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1. Chapter 10 – Preliminary Social and Environmental Impact Assessment

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TABLE OF CONTENTS

10 Preliminary Social and Environment Impact Assessment 10-1

10.1 Introduction 10-1
10.2 Preliminary Social Impact Assessment 10-1
10.2.1 Socio-Economic Characteristics of Study Area 10-1
10.2.2 Preliminary Social Impact Assessment 10-1
10.2.3 Project Specific Impacts 10-2
10.3 Preliminary Environment Impact Assessment 10-8
10.3.1 Air Pollution 10-8
10.3.2 Noise Pollution 10-10
10.3.3 Preliminary Environmental Impact Assessment 10-11
10.3.4 Measures to Reduce Vehicular Pollution 10-12
10.4 Conclusion 10-14

LIST OF FIGURES

No table of figures entries found.

LIST OF TABLES

Table 10-1: Major Projects part of CMP and their Social Impact (Qualitative) 10-3
Table 10-2: Indian Air Quality Standards (CPCB) in $\mu g/m^3$ 10-8
Table 10-3: National Ambient Air Quality Standards for Various Land uses ($\mu g/m^3$) 10-8
Table 10-4: Health Effect due to various Pollutants 10-9
Table 10-5: Air Pollution Statistics for Jamshedpur UA 10-9
Table 10-6: Ambient Noise Standards in India 10-10
Table 10-7: Noise Risk Zone Criteria 10-10
Table 10-8: Comparison of Emission Levels 10-14

LIST OF ENCLOSURES

10 Preliminary Social and Environment Impact Assessment

10.1 Introduction

Projects proposed in CMP will help in achieving sustainable development by increasing the share of walk, NMT and PT thus reducing the dependence on private vehicles. The proposals also promote marine walkways, environment friendly vehicles such as e-rickshaws thus increasing the environmental cum social benefits and reducing the overall emission levels in the study area.

The short-term proposals and majority of medium-term proposals considered do not involve major land acquisition or significant relocation and rehabilitation. However, the some of the medium-term and long-term proposals do need acquisition of land hence resulting in relocation and rehabilitation. The implementation of CMP proposals in overall will have positive social and environmental impact in the study area with reduced emission levels. The preliminary social and environmental impact assessment due to implementation of the CMP proposals in discussed in this chapter.

10.2 Preliminary Social Impact Assessment

10.2.1 Socio-Economic Characteristics of Study Area

Jamshedpur Urban Agglomeration area includes Jamshedpur Notified Area, Mango Notified Area, Adityapur Nagar Parishad, Jugsalai Municipal Council and eight surrounding villages. The study area is spread over an area of 149 sq. km. with a population of about 13, 37,131 (According to 2011 census). The socio-economic characteristics of the study area are discussed in detail in ***Chapter 4 (Section 4.7).***

10.2.2 Preliminary Social Impact Assessment

There are no adverse social impacts due to the implementation of CMP proposals. In fact, there are positive social impacts due to reduction of congestion, delays and accidents, increased use of public transport, promotion of walk and cycle trips, reduction in private vehicles and consequent reduction in pollution levels.

With the finalisation of the overall transport development proposals ***(Refer Chapter 8: Transportation Improvement Proposals)***, a preliminary assessment of social impacts have been carried out based on site reconnaissance and Google satellite imageries. Social screening is intended to provide inputs for identification of potential impacts with the implementation of the CMP. Screening is conducted by identifying impacts on environment due to implementation of CMP proposals.

Some of the generic social impacts are listed below:

Positive Impacts:

- Availability of choices for transportation (i.e., walk, NMT and PT modes)
- Reduction of congestion and pollution loads
- Better and safe pedestrian facilities and reduction in accidents
- Reduced dependence on private vehicles
- Provision of cycle tracks to promote use of NMT
- Improvement of speed and reduction of travel times

- Better Integration and transfer facilities among the various modes
- Segregation of freight and passenger vehicles to reduce accidents
- Avenue tree plantation and landscaping will improve overall environment in study area
- Marine walkways will improve the quality of life of nearby community by revitalizing the neighbourhood
- Overall improvement in the health conditions of the general public due to reduction in pollution loads
- Reduction in expenditure on transport due to improved road connectivity and public transport availability

Negative Impacts:

- Acquisition of land for development of proposed transport infrastructure facilities
- Rehabilitation & resettlement issues due to loss of livelihood, loss of shelter, severance of community & social ties
- Relocation of existing hawkers from public places
- Removal of squatters and encroachers from the side of the roads/ streets
- Resistance by operators for relocation
- Cutting of trees for development of proposed transport infrastructure facilities

10.2.3 Project Specific Impacts

The likely social impacts of major projects are listed in ***Table 10-1*** below. Other projects either have no social impact or positive social impact.

