DG sets	2 x 500 KVA	--
Fresh Water requirement & Sources	141 KLD Source:	--
Sewage Treatment & Disposal	STP Capacity 200 KLD	--
Estimated Population- Residential, Floating/visitors	Residential Population: 1420 No.s Floating Population: 142 Nos.	--

### 3.2 LAND MANAGEMENT

It may be observed that during the construction phase of the proposed residential apartment, there might be minor soil erosion due to the construction activities as well as surface runoff and soil contamination due to the construction waste and unorganized anthropogenic activities might take place. During the operational phase of the proposed apartment, contamination of soil quality might occur due to improper disposal of generated waste. To avoid those incidents and for land management within the proposed private housing project area apartment adequate measures like plantation, paving of road networks, drainage with proper sloping etc will be undertaken during the construction and operational phase of the proposed apartment.

**Table No. C3-2: Socio-economic**

<b>HIGH RISE RESIDENTIAL APARTMENT BUILDING OF M/S SHUVAM CONSTRUCTION (P)LTD.</b>			
<b>Sl. No.</b>	<b>Name</b>	<b>Area Statistics</b>	
		<b>Square Kilometer (Sq.M)</b>	<b>Percent (%)</b>
10 Km Buffer		314.286	100
1	Water Bodies	2.239	0.71
2	Settlement	132.672	42.21
3	Road	7.028	2.24
4	Agriculture Land	117.891	37.51
5	Scrub Forest	55.11	17.53
6	River	0.558	0.18

### 3.3 SOCIO-ECONOMIC ASPECT OF THE 10 KM BUFFER ZONE

**Table No. C3-3: Socio-economic**

<b>Name</b>	<b>Rural/Urban</b>	<b>Total Population</b>	<b>Total Literates</b>	<b>Total Working Population</b>	<b>Total Cultivators</b>	<b>No. of House Hold</b>	<b>Sex ratio</b>
Ghantikia	Rural	1377	917	486	64	311	946.2
Damodarpur	Rural	549	409	193	21	119	843.7
Bharatapur	Rural	439	290	108	32	94	1000
Krushnapur	Rural	602	465	180	31	114	928.5
Madhusudanpur	Rural	0	0	0	0	0	0
Badapokhariapatna	Rural	413	295	146	45	97	903.2
Nathpur	Rural	0	0	0	0	0	0
Chhotarapursasan	Rural	975	767	291	44	208	830.1
Nidhipur	Rural	227	143	116	45	47	363.6
Durgapur	Rural	341	243	160	38	68	833.3
Ranasinghprasad	Rural	297	234	86	40	70	750
Patasanipur	Rural	819	554	419	67	193	660.3
Kashipur	Rural	324	262	99	2	70	523.8
Ramachandrapur	Rural	1678	1190	518	113	364	926.6
Katilagothpatna	Rural	971	606	235	88	190	853.3
Gopalpur	Rural	235	204	72	10	65	750
Hatasahi	Rural	337	278	103	0	66	1000
Naragoda	Rural	392	338	131	36	75	708.3
Malisahi	Rural	773	580	232	22	187	955.5



**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd.**

Radhakrishnapur	Rural	58	50	14	2	10	200
Jamujhari	Rural	1235	969	434	64	245	870.9
Chatabar	Rural	1963	1463	606	84	387	855.5
Botanda	Rural	428	340	130	1	85	916.6
Nandipur	Rural	0	0	0	0	0	0
Kuha	Rural	740	669	209	1	138	666.6
Kaimatiapatna	Rural	689	516	206	24	119	794.1
Madanpur	Rural	1257	1015	484	46	241	742.8
Badaraghunathpur	Rural	598	475	214	18	130	744.1
Gadajagasora	Rural	0	0	0	0	0	0
Durgapur	Rural	913	684	314	141	195	829.2
Harekrushnapur	Rural	625	531	171	7	126	966.6
Arisol	Rural	561	429	233	52	143	741.9
Chandiheta	Rural	0	0	0	0	0	0
Bairang	Rural	206	157	43	2	41	909.1
Budhanagar	Rural	1310	994	399	90	264	821.4
Bhubaneswar	Total	138353	106027	48384	4969	28655	950.8
Chandaka Jogisahi	Rural	2267	1685	766	110	491	1000
Kujimahal	Rural	1684	1221	612	134	374	948.4
Malipada	Rural	1658	1350	480	37	325	966.2
Bidyadharpur	Rural	144	126	47	7	35	666.6
Gothapatna	Rural	1641	1316	438	12	251	885.2
Ghangapatna	Rural	1640	1254	678	56	355	724.1
Kantabad	Rural	2461	1816	836	150	488	942.4
Barapita	Rural	298	143	118	1	58	920.1
Balipada	Rural	1417	1051	494	57	308	987.6
Kalyanpur	Rural	2018	1596	728	97	376	833.3
Jayapur	Rural	333	247	109	56	66	928.5
Mohanpur	Rural	4	2	1	1	1	0
Badadhanpur	Rural	0	0	0	0	0	0
Samantarapurpatna	Rural	590	423	247	33	104	806.4
Gelapur	Rural	149	106	54	3	33	636.3
Krushnapur	Rural	60	42	14	0	10	800
Dadhibamanpur	Rural	35	29	10	5	5	250
Gangeswarpursasan	Rural	323	273	97	15	76	550
Damodarpur	Rural	210	172	75	2	44	800
Srinibasapur	Rural	0	0	0	0	0	0
Hatasahi	Rural	932	791	274	4	162	673
Sijuput	Rural	1022	818	331	50	202	830.5
Sahajapur	Rural	169	130	45	0	33	714.2
Dashabatia	Rural	43	36	14	0	6	666.6
Beguniabarahi	Rural	0	0	0	0	0	0
Nandapur	Rural	274	214	98	13	52	1
Retanga	Rural	1092	846	329	52	232	836.0
Sijuan	Urban	1348	1151	586	19	176	888.8
Jagannathpur	Rural	1581	1159	533	58	318	750
Budhalo	Rural	184	144	59	32	43	272.7
Chheliamal	Rural	0	0	0	0	0	0
Subhalo	Rural	456	338	148	60	106	769.2
Bhingarpur	Rural	4752	3774	1713	359	994	995.5
Dedhalo	Rural	272	216	82	31	55	733.3
Jitikarsuanlo	Rural	1903	1412	745	129	407	927.2
Deandhoti	Rural	310	245	154	49	80	916.6
Gotalagram	Rural	836	663	294	113	155	833.3
Umadeibrahmpur	Rural	830	629	279	6	176	1000

Chitalpur	Rural	780	636	227	51	157	750
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**Table No. C3-4: Socio-economic aspect of Urban & Rural Area**

Details	Rural Area
Total Population	193401
Total Literate	148148
Total Working	67131
Total Cultivators	8001
No. of Household	39871
Sex Ratio	939.7

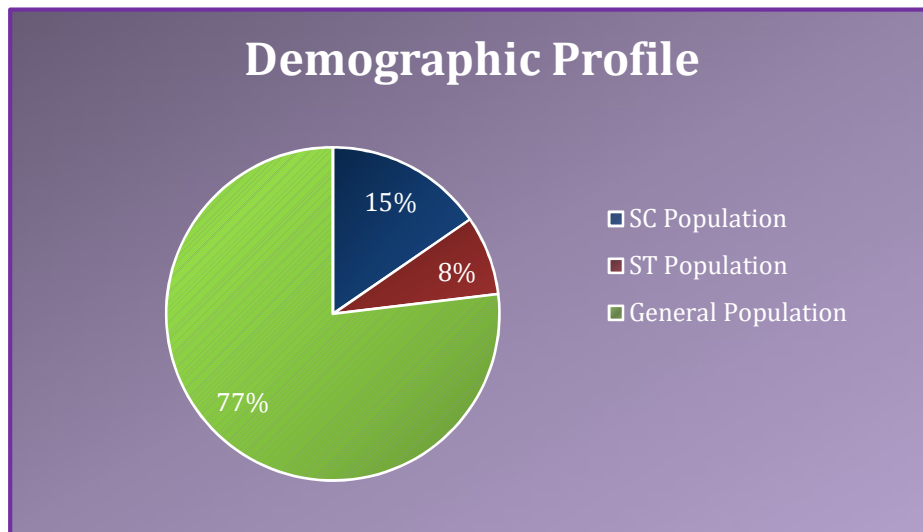
**Socio-economic condition:** The population of the surrounding area is predominantly rural due to high urbanization rate in and around. Literacy rate is also high around (76.6%) and that is also due to urbanization. Same is the case of working population as working population of rural area is higher than urban area due to migration to rural area for better employment. The building project is generating more income for nearby people due to better employment opportunities enhance their economic status.

### 3.4 Demographic pattern of the study area:

**Findings:**

- 15.4 % are SC & 7.7 % ST categories.
- Male population is more than Female population.
- Out of total population General category is more than SC and ST category.

**Fig.No.C3-1: Demographic Pattern**



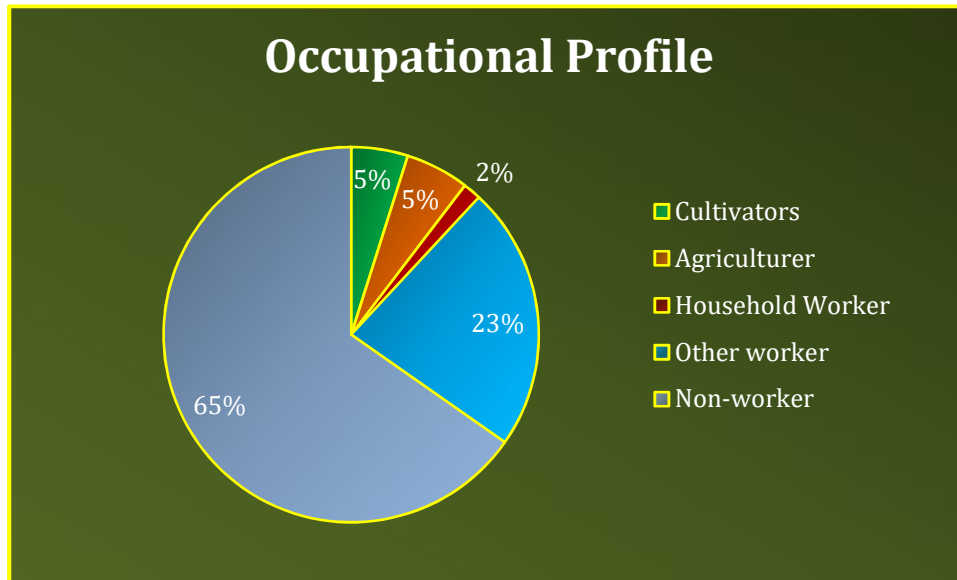
### 3.5 Occupational pattern of the study area:

**Findings:**

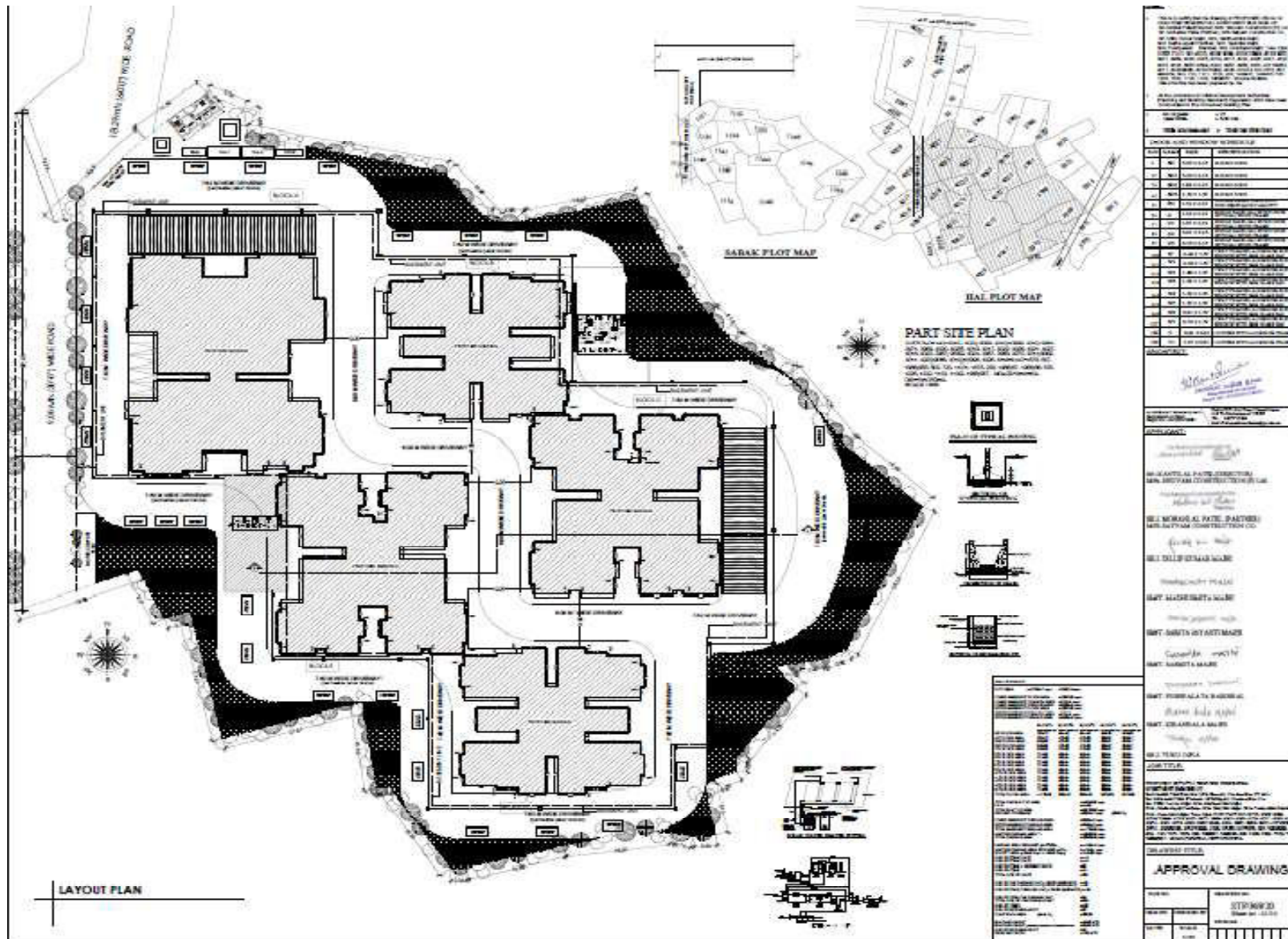
- Large percentages of population average about 23 % population depend upon Business, Trade and Other occupation.
- About 5 % of population depend upon Cultivators activities.

- About 5 % of populations depend upon Agricultural activities.
- About 1.1 % of populations depend upon household industries.
- About 65.2% of population re non-worker.

**Fig.No.C3-2: Occupational Pattern**



**Fig No.C3-3: Master Plan**





## **CHAPTER-4**

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# **WATER MANAGEMENT**

### **4.0 WATER ENVIRONMENT**

Water is the most important component for any society and is an important sustainable development indicator. In India, there is a growing demand on the existing water resources which mainly includes the river water sources, precipitation and ground water sources. The increase in usage and water demand is due to rapid increase in population, urbanization and industrialization. There is also huge quantity of Water required in the process of building construction and during the Operation phase. In Construction Phase water will be used in mixing of construction materials, dust suppression and use of workers, those are residing in construction period.

It is important that any sustainable urban development project should integrate the sustainable and environment friendly water management plan at the design stage. Hence the management of water quality during the construction as well as operation period of the proposed apartment is required. Construction activities may include the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved. As there will be few no. of residential labour residing at the project site so small amount of wastewater generated from the construction activities. Most of the water is used for mixing in construction materials, curing & dust suppression.

However, domestic effluent generated from toilets of workers camp will be discharged to soak pit via septic tank. During the operational phase, the waste water generated from different blocks will be treated in STP. Treated water will be used for flushing, landscaping, dust suppression & other miscellaneous uses. Efforts should be made to use minimal water resources because conserving water also indirectly saves energy. Hence to have the maximum savings, optimal and economical use of water through water conservation should be given priority in this project.

