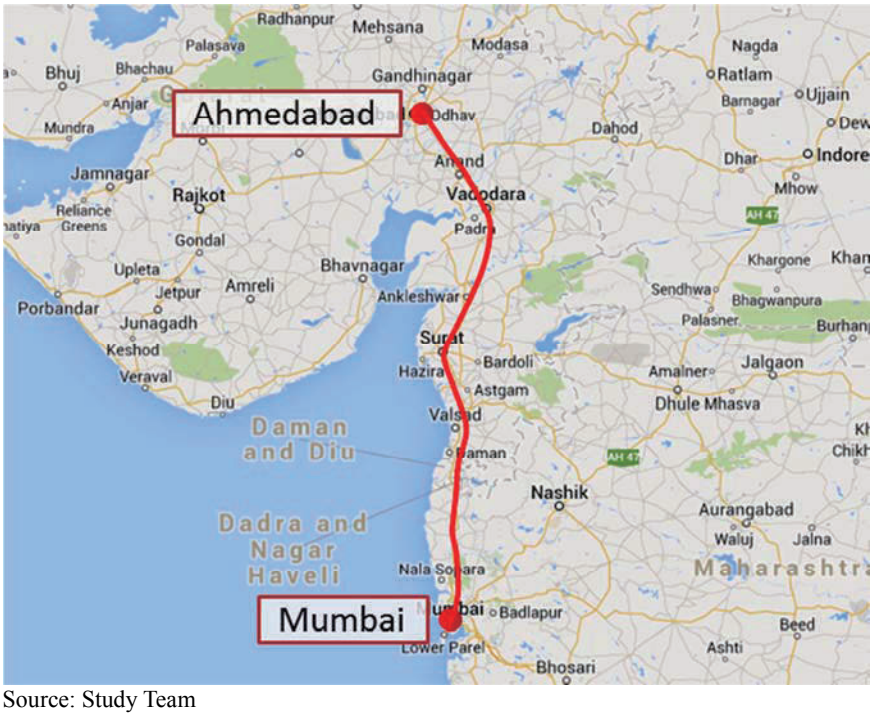
Chapter 7 Environmental and Social Considerations

7.1 Project Description

7.1.1 The Project Location

The region targeted by the study is a corridor having a length of approximately 500 km that links the city of Mumbai and Ahmedabad. The study area comprises of 250 m both side from the center line along the proposed Mumbai-Ahmedabad High Speed Railway Corridor (MAHSRC) alignment. The planned route is located between latitude 19003'58.52"N-longitude 72005'47.48"E and latitude 23005'39.78" N-longitude 72034'33.48"E, stretching from the coastal plain bordering the Arabian Sea, located in the Mumbai urban conglomerate of Maharashtra State and to the west of the Western Ghats, to the Ahmedabad, central region of Gujarat State. Adjacent to the proposed route from Mumbai to Thane, there are two important ecologically sensitive fragile areas- the Sanjay Gandhi National Park (SGNP) and the Tungareshwar Wildlife Sanctuary (TWLS). Measures are being planned to minimize alterations in these areas. Moreover, due to the existence of mangrove wetlands within Thane Creek East of Mumbai, plans are being made to adopt a tunnel structure in order to avoid alterations. There is another ecologically sensitive fragile area through which the proposed MAHSRC passes is Dahanu Taluka, about 120 km from the Mumbai.



Source: Study Team

Figure 7.1-1 Proposed Alignment of Mumbai-Ahmedabad High Speed Railway Corridor

7.1.2 Project Background

India has undergone rapid economic growth in recent years, and along with this growth has come a sharp rise in the volume of people and goods being transported in the country. To meet this demand, Dedicated Freight Corridors (DFC) are being constructed to haul freight from Delhi to Mumbai and Kolkata. As for passenger transport, the Indian Ministry of Railway (MOR) prepared the "Indian Railways Vision 2020" in December 2009. In the Vision, the comparison between Railway Transport and Road Transport or Aviation has conducted and concluded that Railway Transport takes advantage of less emission of greenhouse gas, high capacity of

passenger transport etc. The Vision identified the need for introducing High Speed Railway (HSR). HSR is needed as a measure to archive several goals and demands indicated in Railway Vision 2020 with its various features. Six (6) main items which HSR will satisfy requirements are presented as follows:

(1) Safety is the top priority of HSR
(2) High Capacity
(3) High Frequency
(4) Network Expansion
(5) High Energy Efficiency and Low Emission of greenhouse gas (CO_2)
(6) Strong Infrastructure and HSR System for Natural Disaster

Pre-feasibility studies are now being started in sequential order on seven routes which are candidates for the construction of HSR. Furthermore, a report issued by an expert committee on modernization of India's national railways that was established by MOR designates the line between Mumbai and Ahmedabad (approximately 500 km long) as the first HSR section planned to be constructed. A pre-feasibility study for this line was conducted by RITES of India, Systra of France and others in fiscal year 2009. India and Japan issued a joint statement on May 29, 2013, that included a decision to conduct a joint Feasibility Study (FS) on the construction of HSR between Mumbai and Ahmedabad by reviewing the conclusion described in the Vision, considering the alternatives and prepare HSR plan necessary for its preparation, implementation, operation and maintenance.

7.1.3 Importance of the Project

(1) Indian Railways Vision 2020

MOR in India formulated the "Indian Railways Vision 2020" in December 2009 as a long-term vision up to the year 2020. The Vision was formulated to address four national goals: (1) Inclusive Development, both Geographically and Socially; (2) Strengthening National Integration; (3) Large-Scale Generation of Productive Employment; and (4) Environmental Sustainability. An investment as much as 14 trillion rupee (Rs) is planned for the next ten years. Specifically, the vision sets the objectives to drastically increase revenue, expand the network and transport capacity, enhance safety and environmental sustainability, and reform passenger services. It also sets targets for business development in various fields, including passenger services on the conventional railway, HSR and rail freight, luggage, advertisements, telecommunication, and so on.

(2) High-speed Railway Vision

For HSR that operates at the maximum speed of 250–350 km/h, the vision plans to implement projects for at least four corridors by 2020. Furthermore, it will also make plans for multiple routes to connect the commercial centers, tourist spots, pilgrimage destinations, and so on. Figure7.1-2 and Table7.1-1 shows the seven corridors of the planned HSR routes (Indian Railways Vision 2020 put forth six corridors but the Delhi - Jaipur - Jodhpur section was added later to total seven corridors). MOR is conducting pre-feasibility studies of these routes sequentially.

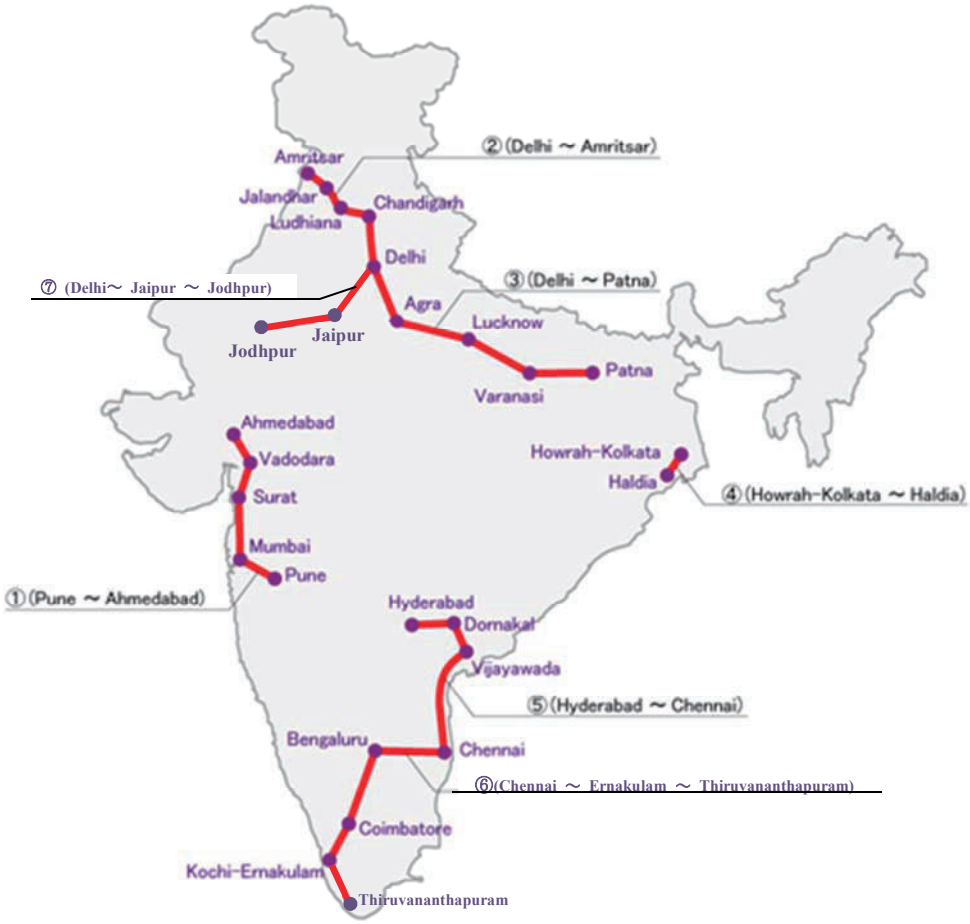


Figure 7.1-2 Seven Corridors for the Pre-feasibility Studies of HSR in India

Table 7.1-1 Seven Corridors Planned for HSR in India

Corridor	Route	Length
①	Pune–Mumbai–Ahmedabad	Approx. 680 km
②	Delhi–Chandigarh–Amritsar	Approx. 480 km
③	Delhi–Agra–Lucknow–Varanasi–Patna	Approx. 1,000 km
④	Howrah–Haldia	Approx. 140 km
⑤	Hyderabad–Dornakal–Vijayawada–Chennai	Approx. 780 km
⑥	Chennai–Bengaluru–Ernakulam–Thiruvananthapuram	Approx. 1,020 km
⑦	Delhi–Jaipur–Jodhpur	Approx. 530 km
Total		Approx. 4,630 km

(3) A report by an expert committee on modernization of Indian National Railway

A 2012 report by an expert committee on modernization of India's national railways that was established by the Indian MOR designates a route between Mumbai and Ahmedabad (approximately 500 km) as the first HSR section to be constructed. The following is an excerpt from the Report of the Expert Group for Modernization of IR (New Delhi, date: 25 Feb. 2012).

High Speed Passenger Train Corridors

Construct a HSR line between Ahmedabad and Mumbai with speed of 350 km/h. Undertake detailed studies for 6 other HSR corridors already identified. These include:

(1) Delhi-Chandigarh-Amritsar (450 km);
(2) Hyderabad-Dornakal-Vijayawada-Chennai (664 km);
(3) Howrah-Haldia (135 km);
(4) Chennai-Bangalore-Coimbatore-Ernakulam (850 km);
(5) Delhi-Agra-Lucknow-Varanasi-Patna (991 km)
(6) Ernakulam-Trivandrum (194 km).

7.1.4 Objective of the Project

According to the GOI's Environmental Impact Assessment Notification issued by the Ministry of Environment and Forests (MOEF), New Delhi on 14th September, 2006 under the Environment (Protection) Act, 1986, railway and bridge construction projects do not require the conduct of Environmental Impact Assessment (EIA) studies including preparation of an Environmental Management Plan (EMP) was conducted in order to mitigate potential negative environmental impacts for the MAHSRC. The main objective of the EIA study is to conduct the baseline data generation of the environmental attributes to know the existing scenario of the environmental parameters. In order to identify the environmental impacts due to the construction and operation of the proposed MAHSRC and associated facilities (Depot, Railway Stations and Maintenance Depot *etc.*), an EIA study is proposed to be undertaken. The aim of the study is to establish the existing environmental conditions, predict impacts of the running of the high speed train, and associated facilities and formulate the EMP. The EIA report is required for the Joint Feasibility Study for the said HSR. The EIA Study has been conducted in accordance with the latest Guidelines of Japan International Corporation Agency (JICA) on Environmental and Social Considerations.

7.1.5 Willingness to Pay

The questionnaire was made to confirm the willingness to pay from every income level those residing along HSR. Furthermore, considering the future income standards, passengers' demand on HSR are distributed among airline, highway express bus and existing railway following their income.

7.1.6 The Executing Agency of the Project

The project proponent is the MOR, Government of India. Recently Rail Vikas Nigam Limited (RVNL)/ High Speed Railway Corporation (HSRC) have established under MOR for the purpose of MAHSRC construction, operation and maintenance.

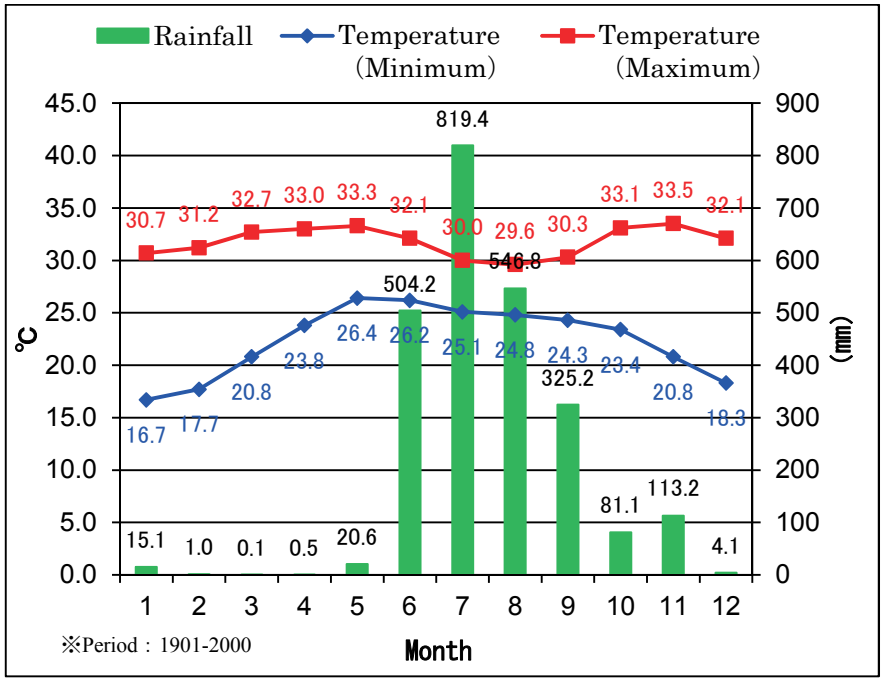
7.2 Present Natural and Social Condition

The planned route is located between 19 degrees and 23 degrees north latitude, stretching from the coastal plain bordering the Arabian Sea, located in the western region of Maharashtra State and to the west of the Western Ghats, to the southeast region of Gujarat State. The climate along the route features hot temperatures and high humidity increasing as it goes south, with heavy rains from June to September caused by monsoons. Adjacent to the proposed route from Mumbai to Thane, there are two important ecologically sensitive fragile area the SGNP and the TWLS. Moreover, due to the existence of mangrove wetlands within Thane Creek east of Mumbai, plans are being made to adopt a tunnel structure in order to avoid alterations.

7.2.1 Climate and Temperature

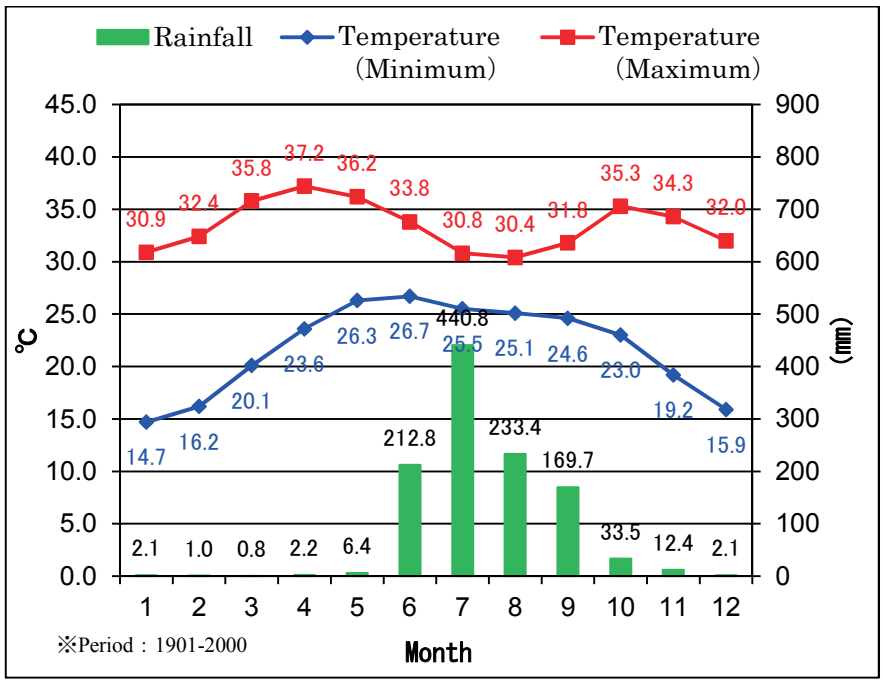
(1) Overview of Climate

Figure 7.2-1 shows the temperature and precipitation of Mumbai, which is situated at the coastal area on the western part of Maharashtra State. According to the climatic region map, Mumbai has tropical monsoon climate. Because of the dominant effect of the southwest monsoon, it is an area with high rainfall. The maximum temperature during the day does not change significantly throughout the year. It is generally around 30℃ to 35℃. On the other hand, the minimum temperature is in January. It is around 15℃. The lowest temperature during the rainy season is around 25℃. The temperature variation throughout the year is relatively large. The rainy season is from June to September. Most of the annual rainfall is concentrated in this period. Figure 7.2-2 and Figure 7.2-3 show the temperatures and precipitations of Surat and Ahmedabad in Gujarat State. According to the map of climatic regions, Surat, which is along the coast, has tropical savanna climate and Ahmedabad, which is inland, has semiarid steppe climate. The precipitation in the rainy season is not as much as that in Mumbai. However, both cities have high temperatures. The maximum temperature of Ahmedabad recorded in May is more than 40℃. In addition, due to the influence of the southwest monsoon, the rainy season and the dry season are very distinct, similar to Mumbai. Most of the annual rainfall is concentrated in the rainy season from June to September.



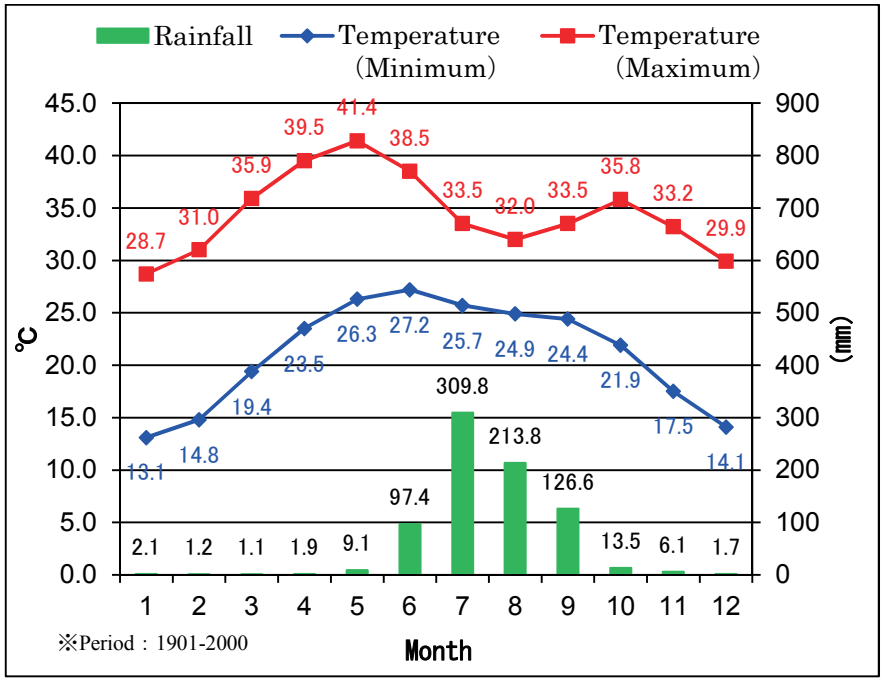
Source: Compiled by Study Team based on India Meteorological Department material

Figure 7.2-1 Monthly Mean Maximum & Minimum Temperature and Total Rainfall Based upon 1951-2000 Data (Mumbai)



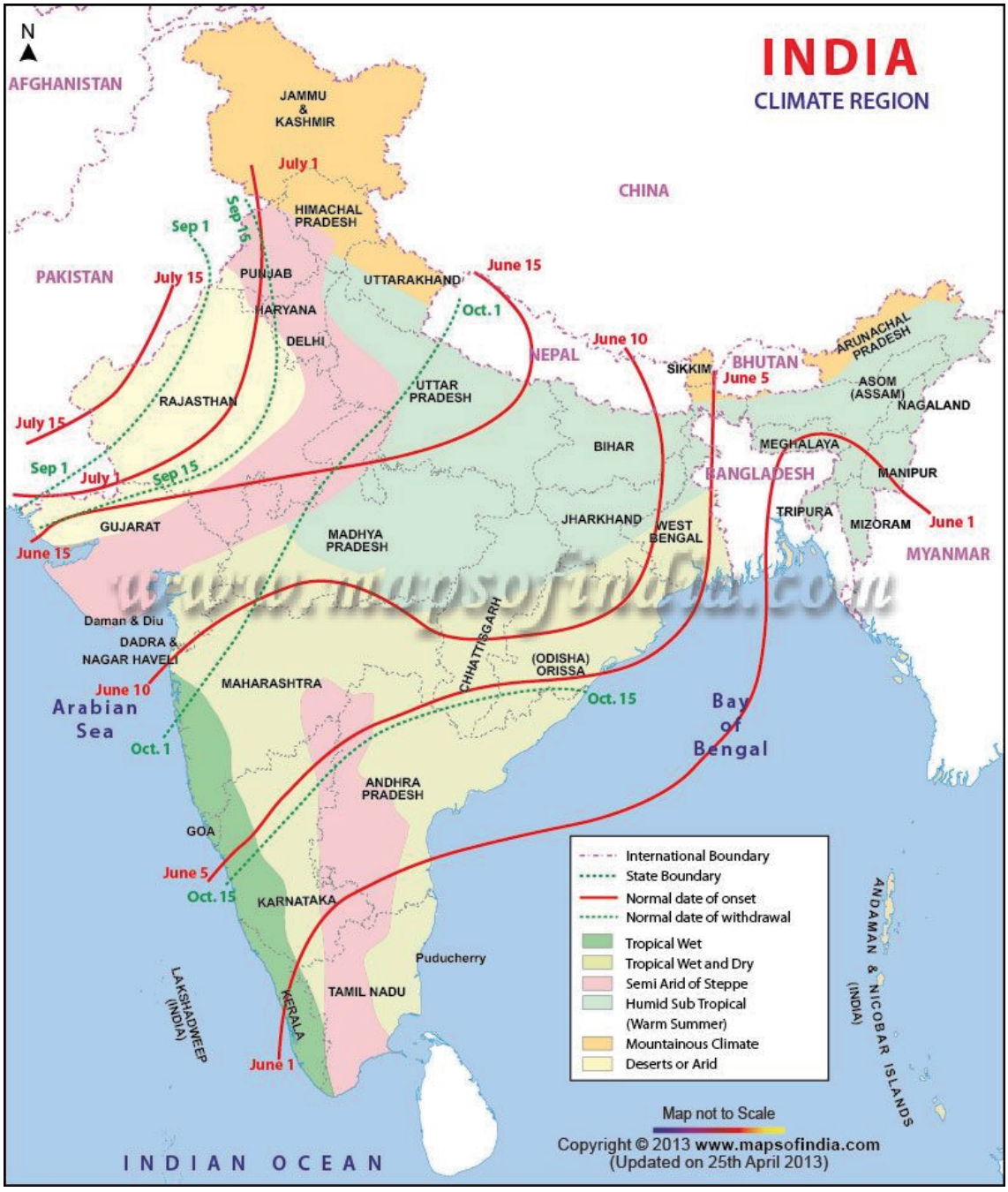
Source: Compiled by Study Team based on India Meteorological Department material

Figure 7.2-2 Monthly Mean Maximum & Minimum Temperature and Total Rainfall Based upon 1951-2000 Data (Surat)



Source: Compiled by Study Team based on India Meteorological Department material

Figure 7.2-3 Monthly Mean Maximum & Minimum Temperature and Total Rainfall Based upon 1951-2000 Data (Ahmedabad)



Source: Map of India

Figure 7.2-4 Climatic Regions

7.2.2 Air Quality

Air Quality standards in India are shown in the Table 7.2-1. The items designated herein are 12 items including sulfur dioxide (SO_2), nitrogen dioxide (NO_2), suspended particulate matter, lead (Pb), carbon mono-oxide (CO), ammonia (NH_3) and others. As the cause of Air Pollution in India, it may be mentioned that 1) vehicle emission, 2) thermal power, 3) biofuel (Firewood stone etc.) and so on. Among them, a main cause is vehicle emission. Therefore, this HSR project is expected to contribute the mitigation of Air Pollution.

Table 7.2-1 Air Quality Standards in India

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential,Rural and Other Area	Ecologically Sensitive Area(notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide(SO_2), $\mu g/m^3$	Annual* 24 hours**	50 80	20 80	-Improved West and Gaeke -Ultraviolet fluorescence
2	Nitrogen Dioxide(NO_2),$\mu g/m^3$	Annual* 24 hours**	40 80	40 80	-Modified Jacob & Hochheiser(Na-Arsenite) -Chemiluminescence
3	Particulate Matter (size less than 10μm)or PM10$\mu g/m^3$	Annual* 24 hours**	60 100	60 100	-Gravimetric -TOEM -Beta attenuation
4	Particulate Matter (size less than 2.5μm)or PM2.5$\mu g/m^3$	Annual* 24 hours**	40 60	40 60	-Gravimetric -TOEM -Beta attenuation
5	Ozone(O_3)$\mu g/m^3$	8 hours** 24 hours**	100 180	100 180	-UV photometric -Chemiluminescence -Chemical Method
6	Lead(Pb)$\mu g/m^3$	Annual* 24 hours**	0.50 1.0	050 1.0	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper -ED-CRF using Teflon filter
7	Carbon Monoxide(CO)	8 hours** 24 hours**	02 04	02 04	-Non Dispersive Infra Red (NDIR) spectroscopy
8	Ammonia(NH_3)$\mu g/m^3$	Annual* 24 hours**	100 400	100 400	-Chemiluminescence -Indophenol blue method
9	Benzene(C_6H_6)$\mu g/m^3$	Annual*	05	05	－Gas chromatography based continuous analyzer -Adsorption and Desorption followed by GC analysis
10	Benzo(O)Pyrene(BaP) －particulate phase only,$\mu g/m^3$	Annual*	01	01	-Solvent extraction followed by HPLC/GC analysis
11	Arsenic(As),$\mu g/m^3$	Annual*	06	06	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel(Ni)$\mu g/m^3$	Annual*	20	20	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

Note: * Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a we ek 24 hourly at uniform intervals.
** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the ti me in a year.2% of the time, they may exceed the limits but not on two consecutive days of monitoring
Source: Central Pollution Control Board (CPCB)

Air quality data of Maharashtra and Gujarat shown in Table 7.2-2.

Table 7.2-2 Air Quality Data

No.	State	City	Type of station	SO_2		NO_2		PM_{10}	
				Annual average (µg/m3)	Air quality	Annual average (µg/m3)	Air quality	Annual average (µg/m3)	Air quality
1	Gujarat	Ahmedabad	RIRuO	15	L	21	M	**95**	C
2		Vadodara	RIRuO	17	L	29	M	**93**	C
3		Surat	RIRuO	16	L	24	M	**76**	H
4	Maharashtra	Thane	RIRuO	14	L	14	L	50	M
5		Mumbai Suburban	RIRuO	4	L	19	L	**97**	C

Notes: The measurements were carried out in 2010
RIRuO - residential / industrial / rural / others
R – Residential and other areas, I – Industrial area,
L- Low, M- Moderate, H – High and C – Critical levels of pollution based on exceedance factor "-" Not Available
Pollution Level Classification – SO_2 (µg/m3) L (0-25), M (26-50), L (51-75), C (>75), / NO_2 (µg /m3) L (0-20), M (21-40), H (41-60), C (>60), / PM_{10} (µg/m3) L (0-30), M (31-60), H (61-90), C (>90)
Those that exceed the National Ambient Air Quality Standards are shown in **bold**
Source: CPCB

7.2.3 Water Quality

The law related to water pollution in India is the Water (Prevention and Control of Pollution) Act of 1974, aiming at preventing water pollution and securing water quality through regulations. The Water (Prevention and Control of Pollution) Rules were established in 1975 but without definition of level of wholesomeness, which was later designated by the CPCB. The Water Quality Criteria designated by CPCB are shown in the Table 7.2-3.

Table 7.2-3 Water Quality Criteria Designated by CPCB

Designated-Best-Use	Class of water	Criteria
Drinking water source without conventional treatment but after disinfection	A	・Total Coliforms Organism MPN/100ml shall be 50 or less ・pH between 6.5 and 8.5 ・Dissolved Oxygen 6mg/l or more ・Biochemical Oxygen Demand 5 days 20℃ 2mg/l or less
Outdoor bathing (Organised)	B	・Total Coliforms Organism MPN/100ml Shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more ・Biochemical Oxygen Demand 5 days 20℃ 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	・Total Coliforms Organism MPN/100ml Shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more ・Biochemical Oxygen Demand 5 days 20℃ 3mg/l or less
Propagation of Wild life and Fisheries	D	・pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more ・Free Ammonia(as N)1.2mg/l or less

Irrigation, Industrial Cooling, Controlled Waste disposal	E	・pH between 6.0 to 8.5 ・Electrical Conductivity at 25℃ micro mhos/cm Max.2250 ・Sodium absorption Ratio Mac.26 ・Boron Max.2mg/l
	Below E	・ Not Meeting A,B,C,D&E Criteria

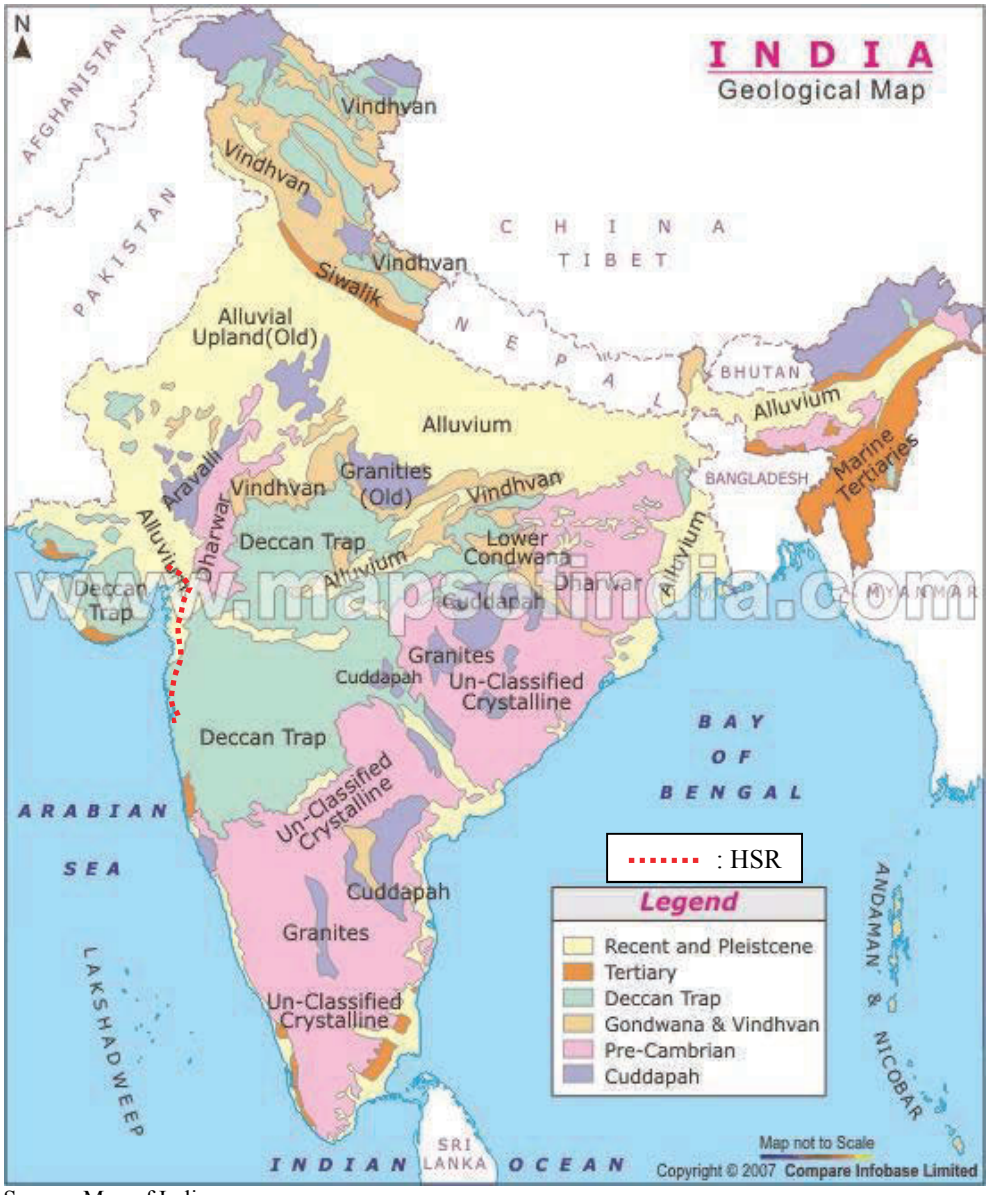
Source: CPCB

7.2.4 Soil Quality

Figure 7.2-5 and Figure 7.2-6 show the geological and soil conditions of Maharashtra State and Gujarat State. In terms of the geology around the proposed route, the Maharashtra State and the southern part of Gujarat State are classified as Deccan Traps. On the other hand, the areas near Vapi and to the north of it have deposits of alluvial and diluvial layers. In terms of the soil around the proposed route, the coast facing the Arabian Sea has red loam and black soil while Ahmedabad, which is inland, has brown soil.

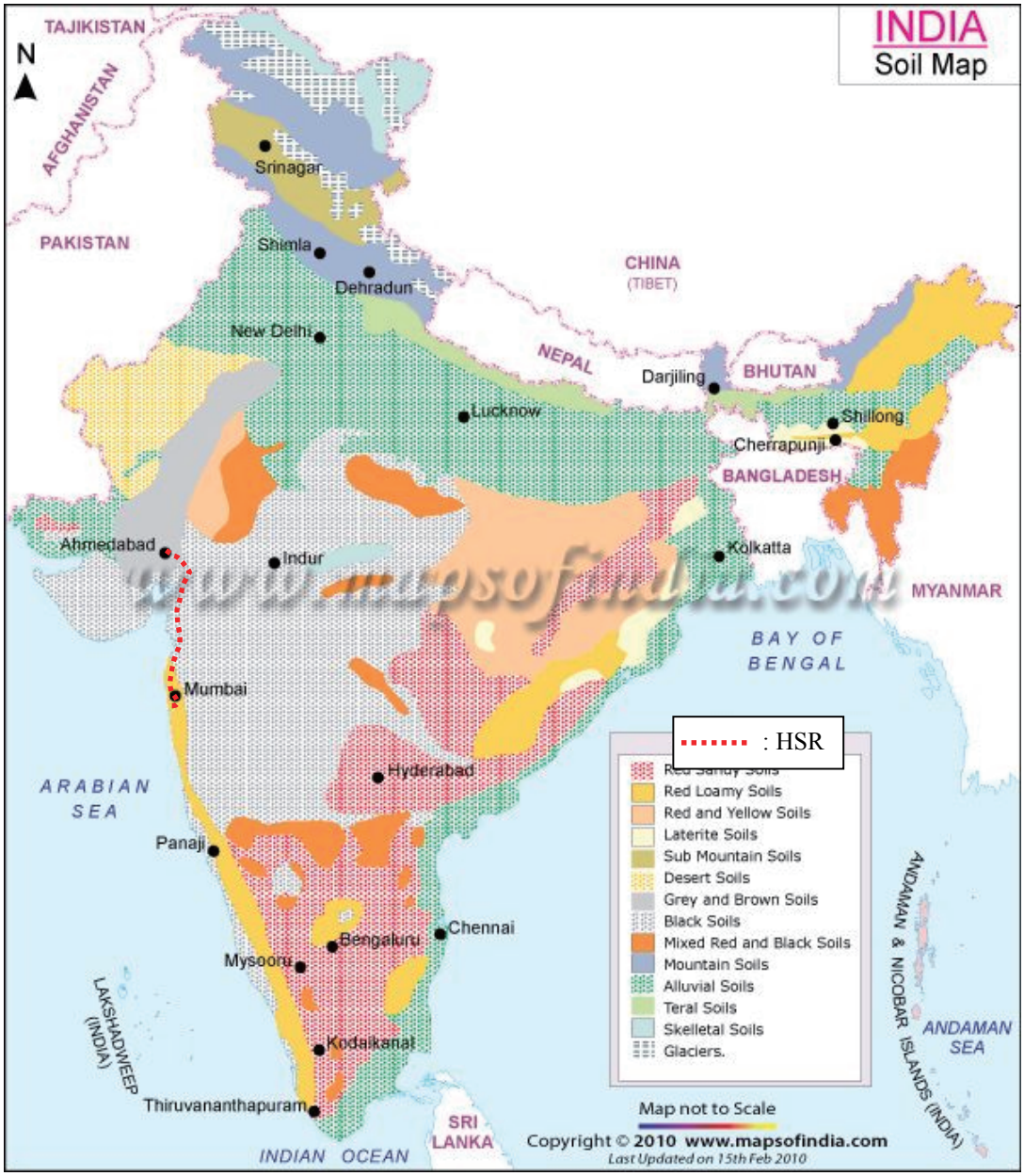
In addition, India is known for wide distribution of black cotton soil (known as Regular soil in India), as shown in Figure 7.2-7. The proposed route will pass through some of those areas.

A characteristic of the soil is that its physical properties change substantially according to its moisture content. In the dry season, the soil will dry up and contract significantly, causing large cracks on the earth's surface. In the rainy season, however, the soil becomes wet and expands, making it sticky and thus sealing the cracks.



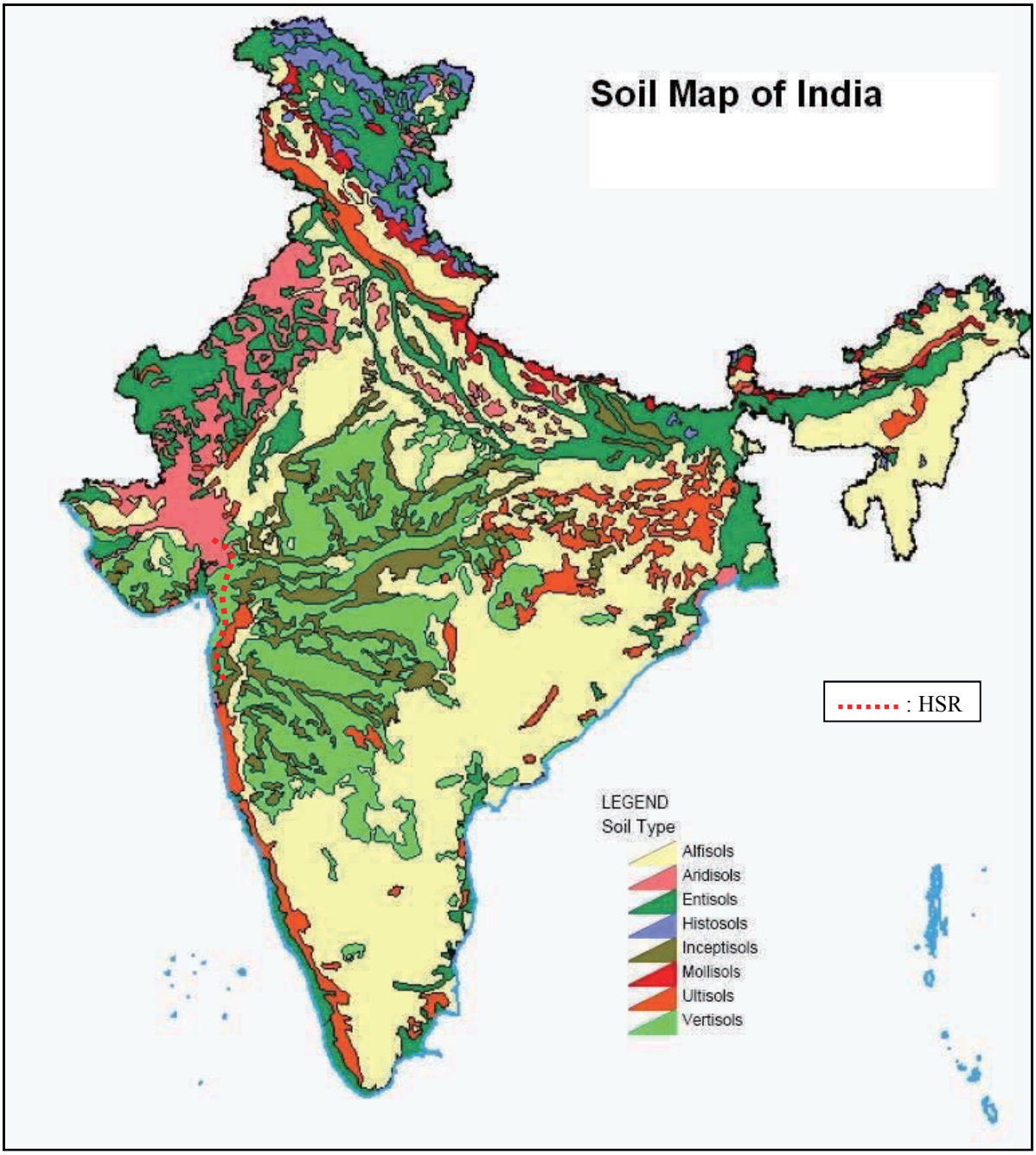
Source: Map of India

Figure 7.2-5 Geological Map



Source: Map of India

Figure7.2-6 Soil Map



Source: National Institute of Hydrology Roorkee, India Homepage

Figure 7.2-7 Distribution of Vertisols

7.2.5 Waste Management

(1) Municipal Solid Wastes

Municipal Solid Wastes (Management & Handling) Rules, 2000 (MSW Rules) are applicable to every municipal authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid. The municipal authority shall comply with these rules as per the implementation schedule laid down in Schedule I shown in Table 7.2-4.

Table 7.2-4 Schedule I (Relates to implementation Schedule)

No.	Compliance Criteria	Schedule
1	Setting up of waste processing and disposal facilities	By 31.12.2003 or earlier
2	Monitoring the performance of waste processing and disposal facilities	Once in six months
3	Improvement of existing landfill sites as per provisions of these rules	By 31.12.2001 or earlier
4	Identification of landfill sites for future use and making site (s) ready for operation	By 31.12.2002 or earlier

Source: Municipal Solid Wastes (Management and Handling) Rules, 2000

1) Management of municipal solid wastes

Any municipal solid waste generated in a city or a town, shall be managed and handled in accordance with the compliance criteria and the procedure laid down in Schedule-II shown in Table 7.2-5.

Table 7.2-5 Schedule II (Specifications Relating to Collection, Segregation, Storage, Transportation, Processing and Disposal of Municipal Solid Waste)

No.	Parameters	Compliance criteria
1	Collection of municipal solid wastes	1. Littering of municipal solid waste shall be prohibited in cities, towns and in urban areas notified by the State Governments. To prohibit littering and facilitate compliance, the following steps shall be taken by the municipal authority, namely: - i. Organising house-to-house collection of municipal solid wastes through any of the methods, like community bin collection (central bin), house-to-house collection, collection on regular pre-informed timings and scheduling by using bell ringing of musical vehicle (without exceeding permissible noise levels); ii. Devising collection of waste from slums and squatter areas or localities including hotels, restaurants, office complexes and commercial areas; iii. Wastes from slaughter houses, meat and fish markets, fruits and vegetable markets, which are biodegradable in nature, shall be managed to make use of such wastes; iv. Bio-medical wastes and industrial wastes shall not be mixed with municipal solid wastes and such wastes shall follow the rules separately specified for the purpose; v. Collected waste from residential and other areas shall be transferred to community bin by hand-driven containerised carts or other small vehicles; vi. Horticultural and construction or demolition wastes or debris shall be separately collected and disposed of following proper norms. Similarly, wastes generated at dairies shall be regulated in accordance with the State laws; vii. Waste (garbage, dry leaves) shall not be burnt; viii. Stray animals shall not be allowed to move around waste storage facilities or at any other place in the city or town and shall be managed in accordance with the State laws. 2. The municipal authority shall notify waste collection schedule and the

		likely method to be adopted for public benefit in a city or town. 3. It shall be the responsibility of generator of wastes to avoid littering and ensure delivery of wastes in accordance with the collection and segregation system to be notified by the municipal authority as per para 1(2) of this Schedule.
2	Segregation of municipal solid wastes	In order to encourage the citizens, municipal authority shall organise awareness programs for segregation of wastes and shall promote recycling or reuse of segregated materials. The municipal authority shall undertake phased program to ensure community participation in waste segregation. For this purpose, the municipal authorities shall arrange regular meetings at quarterly intervals with representatives of local resident welfare associations and non-governmental organizations.
3	Storage of municipal solid wastes	Municipal authorities shall establish and maintain storage facilities in such a manner as they do not create unhygienic and in sanitary conditions around it. Following criteria shall be taken into account while establishing and maintaining storage facilities, namely: - i. Storage facilities shall be created and established by taking into account quantities of waste generation in a given area and the population densities. A storage facility shall be so placed that it is accessible to users; ii. Storage facilities to be set up by municipal authorities or any other agency shall be so designed that wastes stored are not exposed to open atmosphere and shall be aesthetically acceptable and user-friendly; iii. Storage facilities or 'bins' shall have 'easy to operate' design for handling, transfer and transportation of waste. Bins for storage of bio-degradable wastes shall be painted green, those for storage of recyclable wastes shall be printed white and those for storage of other wastes shall be printed black; iv. Manual handling of waste shall be prohibited. If unavoidable due to constraints, manual handling shall be carried out under proper precaution with due care for safety of workers.
4	Transportation of municipal solid wastes	Vehicles used for transportation of wastes shall be covered. Waste should not be visible to public, nor exposed to open environment preventing their scattering. The following criteria shall be met, namely:- i. The storage facilities set up by municipal authorities shall be daily attended for clearing of wastes. The bins or containers wherever placed shall be cleaned before they start overflowing; ii. Transportation vehicles shall be so designed that multiple handling of wastes, prior to final disposal, is avoided.
5	Processing of municipal solid wastes	Municipal authorities shall adopt suitable technology or combination of such technologies to make use of wastes so as to minimize burden on landfill. Following criteria shall be adopted, namely:- (i) The biodegradable wastes shall be processed by composting, vermicomposting, anaerobic digestion or any other appropriate biological processing for stabilization of wastes. It shall be ensured that compost or any other end product shall comply with standards as specified in Schedule-IV; (ii) Mixed waste containing recoverable resources shall follow the route of recycling. Incineration with or without energy recovery including pelletisation can also be used for processing wastes in specific cases. Municipal authority or the operator of a facility wishing to use other state-of-the-art technologies shall approach the Central Pollution Control Board to get the standards laid down before applying for grant of authorization.
6	Disposal of municipal solid wastes	Land filling shall be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing. Land filling shall also be carried out for residues of waste processing facilities as well as pre-processing rejects from waste processing facilities. Land filling of mixed waste shall be avoided unless the same is found unsuitable for waste processing. Under unavoidable circumstances or till installation of alternate facilities, land-filling shall be done following proper norms. Landfill sites

		shall meet the specifications as given in Schedule –III.

Source: Municipal Solid Wastes (Management and Handling) Rules, 2000

(2) Hazardous Waste

List of Waste Constituents with concentration limits shown in Table 7.2-6.