Table 10-1: Major Projects part of CMP and their Social Impact (Qualitative)

S. No.	Project Name	Description	Qualitative Social Impact	Mitigative Measures
1	One-way Traffic Management	One-way plan in Sakchi	→ Improves mobility in and around Sakchi Gol Chakkar Area → Reduces congestion → Reduces conflicts and avoids accidents → Reduction in travel time → Smooth flow of traffic and well as commercial operations → Travel distance might increase for certain trips	→ Not applicable
2	Hawkers and On-street vendors management	Sakchi, Kadma, Golmuri, Mango chowk, along Dimna Road (on median), Burma Mines RoB, Railway Station area, Parsudih Main Road etc.	→ Footpaths will be free from encroachments thus improving pedestrian safety and conflicts between pedestrians and motorists → Improvement in capacity of the roads → Effective utilisation of the carriageway width reducing road blocks, delays and congestion → Resistance might come from hawkers/ on-street vendors	→ Relocation of the encroachers/ hawkers to suitable areas to minimize the effects due to loss of livelihood

S. No.	Project Name	Description	Qualitative Social Impact	Mitigative Measures
3	Footpaths & Cycle Tracks (dedicated bicycle lane)	→ Dimna Road → Subarnarekha link Road → Jubilee Road → Straight Mile Road → Tata-Hata Main Road → New Kalimati Road → Golmuri Road → Kadani Road → Namidih Road → Marine Drive → Rivers Meet Road → Adityapur Toll Bridge Road → Tata – Kandra Road	→ Improved pedestrian facilities → Improved safety for cyclists → Likely increase in shift of motorised vehicles to walk and NMT trips → Reduction in fatalities and injuries due to improved/ segregated facilities for motorists and pedestrians/ cyclists → Land acquisition may be required at certain locations	→ Land owners have to be suitably compensated and other incentives should be given
4	Parking Management	On-street parking management. Provision of off-street parking facilities at following locations: → Sakchi area → Bistupur area → Along Dimna Road/ Mango Chowk → Near Sher-e-Punjab Chowk → Tata Nagar Railway station area	→ Effective usage of the carriageway width thus improving the mobility → Reduction in delays and improved travel speed, travel time → Improvement in safety and reduction in accidents → Smooth operation of commercial activities → Land acquisition may be is required at few locations	→ Relocation of the encroachers/ hawkers to suitable other market areas to minimize the effect of relocation on their business → Compensation to be paid to acquired land owners at existing market value in case of any land acquisition

S. No.	Project Name	Description	Qualitative Social Impact	Mitigative Measures
5	Junction Improvements	→ Dimna Chowk → Mango Chowk → Bus Stand Chowk → Sakchi Gol Chakkar → Sakchi Bus Stand Chowk → Regal Chowk → Voltas Junction\ → Tata Station Chowk → Jugsalai Chowk → Sher-e-Punjab Chowk → S-Type Chowk → Ashiyana Chowk	→ Reduction in vehicle-vehicle and vehicle-pedestrian conflicts → Improved sight-distance → Improvement in safety of people and reduces the risk of accidents → Improved facilities for pedestrians and bicyclists → Effective utilisation of the junction capacity	→ Utmost care and proper planning while improving the geometry of junctions to avoid conflict zones
6	Road Widening Proposals	All the roads proposed to be widened as discussed in Chapter 8 ***(Table 8-11)***	→ Reduces traffic load on Mango bridge and respective access roads → Heavy vehicles need to wait on city access roads due to entry restrictions → Considerable reduction in travel time and travel distance → Significant reduction in transport costs benefiting many sections of the society → The increased flow of traffic and goods will promote economic opportunities for the benefit of the people along the road → Rise in land value adjoining the	→ Proper resettlement & rehabilitation plan shall be prepared to minimise the disruption and economic loss to the affected communities along the proposed road. → Compensation shall be paid at existing market value → Temporary employment during construction stage to project affected persons with particular attention to vulnerable groups to the extent possible
	Development of New Link	The alternate road links that are proposed to be developed are: → Eastern Corridor → New Bridge and road from western corridor (Sonari) till NH-33 → New Bridge and road on eastern side via Manpita to NH-33		
	Development of Ring Road	Development of new ring road to bypass through traffic		