The water requirement for the proposed project can be divided into two stages:

- I. Construction Stage
- II. Operational Stage

#### **4.0.1 Water Requirement during construction stage**

For major construction activities daily requirement of water will be  $34 \text{ m}^3$  (Norms Construction (Peak)@ $0.6\text{m}^3/1000\text{sqm}$  BUA) per day. Water consumption for the resident laborers will be  $34 @ 70 \text{ lpcd} = 2380$  liters. Therefore, during the

construction phase, total daily water requirement will be 3400 liters + 2380 liters = 5780 liters = 5.7 m<sup>3</sup>/day. This will be sourced by Private tankers.

**Table No. C4-1: Water requirement construction stage**

Sl. No.	Purpose	Requirement (m <sup>3</sup> /day)
1	Construction (Peak)	34
2	Residing laborers (10 @ 70 lpcd)	2.38
	<b>Total</b>	<b>36.38</b>

#### 4.0.2 Water Requirement during Operation Stage

During operation phase water will be sourced from Ground Water.

**Table No. C4-2: Total Water requirement (With Dual Plumbing)**

Water Requirement for Residential Purpose					
Sl. No.	Total Population	Per Capita Consumption (Ltr/day)	Water Requirement (KLD)		
			Fresh	Flushing	Total
1	1520	135 (Fresh Water-90 LPD, flushing Water-45 LPD)	136.8	68.4	205.2
2	152 (Floating people for Residential block)	45 (Fresh Water-30 LPD, Flushing Water-15 LPD)	4.5	2.3	6.8
<b>TOTAL</b>			<b>141.3</b>	<b>70.7</b>	<b>212</b>

**Note:** Total fresh water requirement will be 141.3~141 KLD. It will be taken from ground water source. We have adopted dual plumbing system.

**Table No. C4-3: Wastewater Calculations**

Details	Water (KLD)
Fresh Water requirement	141
Wastewater generated from Fresh Water (@ 80 % of domestic water requirement)	112.8~113
Water requirement for Flushing Purpose	70.7
Wastewater generated from Flushing (@ 95 % of flushing requirement)	67.16
Total Wastewater generated	113+67.16=180.16
STP Loss (5 % of wastewater generation)	6.89~6.9
<b>Recycled water form STP @ 95 % of wastewater generated</b>	<b>173.26~173</b>
<b>Hence Sewage Treatment Plant Capacity</b>	<b>200 KLD</b>

**Table No. C4-4: Water Balance (Non-Monsoon)**

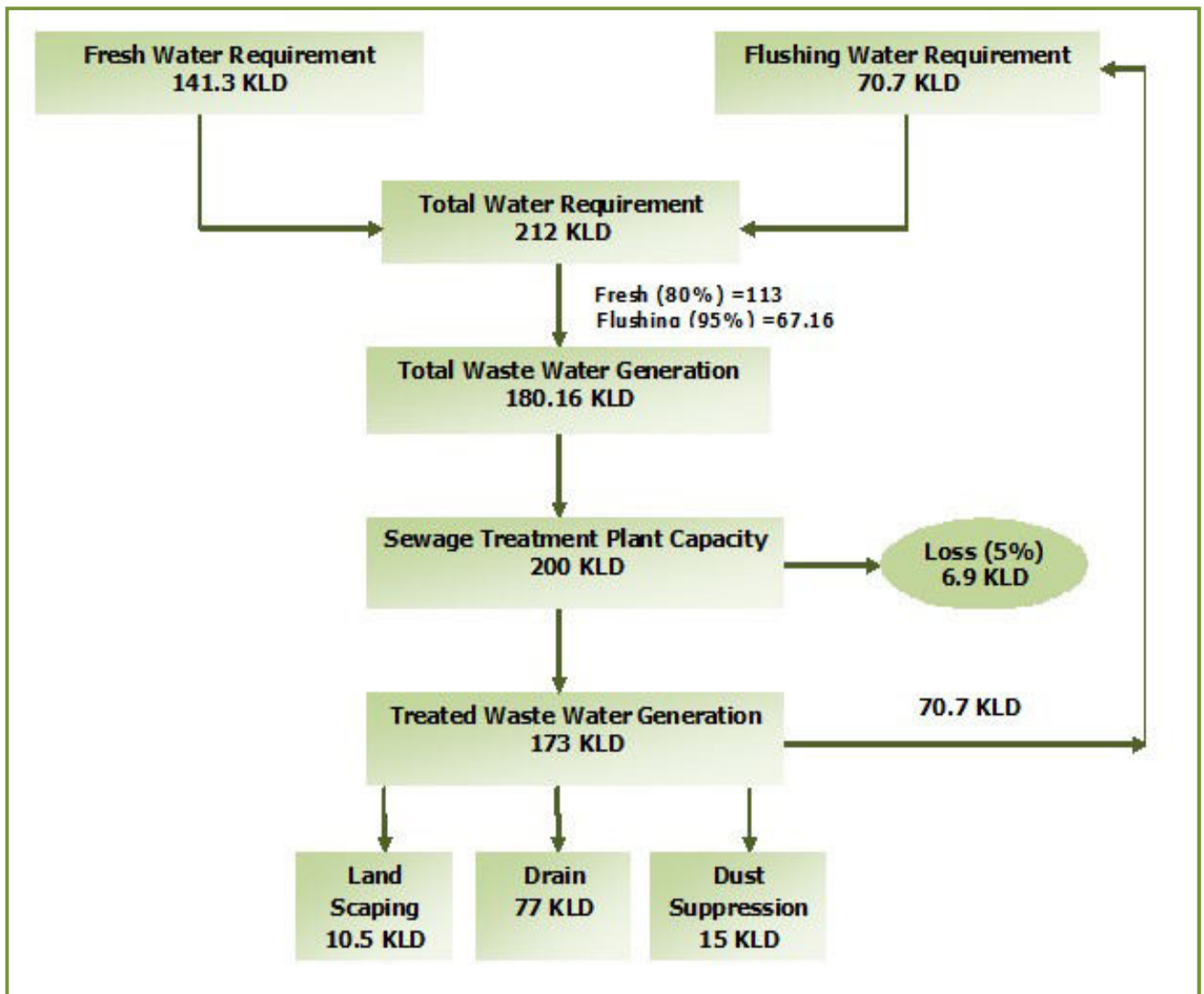
Sl. No.	Description	Quantity in m <sup>3</sup> /day		Waste water generated m <sup>3</sup> /day
		Fresh makeup	Reuse	
1	Fresh Water Requirement	141	-	113
2	Flushing	-	70.7	67.16
3	Landscaping	-	10.5	-
4	STP Loss	-	6.9	-
5	Dust Suppression on road	-	15	-
6	Drain		77	
<b>Total</b>		<b>141</b>	<b>180.16</b>	<b>180.16</b>

**Table No. C4-5: Water Balance (Monsoon)**

Sl. No.	Description	Quantity in m <sup>3</sup> /day		Waste water generated m <sup>3</sup> /day
		Fresh makeup	Reuse	
1	Fresh Water Requirement	141	-	113
2	Flushing	-	70.7	67.16
3	STP Loss	-	6.9	-
4	Discharge to Drain	-	102.56	-
<b>Total</b>		<b>141</b>	<b>180.16</b>	<b>180.16</b>

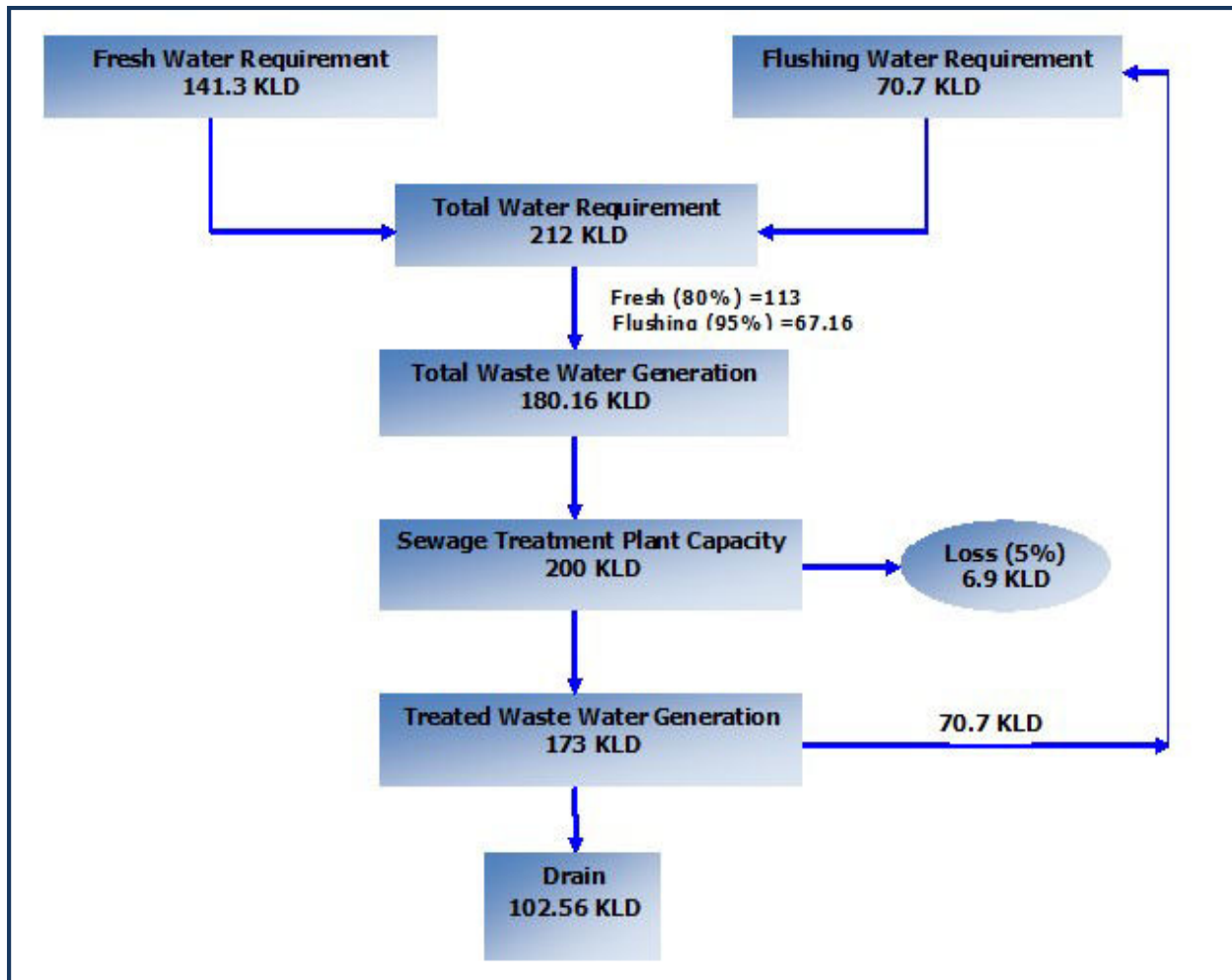
### 4.0.3 Detail Water Balance

#### Water Balance during Monsoon Period





**Water Balance during non monsoon period**



**4.0.4 Waste water generation and Treatment**

Every building generates wastewater amounting about (80 % of fresh water consumed + 95 % of flushing water). The major source of wastewater includes the grey water from kitchens, bathrooms and black water from toilets. It is expected that the project will generate approx. 180.16 m<sup>3</sup>/day of wastewater. The wastewater will be treated in the STP of capacity of 200KLD provided within the apartment. Out of which 173 m<sup>3</sup>/day will be recycled within the project for flushing (70.7 m<sup>3</sup>/day), landscaping (10.5 m<sup>3</sup>/day), STP loss (6.9 m<sup>3</sup>/day) & Dust suppression in Road Area(15 m<sup>3</sup>/day). In case of Monsoon period 131 m<sup>3</sup>/day will be recycled within the project for flushing (70.7 m<sup>3</sup>/day), STP loss will be 6.9 m<sup>3</sup>/day and 102.56 m<sup>3</sup>/day surplus will be generated which will be discharged to the drain.

**Table No. C4-6: Waste water generation**

Sl. No.	Source	Quantity m <sup>3</sup> /day
1	Fresh Water effluent (Without Flushing)	113
2	Flushing	67.16
<b>Total</b>		<b>180.16</b>

#### **4.1 SEWAGE TREATMENT PLANT**

Sewage treatment is the process of removing contaminants from domestic or household sewage. It includes physical, chemical, and biological processes to remove physical, chemical and biological contaminants. Its objective is to produce an environmentally safe fluid waste stream (or treated effluent) and a solid waste (or treated sludge) suitable for disposal or reuse (usually as farm fertilizer). The objective of sewage treatment plant is to produce a disposable effluent without causing harm to the surrounding environment, and prevent pollution.

The sewage treatment plant is based on Multi Bed Bioreactor Technology. The biological treatment system will consist of an MBBR tank with Air Blower. The treatment scheme will consist of Screening, Equalization, Biological Treatment, Clarification, Sludge Recirculation, Filtration and Disinfection. The treated water will be low in BOD, COD, TSS, O&G etc.

##### **4.1.1 Process Technology**

Domestic wastewater is mainly comprised of small concentrations of suspended and dissolved organic solids. Among the organic substances present in sewage are carbohydrates, lignin, fats, soaps, synthetic detergents, proteins and their decomposition products. The main pollutants in the raw sewage are represented in the form of Bio-chemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). The ammoniacal nitrogen, nitrate nitrogen and phosphorous present also represent as polluting substances. The bacterial ability to break down the organic matter to harmless end products like carbon dioxide and water molecules is utilized to treat the raw sewage. That sewage causes harmful effect on surrounding environment. Biological treatment is needed for this sewage containing organic matter.

##### **Biological Sewage Treatment**

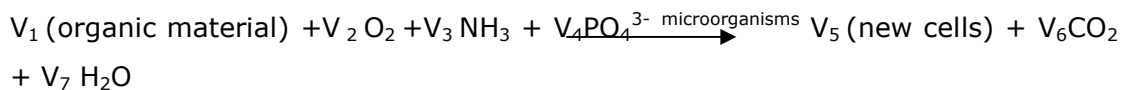
The objectives of Biological treatment of domestic wastewater are to

- Transform (i.e., oxidize) dissolved and particulate biodegradable constituents into acceptable end products.
- Capture and incorporate suspended and non settleable colloidal solids into a biological floc or biofilm.

- Transform or remove nutrients, such as nitrogen and phosphorus, and remove specific trace organic constituents and compounds.

### **Role of Microorganisms in Sewage Treatment**

The removal of dissolved and particulate carbonaceous BOD and the stabilization of organic matter found in sewage are accomplished biologically using a variety of microorganisms, principally bacteria. Microorganisms are used to oxidize the dissolved and particulate carbonaceous organic matter into simple end products and additional biomass, as represented by the following equation for the aerobic biological oxidation of organic matter.



Where  $V_1$  = the stoichiometric coefficient.

Oxygen ( $\text{O}_2$ ), ammonia ( $\text{NH}_3$ ), and phosphate ( $\text{PO}_4^{3-}$ ) are used to represent the nutrients needed for the conversion of the organic matter to simple end products (i.e., carbon dioxide ( $\text{CO}_2$ ) and water). Here microorganisms are needed to carry out the oxidation process. The term new cells are used to represent the biomass produced as a result of the oxidation of the organic matter. Microorganisms are also used to remove nitrogen and phosphorus in sewage treatment processes. Specific bacteria are capable of oxidizing ammonia (nitrification) to nitrite and nitrate, while other bacteria can reduce the oxidized nitrogen to gaseous nitrogen. For phosphorus removal, biological processes are configured to encourage the growth of bacteria with the ability to take up and store large amounts of inorganic phosphorus.

Because the biomass has a specific gravity slightly greater than that of water, the biomass can be removed from the treated liquid by gravity settling. It is important to note that unless the biomass produced from the organic matter is removed on a periodic basis, complete treatment has not been accomplished because the biomass, which itself is organic, will be measured as BOD in the effluent. Without the removal of biomass from the treated liquid, the only treatment achieved is that associated with the bacterial oxidation of a portion of the organic matter originally present.

### **Submerged Attached Growth Processes**

Aerobic submerged fixed- film processes include down flow packed- bed reactors, up flow packed- bed reactors, and up flow fluidized- bed reactors. The type and size of packing is a major factor that affects the performance and operating characteristics of submerged attached growth processes. Designs differ by their packing configuration, inlet, and outlet flow distribution and collection. No clarification is used with aerobic submerged attached growth processes, and

excess solids from biomass growth and influent suspended solids are trapped in the system and must be periodically removed. Most designs require a backwashing system much like that used in a water filtration plant to flush out accumulated solids, usually on a daily basis.