Table 7.2-6 Waste Constituents with Concentration Limits

No.	Constituents	Concentration limit
1	(Iso-and thio-) cyanates	5, 000 mg/kg
2	Acid amides	20, 000 mg/kg
3	Acid anhydride	20, 000 mg/kg
4	Amines	5, 000 mg/kg
5	Ammonia and ammonium compounds	20, 000 mg/kg
6	Anthracene	50 mg/kg
7	Antimony and antimony compounds	50 mg/kg
8	Aromatic compounds other than those listed under A12 to A18	20, 000 mg/kg
9	Arsenic and arsenic compounds	50 mg/kg
10	Asbestos	5, 000 mg/kg
11	Barium compounds except barium sulphate	20, 000 mg/kg
12	Benzene	50 mg/kg
13	Beryllium and beryllium compounds	50 mg/kg
14	Bromates, (hypo-bromites)	20, 000 mg/kg
15	Bromine	5, 000 mg/kg
16	Cadmium and cadmium compounds	50 mg/kg
17	Carcinogenicity, Mutagenecity and Endocrine disruptivity Wastes contaminated or containing established carcinogens, mutagens and endocrine disruptors.	※[1]
18	Chlorates, (hypo-chlorites)	20, 000 mg/kg
19	Chlorine	5, 000 mg/kg
20	Chromium (III) compounds	5, 000 mg/kg
21	Chromium (VI) compounds	50 mg/kg
22	Chrysene, benzo (a) anthracene, fluoranthene, benzo (a) pyrene, benzo (K) fluoranthene, indeno (1, 2, 3-cd) pyrene and benzo (ghi) perylene	50 mg/kg
23	Cobalt compounds	5, 000 mg/kg
24	Copper compounds	5, 000 mg/kg
25	Corrosive Wastes which may be corrosive, by chemical action, will cause severe damage when in contact with living tissue.	※[1]
26	Explosive Wastes which may explode under the effect of flame, heat or photochemical conditions. Any other waste of explosive materials included in the Indian Explosive Act.	※[1]
27	Ferro-silicate and alloys	5, 000 mg/kg
28	Flammable wastes with flash point 65.6o c or below.	※[1]
29	Flourine	5, 000 mg/kg
30	Fluorine compounds	20, 000 mg/kg
31	Halogenated aliphatic compounds	5, 000 mg/kg
32	Halogenated aromatic compounds	50 mg/kg
33	halogenated compounds of aromatic rings, e.g. polychlorinated biphenyls, polychloroterphenyls and their derivatives	50 mg/kg
34	Halogen-containing compounds which produce acidic vapours on contact with humid air or water, e.g. silicon tetrachloride, aluminum chloride, titanium tetrachloride	5, 000 mg/kg
35	Halogen-silanes	5, 000 mg/kg

36	Hydrazine (s)	5, 000 mg/kg
37	Hydrides	50, 000 mg/kg
38	Inorganic cyanide compounds	50 mg/kg
39	Inorganic peroxides	20, 000 mg/kg
40	Inorganic Tin compounds	5, 000 mg/kg
41	Iodates	20, 000 mg/kg
42	Lead and lead compounds	5, 000 mg/kg
43	Manganese-silicate	5, 000 mg/kg
44	Mercaptans	5, 000 mg/kg
45	Mercury and mercury compounds	50 mg/kg
46	Metal carbonyls	50 mg/kg
47	Metal hydrogen sulphates	50, 000 mg/kg
48	Molybdenum compounds	5, 000 mg/kg
49	Napthalene	50 mg/kg
50	Nickel compounds	5, 000 mg/kg
51	Nitrates, nitrites	20, 000 mg/kg
52	Nitrides	50, 000 mg/kg
53	Nitriles	5, 000 mg/kg
54	Organic azo-and azooxy compounds	5, 000 mg/kg
55	Organic nitro-and nitroso-compounds	5, 000 mg/kg
56	Organic nitrogen compounds expressed as nitrogen	50, 000 mg/kg
57	Organic oxygen compounds	50, 000 mg/kg
58	Organic silicone compounds	20, 000 mg/kg
59	Organic sulphur compounds	20, 000 mg/kg
60	Organo phosphorus compounds B13 Organic peroxides	5, 000 mg/kg
61	Organo-chlorine pesticides	50 mg/kg
62	Organo-tin Compounds	50 mg/kg
63	Oxides and hydroxides except those of hydrogen, carbon, silicon, iron, aluminum, titanium, manganese, magnesium, calcium	50, 000 mg/kg
64	Phenanthrene	50 mg/kg
65	Phenol and phenolic compounds	5, 000 mg/kg
66	Phosphate compounds except phosphates of aluminium, calcium and iron	20, 000 mg/kg
67	Salts of per-acids	20, 000 mg/kg
68	Selenium and selenium compounds	50 mg/kg
69	Silver compounds	5, 000 mg/kg
70	Sulphides	20, 000 mg/kg
71	Tellurium and tellurium compounds	50 mg/kg
72	Thallium and thallium compounds	50 mg/kg
73	Total hydrocarbons other than those listed under A12 to A18	50, 000 mg/kg
74	Total Sulphur D2 Inorganic acids	50, 000 mg/kg
75	Toxic Wastes containing or contaminated with established toxic and or eco- toxic constituents.	※[1]
76	Tungsten compounds	5, 000 mg/kg
77	Vanadium compounds	5, 000 mg/kg
78	White and red phosphorus	5, 000 mg/kg
79	Zinc compounds	20, 000 mg/kg

Note: ※[1]: Regardless of concentration limit, Classified as hazardous wastes if the waste exhibits any of the following Characteristics.

Waste constituents and their concentration limits given in this list are based on erstwhile BAGA (the Netherlands Environment Protection Agency) List of Hazardous Substances. In order to decide whether specific wastes listed above is hazardous or not, following points be taken into consideration:

(i): If a component of the waste appears in one of the five risk classes listed above (A,B,C,D) and the concentration of the component is equal to or more than the limit for the relevant risks class, the material is then classified as hazardous waste.

(ii): If a chemical compound containing a hazardous constituent is present in the waste, the concentration limit does not apply to the compound, but only to the hazardous constituent itself.

(iii): If multiple hazardous constituents from the same class are present in the waste, the concentrations are added together.
(iv): If multiple hazardous constituents from different classes are present in the waste, the lowest concentration limit corresponding to the constituent(s) applies.
(v): For determining the concentration of the hazardous constituents in the waste "Toxicity Characteristics Leaching Procedure (TCLP) as per ASTM-D5233-92 should be adopted.
Source: Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008

(3) Waste Treatment Plant

List of Waste Treatment Plant installed enroute proposed Alignment shown in Table 7.2-7.

Table 7.2-7 List of Waste Treatment Plant installed Enroute Proposed Alignment

Location	Capacity	Type of Plant
Vadodara Municipal Corporation, Vadodara, Gujarat	52,000 m^3/day	Sewage Treatment Plant at Tarsali for combined domestic sewage and industrial waste water.
Baroda Municipal Corporation, Baroda, Gujarat.	28,000 m^3/day	Sewage Treatment Plant at Wadi for combined domestic sewage and industrial waste water
Baroda Municipal Corporation, Baroda, Gujarat.	9,000 m^3/day	Sewage Treatment Plant at Tarsali for combined domestic sewage and industrial waste water.
City and Industrial Development Corporation, Vashi - New Bombay, Maharashtra.	4,500 m^3/day	Sewage Treatment plant.
Krishak Bharati Co-operative Limited (KRIBHCO), Hazira, Surat	3,000 m^3/day	Sewage Treatment plant.
Gujarat Narmada Valley Fertilizers Co. Ltd., Bharuch, Gujarat.	1,200 m^3/day	Sewage Treatment Plant for GNFC Township.
Gujarat Narmada Auto Limited. Chanderia, Bharuch, Gujarat.	350 m^3/day	Sewage Treatment plant.
M/s. IOT Infrastructure & Energy Services Limited, (for CAIRN Energy India Ltd., BARMER TO SALAYA PIPELINE Project, Viramgam, Gujarat), Mumbai	72 m^3/day	Sewage Treatment plant.
Kvearner, Bharuch	2.5 m^3/day	Sewage Treatment plant.
Bajuwa Gram Panchayat, Baroda, Gujarat.	1000 m^3/day	Sewage Treatment plant.
Pirana, Ahmedabad	106 MLD	Sewage Treatment plant.
Vasna, Ahmedabad	126 MLD	Sewage Treatment plant.
Atladara, Vadodara	86 MLD	Sewage Treatment plant.
Tarsali, Vadodara	52 MLD	Sewage Treatment plant.
Gajarwadi, Vadodara	66 MLD	Sewage Treatment plant.
Anjana, Surat	82.5 MLD	Sewage Treatment plant.
Bhatar, Surat	120 MLD	Sewage Treatment plant.
Singanapore, Surat	100 MLD	Sewage Treatment plant.
Adharwadi, Kalyan	16 MLD	Sewage Treatment plant.
Triambak, Nashik	22 MLD	Sewage Treatment plant.
Nashik	78 MLD	Sewage Treatment plant.

Kopri ,Thane	54 MLD	Sewage Treatment plant.
Surat Municipal Corporation	200 TPD	Solid Waste
Gujarat Urban Development Corporation (GUDC), Ahmedabad	200 TPD	Solid Waste
Surat Municipal Corporation	600 TPD	Solid Waste
Aurangabad Municipal Corporation(AMC)	360 MT/ day.	Solid Waste
Nanded Waghala City Municipal Corporation	250 TDP	Solid Waste
Municipal Corporation of Greater Mumbai (MCGM)	600 TPD	Solid Waste
Ahmedabad	1.11 miliion Tonne per annum	Solid Waste
Vadodara	1.11 miliion Tonne per annum	Solid Waste
Surat	1.11 miliion Tonne per annum	Solid Waste
Vapi	1.11 miliion Tonne per annum	Solid Waste
Mulund	650 MT/Month	Solid Waste
Deonar	650 MT/Month	Solid Waste
Kanjur	650 MT/Month	Solid Waste
Navi Mumbai-Turbine Municipal Solid Waste Processing Waste Disposal Facility	650 MT/Month	Solid Waste
Thane-Diaghar	650 MT/Month	Solid Waste
Mira-Bhayander (Thane)	315 MT/Month	Solid Waste
Vasai-Virar	Gokhiware village-550 MT/Month	Solid Waste
Kalyan-Dombivali	Village-Umbarde- 550 MT/Month	Solid Waste
Ulhasnagar	500 MT/Month	Solid Waste
Bhiwandi Nizampur City	Dapode village-300 MT/Month	Solid Waste

Source: CPCB

7.2.6 Noise and Vibration

(1) Noise

Noise from an HSR system is expressed in terms of a "source path receiver" framework. The "source" generates noise levels that depend on the type of source (e.g., a high speed rail) and its operating characteristics (e.g., speed). Noise standards in India are shown in Table 7.2-8 which is from "The Noise (Regulation and Control) Rules".

Table 7.2-8 Noise Standards in India

Area Code	Category of Area/Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
(a)	Industrial area	75	70
(b)	Commercial area	65	55
(c)	Residential area	55	45
(d)	Silence Zone	50	40

Note: 1. Day time shall mean from 6.00a.m.to 10.00p.m.

2. Night time shall mean from 10.00p.m.to 6.00am.
3. Silence zone is an area comprising not less than 100 meters around hospitals, educational insti tutions, courts, religious places or any other area which is declared as such by the competent aut hority
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.
Source: CPCB

Existing information of noise in Maharashtra is shown in Table 7.2-9.

Table 7.2-9 Existing Data of Noise in Maharashtra

No.	Monitoring Site	Day Time (6a.m.-10p.m.) values in dB(A)				Night Time (10p.m.-6a.m.) Values in dB(A)			
		L_{eq}	L_{10}	L_{50}	L_{90}	L_{eq}	L_{10}	L_{50}	L_{90}
1) Mumbai:									
1	High Court	**74.8**	70.5	75.5	78.9	**53.3**	43.2	48.7	69.7
2	Mumbadevi	**70.5**	66.8	71.7	73.9	**56.2**	51.1	52.8	67.2
3	Borivali National Park	**72.5**	65.1	73.9	79.6	**71.5**	65.5	69.3	79.8
4	An top Hill	**73.3**	67.8	74.0	78.1	**59.0**	55.0	57.3	64.8
5	Shivaji Park	**68.4**	62.1	68.2	75.4	**53.2**	48.8	53.3	56.8
6	Santacruz Airport	**74.8**	67.6	74.9	80.2	**71.6**	69.9	70.9	74.6
7	Ghatkopar	**70.1**	64.0	70.5	74.7	**65.5**	61.8	65.7	68.4
8	Vashi Naka	**81.0**	76.6	81.4	86.5	**71.3**	67.1	71.0	75.8
9	Goregon	73.8	65.2	72.4	82.1	52.1	42.8	52.4	61.1
10	Charkop	69.0	59.4	66.6	80.0	58.7	55.5	58.7	61.8
2) Pune:									
1	Nucleus Mall	**74.4**	78.2	74.1	70.9	**71.7**	74.9	70.2	69.6
2	Pune University	**74.6**	78.0	73.7	71.7	**72.4**	74.2	72.5	70.3
3	Kakade Angan	**71.9**	74.3	71.1	70.1	**65.0**	69.8	63.3	62.0
3) Nashik:									
1	Dwarka Circle	**78.0**	84.6	76.6	72.4	**72.1**	78.4	72.2	66.1
2	Pandit Colony	**67.3**	76.8	64.9	60.5	**66.7**	70.7	66.7	62.2
3	Pavan Nagar	**71.1**	86.8	67.6	63.9	**68.0**	73.4	68.5	62.2
4) Aurangabad:									
1	Ghati Hospital	**67.3**	71.3	68.0	62.3	**51.8**	57.7	50.9	45.9
2	Nirala Bazaar, Samarth Nagar	**68.4**	71.2	68.7	65.7	**61.7**	64.9	61.9	57.6
3	CIDCO N-4	**64.1**	66.8	64.4	61.0	**54.1**	57.2	54.1	50.9
5) Nagpur:									
1	Govt. Medical College	**65.7**	69.6	66.3	61.7	**49.7**	54.3	48.4	46.3
2	Sitabardi Police Station	**70.9**	73.0	70.7	68.4	**63.5**	71.9	62.7	57.7
3	Shivaji Nagar	**66.1**	68.5	66.3	62.5	**56.7**	61.7	54.8	53.2
6) Kolhapur:									
1	Collector Office	**55.6**	63.1	55.7	47.0	48.4	51.9	47.1	45.9
2	Shahupuri	**71.9**	77.0	72.6	66.6	53.3	61.0	51.4	46.8
3	Dasara Chowk	**63.9**	67.1	65.7	58.7	**51.0**	56.3	49.4	46.9

Note: 1. Measurement of the day time were carried out in the December 15, 2012

2. Measurement of the night time were carried out between December 15 to 16, 2012
3: Those that exceed the noise standard in India are shown in **bold**
Source: REPORT ON AMBIENT NOISE MONITORING IN METROPOLITON CITY – 2012

Existing information of noise in Gujarat is shown in Table 7.2-10. In Gujarat the main sources of noise are the equipment used during handling and transportation. The noise level is also monitored at the location fall in buffer and core region. Noise level is monitored with the Noise level meter.

Table 7.2-10 Existing Data of Noise in Gujarat

No.	Monitoring Site	Day Time (6AM-10PM) values in dB(A)		Night Time (10PM-6AM) Values in dB(A)	
		Quarterly:Jan.-13 to March-13	Quarterly:April.-13 to June-13	Quarterly:Jan.-13 to March-13	Quarterly:April.-13 to June-13
1	Lignite cutting area	63.0	64.0	59.0	61.0
2	Overburden cutting area	65.0	65.0	59.0	61.0
3	Overburden dumping area	62.0	61.0	56.0	58.0
4	Mines boundary/Peripheral mines haul road	60.0	58.0	53.0	56.0
5	Mine Site Office	59.0	52.0	55.0	49.0
6	Vastan Village (within core zone)	54.0	53.0	52.0	51.0
7	Surali Village	57.0	55.0	53.0	52.0
8	Nani Naroli/Tadkeshwar Village	58.0	59.0	54.0	56.0

Note: Exceeds the noise standard in India for Gujarat is unknown
Source: The Study Team based on Gujarat Industries Power Company Limited

(2) Vibration

Vibration from an HSR system is also expressed in terms of a "source path receiver" fr amework. The "source" is the train rolling on the tracks, which generates vibration ener gy transmitted through the supporting structure under the tracks and into the ground. In India, standards for vibration have not been established in India. Therefore, several inter national and national standards as shown in Table 7.2-11, Table 7.2-12, Table 7.2-13 an d Table 7.2-14 are applied to this Project.

Table 7.2-11 International and National Standards for Vibration (1)

Key Feature	International standards[1] ISO 2631-1:1997, ISO 2631-2:2003	Austria ÖNORM S 9012:2010	Germany[2] DIN 4150-2:1999
Scope	Whole-body vibration: continuous and shock-induced vibration in buildings	Land-based transport vibration in buildings (vibration and structure borne) noise)	Effects of vibrations on people in building
Frequency range	1-80 Hz	1-80 Hz	1-80 Hz
Frequency weighting	W_m (recommended)	W_m	Close to W_m (DIN 45669-1)
Time constant	Slow (1s) recommended	Slow (1s)	Fast (0.125s)

Measured quantity	Acceleration	Acceleration	Velocity
Indicator	· r.m.s. weighted value · Maximum transient vibration value (running r.m.s.) · Vibration dose value	· Maximum acceleration E_{max} · Mean equivalent acceleration E_r	· Maximum weighted vibration strength KB_{Fmax} · Mean vibration strength KB_{FTr}
Measurement	In the direction of the highest amplitude	Where the amplitude is the highest (usually on floor at mid-span) In bedrooms near the bed	Three directions (x, y, z) Floor where the highest amplitude can be observed

Note 1: As far as human response to railway-induced vibrations in buildings is concerned, the mentioned features are found in the general Part 1 and/or in the specific Part 2 of ISO 2631 as well as in ISO 8041:2005 (and its 2007 corrigendum). ISO 14837-1:2005 gives no further precision.
Note 2: The Swiss directive BEKS: 1999 (Assessment of vibration and structure-borne noise from railway traffic) also refers to DIN 4150-2.
Source: International Union of Railways (UIC)

Table 7.2-12 International and National Standards for Vibration (2)

Key Feature	Italy[1] UNI 9614:1990	Japan[2] Vibration regulation law	The Netherlands SBR Richtlijn – Deel B (2002)
Scope	Vibrations and shocks: comfort in buildings	Environmental vibration	Guidelines for the measurement and the assessment of vibrations: nuisance for people in buildings
Frequency range	1-80 Hz	1-80 Hz	1-80 Hz
Frequency weighting	W_m	Vertical (W_k) and horizontal (W_d)	DIN 45669-1:1995 (close to Wm)
Time constant	Slow (1s)	0.63s	Fast (0.125s)
Measured quantity	Acceleration	Ground acceleration	Velocity
Indicator	Maximum weighted r.m.s. acceleration value or level (dB re 10^{-6} m/s²)	acceleration level L_V (running weighted r.m.s. value): $LLV = 20 \lg aa/aa0$ re 10^{-5} m/s²	·Statistical (95-percentile) maximum vibration strength V_{max} ·Mean vibration strength V_{per}
Measurement	Where the amplitude is the highest (usually on floor at mid-span)	-	Three directions (x, y, z) with horizontal x- and y-axes parallel to walls as much as possible

Note 1: See also ISO 2631-2:1989.
Note 2: See also JIS C 1510:1995 and comments.
Source: UIC

Table 7.2-13 International and National Standards for Vibration (3)

Key Feature	Norway NS 8176:2005	Spain Real Decreto 1307/2007	Sweden[1] SS 460 48 61:1992
Scope	Land-based transport: comfort in building	Noise regulation (zoning, quality and emissions)	Vibrations and shocks: evaluation of comfort in buildings
Frequency range	0.5-160 Hz	1-80 Hz	1-80 Hz
Frequency weighting	Wm	Wm	Wm
Time constant	Slow (1s)	Slow (1s)	Slow (1s)
Measured quantity	Velocity or acceleration	Acceleration	Acceleration or velocity

Indicator	Statistical 95-percentile weighted velocity $v_{w,95}$ or acceleration $a_{w,95}$	Maximum weighted r.m.s. acceleration level L_{aw} : $L_{aw} = 20 \lg a_w/a_0$ re 10^{-6} m/s²	Maximum weighted r.m.s. value (acceleration or velocity level): $L_{aw} = 20 \lg a_w/a_0$ re 10^{-6} m/s² $L_{vw} = 20 \lg v_w/v_0$ re 10^{-9} m/s
Measurement	Where the amplitude is the highest (usually on floor at mid-span)	Where the vibration is most annoying in the dominant direction if identified; otherwise in all directions for the total resultant vibration value	Three directions (x, y, z) or if known, in the direction of maximum amplitude (often at mid span of the longest-span floor)

Note 1: See also Dnr.S02-4235/SA60 and Nordtest method NT ACOU 082.
Source: UIC

Table 7.2-14 International and National Standards for Vibration (4)

Key Feature	United Kingdom[1] BS 6472-1:2008	USA FRA (2005), FTA (2006)
Scope	Human exposure to vibration in buildings (sources other than blasting)	Guidance manuals on noise and vibration impact assessment (transit and high-speed rail projects)
Frequency range	0.5-80 Hz	-
Frequency weighting	W_b (vertical motion) or W_d (horizontal motion)	None
Time constant	-	Slow (1s)
Measured quantity	Acceleration	Velocity
Indicator	Vibration dose value	·General Assessment: maximum running r.m.s. velocity level Lv (VdB) $L_v = 20 \lg v_w/v_{ref}$ re 10^{-6} in/s · Detailed Analysis: maximum velocity level in one-third octave bands
Measurement	Highest expected level Central part of the floor (one or two measurements)	Near the centre of a floor span where the vibration amplitude are the highest

Note 1: See also BS 6841:198
Source: UIC

7.2.7 Ground Subsidence

Ground subsidence is the sinking or settling of the ground surface. The subsidence along the HSR would cause subsidence damage and give rise to huge security risk especially to this 300-330 km/h HSR. Detecting the subsidence of railway, therefore, is a very important task. Percentage Distribution of Black Cotton Soil in the proposed Alignment is shown in the Table 7.2-15. It is evident from the above that most of the stretches of the proposed alignment either passes through the basaltic rock or black cotton soil. The abstraction of ground water is also minimal in the cities where the stations have been proposed. Only concern pertaining to ground subsidence/land subsidence is the stretch of Konakn, where the history says that there have been several instances of rock sliding causing the train disruption. Another concern is the proposed tunnel in the Mumbai of about 21.2 km which will be carried out in the basaltic rock.

Table 7.2-15 Percentage of Black Cotton Soil in the proposed Alignment

Section	Percentage (%)
Mumbai - Thane	75%
Thane - Virar	30%
Virar - Boisar	65%
Boisar - Vapi	30%
Vapi - Bilimora	100%
Bilimora - Surat	90%
Surat - Bharuch	55%
Bharuch - Vadodara	90%
Vadodara - Anand / Nadiad	30%
Anand / Nadiad - Ahmedabad	85%
Ahmedabad - Sabarmati	0%

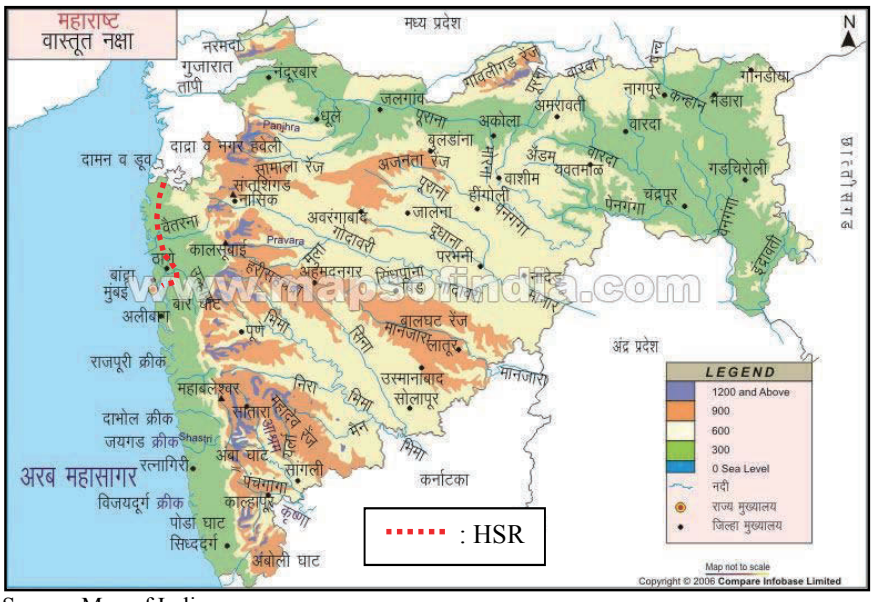
Source: National Bureau of Soil Survey and Land Use Planning

7.2.8 Offensive Odors

Offensive Odor problem was not encountered at any location along the proposed alignment. During construction phase due to nearby flowing drain and rivulets it may be encountered, particularly in the cities like Mumbai, Thane, Virar, Bharuch, Surat, Ahmedabad. Cleanliness shall be maintained at construction sites during the construction phase and at the proposed stations, maintenance depots during the operation phase to avoid any foul odor.

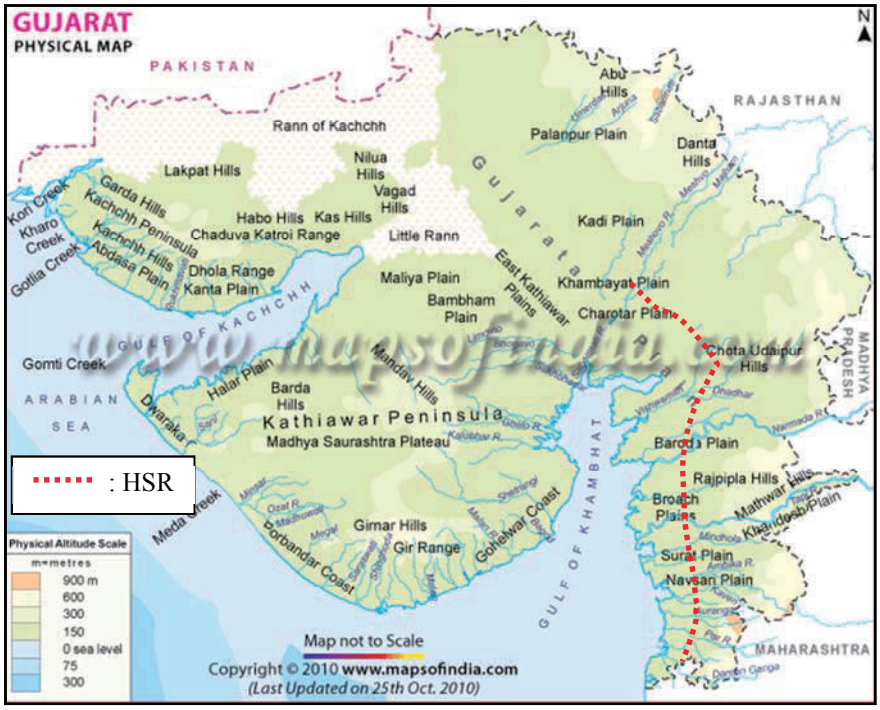
7.2.9 Topography

Figure 7.2-8 and Figure 7.2-9 show the terrain conditions of Maharashtra and Gujarat States. The proposed route is located on the plain facing the Arabian Sea. However, there is hilly terrain in the north to south direction from Mumbai up to approximately 100km north of it. This section is an elongated plain sandwiched between the Arabian Sea and the hilly terrain.
As mentioned above, there are many large-scale rivers in the Mumbai–Ahmedabad section, the project area of the proposed route. The delta areas at the estuaries are well developed.



Source: Map of India

Figure 7.2-8 Physical Map (Maharashtra State)



Source: Map of India

Figure 7.2-9 Physical Map (GUJARAT State)

7.2.10 Bottom Sediment

Bottom sediments comprise of particles that have been transported by water and air and deposited on a floor of river in addition the deposited particles some more particulate matter is added up by the chemical and biological processes. The median particle diameter is chosen for texture size selection because it is used in empirical relations to predict other soil properties, and as such is a useful parameter to know. Particles are grouped according to their size into what are called soil separates. The smallest particles are clay particles and are classified by the United States Department of Agriculture (USDA) as having diameters of less than 0.002 mm. Texture is combination of the most abundant particle sizes. The classification of the soil on the basis of USDA is presented in Table 7.2-16.

On the basis of the soil texture classification of USDA, most of the soil at bridges construction site falls under the category of fine sand. Few sites come under category of very coarse sand.

Table 7.2-16 Soil Classification Based on Size

Soil	Diameter in mm
Clay	Less than 0.002
Silt	0.002-0.05
Ver fine Sand	0.05-0.10
Fine Sand	0.10-0.25
Medium Sand	0.25-0.50
Coarse Sand	0.50-1.00
Very Coarse Sand	1.00-2.00

Source: USDA

7.2.11 Biota and Ecosystem

India has rich diversity of flora and fauna like the diverse culture, religion, climate and soil. The Indian flora and fauna are an eye candy for the nature lovers. Nearly 23.68 per cent of the gross physical area of India is covered under forest. The forest types vary from region to region and each one has some unique features, be flora or fauna, both terrestrial and aquatic, and estuarine

ecosystems. The Indian flora and fauna include around 15,000 species of flowering plants, 400 species of mammal, 1250 species of bird, 10,000 species of insect, 2546 species of fish, 197 species of amphibian and 408 reptile species. The entire stretch of the proposed alignment can be divided into two segments in accordance with the ecological characteristics of the region. The first stretch falling in the Maharashtra region shows rich diversity comprising of National Parks (NP), Ecological Sensitive Zones (ESZ) like Dahanu, Wildlife Sanctuary (WLS), forests, creek, mangroves whereas, the stretch falling in Gujarat region comprises of mainly agricultural land with flat topography. The study area is delineated 250 m either side from centerline of the proposed HSR Corridor. Mangroves are found scattered along the fringes of the Ulhas and Vaitarni rivers and mouth of the estuary. Mangroves are the evergreen forests having restricted distribution to coasts only rather endemic to coastal areas. Their plant species accumulates the toxic air pollutants whereas animal population consumes organic waste. They are particularly valuable as repositories of many unique varieties of flora and fauna. The mangroves are transitional ecosystem between land and sea. The represent combine status of adjoining ecosystems. Most of the land in the study area (Zone of Influence) is used for agriculture and horticultural practices.

(1) IUCN Red List of Wild Lives

The International Union for the Conservation of Nature (IUCN) or Wildlife Conservation Society (WCS) has categorized some of the wild life species of Maharashtra and Gujarat States as presented on Table 7.2-17 and Table 7.2-18 for fauna, and Table 7.2-19 and Table 7.2-20 for flora respectively. To conduct a detailed investigation in the future.

Table 7.2-17 IUCN Red List of Wild Lives (Fauna)

No.	Class	Order	Family	Scientific Name	Rank	Area
1	ACTINOPTERYGII	CYPRINIFORMES	COBITIDAE	*Botia striata*	EN	MH
2	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Devario fraseri*	VU	MH
3	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Hypselobarbus kolus*	VU	MH
4	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Hypselobarbus mussullah*	EN	MH
5	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Labeo potail*	EN	MH
6	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Osteobrama bhimensis*	EN	MH
7	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Parapsilorhynchus discophorus*	VU	MH
8	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Parapsilorhynchus elongatus*	EN	MH
9	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Parapsilorhynchus prateri*	CR	MH
10	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Puntius deccanensis*	CR	MH
11	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Puntius fraseri*	EN	MH
12	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Salmophasia horai*	VU	MH
13	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Schismatorhynchos nukta*	EN	MH
14	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Thynnichthys sandkhol*	EN	MH
15	ACTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Tor khudree*	EN	MH
16	ACTINOPTERYGII	SILURIFORMES	ARIIDAE	*Arius gagora*	NT	MH

17	ACTINOPTERYGII	SILURIFORMES	BAGRIDAE	*Mystus malabaricus*	NT	MH
18	ACTINOPTERYGII	SILURIFORMES	SCHILBEIDAE	*Silonia childreni*	EN	MH
19	ACTINOPTERYGII	SILURIFORMES	SILURIDAE	*Pterocryptis wynaadensis*	EN	MH
20	ACTINOPTERYGII	SILURIFORMES	SISORIDAE	*Gagata itchkeea*	VU	MH
21	ACTINOPTERYGII	SILURIFORMES	SISORIDAE	*Glyptothorax madraspatanus*	EN	MH
22	ACTINOPTERYGII	SILURIFORMES	SISORIDAE	*Glyptothorax poonaensis*	EN	MH
23	ACTINOPTERYGII	SILURIFORMES	SISORIDAE	*Glyptothorax trewavasae*	VU	MH
24	ACTINOPTERYGII	SYNBRANCHIFORMES	SYNBRANCHIDAE	*Monopterus indicus*	VU	MH
25	AMPHIBIA	ANURA	BUFONIDAE	*Xanthophryne tigerina*	CR	MH
26	ARACHNIDA	ARANEAE	THERAPHOSIDAE	*Thrigmopoeus truculentus*	NT	MH
27	CHONDRICHTHYES	CARCHARHINIFORMES	CARCHARHINIDAE	*Lamiopsis temmincki*	EN	Both
28	CHONDRICHTHYES	CARCHARHINIFORMES	HEMIGALEIDAE	*Chaenogaleus macrostoma*	VU	GJ
29	CHONDRICHTHYES	CARCHARHINIFORMES	SPHYRNIDAE	*Sphyrna mokarran*	EN	Both
30	CHONDRICHTHYES	LAMNIFORMES	LAMNIDAE	*Isurus oxyrinchus*	VU	MH
31	CHONDRICHTHYES	ORECTOLOBIFORMES	HEMISCYLLIIDAE	*Chiloscyllium arabicum*	NT	GJ
32	CHONDRICHTHYES	RAJIFORMES	MOBULIDAE	*Manta birostris*	VU	Both
33	CTINOPTERYGII	CYPRINIFORMES	CYPRINIDAE	*Garra bicornuta*	NT	MH
34	GASTROPODA	LITTORINIMORPHA	LITTORINIDAE	*Cremnoconchus carinatus*	EN	MH
35	GASTROPODA	LITTORINIMORPHA	LITTORINIDAE	*Cremnoconchus conicus*	VU	MH
36	HOLOTHUROIDEA	ASPIDOCHIROTIDA	HOLOTHURIIDAE	*Holothuria fuscogilva*	VU	Both
37	MAMMALIA	RODENTIA	MURIDAE	*Millardia kondana*	CR	MH
38	REPTILIA	SQUAMATA	GEKKONIDAE	*Cnemaspis indraneildasii*	VU	MH
39	REPTILIA	SQUAMATA	GEKKONIDAE	*Hemidactylus albofasciatus*	VU	MH
40	REPTILIA	SQUAMATA	GEKKONIDAE	*Hemidactylus gujaratensis*	VU	GJ
41	REPTILIA	SQUAMATA	GEKKONIDAE	*Hemidactylus sataraensis*	VU	MH
42	REPTILIA	SQUAMATA	SCINCIDAE	*Eurylepis poonaensis*	EN	MH
43	REPTILIA	SQUAMATA	UROPELTIDAE	*Uropeltis bicatenata*	NT	MH
44	REPTILIA	SQUAMATA	UROPELTIDAE	*Uropeltis phipsonii*	VU	MH
45	REPTILIA	TESTUDINES	CHELONIIDAE	*Chelonia mydas*	EN	GJ
46	REPTILIA	TESTUDINES	TRIONYCHIDAE	*Nilssonia leithii*	VU	MH

Note: Area
Both: Both states
MH: Only Maharashtra

GJ: Only Gujarat
Source: IUCN Red List 2013

Table 7.2-18 Summary Sheet on Red List Rank Basis (Fauna)

	Habitat	RANK					
		DD	LC	NT	VU	EN	CR
Species	Both states	11	76	-	2	2	-
	Maharashtra	28	147	5	2	15	4
	Gujarat	2	12	1	14	1	-
	Total	**41**	**235**	**6**	**18**	**18**	**4**

Note: Rank
CR: Critically Endangered
EN: Endangered
VU: Vulnerable
NT: Near Threatened
LC: Least Concern
DD: Data Deficient
Source: IUCN Red List 2013

Table 7.2-19 IUCN Red List of Wild Lives (Flora)

No.	Class	Order	Family	Scientific Name	Rank	Area
1	ISOETOPSIDA	ISOETALES	ISOETACEAE	*Isoetes panchganiensis*	EN	MH
2	LILIOPSIDA	ARALES	ARACEAE	*Cryptocoryne cognata*	EN	MH
3	LILIOPSIDA	ARECALES	PALMAE	*Hyphaene dichotoma*	NT	Both
4	LILIOPSIDA	CYPERALES	GRAMINEAE	*Dimeria hohenackeri*	EN	MH
5	LILIOPSIDA	CYPERALES	GRAMINEAE	*Glyphochloa santapaui*	VU	MH
6	LILIOPSIDA	CYPERALES	GRAMINEAE	*Hubbardia heptaneuron*	VU	MH
7	LILIOPSIDA	CYPERALES	GRAMINEAE	*Isachne bicolor*	VU	MH
8	LILIOPSIDA	CYPERALES	GRAMINEAE	*Isachne meeboldii*	CR	MH
9	LILIOPSIDA	CYPERALES	GRAMINEAE	*Isachne swaminathanii*	EN	MH
10	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon bolei*	CR	MH
11	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon dalzellii*	EN	MH
12	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon kolhapurense*	VU	MH
13	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon konkanense*	VU	MH
14	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon maharashtrense*	VU	MH
15	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon ratnagiricum*	CR	MH
16	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon rouxianum*	CR	MH
17	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon santapaui*	CR	MH
18	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon sharmae*	CR	MH
19	LILIOPSIDA	ERIOCAULALES	ERIOCAULACEAE	*Eriocaulon tuberiferum*	VU	MH
20	LILIOPSIDA	NAJADALES	APONOGETONACEAE	*Aponogeton bruggenii*	VU	MH
21	LILIOPSIDA	NAJADALES	APONOGETONACEAE	*Aponogeton satarensis*	EN	MH
22	LILIOPSIDA	ZINGERBERALES	ZINGIBERACEAE	*Curcuma caulina*	EN	MH
23	MAGNOLIOPSIDA	ASTERALES	COMPOSITAE	*Gynura travancorica*	NT	MH

24	MAGNOLIOPSIDA	FABALES	LEGUMINOSAE	*Cajanus cajanifolius*	NT	Both
25	MAGNOLIOPSIDA	FABALES	LEGUMINOSAE	*Chamaecrista kolabensis*	EN	MH
26	MAGNOLIOPSIDA	FABALES	LEGUMINOSAE	*Dalbergia congesta*	EN	Both
27	MAGNOLIOPSIDA	FABALES	LEGUMINOSAE	*Eleiotis rottleri*	VU	Both
28	MAGNOLIOPSIDA	FABALES	LEGUMINOSAE	*Rhynchosia heynei*	VU	Both
29	MAGNOLIOPSIDA	FABALES	LEGUMINOSAE	*Vigna khandalensis*	NT	Both
30	MAGNOLIOPSIDA	GENTIANALES	APOCYNACEAE	*Tabernaemontana heyneana*	NT	MH
31	MAGNOLIOPSIDA	MAGNOLIALES	MYRISTICACEAE	*Myristica malabarica*	VU	MH
32	MAGNOLIOPSIDA	MALVALES	ELAEOCARPACEAE	*Elaeocarpus munronii*	NT	MH
33	MAGNOLIOPSIDA	MYRTALES	LYTHRACEAE	*Ammannia nagpurensis*	EN	MH
34	MAGNOLIOPSIDA	MYRTALES	LYTHRACEAE	*Rotala ritchiei*	EN	MH
35	MAGNOLIOPSIDA	MYRTALES	LYTHRACEAE	*Rotala floribunda*	VU	MH
36	MAGNOLIOPSIDA	PODOSTEMALES	PODOSTEMACEAE	*Dicraeia dichotoma*	NT	MH
37	MAGNOLIOPSIDA	SAPINDALES	ANACARDIACEAE	*Nothopegia castanaefolia*	CR	MH
38	MAGNOLIOPSIDA	SCROPHULARIALES	LENTIBULARIACEAE	*Utricularia albocaerulea*	VU	MH
39	MAGNOLIOPSIDA	SCROPHULARIALES	LENTIBULARIACEAE	*Utricularia praeterita*	NT	MH
40	MAGNOLIOPSIDA	THEALES	DIPTEROCARPACEAE	*Hopea ponga*	EN	MH

Note: Area
Both: Both states
MH: Only Maharashtra
GJ: Only Gujarat
Source: IUCN Red List 2013

Table 7.2-20 IUCN Red List of Wild Lives (Flora)

Species	Habitat	RANK					
		DD	LC	NT	VU	EN	CR
	Both states	8	107	3	2	1	-
	Maharashtra	8	203	5	11	11	7
	Gujarat	2	22	-	-	-	-
	Total	**18**	**332**	**8**	**13**	**12**	**7**

Note: Rank
CR: Critically Endangered
EN: Endangered
VU: Vulnerable
NT: Near Threatened
LC: Least Concern
DD: Data Deficient
Source: IUCN Red List 2013

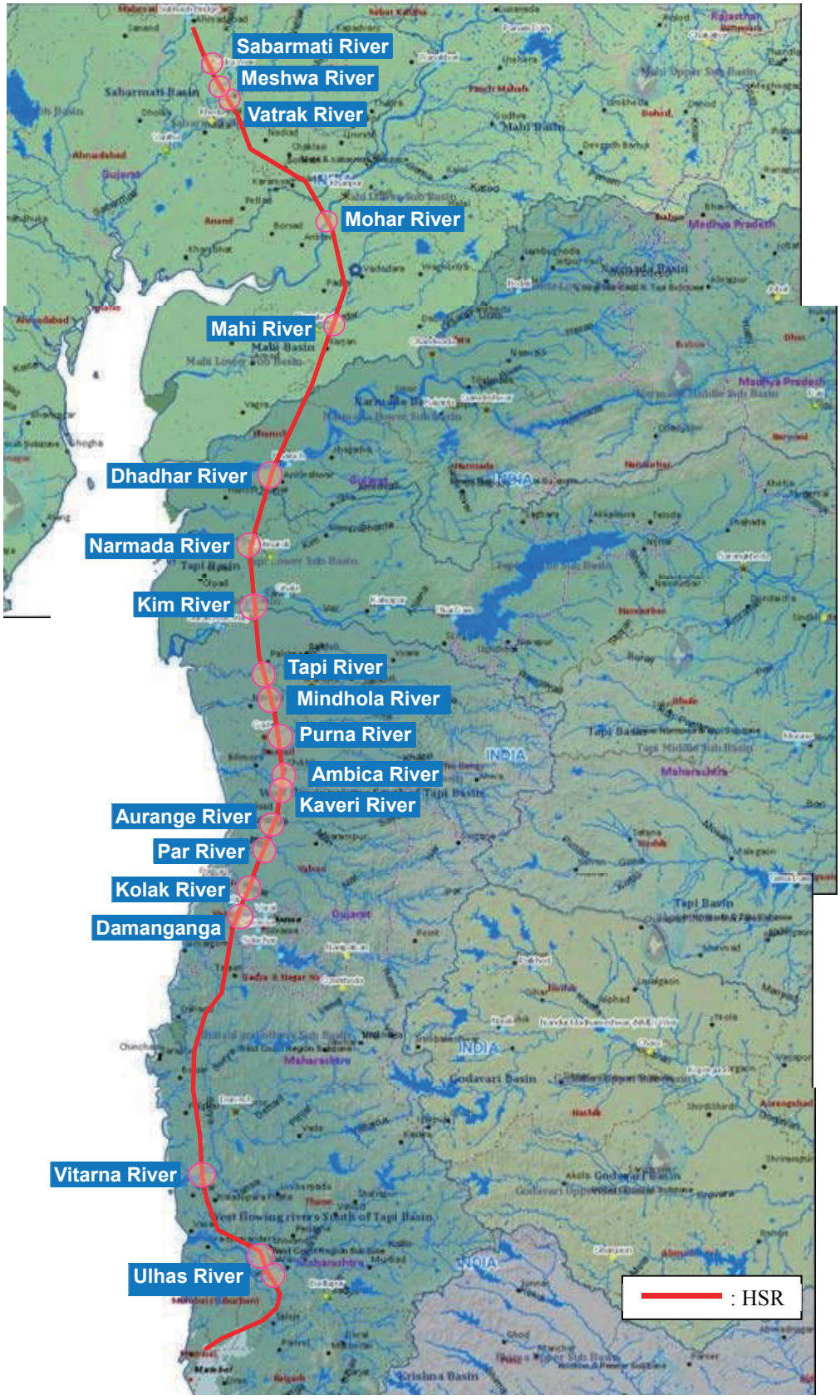
7.2.12 Hydrology

A watershed is a valuable resource for any country. More, so far a country like India, which is essentially agrarian and a vast majority of its population derives its sustenance from agriculture. Adequate knowledge of water bodies is necessary for rational formulation of water management policies. Moreover, unplanned population growth along river basins have led to large scale river pollution, which prevents beneficial use of river waters. Of the rivers that exist in the states of Maharashtra and Gujarat, Table 7.2-21 and Figure 7.2-10 Show the major rivers that the proposed route might cross. Among them, some rivers are of a very large scale. They include Ulhas River, Vaitarna River, Damanganga River, Tapikawa River, Narmada River, and Mahi River. Among these large rivers, BOD of Daman Ganga River indicates very high value. It will be mainly due to untreated chemicals and industrial wastewater discharged from chemical companies and pharmaceutical companies in Vapi (industrial city) near the banks of Daman Ganga River located at south side of Valsad District, Gujarat State.

Table 7.2-21 Major Rivers Crossed by the Proposed Route

No.	Section	Main river
1	Munbai～Thane	Ulhas river
-	Thane～Virar	―
2	Virar～Dahanu	Vaitarna River
3	Dahanu～Vapi	Damanganga River
4	Vapi～Valsad	Kolak River
5		Par River
6		Auranga River
7	Valsad～Surat	Kaveri River
8		Ambica River
9		Purna River
10		Mindhola River
11	Surat～Baruch	Tapi River
12		Kim River
13		Narmada River
14	Baruch～Vadodara	Dhadar River
15	Vadodara～Anand-Nadiad	Mahi River
16	Anand-Nadiad～Ahmedabad (Sabarmati)	Mohur River
17		Vatrak River
18		Meshwo River
19		Sabarumati River

Source: INDIA Water Resources Information System



Source: India-WRIS wiki

Figure 7.2-10 Major Rivers Crossed by the Proposed Route

Table 7.2-22 Water Quality for Major Rivers in 2011

River	LOCATIONS	TEMPERATURE °C			D.O. (mg/l)			pH			CONDUCTIVITY (µmhos/cm)			B.O.D. (mg/l)			NITRATE-N+ NITRITE-N (mg/l)			FECAL COLIFORM (MPN/100ml)			TOTAL COLIFORM (MPN/100ml)		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Water Quality Criteria					> 4 mg/l			6.5-8.5						< 3 mg/l						< 2500 MPN/100ml			< 5000 MPN/100ml		
Ulhas River	At U/S of NRC bund at Mohane, Maharashtra	22.0	30.0	25.9	5.8	**7.3**	6.8	7.2	8.4	7.8	127.8	202	151	2	**4.8**	3.4	0.26	0.78	0.50	35	1800	601	110	1800	740
	At U/S of Badlapur	22.0	30.0	25.9	6.0	**7.4**	7.0	7.5	8.5	7.8	76.53	175	123	2.8	**4.6**	3.4	0.19	0.82	0.44	17	70	42	50	170	100
	At Jambhul Water Works	22.0	30.0	26.0	6.5	**7.6**	6.9	7.4	8.4	7.8	87	181	139	2.6	**4**	3.3	0.19	2.01	0.76	25	200	85	0	350	169
Vaitarna River	Near Road Bridge Gandhare Village, Wada, Thane	22.0	30.0	26.9	5.7	**7.6**	6.8	7.3	**9.4**	8.2	76.84	930	313	3	**10**	4.0	0.08	1.15	0.49	11	140	49	40	250	99
Daman Ganga	At Vapi Weir, Vapi	27.1	28.3	27.7	6.6	**6.7**	6.7	8.0	**9.0**	8.5	196	273	235	N/A	N/A	N/A	2.80	3.40	3.10	N/A	N/A	N/A	N/A	N/A	N/A
	At D/S of M/S Surat Beverages, Village, Dadra	27.1	27.1	27.1	6.7	**6.9**	6.8	7.2	8.3	7.8	221	233	227	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	At Village Namdha, Vapi	27.0	27.0	27.0	4.2	**4.2**	4.2	8.2	8.2	8.2	2754	2754	2754	42	**42**	42.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	At Kachigaon U/S at GIDC wier	25.0	30.0	27.6	6.8	**7.4**	7.1	7.0	8.3	7.3	120	350	212	0.7	**5**	1.4	0.04	2.29	0.84	3	4	3	3	11	6
Tapi River	At Mandavi	27.0	28.0	27.7	7.2	**7.6**	7.4	7.8	8.1	8.0	318	390	359	1.5	2.5	1.9	0.02	0.32	0.22	230	900	677	930	2100	1510
	At Kathore (NH-8 bridge)	26.0	29.0	27.5	7	**7.4**	7.2	7.2	8.0	7.7	495	563	535	1.7	2.1	2.0	0.30	0.40	0.30	33	900	566	930	2800	1908
	At Surat U/S Kathore	26.0	29.0	27.5	6.9	**7.3**	7.1	7.8	8.1	8.0	472	585	525	1.5	2.2	1.9	0.20	0.30	0.30	900	1500	1058	2100	4300	2775
	At Rander Bridge, Surat	27.0	27.0	27.0	6.8	**7.1**	7.0	7.8	7.9	7.9	621	697	659	1.2	2.6	1.9	0.09	0.45	0.27	900	1500	1200	2000	2300	2150
	At NR Bardoli (KAPP Bridge)	27.0	31.0	29.0	5.5	**6.7**	6.1	7.8	7.9	7.9	339	364	352	2.1	2.7	2.4	0.17	0.28	0.23	400	**4300**	2350	2300	**24000**	13150
	At ONGC Bridge, Surat	26.0	28.0	27.5	3.2	**5.6**	4.4	7.1	7.9	7.5	2417	41836	25418	2.5	**9**	4.9	0.10	0.40	0.20	430	**9000**	2815	1500	**15000**	5850
Narmada River	At Chandod	25.0	29.0	26.4	6.9	**8.2**	7.6	7.1	8.4	7.9	222	404	274	1.1	**5**	2.3	0.07	0.34	0.18	0.6	14	5	4	34	16
Mahi River	At Sevalia	25.0	28.0	26.6	6.9	**8.3**	7.6	7.4	**8.7**	8.1	291	490	418	0.9	**5**	3.3	0.00	0.92	0.22	2	6	3	7	17	9
	At Vasad	25.0	25.0	25.0	8.8	**8.8**	8.8	8.3	8.3	8.3	561	561	561	2	2.0	2.0	0.38	0.38	0.38	3	3	3	9	9	9
Sabarmati River	At Mahudi Jain Temple, 150Km from Origin	22.0	22.0	22.0	7.1	**7.1**	7.1	8.1	8.1	8.1	506	506	506	4	**4.0**	4.0	0.47	0.47	0.47	90	90	90	430	430	430

Note: The measurements were carried out in 2011
Those that exceed the water criteria in India are shown in **bold**
Source: Basin Wise Water Quality Data 2011 by CPCB.

