

Executive Summary of Environmental Impact Assessment Report of Orange Smart City, Pen Taluka, Raigad District



SUBMITTED TO

**MAHARASHTRA POLLUTION CONTROL BOARD FOR
PUBLIC HEARING.**

**PROJECT PROPONENT : ORANGE SMART CITY INFRASTRUCTURE PVT.
LTD.**

**ENVIRONMENTAL CONSULTANT : BUILDING ENVIRONMENT (INDIA) PVT.
LTD.**



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1.0 Project Context

The 'Orange Smart City Infrastructure Pvt. Ltd.' (OSCIPL), a public registered company intends to develop 'Orange Smart City' (OSC) as an integrated industrial area over 1072.38 acres of land in Pen Taluka, District Raigad of Maharashtra. The land is spread over four land parcels located in close proximity adjacent to the NH 17 and SH 87 i.e Pen-Khopoli Road and close to River Bhogeshwari and River Balganga. The nearest railway station is Pen situated on the Panvel - Roha route of Central Railway. The Project will have Industrial (less polluting), Residential & Commercial clusters with state-of-the-art infrastructure and globally benchmarked smart features. The project development envisages Indian and foreign investments over a period of 15 years, creating a total built-up area of 93.09 million square feet of industrial, residential and commercial space. The project also aims to become home to a population of approximately three lakhs and create job opportunities for approximately 1.5 lakhs skilled and unskilled professionals.

2.0 Project Opportunities

The site falls within two planning areas namely Raigad Regional Plan boundary (approximately 900 acres) and Mumbai Metropolitan Region (MMR) Development Authority (– approximately 100 acres) limits. The project site spread across over 1072.38 acres of land, is closely clustered at four locations i.e. Site T1; T2; T3 & T4. The site parcels are located in close proximity to India's financial capital, Mumbai. The project boundary is linear irregular shaped clustered around four land parcels that fall within the Delhi Mumbai Industrial Corridor (DMIC) influence zone. The site cluster is well connected and is in close proximity of the Jawaharlal Nehru Port (JNPT), the well-developed urban center of Navi Mumbai, the proposed Mumbai Trans-Harbour Link (MTHL) and the proposed Navi Mumbai International Airport (NMIA). The Project topography is generally flat and with gentle gradient with moderate undulations with an average contour of about 200 mtrs. The Project is located at a travel distance of about 45 km from South Mumbai via proposed Mumbai Trans Harbour Link and 25 km distance from new proposed Navi Mumbai International Airport. The proposed Project is envisaged to become a 'City of Opportunity' that prides in providing 'Smart services for all, Employment for all & Accommodation' (SEA) for all. The Project is planned on the 3P principle – People, Planet and Profit; to effectively address the Social, Economic & Environmental concerns. The Project will comprise of residential area, industrial, and commercial land use and will also have basic provisions of city infrastructures viz; roads, amenities, bridges, water supply infrastructure, wastewater infrastructure etc.

3.0 Project Salient Features

The salient features of the project are given in Table-1.1

Table-1.1: Project Salient Features

Sr.No	Particulars	Details /Values
1	Name of the project	Orange Smart City
2	Location	Pen, Raigad
3	Total site area	1072.38 acres (4339767.89 sq.m)
4	Total Built Up Area	8.64 million sq.m
5	Category as per EIA Notification 2006	Industrial Estate – 7(c)
6.	Type of industries	Logistics, Engineering, Agro, Electronics and Semi-Conductor, Life Sciences, Information technology, Gems and Jewellery, & Research and Development and these industries are less polluting.
7	Industrial Built Up Area	1821828.61 sq.m
8	Commercial Built Up area	2505594.98 sq.m
9	Residential Area	4188998.07 sq. m.
10	Green Area	267.87 Acres (1084031.43 sq.m)
11	Amenities / Utilities	24154.79 sq.m
12.	Estimated Population	3,00,000 nos
13	Estimated Employment Opportunities	153923
14.	Project cost Rs.	INR 2032 crores (+ INR 2000 Crores land cost)
15	Source of Power	Maharashtra State Electricity Distribution Company Ltd. (MSEDCL)
16	Power requirement - Construction Phase - Operation Phase -	5 MVA 353 MVA
17	Source of Water	Hetwane Dam
18	Water requirement Construction Phase	45 CMD

Sr.No	Particulars	Details /Values
	Operation Phase	62 MLD
19	Wastewater Generated	
	Construction Phase -	36 CMD
	Operation Phase -	46 MLD
20	Solid waste Generation :	
	Solid waste from residential areas	111 TPD
	Solid waste from industrial areas	10 TPD

4.0 Alternative Site Selection and Evaluation

The following three sites in Raigad District were considered and evaluated:

- Tarankhop Ramraj and Dhavate
- Meleghar and Kashmire
- Borgaon, Shene, Virani, Belavade, Walak, Mugoshi, Govirle & Hamrapur

The comparison of the three alternative sites considered on the various key parameters is presented below in Table-1.2 :

Table-1.2: Comparative statement of alternative sites

Sr. No	Aspect	Site – 1 Tarankhop & Ramraj	Site – 2 Meleghar & Kashmire	Site – 3 Borgaon, Virani, Shene, Ambeghar, Belawade, Khurd, Belawade Budruk, Mungeshi, Govirle
1.	Connectivity	From state Highway and indirectly from National Highway	Access from ODR 28 of Pen Tehsil Required ROB on Railway for access from NH-17	Very good multi point access on National Highway and State Highway. Also feasible to have railhead and water transport connect near Hamrapur.