The major advantages of submerged attached growth processes are

- Their relatively small space requirement,
- The ability to treat effectively dilute waste water,
- No sludge settling issues as in activated- sludge process.

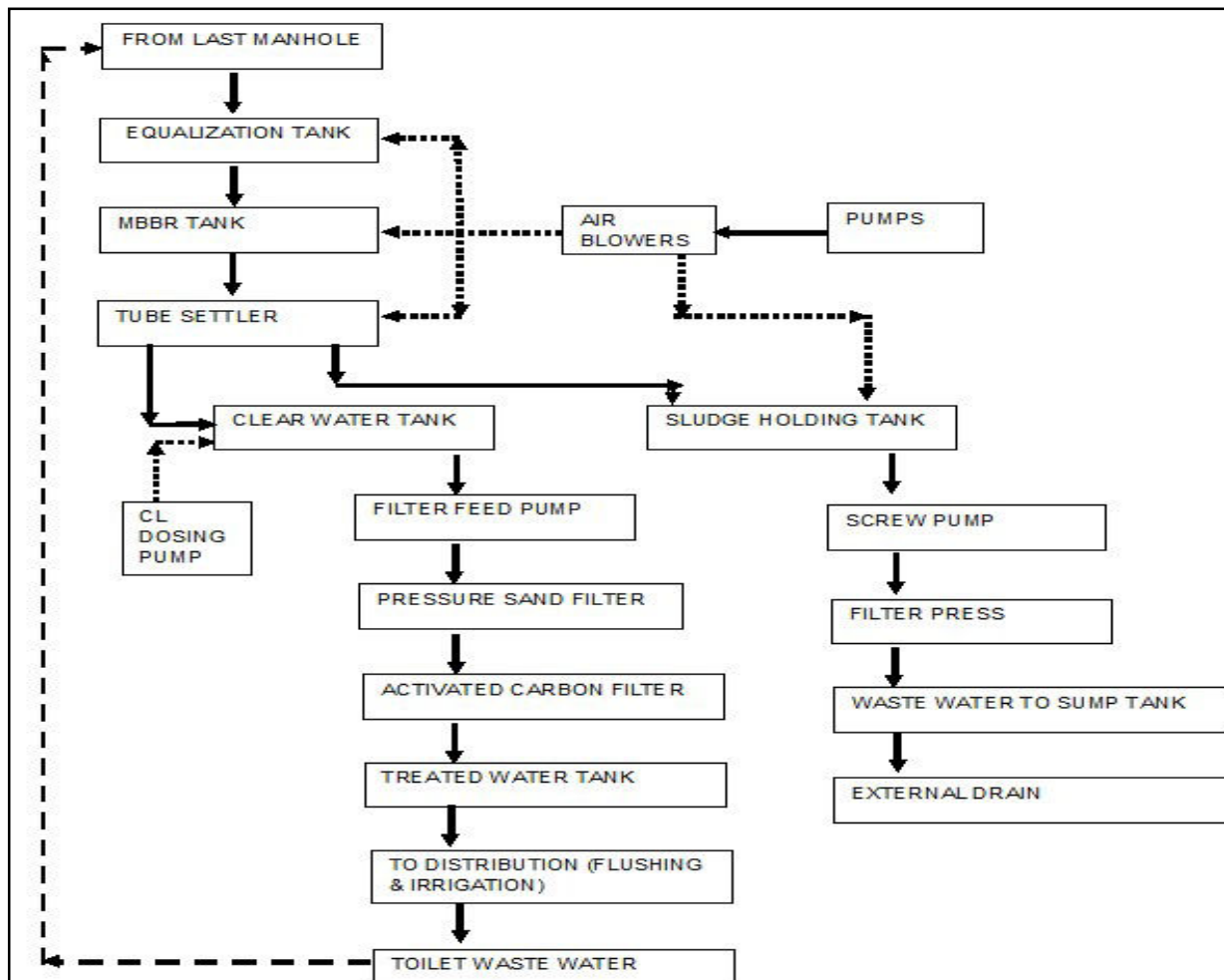
Here suspended growth process is adopted for biological treatment of raw sewage.

### **Suspended Growth Process in Sewage Treatment**

In suspended growth processes, the microorganisms responsible for treatment are mentioned in liquid suspension by appropriate mixing methods. The most common suspended growth process used for Sewage treatment is activated-sludge process.

#### **4.4.2 Process Description with flow Diagram**

##### **MBBR FLOW DIAGRAM**





### **Process characteristics**

The process design involves Physicochemical and Biological process.

- **Physico-Chemical Process**

Screening, Equalization, MBBR, Clarification, Filtration, and Chlorination.

- **Biological Process**

Converting organic pollutant into harmless by-products with the help of Aerobic Micro organisms in the MBBR media.

### **Concept for S.T.P.**

- a) Good quality of treated water.
- b) Under any circumstances stringent pollution control norms are met.
- c) No threat for disposal.
- d) As far as possible it keeps the environment clean & free from contamination.
- e) In future, it may be a requisite for the institution while trying to get ISO14001 Certification/ other appreciation.
- f) Minimal electricity consumption, less chemical consumption with low operation & maintenance cost and less space.
- g) Save the mother earth for future generations and fulfill social obligations.

### **Proposed Treatment Scheme**

The treatment consists of Aerobic Treatment in MBBR Tank with the help of Air blower, and then Clarifier and Tertiary Treatment in Multi grade filter and Activated carbon Filter with chlorination.

In this process the sewage will be treated in three stages

- Primary treatment
- Secondary treatment
- Tertiary treatment

#### **Primary treatment:**

1. In the primary treatment the effluent will pass through the bar screen chamber. In this section suspended matters, grit and floating material etc will be removed from the effluent. Then the effluent is sent to a collection tank cum equalization tank by gravity.
2. The effluent will be pumped from equalization tank to MBBR Tank for Aerobic Treatment.

#### **Secondary treatment:**

1. In the secondary treatment the effluent in MBBR tank is treated by aerobic process followed by clarifier. In MBBR tank organic load will be degraded with the

help of aeration by the bacterial population colonized on the poly propylene packing discs.

2. Mixed liquor suspended solids (MLSS) will be maintained in MBBR tank in definite proportion by the MBBR Media.
3. Oxygen is injected in MBBR tank by air from the air blower.
4. Then effluent will go to the clarifier tank for settling of sludge. The clear overflow from clarifier will go to the filter feed tank. The excess sludge from the clarifier shall be withdrawn to sludge holding tank then to sludge drying beds for sludge dewatering. The dried sludge can be used as good manure for landscaping.

**Tertiary treatment:**

1. In the tertiary treatment the clear water from filter feed tank will be filtered by pumping through the MGF (Multi Grade filter) and ACF (Activated Carbon Filter) for further polishing i.e. for removing colour and smell from the treated water.
2. The treated sewage is then added with chlorine to kill the pathogens / E-Coli coli forms, so that it becomes fit for disposal in the lake / water ways. Chlorine being a very strong oxidising agent, a small dose of 3-4 mg / l is enough to achieve desired levels of disinfection.
3. Small residual chlorine (of the order of 0.2-0.25 mg / l) also ensures that there is no re-growth of E-coli, till the final disposal point. The treated sewage, now substantially free from organic contamination, free from coli form bacteria can be safely disposed off in the river, or in other water bodies. This water can also be re-used for gardening/toilet flushing or for other secondary applications.
4. Chemicals treatment using at least 1% hypo-chloride solution or any other equivalent chemical reagent must be ensured that chemical treatment ensures disinfection.

**4.2 WATER POLLUTION MONITORING:**

Regular monitoring of water pollution within the campus may be undertaken as per the guidelines of OSPCB. The water samples are to be collected from all the drinking water sources. The ground water quality monitoring report will be communicated to OSPCB and the society of the residential apartment.

**Sanitary and Plumbing features:**

The material used for plumbing fixture is non-absorptive and acid resistant. Water spout in the sink has been considered at a level which is adequate to avoid contaminating utensils and contents of carafes etc.

Floor mounted Water closets with integrated Porcelain Cistern with water conserving dual flush arrangement have been considered. Porcelain under counter / over counter wash basin will be used with suitable bottle trap. All sanitary fittings including Health Faucet will be Chromium plated as per standards. The Water

distribution system shall be designed & pipe size shall be selected such that under conditions of peak demand, the capacity at the fixture supply pipe outlets shall not be less than shown in the IS code. The minimum flow rate & flow pressure provided to fixture 7 an appliance not listed in IS Code, shall be in accordance with the manufacturer's installation instructions. The project includes /use chemical resistant pipe for well waste , soil and vent piping serving lavatory fixtures. All valves shall be of approved type and compatible with the type of piping material installed in the system.

#### **4.2.1 Ground Water Quality Monitoring**

The most important source of water in the region is groundwater. Groundwater is available in plenty in the region from the bore wells in the study area. Ground water from dug wells, tube wells and hand pumps cater to the drinking water needs of the villages in the region. The quality of ground water was assessed by taking samples and analyzed as per CPCB norms. The water samples were collected and analyzed for physical, chemical and microbiological characteristics as per CPCB guidelines and approved methods. The details of analysis results are given in the Table No. C4-10.

**Table No. C4-8: Ground Water Quality Analysis**

Sl. No	Parameter	Unit of measurement	Standard as per IS: 10500, 2012		Result
			Acceptable Limit	Permissible Limit	
1	Colour	Hazen	5	15	<5
2	Odour	--	AL	AL	AL
3	Taste	--	AL	AL	AL
4	Turbidity	NTU	1	5	<1
5	pH Value @ 25°C	--	6.5-8.5	No Relaxation	6.84
6	Total Hardness (as CaCO <sub>3</sub> )	mg/l	200	600	168
7	Iron (as Fe)	mg/l	0.3	No Relaxation	0.22
8	Chloride (as Cl)	mg/l	250	1000	13.9
9	Residual, free Chlorine	mg/l	0.2	1.0	ND
10	Total Dissolved Solids	mg/l	500	2000	248.4
11	Calcium (as Ca)	mg/l	75	200	44.89
12	Magnesium (as Mg)	mg/l	30	100	13.61
13	Copper (as Cu)	mg/l	0.05	1.5	<0.03
14	Manganese (as Mn)	mg/l	0.1	0.3	<0.05
15	Sulphate (as SO <sub>4</sub> )	mg/l	200	400	5.74
16	Nitrate (as NO <sub>3</sub> )	mg/l	45	No Relaxation	2.23
17	Fluoride (as F)	mg/l	1.0	1.5	0.15
18	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	0.001	0.002	<0.001
19	Mercury (as Hg)	mg/l	0.001	No Relaxation	<0.001
20	Cadmium (as Cd)	mg/l	0.003	No Relaxation	<0.003
21	Selenium (as Se)	mg/l	0.01	No Relaxation	<0.001
22	Arsenic (as As)	mg/l	0.01	0.05	<0.001
23	Cyanide (as CN)	mg/l	0.05	No Relaxation	ND
24	Lead (as Pb)	mg/l	0.01	No Relaxation	<0.01
25	Zinc (as Zn)	mg/l	5	15	<0.05
26	Chromium (as Cr)	mg/l	0.05	No Relaxation	<0.05
27	Mineral Oil	mg/l	0.5	No Relaxation	<0.05
28	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	200	600	174

29	Aluminium (as Al)	mg/l	0.03	0.2	<0.01
30	Boron (as B)	mg/l	0.5	1.0	<0.2
31	Total Coliform	MPN/100 ml	Absent in 100 mL Sample	Absent	Absent
32	Faecal Coliform	MPN/100 ml	Absent in 100 mL Sample	Absent	Absent
33	E.Coli	MPN/100 ml	Absent in 100 mL Sample	Absent	Absent

Ground water samples were tested for assessing the base line water environment of the area. Based on analysis the results were observed in study area that the pH is 6.84. The pH limit for drinking water is 6.5 to 8.5. Beyond this range the water will affect the human health and water supply system. In the study area the pH of the ground water is well within the limits. The analytical results of the samples were compared with the drinking water standard IS 10500 to check the portability. It is observed that the ground water samples showed no alarming levels of pollutant concentration and all the samples were conforming to the prescribed drinking water standards.

### **4.3 RAINWATER RECHARGING AND STORM WATER MANAGEMENT**

The storm water disposal system for the premises shall be self-sufficient to avoid any collection/stagnation and flooding of water during excess rainfall. The amount of storm water run-off depends upon many factors such as intensity and duration of precipitation, characteristics of the tributary area and the time required for such flow to reach the drains. The drains shall be located near the carriage way along either side of the roads. Taking the advantage of road camber, the rainfall run off from roads shall flow towards the drains. Storm water from various blocks and roof shall be connected to adjacent drain by a pipe through catch basins. Proposed storm water system consists of pipe drain, catch basins and recharging pits at regular intervals for rain water recharging. Therefore, it has been calculated to provide 6 nos. of rainwater harvesting pits at selected locations, which will catch the maximum run-off water from the area.

- 1) Since the existing topography is congenial to surface disposal, a network of storm water pipe drains is planned adjacent to roads. All building roof water will be brought down through rain water pipes.
- 2) Proposed storm water system consists of pipe drain, catch basins and seepage pits at regular intervals for rain water harvesting and ground water recharging.
- 3) Peak hourly rainfall 120 mm/hr shall be considered for designing the storm water drainage system.

#### **4.3.1 Design specifications of the rain water harvesting plan are as follows:**

Rain water harvesting has been catered to and designed as per the guideline of CGWA. Peak hourly rainfall has been considered as 120 mm/hr. The recharge pit of 4.0 m dia and 1.5 m effective depth is constructed for recharging the water. At the bottom of the



recharge well, a filter media is provided to avoid choking of the recharge bore. Design specifications of the rain water harvesting plan are as follows:

- Catchments/roofs would be accessible for regular cleaning.
- The roof will have smooth, hard and dense surface which is less likely to be damaged allowing release of material into the water. Roof painting has been avoided since most paints contain toxic substances and may peel off.
- All gutter ends will be fitted with a wire mesh screen and a first flush device would be installed. Most of the debris carried by the water from the rooftop like leaves, plastic bags and paper pieces will get arrested by the mesh at the terrace outlet and to prevent contamination by ensuring that the runoff from the first 10-20 minutes of rainfall is flushed off.
- No sewage or wastewater would be admitted into the system.
- No wastewater from area likely to have oil, grease or other pollutants has been connected to the system.

#### **4.3.2 Maximum Rainfall Intensity Calculation (For Recharge Pit)**

Rational formula for calculating run-off = CIA

Q = Runoff in m<sup>3</sup>

A = Area in sqm

C = Co-efficient of run-off based on Manual on norms and standards for environment clearance of large construction projects, Ministry of Environment and Forests, Government of India.

I = Intensity of rainfall in mm based on IMD Data

Yearly rainfall : 1505 mm/yr

Monsoon Months : June – September

For determination of no. of Rain Water Harvesting pits maximum rainfall value has been taken.

Maximum hourly rainfall = 120 mm/hr

#### **4.3.3 Calculations for storm water load for recharging in Max. Rainfall**

##### **Total Run-off: Roof Top**

Intensity of rainfall = 120 mm/hr

Drainage area in Sqm = 3053.12 m<sup>2</sup>

Coefficient of run-off = 0.90

Therefore, runoff = 0.90 x 0.12 x 3053.13 = **329.73 m<sup>3</sup>/hr**

**Total Run-off: Paved Surface**

Intensity of rainfall	= 120 mm/hr
Drainage area in Sqm	= 5037.87 m <sup>2</sup>
Coefficient of run-off	= 0.70
Therefore, runoff	= 0.70 x 0.12 x 5037.87 = <b>423.18 m<sup>3</sup>/hr</b>

**Total Run-off: Unpaved Surface**

Intensity of rainfall	= 120 mm/hr
Drainage area in Sqm	= 2641.18 m <sup>2</sup>
Coefficient of run-off	= 0.15
Therefore, runoff	= 0.15 x 0.12 x 2641.18 = <b>47.54 m<sup>3</sup>/hr</b>

**Total Runoff Load = (329.73+423.18+47.54) m<sup>3</sup>/hr**  
**= 800.45 m<sup>3</sup>/hr**

**4.3.4 Typical Rain Water Recharge Pit Details:**

⇒ Considering coefficient for Evaporation/ Spillage and first flush etc.