7.2.13 Protected Area

(1) Protected Area

Following protected areas are designated pursuant to the Wildlife (Protection) Act 1972 in India: Table7.2-23 and Table7.2-24 show the protected areas in Maharashtra and Gujarat States, respectively. Some protected areas shown in following table are covered in the world heritage "Western Ghats." It is no impacts because "Western Ghats" are away from planned HSR route and outside this project area.

Table7.2-23 Protected Areas (Maharashtra State)

No.	Status	Name	Concerned District
1	National Park	Chandoli NP	Sangli
2		Gugamal NP	Amravati
3		Nawegaon NP	Bhandara, Gondia
4		Pench NP	Nagpur
5		Sanjay Gandhi（Borivilli） NP	Mumbai, Thane
6		Tadoba NP	Chandrapur
1	Wildlife Sanctuary	Amba BarwaWLS	Buldhana
2		Andhari WLS	Chandrapur
3		Aner Dam WLS	Dhule
4		Bhamragarh WLS	Gadchiroli
5		Bhimashankar WLS	Pune, Thane, Raigad
6		Bor WLS	Wardha, Nagpur
7		Chaprala WLS	Gadchiroli
8		DeolgaonRehkuri WLS	Ahmednagar
9		Dhyanganga WLS	Buldhana
10		Gautala WLS	Aurangabad, Jalgaon
11		Great Indian Bustard WLS	Solapur, Ahmednagar
12		Jaikwadi WLS	Ahmednagar, Aurangabad
13		KalsubaiHarishchandragad WLS	Ahmednagar
14		Karnala WLS	Raigad
15		Karanjasohol WLS	Akola
16		Katepurna WLS	Akola, Washim
17		Koyana WLS	Satara
18		Lonar WLS	Buldhana
19		Malvan Marine WLS	Sindhudurg
20		MayureswarSupe WLS	Pune
21		Melghat WLS	Amravati
22		Nagzira WLS	Bhandara
23		NaigaonMayur WLS	Beed
24		NandurMadhameshwar WLS	Nashik
25		Narnala WLS	Akola
26		Painganga WLS	Yeotmal, Nanded
27		Phansad WLS	Raigad
28		Radhanagari WLS	Kolhapur
29		Sagareshwar WLS	Sangli
30		Tansa WLS	Thane
31		Tipeshwar WLS	Yeotmal
32		Tungareshwar WLS	Thane
33		Yawal WLS	Jalgaon
34		YedsiRamlinGhat WLS	Osmanabad
35		Wan WLS	Amravati
36	Conservation Reserve	Bhorkada	Nashik

37	ESA	Dahanu Taluka ESA	Thane

Source: Protected Area Network India
: Maharashtra Environment Department homepage
: Maharashtra Forest Department homepage

Table 7.2-24 Protected Area (Gujarat State)

No.	Status	Name	Concerned District
1	National Park	Vansda NP	Navasari、Valsad
2		Blackbuck NP	Bhavnagar
3		Gir NP	Junagadh
4		Marine (Gulf of Kachchh) NP	Jamnagar
1	Wildlife Sanctuary	BalaramAmbaji WLS	Banaskantha
2		Barda WLS	Rajkot,Jamnagar, Porbandar
3		Gaga Great Indian Bustard WLS	Jamnagar
4		Gir WLS	Junagadh、Amreli
5		Girnar WLS	Junagadh
6		Hingolgadh Nature Reserve WLS	Rajkot
7		Jambugodha WLS	Panchmahal
8		Jessore WLS	Banaskantha
9		Lala Great Indian Bustard WLS	Kachchh
10		Kachchh Desert WLS	Kachchh
11		Khijadiya WLS	Jamnagar
12		Marine (Gulf of Kachchh) WLS	Jamnagar
13		Mitiyala WLS	Amreli
14		Nal Sarovar Bird WLS	Ahmedabad, Surendranagar
15	Wildlife Sanctuary	Narayan Sarovar (Chinkara) WLS	Kachchh
16		Paniya WLS	Amreli
17		Porbandar Lake WLS	Porbandar
18		Purna WLS	Dangs
19		RamparaVidi WLS	Rajkot
20		Ratanmahal WLS	Dahod
21		Shoolpaneswar (Dhumkhal) WLS	Narmada、Bharuch
22		Thol Lake WLS	Mahesana
23		Wild Ass WLS	Kachc, Rajkot, Mahesana, Patan, Banaskantha, Surendranagar
24	Conservation Reserve	Chharidhand	Kachchh

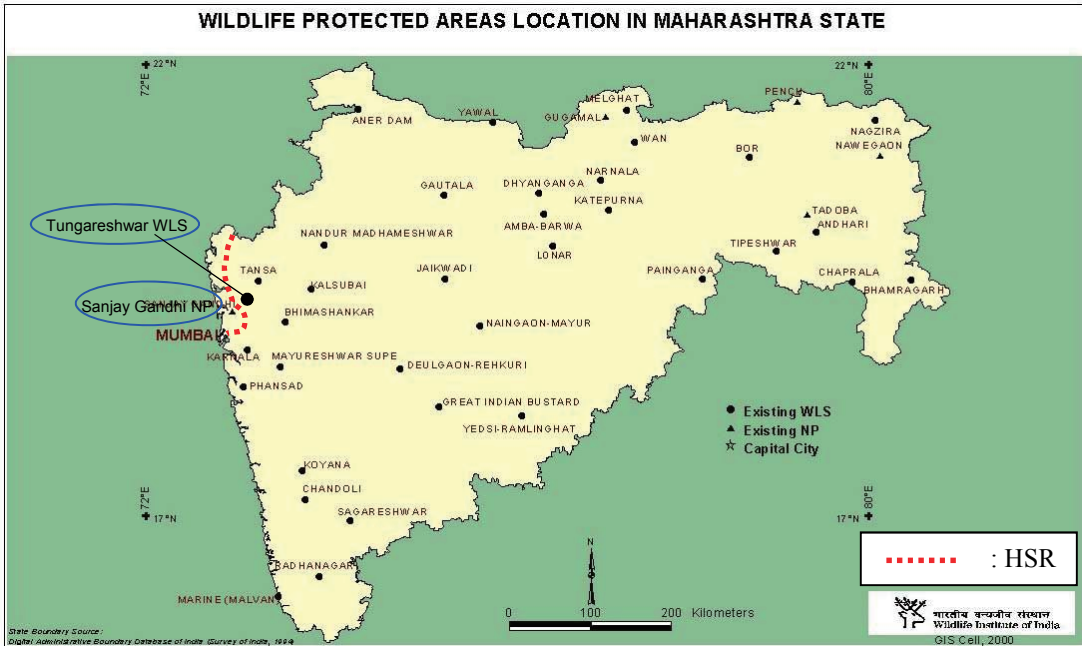
Source: Protected Area Network India
: Gujarat Forests & Environment Department homepage
: Gujarat Forest Department homepage

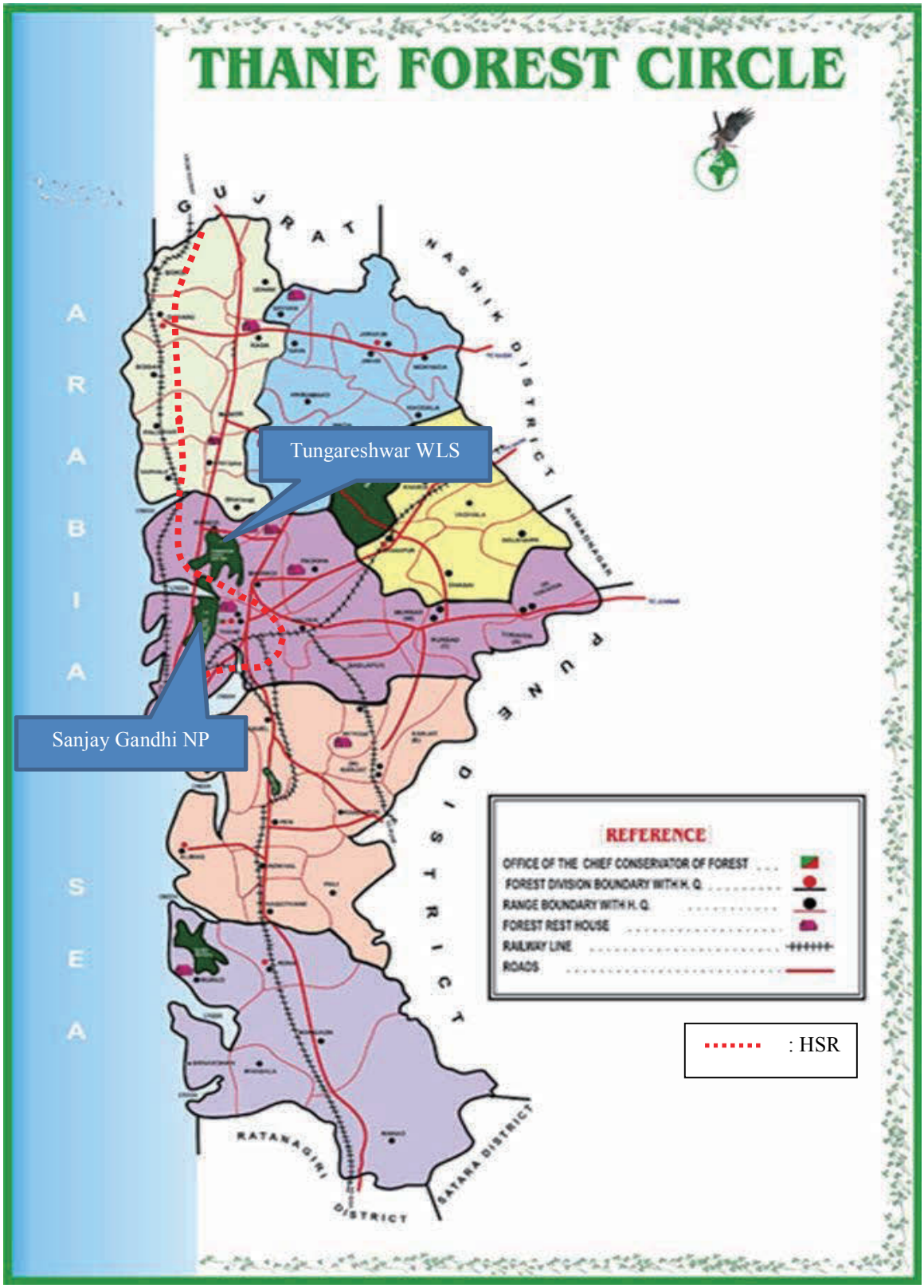
Among the protected areas shown in Table7.2-23 and Table7.2-24, the proposed route will pass through the districts of seven protected areas. They are shown in Table7.2-25.
The route proposed at this time will pass near the SGNP and TWLS, as shown in Figure 7.2-11 and Figure 7.2-12.

Table 7.2-25 Protected Areas (in the Districts Covered by the HSR Plan)

No	Name of Protected Area		State	District
1	National Park	Sanjay Gandhi （Borivilli） NP	Maharashtra	Mumbai, Thane
2	Wildlife Sanctuary	Bhimashankar WLS		Pune, Thane, Raigad
3		Tansa WLS		Thane
4		Tungareshwar WLS		Thane
5	National Park	Vansda NP	Gujarat	Navasari, Valsad
6	Wildlife Sanctuary	Nal Sarovar Bird WLS		Ahmedabad, Surendranagar
7		Shoolpaneswar (Dhumkhal) WLS		Narmada, Bharuch

Source: Protected Area Network India
: Maharashtra Environment Department homepage
: Maharashtra Forest Department homepage
: Gujarat Forests & Environment Department homepage
: Gujarat Forest Department homepage





Source: Thane Forest Department Homepage

Figure 7.2-12 SGNP and TWLS

If the project area falls within WLS or NP protected area or within its ESZ then application is required to be submitted for conducting survey (from part1) and for carrying out project work (remaining forms part 2 and 3). Even for conducting survey, permission of MOEF is required. For acquisition of any area within protected area, permission of both National board of Wildlife (NBWL) of MOEF. Supreme Court is required whereas for acquisition within ESZ of the WLS, permission of MOEF (NBWL) will be sufficient. The application is to be submitted to the in charge of NP / WLS and processed through proper channel to the Chief Wildlife Warden of the state, then to the State Wildlife Board (SWLB). After obtaining recommendation from the SWLB the proposal is forwarded to MOEF for recommendation of NBWL. Finally, an application is to be submitted to Standing Committee. Supreme Court for obtaining permission of the Apex Court. Besides, other protected areas such as; "The Convention on Wetlands of International Importance especially as Waterfowl Habitat", "Protected area for Tigers and Elephants", "Biosphere Reserves" and "Marine Protected Areas" is not found neighbor to the HSR route.

1) Sanjay Gandhi National Park (SGNP)

The proposed alignment of MAHSRC passes between the SGNP and TWLS at chainage SGNP or Borivali NP, has unique combinations of rich bio-diversity despite very high anthropogenic and biotic pressures due to its typical location and the almost complete biological fragmentation leading to the "fenced island" type case for its southern block and high values for nature tourism and Eco-tourism. It protects the catchments of two water reservoirs i.e. Tulsi & Vihar that supply water to Mumbai and Thane. Krishnagiri Upvan, well known for tourism in Borivali, is a part of this Division. Leopard, the only big cat of the area, exists with very high density. The forests are mostly moist deciduous type of forests and, in general, they are dense throughout the area. ESZ is not undefined in the vicinity of SGNP. And also information regarding plants and animals that live in SGNP is shown in 4.1.11 Fauna and Flora in Chapter 4, EIA report.

2) Tungareshwar Wildlife Sanctuary (TWLS)

There is another ecologically sensitive area through which the proposed MAHSRC passes is TWLS. The TWLS falls between longitude 72052' E to 730 E and latitude 170 00'N to 19028' N. It is situated in Thane district of Maharashtra State and under the administrative control of CF and Director SGNP Division, Borivali (Mumbai).The total Notified area of Sanctuary is 85.70 sq. km. has been declared by Maharashtra Government Resolution No.WLP 10-02lCR-47/F-1 dated 24th October 2003.The protected forest 917.305 ha and unclassified forest 37.140 ha in small patches around TWLS was handed over to Sanctuary staff for protection and management as per C.C.F. order dated 1.11.2003. Total area under management of TWLS is 95.24 km^2. ESZ is not undefined in the vicinity of TWLS. And also information regarding plants and animals that live in TWLS is shown in 4.1.11 Fauna and Flora in Chapter 4, EIA report.

(2) Forest

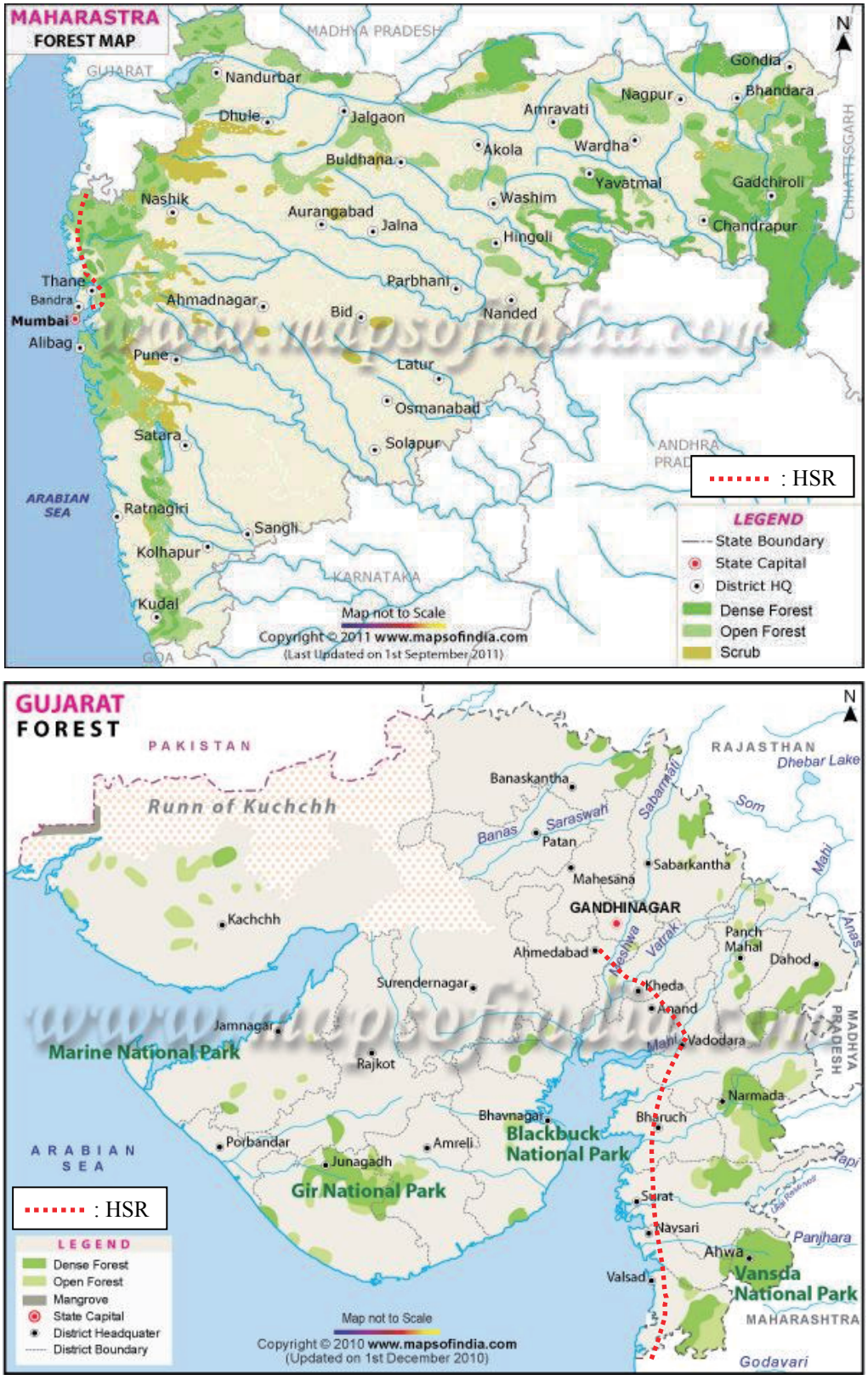
Table 7.2-26 shows in list of forests (Reserved, Protected and Unscheduled) through which the proposed alignment passes. Also Figure 7.2-13 gives an overview of the distribution of forests in Maharashtra State and Gujarat State. Reserved Forest and Protected Forest are managed by Indian Forest Act and State Forest Act in India. According to these Forest Acts, Reserved Forest is completely protected and Protected Forest is protected under certain restrictions by law. The protected areas defined by Forest Acts restrict deforestation due to wood use, the role is different from the role of the protected areas defined for conservation of Flora, Fauna and ecosystems in NP, WLS and so on.

Going forward, in conjunction with the formulation of the detailed plan, due to the existence of

forest distributions adjacent to the planned route, tree and forest research for the Reserved Forest and Protected Forest areas requiring deforestation will be required. Steps to obtain permission for the deforestation will also be required. Before submission of application for obtaining clearance under Forest Conservation Act 1980, lot of homework is required. This includes, finding out the jurisdiction of various forest officials in the project area, consolidation of land details (Forest as well as Non-forest) such as survey no., area being acquired, village, land plan. 7/12 land records, Joint Measurement Reports / Maps and village maps and its scrutiny by Forest Officials, obtaining minimum land required certificate from Collector, applicability of Forest Rights Act, obtaining certificate from State Archaeological Department, obtaining various certificate from local head of the project unit and Deputy Conservator of Forests (CF). The land falling within protected areas (WLS/NP) and Mangroves (as Protected Forests) are to be included in this proposal. After submission of application to concerned Deputy CF, Joint Survey of the project area with forest officials for verification of land details and counting of the trees to be cut is essential. For multiple deputy, CF's are involved, the coordinating Deputy CF (territorial) is required to be nominated for consolidation of the proposal. After consolidation and forwarding from Territorial Chief Conservator of Forest (CCF), the proposal is scrutinized at office of the Nodal Officer at the headquarters of the State Forest Department. After scrutiny at State Forest Headquarter, the proposal is forwarded to the State Government (Secretary / Forests and Minister / Forests) and then to MOEF. If the area involved is less than 40 hectare (Ha), the case is handled at Regional MOEF Center. At MOEF, the case is placed before Forest Advisory Committee (FAC) for a scrutiny and finally recommendation. After recommendation of FAC, approval of Minister of State (MOS) / Forest and Environment / Government of India is to be obtained. After grant of first stage approval, process for second stage approval is to be initiated. Procedures of forest clearance are shown in Figure 7.2-14.

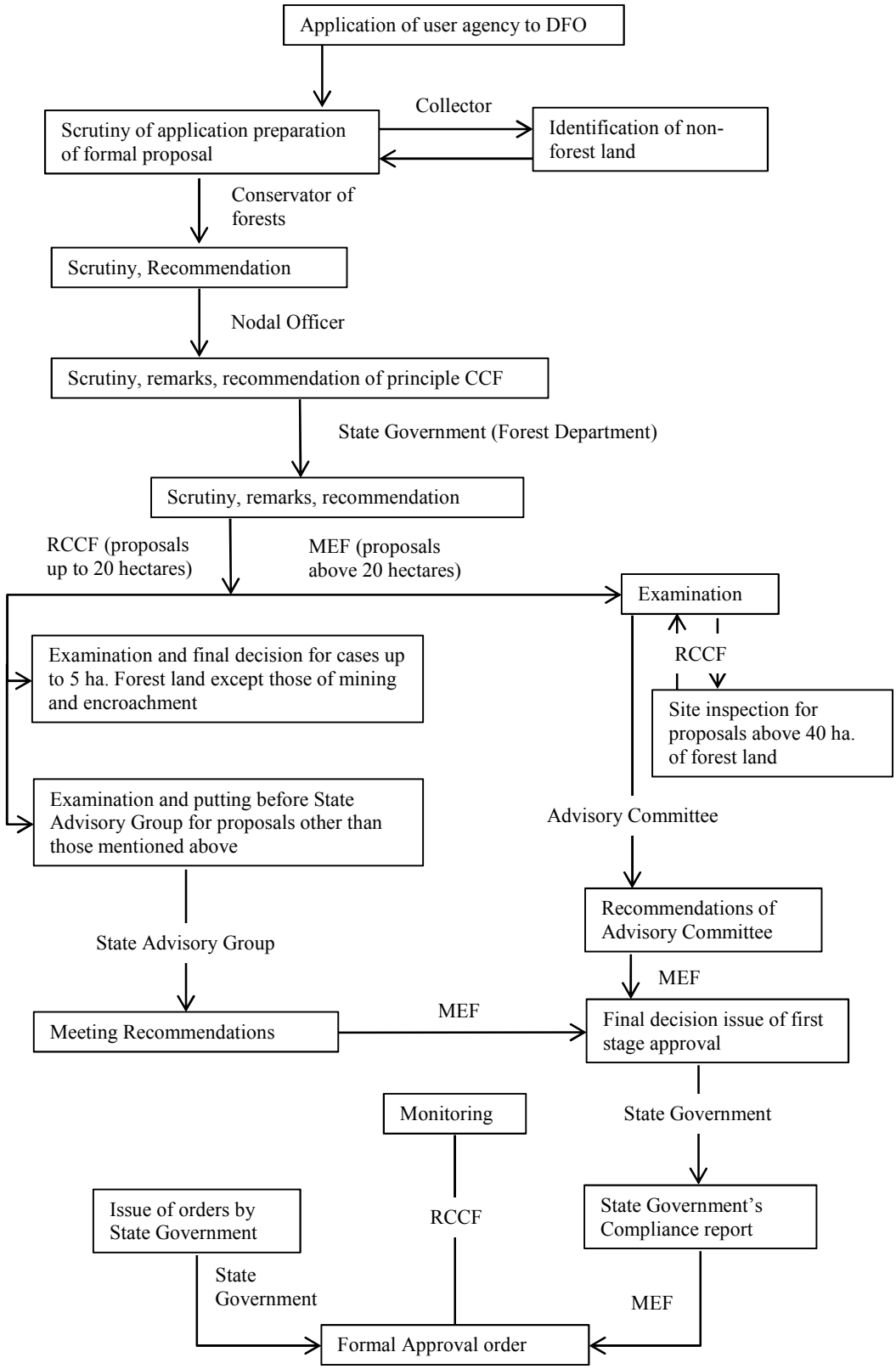
Table 7.2-26 List of Forests (RF, PF & Unscheduled)

No.	Name of the Forest	State/District
1	Vadghar Reserved (Forest & Open Jungle)	Maharashtra/ Thane
2	Sarjmori Reseved (Forest & Open Jungle)	Maharashtra/ Thane
3	Sativli (Reserve Forest)	Maharashtra/ Thane
4	Khairpada (Forest & Open Jungle)	Maharashtra/ Thane
5	Kasarali (Forest & Open Jungle)	Maharashtra/ Thane



Source：Map of India

Figure 7.2-13　Distribution of Forests



Source: Maharashtra Forest Department

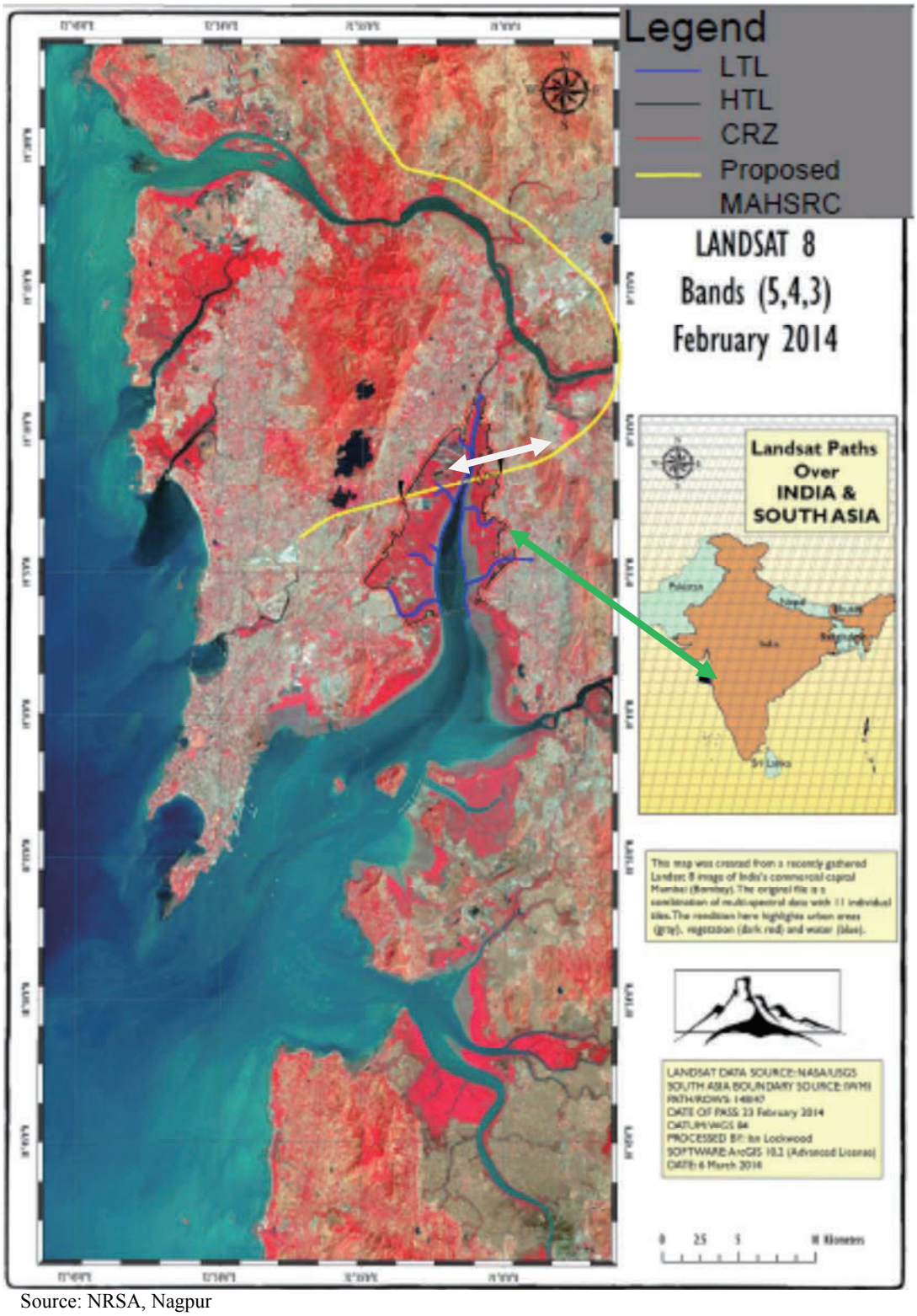
Figure 7.2-14 Procedures of Forest Clearance

(3) Condition of Thane Creek

The proposed route will pass near the middle part of Thane Creek, which runs north to south, between Vashi Bridge and Arioli Bridge. According to the sea chart that we obtained, the depth of that sea area is approximately 2m. It should be noted that, in addition to mangrove wetlands at the Thane Creek, the Sewri tidal flat in the southwestern area of the Thane Creek is famous as a visiting place of migratory birds, such as flamingos. The proposed route will pass at about 10km north of the tidal flat via a tunnel. Therefore, the route plan will not alter the tidal flat Sewri. In addition to the Indian Forest (Conservation) Act of 1980 (Amendment 1988), "Tree Officer" is the authority to grant the felling permission pursuant to The Maharashtra Felling of Trees (Regulation) Act, 1964. The project proponent is required to pursue the provision for trees in urban areas in the State by regulating felling of trees and providing for planting of adequate number of new trees in those areas.

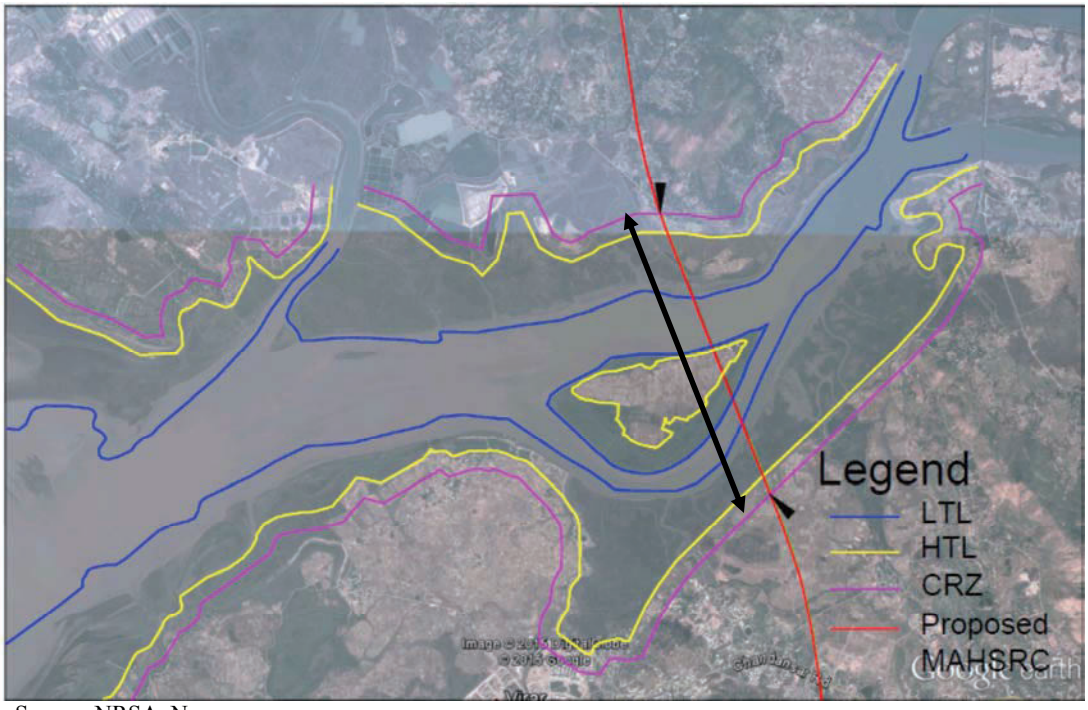
(4) Coastal Regulation Zone (CRZ)

The definition of CRZ has been widened to include the land area from "High Tide Line" (HTL) to 500 m on the landward side, as well as the land area between HTL to 100 m or width of the creek, whichever is less, on the landward side along tidal influenced water bodies connected to the sea. The CRZ also includes, for the first time, water area up to 12 nautical miles in the sea and the entire water area of a tidal water body such as creek, river, estuary without imposing any restrictions of fishing activities. The CRZ map of the Mumbai region placed at Figure 7.2-15 shows the demarcation of Low Tide Line (LTL) and High Tide Line (HTL) CRZ area and superimposed proposed MAHSRC alignment. On perusal of the map it is evident that the proposed MAHSRC alignment measuring 6.7145 km passes through the CRZ and also through the dense patches of mangroves. The Figure 7.2-16 shows that the proposed MARC alignment between Gaskopari and Tembhikhodave measuring 2.71 km passes through the CRZ. On the other hand, proposed route of Gujarat section does not pass through the CRZ. Railway Projects are not listed in the list of industries / development works that are required to seek clearance under Environment Protected Act (EPA) 1986, but other notifications under this Act such as CRZ Notification 2011 and notification(s) pertaining to any ESZ declared by MOEF are required to be adhered to. For obtaining CRZ clearance there are two stages, namely clearance at the State level through State Coastal Zone Management Authority and clearance at Central Government level through MOEF. Before putting up CRZ application, CRZ maps on the scale 1:4000 (from an authorized agency) and Disaster Management Plan are required to be prepared. Application for obtaining Non-objection Certificate (NOC) from an environment protection authority should be prepared after consulting the authority itself. Procedures of CRZ clearance are shown in Figure 7.2-17.



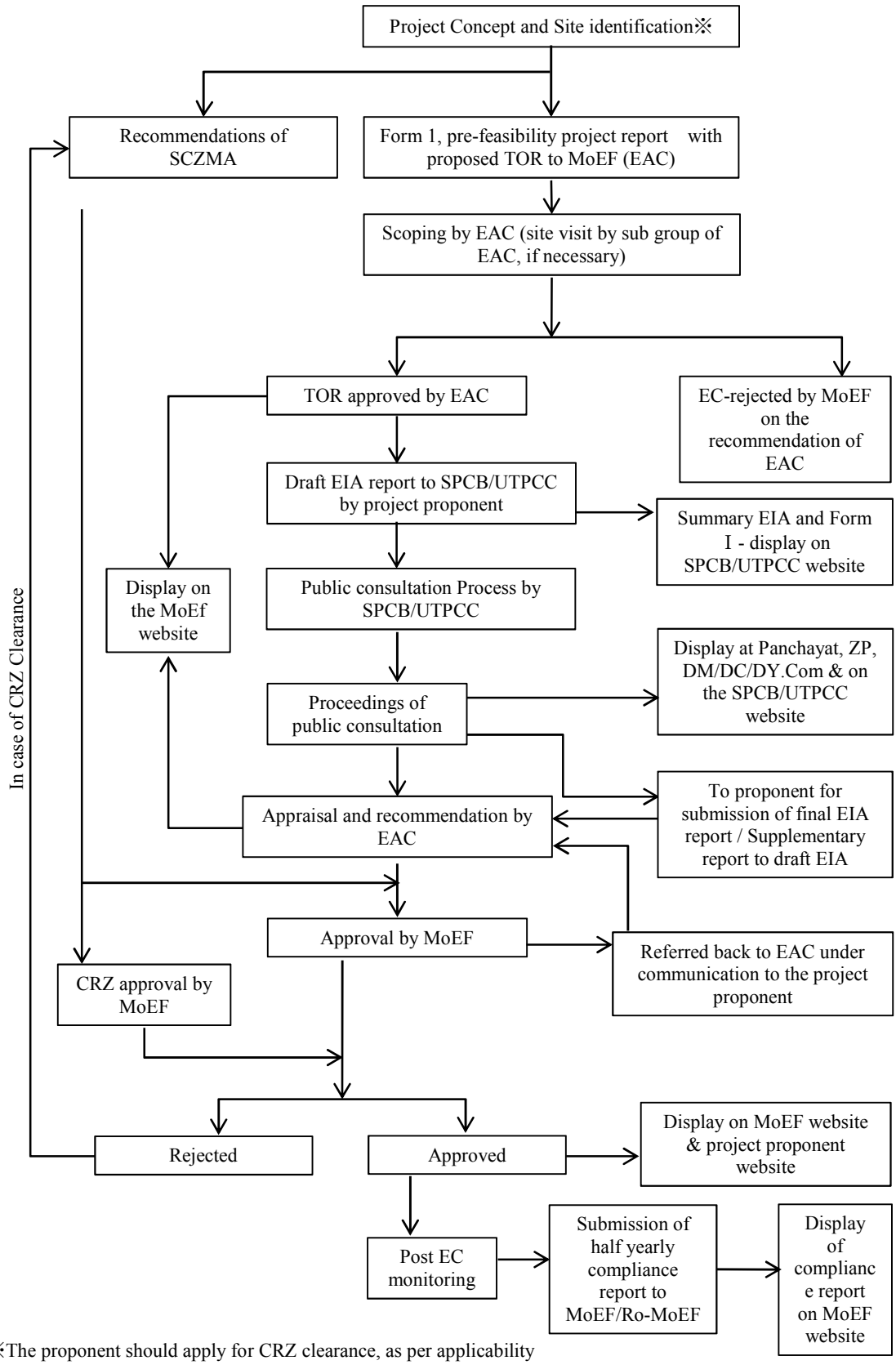
Source: NRSA, Nagpur

Figure 7.2-15 CRZ Map of Mumbai Region with Superimposed Proposed Alignment



Source: NRSA, Nagpur

Figure 7.2-16 CRZ Map between Gaskopari and Tembhikhodave with Superimposed Proposed Alignment



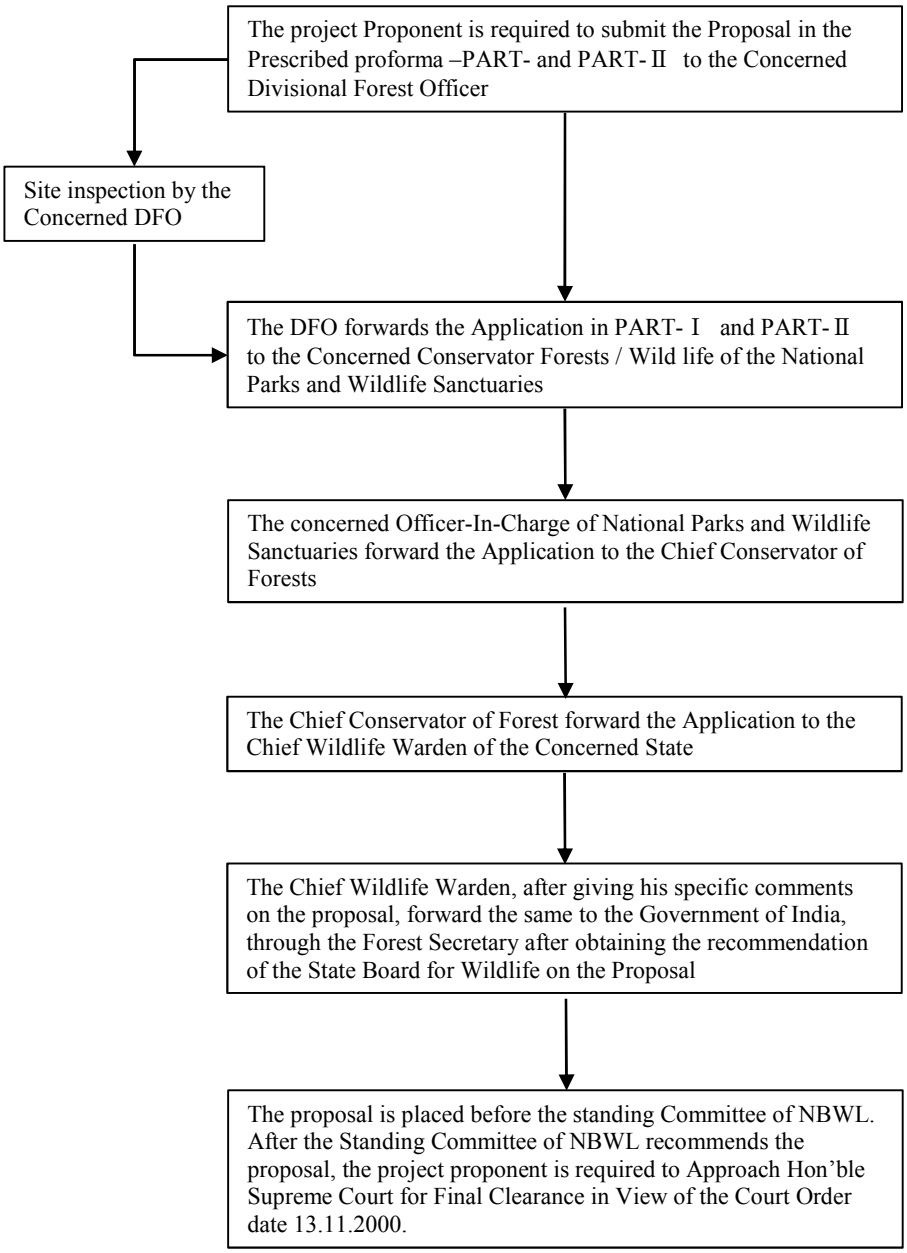
※The proponent should apply for CRZ clearance, as per applicability

Source: Ministry of Environment, Forest and Climate Change (MoEFCC)

Figure 7.2-17 Procedures of CRZ Clearance

(5) Ecological Sensitive Zone (ESZ)

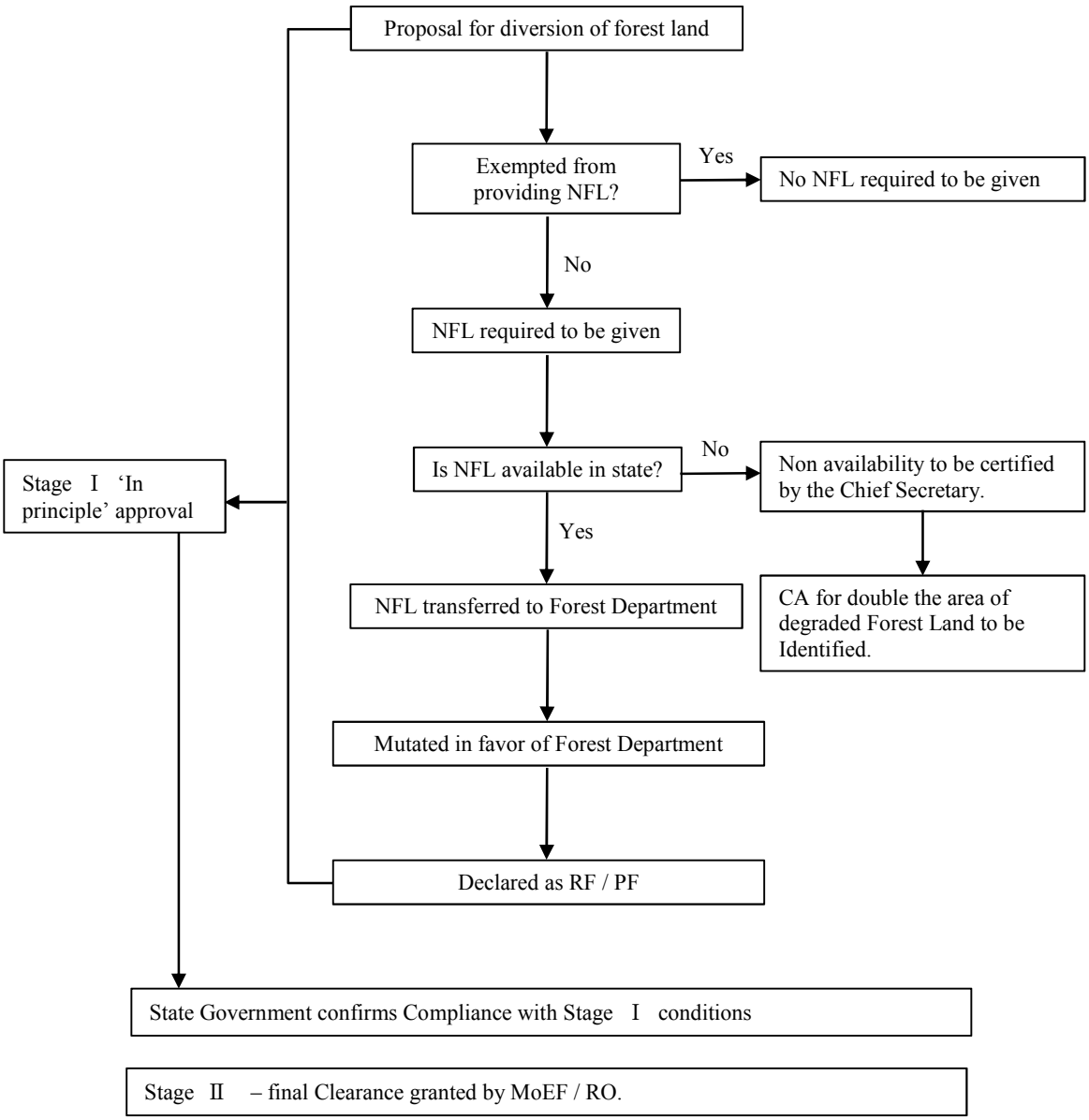
The purpose of declaring ESZ around NP and WLS is to create some kind of "Shock Absorber" for the protected Areas. They would also act as transition zone from areas of high protection to area involving lesser protection. As has been decided by the NBWL, the activities in the ESZ would be of a regulatory nature rather than prohibitive nature, unless and otherwise so required.
The width of the ESZ and type of regulations will differ from Protected Areas to Protected Areas. However, as a general principle the width of the ESZ could go up to 10kms around a Protected Areas as provided in the Wildlife Conservation Strategy 2002.
In case where sensitive corridors, connectivity and ecologically important patches, crucial for landscape linkage, are even beyond 10Kms with these should be included in the ESZ. Further, even in context of a particular Protected Areas, the distribution of an area of ESZs and the extent of regulation may not be uniform all around and it could be variable width and extent. In the vicinity of the planned route, except NP, and WLS, Dahanu Taluka is specified in the ESZ. Procedures of ESZ clearance are shown in Figure 7.2-18 & Figure 7.2-19



Note: Hon'ble Supreme Court Vide their order dated 13.11.2000 has directed that there shall be no dereservation / denotification of National Parks and Sanctuaries without approval of the Supreme Court. Therefore, to take up any such activity, a clearance from Hon'ble Supreme Court is Mandatory.