S. No.	Project Name	Description	Qualitative Social Impact	Mitigative Measures
			road → Land acquisition is required → Loss of households and disruption of livelihood	
7	Expansion of the existing Bus Terminals	→ Intra-city bus terminal, Sakchi → Development of ISBT terminal	→ Increased PT share for daily commuting → Reduction in private vehicle usage → Reduction of congestion on city roads and emission levels → Improved facilities for PT users → Improved bus circulation within and around the terminal area → Sustainable transportation development in the study area → Land acquisition is required	→ Proper resettlement & rehabilitation plan shall be prepared to minimise the disruption and economic loss to the affected communities along the proposed road. → Compensation shall be paid at existing market value

S. No.	Project Name	Description	Qualitative Social Impact	Mitigative Measures
8	Development of new Truck Terminal	Option 1 : Relocating the existing truck terminal to Baliguma area with direct access to NH-33 Option 2 : Development of new mini-truck terminal at Baliguma area to cater to the needs of future demand	→ Improved facilities to goods transport → Significant reduction in transport costs benefiting many sections of society → Land value appreciation in adjoining areas → Loss of livelihood and income for the owners of the acquired private land	→ Compensation to be paid to acquired land owners at existing market value
9	Mobility Corridors	Development of 4-lane divided roads with proposed Mini-bus/ Midi-bus service along the following corridors: → Dimna Road → Subarnarekha Link Road → Tata – Hata Main Road → Tata – Kandra Road	→ Improved pedestrian facilities → Improved mobility → Improved facilities to daily commuters → Improved safety for bicycle users → Reduction in road fatalities & injuries → Increase in land property value → Likely acquisition of private lands at certain locations → Revenue of IPT service operators may get declined	→ Compensation at existing market value to be paid to private land owners before commencement of the project → Alternative employment opportunities to be provided to phased out IPT drivers

As assessed in ***Table 10-1*** above, it can be observed that majority of impacts due to implementation of CMP proposals are positive in nature resulting in increased mobility in the study area.

10.3 Preliminary Environment Impact Assessment

10.3.1 Air Pollution

10.3.1.1 Introduction

In general, vehicular pollution constitutes the major source of pollution in urban areas. The major pollutants in vehicular exhaust emission are carbon monoxide, unburned hydrocarbons, oxides of nitrogen and sulphur, partially burnt products, particulate matters and lead components. The concentration of fuel pollutants varies with the type of engine – petrol or diesel.

Rapid urbanization has resulted in an increase in the number of motor vehicles. This increased mobility, however, come with a high price as the number of vehicles continues to grow and the consequent congestion increases and causes air and noise pollution.

Jamshedpur UA currently has about 4, 05,000 registered vehicles (Since 2005) of which on average 95% constitutes to passenger vehicles and rest 5% constitutes to goods vehicles.

10.3.1.2 Air Quality Standards

Air Quality standards are briefly discussed in the following section before presenting current air quality in the study area. Air Quality standards prescribed by Central Pollution Control Board (**CPCB**) is presented in ***Table 10-2*** and ***Table 10-3*.**

Table 10-2: Indian Air Quality Standards (CPCB) in μg/m^3

Pollution	SO_2 & NO_x	SPM
Low	0 - 40	0 - 180
Moderate	40 - 80	180 - 360
High	80 - 120	360 - 540
Critical	> 120	> 540

Table 10-3: National Ambient Air Quality Standards for Various Land uses (μg/m^3)

Pollutant	Industrial Area	Residential Area	Sensitive Area
SO_2	120	80	30
NO_x	120	80	30
SPM	500	200	100
RPM	150	100	75
CO*	5.0	2.0	1.0