	= 0.700
⇒ Total Storm Water Flow	= 2573 X 0.700 m <sup>3</sup> /Hour
	= 1801.1 m <sup>3</sup> /Hour
SAY	= 1801 m <sup>3</sup> /Hour

**VOLUME OF STORM WATER**

Total Storm Water Flow	= 1801 m <sup>3</sup> /hr
------------------------	---------------------------

Considering 15 minutes (0.25 Hr) Retention Period.

Volume Required	= 1801 x 0.25
	= 450.25 m <sup>3</sup>

Volume	= 450 m <sup>3</sup>
--------	----------------------

Considering 1 No. Rain Water Harvesting Pit of size 4 m dia and 2.5 m effective depth.

**Volume of One No. Rain Water Harvesting Pit**

Diameter of Pit (d)	= 4 m
Radius (r)	= 2 m
Water Depth (h)	= 2.5 m

Volume of 1 No. Rain Water Harvesting Pit	= 1.0 x $\pi r^2 h$
---	---------------------

$$\begin{aligned} &= 1.0 \times 3.14 \times (2)^2 \times 2.5 \\ &= 31.4 \text{ m}^3 \end{aligned}$$

No. of Rain Water Harvesting Pit

Total No. of rain water harvesting pit required

$$\begin{aligned} &= \text{Total Volume/Volume of One Rain Water Harvesting Pit} \\ &= 450/31.4 \\ &= 14.33 \text{ Nos.} \approx 14 \text{ Nos.} \end{aligned}$$

**Total no. of Rain Water Harvesting Pit Required = 14 Nos.**

**4.3.5 Actual Rain Water Available on Normal Rainfall**

Rainfall during monsoon = 1505 mm/yr (in 54 days)

Average daily rainfall during monsoon = 27.8 mm/day say 28 mm/day

**Total Run-off: Roof Top**

$$\begin{aligned} \text{Intensity of rainfall} &= 28 \text{ mm/day} \\ \text{Drainage area in Sqm} &= 3053.12 \text{ m}^2 \\ \text{Coefficient of run-off} &= 0.90 \\ \text{Therefore, runoff} &= 0.90 \times 0.028 \times 3053.12 = \mathbf{76.93} \\ &\mathbf{m^3/day} \end{aligned}$$

**Total Run-off: Paved Surface**

$$\begin{aligned} \text{Intensity of rainfall} &= 28 \text{ mm/day} \\ \text{Drainage area in Sqm} &= 5037.87 \text{ m}^2 \\ \text{Coefficient of run-off} &= 0.70 \\ \text{Therefore, runoff} &= 0.70 \times 0.028 \times 5037.87 = \mathbf{98.74} \\ &\mathbf{m^3/day} \end{aligned}$$

**Total Run-off: Unpaved Surface**

$$\begin{aligned} \text{Intensity of rainfall} &= 28 \text{ mm/day} \\ \text{Drainage area in sqm} &= 2641.18 \text{ m}^2 \\ \text{Coefficient of run-off} &= 0.15 \\ \text{Therefore, runoff} &= 0.15 \times 0.028 \times 2641.18 = \mathbf{11.09} \\ &\mathbf{m^3/day} \end{aligned}$$

$$\begin{aligned} \text{Total Runoff Load} &= \mathbf{(76.93+98.74+11.09) m^3/day} \\ &= \mathbf{186.76 m^3/day} \approx \mathbf{187 m^3/day} \end{aligned}$$

$$\text{Actual Rain Water for 4 Months} = 187 \times 120$$

$$= 22440 \text{ m}^3$$

**Actual Rain Water Available on Normal Rainfall = 22440 m<sup>3</sup>**

Fresh Water Requirement = 141.3 m<sup>3</sup>/day

Fresh Water Requirement per year = 141.3 x 365 = 51574.5 m<sup>3</sup>/Year

Rain Water Available during Monsoon Season = 22440 m<sup>3</sup>

**Actual Rain Water Harvesting = 51574/22440 = 2.29 x 100 = 229 %**

**4.3.6 RESERVE TANK ON ONE DAY BASIS RAIN WATER STORAGE**  
**DEATILS:**

Rainfall during monsoon = 1505 mm/yr (in 54 days)

Average daily rainfall during monsoon = 27.87 mm/day say 28 mm/day

**Total Run-off: Roof Top**

Intensity of rainfall = 28 mm/day

Drainage area in Sqm = 3053.12 m<sup>2</sup>

Coefficient of run-off = 0.90

Therefore, runoff = 0.90 x 0.028 x 3015

= 76.93 m<sup>3</sup>/day

Volume of Tank = 77 m<sup>3</sup>/day

**4.4 Treated Waste Water and Storm Water Disposal**

The waste water generated from different blocks of residential apartment will go to the sewage treatment plant through the waste water disposal channel. After treatment of waste water the surplus waste water will go to the nearby national highway drain. The surplus storm water generated after rain water harvesting process will go to the nearest national highway drain through separated storm water channel. For discharge of waste water and surplus storm water to drain, Permission has been granted from National Highway Authority of India.





## **CHAPTER-5**

### **AIR & NOISE MANAGEMENT**

#### **5.0 AIR ENVIRONMENT**

Ambient Air Quality indicates of overall state of environment of a particular area. Ambient air quality (AAQ) is an important criterion of a sound environment and its degradation causes various long-term impacts on the human health & wealth. Adjacent areas of the site are almost residential. Therefore, Construction and decommissioning activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of solid waste on-site. Adequate mitigate measures will be adopted to reduce and control air emissions from construction and decommissioning site.

##### **5.0.1 Air Pollution Monitoring**

The study was for one month with frequency of twice a week at each site. 24-hour average samples were collected from each station for Respirable particulate Matter (RPM or PM<sub>10</sub>), Fine particulate matter (PM<sub>2.5</sub>), Sulphur dioxide (SO<sub>2</sub>) and Oxides of nitrogen (NO<sub>2</sub>). These samples were analyzed in laboratory by adopting the methods specified in National Ambient Air Quality Standards. The baseline information has been generated by M/s CEMC Pvt. Ltd.

##### **5.0.2 Ambient Air Quality of the site**

The results of the monitored data indicate that the ambient air quality of the region in general is in conformity with respect to residential norms of National Ambient Air Quality standards of Central Pollution Control Board (CPCB), with present level of activities. Analysis results with respect to PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> are presented in **Table No. C5-1**.

**Table No. C5-1: Ambient Air Quality of the study area during Oct 2019**

March 2021	Project Site (µg/m <sup>3</sup> )					Shyampur (µg/m <sup>3</sup> )				
	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	Co	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	Co
01.03.2021	68.4	35.8	8.2	11.8	0.24	54.6	28.2	6.6	9.8	0.23
05.03.2021	67.6	35.0	7.4	11.4	0.21	52.2	27.4	6.2	9.4	0.21
08.03.2021	68.8	35.4	7.8	11.6	0.23	55.4	28.8	7.1	10.0	0.25
12.03.2021	66.6	34.8	7.2	12.2	0.25	56.2	29.2	7.4	10.4	0.27
15.03.2021	67.4	35.2	7.5	12.0	0.28	55.6	28.6	6.8	9.6	0.25
19.03.2021	67.8	35.6	7.7	11.7	0.22	53.2	27.8	6.6	9.5	0.22
22.03.2021	65.2	34.4	6.8	11.2	0.26	56.4	30.4	7.8	10.6	0.29
26.03.2021	63.6	33.8	6.2	10.8	0.27	54.8	28.6	7.0	10.1	0.24
29.03.2021	66.4	34.2	7.1	11.2	0.23	53.8	28.0	6.6	9.7	0.22

<b>Average</b>	<b>66.87</b>	<b>34.91</b>	<b>7.32</b>	<b>11.54</b>	<b>0.24</b>	<b>54.69</b>	<b>28.56</b>	<b>6.90</b>	<b>9.90</b>	<b>0.24</b>
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### 5.0.3 Air Quality Scenario of Study Area

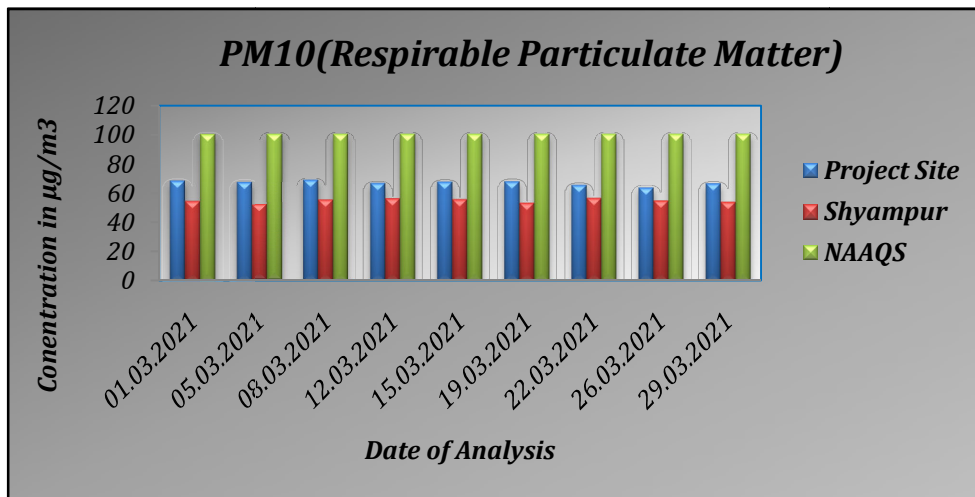
#### 5.0.3.1 Air Quality Scenario In Respect of PM<sub>10</sub> & PM<sub>2.5</sub>

Particulate Matter or dust in general terms is the particulate matter in suspension in ambient air. The PM<sub>10</sub> almost entirely consists of coarse particulates and fine particles out of which coarse particles are quickly eliminated in respiratory system and, hence are not very harmful. But particulate matter (PM<sub>10</sub>) in the size range of 0.5 to 10 microns can cause health effects.

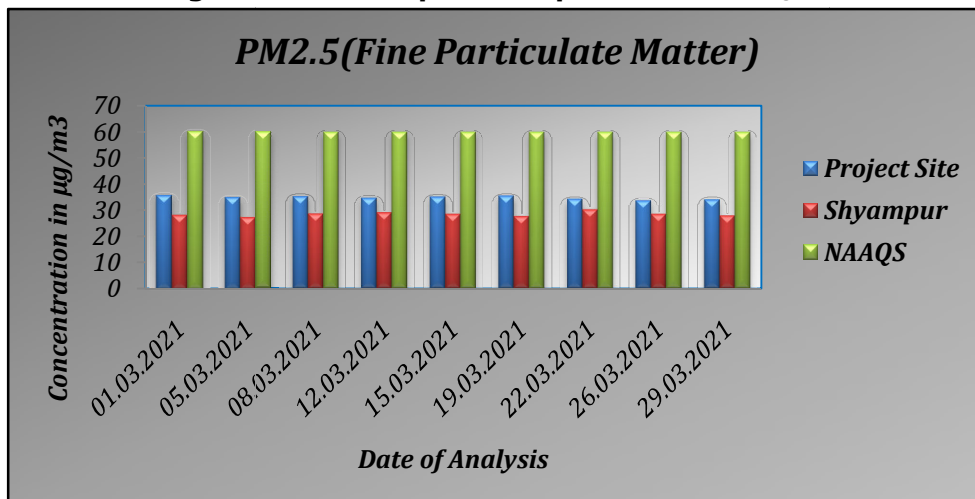
#### PM<sub>10</sub> & PM<sub>2.5</sub> levels in the Project Area

PM<sub>10</sub> & PM<sub>2.5</sub> levels were in the range of 63.6-68.4 µg/m<sup>3</sup> and 33.8-35.8 µg/m<sup>3</sup> respectively.

**Fig. No.C5-1: Graphical Represent of PM<sub>10</sub> Value**



**Fig. No.C5-2: Graphical Represent of PM<sub>2.5</sub> Value**



### Scenario with respect to PM<sub>10</sub> & PM<sub>2.5</sub>

The 24 hourly average values of PM<sub>10</sub> were compared with the national ambient air quality standards and it was found that almost all sampling stations recorded values lower than the applicable limit of 100µg/m<sup>3</sup> for Residential areas. The PM<sub>2.5</sub> was also found to be within the standard limit of 60µg/m<sup>3</sup> for Residential areas.

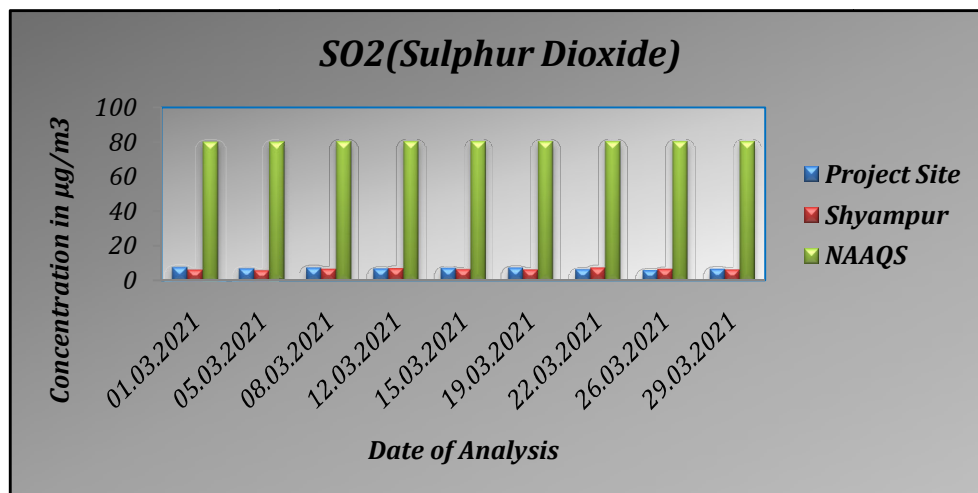
### 5.0.3.2 Air Quality Scenario In Respect of SO<sub>2</sub>

#### General Effect of Sulphur Dioxide

Sulphur dioxide gas is an inorganic gaseous pollutant. Sulphur dioxide emissions are expected to be emitted wherever combustion of any fuel containing elemental Sulphur takes place.

The sulphur in the fuel will combine with oxygen to form sulphur dioxide. Sulphur trioxide and Sulphuric acid mist are the other important pollutants in the sulphur group. SO<sub>2</sub> (Sulphur Dioxide) in the air is caused due to the rise in combustion of fossil fuels.

#### SO<sub>2</sub> Levels in the Project Area:



SO<sub>2</sub> levels were in the range of 6.2-8.2 µg/m<sup>3</sup>.

**Fig. No.C5-3: Graphical Represent of SO<sub>2</sub> Value**

### Scenario with respect to SO<sub>2</sub>

The 24 hourly average values of SO<sub>2</sub> were compared with the national ambient air quality standards and it was found that most of the sampling stations recorded values lower than the applicable limit of 80µg/m<sup>3</sup> for Residential areas.

### 5.0.3.3 Air Quality Scenario In Respect of NO<sub>x</sub>

#### General Effect of Oxides of Nitrogen

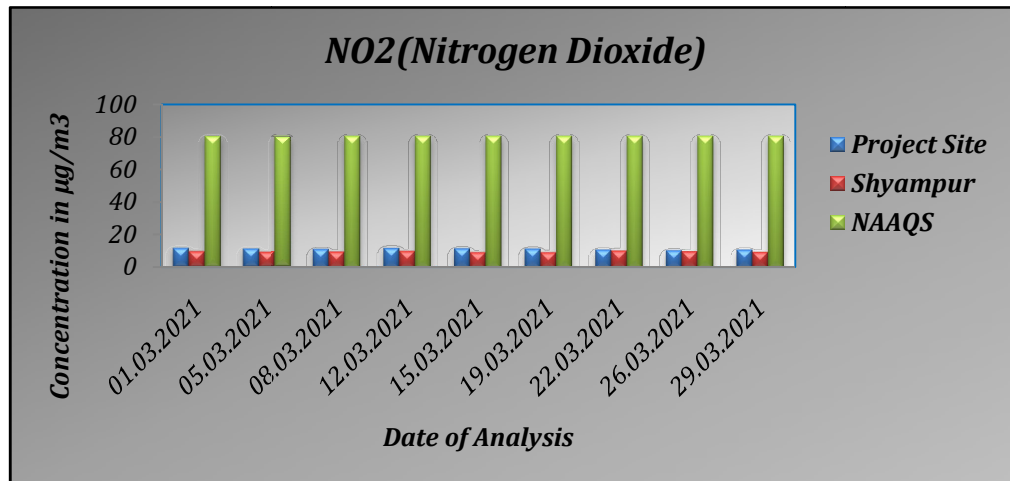
Like Sulphur dioxide, oxides of nitrogen are also an inorganic gaseous pollutant. Oxides of nitrogen are expected to be emitted wherever combustion at high temperature takes place. Nitrous oxide and nitric acid mist are the other



important pollutants in the inorganic nitrogen group. It causes eye, nose, and throat irritation. May cause impaired lung function and increased respiratory infections in young children. NO<sub>x</sub> acts mainly as an irritant affecting the mucosa of the eyes, nose, throat, and respiratory tract.