Source: Guidance Document issued by the MoEFCC

Figure 7.2-18 Procedure to be Followed for Activities Inside National Parks/Wildlife Sanctuaries



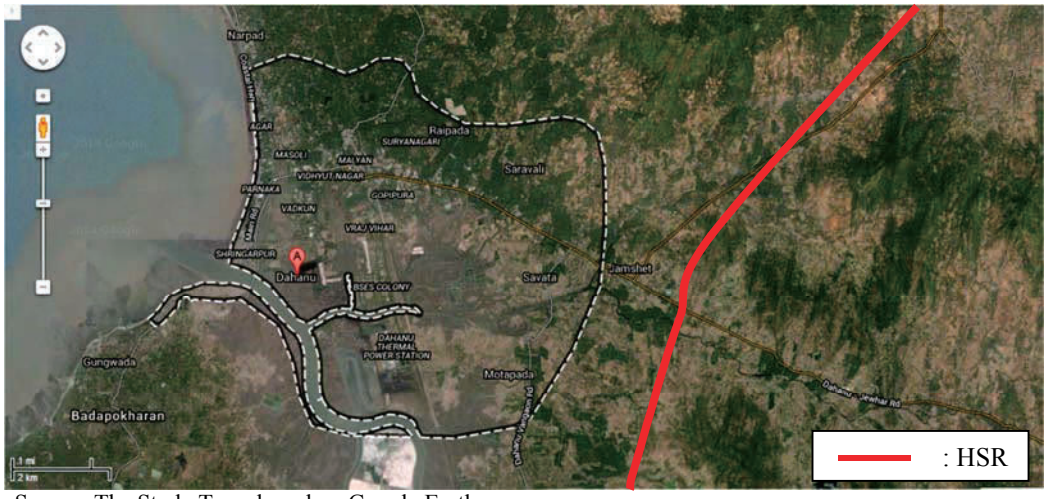
Note: NFL–Non forest land, CA–Compensatory Afforestation, PF-Protected Forest, RF-Reserve Forest

Source: Maharashtra Forest Department

Figure 7.2-19 Flow Chart for Granting Permission for Diversion of Forest Land

1) Dahanu Taluka

Dahanu is a coastal city and a municipal council in Thane District on the western coast of Maharashtra State. It is located 120 km north of Mumbai. Topographically, Dahanu Taluka can be divided into a 10-12 km wide bandarpatti i.e a coastal belt of lowlands and flats extending from the coast to foot of the Sahyaari Range. The entire coastal belt with its rich natural resources, wetlands, mangroves and river deltas, forms a lucrative fishing area. The junglepatti or the forest belt, to the east of the foothills consists of tropical deciduous forests. The forest cover in Dahanu is still fairly high at 45%. Dahanu Taluka is one of the last green areas remaining in western Maharashtra and Gujarat. 32% of the total land of Dahanu Taluka is used for agriculture and horticulture, 24% is used for grazing cattle, 2.5% of the lands are wetlands and mangroves and 38% of the land comprises protected and reserved forests. These harbour a rich variety of wildlife including endangered species such as leopards, spotted deer, barking deer, and mouse deer. The coastal creeks and inlets at Dahanu are the feeding grounds for various species of fish. Dahanu, with its 35 km coastline acts like an oasis on the western coast of Maharashtra, sandwiched between Bombay and its sprawling suburbs to the south and the industrial cities of Vapi and Surat to its north. The map of Dahanu ESZ is shown in Figure 7.2-20.



Source: The Study Team based on Google Earth

Figure 7.2-20 MAP of Dahanu

(6) Important Bird Area (IBA)

A program of Important Bird Areas is the project that BirdLife International i.e. international bird protection organization jointly implements with member organizations of more than 100 countries. The purpose of this program is that "important natural environment considered the birds as an indicator" is selected based on Universal criteria (IBA criteria) and not only individual habitat but also all habitat are conserved throughout the world as a network. IBA in Maharashtra and Gujarat are shown in Table 7.2-27 and Table 7.2-28 in the vicinity of the planned HSR route is fill. In the vicinity of the planned HSR route there are four IBAs, however, there is no possibility of modification by this project because they are away from the planned HSR route.

Table7.2-27 IBA list in Maharashtra

No	Name of the Place	Area
1	Bhimashankar Wildlife Sanctuary	13,078 ha
2	Burnt Island (Bandra) Vengurla Rocks	6 ha
3	Gangapur Dam and grasslands	4,000 ha

4	INS - Shivaji and adjoining areas, Lonavla	1,000 ha
5	Jaikwadi Wildlife Sanctuary	34,105 ha
6	Jawaharlal Nehru Bustard Sanctuary	849,644 ha
7	Koyna Wildlife Sanctuary	42,652 ha
8	Mahul - Sewree Creek	1,000 ha
9	Melghat Tiger Reserve	115,003 ha
10	Nagzira Wildlife Sanctuary	15,281 ha
11	Nandur Madhmeshwar Wildlife Sanctuary	10,012 ha
12	Navegaon National Park	13,388 ha
13	Ozar and adjoining grassland	20,000 ha
14	Radhanagari Wildlife Sanctuary	35,116 ha
15	Sanjay Gandhi National Park	10,308 ha
16	Tadoba National Park and Andhari Tiger Reserve	11,655 ha
17	Taloda Reserve Forest	33,400 ha
18	Tansa Wildlife Sanctuary	30,481 ha
19	Thane Creek	12,200 ha
20	Toranmal Reserve Forest	26,000 ha

Source: Bird Life International

Table 7.2-28 IBA list in Gujarat

No	Name of the Place	Area
1	Banni Grassland and Chhari Dhand	384,700 ha
2	Bhal area	259,000 ha
3	Charakla Saltworks	8,200 ha
4	Flamingo City	750,722 ha
5	Gir National Park and Wildlife Sanctuary	141,213 ha
6	Kaj Lake	720 ha
7	Khijadiya Lake and Bird Sanctuary	1,650 ha
8	Marine National Park and Wildlife Sanctuary	45,792 ha
9	Nalsarovar Wildlife Sanctuary	12,082 ha
10	Naliya Grassland	50,000 ha
11	Rampura Grassland	2,000 ha
12	Saltpans of Bhavnagar	357,540 ha
13	Thol Lake Wildlife Sanctuary	700 ha
14	Velavadar National Park	3,408 ha
15	Wetlands of Kheda	8,700 ha
16	Wild Ass Wildlife Sanctuary	495,371 ha

Source: Bird Life International

7.2.14 Demography

Table7.2-29 shows the population of the districts passed by the proposed route. The total population of the districts where the proposed route will go through is about 50 million people. Mumbai (Mumbai and suburbia) and Thane have over 10 million people, followed by the densely populated Ahmedabad, Surat, and Vadodara, which have 41 million people and account for approximately 80% of the total. In terms of the urban population, the entire district of Mumbai is urban area and the ratios of urban population in Thane, Surat, and Ahmedabad are extremely high, showing that the population in the districts passed by the proposed route is concentrated in the urban areas. The population growth rates from 2001, all districts except Mumbai, are on the rise. The population growth rates in Surat and Thane are remarkably high and the growth rates in Ahmedabad and Valsad are high.

Table 7.2-29 Demography in the States

State	District	Population 2011			Percentage share of Total Population 2011		Percentage Decadal Growth (Persons) 2001～2011		
		Total	Rural	Urban	Rural	Urban	Total	Rural	Urban
Maharashtra	Mumbai	3,145,966	—	3,145,966	—	100.0	-5.8	—	-5.8
	Mumbai (Suburban)	9,332,481	—	9,332,481	—	100.0	8.0	—	8.0
	Thane	11,054,131	2,551,037	8,503,094	23.1	76.9	35.9	14.4	44.1
Gujarat	Valsad	1,703,068	1,068,993	634,075	62.8	37.2	20.7	3.9	66.4
	Navsari	1,330,711	921,599	409,112	69.3	30.7	8.2	3.2	21.6
	Surat	6,079,231	1,235,509	4,843,722	20.3	79.7	42.2	-8.4	65.5
	Bharuch	1,550,822	1,022,413	528,409	65.9	34.1	13.1	0.4	49.9
	Vadodara	4,157,568	2,097,791	2,059,777	50.5	49.5	14.2	5.1	25.1
	Anand	2,090,276	1,456,483	633,793	69.7	30.3	12.6	8.0	24.8
	Kheda	2,298,934	1,775,716	523,218	77.2	22.8	12.8	8.8	28.7
	Ahmedabad	7,208,200	1,149,436	6,058,764	16.0	84.1	22.3	-0.3	27.8

Source: Census of India 2001–2011

7.2.15 Employment and Livelihood

There is no large difference in the labor force participation rate of men between urban and rural areas. However, the labor force participation rate of women in rural areas is high and many of them work in agriculture.

Table7.2-30 Status of Work Participation

State	District	Workers 2011			Work participation rate 2011						
		Total	Rural	Urban	Total			Males		Females	
					Total	Rural	Urban	Rural	Urban	Rural	Urban
Maharashtra	Mumbai	1,311,739	—	1,311,739	39.3	—	39.3	—	59.2	—	13.7
	Mumbai (Suburban)	3,152,509	—	3,152,509	36.5	—	36.5	—	56.0	—	12.8
	Thane	3,179,981	1,070,883	2,109,098	39.1	48.0	35.7	55.7	55.9	39.9	11.4
Gujarat	Valsad	650,257	507,655	142,602	46.1	49.3	37.4	57.2	57.9	41.1	12.7
	Navsari	545,215	426,483	118,732	44.3	47.8	35.3	57.1	54.9	38.1	13.8
	Surat	2,182,509	1,029,427	1,153,082	43.7	51.5	38.5	59.6	61.3	42.9	8.7
	Bharuch	570,693	457,729	112,964	41.6	45.0	32.0	57.8	53.1	31.1	8.8
	Vadodara	1,518,845	988,459	530,386	41.7	49.5	32.2	58.7	52.5	39.7	9.9
	Anand	784,711	615,341	169,370	42.3	45.6	33.3	56.5	51.4	33.7	13.6
	Kheda	908,180	778,796	129,384	44.9	48.1	31.8	56.2	50.4	39.4	11.7
	Ahmedabad	2,009,365	512,642	1,496,723	34.5	44.5	32.1	55.3	52.5	32.6	9.0

Source: Census of India 2001–2011

7.2.16 Literacy

Gender gap in literacy rate is obvious in all districts. The literacy rate of women tends to be low in general. Female literacy rate in rural areas is particularly low, showing that the access educational opportunity for women in rural areas is not sufficient.

Table7.2-31 Status of Literacy

State	District	Literacy Rate 2011						
		Total			Males		Females	
		Total	Rural	Urban	Rural	Urban	Rural	Urban
Maharashtra	Mumbai	88.5	–	88.5	–	90.5	–	86.0
	Mumbai (Suburban)	90.9	–	90.9	–	94.3	–	86.9
	Thane	86.2	71.2	90.5	80.5	93.8	61.4	86.7
Gujarat	Valsad	80.9	73.7	92.9	80.5	95.7	66.7	89.6
	Navsari	84.8	82.6	89.8	88.3	93.9	76.7	85.4
	Surat	86.7	78.0	88.9	84.3	92.7	71.2	83.9
	Bharuch	83.0	79.9	89.0	86.9	92.4	72.5	85.2
	Vadodara	81.2	70.7	91.5	79.9	95.1	61.0	87.6
	Anand	85.8	83.9	90.2	92.6	94.7	74.4	85.3
	Kheda	84.3	83.1	88.2	93.3	93.8	72.4	82.3
	Ahmedabad	86.7	72.5	89.3	84.9	93.8	59.4	84.2

Source: Census of India 2001–2011

7.2.17 Water Use

In regards to the development status of water supply facilities in India, throughout the country the percentage of households that were supplied drinking water from taps has improved from 36.7% in 2001 to 43.5% in 2011.

In Maharashtra, the percentage of households supplied drinking water from taps has increased from 64% in 2001 to 67.9% in 2011, households supplied drinking water from wells has increased from 14.4% to 17.8%, and households supplied drinking water from hand pumps and tube wells has decreased from 15.8% to 15.5%.

At the same time, in Gujarat the percentage of households supplied drinking water from taps has increased from 62.3% in 2001 to 69% in 2011, households supplied drinking water from wells has decreased from 11.7% to 7.1%, and households supplied drinking water from hand pumps and tube wells has decreased from 21.8% to 21.1%.

For both states, it can be surmised that the households which stopped using wells started using taps thus accounting for the increase in the percentage of tap usage.

Table7.2-32 Number and Percentage of Households with Tap Water Access (Nationwide, 2011)

MAIN SOURCE OF DRINKING WATER 2001-2011

TOTAL

State code	India/ State/ Union Territory #	Total households		Tap water		Well water		Handpump/ Tubewell water		Other sources of water		New question in 2011				India/ State/ Union Territory #	State code
												Tap		Well			
		2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	Treated	Un-treated	Covered	Un-covered		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2	1
00	**INDIA**	**246,692,667**	**191,963,935**	**43.5**	**36.7**	**11.0**	**18.2**	**42.0**	**41.2**	**3.5**	**3.9**	**32.0**	**11.6**	**1.6**	**9.4**	**INDIA**	**00**
01	Jammu & Kashmir	2,015,088	1,551,768	63.9	52.5	6.5	5.6	12.8	12.7	16.7	29.2	34.7	29.2	1.9	4.7	Jammu & Kashmir	01
02	Himachal Pradesh	1,476,581	1,240,633	89.5	84.1	2.9	4.8	4.2	4.5	3.4	6.6	83.9	5.6	1.5	1.3	Himachal Pradesh	02
03	Punjab	5,409,699	4,265,156	51.0	33.6	0.4	0.8	46.6	64.0	2.0	1.6	41.1	9.9	0.2	0.2	Punjab	03
04	Chandigarh #	235,061	201,878	96.7	91.9	0.1	0.0	2.6	8.0	0.6	0.2	93.7	3.0	0.1	0.0	Chandigarh #	04
05	Uttarakhand	1,997,068	1,586,321	68.2	65.9	1.1	1.2	24.0	20.8	6.7	12.1	53.9	14.3	0.7	0.4	Uttarakhand	05
06	Haryana	4,717,954	3,529,642	68.8	48.1	3.0	11.7	25.0	37.9	3.2	2.2	55.9	12.9	0.7	2.3	Haryana	06
07	NCT of Delhi #	3,340,538	2,554,149	81.3	75.3	0.1	0.0	13.7	21.9	4.9	2.7	75.2	6.1	0.1	0.0	NCT of Delhi #	07
08	Rajasthan	12,581,303	9,342,294	40.6	35.3	10.8	24.0	37.5	32.9	11.1	7.9	32.0	8.5	1.2	9.6	Rajasthan	08
09	Uttar Pradesh	32,924,266	25,760,601	27.3	23.7	4.0	11.6	67.9	64.1	0.9	0.6	20.2	7.1	0.6	3.4	Uttar Pradesh	09
10	Bihar	18,940,629	13,982,590	4.4	3.7	4.3	12.6	89.6	82.9	1.7	0.8	3.1	1.3	0.7	3.7	Bihar	10
11	Sikkim	128,131	104,738	85.3	70.3	0.6	0.1	0.1	0.4	14.1	29.1	29.2	56.1	0.4	0.2	Sikkim	11
12	Arunachal Pradesh	261,614	212,615	65.5	67.8	5.7	4.7	13.1	9.7	15.7	17.8	26.4	39.1	1.4	4.3	Arunachal Pradesh	12
13	Nagaland	399,965	332,050	47.2	42.0	25.7	34.9	6.7	4.5	20.5	18.6	6.1	41.1	6.6	19.1	Nagaland	13
14	Manipur	507,152	397,656	38.6	29.3	7.5	6.4	6.8	7.7	47.1	56.6	25.6	13.0	2.8	4.7	Manipur	14
15	Mizoram	221,077	160,966	58.7	31.9	4.7	2.0	1.7	4.0	34.9	62.0	39.4	19.3	2.0	2.7	Mizoram	15
16	Tripura	842,781	662,023	33.2	24.6	27.4	38.3	34.3	27.9	5.1	9.1	20.3	12.9	2.9	24.5	Tripura	16
17	Meghalaya	538,299	420,246	39.3	34.5	25.4	27.4	5.4	4.4	29.9	33.7	27.8	11.5	6.9	18.4	Meghalaya	17
18	Assam	6,367,295	4,935,358	10.5	9.2	18.9	26.7	59.4	49.6	11.3	14.6	9.2	1.3	1.7	17.2	Assam	18
19	West Bengal	20,067,299	15,715,915	25.4	21.4	6.0	10.0	66.8	67.1	1.7	1.5	21.0	4.4	0.7	5.4	West Bengal	19
20	Jharkhand	6,181,607	4,862,590	12.9	12.6	36.5	51.8	47.3	30.1	3.4	5.6	10.0	2.9	1.9	34.6	Jharkhand	20
21	Odisha	9,661,085	7,870,127	13.8	8.7	19.5	28.6	61.4	55.5	5.2	7.3	10.0	3.9	2.2	17.3	Odisha	21
22	Chhattisgarh	5,622,850	4,148,518	20.7	15.5	11.4	24.6	65.6	55.0	2.3	4.9	12.3	8.4	0.8	10.6	Chhattisgarh	22
23	Madhya Pradesh	14,967,597	10,919,653	23.4	25.3	20.0	29.0	54.6	43.1	2.0	2.6	16.4	6.9	1.1	18.9	Madhya Pradesh	23
24	Gujarat	12,181,718	9,643,989	69.0	62.3	7.1	11.7	21.2	21.8	2.7	4.2	39.8	29.2	2.3	4.8	Gujarat	24
25	Daman & Diu #	60,381	34,342	75.2	72.9	0.7	3.4	23.5	23.4	0.5	0.2	54.6	20.6	0.5	0.2	Daman & Diu #	25
26	D & N Haveli #	73,063	43,973	46.5	28.2	7.2	19.4	45.0	48.8	1.3	3.6	26.0	20.5	1.4	5.7	D & N Haveli #	26
27	Maharashtra	23,830,580	19,063,149	67.9	64.0	14.4	17.8	15.5	15.8	2.1	2.4	56.3	11.6	2.2	12.2	Maharashtra	27
28	Andhra Pradesh	21,024,534	16,849,857	69.9	48.1	6.4	16.5	20.6	32.0	3.1	3.4	49.0	20.9	0.5	5.9	Andhra Pradesh	28
29	Karnataka	13,179,911	10,232,133	66.1	58.9	9.0	12.4	21.5	25.7	3.5	3.0	41.2	24.8	1.0	8.0	Karnataka	29
30	Goa	322,813	279,216	85.4	69.0	11.1	26.1	0.3	1.1	3.2	3.8	82.0	3.4	4.0	7.1	Goa	30
31	Lakshadweep #	10,703	9,240	20.3	3.1	71.7	93.0	2.5	1.6	5.5	2.4	9.1	11.1	6.9	64.9	Lakshadweep #	31
32	Kerala	7,716,370	6,595,206	29.3	20.4	62.0	71.9	4.2	3.0	4.4	4.8	23.4	6.0	14.6	47.4	Kerala	32
33	Tamil Nadu	18,493,003	14,173,626	79.8	62.5	5.1	10.6	12.8	23.0	2.4	3.8	55.8	23.9	1.2	3.8	Tamil Nadu	33
34	Puducherry #	301,276	208,655	95.3	89.3	1.9	2.7	2.5	6.6	0.3	1.4	90.8	4.5	0.1	1.8	Puducherry #	34
35	A & N Islands #	93,376	73,062	85.0	76.2	7.3	16.0	0.5	0.5	7.1	7.3	68.8	16.2	0.7	6.6	A & N Islands #	35

Source: Ministry of Home Affairs

7.2.18 Current Land-use

Land use composition for areas 250m outwards on both sides of the centerline of the planned route is shown in Table 7.2-33. And is classified as 1, Agriculture2, Settlements3, Vegetation4, Waste Land5, Water Bodies, and 6, Miscellaneous. It is expected that the planned route will pass through large portions of waste land and agricultural land.

Table 7.2-33 Land Use/Land Cover of the Study Area Based on Satellite Imagery

Land Use Class	Area in Ha	%
Agriculture	23644.94	94.86
Water bodies	726.81	2.92
Settlements	225.12	0.90
Vegetation	137.72	0.55
Waste Land	166.68	0.67
Miscellaneous	25.64	0.10
Total	24926.91	100

Source: Study team based on satellite image

7.2.19 Cultural Heritage

India is one of the oldest civilizations in the world, spanning a period of more than 4000 years, and witnessing the fusion of several customs and traditions, which are reflective of the rich culture and heritage of the Country. There are many religious and historical heritages in India. Although there is no such historical and cultural heritage protected by law with direct impact to the planned route, several heritages are found in its vicinity. The major temples, ruins and cultural heritages between Mumbai and Ahmedabad are listed hereunder;

Table 7.2-34 Cultural Heritage (Maharashtra)

No.	Type	Name	District	Source
1	Fort	Bandra Fort	Mumbai Suburban	A
2		Dharavi Fort	Mumbai Suburban	A
3		Mahim Fort	Mumbai City	A
4		Shivadi Fort	Mumbai City	A
5		St. George fort	Mumbai City	A
6	Historical Monument	August Kranti Maidan	Mumbai City	A
7		Gateway of India	Mumbai City	A
8	Temple / Sharine	Banganga Talav	Mumbai City	A
9	**Station**	**Chhatrapati Shivaji Terminus (formerly Victoria Terminus)**	**Mumbai City**	**B**

Note: World heritage is shown in **bold**.
Description of the selection criteria of the World Heritage
Criterion (ii): Chhatrapati Shivaji Terminus (formerly Victoria Terminus) of Mumbai (formerly Bombay) exhibits an important interchange of influences from Victorian Italianate Gothic Revival architecture, and from Indian Traditional buildings. It became a symbol for Mumbai as a major mercantile port city on the Indian subcontinent within the British Commonwealth.
Criterion (iv): Chhatrapati Shivaji Terminus (formerly Victoria Terminus) is an outstanding example of late 19th century railway architecture in the British Commonwealth, characterized by Victorian Gothic Revival and traditional Indian Features, as well as its advanced structural and technical solutions.
Source: A: Archaeological Survey of India
B: UNESCO World Heritage Centre

Table 7.2-35 Cultural Heritage (Gujarat)

No.	Type	Name	District	Source
1	Fort	Dabhoi	Vadodara	A
2		Surat Castle	Surat	A
3	Grave site	Badshah no Hajiro	Ahmedabad	A
4		Dutch Tomb	Ahmedabad	C
5		European tombs	Surat	A
6		Heritage Walk	Ahmedabad	A
7		Qutbuddin Hajira	Vadodara	A
8		Rani no Hajiro	Ahmedabad	A
9		Tomb Koriat Makbaro	Surat	C
10	Haveli	Heritage Walk	Ahmedabad	A
11		Tambekar Wada	Vadodara	A
12	Historical Monument	Amrutvarshni Vav	Ahmedabad	C
13		Ancient Step Well	Ahmedabad	C
14		Ancient Talav	Vadodara	C
15		Bhadrakali Mata Stepwell	Kheda	C
16		Kabirvad	Bharuch	B
17		Kadia Dungar Caves	Bharuch	C
18		Khan Talav Having Water Let out	Ahmedabad	C
19		Mota Todavali Vav	Kheda	C
20		Vav (Step Well)	Kheda	C
21		Vidyadhar Vav	Vadodara	C
22		Vori Vav	Kheda	C
23	Palace	Palaces	Vadodara	A
24		Utelia Palace	Ahmedabad	A
25	Pilgrim Place	Ancient Masjid (Mosque)	Ahmedabad	C
26		Dakor	Kheda	B
27		Kayavarohan	Vadodara	B
28		Malsar	Vadodara	B
29		Shuklatirth	Bharuch	B
30		Udwada	Valsad	B
31	Temple / Sharine	Kirti Mandir	Vadodara	A
32		Kund & Toran	Kheda	C
33		Nyaya Mandir	Vadodara	A
34		Radhakrishna Temple	Valsad	C
35		Ranmukteshwar Temple	Vadodara	C
36		Surya Narayan Temple	Vadodara	C

Source: A: The Official Website of Gujarat Tourism, Govt. of Gujarat
B: Maps of india.com
C: Archaeological Survey of India

7.2.20 Indigenous or ethnic Minority

(1) Scheduled Caste (SC) and Scheduled Tribe (ST)

The Scheduled Caste and Scheduled Tribe are two groups of historically-disadvantaged people recognized in the Constitution of India. During the period of British rule in the Indian subcontinent, they were known as the Depressed Classes. Since independence, the Scheduled Castes, Scheduled Tribes were given reservation in India. The Constitution lays down the general principles of affirmative action for SC and ST. The term "Scheduled Tribes" refers to specific indigenous peoples whose status is acknowledged to some formal degree by national legislation. According to the below mentioned census, the ratio of SC is 10% to the total population of Ahmedabad. The ratios of Scheduled Caste in other districts are in the 2.6–5.6% range. However, the distinct difference in the ratio by district is not observed. The ratios of ST account for about half of the total population in Valsad and Navasari extremely higher than that of other districts. Furthermore, rations of ST in Thane, Surat, Bhauruch and Vadodara district are high.

Table 7.2-36 Distribution of SC and ST

State	District	Percentage of SCs to total population	Percentage of STs to total population
Maharashtra	Mumbai	5.5	0.6
	Mumbai (Suburban)	4.6	0.8
	Thane	4.2	14.7
Gujarat	Valsad	2.6	54.8
	Navsari	3.2	48.1
	Surat	3.4	28.2
	Bharuch	4.5	32.4
	Vadodara	5.6	26.6
	Anand	5.3	1.2
	Kheda	5.2	1.6
	Ahmedabad	10.7	1.0

Source: Census of India 2001–2011

7.2.21 Social Infrastructures and decision-making Institutions

District wise distribution of identified Common Property Resource (CPR) structures is mentioned in Table 7.2-35. Out of the 1,659 affected structures, 744 (44.9%) affected structures are electricity distribution poles followed by 358 (21.6%) roads, 76 (4.6%) electricity distribution lines/wires, 71 (4.3%) wells/tube wells/hand pumps, 69 (4.2%) railway buildings, 60 (3.7%) places of worship and electricity transformers each, 56 (3.4%) government buildings. Other CPR structures constitute of village common land, high transmission tower, panchayat building, community ponds, schools etc. In the context of road, it is understood that the impact will be of temporary nature, as the technical design is likely to have provisions of culverts and viaducts ensuring smooth passage way during operational phase. The impact may be only during the construction phase.

Table 7.2-37 Details of Affected CPR Structures

District	Well/ Tube wells/ Hand Pump	Community Ponds	Panchayat buildings	Electricity line	High Transmission Tower	Electricity Pole	Places of Worship	Burial / cremation grounds	Government Buildings	Railway Buildings	Schools	Village Common Land	Roads	Electricity Transformer	Others	Grand Total
Mumbai													2			2
Thane	1	1		1	6	17							14			40

Palghar	13	2	1	25	13	70			7		1	9	83	6	7	237
Dadra Nagar Haveli	2			4	1	10			2				3			22
Valsad	26	3	1	12	3	137	3	4	4		3	2	66	15	4	283
Navsari	7	2		5	7	104	3		2				38	3	6	177
Surat	1	3	4	3	5	62	1		8			3	41	6	2	139
Bharuch	2	2		1		60	2		4		1	30	26	9	1	138
Vadodara	1			1	3	85	13		11	27		2	24	6	7	180
Anand	4	1		4	1	57	6		1				18	2		94
Kheda	13	1		8	2	80	17	2	4		1	1	29	11	1	170
Ahmedabad	1			12	3	62	15		13	42			14	2	13	177
Grand Total	71	15	6	76	44	744	60	6	56	69	6	47	358	60	41	1,659
Percentage	4.3	1	0.4	4.6	2.7	44.9	3.7	0.4	3.4	4.2	0.4	2.9	21.6	3.7	2.5	100

Source: CPR Survey Data, Sep-Dec 2014

7.2.22 Health Care Facilities

The public health system in India comprises a set of state-owned health care facilities funded and controlled by the Government of India. Some of these are controlled by agencies of the central government while some are controlled by the governments of the states of India. The governmental ministry which controls the central government interests in these institutions is the Ministry of Health & Family Welfare. Governmental spending on health care in India is exclusively this system, hence most of the treatments in these institutions are either fully or partially subsidised. Since the Alma-Ata Conference of 1978, which declared health as a fundamental human right, health and nutrition have been accepted as important national concerns in the developing countries. In the Indian federal system, health is the concern of state governments, though some of the important health programs are funded by the central government. In Maharashtra has been in the forefront of healthcare development in the country. It was among the first states to decentralize primary health care administration through Zilla Parishads as early as 1961. Further, under the Minimum Needs Program Maharashtra was again one of the first states to achieve the norms mandated for primary health centers, sub centers and Rural Hospitals. The state also has the largest private health sector in India whose reach is quite extensive. In Gujarat, though per capita healthcare expenditure in the state is much lower than that for the country, the state has much higher level of health facilities.

The number of hospitals and dispensaries per lakh population is more than three times that in India. But the difference between Gujarat and India is not high when the health sub centers, beds per lakh population and doctors and nurses per lakh population are considered. With respect to Primary Health Centers (PHCs), Gujarat's performance is lower. This Gujarat's performance is better in high order health facilities, which are generally located in urban areas.

7.2.23 Educational Institutions

The essence of Human Resource Development is education which plays a significant and remedial role in balancing the socio-economic fabric of the Country. In Maharashtra, schools are run by the state government or by private organizations, including religious institutions. It

has 24 universities with a turnout of 160,000 Graduates every year.
In Gujarat, have both private and public universities, many of which are supported by the Government of India and the state government. Apart from these there are private universities supported by various bodies and societies. There are total 30 universities in Gujarat as of 4th February 2012. In Gujarat there is one central university, eighteen state universities, two deemed universities and nine private universities and a number of institutions imparting higher education in the field of Management, Medical, Engineering, Research Organizations etc.

7.2.24 HIV/AIDS

India has a population of 1.2 billion people, around half of whom are adults in the sexually active age group. The first AIDS case in India was detected in 1986 and since then HIV infection has been reported in all states and union territories.
The predominant route of transmission of HIV/AIDS in India is through the heterosexual route (86%). Some of the key factors fueling the spread of HIV/AIDS in India are commercial sex, high prevalence of STI, large scale migration of workers from rural to urban areas and low levels of female literacy. According to the Annual Round of HIV Sentinel Surveillance 2003, the estimated number of 5.1 million HIV infections consists of 3.48 million general population, 1.49 million STI patients, 70000 Female sex workers, 10000 intravenous drug users, and 55000 children. The rates of HIV among sex workers, intravenous drug users, and STI patients remain unacceptably high in many parts of the country. Table 7.2-38 shows the status of HIV/AIDS in India in different states.

Table7.2-38 Status of HIV/AIDS in India in Different States.

State/Union Territory	Antenatal clinic HIV prevalence 2010-11 (%)	STD clinic HIV prevalence 2007 (most recent data) (%)	IDU HIV prevalence 2010-11 (%)	MSM HIV prevalence 2010-11 (%)	Female sex worker HIV prevalence 2010-11 (%)
A & N Islands	0.13	1.33	...	...	...
Andhra Pradesh	0.76	17.2	3.05	10.14	6.86
Arunachal Pradesh	0.21	0	0.24	...	0.28
Assam	0.09	0.5	1.46	1.4	0.46
Bihar	0.17	0.4	4.54	4.2	2.3
Chandigarh	0	0.42	7.2	0.4	0
Chhattisgarh	0.43	3.33	0.42	14.98	2.73
D & N Haveli	0	...	...	...	...
Daman & Diu	0.13	...	...	...	...
Delhi	0.3	5.2	18.27	5.34	0.7
Goa	0.33	5.6	...	4.53	2.7
Gujarat	**0.46**	**2.4**	**1.6**	**3**	**1.62**
Haryana	0.19	0	0.8	3.05	0.48
Himachal Pradesh	0.04	0	4.89	1.23	0.53
Jammu & Kashmir	0.06	0.2	0	...	0
Jharkhand	0.25	0.4	2.02	0.4	0.82
Karnataka	0.69	8.4	0	5.36	5.1
Kerala	0.13	1.6	4.95	0.36	0.73

Lakshadweep	0	0	...	...	...
Madhya Pradesh	0.32	1.72	5.13	7.94	0.93
Maharashtra	**0.42**	**11.62**	**14.17**	**9.91**	**6.89**
Manipur	0.78	4.08	12.89	10.53	2.8
Meghalya	0.05	2.21	6.44	...	...
Mizoram	0.4	7.13	12.01	...	...
Nagaland	0.66	3.42	2.21	13.58	3.21
Odisha (formerly Orissa)	0.43	1.6	7.16	3.79	2.07
Puducherry (formerly Pondicherry)	0.13	3.22	...	1.21	1.21
Punjab	0.26	1.6	21.1	2.18	0.85
Rajasthan	0.38	2	...	...	1.28
Sikkim	0.09	0	0	...	0
Tamil Nadu	0.38	8	...	2.41	2.69
Tripura	0	0.4	0.45	...	0.21
Uttar Pradesh	0.21	0.48	2.03	1.56	0.62
Uttarakhand (formerly Uttaranchal)	0.25	0	4.33	...	...
West Bengal	0.13	0.8	2.72	5.09	2.04

Note: Those that Maharashtra and Gujarat are shown in **bold**
Source: National AIDS Control Organization (NACO)

Following measures will be taken in the construction stage by the expert to prevent HIV/AIDS.

- What is the AIDS
- Infection route of HIV
- Progress from HIV infection to AIDS
- Infection prevention against HIV
- When you have worry about the infection
- When the infection becomes clear
- When infected person is around you

7.2.25 Gender

2012 as indicated by the gang rape-murder that occurred in December, discrimination against women remains deeply rooted in India.
That discrimination against these women is the biggest obstacle of women's empowerment is where it is pointed out in the 12th Five-Year Plan.
Table 7.2-39 shows the gender inequality indices that United Nations Development Program (UNDP) is announced. Human Development Index (HDI) of India is ranked 135th.

Table 7.2-39 Gender Inequality Indices

HDI rank	Country	Gender Inequality Index Value, 2013	Gender Inequality Index Rank, 2013	Maternal mortality ratio, 2010	Adolescent birth rate, 2010/2015	Share of seats in parliament, 2013	Population with at least some secondary education, 25 +, female, 2005-2012	Population with at least some secondary education, 25 +, male, 2005-2012
129	Honduras	0.482	99	100	84	19.5	28	25.8
129	Morocco	0.46	92	100	35.8	11	20.1 e	36.3 e
131	Vanuatu	..	..	110	44.8	0.1	..	..
132	Nicaragua	0.458	90	95	100.8	40.2	30.8 e	44.7 e
133	Kiribati	..	..	..	16.6	8.7	..	..
133	Tajikistan	0.383	75	65	42.8	17.5	89.9	95
135	**India**	**0.563**	**127**	**200**	**32.8**	**10.9**	**26.6 e**	**50.4 e**
136	Bhutan	0.495	102	180	40.9	6.9	34	34.5
136	Cambodia	0.505	105	250	44.3	18.1 h	9.9	22.2
138	Ghana	0.549	123	350	58.4	10.9	45.2	64.7
139	Lao People's Democratic Republic	0.534	118	470	65	25	22.9 e	36.8 e

Note: Those that India is shown in **bold**
Source: UNDP

7.2.26 Children's Rights

The Indian constitution accords rights to children as citizens of the country, and in keeping with their special status the State has even enacted special laws. The Constitution, promulgated in 1950, encompasses most rights included in the UN Convention on the Rights of the Child as Fundamental Rights and Directive Principles of State Policy. Over the years, many individuals and public interest groups have approached the apex court for restitution of fundamental rights, including child rights. The Directive Principles of State Policy articulate social and economic rights that have been declared to be "fundamental in the governance of the country and the duty of the state to apply in making laws" (Article 37). The government has the flexibility to undertake appropriate legislative and administrative measures to ensure children's rights; no court can make the government ensure them, as these are essentially directives. These directives have enabled the judiciary to give some landmark judgements promoting children's rights, leading to Constitutional Amendments as is in the case of the 86th Amendment to the Constitution that made Right to Education a fundamental right.

7.2.27 Climate Change

The effects of global warming on the Indian subcontinent vary from the submergence of low-lying islands and coastal lands to the melting of glaciers in the Indian Himalayas, threatening the volumetric flow rate of many of the most important rivers of India and South Asia. In India, such effects are projected to impact millions of lives. As a result of ongoing climate change, the climate of India has become increasingly volatile over the past several decades; this trend is expected to continue.

7.2.28 Landscape

The landscape of the proposed alignment can be bifurcated into two different regions. The first part towards Mumbai, having undulated and coastal area while the second one, falling in the Gujarat region having plain with minor undulation.
Geographically, Mumbai is an island outside the mainland of Konkan in Maharashtra separated from the mainland by narrow Thane Creek and a somewhat wider Harbor Bay. At present, it covers the original island group of Mumbai, and most of the island of Salsette, with the former Trombay Island appended to it in its Southeast. Small part in the north the Salsette Island however, lies in Thane District. The Salsette-Mumbai island creek and the Thane Creek together separate it from the mainland. Thus the area of Greater Mumbai is surrounded on three sides by the seas; by the Arabian Sea to the west and the south, the Harbor Bay and the Thane Creek in the east-but the north, the district of Thane stretches along its boundary across the northern parts of Salsette. Its height is hardly 10 to 15 meters above sea level. At some places the height is just above the sea level. Part of Mumbai City district (Backbay and Bandra reclamation) are the major reclamation areas of Mumbai in the Arabian sea. Gujarat is situated on the west coast of India. It is bounded in the west by the Arabian sea, in the north-west by Pakistan, in the north by Rajasthan, in the east by Madhya Pradesh and in the south and south-east by Maharashtra. The state of Gujarat occupies the northern extremity of the western sea-board of India. It has the longest coast line of 1290 kms. The state comprises of three geographical regions. The peninsula, traditionally known as Saurashtra, is essentially a hilly tract sprinkled with low mountains. Kutch on the north-east is barren and rocky and contains the famous Rann (desert) of Kutch, the big Rann in the north and the little Rann in the east. The mainland extending from the Rann of Kutch and the Aravalli Hills to the river Damanganga is on the whole a level plain of alluvial soil.

7.2.29 Accident

Many of the railway accidents occurred in India are due to level crossing and human error involved in train operation. Moreover, traffic accident mortality rate in India is 10.9 (traffic fatalities per 100,000 population) and a relatively high number of the same extent as the United State. The railway accidents occurred in recent years in India are shown below.

- 03 January 2010 – India- All seven coaches of the Arunachal Pradesh Express, running between Murkongselek and Rangiya, derailed at a place between Helem and Nij Bogaon inAssam in the early hours of today, but none of the passengers was hurt.

- 17 January 2010 – India- Two persons were killed and four others injured when their car was hit by a train at an unmanned crossing on Sunday afternoon in Barabanki district. The accident happened when the Lucknow-Sultanpur Harihar Nath Express hit the car at Barha railway crossing under Haidergarh police station area. Two persons traveling in the car died on the spot while the four others who sustained serious injuries have been referred to Trauma Centre in Lucknow. Train traffic on this route was disrupted for nearly two hours after the accident.

- 13 September 2011 - A Chennai suburban MEMU train rammed into a stationary Arakonam-Katpadi passenger train at around 9.30 PM. Ten people were killed and many injured. It happened between Melpakkam and Chitheri Station in Vellore district. The passenger train was waiting for the signal. In the impact eight coaches were derailed and 3 were completely damaged.

- 20 March 2012 - 15 people were killed when a train collided with an overcrowded taxi minivan at an unmanned railroad crossing in northern Uttar Pradesh state, Mahamaya Nagar district, 296 kilometres from state capital Lucknow.

- 31 May 2012 - Howrah-Dehradun-Doon Express,derailed near Jaunpur(U.P.).At least 7 people killed and 15 sevearly injured.

- 19 August 2013 - Dhamara Ghat train accident, at least 35 people died when 12567 Saharsa-Patna Rajya Rani SF Express ran over people at the Dhamara station near Saharsa in Bihar.

- 20 March 2014 An 18-year-old student was killed while nine persons, including two women and a railway guard, were injured when six coaches of a local train derailed after getting uncoupled from the rest of the train at Titwala, 61 km from Chhatrapati Shivaji Terminus.

- 18 April 2014 - 11068 Faizabad Junction-Lokmanya Tilak Terminus Express derailed near Asangaon in the evening, holding up services on the Central Railway. The engine and one coach of the Faizabad-LTT Express derailed around 8pm. The CR spokesperson said, "There were no injuries and cause of derailment was not known."

- May 4, 2014 - 50105 Diva Junction-Sawantvadi Passenger train derailed between Nagothane and Roha stations at 9-30 AM. About 20 are dead while about 100 are injured. Several other trains were delayed, cancelled or diverted in the Konkan Railways.

- 25 June 2014 - 12236- Dibrugarh Rajdhani Express Derailed near Bihar's Chapra town, Four Killed and Eight injured.

7.3 EIA System in India

According to the "Requirement of prior Environmental Clearance (EC), Environment (Protection) Rules, 1986," the Railway Project is not listed in the Schedule: List of Projects or activities requiring prior environmental clearance. On the other hand, "Illustrative List of Sensitive Sectors, Characteristics, and Areas," and JICA Guidelines presents as; "The project of sensitive sectors, characteristics, and areas shown in this illustrative list are those that will likely have a significant adverse impact on the environment and society. Each individual project is categorized in accordance with the standards for "Category A" indicated in the categorization section of the guidelines, depending on the impacts of the individual projects. "Hence, the HSR project falls in "Sensitive Sectors (roads, railways, and bridges" and "Sensitive Characteristics (Large-scale involuntary resettlement)."Accordingly, both EIA Report and Resettlement Action Plan (RAP) should be prepared. Procedures of environmental clearance are shown in Figure7.3-1.

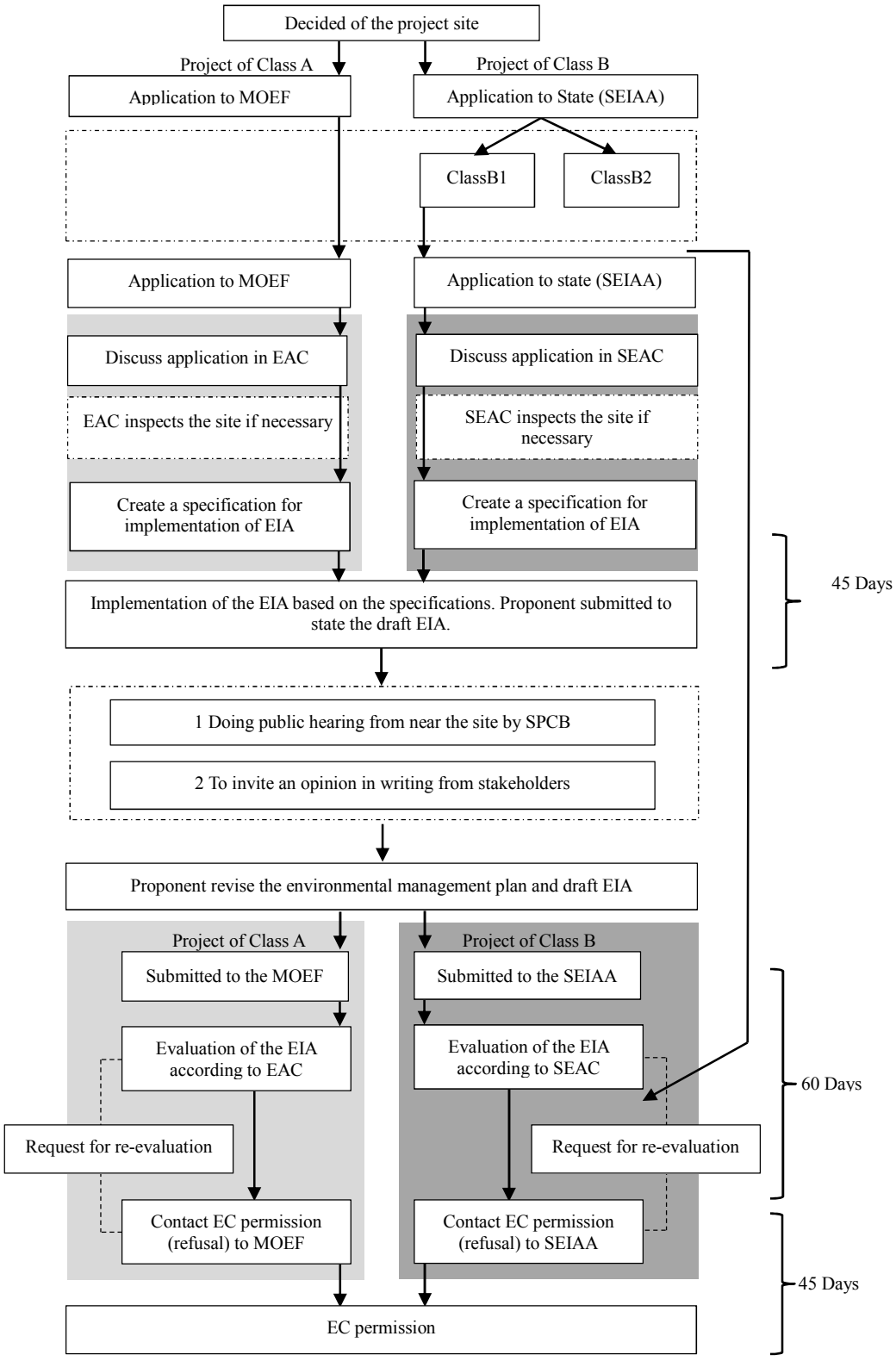


Figure7.3-1 Procedures of Environmental Clearance

7.3.1 Law and Regulations in India

Comprehensive environmental legislation has grown in the country since 1970. The Environmental Legislation helps to plug in gaps and protect environment while developing various project associated with the development of the country. The laws implementation will help in sustainable development and protects the human health and property as well. The MOEF and the State and CPCB together form as the regulatory and administrative core sector. There are many important environmental legislations which are directly relevant to the proposed HSR Project between Mumbai and Ahmedabad. While some legislation are applicable before the execution of the project in terms of getting clearances/permissions from the statutory authorities before the implementation of the project, and some needs to be followed at the time of implementation of the project.

Table 7.3-1 Applicable National Policies and Regulations

Title	Outline
The Environment (Protection) Act, 1986	This act was enacted with the objective of providing for the protection and improvement of the environment. It empowers the Central Government to establish authorities [under section 3(3)] charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country.
EIA Notification, 2006 and Amendments	The Environmental Impact Assessment Notification issued by the Ministry of Environment and Forests, Government of India is governing all developmental interventions that are taking place in the country. This notification was initially issued by the MOEF in 1994 and later amended in 2006 based on re-engineered process. The purpose of this notification is to impose restrictions and prohibitions on the expansion and modernization of any activity or proposing a new project as specified in Schedule I in any part of India unless environmental clearance has been accorded by the Central Government or State Government in accordance with the procedure specified in the notification.
The Indian Forest Act, 1927	The Indian Forest Act, 1927 was enacted after repealing the Indian Forest Act, 1878 for the purpose of consolidating the law relating to forests, the transit of forest produce and the duty leviable on timber and other forest produce.
Forest Conservation Act, 1980 and its Amendments	This Act provides for the conservation of forests and regulating diversion of forestlands for non-forest purposes. When any project falls within forestlands, prior clearance is required from the relevant authorities under the Forest (Conservation) Act, 1980. The respective State Governments cannot de-reserve any forestland or authorize its use for any non-forest purposes without approval from the Central Government.
Forest Conservation Rules, 2003 and its Amendments	According to the Forest (Conservation) Rules, 2003 as amended up to February 2004, the project requires forestry clearance if forest land acquisition is involved. In case of forest land, if acquisition is less than 40 ha (other than mining project), decision will be taken by Principal Conservation of Forest, and if acquisition is more than 40 ha, the proposal will be sent to MOEF for their approval.
Supreme Court Orders on	The Supreme Court began by reinterpreting the meaning of

Title	Outline
Forest Conservation and Protected Areas (in the Thirumulpad Forest Case), 1996 and 2000	"forest" as defined in the Forest Conservation Act, 1980. The Act essentially requires the Central Government approval for conversion of forest land to non-forest purposes. By virtue of the Supreme Court's order dated on13th of November, 2000, no Forest, National Park or Sanctuary can be de-reserved without the approval of the Supreme Court.
The Biological Diversity Act, 2002 and its Rules, 2007	This Act was born out of India's attempt to realize the objectives enshrined in the United Nations Convention on Biological Diversity, 1992 which recognizes the sovereign rights of states to use their own Biological Resources. All restrictions applicable to protected areas such as National Park and Sanctuaries are also applicable to the reserves.
The Wildlife (Protection) Act, 1972 and its Amendment, 2002	The Act was enacted with the objective of effectively protecting the wild life of the country and to control poaching, smuggling and illegal trade in wildlife and its derivatives. The Act provides for protection to the listed endangered flora and fauna and ecologically important protected areas. It empowers the Central and State Governments to declare any area as a wildlife sanctuary, national park or closed area.
Noise Pollution Regulation and Control Rules, 2000	As a result of considering the deleterious and psychological effects of the noise pollution on human well-being, the rules for noise pollution came into force in 2000. According to the provisions of the Rules, a person could make a complaint to the designated authority in the event that the actual noise levels exceed the ambient noise standards by 10 dB or more as compared to the standards prescribed in the Schedule of the Rules.
Air (Prevention and Control of Pollution) Act, 1981	This Act provides for the prevention, control and abatement of air pollution. It is applied when air polluting activity in an air pollution control area or when emissions of any air pollutants into the atmosphere exceed the standards set by the Central and State Boards.
Water (Prevention and Control of Pollution) Act, 1974	The Water (Prevention and Control of Pollution) Act, 1974 resulted in the establishment of the Central and State level Pollution Control Boards which responsibilities include managing water quality and effluent standards, as well as monitoring water quality, prosecuting offenders and issuing licenses for construction and operation of certain facilities.
Ancient Monuments & Archaeological Sites & Remains Act, 1958	The Archaeological Survey of India administers the Ancient Monuments and Archaeological Sites and Remains Act, 1958 to provide for prohibited and regulated areas around monuments of national importance. According to this act, the area falling within 100 m radius from the peripheries of the protected monument is declared as prohibited area and to the extent of 200 m as a regulated area. No development activity is permitted within a 100 m radius and for the radius between 100 to 200 m, construction could be made only in accordance with the terms and conditions of the license granted by the Director General of the Archaeological Survey of India.
Ancient Monuments & Archaeological Sites &	This act has been enacted to amend the Ancient Monuments and Archaeological Sites and Remains Act, 1958 by inserting

Title	Outline
Remains (Amendment and Validation) Act, 2010	provisions for validation of certain actions taken by the Government under the principal act and came into force on January 23, 2010. Archaeological sites and remains to be done by the National Monument Authority (NMA), which is to be constituted by the Government under this amended act. The act has also specified the composition, functions and responsibility of the Authority.
Cultural Environment Related Act, 1958	As a result of growing interest in cultural heritage in the nation, both government agencies and NGOs concerned with the preservation and conservation of this heritage. It regulates all archaeological activities in the country as per the provisions of the Ancient Monuments and Archaeological Sites and Remains Act, 1958 as well as Antiquities and Art Treasure Act, 1972.
Regulation / Act governing Vibration	There is no prevailing regulation/standard in India governing train induced ground vibrations. Regulations/standards prevailing in other countries such as USA, Japan, and Sweden, etc. have been reviewed and compared with the findings of vibration monitoring in its respective chapter.
Public Liability Insurance Act, 1991 and its Amendment, 1992	This act imposes on the owner the liability to provide immediate relief in respect of death or injury to any person or damage to any property resulting from an accident while handling any of the notified hazardous chemicals. This relief has to be provided on a "no fault" basis. Owner handling hazardous chemicals has to take an insurance policy of an amount equal to its "paid up capital" or up to Indian Rupees 500 million, whichever is less.
National Green Tribunal Act, 2010	The National Green Tribunal has been established on October 18, 2010 under the National Green Tribunal Act, 2010 for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto.
National Green Tribunal (Practices and Procedure) Rules, 2011	The rules specify the minimum composition of tribunal for hearing an application or appeal, circuit powers of the Chairperson to delegate powers to a judicial member of the Tribunal, procedure for filing application or appeal, place of filing and hearing of appeal, functions of registrar of tribunal, procedure for relief and compensation, procedure for documentation of case and other procedural and administrative matters related to the Tribunal.