10.3.1.3 Impact of Air Pollution

Health effects caused due to various pollutants are presented in ***Table 10-4.***

Table 10-4: Health Effect due to various Pollutants

Pollutants	Health Effect
Oxides of Sulphur (SO_x)	Aggravate asthma, leading to wheezing, chest tightness and shortness of breath, increased medication use
Particulate Matter (PM)	Short-term exposures can aggravate heart or lung diseases leading to symptoms, increased medication use, hospital admissions,
Oxides of Nitrogen (NO_x)	Aggravate lung diseases leading to respiratory symptoms, hospital admissions, and increase susceptibility to respiratory infection.
Lead (Pb)	Damages the developing nervous system, resulting in IQ loss and impacts on learning, memory, and behaviour in children. Cardiovascular and renal effects in adults and early effects related to anaemia.
Carbon Monoxide (CO)	Reduces the amount of oxygen reaching the body's organs and tissues; aggravates heart disease, resulting in chest pain and other symptoms leading to hospital admissions and ED visits.
Ammonia (NH_3)	Contributes to particle formation with associated health effects.
Other Toxic Air Pollutants	Cause cancer; immune system damage; and neurological, reproductive, developmental, respiratory, and other health problems. Some toxic air pollutants contribute to ozone and particle pollution with associated health effects

10.3.1.4 Current Air Quality in Jamshedpur

Data regarding the levels of air pollution for the year of 2014 are collected from the Pollution Monitoring Center, Adityapur and is presented in ***Table 10-5*** . It can be observed that all the emissions are within the permissible limits.

Table 10-5: Air Pollution Statistics for Jamshedpur UA

Location	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SPM ($\mu g/m^3$)
Bistupur, East Singhbhum District	37.54	42.94	147.17
Golmuri, East Singhbhum District	37.85	47.42	154.36
Regional Office, Saraikela Kharswan District	40.34	50.04	167.46
Barajamda, West Singhbhum District	18.31	24.80	140.42

10.3.2 Noise Pollution

10.3.2.1 Introduction

Noise pollution is defined as a form of air pollution that is an audible unwanted sound that poses a threat to a person's health and well-being. Noise has been a source of discontent to the people.

Noise affects human health in a number of ways. These include both direct as well indirect effects. Direct effects include annoyance, irritability, sleeplessness, and interference with communication, performance effects, effects on social behaviour and hearing loss and health effects. Indirect effects include increased health cost, decreased property values (especially near railway stations, airports, industrial areas) Continuous or prolonged exposure to noise levels of 80-85 dB or more can cause deafness. Exposure to a noise of around 100dB can cause permanent loss of hearing power.

10.3.2.2 Noise Standards

As per the Ministry of environment and Forests, Government of India (EPA Notification G.S.R. 1063 (E), dated. 26th Dec., 1989) ambient permissible standards has been set for the noise levels in different establishments during day as well as night times. These have been set under the Environment (Protection) Act 1986 and presented in ***Table 10-6.***

Table 10-6: Ambient Noise Standards in India

Area	dB(A) Day Time 6:00AM-9:00PM	dB(A) Night Time 9:00PM -6:00 AM
Industrial	75	70
Commercial zone	65	55
Residential area	55	45
Silence zone (*Hospitals,Schools etc)*	50	40

Human perceptions to change in sound level are shown in ***Table 10-7.***

Table 10-7: Noise Risk Zone Criteria

Intensity of noise in dB(A)	Zones
Less than 66	Safe
66-71	Tolerable
71-76	Low risk
76-81	Moderately risk
81-86	High risk
Greater than 86	Extremely risk

(Source: Banerjee et.al, 2008)

10.3.2.3 Current Noise Pollution levels in the Study Area

At present, no data is being collected to assess the noise pollution levels in the study area by pollution control committee. There is a need to collect Noise levels at major junctions, other environmental sensitive areas and monitor the same to follow suitable mitigative measures.