#### **NO<sub>x</sub> Levels in the Project area**

NO<sub>x</sub> levels were in the range of 10.8-12.0 µg/m<sup>3</sup>.



**Fig. No.C5-4: Graphical Represent of NO<sub>x</sub> Value**

#### **Scenario with respect to NO<sub>x</sub>**

The 24 hourly average values of NO<sub>x</sub> were compared with the national ambient air quality standard and it was found that all the sampling stations recorded values lower than limit of 80µg/m<sup>3</sup> for industrial areas.

#### **5.0.4 Air Quality Modeling Study**

##### **Prediction of Impacts**

Vehicular emissions and DG sets emission will be major sources of air pollution from building construction projects. During the post construction phase, cars, scooter/motorcycle will be owned by the population of such project. Ground Level Concentration of pollutants (as added by the project) will depend upon the following:

- Emission of pollutants from additional traffic on the roads due to the project.
- Meteorological conditions.
- Emission sources from D.G. Sets.

In this project, 2 DG set of 500 KVA capacity has been proposed for back up of electricity supply during power failure. This will cause emission of PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub> and CO to the atmosphere. In the proposed project D.G. sets will be used only during power failure and low Sulphur diesel will be used as fuel to minimize SO<sub>2</sub> emission. Therefore, incremental load in the ambient air environment will be found to be very low as given in the report. An adequate stack height will be

provided as per the stipulated guidelines of Central Pollution Control Board (CPCB)/ National Building Code Manual to facilitate proper dispersion of pollutants and to minimize the impact on Ambient Air Quality under the influence of local meteorology.

## **5.1 NOISE ENVIRONMENT**

During construction and decommissioning activities, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes, vehicular movement and the transportation of equipment, materials and people within the project site. Mitigation of noise is most effective, when it is done at the source, before the noise escaped and it is least expensive. In the constructional phase, the major source of noise pollution is from constructional works and in operational phase, the only probable major source of noise pollution is auditoria. Apart from this noise can be generated from the vehicular movement in and around the project site and from the generators during operation. Appropriate mitigation measures will be adopted for noise minimization.

### **5.1.1 Noise Quality Monitoring and Abatement:**

Regular monitoring for the following environmental aspects as per the requirements of Odisha State Pollution Control Board (OSPCB) will be carried out to ensure conformity to the specified standards. Detailed management plan given in EMP chapter. There has been a steady trend to design quieter buildings with regard to sources within and without the structures. In the case of construction of new (or remodeled) apartments, condominiums, hospitals, and hotels, many states and cities have stringent building codes with requirements of acoustical analysis, in order to protect building occupants. With regard to exterior noise, the codes usually require measurement of the exterior acoustic environment in order to determine the performance standard required for exterior building skin design. The architect can work with the acoustical scientist to arrive at the best cost-effective means of creating a quiet interior (normally 45 dB). The most important elements of design of the building skin are usually: glazing (glass thickness, double pane design etc.), perforated metal (used internally or externally), roof material, caulking standards, chimney baffles, exterior door design, mail slots, attic ventilation ports, and mounting of through-the-wall air conditioners.

### 5.1.2 Noise Level of the Project site

**Table No. C5-2: Noise Level**

Date	Sampling Locations	NL Day Time dB (A)			NL Night Time dB (A)		
		Max	Min.	Avg.	Max.	Min.	Avg.
12.03.2021	Project Site	63.4	60.8	62.1	54.0	49.4	51.7
12.03.2021	Shyampur	56.2	54.6	55.4	53.6	48.2	50.9
<b>Limits*</b>		<b>55</b>			<b>45</b>		

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## **CHAPTER-6**

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# **GREENBELT AND LANDSCAPING**

### **6.0 GREEN BELT DEVELOPMENT:**

Green belt has been developing all around the housing project. About 2 m wide all around the proposed project has been provided for development of trees in two rows. The design of the greenery will be done in consultation with the horticulturist.

The selection being based on the broad-leafed nature of the trees and its ability to attract birds. The philosophy behind the green belt development is to improve the ecology and environment of the surrounding of the plant by extensive afforestation. Planting scheme has also been chosen keeping in mind the needs of residents during traditional/festive occasions apart from functional, ecological and aesthetic needs.

Greenbelt means planting of special type of plants suitable to that particular agro climate zone and soil characteristics in a place which will make the area cooler, reduce air pollution, prevent soil erosion and further improve the soil fertility status. A green belt around the periphery of boundary and road side will be created to avoid erosion of soil, prevention of landslides, minimize the air pollution and noise pollution in the project area. The green plants are capable of absorbing air pollutants and forming sinks for pollutants. Leaves with their vast area in a tree crown, absorb pollutants on their surface, effectively reducing their concentration and noise level in the ambient.

According to the CPCB guide line there are 15 Agro climatic regions, each of these region is further divided in to 68 sub zones based on annual rain fall, Climatic condition and soil types. The project site coming under zone-III and sub zone North Odisha Coast, Where the climate is Moist sub-humid with Deltic alluvial, Coastal alluvial Laterite and Red Loamy soil type. The species recommended for the Greenbelt are quite adapted to such Climatic condition and grow well in the above soil types.

#### **6.0.1 Guidelines & Techniques for Green Belt Development**

Extensive survey in the project area was undertaken to observe the structure and composition of vegetation. All these traits are difficult to fulfill in a single species. Hence a combination of plant is selected depending upon the topographical suitability and species selected as per SPCB Guideline. The soil characteristics were also kept in mind. Based on this survey and environmental conditions suitable native plants species have been proposed for green belt development plan. Plantation along roads must take into account visibility aspects on curves so as to ensure safe driving. The schematic arrangement of greenbelt plantation proposed of proposed area is presented in Figures. Plantation will be done in a three tier system consisting of large trees, smaller trees and shrubs. Whereas some grasses and flowering plants are grown on lawns and garden.

- First layer consisting of shrubs and grasses.
- Second layer consisting of smaller trees.



### **6.0.2 Development of Green Belt**

The plantation matrix adopted for the green belt development includes pit of 0.3 m x 0.3 m size with a spacing of 2 m x 2 m. In addition, earth filling and manure may also be required for the proper nutritional balance and nourishment of the sapling. It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration.

Multi-layered plantation comprising of medium height trees (7 m to 10 m) and shrubs (5 m height) are proposed for the green belt. In addition creepers will be planted along the boundary wall to enhance its insulation capacity.

Greenbelt is a set of rows of trees planted in such a fashion, to create effective barrier between the project and surroundings. The greenbelt helps to capture the fugitive emissions, attenuate the noise levels in the housing project and simultaneously improving aesthetics of the housing project. The greenbelt around the housing project compound wall and in the reverse site will be developed in keeping view of the following objectives.

1. Planting of trees in each row will be in staggered pattern.
2. The short trees will be planted in the first rows and the tall trees in the outer rows around the purview of the project site.
3. Since the trunks of the trees are generally devoid of foliage, it will be useful to have shrubs in front of the trees so as to give coverage to this portion.
4. Sufficient spacing will be maintained between the trees to facilitate effective height of the greenbelt.
5. Plants of native origin, fast growing type with canopy and large leaf index shall be preferred.

### **6.0.3 Selection of Plant Species for Green Belt Development**

The selection of plant species for the development depends on various factors such as climate, elevation and soil. The plants would exhibit the following desirable characteristics in order to be selected for plantation.

1. The species should be fast growing and providing optimum penetrability.
2. The species should be wind-firm and deep rooted.
3. The species should form a dense canopy
4. As far as possible, the species should be indigenous and locally available.
5. Species tolerance to air pollution like SO<sub>2</sub> and NO<sub>2</sub> should be preferred.
6. The species should be permeable to help create air turbulence and mixing within the belt.
7. There should be no large gaps for the air to spill through.
8. Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces.
9. Ability to withstand conditions like inundation and drought.
10. Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter).
11. Attractive appearance with good flowering and fruit bearing.
12. Bird and insect attracting tree species.
13. Sustainable green cover with minimal maintenance.

**Table No. C6 - 1: Tree species selected for Greenbelt as per CPCB**

Type	Botanical Name	Common Name
<b>SCHEDULES OF TREES</b>		
T4	<i>Azadirachta indica</i>	Neem
T8	<i>Pongamia glabra</i>	Karang
T9	<i>Michelia champaca</i>	Golden champa
T10	<i>Mimusops elengi</i>	Bakul
T13	<i>Aegle marmelos</i>	Bela
<b>SCHEDULES OF PALMS</b>		
P1	<i>Hyophorbe lagenicaulis</i>	Bottle Palm
<b>SCHEDULES OF FRUIT TREE</b>		
F3	<i>Caryota urens</i>	Cheekoo
F4	<i>Psidium guava</i>	Guava

#### **6.0.4 Preparation for Seedlings:**

##### **6.0.4.1 To Undertake plantation on site, following steps will be taken:**

- Obtaining Healthy seedlings from nursery;
- Preparation of pits and preparing them for transfer of seedlings
- Take care of seedlings after plantation in pits.

##### **6.0.4.2 Pit and Soil Preparation:**

- The pit size has been recommended as 45 cm x 45 cm x 45 cm for trees and 30 cm x 30 cm x 30 cm for shrubs.
- The spacing for trees is proposed 2 m while 1 m for shrubs plantation.
- The pits should be watered prior to plantation of seedlings.

##### **6.0.4.3 Post Care Facilities:**

- The growing plants are cared at least for the first 3 years under favorable condition of climate and irrigation.
- For healthy and vigorous growth adequate nutrient will be supplied.
- To avoid water stress condition regular watering will be done.



## **CHAPTER-7**

### **BUILDING MATERIALS**

#### **7.0 QUANTITY OF MAJOR BUILDING MATERIALS:**

For the construction of the proposed Private housing project (High Rise Residential Apartment Building), the major building materials are cement, sand, stone chips, Fly ash bricks and steel. Through it is too early for estimation of consumption of building materials in this stage, but an attempt has been made for preliminary assessment for such consumption; Major building materials is assessed as follow:

**Table No. C7-1: Major Building Materials**

<b>Sl. No.</b>	<b>Materials</b>	<b>Unit</b>	<b>Quantity</b>
1	Fly Ash Bricks	No	3302858
2	Cement	Bags	173572
3	Sand	Cum	23888
4	Chips	Cum	8466
5	Steel	Ton	1329

#### **7.1 DETAILS OF CONSTRUCTION MATERIALS:**

##### **7.1.1 List of building materials to be use:**

**Table No. C7-2: List of building materials**

1. Coarse sand	11. P.V.C. conduit
2. Fine sand	12. MDS, MCBs
3. Stone aggregate	13. PVC overhead water tanks
4. Stone for masonry work	14. 2 1/2" thick red colour paver tiles
5. Cement	15. PPR (ISI marked)
6. Reinforcement steel	16. PVC waste water lines
7. Pipe scaffolding (cup lock system)	17. S.W. sewer line up to main sewer
8. Fly ash Bricks	18. PVC rain water down take
9. CLC fly ash blocks	19. Stainless steel sink in kitchen
10. Crazy (white marble) in grey cement	20. Joinery hardware- ISI marked

##### **7.1.2 Materials used for construction & their U values:**

**Table No. C7-3: Construction materials & their U values**

<b>Type of Construction</b>	<b>U values(in W/m<sup>2</sup>.C)</b>
<b>Walls:</b>	
<b>Brick:</b>	
Plastered both sides-144 mm	3.24
Solid, Unplastered-228 mm	2.67

Plastered both sides-228 mm	2.44
<b>Concrete, Ordinary, Dense:</b>	
-152 mm	3.58
-203 mm	3.18
<b>Concrete block, cavity, 250 mm(100+50+100), outside rendered, inside plastered:</b>	
Aerated Concrete blocks	1.19
<b>Hollow Concrete block, 228 mm single skin, outside rendered, inside plastered:</b>	
Aerated Concrete blocks	1.70
<b>Roofs Pitched:</b>	
Tiles or sales on boarding and felt with plaster ceiling	1.70
<b>Roofs Flat:</b>	
Reinforced concrete slab, 100 mm screed 63-12 mm, 3 Layers bituminous felt.	3.35
<b>Floors:</b>	
Concrete on ground or hardcore fill	1.13
+Grano, Terrazzo or the tile finish	1.13
+Wood block finish	0.85
<b>WINDOWS:</b>	
<b>Exposure South, Sheltered:</b>	
Single glazing	3.97
Double glazing 6 mm space.	2.67

### 7.1.3 List of Machinery used during Construction

**Table No. C7-4: List of Machinery**

(i) Dumper	(viii) RMC Plant
(ii) Concrete mixer with hopper	(ix) Tower Cranes
(iii) Excavator	(x) Hoist
(iv) Concrete Batching Plant	(xi) Labour Lifts
(v) Cranes	(xii) Pile Boring Machines
(vi) Road roller	(xiii) Concrete pressure pumps
(vii) Bulldozer	(xiv) Mobile transit mixer



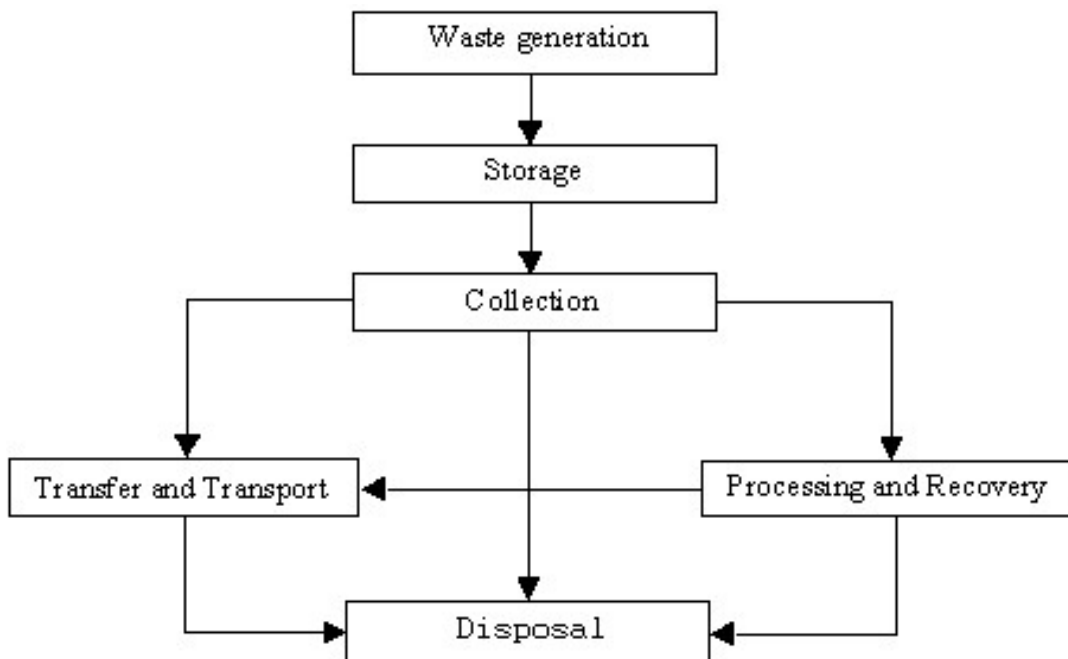
## **CHAPTER-8**

# **SOLID WASTE MANAGEMENT**

### **8.0 SOLID WASTE DISPOSAL SYSTEM**

#### **During Construction:**

Solid wastes like excavated earth and used construction materials will be generated during Construction period. Excavated earth will be properly collected and stored within the project area which will be used for filling up the low-lying areas of the project site to the extent possible. During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling till the work was complete. Building materials will be stored on a platform within a covered area. Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.