<table>
<tr><th>Title</th><th>Outline</th></tr>
<tr><td>Applicable Cross-Sectoral Laws</td><td>There are a number of laws that are cutting across all sectors and development process of the country. Some of these are directly relevant especially during the construction stage and are listed below.
<table>
<tr><th>Applicable GOI Acts</th><th>Year</th><th>Objective</th></tr>
<tr><td>Minimum Wages Act</td><td>1948</td><td>As per this act, the employer is supposed to pay not less than minimum wages fixed by appropriate Government.</td></tr>
<tr><td>Child Labor (Prohibition and Regulation) Act</td><td>1986</td><td>This Act prohibits employment of children below 14 years of age in building and construction industry covering Railway.</td></tr>
<tr><td>The Labors Act</td><td>1988</td><td>The health and safety of workers employed in construction work etc.</td></tr>
<tr><td>The Factories Act</td><td>1948</td><td>Health and safety considerations for workers.</td></tr>
<tr><td>Workmen's compensation Act</td><td>1923</td><td>This act provides for compensation in case of injury by accidents arising out of and during the course of employment.</td></tr>
<tr><td>Contract Labor (Regulation and Abolition) Act</td><td>1970</td><td>This act provides for certain welfare measures to be provided by the contractor to contract labor.</td></tr>
<tr><td>The Building and other Construction Workers Act</td><td>1996</td><td>All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. The employer is required to provide safety measures at construction work site and other welfare measures such as canteens, first-aid facilities, ambulance, housing accommodation for Workers near the workplace etc.</td></tr>
</table></td></tr>
<tr><td>The National Environmental Policy (NEP), 2006</td><td>The National Environmental Policy (NEP), 2006 is a response to national commitment to clean environment mandated in the Indian Constitution and is intended to mainstream environmental concerns in all development activities.</td></tr>
<tr><td>National Forest Policies</td><td>The Ministry of Food and Agriculture formulated the National Forest Policy to be followed in the management of State Forests in the country long time back in 1952. The policy envisages in enhancing the forest coverage of the country to 33% of total geographical area of the country.</td></tr>
</table>

Source: Report of DFC

Table 7.3-2 Other Relevant Rules, Notifications and Standards

Title	Outline
Fly Ash Utilisation Notification, 1999 and its Amendment, 2003	It is mandatory that every agency, person or organization shall utilize fly ash for construction of roads or flyovers or embankments or any other construction activity from the thermal power plants located within a radius of 100 kilometers of the construction site. This Notification recognizes that it is necessary to protect the environment, conserve top soil and prevent the dumping and disposal of fly ash discharged from coal or lignite based thermal power plants on land.
Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 and its Amendments	The objective of these rules is to ensure environmentally sound management of all hazardous materials and to enable recovery and/or use of useful materials from hazardous waste destined for final disposal.
Coastal Regulation Zone (CRZ) Notification, 2011	The definition of CRZ has been widened to include the land area from HTL to 500 m on the landward side, as well as the land area between HTL to 100 m or width of the creek, whichever is less, on the landward side along tidal influenced water bodies connected to the sea. The CRZ also includes, for the first time,

Title	Outline
	water area up to 12 nautical miles in the sea and the entire water area of a tidal water body such as creek, river, estuary without imposing any restrictions of fishing activities.
MOEF Eco-sensitive Area Notifications	These Notifications clearly mentions the prohibitive/ restricted activities and the minimum distance to be maintained for any sort of activities. These include non-establishment of any industrial unit adjacent to the eco-sensitive zone, no construction activities to be entertained in the vicinity and quarrying and mining to be strictly prohibited.
Dahanu ESA Notification, 1991 and its Amendments	Dahanu area which comes under the Thane district in the State of Maharashtra has mangrove forests, which is considered to be eco-sensitive area and several legislations are supporting to safeguard of the mangrove areas in the district. Through this Notification, the Central Government in consultation with the Government of Maharashtra declared entire Dahanu Taluka as an ecologically fragile area and to impose restrictions on the setting up of industries which have detrimental effect on the environment. Further, an Authority known as Dahanu Taluka Environment Protection Authority (DTEPA) was constituted to exclusively monitor the activities in the area and implement all provisions as mentioned in the Notification.
Maharashtra Felling of Trees (Regulation) Act, 1964 and its Amendments	This Act makes better provision for regulating the felling of certain trees in the State of Maharashtra, for the purpose of the preservation thereof, and for the protection of the soil against erosion. There are restrictions on felling of 16 species of trees which are specified in the Schedule of the said Act (*called as "Scheduled Trees*") in urban areas without the previous permission of the 'tree officer'. An application made to a Tree Officer for felling a tree should contain the name of the owner of land on which the tree stands; number of trees to be felled; and the purpose for felling the trees. The application should be accompanied by a site plan, indicating the position of the trees required to be felled.
Saurashtra Felling of Trees (Infliction of Punishment) Act, 1951	In Gujarat, felling and removal of Limbo, Desi baval, Khijdo, Kanji, Amli and Ambo trees (*called as "Scheduled Trees"*) have been governed by this Act. It is desirable that an equal number of trees need to be planted and cared for a year or more in advance before felling of trees. Such trees planted are normally recorded in revenue records.
Mumbai High Court Order on Mangrove Areas	The Mumbai High Court has recently banned non-forest activities in the coastal areas of Maharashtra where mangroves are growing. A division bench of the Court ruled that "no non-forest activities shall be permitted throughout the state in mangrove areas" and such areas shall be treated as deemed 'reserved forests' and attract all provisions of the Forest Conservation Act, 1980.
Office Memorandum of MoEFCC on Order of Hon'ble Supreme Court	According to an office memorandum of the MoEFCC dated 18 May 2012 in order to ensure compliance of the Hon'ble Supreme Court's order of 27 Feb 2012, it is now mandatory to seek environmental clearance under the Environmental Impact Assessment Notification 2006 for mining of minor mineral

Title	Outline
	materials such as sand, ordinary earth, stone, moorum, aggregate on land parcels of any area. It means the DFC project while identifying the possible sources of 'Borrow areas and Quarry sites' should ensure that any identified agency has a valid licensed lease to extract sand, moorum and other materials as well as has also obtained environmental clearance from the concerned department for the leased area and is complying with all stipulated conditions of the clearance letter.
Railways (Amendment) Act, 2008	The Railways Act, 1989 was amended in 2008, which is called the Railways (Amendment) Act, 2008 (RAA 2008). The RAA 2008 provides land acquisition process and procedures for special railway projects such as the MAHSRC, including valuation methodologies for land compensation. The amendments include insertion of following clauses: ·7A (competent authority) means any person authorized by the central Government by notification, to perform the functions of the competent authority for such area as may be specified in the notification; ·29A (person interested) – (i) all persons claiming an interest in compensation to be made on account of the acquisition of land under this Act; (ii) tribals and other traditional forest dwellers, who have lost any traditional rights recognized under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest persons having tenancy rights under the relevant State laws; ·37A (special railway project) – means a project, notified as such by the Central Government from time to time, for providing national infrastructure for a public purpose in a specified timeframe, covering one or more States or the Union territories; ·Chapter IVA – Land Acquisition for a Special Railway Project:
Land Acquisition Act, 1984 and its Amendment	In India, land may be acquired by the Government for a public purpose under the principles of eminent domain, that is, the Government has the first right for land. Land is acquired by the Government most commonly under the Land Acquisition Act of 1894 modified in 1984. The amendment of 1984 extended the scope of the definition of public purpose and some of its norms related to time, amount and procedures of compensation. However, the Act in essence remains unchanged. The Act is applicable to the whole of country except the State of Jammu and Kashmir. The land needed for the DFC project will be acquired under the Act of 1894 and compensated as per the provisions of Act unless decided otherwise by the Government. Land acquisition under the Act on average takes two or three years. However, there is provision of an emergency clause under the Land Acquisition Act. This clause is not invoked to acquire land. The compensation as per the Land Acquisition Act includes the award amount, 30% solatium and interest of 12% from the date of issue of the notification under Section 4 of the Act. The valuation of trees and other immovable properties on

Title	Outline
	the land is compensated based on the rates decided by the competent authority in consultation with concerned departments for the purpose of payment of compensation. However, this Act is not be applicable to MAHSRC project.
Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Social Impact Assessment and Consent) Rules, 2014 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (30 of 2013)	G.S.R. 574(E).—Whereas certain draft rules, namely the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Social Impact Assessment and Consent) Rules, 2014 were published as required under section 112 of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (30 of 2013), vide notification of the Government of India in the Ministry of Rural Development (Department of Land Resources), number G.S.R. 101(E), dated the 20th February, 2014 in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i) dated the 20th February, 2014 for inviting objections and suggestions from all persons likely to be affected thereby before the expiry of a period of thirty days from the date on which copies of the Gazette containing the notification were made available to the public. However, this Act is not be applicable to MAHSRC project.

Source: Report of DFC

7.3.2 Role of Concerned Authorities

Ministry of Environment and Forests (MOEF)

MOEF is the nodal agency in the administrative structure of the central government for planning, promotions, co-ordination and overseeing the implementation of India's environmental and forestry policies and programs. The major responsibilities of MOEF include:

- Environmental resource conservation and protection, including environmental impact assessment, clearance of developmental projects;
- Co-ordination with the other ministries and agencies, voluntary organizations and professional bodies for environmental action plans;
- Promotion of research and development, manpower planning and training and creation of environmental awareness;
- Liaison and coordination with international agencies involved in environmental matters.

Central and State Pollution Control Boards

The Central Pollution Control Board is responsible for pollution control throughout the country. In addition to the control of air, noise and water pollution it is also responsible to ensure effective control of disposal of hazardous wastes and storage and handling of hazardous chemicals and substances. With the enactment of air and water pollution laws, states have set-up their own State Pollution Control Boards (SPCBs) to monitor industrial emissions and effluents and to approve the operation of new industries after careful scrutiny. The functions of the SPCBs include:

- The planning of comprehensive state programs for the prevention and control of air and water pollution and to ensure the implementation thereof;
- Inspection of pollution control equipment/ plants for monitoring of their efficiency.

The SPCB in consultation with the CPCB may establish norms for air quality, gaseous emission and noise level etc.

Indian Board for Wildlife and State Boards for Wildlife

Wildlife Division in the Ministry is responsible for carrying out the activities relating to Wildlife conservation with the State Governments and to provide financial and technical assistance to them for scientific management of the wildlife resources in the country. It is also responsible for carrying out the activities related to wildlife research and training of personnel involved in wildlife management through Wildlife Institute of India. Presently Wildlife Division is headed by the Addl. Director General of Forests (Wildlife) who is also Director, Wildlife Preservation and the Management Authority of Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Forest Department Gujarat and Maharashtra Forest Department

Both State Forest Department are entrusted with the prime responsibility of protection, conservation and development of the forests and wildlife of the state.

- Protection, Conservation and development of forests and wild life, the adoption of measures of soil conservation, moisture conservation and increasing soil fertility.
- The utilization of the forest so as to obtain the maximum yield consistent with their permanent maintenance and the supply of the needs of the people, agriculture, industry and defense.
- To conduct research into silviculture, utilization and other problems affecting the regeneration and development of the forests.
- To achieve the goals of National Forest policy 1988 and to cover the maximum area under forests.
- To create awareness among the people about the forests and environment.
- To increase the active participation of the local people in protection and conservation of forest with special emphasis on tribal, poor and women.

Supreme Court of India

Since 1996, the Supreme Court of India has assumed the role of the principal decision maker so far as issues relating to forests and wildlife are concerned. This has been due to Supreme Court's intervention through the following cases:

- The T. N. Godavarman Thirumulkpad vs Union of India and ors (WP No 202 of 1995) concerning the implementation of the Forest Conservation Act, 1980.
- The Centre for Environmental Law (CEL), WWF vs Union of India and ors (WP No 337 of 1995) concerning the issue of settlement of Rights in NPs and Sanctuaries and other issues under the Wildlife (Protection) Act, 1972.

These cases are being heard for the last nine years and are a part of what is termed as "continuing mandamus", whereby the Courts, rather than passing final judgments, keeps on passing orders and directions with a view to monitor the functioning of the executive. They have led to fundamental changes in the pattern of forest governance and decision making.

Some examples include:

- By virtue of the Supreme Court's order dated 13.11.2000 in the CEL WWF case (W.P. No. 337 of 1995), no forest, National Park or Sanctuary can be deserved without the approval of the Supreme Court.
- No non-forest activity is permitted in any NP or Sanctuary even if prior approval under the Forest (Conservation) Act, 1980 has been obtained.
- The interim order dated 14.2.2000 prohibited the removal of any dead or decaying trees, grasses, drift wood etc. from any area comprising a NP or a Sanctuary notified under Section 18 or 35 of the Wildlife (Protection) Act, 1972.

It was also directed that if any order to the contrary has been passed by any State Government or

other authorities the operation of the same shall be stayed. In order to advise the Supreme Court on the various issues concerning forest and wildlife conservation, the CEC was set up as an authority under Section 3 (3) of the Environment (Protection) Act, 1986 to adjudicate on forest and wildlife related issues. Despite its wide impact and implication on forest management and governance most environment, human rights and activists groups and also the Government are not generally aware of the current developments in the Courts. Existing methods of reporting of Court's orders and judgments are generally inadequate and do not reach the concerned the groups in time. An Information Dissemination Service is therefore been envisaged as a neutral body that will keep a watch on the happenings in the Supreme Court and disseminate information through electronic as well as other means to interested groups and individuals on all decisions concerning the above two cases.

Maharashtra State Coastal Zone Management Authority

The State level MCZMA was constituted by the MOEF under Environment (Protection) Act, 1986. It was in the year 1998 that the MOEF (under orders from the Supreme Court of India in 1996) constituted the State Coastal Zone Management Authorities (SCZMA) for each State having coastline and National Coastal Zone Management Authority (NCZMA) to ensure the implementation of CRZ Notification, 1991. Main functions of MCZMA are;

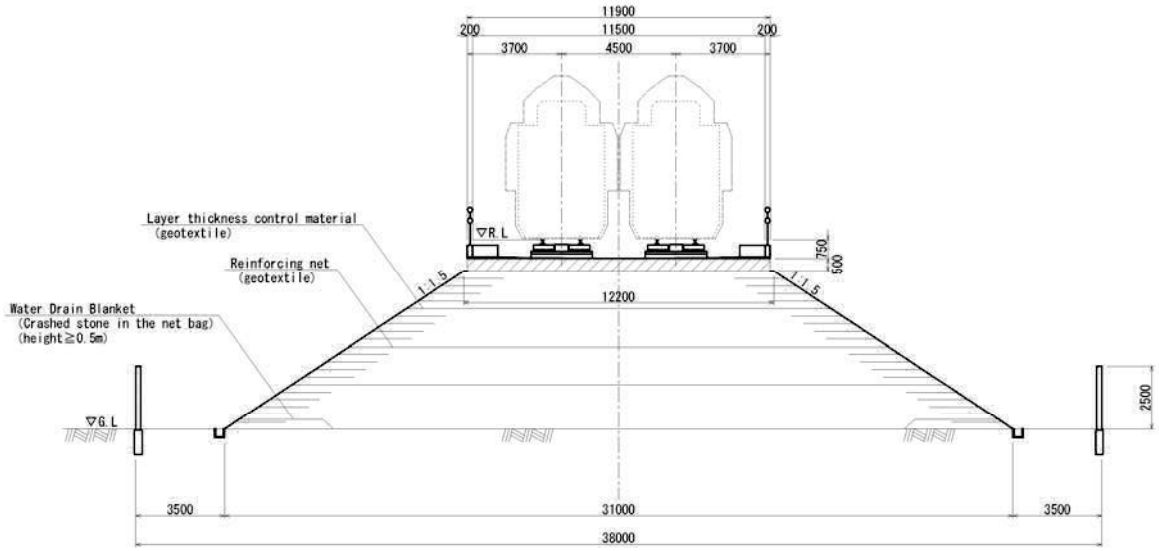
- To take measures for protecting and improving the quality of the coastal environment
- Examination of proposals for changes or modification in classification of CRZ areas
- Enquiry into cases of alleged violation of the provisions of the CRZ Notification, 1991 and take appropriate decision under Section-5, 10& 19 of Environment (Protection) Act, 1986
- To examine all projects proposed in CRZ areas and give their recommendations
- To identify ecologically, economically and highly vulnerable areas of the coastal zone and formulate area specific management plans.

National Coastal Zone Management Authority

S. O.991 (E).-In exercise of the powers conferred by sub-sections (I) and (3) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986) (hereinafter referred to as said Act) and in supersession- of the Order of the Government of India in the MOEF number J-17011/18/96-lA-III dated 13th August, 1998, except as respects things done or omitted to be done before such supersession, the Central Government hereby constitutes an authority to be known as the NCZMA.

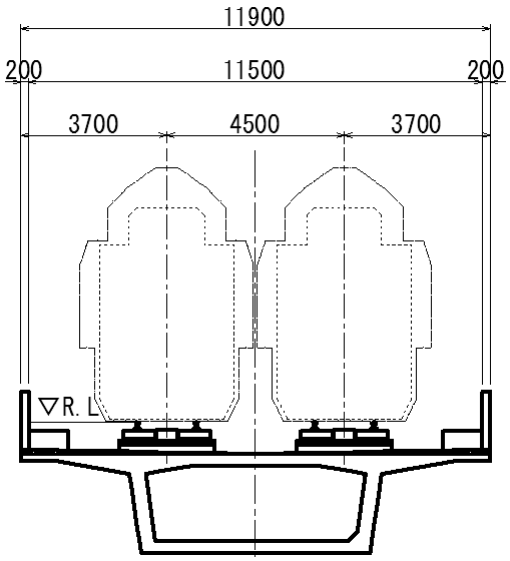
7.4 Analysis of Alternatives

The MOR Government of India proposes to construct, operate, and maintain an electric-powered high-speed train (HST) system from Mumbai to Ahmedabad. When completed, the nearly 508.5 km railway corridor would provide new passenger rail service. The HST would be capable of up to 300-350 km-per-hour (kmph) operating speeds, with state-of- the-art safety, signaling, and automated train control systems. The HST System would connect and serve the major metropolitan areas of Gujarat and Maharashtra, extending from Mumbai to Ahmedabad. The HSR line will connect Mumbai (population if 12 million) which is the capital city of the State of Maharashtra and the second most populous metropolitan area in India with Ahmedabad (population of 5.5 million) which is the metropolis in the State of Gujarat. The approximately 500 km long line consists of HSR vision running along the Arabian Sea coast side and connecting with Surat (population of 4.5 million) and Vadodara (population of 3.6 million) stations which are the second and third largest city in the State of Gujarat. Three alternatives and "No Action Plan" are prepared and reviewed considering convenience of transport network, passengers demand, technical issues related to operation, safety, cost and environmental & social consideration point of view. Generally, railway structures are classified into three (3) major types, which are: At Grade Structure Type, Elevated Structure Type (Viaduct) and Underground Structure Type (Tunnel). The type of railway structure is based mainly on urban/rural characteristics of along a proposed route, considering construction cost, construction period of scheme, advantages to people (scheme users), environmental consideration, and operation and maintenance. And those structural types are considered in the preparation of alternatives. Embankment material is planned to be gathered from some points, which points are 20 – 30 km away from planned HSR route as well as DFC Project. On Indian provisions, it is possible to mine till depth of 1.5 m from ground surface without permission. Under 1.5m from ground surface, it is necessary to purchase a permission from environmental authority. Emissions soil from Tunnel and Cutting are planned to re-use within the project site. If unavoidable, the surplus soils are planned to gather to quarry site near the planned HSR route.



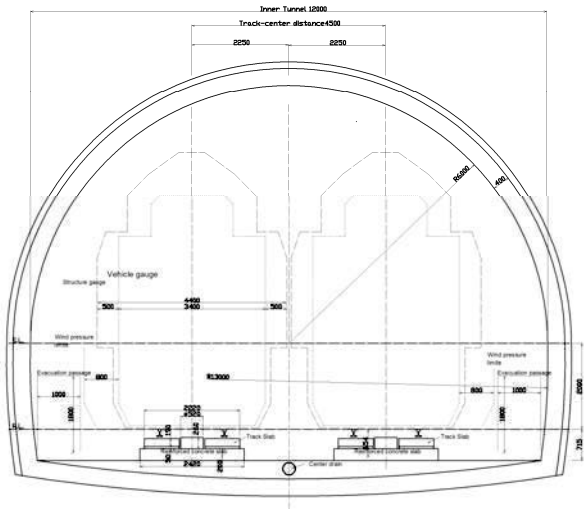
Note: All dimensions are tentative

Figure 7.4-1 Standard Cross-section of Typical Embankment



Note: All dimensions are tentative

Figure 7.4-2 Standard Cross-section of Typical Viaduct



Note: All dimensions are tentative

Figure 7.4-3 Standard Cross-section of Tunnel

7.4.1 Comparison of Alternatives

When selecting the alternatives, as described in 4.7.3 (3) and (4), they were considered in Mumbai, Surat, Vadodara and Ahmedabad, which are major cities. As important aspects for selecting the alternatives, 1) Connectivity with other transportation, 2) Attractiveness, 3) Natural and social environmental issues, 4) Technical, 5) Promptness are considered.

Based on these aspects, site survey and meetings with both state governments and regional railways and so on, firstly some HSR station candidate locations were selected in each major city, next comparisons were carried out with considering the routes to proposed stations. Based on the above studies, combination of station candidate locations and routes with higher validity was set as Alternatives of all whole section.

Moreover, regarding selecting the alignment between main cities, it is expected that there will be no impacts of environmental social consideration in particular. And also a comparison regarding impacts of forests and Thane Creek was carried out. Followings are comprehensive

characteristics of the alternatives:

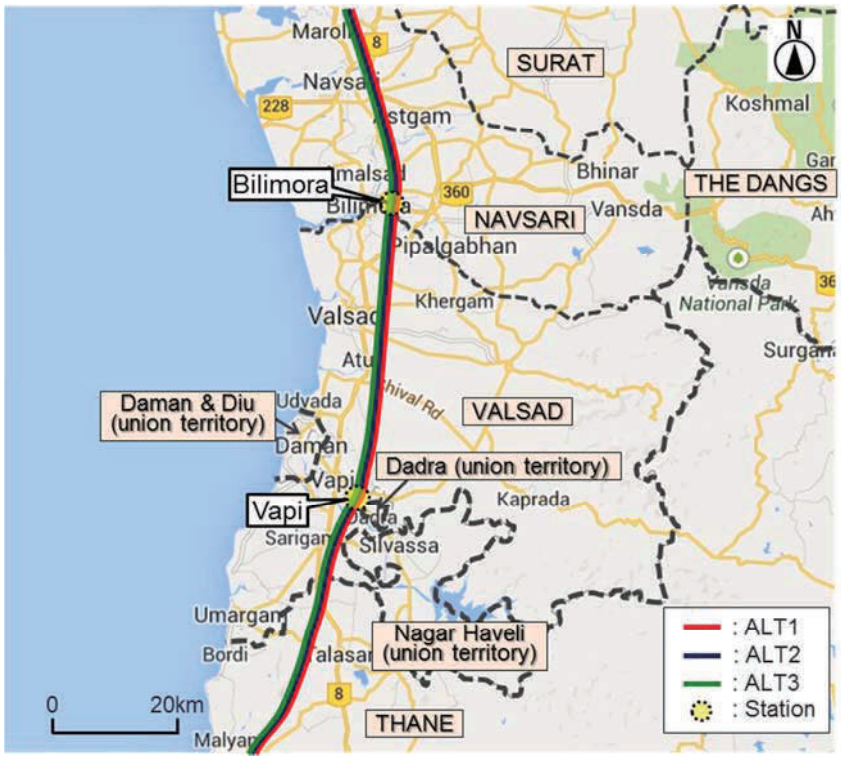
1) Alternative 1 (ALT1) presented in red line from Figure 7.4-4 to Figure 7.4-7: Dedicated route for which new terminal station is proposed at Mumbai, crossing Thane Creek by tunnel, connecting with new suburban station in Surat and juxtaposed to existing stations at Vadodara & Ahmedabad. High speed operation is available through all whole section.

2) Alternative 2 (ALT2) presented in blue line from Figure 7.4-4 to Figure 7.4-7: Dedicated route for which new terminal station is propose at Mumbai, crossing Thane Creek by Viaduct, juxtaposed to existing station at Surat and connecting with new suburban stations at Vadodara and Ahmedabad. High speed operation is available through all whole section.

3) Alternative 3 (ALT3) presented in green line from Figure 7.4-4 to Figure 7.4-7: ALT3 route considers interoperability that HSR and existing railway are mixed in Mumbai, Surat, Vadodara and Ahmedabad areas. High speed operation is difficult in some sections.

Source: Study Team

Figure 7.4-4 Comparison of Alternatives between Mumbai and Boisar

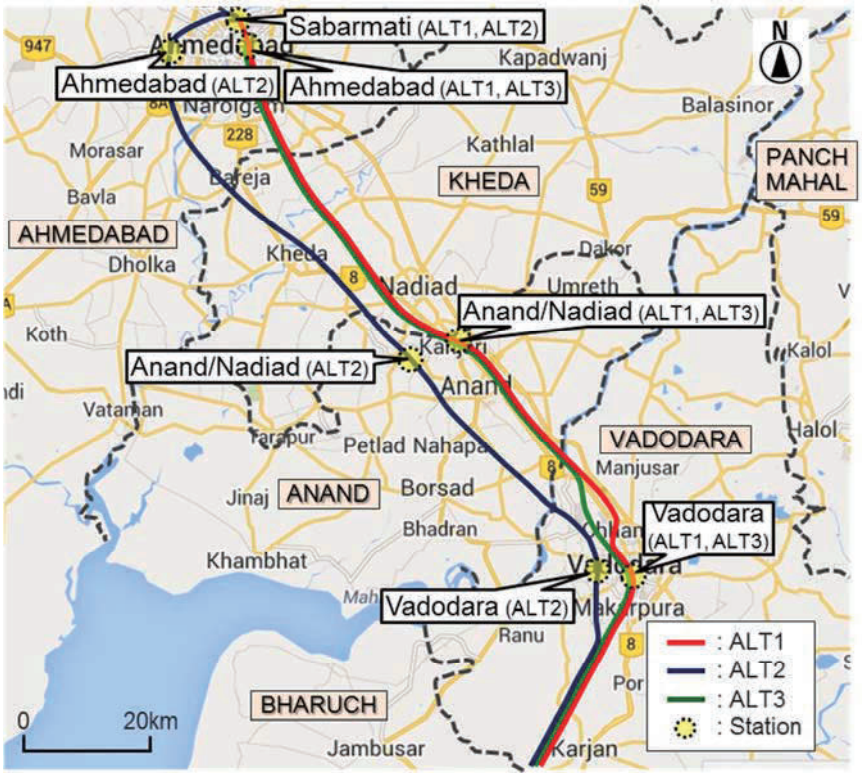


Source: Study Team

Figure 7.4-5 Comparison of Alternatives between Thane and Navsari

Source: Study Team

Figure 7.4-6 Comparison of Alternatives between Surat and Bharuch



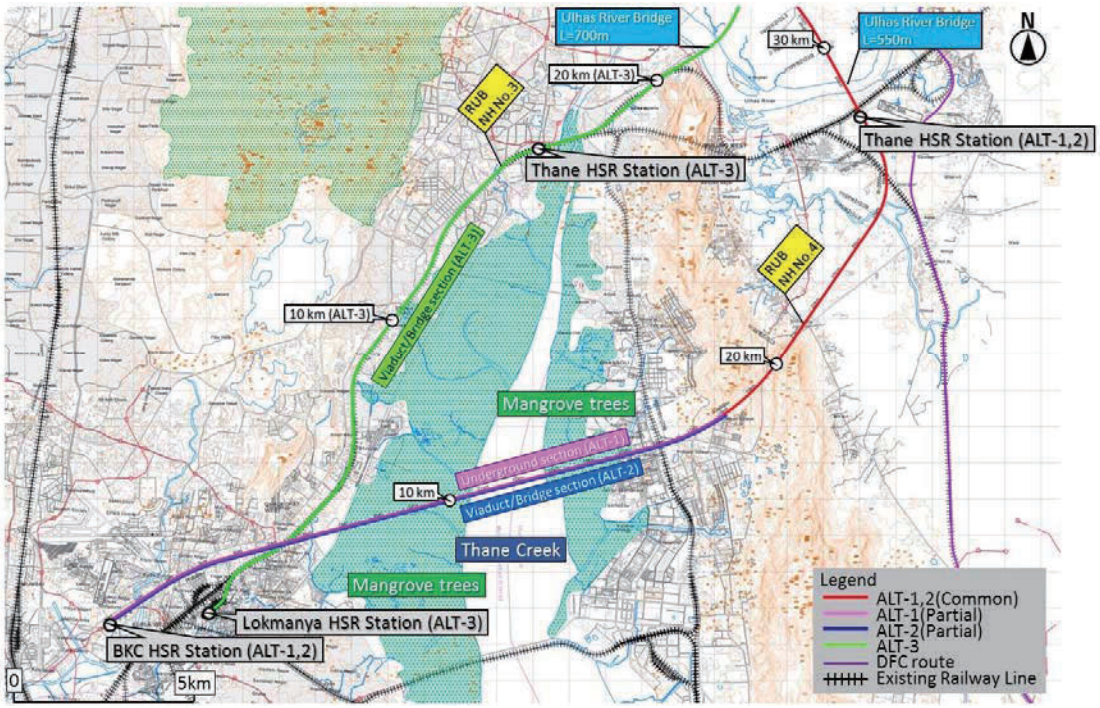
Source: Study Team

Figure 7.4-7 Comparison of Alternatives between Bharuch and Ahmedabad

Detail characteristics of each alternative are described as follows:
As shown in following figures, ALT1 presented in pink line partially, alternative 2 (ALT2) presented in blue line partially, alternative 3 (ALT3) presented in green line partially and also common route of all alternatives presented in red line.

Between Mumbai and Thane

- Regarding ALT1 and ALT2 in Mumbai suburban district, the HSR station location was planned at Bandra Kurla Complex, which is Central Business District. On the other hand, regarding ALT3, the HSR station was planned to utilize Lokmanya existing station and the HSR route was planned to parallel existing line from Lokmanya Station to Kalwa station (northeast side of Thane existing station) considering interoperability that HSR and existing railway are mixed.
- Regarding ALT1 and ALT2 between Mumbai and Navi Mumbai area (Navi Mumbai is area on east side of Thane Creek), ALT1 route passes through Thane Creek at underground and ALT2 route passes at elevated. It would be necessary to compare with them in the viewpoint of environmental issues.
- In the case of passing Thane Creek by bridge, it is impossible to avoid modification of Mangrove trees. On the other hand, in the case of passing Thane Creek by tunnel, the construction cost of tunnel is higher than that of bridge. In the viewpoint of environmental issues, crossing Thane Creek by tunnel was selected.
- Thane HSR station on ALT1 and ALT2 was planned to be connected with the existing line, on the other hand, Thane HSR station on ALT3 was planned to utilize Thane existing station considering interoperability.

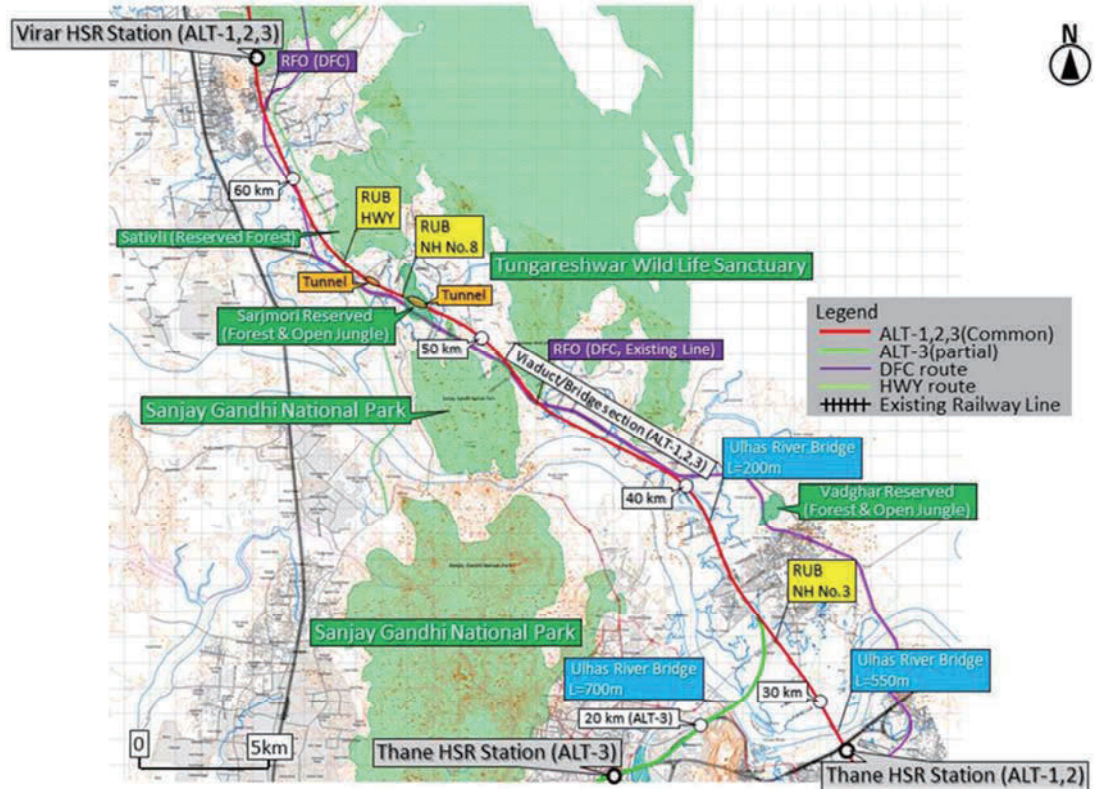


Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-8 Comparison of Alternatives between Mumbai and Thane

Between Thane and Virar

- Between Thane HSR station and Virar HSR station, there are SGNP and TWL. The HSR route was planned to avoid these areas by utilizing some curves. If the impact is predicted by EIA, the monitoring would be considered.
- In the section between Thane HSR station and Virar HSR station, viaduct structure was mainly planned due to some residential areas and passing by Ulhas River except some mountains.
- Virar HSR station location was planned at vacant green field on south side of mountains and away from Virar city. New road for access to HSR station would be necessary.

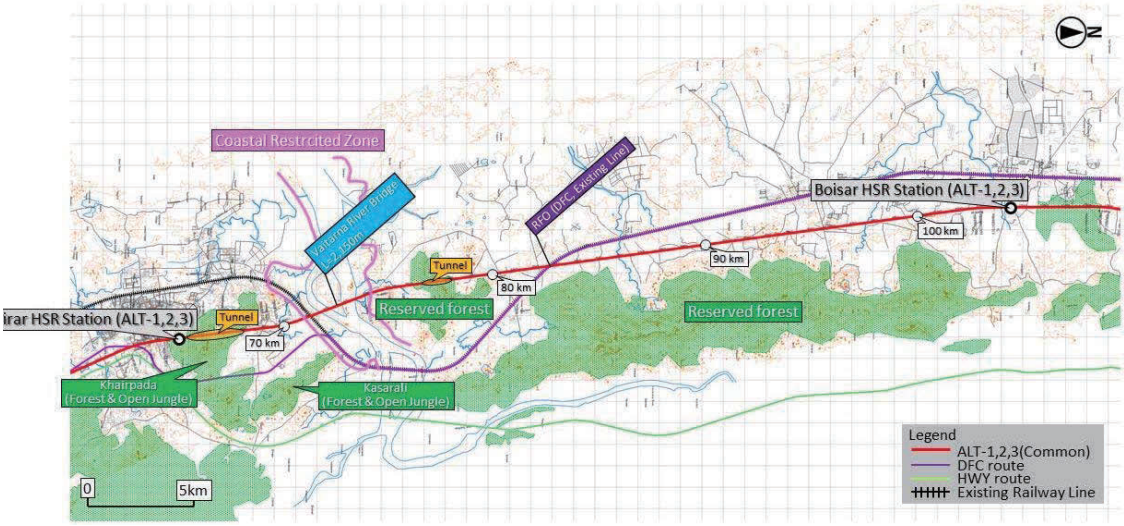


Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-9 Comparison of Alternatives between Thane and Virar

Between Virar and Boisar

- In the section between Virar HSR station and Boisar HSR station, embankment structure was mainly planned due to many green fields, except crossing Vaitarna River, DFC & existing lines and mountains.
- Boisar HSR station location was planned at vacant green field on the east side of Boisar city. There are some industrial areas in Boisar.

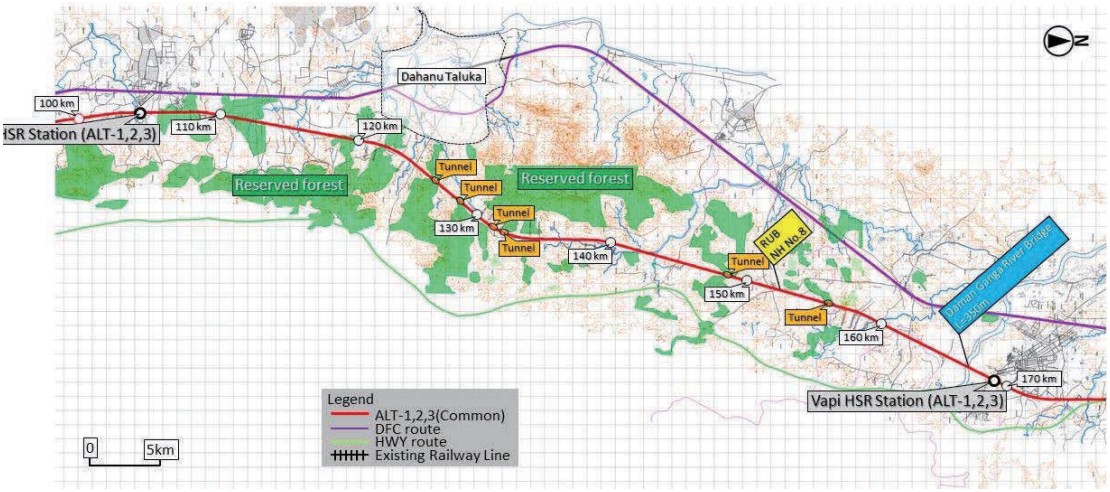


Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-10 Comparison of Alternatives between Virar and Boisar

Between Boisar and Vapi

- In the section between Boisar HSR station and Vapi HSR station, embankment structure was mainly planned due to many green fields, except crossing rivers, roads such as National Highway and mountains.
- The HSR route was planned to avoid mountainous areas as possible from 130 km to 140 km.
- Vapi HSR station location was planned near State Highway No.185 at suburb of the southeast side of Vapi city.

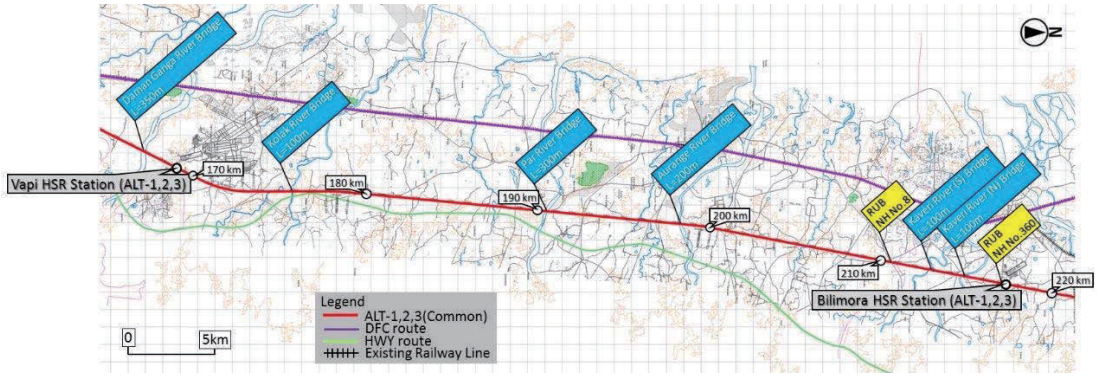


Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-11 Comparison of Alternatives between Boisar and Vapi

Between Vapi and Bilimora

- In the section between Vapi HSR station and Bilimora HSR station, embankment structure was mainly planned due to many green fields, except crossing rivers and roads such as National Highway.
- Bilimora HSR station location was planned near National Highway No.360 at suburb of the east side of Bilimora city.



Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

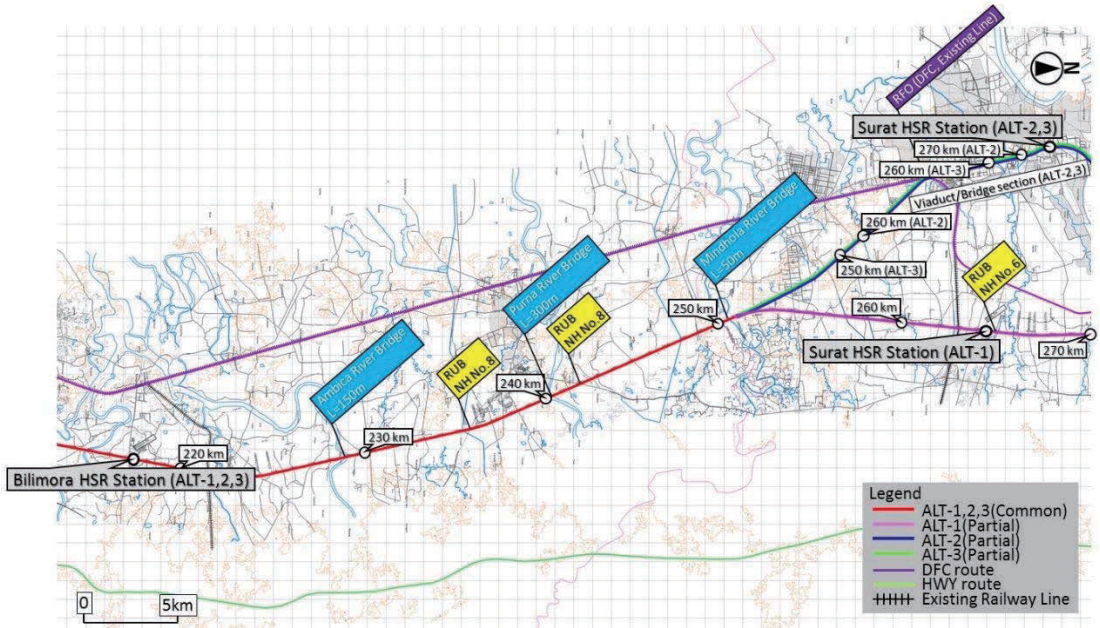
Figure 7.4-12 Comparison of Alternatives between Vapi and Bilimora

Between Bilimora and Surat

- In the section between Bilimora HSR station and Surat HSR station, embankment structure was mainly planned due to many green fields, except crossing rivers, roads such as

National Highway and before and after Surat city area.

- Regarding ALT1, the HSR station location was planned near National Highway No.6 at suburb of the east side of Surat city center. On the other hand, regarding ALT2, the HSR station was planned to be juxtaposed with Surat existing station and the HSR route was planned to parallel existing line at elevated. Regarding ALT3, the HSR station was planned to utilize Surat existing station and the HSR route was planned to parallel existing line before and after Surat city area considering interoperability that HSR and existing railway are mixed.

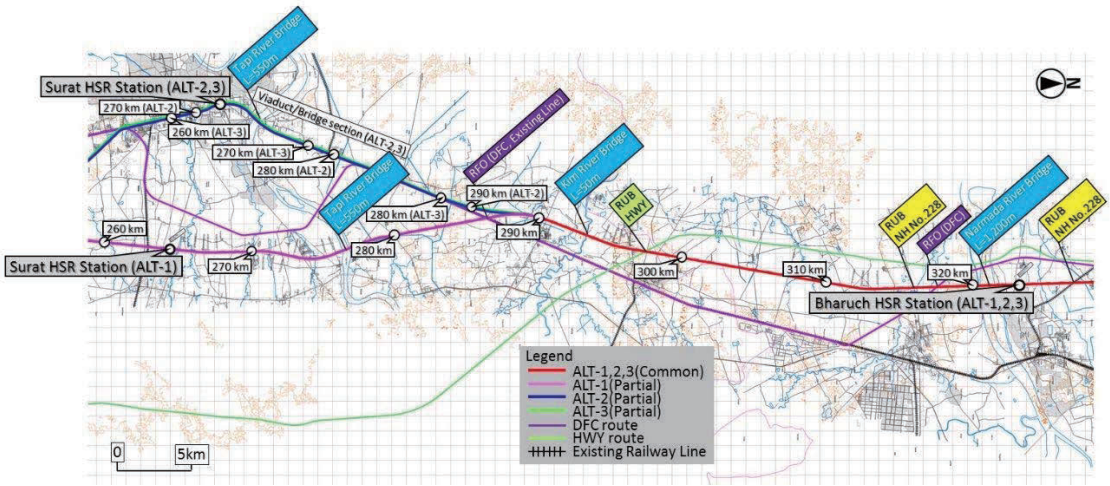


Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-13 Comparison of Alternatives between Bilimora and Surat

Between Surat and Bharuch

- In the section between Surat HSR station and Bharuch HSR station, embankment structure was mainly planned due to many green fields, except crossing rivers, DFC & existing lines and roads such as National Highway.
- Bharuch HSR station location was planned near State Highway No.6 at suburb of the west side Bharuch city.