Sr. No	Aspect	Site – 1 Tarankhop & Ramraj	Site – 2 Meleghar & Kashmire	Site – 3 Borgaon, Virani, Shene, Ambeghar, Belawade, Khurd, Belawade Budruk, Mungeshi, Govirle
2.	Terrain	Plain	Plain	Plain land with gentle Slopes
3.	Availability of Land	50% Irrigated and 50% Fallow Land. Hence more agricultural land will be used for the project	80% Irrigated and 20% Non-irrigated	Barren Waste land suitable for industrial development.
4.	Cost	High	Unaffordable	Relatively affordable
5.	Water Availability	Water can be available from Hetwane Dam	Only Hetwane Dam is nearest water source	Water can be available from Hetwane Dam One more water source required for T4 & T3
6.	Manpower Availability	Good	Moderate	Good
7.	Proximity to JNPT	Proximity to the proposed MTHL & JNPT within 30 to 35 km respectively	Proximity to the proposed MTHL & JNPT within 30 to 35 km respectively	Proximity to the proposed MTHL & JNPT within 25 to 30 Km respectively

Based on the comparative evaluation of the three identified sites, it was decided that the third location covering villages Borgaon, Virani, Shene, Ambeghar, Belawade, Khurd, Belawade Budruk, Mungeshi, Govirle was highly suitable for locating the OSC at the current location.

5.0 Proposed Land Use

The Project layout has been designed to keep the industrial, residential and commercial activity in relatively distinct zones though the industrial activity is less- polluting falling in 7 (C) category. As per the design layout the Project is in four predominant land use zones details of which are presented in Table-1.3

Table-1.3: Details of the land use-parcel wise

Sr. No	Land Use Zone	Physiography	Type of Proposed Use	Total site area (Acres)	Affected area in acres	Percentage
1.	T 1	Gentle Slope	Predominantly Industrial with low Residential and Commercial Land Use	723.33	173	24%
2.	T2	Plain open land	Predominantly Industrial with low Residential and Commercial Land Use	102.63	-	-
3.	T3	Partially impacted by CRZ -III	Predominantly Residential and Commercial	113.23	16	14%
4.	T4	Plan open land	Predominantly Residential and Commercial	133.19	-	-
Total project area				1072.38	189	18%

The project area is currently undeveloped or underdeveloped. All the four land parcels are vacant, dry barren without any vegetative growth or manmade structures. As per the proposed development, out of the total land use, nearly 57 percent planned for Industrial, Residential and Commercial purpose and 6 percent for Amenities / Utilities / Facilities, together which forms 63 percent of the total project area. Balance 37 percent is proposed for major roads and Undevelopable / Green / Open Space. Part of the T3 land parcel (approximately 38 acres out

of 113 acres in T3) comes under CRZ-III limit which will be used for activities permissible in CRZ-III areas.

The details of the land spread over four locations is shown in Table-1.4

Table-1.4 : Details of the existing land

Site	Name of Village	Area in Acres
T1	Borgaon, Shene, Ambeghar and Virani	723.33
T2	Belawade Budruk	102.63
T3	Balawali, Govirle, Kopar, Ambiwali and Hamrapur	113.23
T4	Mungoshi, Walak, Ambeghar, Belawade-Khurda, Padale and Belawade Budruk	133.19
Total Area		1072.38

The area between the bridge on the Bhogeshwari river (100m from the project site) and the irrigation canal leading to Hetwane Dam (300 m from the project site) is proposed to be developed as a golf course which will be compatible to the proposed land use. It is also to be noted that the proposed Balganga project is located at a distance of 1.82 km from the T4 land parcel.

The proposed land use distribution of the Project is shown in Table-1.5

Table-1.5: Proposed Land Use Distribution

Land use	Area in Acres	Percentage
Industrial	390.00	36%
Commercial Area	88.43	8%
Residential Area	138.23	13%
Major Roads	128.86	12%
Undevelopable/Green/Open	267.87	25%
Amenities/Utilities / Facilities	58.99	6%
Total	1072.38	100

6.0 Description of the Environment

The baseline environmental status was studied for the following components:

- a) Meteorology
- b) Air Quality
- c) Noise Quality
- d) Water Quality
- e) Soil Quality
- f) Ecology and
- g) Socio-Economic component

The salient findings / interpretation of each of the components is given below:

A. Meteorology

An onsite meteorological station was installed to study wind speed, wind direction and temperature during the period from March 2016 to May 2016. The predominant wind direction during the period was from the West –North West quadrant. The findings are summarised in **Table-1.6**

Table-1.6 : Synopsis of onsite meteorological data

Month	Wind speed (m/sec)			Temperature (°C)		
	Max	Min	Avg	Max	Min	Avg
March -2016	5.5	0	1.25	39.1	18	26.8
April-2016	6	0	1.6	36	20.9	27.7
May -2016	4.6	0	1.57	34	23.4	29.4

The onsite meteorological data was compared with data from the nearest India Meteorological Department (IMD) station Murud. The predominant wind direction as per the IMD Murud station is from the West –North West quadrant. The summary of the IMD data is presented in Table-1.7

Table-1.7: Synopsis of the IMD Murud data (March 2014 to May 2014)

Month	Wind speed (m/sec)			Temperature (°C)		
	Max	Min	Avg	Max	Min	Avg
March -2014	4.1	0	1.2	38.6	17.8	27

Month	Wind speed (m/sec)			Temperature (0C)		
	Max	Min	Avg	Max	Min	Avg
April-2014	3.9	0	1.4	36.6	19.2	27.7
May -2014	4.6	0	1.5	34.3	23.8	29.6

The onsite meteorological data is in general agreement with the IMD Murud data. The minor differences are observed due to the difference in the period of recording.