#### **During Operation:**

From the proposed housing project solid waste in form of food waste from kitchen and miscellaneous waste will be generated @ 0.45 kg/person/day, which will be about 639 kg/day. The waste generated from floating population in residents will be @ 0.15 kg/day, which will be 21.3 kg/day. The generated solid waste from the residential areas will be segregated as biodegradable and non-biodegradable. This will be collected in separate colored bins. Proper waste management practices will be adopted during the collection, storage and disposal of the generated solid waste and construction and demolition waste.

Solid waste from sweeping and Dry Garbage containing non biodegradable wastes like polythene bags, metal, ceramic Waste, glass etc. shall be stored in separate garbage bin and sent to approved recyclers.

Around 90 kg/day of STP sludge will be generated. As sewage sludge contains many elements essential to plant life, such as nitrogen, phosphorous, potassium, and in addition, at least traces of minor nutrients which are considered more or less indispensable for plant growth, such as boron, calcium, copper, iron, magnesium, manganese, Sulphur and zinc. The sludge humus, besides furnishing plant food, benefits the soil by increasing the water holding capacity, thus making possible the working of heavy soils into satisfactory seed beds. Sludge will be used as manure in landscaping.

### **8.0.1 Solid waste Generation:**

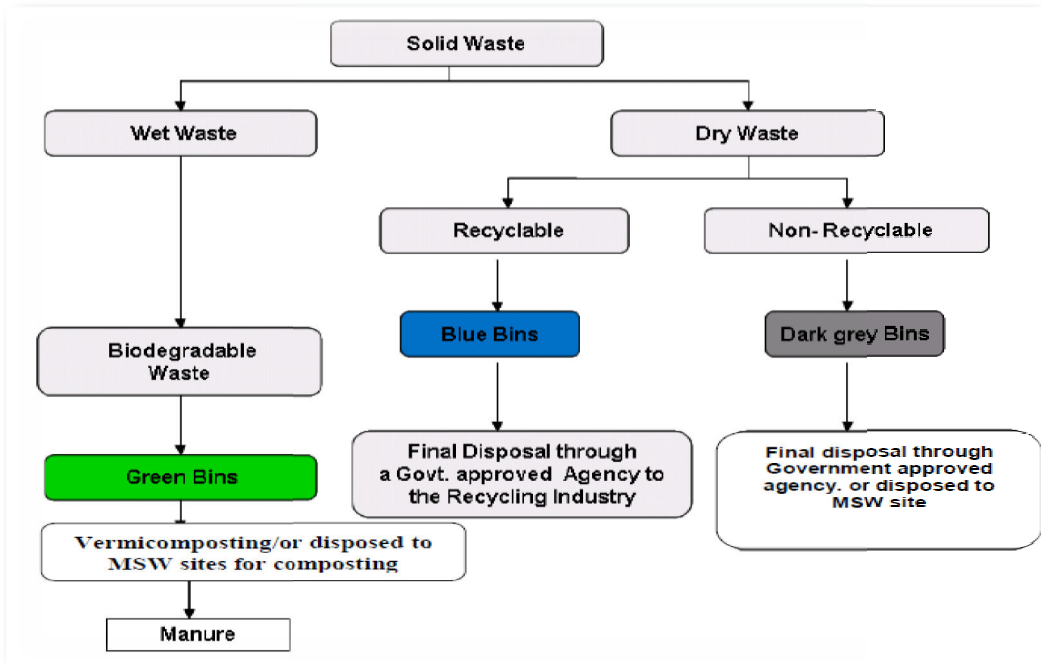
**Table No. C8-1: Solid waste Generation**

<b>Sl. No.</b>	<b>Category</b>	<b>Counts (heads)</b>	<b>Waste generated</b>
1.	Residents	1420 @ 0.45 kg/day	639 kg/day
3.	Floating population in residents	142 @ 0.15 kg/day	21.3 kg/day
5.	STP sludge(S in Kg= $Q \times 0.01 \times 0.05$ Where, Q = Quantity of waste water generated in Ltr)		90.08 ~90 kg/day
<b>Total Solid Waste Generated</b>			<b>750.3 kg/day</b>

**Table No. C8-2: Solid waste Generation during operation phase**

<b>S. No.</b>	<b>Types of Solid waste and other waste</b>	<b>Description</b>
1.	Food Waste (garbage)*	Wastes from the kitchen including preparation, cooking and serving of food.
2.	Rubbish*	Combustible (Primary Organic): Paper, cardboard, cartons, wood, boxes, plastics, rags, cloths, beddings, leather, rubber, grass, leaves, yard trimming. Non-combustibles (Primary Inorganic): Metals, tin cans, metals foils, dirt, stones, bricks, ceramics, crockery, glass bottles, other metal refuses.
3.	Street Waste*	Street sweeping, dirt, leaves, catch basin dirt, animal dropping, contents of litter receptacles dead animals.
4.	Horticultural waste*	Tree trimming, leaves, waste from parks and gardens etc.
5.	General domestic waste from office and administration	Paper, General Domestic Waste etc.
7.	STP Sludge	Sludge generation after treatment of sewage in STP.

**\*Source:** Manual on Municipal Solid Waste Management, published by Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, Government of India



### **8.1 HAZARDOUS WASTE MANAGEMENT:**

Construction activities may pose the potential for release of petroleum based products, such as lubricants, excess paints, paint brushes, hydraulic fluids, and fuels during their storage, transfer or use in equipment. These materials may also be encountered during decommissioning activities in building components. Proper precaution and care will be taken during handling and storage. Waste will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.

### **8.2 HANDLING OF SOLID WASTE:**

For better housekeeping, Solid waste handling and disposal, The House keeping group conduct close monitoring of housekeeping action to ensure that solid wastes are properly collected, stored and disposed. The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and non-biodegradable. Biodegradable waste will be stored in designated bins whereas non-biodegradable waste separated as Recyclable and Non-recyclable waste, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.

## **CHAPTER-9**

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# **POWER REQUIREMENT & ENERGY CONSERVATION**

### **9.0 POWER REQUIREMENT**

The total consolidated electrical load estimate for proposed project is about **1482 KW**. The power will be entirely supplied by 11 KV source of TPCODL of Odisha State Electricity Board. Also, in case of power cut, 100 % power backup generator will be provided for common uses only. For this purpose diesel generator having 500 KVA (2 nos.) capacities will be provided.

**Table No. C9-1: Connected Load of Each Residential Unit**

<b>Sl. No.</b>	<b>Description</b>	<b>No. of Unit</b>	<b>Load per Unit</b>	<b>Total Load</b>
1	4 BHK	13 Units	6.0 KW	78 KW
2	3 BHK	155 Units	6.0 KW	930 KW
3	2 BHK	116 Units	4.0 KW	464 KW
<b>Total Load</b>				<b>1472 KW</b>

**Table No. C9-2: Total Load of Electricity**

<b>Sl. No.</b>	<b>DETAILS</b>	<b>TOTAL</b>
1.	Total Energy Consumption For 284 Residential Units	1472 KW
2.	Common Services	10.0 KW
<b>TOTAL</b>		<b>1482.0 KW</b>

#### **9.0.1 Power Back-up Requirement**

In order to meet emergency power requirements during the grid failure, there is provision of 2 nos. of DG sets of 500 KVA capacities for power back up in the Proposed Housing Project. The proposed DG sets will be equipped with state of the art insulation, acoustic enclosure to minimize noise generation and adequate stack height for proper dispersion.

### **9.1 ENERGY SAVING MEASURES**

Conservation of energy broadly characterized as either passive or active form, depending on the way they distribute energy. Active measures include the use of energy efficient/energy saving appliances. Passive measures include orienting a building to the Sun, selecting materials with favorable thermal mass or light dispersing properties, and designing spaces that naturally circulate air. Active technologies increase the supply of energy and are considered supply side technologies, while passive technologies reduce the need for alternate resources and are generally considered demand side technologies.

#### **9.1.1 Passive Measures:**

The primary function of the building is to provide comfortable indoor environment. The buildings should be built in architectural features that took maximum advantage of climate and its surrounding, which is reflected in the planning and design of the buildings. Selection of proper construction materials

with proper design approach helps achieve thermal and visual comfort with less dependence upon artificial systems, which results in energy saving with environmental benefits. Advanced solar architecture and urban planning methods were first employed by the Greeks and Chinese, who oriented their buildings toward the south to provide light and warm. The common features of passive solar architecture are orientation relative to the Sun, compact proportion (a low surface area to volume ratio), selective shading (overhangs) and thermal mass. When these features are tailored to the local climate and environment they can produce well-lit spaces that stay in a comfortable temperature range.

Out of 5 climate zone in India project site comes under warm and humid climate zone. In these regions, high temperatures are accompanied by very high humidity levels leading to immense discomfort. Cross ventilation is hence very essential here. Adequate shading measures are also necessary to protect the building from direct solar radiation. The building shall be comply to the Energy Conservation Building Code (ECBC) with proper windows to achieve maximum solar gain in winter and minimize in summer combines three strategies via orientation, glazing and thermal mass. The walls and roofs will be also designed suitably to reduce heat gain.

**The Passive Measures include:**

- Proper solar orientation i.e. building is oriented in north-south direction giving indirect light from north.
- South west light exposure and low exposure to east light
- Lower exposure to reduce heat gain.
- Optimum window position for low heat gain.
- Development of greenbelt to reduce heat gain.
- Glazing tiles on the roof and high florescent paint on the wall to reduce heat gain.
- Proper space plan reduce air conditioning.
- Natural lighting of rooms is enhanced with raised roofing with low emissivity glasses.

In addition to above there are some other architectural features which are helpful in Conservation of energy resources are:

- The width to height ratio between the apartments is achieved as per BDA rules.
- All window openings are provided with chajjas and wall projections as specified by design standards.
- The full heights openings have been designed for better lighting in the apartment units. For climatic considerations, all these openings are placed next to balcony which acts as a buffer but eliminating the direct lighting and thereby avoiding heat ingress.



- Use of large fenestration in buildings reduces the use of mechanical light energy during time thereby reducing the energy consumption.

#### **9.1.1.1 Thermal Envelope:**

A thermal envelope is everything about the house that serves to shield the living space from the outdoors. It includes the wall and roof assemblies, insulation, air/vapor retarders, windows.

#### **9.1.1.2 Insulation:**

The exterior wall and Roof should be made such a way that it helps in reducing solar heat gain and serves as an insulator. Whereas the interior wall should be made using eco-friendly Autoclaved Aerated Concrete Panels using fly ash and cement. The product serves as an insulator and acoustic dampener. Roofs are provided with insulation suitable to achieve a maximum of U-factor of overall assembly of  $3.35 \text{ W/m}^2\text{-}^\circ\text{C}$  and Opaque walls shall comply with the maximum U-factor overall assembly of  $2.440 \text{ W/ m}^2\text{-}^\circ\text{C}$ .

#### **9.1.1.3 Orientation:**

Orientation of the buildings utilizes east lighting and minimal use of west lighting. North and South of the buildings are provided with good number of windows. To avoid direct west sun shading devices are provided in the building such as pergolas, louvers, sunshades and roof over hangs. Providing Open to sky areas to allow light and air. Adequate set back around the buildings to allow access for natural light and wind.

#### **9.1.1.4 Glazing:**

Plain float glass and UPVC glaze is used for windows. Air Leakage for glazed swinging entrance door will be designed to ensure that the air leakage does not exceed to  $2.0 \text{ l/s m}^2$ .

#### **9.1.2 Active Measures are:**

- Use of copper wound high efficiency transformers and motors.
- Use of CFL instead of tube lights and conventional bulbs.
- Use of electronic ballast in place of conventional ballast.
- Use of solar street lighting.
- Use of energy efficient cables and wires

#### **9.1.2.1 Lighting**

Interior lighting system in building area will be equipped with an automatic control device. Luminaries in day lighted areas greater than  $25 \text{ m}^2$  will be equipped with manual control device.

#### **9.1.2.2 Use of energy-efficient Appliances:**

Appliances with relatively high operating efficiencies will be used for proper utilization of power and to avoid power losses. However, higher efficiency appliances provide a measure of less air pollution and noise pollution.

## **9.2 ENERGY CONSERVATION BY USING LED LUMINARIES AND SOLAR LIGHTING:**

**Table No. C9-3: Energy Saving Using LED Light**

**Energy Saving by using Solar Lighting:**

Total Saving by using Solar light in Common Area = **69.7 KW**

**Energy Saving by using Solar Street Lighting:**

There are 123 nos. of Solar Lighting poles has been proposed for Street lighting,

Energy conservation by using Solar Street Lighting =  $123 \times 72 = 8856 \text{ watt} = \mathbf{8.8 \text{ KW}}$

Energy Saving by using Solar Lighting = 69.7 KW

Energy Saving by using Solar Street Lighting = 8.8 KW

Total Energy Saving =  $69.7 + 8.8 = 78.5 \text{ KW}$

**Total Energy Saving =  $78.5/1482 = 0.052 = 5.2 \%$**

**Energy Saving by using LED Lighting:**

Consumption with Conventional Light = 1 watt/sqm

Consumption with LED Light = 0.4 watt/sqm

Built up Area = 44996.5 sqm

Total Consumption with Conventional Light = 44996.5 watt

Total Consumption with LED Light =  $44996.5 \times 0.4 = 17,998.6 \text{ watt}$

Total Saving by using LED light =  $44996.5 - 17998.6 = 26,997.9 \text{ watt} = \mathbf{26.99 \text{ KW}}$

Energy Saving by using Solar Lighting in Common Area = 69.7 KW

Energy Saving by using Solar Street Lighting = 8.8 KW

Energy Saving by using LED Lighting = 26.99 KW

Total Energy Saving =  $69.7 + 8.8 + 26.99 = 105.49 \text{ KW}$

Total Energy Consumption = 1482 KW

**Total Energy Saving =  $105.49/1482 = 0.0711 = 7.11 \%$**

## **CHAPTER-10**

### **PARKING PROVISION AND TRAFFIC MANAGEMENT PLAN**

For smooth flow of traffic and to avoid accidents during movement of vehicles, the road system has been designed in accordance with the ODA, NBC codes/regulations. Parking space will be provided at suitable locations proximity to activity stations. The requirement of parking area will be provided as per ODA guidelines. A total area 22308.36 Sqm is earmarked for parking vehicles (two wheelers and light motor vehicle).

#### **10.0 OBJECTIVE OF TRAFFIC CIRCULATION PLAN:**

- To provide a safe route for people to enter and leave.
- To identify any risks to the general public and local traffic from construction vehicles and to put control measures in place to protect all members of the public, drivers & site workers, from any injury involving traffic travelling to and from the site.
- To provide measures to control the speed of vehicular movement.
- To prevent parking within the local estates.
- Existing Emergency access routes will be maintained to permit emergency vehicles to attend the premises at all times.
- To outline procedures for dealing with emergencies and safe evacuation.
- To consider the safety of all road users including pedestrians and cyclists and particular attention to the safety of children, the elderly, cyclists and the disabled.

#### **10.1 ROAD NETWORK:**

##### **Local Streets:**

The proposed project site can be approached from NH-5 at a distance of 1.4 Km.

#### **10.2 EXISTING TRAFFIC SCENARIO AND ADDITIONAL IMPACT**

##### **10.2.1 Construction Phase:**

For transportation of construction materials expected traffic volumes will be average 6 tippers per day. During the construction phase as the local road network will be used to construct the designated route. To reduce the traffic density the designated road will be used with proper traffic calming. All construction vehicles employed for the execution of the works will be expected to travel to and from site along the designated route below 20 Kmph speed.

##### **10.2 Operation Phase:**

During the operation period there will be increase in traffic density due to the movement of residential people and guests.

**Traffic density of NH-16:-** NH-16 is a major National Highway is well connected with the proposed project site at a distance of 1.4 Km.

**Traffic density of residential People:** The total population of the residential will be 1522 nos and floating population will be 152 nos, for their movements of vehicles are necessary and for this purpose there will be about **7330 PCU** are used.

As the road connected to the site running with **6156 PCU** traffic density per day, in addition of **1174 PCU** to the main road network during Operation phase, which will not create any significant impact on existing traffic density.