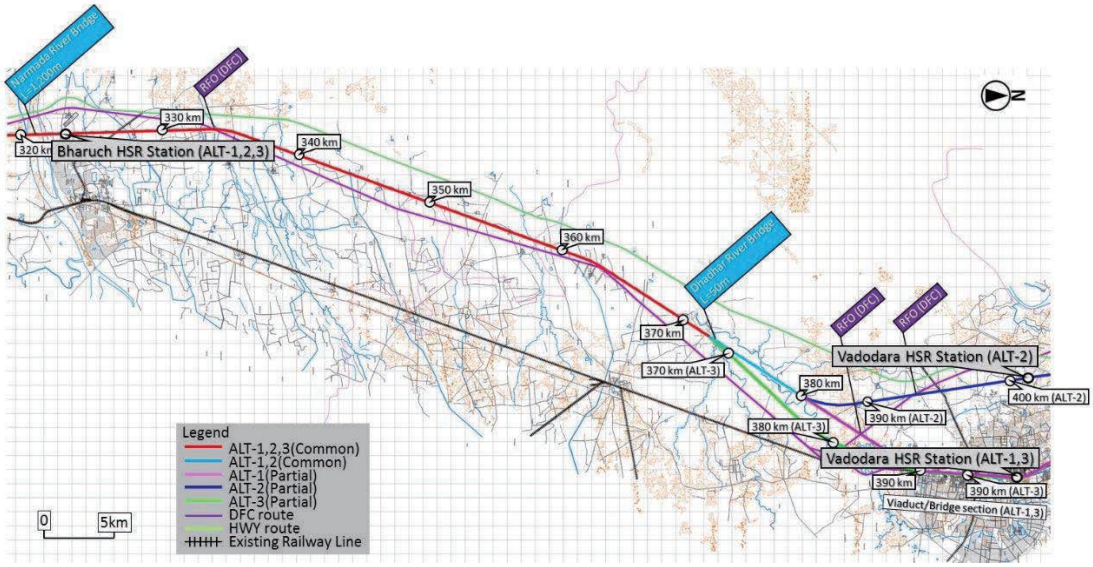


Note) Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-14 Comparison of Alternatives between Surat and Bharuch

Between Bharuch and Vadodara

- In the section between Bharuch HSR station and Vadodara HSR station, embankment structure was mainly planned due to many green fields, except crossing rivers, DFC & existing lines, roads such as National Highway and before and after Vadodara city area.
  Regarding ALT1, the Vadodara HSR station was planned to be juxtaposed with Vadodara existing station and the HSR route was planned to parallel existing line at elevated. On the other hand, regarding ALT2, the HSR station location was planned near State Highway No.11 at suburb of the west side Vadodara city center. Regarding ALT3, the HSR station was planned to utilize Vadodara existing station and the HSR route was planned to parallel existing line before and after Vadodara city area considering interoperability that HSR and existing railway are mixed.

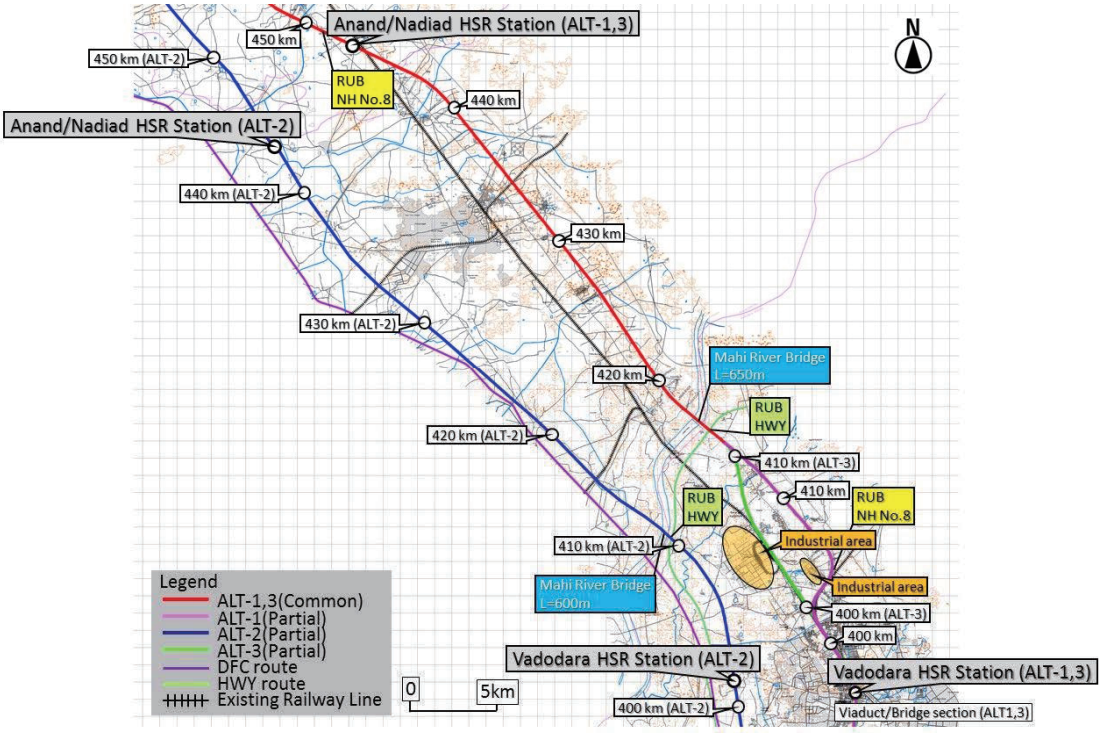


Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-15 Comparison of Alternatives between Bharuch and Vadodara

Between Vadodara and Anand/Nadiad

- In the section between Vadodara HSR station and Anand/Nadiad HSR station, embankment structure was mainly planned due to many green fields, except crossing rivers, DFC & existing lines, roads such as National Highway and before and after Vadodara city area.
- Anand/Nadiad HSR station location of ALT1 and ALT3 was planned near State Highway No.150, nearly half between Anand and Nadiad city. On the other hand, in the case of ALT2, the location was planned near state highway No.139 away from Anand and Nadiad city.

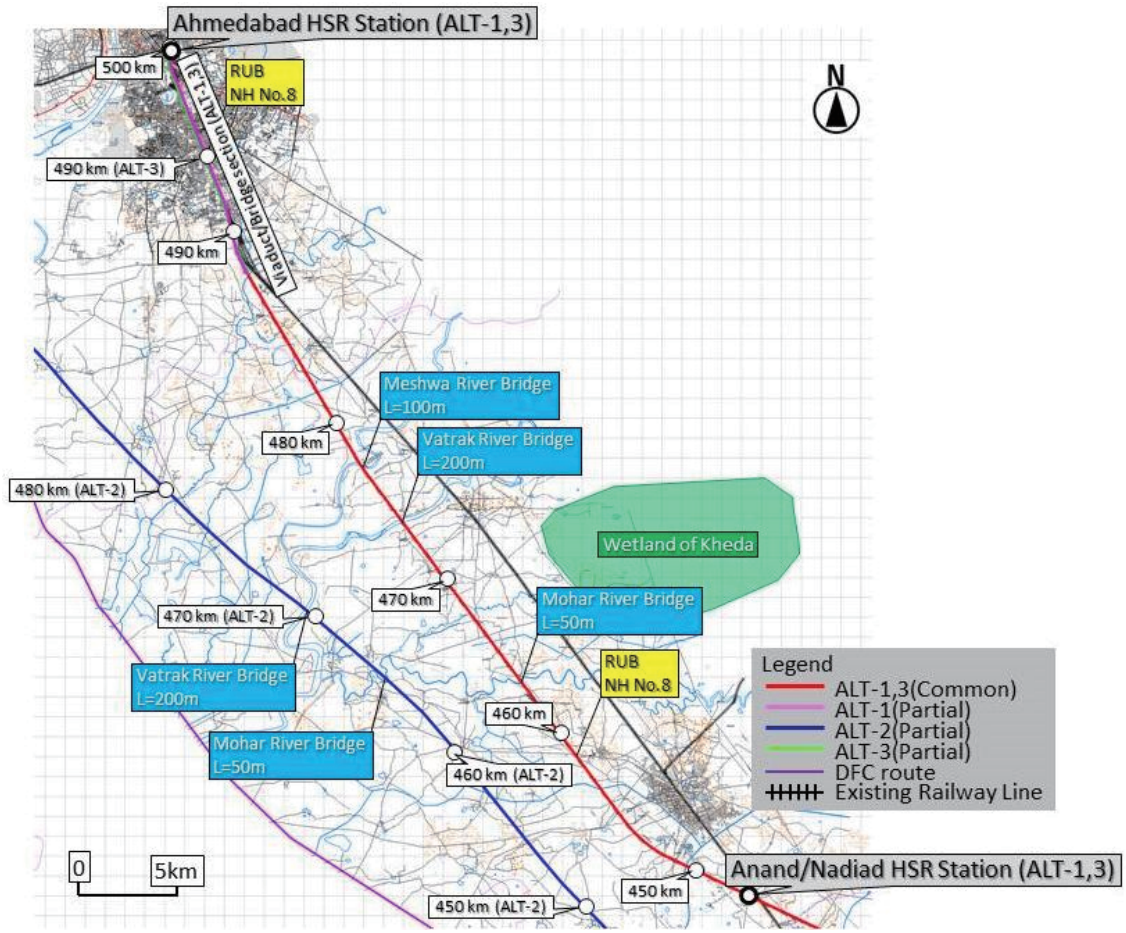


Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-16 Comparison of Alternatives between Vadodara and Anand/Nadiad

Between Anand /Nadiad and Ahmedabad

- In the section between Anand/Nadiad HSR station and Ahmedabad HSR station, embankment structure was mainly planned due to many green fields, except crossing rivers, roads such as National Highway and before and after Ahmedabad city area.
- Regarding ALT1, Ahmedabad HSR station was planned to be juxtaposed with Ahmedabad existing station and the HSR route was planned to parallel existing line from south side in city area. On the other hand, regarding ALT2, the HSR station location was planned at green field near Bopal city at suburb of the west side Ahmedabad city center. Regarding ALT3, the HSR station was planned to utilize Ahmedabad existing station and the HSR route was planned to parallel existing line from Sardar patel ring road considering interoperability that HSR and existing railway are mixed.

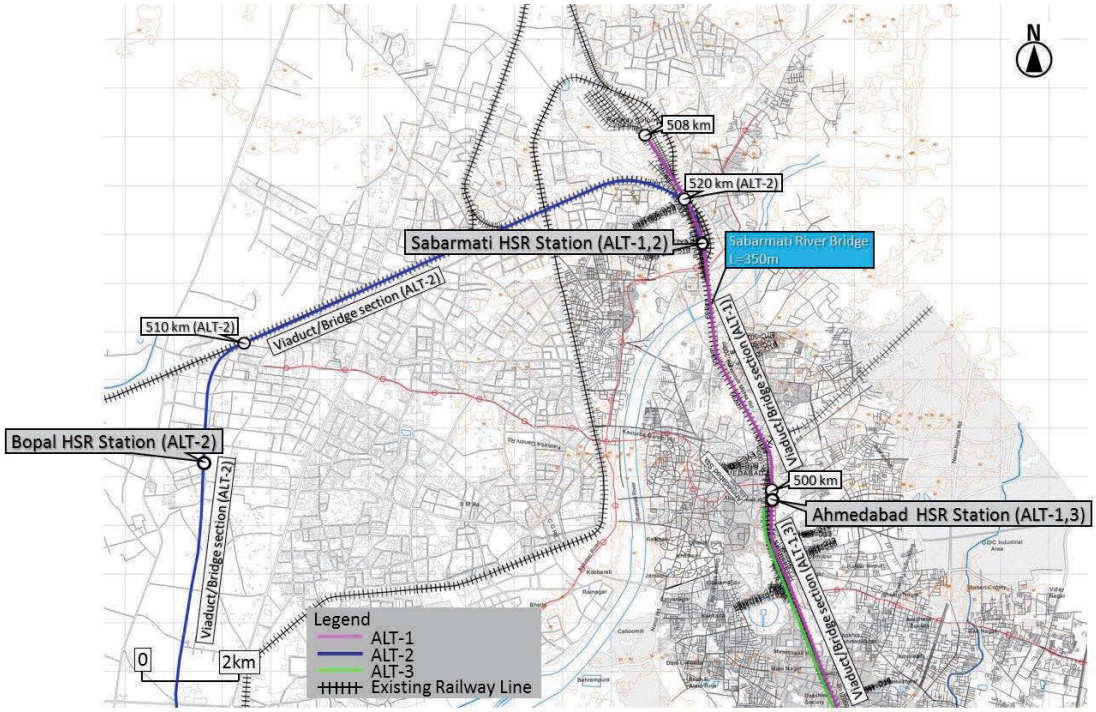


Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-17 Comparison of Alternatives between Anand/Nadiad and Ahmedabad

Between Ahmedabad or Bopal and Sabarmati

- In the section between Ahmedabad HSR station or Bopal HSR station and Sabarmati HSR station, viaduct structure was planned due to going above the existing line mainly.
- Regarding ALT1, Sabarmati HSR station was planned to be set between both east and west of sabarmati existing station and the HSR route was planned to go the east along existing line at elevated. On the other hand, regarding ALT2, the HSR route was planned to go the south along existing line after passing Bopal HSR station.



Note: Chainages without ALT-2, 3 indicate those of Alternative 1.
Source: Study Team

Figure 7.4-18 Comparison of Alternatives between Ahmedabad or Bopal and Sabarmati

7.4.2 No Action Plan

"No Action Plan" is carried out to grasp whether the passenger demand is sharing how to other transportation and also what kind of impact in environmental aspects in the future, if HSR network is not built.

HSR network will be not formed and it seems that burden to the project cost and environment is the least than that of Alternatives in a short-term. However, the brisk economic activities require the improvement of other transportation means, such as air and ground transport which will result the burden to the cost and environment in a middle/long term.

Thus, comprehensive comparison of Alternatives is summarized in Table 7.4-1.

Table 7.4-1 Comparison of Alternatives

		ALT1		ALT2		ALT3		No Action Plan	
Route overview	Length	508.5km		521km		496km		N/A	
	Number of Station	12 nos.		12 nos.		11 nos.		N/A	
	Structural Feature	At grade: 341 km Viaduct/Bridge: 140 km (Continuous elevated section: 123 km, River section: 13 km/37 number, RUB section: 4 km/121 number) Underground: 27.5 km	-	At grade: 342 km Viaduct/Bridge: 171 km (Continuous elevated section: 152 km, River section: 12 km/33 number, RUB section: 7 km/162 number) Underground: 8 km	-	At grade: 314 km Viaduct/Bridge: 177 km (Total length of mixed train operation: 72 km) (Continuous elevated section: 161 km, River section: 8 km/35 number, RUB section: 8 km/129 number) Underground: 5 km	-	No improvement	-
	Time required	Super express (Stop at 3 stations): 2 hours 07 min. Local train (Stop at every station): 2 hours 58 min.	A	Super express (Stop at 3 stations): 2 hours 12 min. Local train (Stop at every station): 3 hours 01 min.	B	Super express (Stop at 3 stations): 2 hours 52 min. Local train (Stop at every stations): 3 hours 40 min.	C	No improvement	D

Transport network		A high speed operation is possible throughout the whole section. Thane/Vadodara/Ahmedabad/Sabarmati: connected to existing railway. Other Stations: New stations A transfer to Indian Railway is needed.	A	A high speed operation is possible throughout the whole section. Thane/Surat/Sabarmati: connected to existing railway. Other Stations: New stations A transfer to Indian Railway is needed.	A	A high speed operation is difficult in the section on which HSR and existing railway are mixed. A transfer to Indian Railway is not needed.	C	No improvement	D
Technical side	Passenger demand	Boarding Passenger: 40 thousand PAX/day (2023), 202 thousand PAX /day (2053). Huge demands on Mumbai, Ahmedabad and Vadodara station are expected.	A	Boarding Passenger: 33 thousand PAX/day (2023), 168 thousand PAX /day (2053). Less demands on Ahmedabad and Vadodara station because each station is in the suburban area, and passenger is required to transfer.	B	Boarding Passenger: 34 thousand PAX/day (2023), 165 thousand PAX /day (2053). Although the location of each station is better than ALT1/ALT2, the arrival time between each station is longer than ALT1/ALT2 due to mixed operation with HSR and existing railway.	C	No change	D
	Technical issues related to operation	High speed operation is available due to the dedicated line.	A	High speed operation is available due to the dedicated line.	A	The railway capacity for HSR is less because many kinds of train are operated on same railway. The system including signals and rolling stocks for mixed operation of HSR and local trains is needed.	C	N/A	-
	Safety	A high safety is kept because of full dedicated railway line.	A	A high safety is kept because of full dedicated railway line.	A	A safety level is lower than dedicated railway because HSR and local train are	B	A safety is as same as current situation.	C

						mixed on a same track.			
	Cost	709,151 (million INR).	C	684,194 (million INR).	B	656,038 (million INR).	A	N/A	-
Environmental and social considerations		Natural Conservation: Some forests are affected but Thane creek is not affected. Resettlement: it would be accompanied with 1,120 resettlement in total.	C	Natural Conservation: 7 km long of Thane creek is affected. Resettlement: It would be accompanied with 1,556 resettlement in total.	D	Natural Conservation: Some of forest is affected but Thane creek is not affected. Resettlement: It would be accompanied with 946 resettlement in total.	B	The impact is the least. It is not accompanied with resettlement.	A
Total evaluation		The HSR system can be introduced throughout whole section. High safety and efficiency are kept. It is possible that the characteristic of HSR is exerted most. High demand is expected because major stations are in the urban area. In Mumbai area, the impacts of resettlement and natural environment are less because HSR is underground. The impact to natural environment is the least because the number of bridges to be constructed is less among alternatives. **This is the most desirable plan.**	A	The HSR system can be introduced throughout whole section. High safety and efficiency are kept. It is possible that the characteristic of HSR is exerted most. The demand expectation is less than ALT1 because major stations are in the suburban area. In Mumbai area, Natural environmental along 7 km long of Thane creek is affected. This plan is inferior to ALT1.	B	The HSR system cannot be introduced throughout whole section (It is assumed HSR considering interoperability with existing railway served with cases in Europe). High safety and efficiency cannot be kept. Shortage in railway capacity. The time required is longer than ALT1 or ALT2. Modal shift is less. This plan is inferior to ALT1 or ALT2.	C	It is impossible that HSR is introduced in existing railway. The demand is lower because there is competition with other modes. The high safety cannot be kept.	D

Note) Index of A, B,C and D in the above table each indicates Excellent, Better, Good, and Not preferable, relatively.
Source: Study Team

7.5 Scoping and TOR on EIA

As described in section 7.3, in India's "Requirement of prior Environmental Clearance (EC), Environment (Protection) Rules", railway projects do not require prior environmental clearance. However, under the JICA's Environmental and Social Considerations Guidelines they fall under "Category A". Based on JICA's guidelines items of impact were selected, and TOR were evaluated based on scoping results.

7.5.1 Predicted Impacts and Scoping

Selection result of project items of impact are displayed in Table 7.5-1. Based on JICA's guidelines items of impact were selected which was discussed in 7.4, and TOR were evaluated based on scoping results.

Table 7.5-1 Scoping of the Proposed Project

No.	Items of Impact	Predicted Impact				Reason of Prediction
		Before/During construction stage		Operation stage		
		Positive	Negative	Positive	Negative	
[Anti-Pollution Measures]						
1	Air pollution	D	B	C	D	During construction stage: There might be air pollution by an operation of construction machineries. Operation stage: The modal shift of transportation, such as bus/ vehicle will be expected to decrease the pollution level of ambient air.
2	Water pollution	D	B	D	B	During construction stage: There might be water pollution by drainage from construction site. Operation stage: Impact due to the effluent from facilities of rolling stock inspection and repair is assumed.
3	Soil pollution	D	B	D	D	During construction stage: Impacts are assumed when fuel/oil leakage might be occurred. Operation stage: No impact is assumed.
4	Waste	D	B	D	B	During construction stage: Surplus soil and waste material are discharged. Operation stage: Impacts due to the waste from facilities of rolling stock inspection and repair is assumed.

5	Noise and vibration	D	B	D	A	During construction stage: There might be noise and vibration by an operation of construction machineries. Operation stage: There are noise, vibration and tunnel sonic boom by the HSR operation.
6	Ground subsidence	D	C	D	D	During construction stage: Impact due to the tunneling work is not clear at this moment. Operation stage: Risk of the above will not remain.
7	Offensive odors	D	D	D	D	During construction stage: Construction works to cause offensive odors are not assumed. Operation stage: Ditto
[Natural Environment]						
1	Topography and geology	D	B	D	D	During construction stage: embankments, cuttings, and tunnel excavation may change the topography. Soil erosion may occur during rain. Operation stage: No action that will have impact is anticipated.
2	Bottom sediment	D	D	D	D	During construction stage: Possibility to cause bottom sediment including hazardous substances is predicted very small.
3	Biota and ecosystem	D	A	D	B	During construction stage: Splitting of habitats due to construction work on the ground and the impact to ecological system due to improvement work in the river can be expected. There is a possibility that the movement of fauna will be hampered due to the constructed facilities.
4	Hydrology	D	B	D	D	Construction stage: There is a possibility of an impact on Hydrology by the bridges construction on rivers and by the Thane tunnel construction. Operation stage: Risk of the above will not remain.
5	Protected area	D	A	D	B	During construction stage: Impact to national park/sanctuary is assumed between Mumbai and Thane station. Operation Stage: Impact will

						partially remain.
[Social Environment]						
1	Water use	D	B	D	B	During construction stage: Impacts to the wells/irrigations/rivers/reservoirs are assumed those locate along the HSR alignment. Furthermore, impact due to new mountain tunnel is assumed. Operation stage: Among above impacts, the impact due to new tunnel may remain.
2	Involuntary resettlement	D	A	D	D	Before construction stage: Structures including residences, shops, factories, warehouses etc. must be displaced due to the HSR project. Adverse impacts will not remain.
3	Local economies, such as employment, livelihood, etc.	B	A	A	B	Before/during construction stage: Some project affected persons (PAPs) will forced to change/lose their jobs, on the other hand, the construction activity will create job opportunities to the local people. Operation stage: The HSR project is expected to enhance the local economy significantly as well as to create job opportunities by inducing overseas railway related companies to establish new offices/factories along the HSR line. On the other hand, it is assumed that there might be a possibility of residual impact to aforesaid PAPs.
4	Land use and utilization of local resources	D	A	B	D	Before/during construction stage: Present land use, such as agriculture, grazing, manufacturing, commerce etc. will be affected due to the HSR project. Operation stage: The HSR will require the minimum space compared with other ways of transportation (highway/airport) and effective urban/local development will be enhanced. Problems in large city, such as

						urban transportation/drinking water/waste those arisen especially in Mumbai will be mitigated by relocating some of its function near the HSR station.
5	Social institutions, such as social infrastructure and local decision-making institutions Existing social infrastructures and services	D	A	D	D	Before/during construction stage: Many aboveground/underground utilities or schools/clinics etc. must be removed prior to start the construction activity. Operation stage: Those infrastructures and facilities will be properly relocated prior to start the construction activities, therefore the impact will be small. Furthermore, the HSR will shorten the trip hour greatly and enhance the movement of people easier.
6	Poor	D	A	D	A	Before/during construction stage: Impact to poverty group is assumed when the compulsory displacement is required. Operation stage: The poverty group will become poorer if the compensation to displacement or rehabilitation of livelihood measures are not taken.
7	Indigenous or ethnic minority people	C	C	C	C	Before/during construction stage: Distribution of indigenous or ethnic minority groups is not identified at this moment. Operation stage: Ditto
8	Misdistribution of benefits and damages	D	B	D	B	During construction stage: It is assumed that some people will be profited, on the other hand some will be damaged due to the HSR project. Operation stage: it is assumed that the impacts will still remain in operation stage.
9	Local conflicts of interest	D	B	D	B	Before/during construction stage: It is assumed that the HSR alignment requires splitting the villages due to the displacement. This will result the gaps between displaced villagers and not displaced ones from the financial/convenience aspect. Operation stage: It is assumed the conflict will still remain in operation stage.

10	Gender	D	B	D	D	Before/during construction stage: It is assumed that the opportunities of social participation by women groups are not widespread in local areas. Adverse impacts will not remain.
11	Children's right	C	C	C	C	During construction stage: The impact is not clear at this moment. Operation stage: Ditto
12	Cultural heritage	D	B	D	D	Before/during construction stage: It is expected that there is a religious facility for inhabitants who takes root in the community. Operation stage: Adverse impacts will not remain.
13	Infectious diseases, such as HIV/AIDS	D	B	D	B	During construction stage: Though it might be not significant scale, the influx of workers those will join the HSR project may cause the spread of the infectious diseases. Operation stage: Influx of population due to local/urban development will cause other risks of spreading infectious diseases.
14	Landscape	D	D	D	B	During construction stage: The HSR will not run within/near the landscape protection area, therefore impact might be very small. Operation stage: Landscape impacts are assumed by appearance of new structures for HSR.
15	Working conditions	D	B	D	B	During construction stage: safety measures to the workers needs to be taken by the contractors. Operation stage: Impact to the workers those working at facilities of rolling stock inspection and repair is assumed.

16	Social consensus	A	A	B	D	Before/during construction stage: Obtaining the consensus/understanding from wide ranged stakeholders or local stakeholders is crucial to implement the HSR project smoothly as scheduled, otherwise serious issues will arise those will hamper the project implementation. Operation stage: Adverse impacts will not remain.
[Others]						
1	Accident	D	B	D	A	During construction stage: Accidents due to construction activities might occur. Operation stage: There is a possibility of the accident by the railway's high speed operation.
2	Sun shading	D	D	D	B	During construction stage: It is assumed that impact might occur very in short period. Operation stage: Sun shading might occur by new viaducts.
3	Radio disturbance	D	D	D	B	During construction stage: It is assumed that impact might occur very in short period. Operation stage: Radio disturbance might occur due to the HSR operation and new viaducts.
4	Climate change Global warming	D	D	B	D	During construction stage: It is assumed that impact might occur very in short period. Operation stage: The modal shift of transportation such as bus and vehicle can contribute to resolving global warming.

Source: Study Team

Note: A : Remarkable Impact is predicted.
B: Impact is expected to some extent.
C: Extent of Impact is unknown. (A further examination is needed and the impact could be defined as study progresses)
D: Impact is very small or nil and further survey is not required

7.5.2 TOR for EIA and RAP Census, Socio-economic Survey

EIA study will be conducted in accordance with JICA's Guidelines and related regulations/guidelines in India and the TOR for its survey is presented in Table 7.5-2.

Table 7.5-2 TOR for EIA

Items of impact	Items of survey	Approach method
Air pollution	1. Confirm environmental standards in India 2. Confirm the present air quality level 3. Clarify the location s of residence are, school and hospital those neighbor to the HSR 4. Clarify the adverse impacts due to the construction machinery which work in the construction stage	1. Review existing information 2. Review existing information and conduct the site survey where new/improvement of stations are anticipated ・baseline survey of emission air ・12 places, once 3. Conduct site survey 4. Predict magnitude of impacts due to the construction machinery
Water pollution	1. Confirm environmental standards in India 2. Confirm the present water quality level in main rivers 3. Confirm the present river water use for daily life 4. Forecast the adverse impacts mightily arisen in construction stage	1. Review existing information 2. Review existing information and conduct the site survey where HSR cross main rivers ・base line survey of water quality ・19 places, once 3. Conduct site survey and hearing from neighbors 4. Predict magnitude of impacts due to the construction activities
Soil Pollution	1. Confirm environmental standards in India 2. Confirm the present soil pollution level	1. Review existing information 2. Review existing information and conduct site survey
Waste	1. Confirm environmental standards in India 2. Confirm the present waste treatment condition	1. Review existing information 2. Review existing information and conduct site survey
Noise and vibration	1. Confirm environmental standards applied both in India and other countries on HSR 2. Confirm the present noise and vibration level 3. Clarify the location s of residence are, school and hospital those neighbor to the HSR 4. Predict noise and vibration level in construction and operation stage	1. Review existing information 2. Review existing information and conduct the site survey where new/improvement of stations are anticipated ・baseline survey: LAeq ・12 places, once 3. Conduct site survey 4. Predict noise and vibration level in construction and operation stage based on anticipated parameters
Ground subsidence	1. Confirm environmental standards in India	1. Review existing information 2. Review existing information

	2. Confirm the areas where ground subsidence might be anticipated	and conduct site survey.
Topography and geology	1. Confirm the situation of Topography and geology	1. Review existing information and conduct site survey.
Biota and ecosystem	1. Clarify the precious species and related laws and regulations in the two States 2. Confirm the distribution of fauna and flora 3. Confirm the information on river ecosystem (situation and environment of inhabiting)	1. Review existing information and data collection from the concerned agencies 2. Review existing information and conduct site survey. 3. Review existing information and conduct site survey
Hydrology	1. Confirm the hydrological environment around rivers crossing HSR route	1. Conduct site survey
Protected area	1. Confirm the legislative system on Protected Area 2. Confirm the location of Protected area or Reserved Forests	1. Review existing information and data collection from the concerned agencies 2. Review existing information and conduct site survey.
Water use	1. Confirm the situation of Water use	1. Review existing information and conduct site survey.
Involuntary resettlement	1. Confirm the magnitude of land acquisition and resettlement and prepare RAP	1. Gap between JICA's Guideline and related Law/Guidelines in India 2. Satellite photograph in target area 3. Census and socio-economic survey 4. RAP which conforms to World Bank's Safeguard Policy OP 4.12 Annex A
Local economies, such as employment livelihood, etc.	1. Clarify assumed affected private properties 2. Identify PAPs	1. Census and socio-economic survey 2. Entitlement eligibility in line with JICA's Guidelines 3. Livelihood restoration program in RAP
Existing social infrastructures and services	1. Clarify the existing residence, school and medical facility	1. Review the existing information 2. Census and socio-economic survey
Land use and utilization of local resources	1. Existing land use	1. Census and socio-economic survey
Social infrastructure and local decision-making institutions. Existing social infrastructure and services	1. Confirm the affected schools, community centers, local clinics	1. Census and socio-economic survey

Poor	1. Questionnaire to PAPs 2. Definition of poor	1. Review the existing information 2. Census and socio-economic survey
Indigenous or ethnic minority people	1. Questionnaire to PAPs 2. Definition of Indigenous people	1. Review the law on indigenous people 2. Census and socio-economic survey
Misdistribution of benefits and damages	1. Confirm if HSR facilities will affect urban/local communities or not	1. Confirm at the local SHM in D/D stage
Local conflicts of interest	1. Confirm if HSR facilities will affect urban/local communities or not	1. Confirm at the district level SHM
Gender	1. Confirm gender issues are still remaining or not	1. Confirm at the district level SHM
Children's right	1. Confirm schools will be affected due to HSR	1. Confirm through the census and socio-economic survey
Cultural heritage	1. Confirm the location of cultural heritage.	1. Review existing information.
Infection diseases, such as HIV/AIDS	1. Confirm the morbidity rate	1. Review the existing information
Landscape	1. Confirm the situation of Landscape	1. Review existing information
Working conditions	1. Way to improve the workers' safety 2. Way to prevent accident which will involve the third person	1. Review the existing law/regulation
Social consensus	1. 1st stage: State level (1) SHM with selected people 2. 2nd stage: District and union territory level (1) When scoping is prepared (2) When draft report is prepared	1. SHMs with institutional and non-institutional persons were held on 2nd of April, 27th of May and 30th of May, 2014 2. (1) SHM with local neighbors at district level will be in Nov. – Dec. 2014 and, (2) SHM with local neighbors at district level will be in Feb. – Mar. 2015
Accident	1. Confirm the accident cases on HSR project 2. Confirm distribution of houses and various facilities around HSR route	1. Collect similar cases 2. Conduct site survey
Sun shading	1. Confirm standards and guarantees in India 2. Confirm situation of houses around HSR route	1. Review existing information. 2. Conduct site survey
Radio disturbance	1. Confirm standards and guarantee in India 2. Confirm the locations	1. Review existing information. 2. Review existing information and conduct site survey

	of transmission station for TV around HSR route	
Climate change Global warming	1. Confirm situation of Climate change and Global warming in India.	1. Review existing information.

Source: Study Team

7.6 Result of EIA Survey

The result of EIA Survey is summarized in Table 7.6-1

Table 7.6-1 Result of EIA Survey

No.	Items of Impact	Outline of the Survey Result
Anti-Pollution Measures		
1	Air pollution	As a result of measurement at the vicinity of 12 planned station locations along the planned route, although PM10 levels in urban areas such as Mumbai and Ahmedabad were under the annual standard levels, a high result of 60 μg/m3 was observed. Levels for other particulates including PM2.5, SO2, NOx, and CO were all under India's standards. (Before/during construction stage) During construction, exposure of soil will occur due to foundation works for elevated bridges, cutting, and embankment. Although the specific details on the operation of construction machinery and number of construction vehicles is not yet determined, it is anticipated that topsoil is Deccan Traps contain Slit a lot and dust will be produced due to construction work (due operation of construction machinery and running of construction vehicles). Dependent upon wind direction temporary and local impact to the surroundings can be expected. (Operation stage) After commissioning there is a possibility of improvement due to the modal shift. However, since details are unclear it shall be assumed that there will be no new impact.
2	Water pollution	As a result of measurement at major 19 rivers the planned route will pass through, DO levels in 6 rivers, pH levels in 3 rivers, and BOD levels in 5 rivers exceed India's environmental standards. (Before/during construction stage) **Elevated Bridges, Embankment, Cutting Section** During construction, exposure of soil will occur due to foundation works for elevated bridges, cutting, and embankment. The site of topsoil is Deccan Traps contain Slit a lot, Rainfall for exposed area will lead to the production of SS 200mg/I muddy water, which if directly discharged into nearby bodies of water without treatment will cause water contamination. **Tunnel Section** If NATM is adopted for tunnel construction, mortar spraying will accompany tunnel lining works. With accompanying water seepage, waste water with high pH levels will be produced. If directly discharged into nearby bodies of water without treatment, water contamination will occur. **River Section** At large rivers, bridge pier construction will accompany work done inside the water. This will temporary to involve drilling the river bottom which will cause muddy water to spread within the river. **Site Office / Workers' Camp** Provision of site offices and workers' camps during construction will cause production of domestic sewage and waste water including urine and feces. If directly discharged into nearby bodies of water without treatment, water contamination will occur. (Operation stage) After commissioning it is expected that waste water such as wash water will be produced from rail yards, and if directly discharged into rivers there will be

		possible impact. At this time the specific amount is undetermined expected waste water will be wash water from rail yards. Also, facilities such as lavatories at stations and rail yards are also expected to produce domestic waste.
3	Soil pollution	In India there are no standards for soil pollution, and soil pollution in the vicinity of the planned route could not be confirmed. (Before/during construction stage) Due to construction work, spillage during refueling and faulty maintenance of construction machinery among other factors may possibly pollute the soil. (Operation stage) Impact is not assumed in operation stage.
4	Waste	(Before/during construction stage) Due to construction work, production of construction waste such as surplus earth and scrap material or domestic waste from worker camps is anticipated. There are multiple waste disposal facilities in the vicinity, and disposal shall adhere to the standards of India, including the usage of such facilities. The specific amount is unconfirmed that construction detailed to plan has not been determined, If appropriate processing measures are not taken, adverse effects to the surrounding environment may be incurred. Excavated soil is discharged during the tunnel excavation. The volume is estimated as approx. 2.4 million m3 on Thane Creek Tunnel and approx. 0.7 million m3 on mountainous tunnel. These tunnel emissions soils would be planned to re-use in the project site. If unavoidable, the surplus soils are planned to gather to quarry site near the planned HSR route. Therefore, it is expected that it does not cause new environmental impacts. (Operation stage) After commissioning it is expected that domestic waste will be produced from rail yards, and disposal in adherence to India's standards will be required. The Delhi Metro Phase I and II result, the waste generation from station is 0.5 – 1.0 cum/day and similar volume shall be expected that need to flow the country of Indian prescription for segregation or dispose in an appropriate manner. Moreover, industrial waste including scrap metal accompanying maintenance will be produced at rail yards, and shall also be processed / disposed of in accordance with the standards specified by the country of India.
5	Noise and vibration	**Sound** As a result of measurement at the vicinity of 12 planned station locations along the planned route, near Mumbai station the LAeq during the daytime was 73dB which exceeded India's Area "B" (Commercial Area) noise standards of 65dB. It can be surmised that this is a result of mostly noise from automobiles due to the location being an urban area. Similarly, the LAeq near Ahmedabad station during the daytime was also high at 61dB. However, levels at other areas were mostly low at 40dB or less. (Before/during construction stage) Due to construction work, the operation of construction machinery and running of construction vehicles is expected, and noise will be produced as a result, and impact to residences in the vicinity is expected. (Operation stage) After commissioning, noise will be produced by HSR operations. In the year of 2053 when the number of trains is anticipated to be maximum, using the proposed Japanese Shinkansen E5 series as a basis for prediction noise is predicted to be 52 dB at day time and 45 dB at night time as measured at 25m away from the nearby track center. The expected noise level is about the same or lower as compared with that of other overseas HSR standards. However, it is necessary to determine the noise level standards for high-speed railway in future, since there is no regulation on railway noise level in India. (This report propose a reference value about the same level of Japan (Lmax: 70dB) and overseas

		(LAeq:60dB)). Silence Zone does not exist such as schools and hospitals within along a MAHSRC line with100m, We confirmed high noise level district at the time of field work, there is a need to perform additional examination of sound insulating walls at detailed design stage. **Vibration** Measurements were made at 12 locations where the stations are to be built along the planned route. The results were 74dB around Anand Station, 84dB around Ahmedabad Station and 75dB in the Sabarmati area, which are all very high. It can be surmised that these vibrations are produced by large vehicle traffic due to the location being an urban area. At other locations, vibration was mostly less than 55dB. (Before/during construction stage) During the construction work, operation of the construction machinery and traffic of heavy duty trucks carrying construction material are expected, causing vibration and impact residences in the vicinity is expected. (Operation stage) After commissioning, vibration will be produced by HSR operations, however using the proposed Japanese Shinkansen as a basis for prediction vibration is expected to be 70dB or less. However, it is necessary to determine the vibration level standards for high-speed railway in future, since there is no regulation on railway vibration level in India. (This report propose a reference value about the same level of Japan (70dB)). Silence Zone does not exist such as schools and hospitals within along a MAHSRC line with 100m, We confirmed high vibration level district at the time of field work, there is a need to perform additional examination of Track pads at detailed design stage. It is necessary to check the status of the vibration monitoring after the serviced, because there is uncertainty in the prediction. **Tunnel boom** (Operation stage) After commissioning, impact sound which is called Tunnel Boom is expected to be produced by compression wave caused by HSR entering a tunnel at a speed of 320km/h. Impact to residences in the vicinity is expected.
6	Ground subsidence	(Before/during construction stage) Several residences stand on both sides of Thane Creek where a tunnel will pass through. The geology of this tunnel section topsoil is Silt, the subsoil is Weathered Rock containing water, Basalt contain almost no water in lower layer. MAHSRC is planning to bore through the tunnel for hard Basalt by NATM construction method 25m～60m below ground, therefore ground subsidence may be caused by drawdown the groundwater and although the possibility is low. Moreover, in several locations along the route the so-called “black cotton soil” which is a peculiar type of soft ground was confirmed to exist. Black cotton soil has an expansive characteristic when seeped with water; therefore ground transformation is anticipated if superstructures are built on top of embankments. (Operation stage) Impact is not assumed in operation stage.
7	Offensive odors	There are no factors which will cause offensive odors during the construction state nor during the operation stage.
Natural Environment		
1	Topography and geology	Ground will be altered due to construction of tunnels, cutting and embankment, and construction of elevated bridges, but no meaningful topographical or geological features exist in the vicinity of the route. Therefore impact to the topography and geology is neither expected during construction nor after commissioning. Safe operation at high speeds is requirement for HSR and

		with the construction of stable structures being one of the major objectives of construction, topographical and geological instability will most likely not occur.
2	Bottom sediment	There are no factors which will impact bottom sediment during the construction stage nor during the operation stage.
3	Biota and ecosystem	(Before/during construction stage) **General Section, Station and Depot** Through document investigation, major fauna and flora habitats have not been confirmed along the planned route including the HSR station and depot. However, due to railway construction, there will be partial losses of fauna and flora habitats. On the other hand, due to the railway being a linear configuration and that it will pass mainly through agricultural land, effects will be limited. The railways construction is mostly Embankment and Viaduct structure. Installed nullah-box varies of the situation to keep the Embankment structural maintenance because there is a risk of disturbing the surface stream water. V Viaduct is widely installing pile with a distance of 30m between and it will not interfere the groundwater flow. Therefore, the predictable repercussion for impact of the ecosystem of inhibition to the riverine system and underground water is very few. **NP and WLS Section** MAHSRC is planned to pass through the middle of Thane District of Maharashtra State, where SGNP and TWLS with the existence of various fauna and flora has been confirmed. However this place is not specified in the ESZ (Eco-sensitive Zone). SGNP is about 100m and TWLS is about 50m in minimum distance between the plan railways that will not give direct effect for it. Viaduct is widely installing pile with a distance of 30m between and it will not interfere the groundwater flow for this area. Planning in the vicinity of the railway have existing of planar structures including a national highway and railroad, noise and vibration even less away the distance, the area is not ecological system cycle surroundings human-induced land use for current status. Therefore, although construction of MAHSRC will accompany a possibility of some impact to the surrounding fauna and flora, the impact will be limited. Impacts of sound and vibration have been also described in detail in (2) Biota and ecosystem, 5.1.2 Natural Environment, Appendix 4 Environmental Impact Assessment. **Thane Creek Section** As Sewri which is located at the south end of Mumbai's Thane Creek is approximately 10km away from the railway and is famous as a visiting place for flamingos, which are specified as NT on IUCN's red list. In this manner, Thane Creek consists of many locations of abundant nature including mangrove forests and wetlands. For this project MAHSRC will pass through the Thane Creek section via tunnel structure. In planning for the tunnel construction in NATM method, plan to drill a hard Basalt layer that contains almost no water under the 30m ~ 60m from the ground in Thane Creek section according to "Ground subsidence". Therefore, low probability that the vibration of the tunnel excavation is propagated for the ground, also low probability to draw a lot of water by a tunnel excavation effect for the mangrove forest. Therefore it can be assumed that impact to the ecosystem will be very limited. **River Section** The bridge piers will be constructed inside the water at large rivers that the MAHSRC will pass through. Roiling the sand of bottom of a river during these bridge piers fundamental construction will temporarily produce muddy water. This construction may affect the river ecosystem temporary. Moreover, bridge widths will only be about 12m, construction will require partial alterations to riparian forests on both sides of the river. Although there is a possibility that affect the ecosystem of the river, diminution is narrow.

		Tree Transplanting In India, based on "The Forest Conservation Act, 1980" the removal of trees requires approval as well as transplanting to other locations. Moreover, in Mumbai and Ahmedabad respective states, laws are in place for tree removal and transplanting. In Maharashtra State, the Maharashtra Felling of Tree (Act 1964), and in Gujarat State the Saurashtra Felling of Trees (Infliction of Punishment) Act, 1951; Rules framed under the Act in 1961 are in place and adherence to these standards will also be required. Therefore, once the detailed route of the railway is determined, trees which will be subject to removal will be investigated and plantation of trees to an appropriate nearby location will be required. Also plantation for the number of trees is determined by consultation with the relevant organizations. (Operation stage) **General Section, Station and Depot** In sections where elevated tracks will be built, the elevated structures shall provide paths of passage for wildlife. In sections with embankments and cut earth, there is a possibility that highly mobile mammals may enter the tracks and be hit by trains. **NP and WLS Section** MAHSRC shall run between SGNP and TWLS, and in order to not disturb wildlife movement elevated structures will be constructed. Moreover, noise and vibration can be expected to accompany the operation of HSR, but as this railway is at a minimum distance of 100m away from SGNP, and a minimum distance of 50m away from TWLS, and as described in the Noise and Vibration section the possibility of generation of significant noise and vibration is low because the distance be shorter and further reduction is expected. Moreover, with a national highway with large vehicles running on it as well as an existing railroad line with numerous rail joints in the vicinity, the MAHSRC will comparatively have little impact. **River Section** Although bridge piers shall be installed at major rivers, they will not be significant as to disrupt the flow of the rivers. Bridges approximately 12m wide shall be constructed across the rivers, and shall allow free movement of mammals, birds, and insects underneath. After commissioning, there will not be waste water discharge from the MAHSRC thus impact will be extremely limited.
4	Hydrology	(Before/during construction stage) Bridge piers will be built in wide river streams where many bridges of equivalent size exist surrounding the construction sites. Moreover, due to bridge construction portions of riparian forests will need to be removed. The railway will only be about 12m in width along with its linear configuration. Bridges will be such that piers placed at uniform intervals will most likely be pile foundation structures which will not impede the flow of riverbed water, therefore impact to the hydrology is not anticipated. And the box culvert shall be provided where inundation problems are anticipated. (Operation stage) There are no factors which will impact hydrology during the operation stage.
5	Protected area	(Before/during construction stage) SGNP and TWSL which are designated as protected areas exist along the planned route. There is no plan for the HSR to run through either of them, but will run between the protected areas. Scope of ESZ is not set for both areas, but as the route is planned close to the protected areas, adequate care is necessary not to affect the environment during construction. However, as SGNP is at a minimum

		distance of 100m away, and TWLS is at a minimum distance of 50m away and thus there will be no direct impact. Viaduct is widely installing pile with a distance of 30m between and it will not interfere the groundwater flow. As mention on ”Biota and ecosystem”, Planning in the vicinity of the railway have existing of planar structures including a national highway and railroad, noise and vibration even less away the distance, the area is not ecological system cycle surroundings human-induced land use for current status, little impact is anticipated in the provision of this project. ESZ has not been also set in the above area. The planned HSR route pass through the some Reserved Forests near Virar, however only taking a part of Reserved Forest as tunnel wellhead in Virar. In other areas, The planned HSR route only passes through a part of Reserved Forest. Therefore, it is predicted that the impacts are less. In addition, the route passes through a mangrove forest in Thane as a CRZ, and the forest will be partly lost. There is no protected district except for two above mentioned areas. Two locations designated as a CRZ are on the route. One is Thane Creek, which a tunnel will pass through and therefore will not be directly altered. Mention about ”Ground subsidence” the tunnel plan to drill a hard Basalt layer that contains almost no water under the 30m~60m from the ground low probability to draw a lot of water by a tunnel excavation effect for the mangrove forest. To limit the extent of alteration, bridges shall be constructed at the Vaitarna River CRZ area located to the north of Virar. However, approximately 0.64ha of mangrove will need to be removed. During the detailed design phase the exact area of removal shall be determined, and procedures for removal shall be followed in accordance with “CRZ Notification 2011.” (Operation stage) MAHSRC shall run between SGNP and TWLS, and in order to not disturb wildlife movement elevated structures will be constructed. Moreover, noise and vibration can be expected to accompany the operation of HSR, but as shown in”Biota and ecosystem” this railway is at a minimum distance of 100m away from SGNP, and a minimum distance of 50m away from TWLS, and as described in the Noise and Vibration section the possibility of generation of significant noise and vibration is low. Moreover, with a national highway with large vehicles running on it as well as an existing railroad line with numerous rail joints in the vicinity, the MAHSRC will comparatively have little impact. Therefore, the construction of MAHSRC is not expected to impact protected areas.
Social Environment		
1	Water use	(Before/during construction stage) Water from rivers and wells is used as drinking and agricultural water in India. Approval is required whenever water is taken for the project, but huge water intake will not be necessary during construction. (Operation stage) After commissioning, water will be used for drinking in the stations and for cleansing in the depots. As water used for the project will always be subject to prior approval, no impact to water usage is anticipated.
2	Involuntary resettlement	(Before/during construction stage) A total of 16,890 ha of land will need to be acquired. And, out of 2,761 households, 1,688 households are going to lose their housing or housing com structures. (Operation stage) Significant extent of impact is assumed due to the HSR Project, however impact is not assumed in operation stage.
3	Local economies, such as employment, livelihood, etc.	A total of 539 PAPs who are wage earners and likely to lose existing employment opportunities. Out of 1,082 Households surveyed, 177 (16.4%) PAHs have business establishments falling under the direct project impact corridor. On the other hand, the creation of direct jobs and also indirect jobs are expected

		for large scale public project. Indian product is expected to catch up the same of advanced nations in several decades. For example, foreign portion of manufacturing rolling stock is dominant in initial stage, but the ratio of local manufacturing is expected to increase.
4	Land use and utilization of local resources	(Before/during construction stage) Present land use, such as agriculture, grazing, manufacturing, commerce etc. will be affected due to the HSR project. (Operation stage) The HSR will require the minimum space compared with other ways of transportation (highway/airport) and effective urban/local development will be enhanced. Problems in large city, such as urban transportation/drinking water/waste those arisen especially in Mumbai will be mitigated by relocating some of its function near the HSR station.
5	Social institutions and local decision-making institutions and social service facilities	(Before/during construction stage) Out of the 1610 affected structures, 744 (46.2%) affected structures are electricity distribution poles followed by 358 (22.2%) roads, 76 (4.7%) electricity distribution lines/wires, 69 (4.3%) railway buildings, 60 (3.7%) places of worship and electricity transformers each, 56 (3.5%) government buildings. (Operation stage) Those infrastructures and facilities will be properly relocated prior to start the construction activities, therefore the impact will be small.
6	Poor	Impacts against the poor people living within proposed HSR alignment will be suffered significantly before/during construction stage.
7	Indigenous or ethnic minority people	The IPs will be affected at villages of Valsad and Palghar Districts significantly before/during construction stage.
8	Misdistribution of benefits and damages	(Before/during construction stage) Impacts are not clear at F/S stage, therefore further survey is required in Final Location Survey Stage. (Operation stage) It is assumed that the impacts will still remain in operation stage.
9	Local conflicts of interest	(Before/during construction stage) Impacts are not clear at F/S stage, therefore further survey is required in Final Location Survey Stage. (Operation stage) It is assumed the conflict will still remain in operation stage.
10	Gender	Gender care in working environment is required in construction stage. However it will become little in operation stage.
11	Children's right	(Before/during construction stage) One school at Palghar, three at Valsad, one at Bharuch and one at Kheda District will be relocated. It is assumed that opportunity of to go to school shall be hampered if relocation of schools have not done properly or their commuting time will become longer than present one. (Operation stage) Impacts might be small in operation stage.
12	Cultural heritage	In both states there are multiple cultural heritages designated by the Government of India and other bodies. Even the closest cultural heritage is a distance of 1.2km away, and Chhatrapati Shivaji Terminus (formerly Victoria Terminus) designated as a World Heritage Site is approx. 14 km away from the planned HSR route, thus there is no possibility of alteration. Access to cultural heritages shall also not be affected. If the cultural/religious facility is found, it is recommended to choose the alignment of HSR to avoid the encounter as much as available. Therefore no impact is expected in the construction nor operation stages.
13	Infectious	(Before/during construction stage)

	diseases such as HIV/AIDS	Existing survey results indicate that HIV infection rates in rural areas are low in India. However, the number of people infected with HIV/AIDS in the whole of India is 2.39 million which is second most in the world. Thus, due to influx of construction workers during construction there will be a possibility of infections spreading. (Operation stage) Due to HSR commissioning it is anticipated that increased movement of people between urban and rural areas will occur, thus increasing the possibility of infectious diseases spreading.
14	Landscape	HSR plan will mostly have embankments or structures around 10m and therefore will be similar height to the surrounding structures. Therefore the landscape will not be largely changed.
15	Working conditions	(Before/during construction stage) It is necessary to secure the safety of workers, pedestrians and vehicular traffics in construction stage. (Operation stage) Impact to the workers those working at facilities of rolling stock inspection and repair is assumed.
16	Social consensus	(Before/during construction stage) Local stakeholders meetings were conducted in two stages or phases. At the initial stage, in every bridge location the consultant disclosed about the goal, objective, different component of the project as a whole and narrated the tentative design of the proposed alignment. The Consultant disclosed the entitlements of the affected households and other stakeholders as designed in the RAP. (Operation stage) Impact is not assumed in operation stage.
Others		
1	Accident	(Before/during construction stage) Due to operation of construction machinery and running of construction vehicles during construction, there is a possibility of accidents occurring. (Operation stage) As there have been several accident cases with regard to high speed trains in India and in overseas countries. Since this project will build a dedicated railway not connected to existing ones, the possibility of accidents comparable to previous cases is low.
2	Sun shading	(Operation stage) HSR is planned to run mostly on embankments or on elevated structures of approximately 10m high, which is similar to the height of surrounding buildings, and thus, possibility of sun shading is estimated to be low.
3	Radio disturbance	(Operation stage) HSR is planned to run mostly on embankments or on elevated structures of approximate 10m high, which is similar to the height of the surrounding buildings, and impact of radio disturbance is expected to be minimal.
4	Global warming/Climate change	(Operation stage) Currently global warming is in progress all over the world. In India, CO2 emission increase due to industrial plant operation and motor traffic increase has become an issue. With regard to CO2 emission by various transport means reported in 2014, 81% is produced by private cars and buses which is the highest, 10% by airplanes, and only 3% by railways, which is the lowest. If HSR were not to exist in the future, continual use of petroleum fuel and reduction of electric energy consumption is expected, which may result in CO2 emission increase from 6,730,000t in 2014 to 8,120,000t in 2053, which will be a 20% increase. On the other hand, when the HSR project is realized, switching from petroleum fuel to electric energy and change of passengers means from automobiles and

		airplanes to the railway will contribute to the reduction of CO2 emission, and is predicted to be 5,665,000t in 2053. An introduction of HSR cause increasing consumption of the electrical energy, however it is expected that it can cover in existing power plants due to approx. 2 % of power supply capacity in both states. As mentioned above, the operation of HSR is expected to reduce CO2 emission.