10.3.3 Preliminary Environmental Impact Assessment

Environmental screening is intended to provide inputs for identification of potential impacts with the implementation of the CMP proposals. Some of the Impacts are listed below:

Positive Impacts:

- Increased use of sustainable modes i.e., walk, non-motorised and PT modes will result in reduction of pollutants. However, the reduction of pollutants depends on the extent of modal shift from private to sustainable modes of transport that is likely to occur with the proposed improvements
- With the improvement in footpaths, the share of walk trips will improve for short trip lengths
- Development of safe, well-connected bicycle network will encourage usage of cycle mode thus improving the usage of sustainable mode of transportation
- With the improvement in public transport facilities such as providing bus shelters, increase in frequency, increase in PT coverage area, providing adequate facilities at terminals will increase the share of PT thus reducing dependency on private vehicles. This leads to reduction in overall vehicle-km resulting to less emission levels.
- With the improvements in transport network, the congestion on roads will reduce leading to higher travel speeds and lower travel time
- Major environmental features such as parks, temples, heritage structures etc., in the study areas would generally be avoided for development of transportation infrastructure facilities, hence environmental impacts on these areas would be minimal to absent
- River-front developments would enhance the environment and promote tourism development
- Overall improvement in environmental quality is anticipated in the operation stage
- Congested core city areas would be experiencing better environmental quality after implementation of the project proposals due to pedestrianisation and encouraging NMT, PT
- Pedestrian safety would also be improved with the implementation of the various proposals

Negative Impacts:

- Relocation of utilities in the pre-construction stage causing temporary disruption to services
- Stacking of construction waste causing interruption to traffic and pedestrian movements
- Run-off from staked construction waste entering the water bodies and existing drainage systems causing clogging of drain outlets as well as the drains themselves

- Generation of dust is a predominant impact in the construction stage and extends into the operation stage especially during maintenance operation. Impacts of dust can be felt during site clearance when the existing pavement is being dismantled
- Local air quality gets degraded due to increased air emissions during construction and operation. Increased emissions during pre-construction stage can be from heavy machinery used for clearing the RoW. High levels of SO_2, HC and NO_x are likely to develop from hot mix plant operations
- Urban areas being built-up and populated; will be more likely to be impacted by construction stage emissions than rural areas

Mitigative Measures

- Plantation will reduce the dispersion of emissions and aid in their deposition. During design stage, traffic bottlenecks and congestion are to be removed by improving road geometry and by widening the roads as well as removal of encroachments to smoothen traffic flow.
- Alternative routes to main corridors in congested settlements will reduce congestion and pollution loads.
- All precautions to reduce emissions from construction machinery should be taken to reduce emissions. To minimize emission impacts at settlement locations, asphalt plants, crushers and the batching plants should be sited at least 1 km in the downwind direction from the nearest human settlement.
- During operation stage, vegetation can be used to reduce some of the effect of lead as well as SPM emissions by plantation of pollution resistant species.
- Fugitive emissions from construction site should be reduced to the extent possible by covering them. Haul roads should be sprinkled regularly with water to settle dust arising from the construction site.
- Sprinkling of water shall be done on all haul roads, especially areas passing through residential areas, to minimise fugitive dust emissions during construction period
- Project interventions such as procurement of low emission vehicle fleets, traffic signal prioritization, provision of signage etc., involve minimal construction activities and hence, environmental and social benefits from these activities will outweigh any minimal impacts that may occur.
- Plantation of trees along the RoW/ adjacent properties to be carried out as compensation measures

10.3.4 Measures to Reduce Vehicular Pollution

a) Promotion of Non-motorised Transport

Provision of adequate facilities for non-motorized transport such as raised crosswalks, footpaths, cycle tracks and other measures such as signage & markings, proper lighting will promote use of non-motorized transport, which is the sustainable mode of transport. Therefore, priority should be given to the non-motorized transport by development of suitable facilities in order to improve environment in cities.

b) Provision of Adequate Road Infrastructure

Vehicular speeds will increase with the provision of adequate road infrastructure. Therefore, construction of missing links, bypasses and other roads to cater to transport demand at desired level of service will help to reduce vehicular pollution. Inadequate and poor quality of road surface leads to increased Vehicle Operation Costs (VOC) and also increased pollution.

c) Transport System Management (TSM) Measures

At lower vehicular speeds, pollution emission levels are higher. The transport system management measures facilitate smooth flow of traffic; consequently, vehicular pollution would also be reduced substantially. It is estimated that with the following TSM measures, journey speeds can be increased by about 30% in cities of various sizes, which will reduce pollution levels considerably:

- On-street parking management, one-way traffic plans, widening of roads, pedestrian facilities, shifting of some of activities such as temporary markets/ hawking zones, enforcement of traffic rules, removal of encroachments etc.
- On-street parking should be restricted. Charges should be levied in core urban areas to discourage on-street parking. Off-street parking facilities should be created on BOT model.

d) Increased share of public transport

PT mode emits much less pollutants. Therefore, reliable PT system with good coverage and frequency should be promoted, in order to reduce vehicular pollution. The following are the measures to be implemented to increase the share of public transport:

- Coverage and frequency of services should be improved
- Construction of new stops/ improvement of existing bus terminal, IPT stand, development of new PT routes and stops should be planned with proper signage and information display
- Transport Authority should issue a timetable and public awareness campaign should be carried out. Transport Authority should handle services professionally with a motto of serving the people. There should be public relationship officer who is available on full time basis to clarify/ alleviate the public transport related issues
- Dedicated bus transport system such as BRTS or high-quality continuous bus service should be introduced along proposed mobility corridors to minimize the dependence on IPT/ private vehicles

e) Vehicle Manufacture and Maintenance

Environmental pollution control measures should also aim at reduction of vehicular pollution. Diesel exhaust emissions can be minimized by proper engine maintenance, engine de-rating and use of fuel additives. Proper maintenance of engine and proper driving habits can reduce exhaust smoke by 30% to 50%. Engine de-rating of buses/trucks ensures smoke free performance along with fuel economy and longer engine life. Use of anti-smoke chemical additives can bring about 50% reduction in vehicular smoke.

f) Age Limits for Motor Vehicles

Older vehicles are more polluting and consume more fuel and are less road worthy. In addition, these vehicles are more likely to have breakdowns on the road thereby causing obstruction to

rest of the traffic on road. Therefore, administration should consider adopting the policy of discouraging old vehicles and encourage their early replacements. Statutory age limits should be set for all type of vehicles. A progressive increasing road tax surcharge could be considered for imposition on all types of vehicles above 15 years of age. Fiscal incentives should be provided for early replacement of old vehicles such as lowering of registration fee and sales tax. Fiscal incentives/ subsidies for new vehicle buyers plan should be devised for gradual phase out with due advance notice. Testing/certification and training of personnel shall be done. Linkage of all PUC centers will facilitate for better data capture.

g) Other Measures

Landscaping/ greening of areas adjacent to roads shall be done. Interlocking tiles may be used for water percolation. As a long-term measure, it is also necessary to consider alternative clean fuels. Apart from reducing vehicular pollution, these also help in conserving petroleum products. The major alternative cleaner fuels that are finding increasing use are Alcohols (ethanol/methanol), Compressed Natural Gas (CNG) and Liquefied Petroleum Gas (LPG).

Good quality data is an important input in assessing the change in air quality and the impact of policy interventions. There are only few monitoring stations in the study for monitoring the pollution loads. There is a need to install more monitoring stations as well decimate the information to improve the awareness of the general public. Currently, data related to noise pollution is not being collected. There is a need to collect the same along with air pollution data.

10.4 Conclusion

The emission level for the base year is about 4.2 tons per sq. km. per day. For the horizon year 2035, in Do-nothing scenario, the emission levels will increase to 4.5 tons per sq. km. per day. With suggested improvements, the emission levels will reduce to 1.3 tons per sq. km. per day. The comparison details of the emission levels between various base and horizon scenarios are presented in ***Table 10-8***.

Table 10-8: Comparison of Emission Levels

Scenario	Average Trip Length (km)	Emission in Tons per sq. km.	Speed (in kmph)
Base Year	4.26	4.2	29
1. Do Nothing (2035)	3.29	4.5	22
2. Transport Network Improvements (2035)	4.06	1.5	29
3. Transport Network Improvements + Public Transport Improvements (2035)	3.94	1.3	31

** Scenario 3 was considered as a final scenario while recommending proposals*

An analysis of the environmental, social impacts and benefits from the various network scenarios indicates potential benefits from the implementation of CMP proposals.