**Table No. C10-1: Traffic density Calculation: Traffic survey done from 01<sup>st</sup> March 2021 to 06<sup>th</sup> March 2021**

Date↓	Source	Time → Type of Vehicles ↓	1000- 1100 HRS	1100 1200 HRS	1200 1300 HRS	1300 1400 HRS	1400 1500 HRS	1500 1600 HRS	1600 1700 HRS	1700 1800 HRS	1800 1900 HRS	1900 2000 HRS	2000 2100 HRS	2100 2200 HRS	Average
<b>01.03.21</b>	<b>Service Road</b>	2W	480	447	387	289	181	200	428	458	259	280	212	259	312
		3W	135	82	61	69	75	59	102	72	83	103	81	60	81
		LMV	64	60	57	69	60	70	74	59	58	65	67	72	64
		HMV	5	5	4	5	6	7	5	7	8	6	7	5	5
<b>02.03.21</b>	<b>Service Road</b>	2W	329	443	412	287	267	241	287	296	321	212	176	171	286
		3W	67	72	56	74	56	51	73	80	67	56	83	61	66
		LMV	77	73	64	51	46	48	53	57	37	62	38	59	55
		HMV	6	5	3	2	3	6	8	4	4	3	5	7	4
<b>03.03.21</b>	<b>Service Road</b>	2W	344	372	267	364	353	238	278	340	456	241	243	258	312
		3W	67	72	56	74	56	51	73	80	67	56	83	61	66
		LMV	64	60	57	69	60	70	74	59	58	65	67	72	64
		HMV	4	5	9	8	8	5	6	8	7	5	8	7	6
<b>04.03.21</b>	<b>Service Road</b>	2W	363	326	295	279	376	455	432	310	259	552	452	537	386
		3W	75	73	56	57	49	65	56	45	64	72	65	59	61
		LMV	67	72	56	74	56	51	73	80	67	56	83	61	66
		HMV	4	5	9	8	8	5	6	8	7	5	8	7	6
<b>05.03.21</b>	<b>Service Road</b>	2W	285	307	335	411	218	248	119	288	317	177	136	161	250
		3W	64	59	63	71	86	59	72	83	64	46	77	72	68
		LMV	60	57	44	37	71	80	63	54	72	66	69	76	62
		HMV	8	5	9	8	4	5	6	8	7	5	8	7	6
<b>06.03.21</b>	<b>Service Road</b>	2W	349	417	329	289	287	198	312	338	420	276	286	249	312
		3W	81	47	64	74	53	53	81	87	118	74	71	37	70
		LMV	70	73	57	71	49	48	59	72	81	77	58	49	63
		HMV	7	5	6	7	8	6	5	7	5	4	5	6	5
<b>07.03.21</b>	<b>Service Road</b>	2W	399	411	409	371	297	318	244	209	200	317	332	247	312
		3W	57	49	65	72	52	72	72	59	90	76	51	81	66
		LMV	62	60	71	56	57	64	65	73	63	48	61	47	60
		HMV	5	5	4	5	6	7	5	7	8	6	7	5	5



**Table No. C10-2: the average exiting traffic density of Service Road connecting to NH-5**

Types of vehicles	Nos. of vehicles	Equivalent passenger Car Unit (PCU) factor	Total Passenger Car Unit/Hr	Total Passenger Car Unit/Day
Two Wheeler	310	0.75	232.5	2790
Three Wheeler	69	2	138	1656
Light Motor Vehicle	62	2	124	1488
Heavy Motor Vehicle	5	3.7	18.5	222
<b>Total</b>	<b>446</b>	<b>--</b>	<b>513</b>	<b>6156</b>

The exiting average PCU per day is **6156**.

**Table No. C10 - 3: Average increase in traffic density after completion of project**

Sl. No.	Item Description	Total No. of flats/ Population	Type of vehicles	No of vehicles	Equivalent passenger Car Unit (PCU) factor	Total passenger Car Unit
1	Residential Flats	1522 Populations	Two Wheeler	290	0.75	217
			Three Wheeler	92	2.0	184
			Light Motor Vehicle (4 Wh)	132	2.0	264
			Heavy Motor Vehicle	--	--	--
2	Floating Population	152 Populations	Two Wheeler	132	0.75	99
			Three Wheeler	53	2.0	106
			Light Motor Vehicle (4 Wh)	152	2.0	304
			Heavy Motor Vehicle	--	--	--
<b>Total</b>				<b>851</b>	<b>--</b>	<b>1174 PCU/Day</b>

The Total Average PCU will be increased by approximately 1174 PCU/day.

So, Total increase in traffic density will be: 6156 PCU (Existing) + 1174 PCU (Estimated) = **7330 PCU**.

**a. Provision of Adequate parking space**

For smooth flow of traffic the road system has been designed in accordance with the BDA, NBC codes/regulations. Parking space has been provided at suitable locations proximity to activity stations.

**Modified V/C and LOS**

Road	Before construction traffic estimation			After construction traffic estimation			LOS
	V	C	V/C	V	C	V/C	
<b>Service road connecting to NH-5</b>	513	1400	0.3	611	1400	0.43	B (Very Good)

**Where,**

**V = Total vehicle Volume in PCU's/hr**

**C = Working capacity of Road in PCU's/ hr**

**For COLLECTOR ROADS= 2-Lane Un-Divided (One Way)**

**LOS = level of Service- As a qualitative measure describing**

**operational conditions within a traffic Stream and their perception by drivers/ Passengers.**

**Source-IRC-37-2011**

**Note-IRC is accepting the fact that, in India roads the real congestion starts when V/C ratio is >1, i.e., for forced flow. Till limit of 1, the road is free for traffic congestion.**

V/C	LOS	Performance
0.0-0.2	A	Excellent
0.2-0.4	B	Very Good
0.4-0.6	C	Average
0.6-0.8	D	Poor
0.8-1.0	E	Very Poor
1.0 & Above	F	Forced/Breakdown

**10.2.3 Parking details:**

**Parking Proposed:**

Parking Area for Residential Areas: 22308.36 Sqm

**As per Odisha Bye-laws:**

Parking Area Required for Residential areas = 30% of FAR area of Residential

The FAR area of Residential areas: 44996.50 Sqm

$$= 44996.5 \times 30/100$$

$$= 13499 \text{ m}^2$$

**Table No. C10-4: Parking as per NBC norms**

<b>Parking Area Provided</b>			
<b>For Residential</b>			
Parking (Covered/Open)			22308.36 Sqm
<b>Equivalent Car Space Provided for Residential</b>			
<b>Details</b>	<b>Area (Sqm)</b>	<b>Area/ECS</b>	
Lower Basement	5863.18	35	167 ECS
Upper Basement	5863.18	35	167 ECS
Visitors Parking Area	10582	35	302 ECS
<b>Total Parking Provided</b>			<b>636 ECS</b>

**So, Total Parking Area provided > Parking Area required (as per Odisha Bye-laws) and Parking Area needed as per NBC 2005 norms.**

**10.2.4 Traffic calming:**

Traffic calming improves the transportation systems and helpful in smooth movement of vehicles inside the apartment as well as minimize the traffic

congestion and accidents. So for better movement and transportation traffic calming is essential. To minimize the traffic congestion and accidents and for speed control inside the apartment, speed breakers will be provided. This is also helpful in reducing the noise and air pollution and makes the system pedestrian and bicyclist friendly.

## **CHAPTER-11**

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### **RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN**

#### **11.0 OBJECTIVE, SCOPE AND CONTENTS OF ON-SITE EMERGENCY PLANNING**

Objectives of Emergency planning are to maximize the resource utilization and made combined efforts towards emergency operations, which includes:

- To localize the emergency and if possible eliminate it.
- To minimize the effect of accidents on people and property.
- To take remedial measures immediately and control it with minimum damage.
- To keep the required emergency equipment in stock at right places and ensure that they are in working condition.
- To keep the concerned personnel fully trained in the use of emergency equipment.
- To give immediate warning to the surrounding localities in case of an emergency situation arising.
- To mobilize transport and medical treatment of the injured.
- To arrange for rescue, treatment of casualties and communicate to relatives.
- To safe guard the people.
- To render necessary help to concerned.

##### **11.0.1 Emergency:**

A major emergency in any situation is one, which has the potential to cause serious injury or loss of life, which may cause extensive damage to the structure in the vicinity, environment and human resources available. This could result in serious disruption to normal operation both inside and outside the premises. Depending on the magnitude of the emergency, services of the outside agencies may also be required for supplementing the internal effort to effectively handle the emergency and to contain the damage.

##### **Emergency Medical facilities:**

First aid will be made available at different places of the building. Arrangements of medicines will be maintained in the Emergency Medical Centre. Breathing apparatus and other emergency medical equipment will be provided and maintained both in constructional phase as well as in operational phase.

#### **11.1 HEALTH AND SAFETY MEASURES FOR THE LABOURERS**

- **Building and structures:** No walls, galleries, stair-ways, floor, platform, staging or structure whether of permanent or temporary character will be constructed in such manner as to cause risk or bodily injury.

- **Child Laborers:** No child laborers will be allowed to work during Construction and Operational phase.
- **Service platforms:** whenever practicable and demanded service platforms and gangways will be provided for overhead shafting, and when required by him this will be securely fence with guard rails and toe boards.
- **Belts, etc:** All belts will be regularly examined to ensure that the joints are safe and the belts are proper tension.
- **Helmets:** Helmets will be provided to the workers for safe guarding themselves against any head injuries.
- **Machinery:** No machineries are equipments will be situated, Operated or maintained in such a manner as to cause risk of bodily injury.
- **Methods of work:** No process of work will be carried out in such a manner as to cause risk of bodily injury.
- **Electricity:** No electricity installation will be provided during construction so as to be dangers to human body or safety.
- **Medical Check-up:** Medical examination for every laborer will be done by certified surgeon at least once in 3 months.
- **First aid:** On-site first aid facility will be made available always for any emergency treatment.

## **11.2 EMERGENCY ACTION PLANS**

### **11.2.1 Emergency Action plan for Cylinder Fire:**

When filled container containing LPG is involved in fire, internal pressure if not relieved, will build up above 70 kg/Sqcm and ultimately rupture the container. Rupture weak by direct flame impingement. Ruptured containers can be propelled at distance by jet action.

If container's pressure is not raised up to 70 Kg/Sqcm leakage from screwed valve joint can occur due to different expansion of steel and brass.

Ignition of the escaping gas would aggravate the fire but release of fire reduces the possibility of rupture.

No attempt should be made to extinguish the burning gas but the container under fire and other containers in vicinity should be kept cool by water spray.

If the gas leakage does not ignite, the container should be approached from top and removed to the place of safety away from, the source of ignition.

### **11.2.2 Emergency action plan for Electric Fire:**

Disconnect the electric supply of the affected areas.

Attempt to extinguish fire with the help of CO<sub>2</sub>, DCP

If the fire is not extinguished, extinguish by spraying water with fog nozzle after ensuring complete isolation of electric circuit.



### **11.2.3 Emergency Action Plan for Oil Fire:**

Attempt to extinguish fire with the help of DCP.

If the fire is not controlled, use water foam to blanket the fire and further action is to be taken.

### **11.2.4 Emergency action plan for Medical Aid:**

#### **Emergency action plan for Electric Shock Casualties:**

Electric shock results in irreversible damage to brain cells followed by deterioration of the organs.

#### **Rescue and first aid:**

Do first aid quickly and without fuss and panic.

Switch off the supply if this can be done at once.

If not possible use a dry stick, dry cloth or other non-conductor to separate the victim from electrical contact.

The rescuer must avoid receiving shock himself by wearing gloves or using a jacket to pull the victim. Always keep in mind that delay in rescue and resuscitation may be fatal.

## **11.3 NATURAL HAZARDS:**

### **11.3.1 Emergency Action Plan for earthquakes:**

The site falls under the zone III as per the seismic zone map of India and indicating Moderate damage risk zone. When first tremors are sensed during an earthquake, all people should evacuate buildings and assemble at safe place/open place away from structures, walls and falling objects.

Emergency services should be contacted for assistance.

After the status is restored, people should inspect all the facilities for rescue, first aid and damage control activities, damage assessment, cleanup, restoration and recovery.

### **11.3.2 Emergency Action Plan for Bomb Threat**

When bomb threat call is received the following measures are to be taken.

Inform the message to the highest local police authority and seek their assistance for patrolling and security need.

Request the Local Fire Brigade to position at least one fire tender at the location immediately.

Keep the concerned department at the regional level informed with the development at regular intervals.

Alert the local Govt. / private hospitals and seek their help for providing ambulances if necessary.

**In the Location premises:**

Keep the Fire hydrant System/all fire fighting and personal protective Equipment in readiness.

Have through inspection of the location for any suspected dangerous object.

Organize security cell for round the clock observation of the premises.

**If the Suspected object is found:**

In case of finding of suspected article , do not disturb its position, but the area around it should be cordoned off to a distance of 100 meters and more depending upon the gravity of situation.

Call the Police immediately, who on reaching the site will decide suitable action for defusing and disposal of the suspected object.

Evolution of thick bellowing smoke is an indication of impending explosion and in such a case, with draw or evacuates all people from the spot, which has been identified.

As a general measure, regulate the movement of the strangers inside the premises and restrict their entry with permits.

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

### 12.0.1 Air Quality Management

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>



	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>



	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>

	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic "wastes" like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>

	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>



	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>Enhance or Protect:</b> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>



	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>

	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic "wastes" like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>



## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>

	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>



	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>

	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>



	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic "wastes" like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>



	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>



	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>

	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic "wastes" like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.



**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>

	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>



	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>

	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic "wastes" like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>

	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>



	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>

	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>



	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic “wastes” like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>



	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>



	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic "wastes" like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>



	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>



	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic "wastes" like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>



	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>



	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic "wastes" like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>



	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>



	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic “wastes” like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>



	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>



	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

### **12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic “wastes” like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>

## **CHAPTER-12**

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# **ENVIRONMENTAL MANAGEMENT PLAN**

### **12.0 ENVIRONMENTAL MANAGEMENT PLAN**

#### **Objective of the EMP**

- ✓ The project management team with practical and achievable plans to ensure that the project's environmental requirements are complied with.
- ✓ An integrated plan for monitoring, assessing and controlling potential impacts.
- ✓ Complies of policies to the satisfaction of state and national authorities.

The detailed EMP will be reviewed and periodically updated, if necessary, to reflect knowledge gained during the course of the project constructions and operations Changes to the detailed EMP will be implemented in consultation with the relevant authorities where necessary.

#### **Role and Responsibilities:**

During construction phase, contractors as well as site-in-charge will be responsible for implementing all the mitigation measures recommended. Later on the EMD (Environmental Management Division) should take necessary measures to look after the environmental management aspects of the proposed apartment. They will closely monitor the pollution aspects of the apartment and identify the problems and accordingly, suggested certain measures to mitigate pollution. Environmental training and awareness programme has also been conducted under the supervision of EMD. The managers/supervisors of EMD would be given authority to look after their day-to-day activities funds to look after their day-to-day duties.

The supervisors will monitor the entire apartment regularly and intimate the society about the current status of the environment and safety measures adopted. Society members will review the reports of the Supervisors for remedial measures.

#### **Communication and Consultation:**

During the construction and the operation phase of the project consultation with relevant regulatory authority, agencies and consultants will be maintained. Effort will be made to full fill their valuable suggestions.

#### **Auditing and Review:**

There will be frequent inspection on vulnerable areas and individuals will be done during construction and operation period. The EMD will keep all inspection and audit reports of environmental performance, which will be made available to the relevant regulatory authorities as required.