Source: Study Team

7.7 Assessment of Impacts

The adverse impacts due to the implementation of HSR during pre-construction, construction and operation stages are indicated in Table 7.7-1

Table 7.7-1 Scoping of the Proposed Plan

Anti-Pollution Measures						
No.	Items of Impact	Predicted Impact		Assessed Impact		Reason of Assessment
		Before/ During Const-ruction Stage	Operation Stage	Before/ During Const-ruction Stage	Operation Stage	
1	Air pollution	B-	C	B-	D	Construction Stage: Operation of construction machinery and construction vehicle traffic are expected to produce dust temporarily. Operation stage: No impact is anticipated.
2	Water pollution	B-	B-	B-	B-	Construction Stage: Muddy water from construction sites and waste water from construction work facilities will be produced, which may cause water pollution. Operation Stage: In the depots, water used for cleansing etc. may cause water contamination.
3	Soil pollution	B-	D	B-	D	Construction Stage: Oil spill from construction machinery may cause soil pollution. Operation stage: No impact is anticipated.
4	Waste	B-	B-	B-	B-	Construction Stage: Waste material will be produced in construction sites. Operation Stage: Waste material will be produced in the stations and depots.
5	Noise and vibration	B-	B-	B-	B-	Construction Stage: Noise and vibration will be produced by construction work. Operation Stage: Noise, vibration, and tunnel boom will produced by the train operations.

6	Ground subsidence	C	D	B-	D	Construction Stage: Tunnel excavation and embankment on specialized ground may cause ground subsidence. Operation Stage : No new impact is anticipated.
7	Offensive odors	D	D	D	D	No offensive odor likely at any stage of project implementation.
Natural Environment						
1	Topography and geology	B-	D	D	D	Construction Stage: No impact to topography and geology is anticipated. Operation Stage: No impact is anticipated.
2	Bottom sediment	D	D	D	D	No impact anticipated
3	Biota and ecosystem	A-	B-	A-	B-	Construction Stage: Due to site construction there will be partial loss of fauna and flora, thus causing impact to the biota and ecosystem. Operation Stage: Animals entering the tracks may be hit by trains
4	Hydrology	B-	D	D	D	Construction Stage: No impact is anticipated. Operation Stage: No impact is anticipated.
5	Protected area	A-	B-	B-	D	Construction Stage: No changes will be made to protected areas but work will be done in nearby locations. Operation Stage: No new impact is anticipated.
Social Environment						
1	Water use	B-	B-	D	D	Construction Stage: No impact is anticipated. Operation Stage: No impact is anticipated.
2	Involuntary resettlement	A-	D	A-	D	Displacement is required in pre-construction stage and impacts are significant.
3	Local economies, such as employment, livelihood, etc.	A-	B-	A-	B-	At several sites, livelihoods will be affected due to displacement, removal of shops and acquisition lands. And it is assumed that impacts will remain in

						operation stage at some sites.
4	Land use and utilization of local resources	A-	D	A-	D	Present land use, such as agriculture, grazing, manufacturing, commerce etc. will be affected due to the HSR project.
5	Social institutions and local decision-making institutions and social service facilities	A-	D	A-	C	Many utilities might be affected due to the HSR Project in construction stage. Impacts are not clear in operation stage, therefore it is need to be identified in Final Location Survey.
6	Poor	A-	A-	A-	B-	Impacts against the poor people living within proposed HSR alignment will be suffered significantly before/during construction stage. And some impacts will remain in operation stage.
7	Indigenous or ethnic minority people	C	C	A-	C	The IPs will be affected at the villages of Valsad and Palghar districts in the state of Gujarat and Maharashtra Districts significantly before/during construction stage. Impacts are not clear in operation stage..
8	Misdistribution of benefits and damages	B-	B-	C	C	Impacts are not clear at F/S stage; therefore further survey is required in Final Location Survey stage.
9	Local conflicts of interest	B-	B-	C	C	Impacts are not clear at F/S stage; therefore further survey is required in Final Location Survey stage in order may not to cause the split of community
10	Gender	B-	D	B-	D	Gender care in working environments is required in construction stage. However, it will become little in operation stage.
11	Children's right	C	C	A-	D	One school at palghar, three at Valsad, one at Bharuch and one at Kheda District will be relocated. By providing box culvert and etc., the access to the

						present/relocated school shall be secured by MOR
12	Cultural heritage	B-	D	D	D	No impact since there are no cultural heritages that exist near the railway.
13	Infectious diseases such as HIV/AIDS	B-	B-	B-	B-	Construction Stage: Influx of worker may cause the possibility of infectious diseases. Operation Stage: Due to the new movement of people there will be risk of infections spreading.
14	Landscape	D	B-	D	D	No large changes to the surrounding landscape.
15	Working conditions	B-	B-	B-	B-	Insufficient safety management will cause the accidents in construction stage.
16	Social consensus	A-	D	A-	D	To obtain consent by local stakeholders prior to start the construction will very much enhance the construction activity.
Others						
1	Accident	B-	A-	B-	C	Construction Stage: There is a risk of accident due to construction work. Operation Stage: There is a risk of accident due to the high speed operations. Technology introduction considering safety is essential. In this stage, its impact is not clear.
2	Sun shading	D	B-	D	D	Construction Stage: No impact. Operation Stage: The height is similar to the surrounding structures thus the possibility of sun shading is low.
3	Radio disturbance	D	B-	D	D	Construction Stage: No impact. Operation Stage: The height is similar to the surrounding structures thus the possibility of radio disturbance is low.
4	Global warming/Climate change	D	B+	D	B+	After the introduction of HSR, due to passenger shifts from automobiles

						and airplanes, the reduction of CO2 emissions can be anticipated.

Source: Study Team
Note:

A+/-: Significant positive/negative impact is expected.

B+/-: Positive/negative impact is expected to some extent.

C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses)

D: No impact is expected.

7.8 Mitigation Measures and its Cost

The mitigation measures and estimated costs in pre-construction/construction stage is presented in Table 7.8-1 and in operation stage is presented in Table 7.8-2, respectively.

Table 7.8-1 Mitigation Measures in Pre-construction/Construction Stage

Item of Impact	Mitigation Measures	Implementing Organization	Responsible organization	Budget
Air pollution	- Construction yards shall be located at a far distance from residential areas - Contractors are required to conduct daily routine equipment and machinery check-ups to ensure that these are in the optimum working conditions. - Regular preventive maintenance service of construction equipment and machineries will strictly comply with. - To reduce the dust, periodical water spray should be taken.	Contractor	Project Implementation Unit (PIU)	Included in a Construction Cost presented in Chapter 12

Water pollution	**Elevated Bridges, Embankment, and Cutting Section** - Sediment basins shall be prepared at construction sites, and muddy water shall not be directly discharged. - Locations with soil exposure shall be covered with sheets or with vegetation. - Sediment basins shall be built where muddy water is generated in huge volumes. **Tunnel Section** - Waste water from tunnels must be discharged after pH treatment. - Where muddy water is generated, it shall be discharged after being passed through a sediment basin or applied separation treatment or the like **River Section** - For work inside rivers, silk fences shall be prepared to prevent the propagation of muddy water. **Site Offices and Workers' Camps** - Temporary sanitation facilities such as portable toilets and garbage bins will be provided by the contractors to ensure that the domestic wastes to be generated by the construction personals are properly handled and not thrown into the drainage to prevent further pollution.	Contractor	PIU	Included in a Construction Cost presented in Chapter 12
Soil pollution	- The operator of heavy equipment should pay attention to prevent fuel leakage when he feeds. - The contractor and consultant of supervision should monitor the manner of fuel feed. - Regular preventive maintenance service of construction equipment and machineries will strictly comply with.	Contractor	PIU	Included in a Construction Cost presented in Chapter 12

Waste	- Contractors are required to facilitate proper disposal plan and manage the construction waste. - If around a waste disposal site is unavailable, we have to dispose them to right spot. The contractor must be the development and management under the laws of India. - Measures shall be taken to reuse as much as possible surplus earth and materials. - The consultant of supervision should monitor the waste disposal.	Contractor	PIU	Included in a Construction Cost presented in Chapter 12
Noise and vibration	- Construction yards shall be located far from residential areas. - Where construction work is carried out in the vicinity of residential areas, sound protection walls shall be installed. - Care shall be taken not to allow construction vehicles to pass through quiet residential streets. - Operators shall be trained so that they may not produce careless noises and vibrations in the vicinity of residences. - Drivers shall be trained so that they will drive construction vehicles at low speeds in the vicinity of residences. - Noise suppressors such as mufflers will be installed whenever deemed necessary to maintain the noise the noise generated by the various heavy equipment and other construction machinery within permissible limits. - Contractors are required to use low-noise equipped machinery whenever it is necessary.	Contractor	PIU	Included in a Construction Cost presented in Chapter 12
Ground subsidence	- For tunnel sections construction method with high water sealing properties shall be adopted, and measures shall be taken to reduce ground subsidence. - Soil stabilization shall be performed before embankment construction for sections with black cotton soil.	Contractor	PIU	Included in a Construction Cost presented in Chapter 12

Biota and ecosystem	- Construction yards shall be planned to keep damages to trees and plants to a minimum. - Removed trees and plants shall be replanted at other locations as necessary. - Planting of trees commensurate to the number of removed trees shall be done in compliance with relevant laws and regulations. - For work inside rivers, silk fences shall be prepared to prevent the propagation of muddy water.	Contractor	PIU	Included in a Construction Cost presented in Chapter 12
Protected area	- Construction yards shall be planned to keep damages to trees and plants to a minimum. - Construction yards shall be located as far as possible from SGNP and TWSL. - Contractors are required to use low-noise equipped machinery whenever it is necessary. - Proper clearance procedure shall be observed in accordance with regulations and standards to protect CRZ and reserved forests.	Contractor RVNL/HSRC	PIU Related state organizations	Included in a Construction Cost presented in Chapter 12 Shall be borne by RVNL/HSRC.
Involuntary resettlement	- Conduct census survey and local stakeholder meeting. - Prepare RAP involving the following measures. - PAPs must be acknowledged as an eligible for compensation. - Identify the eligibility of non-titled people at the census survey intended to PAPs and ensure the compensation and support. - Refer the previous/on-going projects by other donors, determine the requirement for social vulnerability and compensate to them. - Resettlement site must be prepared when PAPs need it. - Confirm if resettlement activities conform to RAP or not by internal monitoring etc. - Establish Grievance Redress Committee - Establish external monitoring committee consists of the third party.	RVNL/HSRC	MOR	Shall be borne by MOR.

Local economies, such as employment, livelihood etc.	- Prepare RAP involving the measure to restore PAPs' livelihood	RVNL/HSRC	MOR	Shall be borne by MOR.
Land use and utilization of local resources	- Provide urban planning to enhance appropriate development of the HSR corridor. - Utilize local materials and products human resources related to construction and operation.	RVNL/HSRC	MOR	Shall be borne by MOR.
Social institutions, such as social infrastructure and local decision making institutions. Existing social infrastructure and services	- Social utilities; such as power supply, drinking water, drainage and communication line are to be diverted before starting the construction activity.	RVNL/HSRC	MOR	Included in a Construction Cost presented in Chapter 12
Poor people	- To minimize impact on present agricultural activities, the construction schedule should be disclosed to the PAPs at the earliest possible stage. - The proper compensation should be given to the PAPs.	RVNL/HSRC	MOR	Shall be borne by MOR.
Indigenous or ethnic minority people	- Prepare IPP involving the measure to restore STs' livelihood	RVNL/HSRC	MOR	Monetary compensation shall be borne by MOR. In addition to the above, 1) Loss of land for grazing 2) Loss of water supply 3) Loss of medical plants 4) Loss of trees for fuel shall be discusuued at SHM.

Misdistribution of benefits and damages	- Conduct a further SHMs and confirm a physical misdistribution - When issues will be settled by providing structures, it will be considered in D/D	RVNL/HSRC	MOR	Included in a Project Cost presented in Chapter 12
Local conflicts of interest	- Conduct a further SHMs and confirm a physical misdistribution - When issues will be settled by providing structures, it will be considered in D/D	RVNL/HSRC	MOR	Included in a Project Cost presented in Chapter 12
Gender	- When women group employed, provide their own toilet and rest station	RVNL/HSRC	MOR	Included in a Project Cost presented in Chapter 12
Children's right	- When the school is affected due to HSR Project, construct their new school prior to start the construction activity - Present commuting distance must be considered when prepare settlement site.	RVNL/HSRC	MOR	Included in a Project Cost presented in Chapter 12
Infectious diseases such as HIV/AIDS	- HIV/AIDS related workshops shall be provided for construction workers - Periodic health checks and HIV/AIDS tests shall be provided for construction workers	Contractor	PIU	Included in a Project Cost presented in Chapter 12
Working conditions	- Construction personnel provides with the necessary safety gears such as protective hard hat and safety belt as necessary. - Contractor/Owner of rolling stock inspection and repair must provide temporary scaffolding, temporary landslide protection wall etc. to protect workers.	Contractor	PIU	Included in a Project Cost presented in Chapter 12
Social consensus	- MOR has to hold local stakeholder meetings periodically, and release project information to neighbor villagers.	RVNL/HSRC	MOR	Included in a Project Cost presented in Chapter 12
Accident	- Workshops shall be organized for workers and provide safety management. - At construction sites, persons responsible for managing hazardous materials such as oil shall be appointed and trained to secure safety. - Traffic controllers shall be provided as necessary.	Contractor	PIU	Included in a Construction Cost presented in Chapter 12

Source: Study Team

Table 7.8-2 Mitigation Measures in Operation Stage

Item of Impact	Mitigation Measures	Implementing Organization	Responsible organization	Budget
Water pollution	- Purification system for the type of waste water produced from depot shall be provided. - Oil absorption mats shall be provided to remove oils from waste water.	HSRC	RVNL	HSRC
Waste	- Treatment pools shall be installed for waste water from stations and depots. Waste water shall be discharged to adjacent rivers after being treated in accordance with the standards. - Prepare and implement a hazardous waste management plan for the disposal of waste oil, batteries and other hazardous materials.	HSRC	RVNL	HSRC

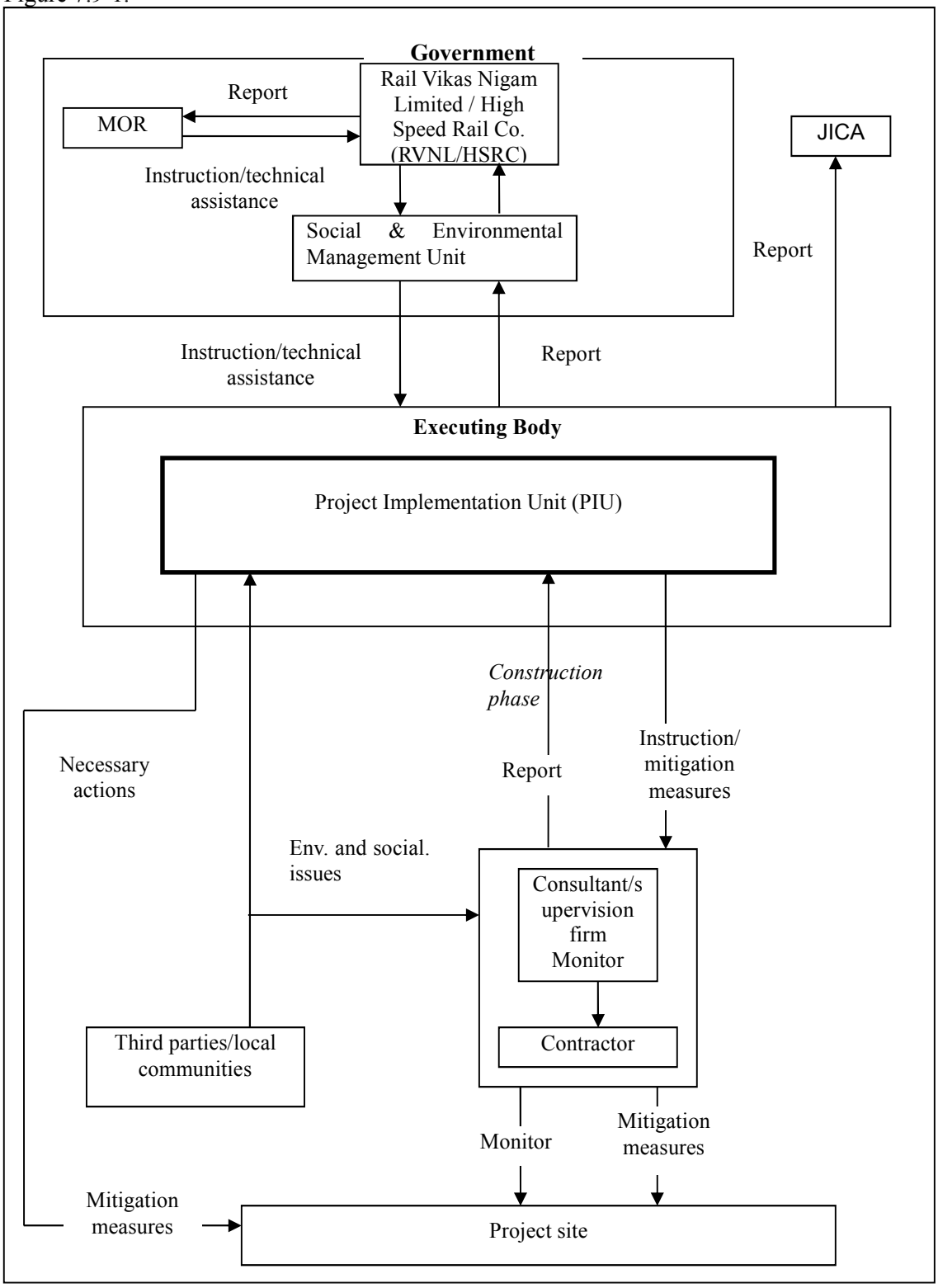
Noise and vibration	**Noise and vibration** - Introduction of low-noise cars ➢ Low-noise pantograph ➢ Pantograph-noise insulation plate etc - Adoption of Long Rails: Reduces percussive noises by reducing the number of rail joints Track and Wheel Maintenance: Reduces noise generated due to uneven wear through regular track and car (Wheel) maintenance - Track Pads: With track pads inserted between rails and sleepers to absorb springiness, vibration propagation can be reduced. - Installing tunnel entrance hoods - Installation or elevation of sound barriers according to the situation of surrounding residences - Implementation of noise and vibration monitoring - In case that measures are difficult to provide at the source of vibration production, sound and vibration protection work shall be carried out on residences. **Tunnel boom** - Adoption of long nose for the front car. - Installing tunnel entrance hoods	HSRC	RVNL	HSRC
Biota and ecosystem	- Fences shall be installed at embankment and cutting sections in order to prevent animals from entering the railway tracks.	HSRC	RVNL	HSRC
Local economies, such as employment, livelihood etc.	- Conduct external monitoring and confirm the level of PAPs' livelihood is worsened or not.	HSRC	RVNL	Shall be borne by MOR, if necessary
Poor people	- Conduct external monitoring and confirm the level of PAPs' livelihood is worsened or not.	HSRC	RVNL	Shall be borne by MOR, if necessary
Misdistribution of benefits and damages	- Conduct external monitoring and confirm if the issue on misdistribution is arisen or not.	HSRC	RVNL	Shall be borne by MOR, if necessary

Local conflicts of interest	- Conduct external monitoring and confirm if the issue on misdistribution is arisen or not.	HSRC	RVNL	Shall be borne by MOR, if necessary
Infectious diseases such as HIV/AIDS	- Contactor will be required to conduct a periodical health education to his personnel. - Enhancement of community health activity for local people.	HSRC	RVNL	Shall be borne by HSRC at O&M sites. Local government shall be responsible for citizen.
Working conditions	- Construction personnel provide with the necessary safety gears such as protective hard hat and safety belt at O&M sites. - HSRC has to provide temporary scaffolding, temporary landslide protection wall etc. at rolling stock inspection and repair.	HSRC	RVNL	HSRC
Accident	- Operations system (such as signal system) with a safety track record shall be implemented, and reliable operations management procedures shall be observed. - Safety education and training shall be periodically provided to the drivers. - Guard fences shall be installed to prevent trespassing into the tracks.	HSRC	RVNL	HSRC

Source: Study Team

7.9 Environmental Monitoring Plan (EMP)

The institutional framework for environmental management and monitoring is presented in Figure 7.9-1.



Source: Study team

Figure 7.9-1 Institutional Framewok of EMP

The proposed environmental monitoring plan in the EMP is shown in monitoring of impacts on environmental components during construction and operation stage and operation stage, respectively, and its monitoring form is attached in Appendix-I Form of Monitoring.

Table 7.9-1 EMP in Pre-construction/Construction Stage

Environmental Indicator	Method/Parameters	Location, Quantity and Frequency	Responsible agency
1 Air quality monitoring	SO2, NOx and PM10 or SPM, PM2.5	1 point of station construction site. (Total 12 points) 4 times / year (Total 24 times in 6 years)	Contractor/Consultant of supervision
2 Water quality monitoring (River water)	pH, SS, Temperature, Oil and Grease, Coliform bacteria	1 sample of 19 major rivers. 12 times / year (Total 72 times in 6 years)	Contractor/Consultant of supervision
3 Monitoring for tunnel drainage	pH, SS, Temperature, Oil and Grease	1sample of 3 points (Urban and Under the sea tunnel vents) 12 times / year (Total 72 times in 6 years)	Contractor/Consultant of supervision
4 Waste Management	Inventory record of waste disposal	Construction site as required	Contractor/Consultant of supervision
5 Noise Monitoring	Leq (dBA) 16 hours / day Measuring 3 times per hour	1 point of station construction sites*1. (Total 12 point) 4 times / year (Total 24 times in 6 years)	Contractor/Consultant of supervision
6 Vibration Monitoring	La (dB), Acceleration (m/s2) 16 hours / day Measuring 3 times per hour	1 point of station construction sites*1. (Total 12 point) 4 times / year (Total 24 times in 6 years)	Contractor/Consultant of supervision
7 Biota and ecosystem	Monitoring whether impacts to wildlife around the construction site.	Construction site as required	Contractor/Consultant of supervision
8 Land Contamination monitoring	Check the maintenance of construction machine.	Construction site as required	Contractor/Consultant of supervision
9 Occupational Health Monitoring	Opinion or complaint of construction worker	Construction site 4 sessions / year (Total 24 sessions in 6 years)	Contractor/Consultant of supervision
10 Involuntary resettlement, Poor	Hiring RAP implementation Consultant (NGO) Monitoring by internal and external monitoring agency	Whole through D/D stage. Whole through construction stage.	RVNL/HSRC, local government. RAP Implementation Consultant (NGO)
11 Social Aspects	Opinion or complaint of residents near the	Construction site as required	Contractor/Consultant of supervision

	construction site		
12 Misdistribution of benefits and damages	Opinion or complaint of residents near the construction site	Construction site as required	Contractor/Consultant of supervision
13 Local conflicts of interest	Opinion or complaint of residents near the construction site	Construction site as required	Contractor/Consultant of supervision

Note: *1 The vicinity of the planned HSR station were selected as monitoring points because there are many habitants near planned HSR station and the areas could be judged as susceptible areas.
Source: Study Team

Table 7.9-2 EMP in Operation Stage

Environmental Indicator	Method/Parameters	Location, Quantity and Frequency	Responsible agency
1 Noise Monitoring	Leq ,Lmax (dBA) 16 hours / day	1 point of station site*1. (Total 12 point) 2 time / (Commissioning / after opening)	HSRC
2 Vibration Monitoring	La (dB), Acceleration (m/s2) 16 hours / day	1 point of station site*1. (Total 12 point) 2 time / (Commissioning / after opening)	HSRC
3 Waste Management	Inventory record of waste disposal	Every stations and Depot	HSRC
4 Biota and ecosystem	1. Monitoring whether impacts to wildlife around the construction site or not. 2. Implementation of regular monitoring of transplanted trees.	1. Arbitrarily around the planned HSR route 2. Site of transplanted	HSRC
5 Restoration of Livelihood	Monitoring by external monitoring agency	1st monitoring: within 6 months after resettlement is completed. 2nd monitoring: within 1 year from 1st monitoring 3rd monitoring: within 2 years from 3rd monitoring	External monitoring consultant
6 Social Institutions	Monitoring by external monitoring agency	1st monitoring: within 6 months after resettlement is completed. 2nd monitoring: within 1 year from 1st monitoring 3rd monitoring: within 2 years from 3rd monitoring	External monitoring consultant

7 Indigenous or ethnic minority	Monitoring by external monitoring agency	1st monitoring: within 6 months after resettlement is completed. 2nd monitoring: within 1 year from 1st monitoring 3rd monitoring: within 2 years from 3rd monitoring	External monitoring consultant

Note: *1 The vicinity of the planned HSR station were selected as monitoring points because there are many habitants near planned HSR station and the areas could be judged as susceptible areas.
Source: Study Team

The estimates for incurring the EMP costs are shown in Table 7.9-3 and Table 7.9-4

Table 7.9-3 EMP Costs in Pre-construction/Construction Stage

Monitoring Item	Tentative Unit Cost (INR)	Unit	Quantity	Methodology	Cost (INR million)
1 Air quality monitoring	10000	location	288	4 times x 6 years x 12 locations (Station construction site)	2.88
2 Water quality monitoring (River water)	20000	location	1368	12 times x 6 years x 19 locations (Major river)	27.36
3 Monitoring for tunnel drainage	20000	location	216	12 times x 6 years x 3 locations (Urban and Under the sea tunnel vents)	4.32
4 Noise Monitoring	5000	location	288	4 times x 6 years x 12 locations (Station construction site)	1.44
5 Vibration Monitoring	15000	location	288	4 times x 6 years x 12 locations (Station construction site)	4.32
6 Occupational Health Monitoring	100000	session	24	4 sessions a year x 6 years	2.40
7 Involuntary resettlement, base line data survey etc.		lump sum	1	15 % of Resettlement &Rehabilitation cost: 725.315 x 15%	108.80
				Sub-Total	128.96

Source: Study Team

Table 7.9-4 EMP Costs in Operation Stage

Monitoring Item	Tentative Unit Cost (INR)	Unit	Quantity	Methodology	Cost (INR million)
1 Noise Monitoring	5000	location	24	2 time x 12 locations	0.12

2 Vibration Monitoring	15000	location	24	2 time x 12 locations	0.36
				Sub-Total	0.48

Source: Study Team

On the basis of baseline study and identified negative impacts, issues like tree cutting, Construction in the CRZ etc needs necessary approvals/clearance from the relevant concerned authorities. PMU will ensure that all necessary approvals/clearances are in place before implementation. Before commencement of the construction the necessary permission required for the project is given in Table 7.9.5.

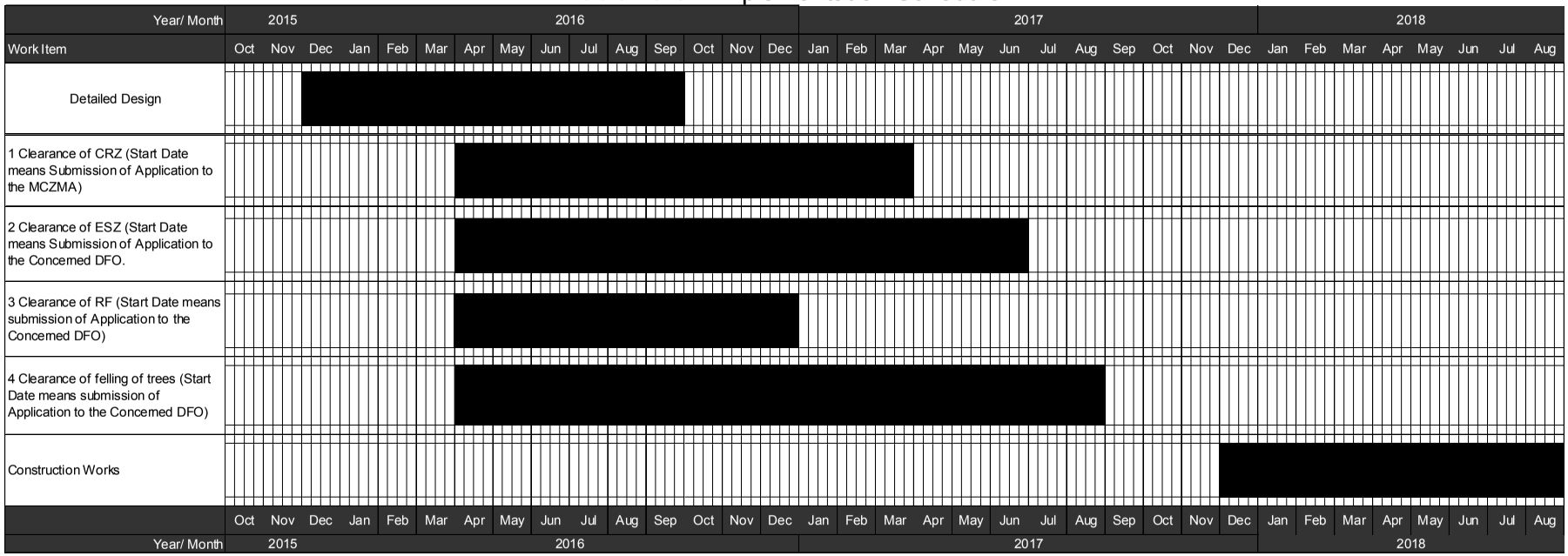
Table7.9-5 List of Place Necessary to Clearance

No.	Clearance	Name of Place	Chainage (in km)	State/District
1	CRZ	Thane Creak*1	6.98-15.22	Maharashtra/Mumbai
2		between Gaskopari and Tembhikhodave	71.20-75.40	Maharashtra/Mumbai
3	RF	Vadghar Reserved (Forest & Open Jungle)	35.43-45.35	Maharashtra/ Thane
4		Sarjmori Reseved (Forest & Open Jungle)	50.67-54.61	Maharashtra/ Thane
5		Sativli (Reserve Forest)	55.20-59.00	Maharashtra/ Thane
6		Khairpada (Forest & Open Jungle)	65.54-67.26	Maharashtra/ Thane
7		Kasarali (Forest & Open Jungle)	69-64-71.31	Maharashtra/ Thane
8	Permission for felling of trees*2	Along Alignment Around the station planned construction site Depot		All district proposed route passes

Note: *1 Relevant section will not be modified in order to adopt the tunnel structure.
*2 The required total area of forest cutting is expected to be approx. 115 ha.
Source: Study Team

The implementation Schedule of each clearance Shows in Table 7.9-6.

Table7.9-6 Implementation Schedule



Source: Study team

7.10 Land Acquisition and Resettlement

7.10.1 Necessity of Land Acquisition and Resettlement

The proposed project requires land. Land will be mainly required for route alignment of rail tracks, station buildings, platforms, entry/exit structures, traffic integration, car shed, power sub-stations, ventilation shafts, administrative buildings, property development and temporary construction depots and work sites etc. Land being a scarce commodity, the project shall displace people from their home and/or impact livelihood base. Project alignment suggests of design considerations to keep land requirement (and acquisitions) to the barest minimum. Nonetheless, the project will involve relocation of shops, commercial-cum-residential buildings and hutments and acquisition of farm land along the proposed corridors. The Resettlement Action Plan (RAP) is based on currently available data/ information with respect to the Project. Currently the details of the project including technical design and route alignments are in the process of finalization and the local district administration in particular have no information about the project. The current report is based on the census survey of impacted structures along the broad alignment proposed for the Project. The study has not surveyed the land losers impacted by the project because the details of the impact are not yet known and such information can best be captured only after local administration (read land revenue department) are engaged to identify the owners/claimants of such land parcels. The related 20A notification under RAA 2008 for land acquisition shall allow the access to land data. The findings in this report should therefore be viewed/ read in light of the above limitations.

7.10.2 Legal Framework of Land Acquisition and Resettlement

The framework applicable for Land acquisition and Resettlement in this project requires an understanding of various policies and guidelines that would govern the project. Policy guidelines of relevance are:

Table 7.10-1 Applicable National Policies and Regulations

Title	Outline
The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and its Rules, 2007	This Act recognizes the rights of forest-dwelling Scheduled Tribes and other traditional forest dwellers over the forest areas inhabited and provided a framework for their right. According to this Act, the proposals submitted under the Forest (Conservation) Act, 1980 for diversion of forest land that non-forest purposes are required to enclose evidences from the respective State Government or the concerned Gram Panchayat. It supports that settlement of rights (if any) under FRA, 2006 will be initiated and completed or bearing on operationalization of the FRA before the proposals are granted for the final approval.
Railways (Amendment) Act, 2008	The Railways Act, 1989 was amended in 2008, which is called the Railways (Amendment) Act, 2008 (RAA 2008). The RAA 2008 provides land acquisition process and procedures for the special railway projects such as DFC, including valuation method of land compensation.

Land Acquisition Act, 1984 and its Amendment	In India, land is acquired by the Government for a public purpose under the principles of eminent domain, that is, the Government has the first right for land. Land is acquired by Government most commonly under the Land Acquisition Act of 1894 modified in 1984. The amendment of 1984 extended the scope of the definition of public purpose and some of its norms related to time, amount and procedures of compensation. However, the Act in essence remains unchanged. The Act is applicable to the whole of country except the State of Jammu and Kashmir.
Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (New Land Acquisition Act)	This is an Act of Indian Parliament regulates land acquisition and provides laid down rules for granting compensation, rehabilitation and resettlement to the affected persons in India. The Act has provisions to provide fair compensation to those whose land is taken away, brings transparency to the process of acquisition of land to set up factories or buildings, infrastructural projects and assures rehabilitation of those affected. The Act establishes regulations for land acquisition as a part of India's massive industrialization drive driven by public-private partnership. The Act replaced the Land Acquisition Act, 1894, a nearly 120-year-old law enacted during British rule. The provision of the Act does not apply acquisition under 16 existing legislation including Railways Amendment Act etc. Therefore, it is construed that (New Land Acquisition Act) will not be applied to HSR in principle.
National Rehabilitation and Resettlement Policy, 2007	The National Rehabilitation and Resettlement Policy, 2007 (NRRP 2007) for Project Affected Families (PAFs) have been prepared by the Department of Land Resources, Ministry of Rural Development, and Government of India. The policy stipulates the minimum benefits to be ensured for persons displaced due to acquisition of land for public purposes. The Policy is applicable to projects displacing 400 or more families *enmasse* in plain areas, or200 or more families *enmasse* in tribal or hilly areas, Desert Development Program. (DDP) blocks, areas mentioned in Schedule V and Schedule VI of the Constitution of India. However, the basic principles of policy can be applied to rehabilitation and resettlement of PAFs regardless of the number of PAFs. The policy provides specific measures for vulnerable and poor groups. As of now there is no law on rehabilitation and resettlement in the country. The Rehabilitation and Resettlement Bill 2007 (Bill No. 98 of 2007) has been introduced in the Lower House (Lok Sabha) of the Indian Parliament.

Source: Study Team

7.10.3 Gaps between JICA's Guidelines and related Ordinance in India

Both the Railways (Amendment) Act, 2008 (RAA) and the National Rehabilitation and Resettlement Policy, 2007 (NRRP) are local applicable policies for the Project. The gap between JICA's Guidelines and aforesaid policies is prepared in the following Table7.10-2.

Table 7.10-2 Gap and Gap Filling Measure

Sl. No.	JICA's Guidelines (2010)	GOI's Applicable State Policy (RAA and NRRP)- TARU	Gaps Between JICA's Guidelines and RAA and NRRP	Proposed Gap Filling Measures
1	Involuntary	Stated aim to minimize	No	-

	resettlement should be avoided wherever possible.	large scale displacement. Encourages projects to be set up on waste land, degraded land, Un-irrigated land. (NRRP 2007, #1.4, Chap 1)		
2	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken.	If unavoidable, Govt. to consider different alternatives to minimize displacement, total land acquired and total agricultural land acquired for non-agricultural use (NRRP 2007, #1.4, Chap 1), RAA has provision for compensation for losses incurred.	No	-
3	People who must be settled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre0project levels.	Provisions made for R&R benefits to all; but subject to condition that non-titleholders must be residing or drawing livelihood in the affected area for a period not less than 3 years preceding date of declaration of the affected area. (NRRP, #3.1.b.iii)	Yes, Non-titleholders need to be residing continuously or drawing livelihood from the affected area for a period not less than 3 years preceding the date of declaration. RAA silent on compensation rights of Non-Titleholders for loss of land (illegally occupied), structures. R&R benefits such as housing improvement, development benefits, loss of crops, trees, transitional support etc. to be provided only if residing/ drawing livelihood for a continuous 3 year period in the area, preceding declaration of 'affected area'	Recognize claims of Non-Title holders (as identified by census survey and irrespective of their residing period status) and in respect of – - Compensation for structures, trees - Structure transfer assistance - Structure reconstruction assistance - Shifting assistance for residential house owner - Tenant shifting allowance Assistance to be provided at par with similar R&R support extended to titleholder familiar
4	Compensation must be based on the full replacement cost as much as possible	Compensation made on market rate as per the rate reflected vides sale deed registration of similar land in the area or in the vicinity. (RAA, 20G #1&2)	Yes, Market rate as calculated by government is usually far below the actual prevailing market rates.	Compensation to be provided at prevailing market rate. Market rate to be established by an independent consultant/engineer/evaluator appointed by project proponents and by assessing the actual rates in project area and in vicinity
5	Compensation and other kinds of assistance must be provided prior to	Provisions exist in NRRP		-

	displacement			
6	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public.	Requirement for RAP is mentioned subject to number of displaced exceeding 400 families in plains or 200 in hilly/tribal areas or Desert Development Program (DDP) blocks.	Yes, numerical condition (400 in plain area, 200 in tribal, hilly or DDP blocks) attached. JICA requires this to be implemented if PAH number is higher than 50.	RAP to be prepared for this project.
7	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance.	Specific mention provided in NRRP	No	-
8	When consultation held, explanation must be given in a form, manner, and language that are understandable to the affected people	Provision made	No	-
9	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans	Specified	No	-
10	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities	Specified	Yes, R&R Committee to be set up only if in the project area more 400 families (in plains) or 200 in tribal/hilly areas are to be displaced	GR mechanism to be set up. Should be accessible to PAHs- to be constituted at district level for land acquisition purposes and at CPM level for R&R benefit aspects. R&R implementing NGO/Consultant to have presence in each project affected district and facilitate and inform PAHs about GRM and its processes.
11	Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socio-economic survey), preferably at	Specified under NRRP for identification of all affected persons and under RAA for all land/asset losers- post notification under 20A of RAA.	No	-

	the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advantage of such benefit.			
12	Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under la), the PAPs who do not have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying	Specified- R&R benefits to non-titleholders provisioned by subject to them residing/ drawing livelihood for period not less than 3 years in the project affected area (from the date formal declaration)	Yes, Non-titleholders if residing or drawing livelihood for a period less than 3 years are not eligible for R&R benefits	- All Non-titleholders (as identified on the date of census survey) will also be eligible for R&R benefits
13	Preference should be given to land –based resettlement strategies for displaced persons whose livelihoods are land-based.	specified	No	-
14	Provide support for the transition period (between displacement and livelihood restoration)	specified	Yes, no such benefits provision for non-titleholder residing/drawing livelihood for a period less than 3 years	- Transition benefits to be provided to all non-titleholders (displaced and livelihoods impacted) who have been identified as per census survey.
15	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.	Mentioned for vulnerable groups as defined under NRRP. Specific mention of additional provisions for SC and ST community mentioned under #7.21 of the NRRP. Requirement of a separate tribal development plan to be prepared if number of tribal displaced families exceeds 200 families.	No	- Separate Indigenous people plan to be prepared for ST community - Special R&R assistance to SC community. - Special attention to be made by the R&R implementing NGO, the vulnerable PAH/persons receive R&R support as made out for them in the RAP.

Source: Study Team

7.10.4 Census and Socio-economic Survey

Census Survey information was collected from 1,082 Project Affected Households (PAHs) with 5,404 PAPs through the Socio-Economic and Census Survey. The Table7.10-3 below provides distribution of PAHs and PAPs spread across 11 districts of Gujarat and Maharashtra. In the context of Palghar, it may be noted that one of the Talukas (and the habitations) i.e. Vasai is situated in the suburban Mumbai and thus has high urban characteristics.

Table 7.10-3 Distribution Details of PAHs and PAPs

State/Districts	PAHs	PAPs
Maharashtra		
Thane	48	199
Palghar	195	951
Dadra Nagar Haveli (UT)	4	18
Gujarat		
Valsad	95	431
Navsari	54	273
Surat	86	410
Bharuch	64	324
Vadodara	105	470
Anand	65	349
Kheda	147	783
Ahmedabad	219	1,196
Grand Total	1,082	5,404

Source: Census Survey Data, Sep-Dec 2014

(1) Duration of Living in the Project Area

Table 7.10-4 shows the time duration of the PAHs those are living in the project area. 82 PAHs out of 1,082 PAHs have been living in the project area since last one year. 185 PAHs have been living in the project areas for a period 31 to 50 years. 343 PAHs has been living in the project area for more than 50 years. All the PAHs (4) in Dadra and Nagar Haveli location have been living in the project area for the last 50 years or more.

Table 7.10-4 Duration of PAHs Living in the Project Area

District	Last 1 Year	1-3	4-10	11-30	31-50	More than 50 Years	Grand Total
Thane	5	-	19	26	-	-	50
Palghar	43	-	55	34	14	47	193
Dadra Nagar Haveli	-	-	-	-	-	4	4
Valsad	8	-	7	24	10	46	95
Navsari	2	2	5	14	4	27	54
Surat	6	4	10	30	22	14	86
Bharuch	2	-	-	8	5	49	64
Vadodara	1	6	34	35	14	15	105
Anand	1	3	10	22	12	17	65
Kheda	11	3	13	50	27	43	147
Ahmedabad	3	7	12	39	77	81	219
Grand Total	82	25	165	282	185	343	1,082
Percent	7.6%	2.3%	15.2%	26.1%	17.1%	31.7%	100.0%

Source: Census Survey Data, Sep-Dec 2014

(2) PAHs and Population by Sex, Age Group and Religion

This section classifies PAHs and PAPs on parameters of sex, age and religion. Additional information has been provided on distribution these based on ownership (number of structures and ownership type) pattern.

1) Family Size

Affected Households covered under census survey may be classified in four categories based on number of family members, as presented in Table 7.10-5. Out of 1,082 PAHs in total, 704 PAHs (65.1%) classify as small sized family, 355 PAHs (32.8%) as mid-size family, 20 PAHs (1.8%) as big family and only 3 PAHs (0.27 %) categorize as a large family.

Table 7.10-5 Family Size

District	Small	Mid-Sized	Big	Large	Grand Total
Thane	41	8	1	-	50
Palghar	131	62	-	-	193
Dadra Nagar Haveli	4	-	-	-	4
Valsad	67	26	2	-	95
Navsari	32	19	1	2	54
Surat	58	24	4	-	86
Bharuch	43	19	1	1	64
Vadodara	84	20	1	-	105
Anand	43	21	1	-	65
Kheda	85	56	6	-	147
Ahmedabad	116	100	3	-	219
Grand Total	704	355	20	3	1,082
Percent	65.1%	32.8%	1.8%	0.3%	100.0%

(Note) Small family: 1-5 members; Mid-Sized Family: 6-10 members; Big Family: 11-20 members; Large Family: more than 20 members.
Source: Census Survey Data, Sep-Dec 2014

2) Religion

District wise distribution of PAHs along religious faiths practised is presented in Table 7.10-6. Out of 1,082 PAHs, 969 (89.6%) PAHs are Hindus, 96 (48.9%) PAHs are Muslim, 14 PAHs are Christian, and 1 PAH is a Buddhist. Most of the Muslim families are found to be located in Ahmedabad (60 out of total 96 Muslim PAHs). Such high concentration is expected as the alignment in the Ahmedabad passes along existing track, that witness's growth of low/poor income settlements, with significant presence of Muslim population.

Table 7.10-6 Religious Affiliation of PAHs

District	Hindu	Christian	Islam	Buddhist	Others	Grand Total
Thane	48		1	-	1	50
Palghar	177	3	11	1	1	193
Dadra Nagar Haveli	4	-	-	-	-	4
Valsad	88	1	6	-	-	95
Navsari	47	1	6	-	-	54
Surat	84	-	2	-	-	86

Bharuch	63	-	1	-	-	64
Vadodara	99	2	4	-	-	105
Anand	63	1	1	-	-	65
Kheda	142	1	4	-	-	147
Ahmedabad	154	5	60	-	-	219
Grand Total	969	14	96	1	2	1,082
Percent	89.6%	1.3%	8.9%	0.1%	0.2%	100.0%

Source: Census Survey Data, Sep-Dec 2014

3) PAHs with Structures

Out of the 1,082 PAHs, a majority of PAHs i.e. 95.3% has 1 structure falling in the HSRC alignment. About 35 PAHs (3.23%) have 2 structures and only 4 PAHs (0.4%) of PAHs have got more than 3 structures in the designated corridor of HSR survey.