B. Ambient Air Quality

The ambient air quality was recorded at the 14 stations. The air quality was recorded w.r.t. the following parameters:

- i. Particulate Matter less than 10 μ m (PM10)
- ii. Particulate Matter less than 2.5 μ m (PM2.5)
- iii. Sulphur dioxide (SO₂)
- iv. Oxides of nitrogen (NO₂)
- v. Carbon monoxide (CO)
- vi. Hydrocarbon (HC)
- vii. Volatile Organic Compounds (VoC)

The maximum 24 hourly values of the PM₁₀, PM_{2.5}, SO₂, NO_x were found to be within the National Ambient Air Quality Standards (NAAQS) limit. The CO levels were also found to be within the NAAQS limit of 2 mg/m³ for 8 hours. The Hydrocarbons and the VOCs were found to be below detectable limit throughout the monitoring period.

C. Noise Quality

The noise quality was recorded at 11 locations. The noise levels (Leq) observed during daytime in residential zone is in the range of 42.5 (Crosswind of T-3 at Kopar village) to 43.9 dB (A) (Upwind of T-1 Wirani Village) while during nighttime it is 32.5 (Downwind of T-4 at Mungoshi Village) to 33.8 dB (A) (Downwind of T-3 at Jite. village). The results reflect that the Leq (day) and Leq (night) was within the limits stipulated by Central Pollution Control Board (CPCB).

D. Water Quality

The ground water quality and the surface water quality was recorded at 6 stations and 8 surface monitoring locations. The ground water quality parameters were analysed are per IS 10500. The ground water results reflect that the calcium slightly exceeds the desirable limit of 75 mg/lit. The surface water quality parameters reflect that the water is chemically and bacteriologically non-potable at three locations while it is potable at remaining five locations.

E. Soil Quality

The soil quality was recorded at 8 locations. The results indicate that the texture was mostly clay and clay loam. The range of micronutrients reflect that the soil has good fertility level and fulfils the minimum nutrient requirement for growth of plants.

F. Ecology and Biodiversity

An elaborate ecology and biodiversity study was conducted within the impact zone (10-15 km radius) of the project site. The conclusions of the study are given below:

- i. The project site does fall in the Western Ghats but is devoid of any Ecologically Sensitive Areas (ESA) as the entire project site is in "PEN" taluka and Pen taluka does not come under ESA as per the Report of the Western Ghats Ecology Panel under chairmanship of Prof Mahdavi Gadgil, Report of the High Level Working Group on Western Ghats under chairmanship of Dr. K. Kasturiragan and the second draft notification no. S.O 2435(E) dated 4th September 2015 issued by the MoEF&CC. However there are some villages notified as ESA and are within the 15 km radius buffer zone of the project which are enlisted in the Table-1.8

Table-1.8: Villages in the 15 km radius of Orange Smart City notified as Ecological Sensitive Area

Sr. no.	Taluka	Village	Distance from the project boundary (km)
1.	Sudhagarh	Tadgaon	8.6
		Uddhar	12
2.	Khalapur	Karambeli	10.97

		Talavali	11.54
3.	Roha	Palas	12.32
		Kondgaon	12.8

- i. The project site is outside any recorded forest areas. The landscape features include flatlands with a gentle gradient and scrublands in the region.
- ii. In the project site, no formal logging of wood and other such activities were observed, however the exploitation of the forest resources by nearby villagers and local communities was evident in the surroundings of the project site. The tell-tale marks of forests fire were also visible near two locations viz. Chirner and Palas village.

a) Flora

- i. By and large the habitat is prevalent with evergreen and deciduous foliage.
- ii. Amongst the locations surveyed, it was observed that many of the sites have localised biological diversity with variety of evergreen tree species as well as shrub layer.
- iii. The development activities may result in clearing of plant species mostly grasses and shrubs which are not unique or rare species because of their abundant occurrence in other areas. Thus, the loss of these species would have no serious ecological consequences.

b) Fauna

However, the project area could be home to general avifaunal species which are widespread and therefore any loss of habitat may not lead to any major loss in species numbers or diversity. Generally the concerns of non-recorded species do exist although it may be on a smaller scale owing to their non-sighting in the three-day sampling period between Dec 16-18, 2015.

c) Endangered Species

The study area does not have recorded presence of any critically threatened species. It was noted that many of the floral species found during the monsoon season especially grasses and herbs are not found in the majority of the dry season of the year.

G. Socio –Economic Profile of the study area

The socio-economic baseline environment is described with respect to the various parameters are as given below:

i. Demographic profile

According to the 2011 Census data, population in the total study area was 364915 living in 84345 households whereas the villages population in the project area was 11187 persons that is about 3% of the total study area population and the population of all the rural villages within the 15 km radius of the study area

ii. Social Groups

The proportion of Scheduled Castes (SCs) and Scheduled Tribes (STs) population within the project study area is on an average 3.0% and 15.3% respectively. The proportion of SC population in affected villages is merely 0.8% found only in 13 villages, which is less than other rural villages (2.2%) and urban centres (4.9%) in the study area. Whereas the proportions of ST population for villages within the project area is (43.9%), which together constitutes to 44.7% which is much higher than the other rural villages (21.9%) & urban areas (18.3%)

iii. Sex Ratio

According to 2011 census, sex ratio in the total study area was found to be 953 while in the affected villages was found to be 972. The sex ratio in the villages other than the affected villages was found to be 957.

It is important to note that, literacy rate for male and female in project affected villages is 57% and 43% respectively which indicates that the literate male population is more than the female literate population.

iv. Vulnerability

As regards vulnerability, poverty is actually a reason for making any section of a population vulnerable. The data for families below poverty line for the all the villages in study area is not available. However based on the studies in other areas of Maharashtra, most of the SC and ST families can be considered as the vulnerable

group which constitutes about 45% of the total population in the project affected villages in addition to any other BPL families in the region.

A primary baseline survey was also conducted by BEIPL and the details can be referred in the EIA study report.

v. Consultation with the villagers

The minutes of the consultation with the villagers in the affected area is given below in Table-1.9 below .