**12.0.1 Air Quality Management**

<b>Table No. C12-1: Air Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<p><b><u>Beneficial:</u></b></p> <ul style="list-style-type: none"> <li>• This project will provide health safety services &amp; education to poor &amp; nearby people with a cheap cost.</li> </ul> <p><b><u>Adverse:</u></b></p> <ul style="list-style-type: none"> <li>• Dust emission during excavation and material handling.</li> <li>• Emission from Vehicles and construction equipments.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Water sprinkling will be done on haulage road &amp; dust prone areas are to be carried out.</li> <li>• All vehicle &amp; construction equipments will be maintained properly to reduce gas emission.</li> <li>• Vehicles engaged during construction shall obtain PUC certificate from concerned authority.</li> <li>• All vehicles delivering loose and fine materials like sand and fine aggregates to the site will be covered with tarpaulin covering to reduce spills on roads.</li> <li>• Dry loose materials like bulk cement will be stored inside a totally enclosed system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and construction activities.</li> <li>• No. of Air quality related complaints from neighboring residence and laborers.</li> <li>• No risk &amp; hazards were recorded from residers inside the premises.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During construction the entire length of the basement and associated areas will be regularly inspected to access the effectiveness of air quality protections.</li> <li>• Regular visual monitoring of dust emissions will be conducted and watering frequency altered as required.</li> <li>• Visual monitoring of dust emissions will be conducted regularly and sprinkling will be done as per requirement.</li> </ul>
<b>Table No. C12-2: Air Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<b>The quality of air environment should</b>

	<b>be such that those are conducive to be suitable for the life, health and well being of humans.</b>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Dust emission during road sweeping.</li> <li>• Emission from Vehicles and DG sets.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regular sweeping of access roads will be carried out.</li> <li>• Vehicles which are not having PUC Certificates will be discouraged to enter the site.</li> <li>• Water will be sprinkled to suppress dust, while cleaning and sweeping the roads and pavements.</li> <li>• Open burning of litter and garbage will not be allowed.</li> <li>• DG set will be provided with adequate stack height.</li> <li>• Combustion efficiency of the DG sets shall be checked every year so that release of black smoke will be minimum.</li> <li>• Sufficient tree plantation will be done along the periphery of the project site as well as in available vacant space inside the campus.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive dust emissions during windy/dry periods and anthropogenic activities.</li> <li>• No. of Air quality related complaints from neighboring and residence people.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• During operation the project area will be regularly monitored to assess the air quality as per the standards formulated by OSPCB.</li> <li>• Monitoring report will be recorded and submitted to OSPCB.</li> </ul>

### 12.0.2 Water Quality Management

<b>Table No. C12-3: Water Resource Management during Construction Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Effective water management will be adopted for optimum use of water during the construction stage. For example, water used for cleaning the bricks can easily re-use for sprinkling the</li> </ul>



	<p>excavated land filling purpose.</p> <ul style="list-style-type: none"> <li>• To reduce on-site water consumption ready mix concrete will be used.</li> <li>• Curing water will be sprayed on concrete structure; free flow water will not used for curing.</li> <li>• Concrete structures will be covered with thick cloths/gunny bags and then water will be sprayed on them. This would avoid water rebound and ensure sustain &amp; complete curing.</li> <li>• Wastewater from painting equipment cleanings and excess paints will be placed into larger drums and allowed the solids to settle.</li> <li>• On site run-off containing dust and sediments will be controlled by providing sediment traps in storm water drain.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive use of water during construction activities.</li> <li>• No. of Water quality related complaints from residence laborers.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Water generated from labour colony will be treated properly.</li> </ul>
<b>Table No. C12-4: Water Resource Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• Security of Water users and enhance portability of water.</li> <li>• Suitability of use of water for different purposes.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Contamination of water resources.</li> <li>• Over use of water resources.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water level to be adopted.</li> </ul> <p>Well design storm water network to collect the rain water from the site area and diverted to proposed rainwater harvesting/ recharging pits for recharging the ground water (Total 6 nos. of recharge pits will be proposed).</p> <ul style="list-style-type: none"> <li>• Use of efficient plumbing fixtures, sensors, auto valves, etc. will be adopted to reduce the water consumption and increase water efficiency.</li> <li>• Installation of water-saving equipment in lavatories, such as low flow toilets.</li> <li>• The occupants of the apartment will be encouraged for optimum use of potable water.</li> <li>• Regular cleaning &amp; maintenance of all</li> </ul>

	<p>overhead &amp; underground water reservoirs will be done.</p> <ul style="list-style-type: none"> <li>• To avoid contamination of the groundwater quality of the locality, the pipeline for collection of sewage and sullage of the residential apartment will be properly laid and the joints of two consecutive pipes will be properly sealed to avoid the leakage of wastewater of sewage.</li> <li>• Ground water quality will be periodically monitored and records will be reviewed and analyzed on regular basis.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No excessive water utilization during Operation periods.</li> <li>• No. of water quality related complaints from neighboring residence.</li> <li>• Complaints regarding bad order from discharge water.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Monitoring of Water quality, will be done regularly.</li> <li>• Drainage network should be cleaned to avoid chocking. The main drain is near the project site.</li> <li>• Regular monitoring of pipelines and plumbing features to avoid leakage and contamination.</li> <li>• Regular inspection and maintenance of STP carried out, inlet and outlet water quality will be monitored, recorded and necessary corrective measures taken.</li> </ul>

**12.0.3 Noise Quality Management**

<b>Table No. C12-5: Noise Quality Management during Construction Phase</b>	
<b>Environmental Value</b>	<p>The Qualities of the aquatic environment that are conducive to:</p> <ul style="list-style-type: none"> <li>• The well being of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment and other health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The equipment used or the modes of operation can be changed to produce less noise. For instance, moving, rotating or impacting machines can be used an anti-vibration mountings or equipment generating minimum noise</li> </ul>

	<p>and vibration be chosen.</p> <ul style="list-style-type: none"> <li>• Internal combustion engines must be fitted with silencers.</li> <li>• Construction equipments are to be maintained properly and regularly for smooth functioning and less noise.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Building materials like bricks, steel coarse aggregate are to be unloaded and a sand bed and inside a covered storage area to produce less noise.</li> <li>• Construction activities will be allowed during the day only.</li> <li>• Noise pollution attenuating green belt, especially along the boundaries of the project site is to be developed to reduce the impact of noise during the construction activities.</li> <li>• Temporary trenches will be dug along the external periphery of the building to prevent the spreading of ground vibration due to pilling works.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• Evidence of noise generating machineries and DG sets.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Regular monitoring and maintenance of construction equipments.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>
<b>Table No. C12-6: Noise Quality Management during Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• The Qualities of the aquatic environment that are conducive to:</li> <li>• The wellbeing of the community or apart of community, including its social and economic amenity.</li> <li>• The well being of an individual's opportunity to have sleep, relaxation and conversation without unreasonable from intrusive noise.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• High noise intensity may cause hearing impairment, sleeping disorder and health effects.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Adequate trees will be planted along the peripheral boundary walls, which will act</li> </ul>

	<p>as acoustic screen or vegetative barrier against the propagation of noise.</p> <ul style="list-style-type: none"> <li>• DG sets will be provided with acoustic enclosure to control noise level as per norms.</li> <li>• Vehicles not having proper silencer will not be allowed to the project site.</li> <li>• Noise producing instrument/appliances, loud speaker etc should not be allowed beyond prescribed limits.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Noise related complaints received from residents and landholders during construction.</li> <li>• No. of complaints regarding noise level during vehicular movements and DG sets operation.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Proper maintenance of DG sets.</li> <li>• Regular monitoring will be carried out to access the noise quality as per the instruction of OSPCB.</li> <li>• All incidents that deviate from normal operating conditions will be reported internally and at such times immediate corrective action initiated.</li> </ul>

#### **12.0.4 Waste Management**

<b>Table No. C12-7: Waste Management during Construction Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• After the completion of the project, bare surfaces within the project site will be covered with vegetation.</li> <li>• While landscaping the open areas, gentle gradient in the land surfaces will be maintained as far as possible to avoid soil erosion.</li> <li>• Suitable storm water drainage system for draining the surface run-off will be provided.</li> <li>• During excavation, the topsoil will be kept separate and used as topping material after land filling, dressing, grading or leveling work is complete.</li> </ul>

	<ul style="list-style-type: none"> <li>• Building materials will be stored on a platform within a covered area.</li> <li>• Designated waste collection areas will be chosen within the project site. Excess concrete will be dumped within this designated area.</li> <li>• Paint brushes, roller, excess paints and containers of paints will be disposed as per Hazardous Waste management and Handling Rules 2016 and Amendments thereof.</li> <li>• Solid waste generated due to human activities will be collected properly and disposed off to the municipal authority's solid waste collection and disposal system.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during construction.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• Evidence from loading and unloading of construction materials.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Construction areas will be inspected after relocation to ensure that no waste material remains.</li> <li>• Daily or weekly work reports shall be recorded and reviewed by each supervisor.</li> </ul>
<b>Table No. C12-8: Waste Management during Operation Phase</b>	
<b>Environmental Value</b>	<p><b>Enhance or Protect:</b></p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land and water contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Solid wastes generated from different sources need to be properly collected and disposed off to maintain hygienic condition within the apartment</li> <li>• No indiscriminate disposal of garbage will be allowed within the apartment. A proper waste collection system is to be implemented.</li> <li>• The Solid Waste generated from the residential apartment will be collected and separated out as biodegradables and</li> </ul>

	<p>non-biodegradable, which will be stored in designated bins. Finally the wastes from designated bins send to approved agency for final disposal.</p> <ul style="list-style-type: none"> <li>• On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public.</li> <li>• Garbage collection procedure is to be conducted during the early morning hours in a day.</li> <li>• Accumulations of garbage in the storage bin have to be avoided for more than 24 hours.</li> <li>• To avoid the dumping of garbage along the roads, common area, few number of solid waste storage bins have to be placed in strategic location.</li> <li>• Sludge from STP after dried will be used as manure in landscaping.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• No Waste related complaints received from residents and landholders during operation period.</li> <li>• Evidence from waste handling, storage and disposal facilities.</li> <li>• No. of complaints regarding foul odour from solid waste and sludge.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Housekeeping checks to ensure waste is being stored correctly and no litter occurring.</li> <li>• All incidents that deviate from normal operating conditions will be reported and immediate corrective action initiated.</li> </ul>
<b>Table No. C12-9: Hazardous Waste Management</b>	
<b>Environmental Value</b>	<p>Enhance or Protect:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• The diversity of ecological processes and associated ecosystem.</li> <li>• Control of releases and accidents.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Land, water and soil contamination.</li> <li>• Disagreeable odour and unhygienic condition.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Diesel and other fuels will be stored in separate enclosures.</li> <li>• Where ever possible, hazardous materials to be substituted by non-hazardous materials, e.g. cleaning solvent can be replaced with film- free</li> </ul>

	<p>biodegradable cleaners. Usage of non chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paint for oil based ones.</p> <ul style="list-style-type: none"> <li>• Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion.</li> <li>• Vehicle maintenance area to be designated to prevent contamination of ground water by accidental spillage of oil.</li> <li>• All hazardous waste will be disposed as per Hazardous Waste management and Handling Rules 1989 and Amendments thereof.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from hazardous waste handling, storage and management facilities.</li> <li>• No. of complaints regarding Disagreeable odour and air, water, soil contamination.</li> </ul>
<b>Monitoring Reporting and Corrective action</b>	<ul style="list-style-type: none"> <li>• Implementing management controls (procedures, inspections, communications, training, and drills) to address risks and hazards.</li> </ul>

**12.0.5 Health and Safety Management.**

<b>Table No. C12-10: Health and Safety during Construction Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on workers health and life.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during construction.</li> <li>• No. of complaints regarding safety equipments and sanitation.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• The primary concern on potential health risks for the construction workers and other employees on site during construction are associated with drinking water quality and better sanitation.</li> <li>• Construction site will be provided with a readily available First Aid Kit including an adequate supply of sterilized dressing materials and appliances. Suitable</li> </ul>



	<p>transport to take injured or sick person to the nearest hospital will be immediately provided.</p> <ul style="list-style-type: none"> <li>• Giving proper instructions about personal safety to all the labour working on the site by project manager before commencement of work, guiding the labour about the measures to be taken during emergency and accident like fire etc.</li> <li>• Providing safety equipment like gloves, helmet, ear muffs / plugs etc. to use for all labour on site,</li> </ul>
<b>Table No. C12-11: Health and Safety during Operation Phase</b>	
<b>Environmental Value</b>	<p>For safe guard of:</p> <ul style="list-style-type: none"> <li>• The life, health and well being of the people.</li> <li>• To made accident free zone.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	Effect on health and life of people.
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Evidence from accidents during Operation period.</li> <li>• No. of complaints regarding traffic problem and fire fighting System.</li> </ul>
<b>Environmental Protection strategy</b>	<p>Fire fighting system comprising of :</p> <ul style="list-style-type: none"> <li>• Hose Reel</li> <li>• Extinguisher</li> <li>• Manual operated electric fire alarm system</li> <li>• Underground Static tank</li> <li>• Terrace Tank</li> <li>• Terrace pump</li> <li>• Maintenance of the systems should be carried out regularly to ensure proper functioning during emergencies.</li> <li>• Safe evacuation rout for building residents should be cleared marked to ensure safety of residents during any emergency.</li> <li>• Alarming/Siron system will be adopted to aware people during emergency.</li> </ul>

**12.0.6 Land use/Land cover & Socio-Economy Management**

<b>Table No. C12-12: Land use/Land cover during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection/conservation of land cover in the site and vicinity through</li> </ul>

	regulated landuse.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Effect on land cover of the project site and vicinity during construction.</li> <li>• Increase in density of built up area.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Remote Sensing based high precision Land use/Land cover mapping in periodic intervals.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Regulated dumping of waste material during construction.</li> <li>• Care for protection of existing tree cover during construction.</li> <li>• Proper landscape planning based green belt development at project site.</li> <li>• Road side and open area plantation in the vicinity.</li> </ul>
<b>Table No. C12 - 13: Socio-Economy during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development in harmony with society/local stake holders.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Engagement of local people in construction work.</li> <li>• Up-gradation in general, specialized and super specialized health care facilities and opportunities.</li> <li>• Up-gradation of income of local people by enhancement of economic/business opportunities and Enhancement in living standards.</li> <li>• Intrusion of external residents in place of indigenous people.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Periodic stakeholder survey/FGD.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Social intervention programs (health camps/disease awareness camps) for socially under privileged groups in the vicinity.</li> <li>• Communicable and infectious disease surveillance programs.</li> <li>• Promotion of traditional arts/crafts/culture of local indigenous stake holders.</li> </ul>

**12.0.7 Soil Conservation & Ecology Biodiversity Management**

<b>Table No. C12-14: Soil Conservation during Construction /Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure protection /conservation of soil (top soil in particular) within the site</li> </ul>

	through proper measures.
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Wind erosion, rain and sheet erosion plays major role on loss of top soil.</li> <li>• Soil protect existing vegetation improve tree &amp; plant growth.</li> <li>• Reusing organic "wastes" like sludge to restore soil function.</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6monthly report.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Topsoil should be stripped up and stored at the far edge of the right-of-way.</li> <li>• Fence the stored top soil areas prior to any disturbance to the surrounding.</li> <li>• If grading the right-of-way is necessary for construction, topsoil should be stripped from the entire area to be graded in order to avoid mixing.</li> <li>• Use of conserved top soil in developing plantation during operation phase</li> </ul>
<b>Table No. C12-15: Ecology &amp; Biodiversity (Plantation) during Construction/Operation Phase</b>	
<b>Environmental Value</b>	<ul style="list-style-type: none"> <li>• To ensure development of green belt within the project site.</li> </ul>
<b>Potential adverse and beneficial Impacts</b>	<ul style="list-style-type: none"> <li>• Role in controlling air, dust &amp; noise pollution.</li> <li>• Improving water holding capacity of the soil.</li> <li>• Providing shed and fruits</li> </ul>
<b>Performance Indicators</b>	<ul style="list-style-type: none"> <li>• Compliances in every 6 monthly reports.</li> </ul>
<b>Environmental Protection strategy</b>	<ul style="list-style-type: none"> <li>• Restoration of the natural biodiversity of the locality.</li> <li>• Local plant species will be planted involving trees, shrubs and climbers.</li> <li>• Plant species with thick &amp; rough bark, profuse branching with ever green canopy of broad &amp; rough leaves and deep root system will be selected.</li> </ul>

**12.0.8 Estimated cost for Environmental Management:**

**Table No. C12 - 16: Estimated cost for Environmental Management**

<b>Sl. No.</b>	<b>Details</b>	<b>Capital Cost in Lakhs</b>	<b>Recurring Cost per</b>
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**Environmental Management Plan**  
**M/S. Shuvam Construction (P) Ltd**

		<b>(Non-recurring)</b>	<b>annum (in lakhs)</b>
1	Air Pollution Control	152	15.2
2	Waste Water Management	196	19.6
3	Water Treatment Plant	152	15.2
4	Solid Waste Management	131	13.1
5	Environmental Monitoring	131	13.1
6	Greenbelt Development	196	19.6
<b>Total</b>		<b>960</b>	<b>96</b>