Table-1.9 : Minutes of the consultation with the villagers

Date of Visit	20/10/2015
Venue :	Project Site
Client	BEIPL : Mr. Hrushikesh Kolatkar Client : Representative from Client

Village Name	Kopar village	Belawade village	Ambeghar village
Discussion Points:			
Key points of the meeting were	<p>The village has school only for Primary level and for Middle and high school students have to go to Jambhul tep, Pen. There is no primary health center facility. For critical health related matters, Pen is the nearest place.</p> <p>Rain water and Dug-well are the main sources of irrigation. For domestic use, Dug-well and Hand pumps are the sources.</p> <p>Most of the people in the village are engaged in agriculture, dairy. Rice and seasonal vegetables are cultivated by</p>	<p>The village has a total of 328 houses The school in the village is only up to eight class. For studies after eight, students have to go to Pen.</p> <p>There is a private clinic of a Physician in the village. The nearest government primary health center is at Pen village.</p> <p>Most of the village land is rain fed for agriculture purpose. For the domestic use well and hand pumps are the sources.</p>	<p>The village Ambeghar has 427 houses. The village has relatively large population. It can be seen that the village is well connected by road.</p> <p>The village has Government school up to 8th standard. For studies after eight, students have to go to Pen.</p> <p>There is a private doctor in the village. The nearest government primary health center is at Pen.</p> <p>Most of the village land is irrigated through dug-wells and tube wells.</p>

	<p>the people. Most of the seasonal vegetables grown are sold in Pen and Navi Mumbai. Almost each family has cows or buffaloes to supplement their income by selling milk. There are also people who are engaged as daily wage labourers in agriculture and construction activity in nearby urban areas.</p> <p>Women in general support the family by engaging in agriculture and dairy activity & household chores.</p>	<p>People of the village in general are engaged in agriculture, dairy and daily wage labourers. Rice and seasonal vegetables are cultivated by the people. Seasonal vegetable grown are sold in nearby urban areas.</p> <p>Almost each family has cows or buffaloes to supplement their income.</p> <p>About half the male population of village is engaged in construction activity in nearby urban areas.</p> <p>The education level is generally low among the villagers</p> <p>Women in general support the family with household chores. In addition, women are also involved in agriculture and dairy activity of family.</p>	<p>For domestic use, dug-wells and hand pumps are the sources of water for villagers.</p> <p>People of the village in general are engaged in agriculture, dairy and wage labour. Main crops is rice and seasonal vegetables are also cultivated. Some families are fully into vegetable cultivation which is a main source of income.</p> <p>In addition to agriculture, the other two main occupation for earning for the locals is dairy and wage labour. Almost each family has cows or buffaloes to supplement their income. Most of the male population of villages is engaged in construction and factories in Pen as wage labor.</p> <p>The education level is generally low among the villagers.</p> <p>Women in general support the family with household chores. In addition, women are also involved in agriculture and dairy activity of family.</p>
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<p>Key observations and issues:</p>	<p>People are aware about the project and have a very positive opinion on the project.</p> <p>People expect the project would bring development in their villages and would open up opportunity of employment and other business avenues</p> <p>People were keen to know when the project would start and what kind of factories will come up.</p> <p>People also expect the project to give preference to local in employment</p> <p>Unemployment and lack of opportunity is evident in the village.</p>	<p>People are aware about the project and have a very positive opinion on the project.</p> <p>People expect the project would bring development in their villages and would open up opportunity of employment and other business avenues</p> <p>People were keen to know when the project would start and what kind of factories will come up</p> <p>People also expect the project to give preference to local in employment</p> <p>In project during the construction phase the locals can be good source of construction labour as they are already in to that activities currently.</p>	<p>People are aware about the project and have a very positive opinion on the project.</p> <p>People expect the project would bring development in their villages and would open up opportunity of employment and other business avenues</p> <p>People were keen to know when the project would start and what kind of factories will come up</p> <p>People also expect the project to give preference to local in employment</p> <p>In project construction phase the locals can be good source of construction labour as they are already in to that activities currently.</p> <p>There is large scale unemployment reported during the survey</p>
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7.0 Anticipated Environmental Impacts and Mitigation Measures

The anticipated environmental impacts and mitigation measures during construction phase along with responsibility of implementation and cost are tabulated below:

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
1.	Ambient Air Quality	Emissions from construction equipment, vehicles Improper handling and storage of construction material Fugitive dust emissions Emissions from onsite operation of diesel generators Burning of waste at camp sites	Suppression of fugitive dust emissions by spraying water, wetting of the stockpile, Proper maintenance of machines and vehicles. Contractors to maintain proper records for fleet engaged. Dust control equipment such as bag house, or cyclone to be employed. Limited vehicular movement to be permitted on disturbed soil. Minimum possible drop height to be maintained while unloading /screening of material. Stockpiling of excess fill material. Paved roads to be cleaned regularly and un-pave roads to be stabilized and watered regularly. Vehicle speed to be restricted to 25 km/h on unpaved roads. Covers and enclosures to be provided for loose construction material at construction site.	Implementation by Contractor and Supervision by OSCIPL	Engagement of sprinklers: 3,00,000 per sprinkler unit

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>Trucks /dumpers engaged to be covered during off site transportation.</p> <p>A minimum freeboard of six inches to be maintained by haul trucks when material is transported on any paved road.</p> <p>Vehicles with valid Pollution under Control (PUC) certificate to be engaged for project.</p> <p>Upwind fencing to be projects.</p> <p>Soil binders to be used for stabilizing sloping surfaces.</p> <p>Downwash of trucks to be undertaken prior to departure.</p> <p>Inactive disturbed surfaces to be sprinkled with water on daily basis.</p> <p>Power supply for construction will be sourced from local distribution company.</p> <p>Generators to be used only as backup source.</p> <p>Diesel generators to be optimally operated and regularly maintained.</p> <p>Appropriate stack height as per the CPCB guidelines to be provided for DG sets.</p>		

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			LPG cylinders to be provided in labour canteens and use of fuel wood to be discouraged. Open burning of waste shall not be permitted. Community kitchen to be promoted among sub – contractors		

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
2.	Water Resources and Quality	<p>Change in topography and alteration of drainage pattern</p> <p>Sediment run off from construction area</p> <p>Disposal of sewage from labour facilities</p> <p>Contamination of surface and groundwater resources due to oil and grease /sewage</p>	<p>Water for construction phase to be sourced from existing sources allocated to PP supplemented with authorized tanker supply.</p> <p>Optimal water conservation measures at camp sites along with adequate awareness programmers to be organized for the workers.</p> <p>Adequate number of toilets (at least 8-10 toilets per 100 labours) with septic tanks and soak pits arrangements to be provided onsite.</p> <p>Random disposal of wastewater from labour colonies to be restricted.</p> <p>Adequate drains and collection sumps to be provided around labour facilities.</p> <p>Sludge from waste water treatment systems to be disposed off properly.</p> <p>Regular removal of debris from construction site to be practiced.</p> <p>Secondary containment and bund shall be provided around excavated soil or loose construction material.</p> <p>Storage area to be kept away from the storm water drain.</p>	OSCIPL	<p>10,000 per toilet with septic tank and soak pit arrangements</p> <p>Storm water drains with silt traps and collection sump: 5-7 lakhs per labour facilities</p> <p>Rain water harvesting structure for construction labour facilities : 40,000 per</p>

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>Oil and grease containing effluents to be pre-treated before discharge.</p> <p>Silt traps and bunds to be set-up around construction sites.</p> <p>Adequate slopes and drainage channels to be provided across the project site, without disturbing any natural drainage.</p> <p>Rainwater harvesting opportunities to be explored and implemented.</p>		recharge pit/ storage unit

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
3.	Landscape and Topography	Change in existing land use from agricultural to mixed use (including industrial and residential) Change in topography Change in drainage pattern Localized flooding and related health issues due to decreased infiltration	The 90% soil requirement will be fulfilled from cutting within the site and only 10% will be sourced from approved quarries. Excavated soil to be used in level raising; The construction contractors shall be instructed not to cut any tree. Green area and green buffers will be developed to improve the landscape. Diversion dykes to channel runoff to be constructed around the excavated site. Land surface contours to be restored in relation to the surroundings. Construction footprint will be well defined and construction work to be carried out within the Project footprints only. Road corridor to be provided with adequate cross drainage.	OSCIPL	Greenbelt buffers : 2,00,000-5,00,000 Depending on area to be covered.
4.	Soil Resources	Soil Erosion and compaction Soil contamination	Top soil to be preserved and reused for landscaping purposes	OSCIPL	Cost of erosion prevention measures to be

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>Clearance of vegetative cover to be minimized to the extent possible and redeveloped latter on.</p> <p>Site grading and excavation to be undertaken during dry season.</p> <p>Dikes, berms, drainage swales or ditches to be provided to divert surface run-off.</p> <p>A retention wall or bund to be provided around the storage areas for excavated soil and other construction material.</p> <p>Completed earthworks to be sealed and/or re-vegetated at the earliest with the help of landscape expert.</p> <p>Stacking of excavated soil material will be made only in earmarked areas.</p> <p>Excavated soil to be used/ transported at the earliest for filling low lying areas.</p> <p>Proper routing and adequate capacity of the storm water run-offs drains to be provided.</p> <p>Movement and parking of heavy machinery and vehicles to be restricted to identified area.</p> <p>Area used for parking purposes to be restored immediately after completion of each project activity.</p>		identified after detailed survey

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>All storage facilities to be designed with paved surface, provided with covered shed and adequate containment facility at the construction.</p> <p>All waste to be handled as per applicable regulations.</p> <p>Hazardous waste to be handled and disposed off in accordance with the requirements of hazardous waste management rules 2008 and Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.</p> <p>Portable oil spill containment and clean-up equipment to be made available at construction site and training for use of such equipment to be imparted.</p> <p>Provision of covered bins at labour facilities</p> <p>Waste to be segregated in biodegradable and non-biodegradable components.</p> <p>Biodegradable waste to be used for animal feed/ vermi-compost/ manure.</p> <p>Contaminated sand/ soil shall be prevented during construction activities.</p>		

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>Trainings to be imparted to all workers and subcontractors regarding hazardous waste storage and disposal procedures.</p> <p>On completion of construction activities, septic tanks for camp sites to be abandoned and filled with earth.</p>		
5.	Traffic and transport	<p>Increased traffic volume</p> <p>Additional traffic load on existing village roads</p> <p>Disruption of traffic and increased cases of road related hazards</p>	<p>Wherever required temporary widening of roads to be undertaken.</p> <p>Traffic and heavy machinery movement schedule to be communicated clearly to the local inhabitants. Prior consultation with local Police and local Panchayat to be undertaken.</p> <p>Providing dedicated path within the site for entry and exit of the construction vehicles</p> <p>Roads damaged due to project vehicles will be continuously repaired.</p> <p>Provision of adequate training to drivers.</p> <p>Dedicated parking area to be provided for project vehicles.</p> <p>Parking along footpaths, single lane roads shall be prohibited.</p>	OSCIPL	Cost of road improvement to be estimated after detailed survey

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>Detailed plan for signage around the construction areas to be prepared to facilitate traffic movement.</p> <p>Inventory of the vehicles used in project and construction equipment along with their PUC's to be maintained.</p>		
6.	Ambient Noise Quality	<p>Noise due to Construction activities (such as excavation, grading, erecting equipment, piling, etc)</p> <p>Noise due to operation of heavy equipment and machinery</p>	<p>Adequate planning to avoid high noise activities to be undertaken.</p> <p>Acoustic enclosures, noise barriers to be provided in areas of high noise generating sources.</p> <p>Rubber padding to be provided for vibration control</p> <p>Movement of vehicles during night time to be limited.</p> <p>Construction workers to use ear muffs in areas with potential for high noise generation.</p> <p>Regular maintenance of vehicles and repair of equipment.</p> <p>Noise barriers will be provided between the activities and the receptors.</p>	OSCIPL	PPE for noise: 20,000- 30,000 per month

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
		<p>Movement of vehicles</p> <p>Noise due to construction equipment such as Concrete Mixers (2Nos) and</p> <p>Batching Plant</p>	<p>Restriction on use of equipment generating high noise during night time.</p> <p>Working hours and construction activities to be aligned and works to be prohibited during night hours.</p> <p>• Acoustical enclosures are strongly recommended with 30 dB Transmission Loss Rating for the Engine, to bring down the SPL below 80 dB.</p>	<p>Contractor</p> <p>Contractor</p>	<p>4,00,000/-</p> <p>2,00,000/-</p>

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>The contractor should carefully choose the batching plant in order to meet with the CPCB Norms.</p> <ul style="list-style-type: none"> • Hydraulic pumps and compressors should be covered with Acoustical Enclosures with 20 dB Transmission Loss Rating in order to reduce the noise. • Valves should be covered with Removable Acoustical Blankets. • The contractor should choose controlled operating hours for noisy activities such as delivery, loading unloading etc. 		
7.	Socio-Economic	<p>Loss of existing village assets</p> <p>Loss of landholdings</p> <p>Impact on livelihood of the villages</p> <p>Loss of livelihood</p>	<p>Affected land losers to be considered for benefits like employment, contracts etc.</p> <p>Skilled and qualified entitled persons to be given preference in employment and other contractual benefits.</p> <p>Procurement of community land to be avoided to the extent possible and adequate buffer area to be retained around villages.</p>	OSCIPL	

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
		Loss of Common Property Resources			
8.	Labour Camp Management	<p>Location of labour facilities.</p> <p>Domestic solid waste generation</p> <p>Firewood for cooking and burning of garbage</p> <p>Indoor air quality issues</p> <p>Waste water generation</p> <p>Health and hygiene issue</p>	<p>Optimal water conservation measures at camp sites along with adequate awareness programmers to be organized for the workers.</p> <p>Adequate number of toilets (at least 8-10 toilets per 100 labors) with septic tanks and soak pits arrangements to be provided onsite.</p> <p>Random disposal of wastewater from labour colonies to be restricted.</p> <p>Adequate drains and collection sumps to be provided around labour facilities.</p> <p>Regular removal of debris from construction site to be practiced.</p> <p>Integrated solid waste management plan will be developed for collection, transportation, treatment and disposal of waste.</p> <p>Workers to be provided with health and safety training.</p> <p>Safety measures, including use of temporary fall protection and out edges of elevated work surfaces, such as hand rails</p>	OSCIPL	

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>and toe boards to prevent materials from being dislodged shall be done for workers while working at heights.</p> <p>First aid and essential medical services to be provided at site.</p>		
9	Occupational Health and Safety	<p>Injury due to improper handling, operation and execution</p> <p>Trip and fall, inadequate fall safe arrangements</p> <p>Exposure to hazardous substances</p>	<p>Manual transfer of heavy loads to be minimized by proper work site layout.</p> <p>Good housekeeping practices to be exercised.</p> <p>Measures such as job rotations and stretch breaks to be adopted.</p> <p>Proper signage to be provided around construction site.</p> <p>Use of Personal Protection Equipment (PPEs) to be mandated at work site.</p> <p>Workers to be provided with health and safety training.</p> <p>Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged shall be done.</p> <p>Safety harness to be ensured for workers while working at heights.</p>	OSCIPL	<p>Training for workers : 6,00,000/- year</p> <p>PPE for construction 25,00,000/- year approximately</p>

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			First aid and essential medical services to be provided at site		
10	Employment and Local Economy	Increased employment opportunities Contracting opportunities for locals Better avenues for Small scale service providers	Project to utilize the facilities available from the local market to support the local economy to the extent possible. Wherever possible, labour from local community will be employed for project.	OSCIPL	Adequate cost will be allocated from the project cost for skill development of local youth through training programs

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
11	Ecology	Loss of trees and ground vegetation Habitat destruction Adverse impact on wildlife due to noise, vehicle movement, poaching, illumination Increased turbidity and siltation	Original soil profile shall be retained by storing each excavated layers separately and restoring it later. Tree felling to be minimized to the extent possible. Contractors shall be instructed to practice the same. Hunting activities will not be permitted within and around the delineated area. Raw materials and debris to be stored away from water bodies, streams and run off areas. Standard noise levels to be maintained during construction activities. A 'Local Ecological Monitoring Group' will be setup to monitor the environmental and ecological safeguard measures during construction phase. Audio visual hall for training at the time of registration of new labourers on site.	OSCIPL	Awareness and training of workers: 10,00,000

8.0 Anticipated Environmental Impact & Mitigation Measures

The anticipated environmental impacts and mitigation measures along with responsibility of implementation and cost during operation phase are tabulated below:

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
1.	Ambient Air Quality	Emission from power backup/ DG sets Stack emission from industries Fugitive emission from industrial processes Emissions from increase	Power demand has been estimated as a part of master plan and dedicated power supply system has been planned for OSC DG sets to be located in the downwind direction with respect to residential areas. OSCIPL developed for overview of power supply shall ensure that the power failure is maintained at minimal. Stack heights for DG sets to be maintained as per CPCB/MoEF&CC norms. Comprehensive planning has been undertaken as a part of master plan development to mitigate impacts due to industries. Planning ensures that the proposed Industrial areas and existing residential lie in the upwind or cross wind direction. Residential areas have been separated from industries by the provision of suitable buffers.	OSCIPL	Buffers areas are incorporated in the project cost Cost of Pollution Control Equipment will be borne by the individual Project entities

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
		in traffic volume	<p>Individual industries will be required to obtain adequate approvals such as Consent to Establish / Consent to Operate or environment clearance from MPCB / SEIAA / MoEF&CC.</p> <p>All emission sources to be provided with adequate stack height as per CPCB / MoEF&CC norms.</p> <p>Low emission fuels to be used by industries.</p> <p>Air pollution control equipment to be employed by industries.</p> <p>Good housekeeping to be practiced.</p> <p>PP to organize seminars and Capacity Building training programmes about the best practices in different industrial sectors.</p> <p>PP in association with the MPCB to regularly monitor the environmental performance of the industries.</p>		
2	Ambient Noise Quality	Increase in noise levels in residential areas and adjoining villages Impact on avifaunal	<p>All habitations to have a suitable buffer area delineated around them.</p> <p>Vegetative barriers in form of green belt to be provided around all industrial areas.</p> <p>All industrial operations to have acoustic enclosure and employ noise attenuation measures.</p> <p>All roads and highways to be provided with vegetative barriers and barrier walls.</p>	OSCIPL	The cost to be estimated based on industry type.

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
		species due to increased noise Movement of vehicles D.G sets	Diesel Generator Sets are supposed to have Sound Pressure Levels of lesser than 75 dBA when measured at 1 meter distance. However, when multiple DG sets are supposed to be kept close to one another, a single Acoustical Enclosure combined for all the DG Sets is recommended with a minimum Transmission Loss Rating of 30 dBA.		4,00,000/-
		Sewage Treatment Plant	STP consists of multiple of blowers and pumps, out of which blowers can generate noise levels exceeding 100 dB. Acoustical Enclosures for STP Blowers are strongly recommended, with 30 dB Transmission Loss Rating.		20,000/-
		Exposure to high noise prone areas	All people working in the vicinity of the Equipment/Machinery with Sound Pressure Levels higher than 90 dB should wear protective ear plugs to avoid permanent hearing damage. Other mitigation measures Sound Reflective barriers to be installed at the boundary of the project site. If re-usable barriers already then the cost is nil. Otherwise it is as given in the column "Estimated Cost"		10,00,000/- to 20,00,000/-

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
3.	Water Resources and Quality	<p>Increase load on fresh water sources</p> <p>Unplanned disposal of industrial waste water generated and sewage</p> <p>Inadequate management of storm water</p> <p>Spills, leaks from industries, storage areas</p> <p>Contamination of natural</p>	<p>Individual projects will have separate water meters and two inlet sources for use of treated wastewater;</p> <p>Building and plumbing code to propose dual plumbing layout; SCADA system to be implemented for monitoring leakages in the water conveyance system;</p> <p>Providing training and education to the public on water conservation habits and the value of drinking water;</p> <p>OSCIPL to organize information forums with industry/commercial owners;</p> <p>To develop a risk management strategy to ensure water safety for the project affected areas;</p> <p>Monitoring of Unaccounted Flow of Water and detection of leakage shall be done;</p> <p>Improvement of management of water supply for integrated water supply management system (IWSMS) using an information technology application;</p> <p>A reliable technical department to be formed for maintenance and quality control shall be established;</p> <p>Domestic and industrial wastewater generated will be treated separately;</p>	OSCIPL	Is incorporated in Project Cost

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
		water resources and ground water aquifers	<p>An RWH Monitoring Cell to be formed which will be responsible for monitoring safe recharge and extraction of ground water in OSCIPL.</p> <p>Areas for ground water recharge shall be identified and delineated; Rain water harvesting tanks are proposed to conserve water</p> <p>Recharge pits are planned for ground water recharge</p> <p>Roof Top RWH shall be made mandatory for all residential, commercial and industrial buildings and shall be monitored by the Cell periodically.</p>		<p>32,40,850/-</p> <p>17,89,350/-</p>
4.	Solid Waste Disposal	<p>Inadequate collection and treatment of domestic waste</p> <p>Unhygienic conditions, odour problem</p> <p>Localized flooding</p>	<ul style="list-style-type: none"> Industries generating hazardous waste to comply with the requirements of Hazardous Wastes (Management and Handling) Rules, 1998 and Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. OSCIPL for SWM to undertake benchmarking as per Ministry of Urban Development. Integrated solid waste management plan will be developed for collection, transportation, treatment and disposal of waste. Facilities will be designed to cater to the requirements of horizon year Industries to contact hazardous waste management facility near Taloja for disposal of their hazardous waste. 	OSCIPL	Included in project plan

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
		Contamination of soil and groundwater Improper disposal of sludge and industrial waste	<ul style="list-style-type: none"> Biomedical waste to be managed in accordance with Bio-Medical Waste (Management and Handling) Rules, 1998 and Bio-Medical Waste Management Rules, 2016. E waste to be sold to authorized recyclers. E waste to be managed in accordance with E-Waste Management Rules, 2016. Recyclable waste to be collected separately and sold to authorized recyclers/ vendors. 		
5	Traffic Volume	Increase in traffic flow Increase in private traffic volume Traffic congestion Irregular Parking	<p>The roads in general to be designed to carry the maximum traffic loads with anticipated future development and on a par with IRC (Indian Road Congress) Standards;</p> <p>A well planned public transport infrastructure has been envisaged for the project;</p> <p>The proposed road circulation shall provide for safe and efficient movement of people;</p> <p>Maintenance of systematic spatial and technical database for the roads which would enable regular monitoring and feedback on road conditions thereby managing effective periodic maintenance;</p> <p>Pedestrian Guard Rails, Road safety Signage and overhead signs shall be placed wherever necessary;</p>	OSCIPL with RTO	Incorporated in the project cost

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>Road widths and lane configurations to be designed based on the modeling exercise;</p> <p>High occupancy vehicle (HOV) lanes shall be encouraged by differential toll policy;</p> <p>Non-motorized vehicles are encouraged</p> <p>Comprehensive traffic and travel surveys shall be conducted every 5 years to monitor traffic characteristics and travel behavior to develop strategies for effective transportation;</p> <p>Each individual project shall develop parking facilities as per the Development Control Regulations.</p> <p>Each residential project to provide parking facilities as per applicable norms and regulations.</p> <p>Sufficient Loading/unloading space to be provided.</p>		
6.	Land use Pattern	Impacts on existing human settlements	<p>During the master planning stage, detailed analysis has been undertaken to delineate site for Orange Smart City and various site alternatives were examined and ranked to select the option based on socio-economic factors.</p> <p>Adequate buffer has been provided around environmentally sensitive features</p> <p>Industrial land use has not been proposed in proximity of the sensitive receptors.</p>	OSCIPL	Incorporated in the project cost

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>All irrigation channels and surface bodies within delineated project area are to be retained.</p> <p>Fiscal measures to be undertaken to restrict unplanned development along the peripheral areas.</p> <p>To limit the development in the existing settlements, the Urban Planning Department is to define the land use for these regions through the Master Plan and limit the densities in these regions through the application of the local applicable building bye laws.</p>		
7.	Ecology	<p>Impact on flora and fauna of the adjoining green areas</p> <p>Illegal cutting of trees.</p> <p>Bird kill</p> <p>Habitat fragmentation and loss</p>	<p>As per master plan, no forest land is falling in the delineated area;</p> <p>Only native and local species will be chosen for green belt.</p> <p>Each industry shall develop green belt in 33% of the total land area as per the CPCB guidelines;</p> <p>Development around the project area will be regulated and no unauthorized development will be allowed.</p> <p>All migrant workers and local contractors will be provided with fuel arrangements at construction labour facilities to avoid any discrete collection of fuel wood.</p> <p>Transmission lines and chimneys will be provided with optical markers to enhance visibility for birds.</p>	OSCIPL	Included in the project cost

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
			<p>No activities shall be planned in the green buffer other than approach/service road, social forestry and horticulture, public amenities (activities which would not result in damaging the green cover).</p> <p>The fronts of river, drain, canal and Nallas, etc. passing through the town are planned as green areas.</p>		
8.	Socio-Economic	<p>Increased employment and business opportunities</p> <p>Improvement in infrastructure</p> <p>Increased income levels</p> <p>Stabilization of the rural economies</p>	<p>OSCIPL and individual project to undertake CSR program to ensure communal harmony and cooperation.</p> <p>The project to put in place OSCIPL responsible for efficient management and maintenance of infrastructure.</p> <p>Orange Smart city is willing to spend CSR money in providing skill development, clean and safe drinking water, sanitation facility, primary health care support in the nearby villages.</p>	OSCIPL	<p>CSR program to be at least 0.4% of the project cost for each Phase.</p> <p>Individual projects will further enhance the CSR budget based on their project cost.</p>

Sr. No.	Component	Impacts Identified	Suggested Mitigation Measures	Responsibility	Estimated Cost (INR)
		Potential for cultural conflict Unplanned secondary development in the adjoining areas			

9.0 Environmental Monitoring Plan

The environmental monitoring plan for the proposed project has been developed in view of the institutional, scientific and fiscal issues pertaining to the project. For developing the monitoring plan, appropriate Value Ecosystem Components (VEC's) which are likely to be affected have been identified. For each component, suitable measurable environmental indicators which are appropriate to the impact mechanism and scale of disturbance and have a low natural variability, broad applicability and an existing data series have been defined.

A comprehensive environmental monitoring plan has been developed for the construction and operation phases of the Integrated Industrial Township. Monthly review meetings shall be carried out by OSCIPL to check for unplanned growth in protected areas. Water resources availability shall be regularly monitored by OSCIPL. OSCIPL shall also work in association with the Pollution Control Board (PCB) to monitor environmental compliance of individual projects and environmental quality of the region.

10.0 Additional Studies

An elaborate risk assessment study was carried out with recourse to various hazards (toxic, flammable, natural) including the hazard identification, MSDS, Fire and Explosion Index, HAZOP study, Consequence Analysis, Failure Frequency Analysis, Impact Assessment, Risk Estimation (Individual risk, Societal risk and F-N curve)'. All the studies and analysis hence concluded that given the data and parameters, no major risks and hazards are predicted and risk mitigation measures have been suggested to reduce the risks to As Low as reasonably practical (ALARP). Also an Onsite DMP and an Offsite DMP has been delineated to counter the risks and the disasters.

11.0 Project Benefits

The Project is a planned mixed investment destination, with the objective of achieving high economic growth for the region with massive employment generation. The project will host electronics manufacturing industries, IT, residential sectors etc., supported by modern infrastructure, premium civic amenities, centres of excellence and proactive policy framework. The various direct and indirect benefits that will accrue from the project are listed below.

- a) Industrial Investment;
- b) Employment Generation;
- c) Capable to cater Domestic Market;
- d) Public investment in core infrastructure ;
- e) Benefits of Greenfield Development and High Access Corridor ;
- f) World-class infrastructure & connectivity;
- g) Housing to about 3,00,000 which will also include Social Housing

12.0 Conclusion

The EIA for Orange Smart City relies on primary and secondary sources of data including site visits and establishment of monitoring stations w.r.t air ,water noise, soil and ecology and biodiversity components. The project will benefit in generating employment and economic benefits to the Mumbai Metropolitan Region and its surroundings and will address Industrial demand and new emerging housing need including affordable housing.. Basis the studies, surveys and analysis it appears that the project may not have any adverse impacts on the environment and shall promote sustainable development.