Table 7.10-7 Number of PAHs With Structures

District	With 1 Structure	With 2 Structures	With 3 Structures	More than 3 Structures	No. of PAHs
Thane	50	-	-	-	50
Palghar	180	9	3	1	193
Dadra Nagar Haveli	3	1	-	-	4
Valsad	87	5	3	-	95
Navsari	48	3	2	1	54
Surat	77	7	1	1	86
Bharuch	61	3	-	-	64
Vadodara	104	1	-	-	105
Anand	62	1	1	1	65
Kheda	143	4	-	-	147
Ahmedabad	217	1	1	-	219
Grand Total	1,032	35	11	4	1,082
Percent	95.4%	3.2%	1.0%	0.4%	100.0%

Source: Census Survey Data, Sep-Dec 2014

4) Ownership Type

Based on the number of families affected, 930 (86%) PAHs out of 1082 PAHs are the owners of the structures. Only 142 (13%) PAHs are living as tenants whereas only 10 (0.9%) PAHs are identified as encroachers/squatters/illegal occupiers. It is to be noted that PAHs belonging to the category of Encroacher/Squatter/Illegal Occupier has been identified in the Project Areas on the basis of respondents view and not been as per the Records of Revenue.

Table 7.10-8 Ownership Type of PAHs

District	Owner	Tenant	Encroacher/Squatter/Illegal Occupier	Grand Total
Thane	44	6	-	50

Palghar	162	31	-	193
Dadra Nagar Haveli	4	-	-	4
Valsad	81	13	1	95
Navsari	48	6	-	54
Surat	69	17	-	86
Bharuch	62	2	-	64
Vadodara	67	38	-	105
Anand	57	8	-	65
Kheda	141	5	1	147
Ahmedabad	195	16	8	219
Grand Total	930	142	10	1,082
Percent	86.0%	13.1%	0.9%	100.0%

Source: Census Survey Data, Sep-Dec 2014

(3) Social Category and Socio-Economic Dimensions of PAHs

Assessment of PAHs social background shows that the majority among them belong to General Caste (414 PAHs, 38.3%) and Backward Caste (BC/OBC) category (407 PAHs, 37.6%) followed by Scheduled Tribe (202 PAHs, 18.7%). The presence of SC family in the project area is 59 PAHs as shown in Table 7.10-9. Scheduled Tribe families are found to be mostly in Palghar (72 PAHs, Talasari and Dahanu taluka), Valsad (32 PAHs) and Ahmedabad District (51 PAHs, Ahmedabad city area).

Table 7.10-9 Social Category of PAHs

District	Gen	BC/OBC	SC	ST	Grand Total
Thane	26	8	1	15	50
Palghar	54	61	6	72	193
Dadra Nagar Haveli	4	-	-	-	4
Valsad	21	37	5	32	95
Navsari	8	31	10	5	54
Surat	22	29	24	11	86
Bharuch	31	23	1	9	64
Vadodara	69	22	7	7	105
Anand	43	22	-	-	65
Kheda	81	66	-	-	147
Ahmedabad	55	108	5	51	219
Grand Total	414	407	59	202	1,082
Percent	38.3%	37.6%	5.5%	18.7%	100.0%

Source: Census Survey Data, Sep-Dec 2014

1) Economic Status of PAHs

The following Table7.10-10 highlights the state recognized economic status of the PAHs. 359 (33%) PAHs in the project areas are below the Poverty line whereas 505 (47%) PAHs are above the poverty line. Rest of the families 218 (20%) couldn't give a clear answer regarding their

economic status.

Table 7.10-10 Economic Status of PAHs

District	BPL	APL	Don't know	Grand Total
Thane	3	24	23	50
Palghar	71	40	82	193
Dadra Nagar Haveli	1	3	-	4
Valsad	32	61	2	95
Navsari	25	19	10	54
Surat	36	27	23	86
Bharuch	27	37	-	64
Vadodara	14	63	28	105
Anand	25	30	10	65
Kheda	64	70	13	147
Ahmedabad	61	131	27	219
Grand Total	359	505	218	1,082
Percent	33.2%	46.7%	20.1%	100.0%

Source: Census Survey Data, Sep-Dec 2014

2) PAHs as Beneficiary of Antyodaya and Annapurna Schemes

Survey also attempted to identify such families who are vulnerable and recognized by the state through food security schemes support. Information given in Table 7.10-11 identifies the status of PAHs in the project areas regarding their beneficiary status related to Antyodaya and Annapurna schemes. Only 60 (5.5%) PAHs have Antyodaya and 30 (2.7%) PAHs have Annapurna Card. Highest concentration of Antyodaya beneficiaries (among PAHs) was reported in Palghar (20 PAHs); a district having high tribal population in two of the project affected talukas (sub-districts).

Table 7.10-11 PAHs having Antyodaya and Annapurna Card

District	Antyodaya Beneficiary PAHs		Annapurna Beneficiary PAH		Grand Total
	Yes	No	Yes	No	
Thane	1	49	1	49	50
Palghar	20	173	4	189	193
Dadra Nagar Haveli	-	4	-	4	4
Valsad	4	91	1	94	95
Navsari	5	49	6	48	54
Surat	2	84		86	86
Bharuch	2	62	-	64	64
Vadodara	8	97	13	92	105
Anand	5	60	1	64	65
Kheda	5	142	3	144	147
Ahmedabad	8	211	1	218	219

Grand Total	60	1022	30	1,052	1,082
Percent	5.5%	94.5%	2.8%	97.2%	100.0%

(Note) Antyodaya is food security scheme for poorest of poor category families by the government while Annapurna is another food security scheme for old and infirm elderly people with no family support.
Source: Census Survey Data, Sep-Dec 2014

(4) Marital Status, Literacy Levels and Occupation of PAPs

1) Marital Status

Information collected about 5,404 PAPs in the survey suggests that 2234 (41.3%) persons are single and 2939 (54.4%) persons are married. A small number (0.1%) is divorced. 226 PAPs are widow/widower. In Vadodara district, 274 persons are married whereas 190 persons are single whereas one can find 58 numbers of widow/widowers in district Ahmedabad.

Table 7.10-12 Marital Status of PAPs

District	Single	Married	Divorced	Widow/Widower	Grand Total
Thane	96	106	-	6	208
Palghar	482	442	-	18	942
Dadra Nagar Haveli	7	10	-	1	18
Valsad	163	242	-	26	431
Navsari	94	166	-	13	273
Surat	162	224	-	24	410
Bharuch	101	207	-	16	324
Vadodara	190	274	-	6	470
Anand	148	182	-	19	349
Kheda	258	484	2	39	783
Ahmedabad	533	602	3	58	1,196
Grand Total	2,234	2,939	5	226	5,404
Percent	41.3%	54.4%	0.1%	4.2%	100.0%

Source: Census Survey Data, Sep-Dec 2014

2) Educational Status

Education level of the affected population is presented in the Table7.10-13 given below. Among the affected population 1,183 (21.9%) have received no kind of education, 1,311 (24.3%) have not completed elementary school, 712 (13.2%) of PAPs have completed elementary school, 729 (13.5%) have completed Class 10 level, and 289 (5.2%) has completed graduation. In District Valsad, 71 persons don't have formal education whereas 55 persons have finished college in district Vadodara. Districts like Palghar (29.65) and Ahmedabad (27.6%) have relatively higher percentage of persons in the category of no education in comparison to other districts.

Table 7.10-13 Educational Status of PAPs

District	Too young for school		No Education		Below Elementary		Completed Elementary		Below High School		Completed High School		Not completed college		Finished College		Grand Total
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	
Thane	16	7.7	45	21.6	51	24.5	10	4.8	13	6.3	27	13.0	10	4.8	36	17.3	208
Palghar	106	11.3	279	29.6	196	20.8	63	6.7	81	8.6	171	18.2	21	2.2	25	2.7	942

Dadra Nagar Haveli	-	-	-	-	5	27.8		0.0	1	5.6	4	22.2	2	11.1	6	33.3	18
Valsad	32	7.4	71	16.5	104	24.1	40	9.3	45	10.4	94	21.8	20	4.6	25	5.8	431
Navsari	19	7.0	38	13.9	79	28.9	35	12.8	31	11.4	39	14.3	12	4.4	20	7.3	273
Surat	43	10.5	59	14.4	111	27.1	50	12.2	51	12.4	54	13.2	19	4.6	23	5.6	410
Bharuch	27	8.3	43	13.3	40	12.3	38	11.7	59	18.2	69	21.3	14	4.3	34	10.5	324
Vadodara	36	7.7	81	17.2	82	17.4	76	16.2	57	12.1	68	14.5	15	3.2	55	11.7	470
Anand	11	3.2	73	20.9	92	26.4	60	17.2	34	9.7	54	15.5	12	3.4	13	3.7	349
Kheda	64	8.2	164	20.9	218	27.8	138	17.6	89	11.4	64	8.2	13	1.7	33	4.2	783
Ahmedabad	103	8.6	330	27.6	333	27.8	202	16.9	111	9.3	85	7.1	13	1.1	19	1.6	1,196
Grand Total	457	8.5	1,183	21.9	1,311	24.3	712	13.2	572	10.6	729	13.5	151	2.8	289	5.2	5,404

Source: Census Survey Data, Sep-Dec 2014

3) Primary Occupation of PAPs

Occupation-wise distribution of affected persons in the project area is presented in Table 7.10-14. 527 (9.7%) out of the 5,404 PAPs are dependent upon Agriculture, whereas 420 PAPs (7.8%) are Unskilled Labor, 203 (3.75%) are engaged in Business/Trade and 36 PAPs (0.7%) are from Household/Cottage Industry. Only 195 PAPs (3.6%) are from Private Sector and a meagre 31 PAPs (0.6%) are Govt. Servants.

Table 7.10-14 Primary Occupation of PAPs

District	Agriculture	Allied Agriculture	Dairy	Forestry	Household/ Cottage Industry	Business/ Trade	Skilled Profession	Un-skilled Labour	Pvt. Service	Govt. Service	Retired/ Pensioner	Unemployed but capable to work	Too Young/ Disabled	Others	Grand Total
Thane	2	-	-	1	-	27		6	5	-	-	4	84	79	208
Palghar	122	8	1	15	8	42	43	38	33	2	-	-	403	227	942
Dadra Nagar Haveli	2	-	-	-	-	3	-	-	-	-	-	-	7	6	18
Valsad	56	1	-	2	4	27	26	9	16	1	8	6	142	133	431
Navsari	28	12	-	-	1	12	12	31	7	1	3	4	76	86	273
Surat	4	12	-	-	15	19	10	31	32	4	10	-	150	123	410
Bharuch	53	30	-	1	2	2	3	17	15	2	-	3	94	102	324
Vadodara	17	3	-	3	1	30	20	35	35	12	6	84	143	81	470
Anand	61	7	9	-	2		4	16	3	1	5	8	137	96	349
Kheda	175	22	4	1	3	22	9	16	6	2	4	49	257	213	783
Ahmedabad	7			1		19	50	221	43	6	10	11	504	324	1,196
Grand Total	527	95	14	24	36	203	177	420	195	31	46	169	1997	1,470	5,404
Percent	9.8%	1.8%	0.3%	0.4%	0.7%	3.8%	3.3%	7.8%	3.6%	0.6%	0.9%	3.1%	37.0	27.2	100.0

													%	%	%

Source: Census Survey Data, Sep-Dec 2014

(5) Income and Expenditure Dimensions of PAHs

1) Income Dimension

Information collected during Census survey on income level of each PAH indicates of mixed income category households. It can be seen from Table 7.10-15 that out of total 1,082 PAHs, about 225 (21%) PAHs of total PAHs are earning less than Rs. 5,000 per month, whereas only 120 (11.1%) PAHs are earning more than Rs. 20,000 per month. Nearly two fifth of the PAHs have monthly income in Rs. 5,000-10,000 range.

Table 7.10-15 Monthly Income of PAHs

District	Less than 5,000 INR	5,000 -10,000	10,000 -20,000	20,000 -50,000	50,000 -1 Lakh	More than 1 Lakh	Grand Total
Thane	8	13	8	6	12	3	50
Palghar	34	120	31	8	-	-	193
Dadra Nagar Haveli	-		1	1	1	1	4
Valsad	20	34	32	5	3	1	95
Navsari	14	29	9		2	-	54
Surat	23	31	26	4	2	-	86
Bharuch	17	17	19	10	1	-	64
Vadodara	17	22	45	9	9	3	105
Anand	19	22	16	4	1	3	65
Kheda	37	43	48	12	5	2	147
Ahmedabad	36	112	59	11	-	1	219
Grand Total	225	443	294	70	36	14	1,082
Percent	20.8%	40.9%	27.2%	6.5%	3.3%	1.3%	100.0%

Source: Census Survey Data, Sep-Dec 2014

2) Expenditure Dimension

Information collected on expenditure pattern among PAHs indicates that out of total 1,082 PAHs, around 380 (35%) of PAHs of total PAHs are spending than less than Rs. 5,000 per month, whereas only 7 (0.7%) PAHs are spending more than Rs. 1 Lakh per month.

Table 7.10-16 Monthly Expenditure of PAHs

District	Less than 5,000 INR	5,000 -10,000	10,000 -20,000	20,000 -50,000	50,000 -1 Lakh	More than 1 Lakh	Grand Total
Thane	17	10	6	12	5	-	50
Palghar	71	96	22	3	-	1	193
Dadra Nagar Haveli	-	-	1	2	1	-	4
Valsad	26	45	18	2	3	1	95
Navsari	22	22	8	-	2	-	54

Surat	36	30	17	2	1	-	86
Bharuch	26	15	14	9		-	64
Vadodara	23	37	27	11	6	1	105
Anand	31	24	6		1	3	65
Kheda	53	46	33	10	4	1	147
Ahmedabad	75	103	35	5	1	-	219
Grand Total	380	428	187	56	24	7	1,082
Percent	35.1%	39.6%	17.3%	5.2%	2.2%	0.6%	100.0%

Source: Census Survey Data, Sep-Dec 2014

7.10.5 Eligibility Policy and Entitlement Matrix

The Entitlement Matrix provides category-wise details regarding the entitlements in relation to the Compensation and R&R principles listed above. This also forms the basis of strategy and other specificities detailed on 'Relocation, Resettlement and Income Restoration.

Table 7.10-17 Entitlement Matrix

Item No.	Type of loss	Entitled Persons (Beneficiaries)	Entitlement (Compensation Package)	Implementation issues/Guidelines
1	Loss of homestead, commercial, Agriculture land, pond, ditches and orchards etc.	Legal owner(s) of land	i. Land Compensation will be done at replacement cost	a. An independent evaluator will be engaged by the land acquiring authority/ project proponents to ascertain prevailing market rate/replacement cost for land lost. b. Market rate as recommended by independent evaluator and agreed by the project proponents/ MOR and the state government will be shared through public meetings before actual act of acquisition. c. Option of purchase of unviable land holding will be given to PAHs. d. In case of unclear or disputed titles too, compensation will be at replacement value and PAH will be treated at par with titleholders but upon resolution by court or consensus e. All fees, taxes and other charges, as applicable under the relevant laws, incurred in the relocation and resource establishment, to be borne by the project
2	Loss of Crops	Legal owner/ grower/ socially recognized owner/ Tenants/ sharecropper/ lessee/ unauthorized occupant of land	i. Compensation for standing crops in case forced relocation @market value and cost of replacement of seeds for next harvest	a. Advance 3 months notice to harvest standing crops/take away crops b. Assessment of market value for various crops and seed varieties to be done by independent evaluator in consultation with District Agriculture Office c. All tenants and sharecroppers will be identified during the detailed census survey exercise. d. Compensation will be paid prior to

				land acquisition and upon certification of compensation receipt by PAHs e. Cash compensation if received for crop loss will be shared between Owner and tenants in a manner similar to agreed sharecropping terms between the two parties. In case of disputes, final resolution will be done district level land acquiring and compensation body, relying on opinion of local elected representative (PRIs) of the area.
3	Loss of Trees/ Perennials/ fish stock	1. Person with Legal Ownership of the land 2. Socially recognized owner	i. Compensation at "replacement value"	a. Compensation for perennial crops, trees, ponds will be calculated as annual produce value multiplied by remaining life of the tree/ponds. b. For trees of timber value, the compensation will be as per market value tree's timber value c. Owners will be allowed to fall the tree (within a stipulated time frame and at least with 3 month's advance notice) and salvage the material
4	Loss of residential /commercial structure by owner(s)/ squatters	Legal Owners or squatters	i. Compensation at replacement cost for structures ii. Resettlement Allowance to all displaced @ INR 50,000 per PAH iii. Transportation Allowance @INR 50,000 per PAH iv. Assistance for Petty Shop/Cattle Shed Construction @ INR 25,000 per structure	a. Replacement cost to be established by independent evaluator appointed by land acquiring body/project proponents b. Compensation to be provided to both owners and squatters and before acquisition of land and the structures c. Option of self-relocation or relocation at the resettlement site (house with developed infrastructure) or a free plot of land and construction allowance (at market rate) Option/provision of a) shop/establishment at commercially viable location within easily accessible distance OR b) commercial plot with construction cost (at market value) OR option of self-relocation with one time compensation d. Resettlement Allowance to all displaced e. Assistance in house construction (for those who opt for self-relocation) f. Right over salvageable material g. Transportation/shifting allowance h. Assistance/Allowance for construction of petty shops, cattle shed etc. i. In case of unclear or disputed titles too, compensation will be at replacement value and PAH will be treated at par with titleholders but upon resolution by court or consensus j. All fees, taxes and other charges, as

				applicable under the relevant laws, incurred in the relocation and resource establishment, to be borne by the project/waived off.
5	Loss of access to Residential houses/ commercial structures (tenants/lease holder)	Tenants of rented/ leased properties	i. Transportation and Shifting Allowance @ INR 50,000 per PAH ii. Resettlement Allowance @INR 50,000 per PAH	a. R&R assistance in terms of both transportation of household/ commercial goods housed in the structure impacted b. Additional resettlement allowance will be paid to tenants/lease holder c. Identification of tenants will be established through census survey conducted prior to acquisition. d. Advance 3 months notice will be served to tenants/lease holder as well
6	Loss of business/ loss of income and work days due to dislocation/displa cement	Owner/operator of the business as per census survey	i. One time assistance against employment, business loss, annuity @ INR 500,000 to all PAH losing livelihoods/business or employment to a PAH member in job created by project (upon skill building) ensuring minimum wages in force or annuity of not less than INR 2000 per month to PAH for 20 years ii. Additional Subsistence Grant @ INR 36,000 per PAH (economically displaced) iii. Grant to artisan and small traders/kiosk owners @INR 25,000	a. Assistance for loss of income/business/livelihood to be provided to all PAHs as identified during census survey b. PAHs will be provided choices of employment, annuity or one time assistance and will be free to opt for any c. Assistance in construction (for those who opt for self-relocation) d. Training for up gradation of skills
7	Poor and vulnerable households	Poor and vulnerable households as identified during census survey	i. All of compensation and assistance as mentioned above ii. Additional assistance to SC and ST families @ INR 50,000 per PAH	a. In case of displacement in Scheduled Areas, as far as possible, affected ST (tribal) families will be relocated in similar ecological zone b. Preference will be given to SC, ST and other vulnerable families for 'land for land' based compensation (land availability with government may be limited to meet compensation requirements), employment opportunities, relocation sites etc. c. Skill training and up gradation by R&R implementing agency
9	Loss of Common Property Resources	Affected Common Property Resources (Mosque, school,	i. Replacement cost as grant for shifting/reconstructio	a. Restoration of affected community buildings and structures to at least previous condition, or replacement of

		community infrastructure etc.)	n of structures Or shifting/ reconstruction of the property by Project ii. Assistance for reconstruction/restoration of properties/resources iii. Provision of alternate access to common properties/resources if access is permanently severed	the structures/ sites in consultation with the community, and following their preferred process. b. Loss of fodder to be compensated by supporting/ growing fodder in common area/ and private agricultural field. c. Reconstruction or restoration to managed by local committee- to be identified by R&R implementing NGO or as designated by acquiring body. d. Ensure that access to common properties/resources is maintained through provision of adequate underpasses/foot over bridges both PAPs, cattle etc.
10	Temporary impact during construction	Community / Individual	i. The contractor shall bear the cost of any impact on structure or land due to movement of machinery and in connection with collection and transportation of borrow materials. ii. Ensuring alternate access options in case of temporary severance with properties/ resources or in communication iii. All temporary use of lands outside proposed CoI to be through written approval of the landowner and contractor. iv. Land will be returned to owner rehabilitated to original preferably better standard	a. Community people should be consulted before starting of construction regarding air pollution, noise pollution and other environmental impact b. The laborers in the camp would be trained about safety measures during construction, aware of health safety, STDs, safe sex etc. The contractor shall ensure first aid box and other safety measures like condoms at construction site. c. Alternate access options will be provided in cases of temporary severance e.g. alternate temporary roads where existing road is closed for construction reasons.

Source: Study Team

(1) Cut-off Date

Cut-off date shall be the following:

- This refers to the date prior to which the project affected family was in possession of the immovable or movable property within the affected zone. For titleholders, it is the date on which the Notification is issued as per Section 20A of the Railways (Amendment) Act, 2008.
- In cases where people lack title, the cut-off-date shall be the date of start of the census survey.
- Compensation to the assets built or occupied after the announcement of cu-off date shall

not be made.

(2) Replacement Cost Survey

A market/replacement cost survey (RCS) was carried out using collection of data/information from both secondary sources and primary sources (direct interviews with people in the affected areas, material suppliers, house contractors, local governments), and from both those affected and those not affected. The objective of this survey was to get an understanding of the prevalent replacements value for assets (immovable) impacted by the project. The cost estimation exercise for the impacted structures was based on physical onsite visit to sites, video and still images captured. Based on the above evidences, the cost assessment was done first by classifying each of the structures/assets in to appropriate categories (discussed below) and assigning an estimated rate and area/extent of impact to the structure (based on google map synced alignment (proposed) of the HSR corridor. Details are presented in Annexure 8-1 Methodology Note for Cost Estimation of Impacted Structures, RAP.

(3) Site Selection

The locations have not been planned or identified for the development of any resettlement sites. The section below discusses the site selection criteria/parameters for the planning and development of resettlement sites.

Table 7.10-18 The Site Selection Criteria/Parameter

Item	Criteria for Site Selection
Location	The selected site should be located as close as possible to the last place of residence of the affected family/household. It should be located closer to the main activity center and social networks of the affected family/area. The site should be well connected with roads and other infrastructure/ amenities. *PAHs in Ahmedabad, for instance during the stakeholder meetings, have demanded for resettlement in the same area, citing their minority status.*
Land	The land area should be; a) free of any encumbrance/encroachments; b) have clear legal title ship; c) adequate/sufficient to house families and associated infrastructure/amenities and d) developed (land development) prior to any creation of new infrastructure. In all, the site should be suitable for habitation/living.
Infrastructure/ access to services:	The resettlement site should have the following infrastructure/amenities ➢ Connectivity and access to main roads ➢ Internal roads ➢ Source of drinking water; ➢ Medical facilities (Either a Health center at the site or in close vicinity) ➢ School: (Either a school at the site or in close vicinity) ➢ Access to Electricity ➢ Connectivity to nearby market ➢ Proper Sanitation arrangements; ➢ Playground and Balwadi; ➢ Temple/mosque or religious structure (based on the profile of the residents); ➢ Open area

Source: Chapter 6.2.1 RAP

(4) Income and Livelihood Restoration Strategy

Income and livelihood restoration strategies for the project will be built around the principle of empowering people/affected communities by providing training and capacity building support

and by enabling them to start their own enterprise by providing seed capital. The end objective of these strategies/programmers would be to provide sustainable income and livelihoods, enabling them to not only sustain but also better their standards of living. Means of employment are limited, especially in rural areas; as a result people migrate to cities and towns in search of jobs. However, there are possibilities of a number of business ideas/ ventures which can be started in rural areas with low budgets, such as pottery, agro-business, fisheries, saloon etc. A few business ideas, which require good management skills, a little effort and hard-work, could be started by the affected persons. Interested people may avail loans from the banks to buy the equipment's. The section below provides an indicative list of business options below which involves small investments to start and can be profitable if run efficiently.

1) Sale of mobile and prepaid cards business

The Project could encourage affected persons to start a business of mobile and prepaid cards which can prove to be profit making business. The Project could also provide seed money to interested persons to start this business.

2) Grocery shop/store business

Setting-up grocery shop/store especially in rural areas could be one of the most lucrative business ideas. The products have to be organized in the store so that customers feel easy and comfortable to shop. One could purchase the products from the wholesale market or directly from the manufacturer.

3) Dairy Farm business in rural area

Milk and milk products have a great demand in every part of the country. Small scale dairy farm could be put together to produce and sell milk, curd etc., which could be sold in the village and nearby areas. Residents could be encouraged to form cooperative dairy farming. Contrarily, if there are big dairy companies in the nearby areas, these local residents could sell the milk to these industries and make profits.

4) Tailoring

Tailoring business can be started by any person (male or female) who is interested in stitching clothes. A little training and tailoring skills can help to set-up a tailoring shop. There are many institutes which offer certification and short term course in tailoring, stitching and embroidery. The Project could sponsor interested person to join these courses. The tailoring business can be started from home. There are many government schemes, which provide financial assistance to help people living in rural areas to start the business

5) Tea stall/ Sweet shop business

Affected people who have interest could be helped in setting-up a tea stall or sweet shop could be a good business idea. Tea is consumed by all strata of the society, where people gather at places/ stalls that serve tea along-with some snacks. Thus, people with expertise in making different kind of Pakoras and tea; the tea stall business could run efficiently and profitably

6) Motor mechanic and puncture shop

Puncture and motor repair shop can be started by any person who is interested; a little training can help to set-up a puncture and repair shop. There are institutes which offer certification and short term course in motor vehicle mechanics. The Project could sponsor interested person to join these courses. There are many government schemes, which provide financial assistance to help people living in rural areas to start the business.

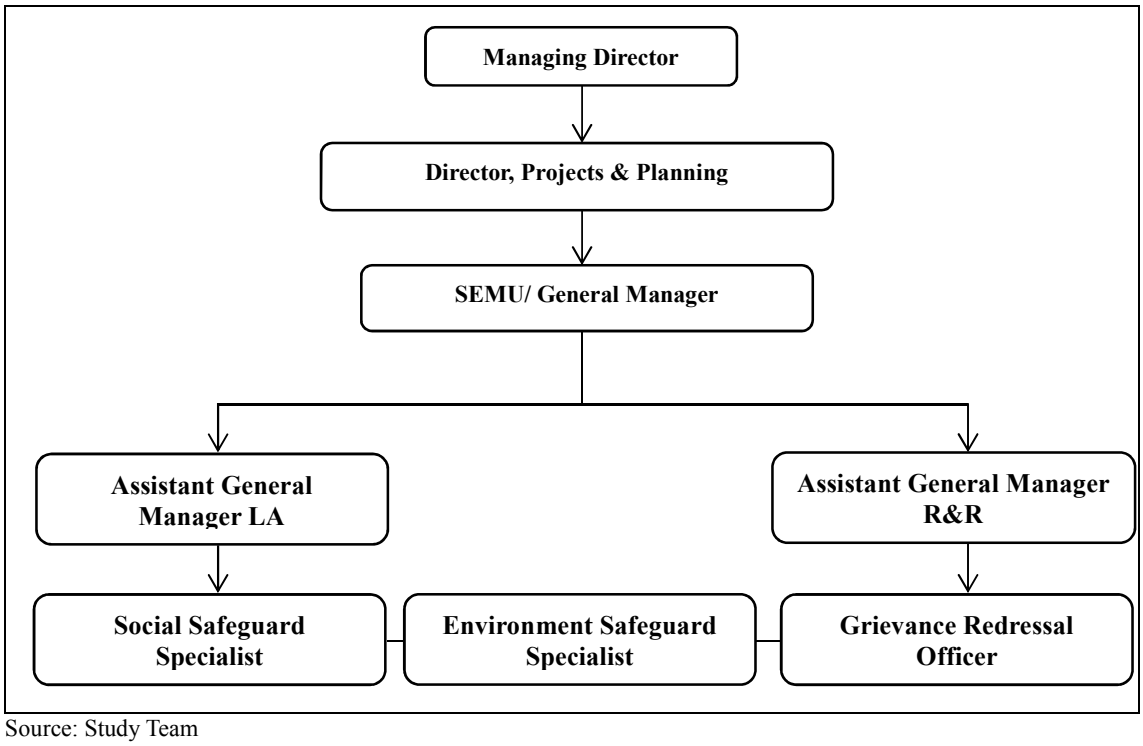
7) Domestic appliances repair shop

Domestic appliances repair shop can be started by any person who is interested. There are institutes which offer certification and short term course in domestic appliances repair. The Project could sponsor interested person to join these courses. The domestic appliances repair business can be started from home. There are government schemes, which provide financial assistance to help people living in rural areas to start the business.

7.10.6 Implementation Organization

Overall, RVNL and HSRC formed under the MOR would be responsible for technical planning, executing and implementing the project. It is envisaged that a Social & Environmental Management Unit (SEMU) would be constituted at the company (RVNL/HSRC) level to oversee and implement the environment and social safeguard measures (SEMU). This SEMU, headed by a senior level personnel (General Manager or above) would be tasked with managing land acquisition and rehabilitation and resettlement process for the project. RVNL/HSRC headed by Managing Director, will have overall responsibility for policy guidance, coordination and planning, internal monitoring and overall reporting of the project. SEMU would facilitate land acquisition and compensation, relocation and resettlement, and the distribution of assistance for the PAPs. The main responsibility of SEMU would be monitoring and implementing all resettlement and rehabilitation activities, including land acquisition.
At the field level the Chief Project Manager's (CPM) office would coordinates the safeguard management and plan and execute the land acquisition and resettlement activities. The CPM will be supported by operational staff at headquarters and by field staff, supported as necessary by consultants who will work together to implement the RAP.

(1) At the Headquarter Level

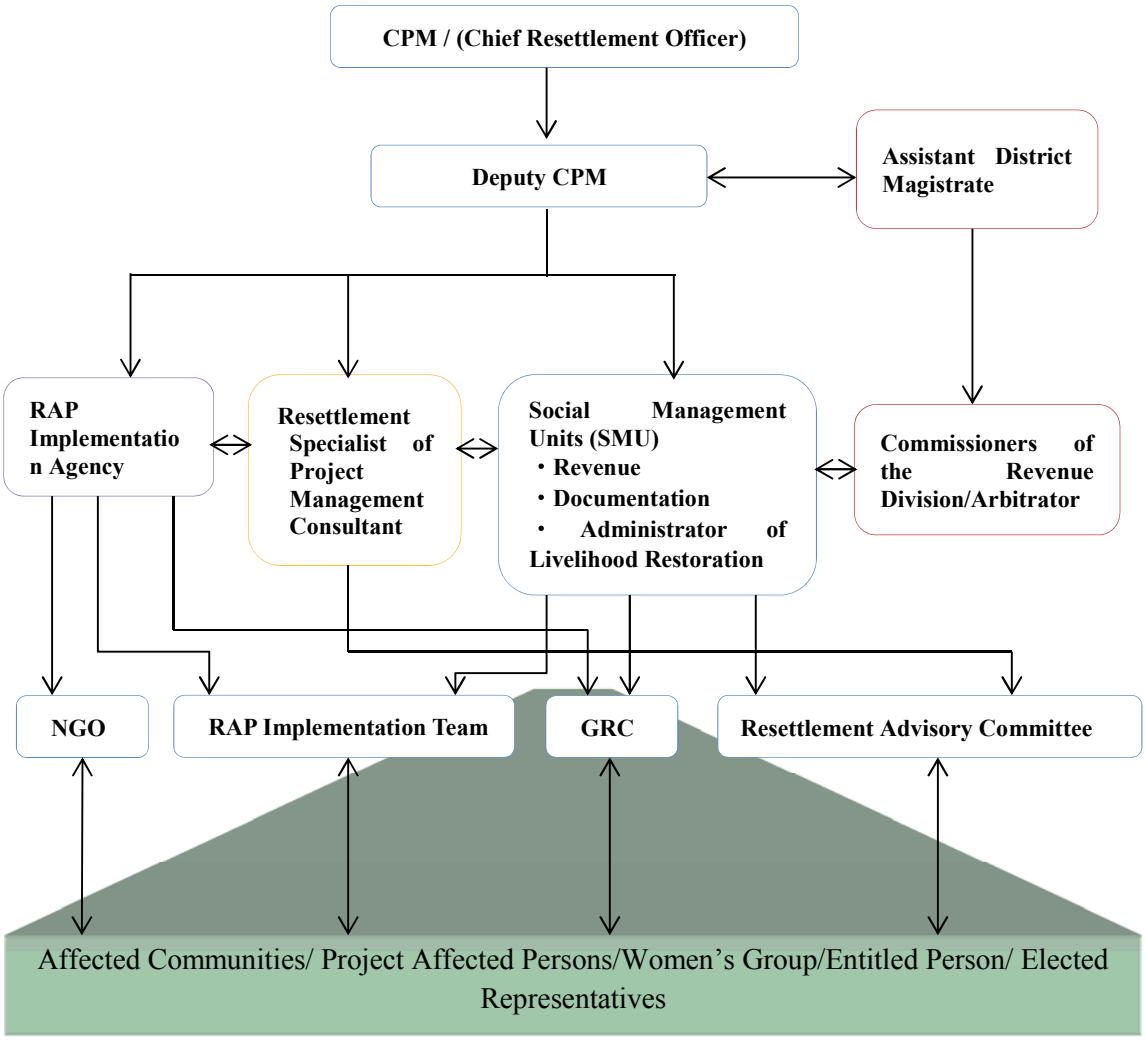


Source: Study Team

Figure 7.10-1 Roles and Responsibility of Resettlement officials at Headquarter Level

(2) At the Field Level

The CPM will act as the Chief Resettlement Officers (CRO) in-charge of planning and implementation of the LA and R&R program. He will be assisted by a Deputy Chief Project Manager (Dy CPM if necessary and required) and Assistant Project Managers (APMs) as required and necessary. The CPM will take guidance and directions from SEMU in policy matters related to Land Acquisition and Resettlement and Rehabilitation. Social Management Units (SMUs) will be established and headed by the APMs reporting to the CRO. The SMU will be provided with additional support to manage the whole process of land acquisition and resettlement. To this effect revenue officers (either in service or retried), documentation and data management operators will be additionally provided. Necessary infrastructure (like computers, printers, phone, office space and utilities etc.) will be provided to this team for efficient and smooth functioning and performance of duties. A RAP Implementation Team also proposed to support and guide the CPM office/team and help in strategic planning/implementation of activities.



Source: Study Team

Figure 7.10-2 Roles and Responsibility of Resettlement officials at Headquarter Level

(3) Grievance Redress Committee

A two-stage public grievance redress mechanism will be established with two grievance

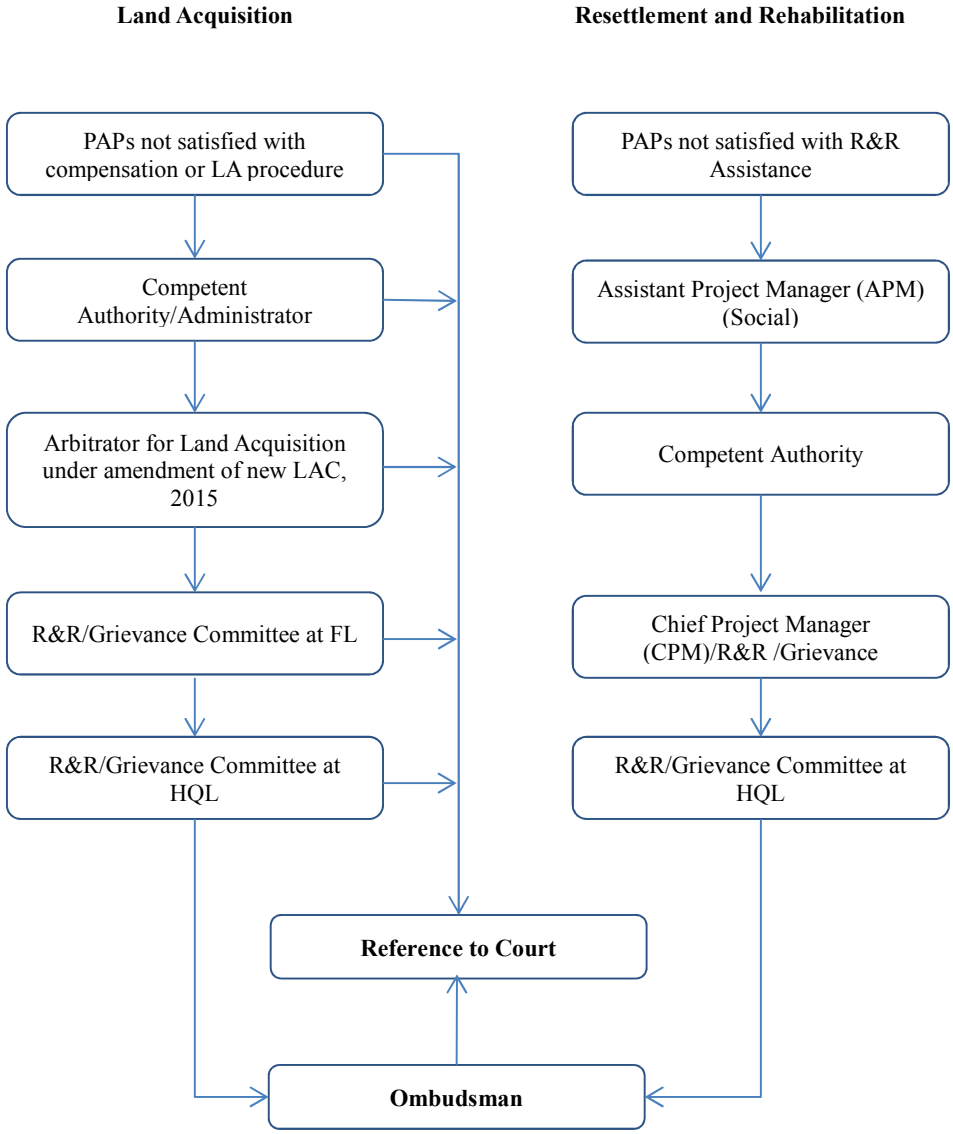
committees operating at the field and HSRC levels, and with an Ombudsman. Safeguard quality monitoring will be carried out by third party consultants (Social and Environmental Safeguards Monitoring Review Consultants).
Grievance Redress at the Field Level: There shall be a Resettlement and Rehabilitation Committee convened by the Chief Project Manager, which will comprise the following:

- District Collector of the concerned District, or his nominee;
- Concerned Competent Authority/Administrator (R&R);
- Concerned Assistant Project Manager-Social;
- Zillah Parishad Chairperson/his or her nominee and
- Representative from civil society/ a reputed local NGO.

Grievance Redress at Project Level: There shall be a Resettlement and Rehabilitation Committee convened by the General Manager (SEMU), which will comprise the following:

- Director (Project Planning)
- Deputy General Manager-Grievance
- Social Specialist
- Representative of the MOR

Following Figure 7-10.3 illustrates Grievance Redress Mechanism.



Source: Study Team

Figure 7.10-3 Grievance Redress Mechanism

The form and manner in which and the time within which complaints may be made to the Ombudsman will be discussed and formulated in D/D stage among related authorities/persons.

(4) Women Groups in Resettlement Process

The impacts of Land Acquisition and Resettlement & Rehabilitation, as has been assessed/ proven in different research studies done nationally/globally are more pronounced amongst women groups. Typically in the context of the project/Indian scenario land holdings, financial and decision making are largely concentrated amongst the males in the family. This results in compensation and entitlement benefits (like land compensation) not reaching to the women members in the family. The entitlement matrix/framework for the project takes cognizance of this existing disparity/vulnerability and attempts to make the benefit allocation process and outcome more inclusive. Several measures have been proposed and are envisaged to ensure that gender issues are duly and addressed in the implementation process, including strengthening's

women's participation in livelihood activities and in implementation for the RAP

These include (and are not limited to):

- Special benefits for women in the entitlement matrix for the project (like vulnerability allowance, customized training/skill building support etc.);
- Issuance of payments/cheque in the name of both husband and wife;
- Consultation requirements with women groups in the planning and implementation of R&R and livelihood restoration measure;
- Ensuring that qualified women personnel are part of the SMU/advisory/SEMU/NGO teams;
- Special provisions in the grievance process/mechanism to collect complaints/concerns of women groups;

(5) Appointment of RAP Implementing Agency (IA)

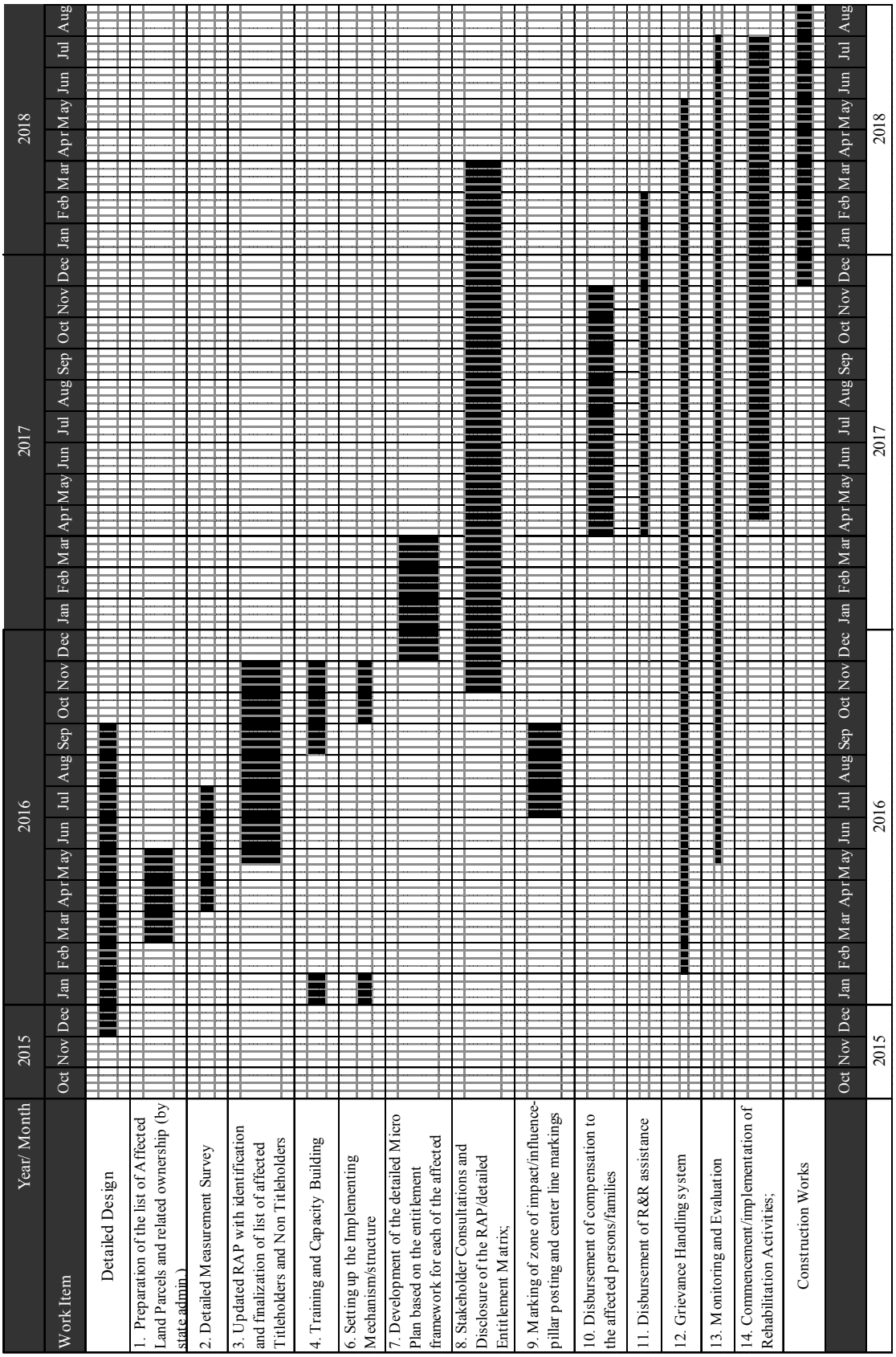
SEMU will appoint an experienced NGO or local consultant firm through standard procurement system. This firm will be appointed for implementation of the RAP in the field level in coordination with RAC, GRC, NGO and Resettlement Specialist of Project Management Consultant. TOR for RAP Implementation Agency refers to Appendix-II.

7.10.7 Implementation Schedule

The implementation schedule will be finalized considering possible changes of events during the project implementation period of the project. The APs will be paid their resettlement cash payments independent of legal compensation before their relocation and payments related to award of compensation by RVNL/HSRC.

The preliminary time bound implementation schedule over a period of 30-32 months from January 2016 (with setting up of Implementing Mechanism and Grievance Redress Mechanism) to July/August 2018 has been provided below. The RAP activities (micro planning, verification of census survey data, assessing losses, institution identification, affected person participation, relocation and income restoration etc.) have been scheduled and summarized with the project implementation. It may also be noted that the RAP implementation agency will be required to establish its grievance redress team much earlier, as much of the grievances that will pertain to land records will crop up as early as in January 2016 during finalization of land plots and associated families affected by land acquisition. However, sometimes sequence may change or delays witnessed due to circumstances beyond the control of the Project. This implementation schedule will be finalized considering possible changes of events during the project implementation period.

Table 7.10-19 RAP Implementation Schedule



7.10.8 Resettlement and Compensation Costs & Budget

(1) Asset Inventory and Assessment of Losses

A total of 1,681 structures, in 207 villages, are identified to be potentially affected by the HSRC project These include residential structures such residential building block (leading to displacement), and other independent structures such as boundary wall, detached bathroom, hand pump, cowshed etc. and commercial structures such as shops, workshops, god owns, warehouse etc. District wise distribution of affected structures is presented in Table 7.10-20.
Out of the 1,684 affected structures 50% of these are found to be in three districts i.e. Palghar, Ahmedabad & Valsad. Two villages Tralsi and Telod under Bharuch district account for 78% of total affected structures in the district, In Kheda district, and 54% of the total affected structures are found to be in four villages i.e. Degam, Bavra, Gothaj & Chhapra. Two villages of Surat district, Kumvarda & Kimamli account for 43% of the district's total. In Vadodara district, 35% of the district's total affected structures are reported from Chhani. In addition, while land based data and related agriculture data has not been collected in detail during the survey, limited information on crop cultivation was collected from a representative sample of 224 PAHs (selected randomly) as part of socio economic survey component.

Table 7.10-20 District wise Count of Affected Structures

District	No. of Structures	Percentage
Ahmedabad	232	13.8
Kheda	169	10
Anand	90	5.3
Vadodara	150	9
Bharuch	116	7
Surat	151	9
Navsari	97	5.8
Valsad	205	12
Dadra Nagar Haveli	11	0.69
Palghar	383	22.7
Thane	79	4.7
Mumbai	1	0.01
Grand Total	1688	100

Source: IOL Survey Data, Sep-Dec 2014

(2) Affected Residential and Commercial Structures: Type, Structure Pattern, Roof and Wall Types

Out of 1688 structures, a total of 1467 residential structures (87%) are likely be affected by HSRC project. As provided in the Table 7.10-21 below, 1,186 (81%) of these are residence building blocks, about 15% of these residential structures are house fence, detached kitchen, bathroom, farm house, cattle shed, water storage units. Remaining 55 (4%) of the affected structures are other residential structures.

Table 7.10-21 Type of Affected Residential Structures

District	Residence	House Fence	Detached Kitchen	Detached Toilet	Detached Bathroom	Farm House	Cattle Shed	Pond	Well	Water tank	Irrigation Bore well	Tube well	others	Grand Total
Mumbai														
Thane	40	3	2	1			1		2				2	50
Palghar	280	13	1	4	8	1	7		2	1	3	5	16	341
Dadra Nagar Haveli	4	1							1			1		7
Valsad	112	5		1	4	3	2		7	1	2	17		154
Navsari	69	4		2		2	5		3	1	1	7	4	98
Surat	94	10			1	12	2				4	1	15	139
Bharuch	81	7			8		2			1	6	2	6	113
Vadodara	103			2	1		1				3		8	118
Kheda	58			1	1		2	4			3	4	1	74
Anand	126			1	1	2	1	1			8	6	3	149
Ahmedabad	219						1		2		1			223
Grand Total	1,186	43	3	12	24	20	24	5	17	4	31	43	55	1,467
Percentage	80.8	2.9	0.2	0.8	1.6	1.4	1.6	0.3	1.2	0.3	2.1	2.9	3.7	100.0

Source: IOL Survey Data, Sep-Dec 2014

Out of 1688 affected structures, 216 and 5 structures are identified as commercial and residential cum commercial structures respectively, constituting 13% of the total affected structures. The commercial structures are mainly shops, factories, god owns and other business establishment types. Out of 221 commercial structures 40%, 24% and 14% are shops, factories and other business establishment respectively. Palghar (Vasai taluka), Valsad, Thane and Vadodara have maximum number of impacted commercial structures.

Table 7.10-22 Type of Commercial & Residential cum Commercial Structures

District	Shop	Workshops	Stalls	Factories	Godown	Other Business Establishment	Residential Cum Commercial	Grand Total
Mumbai						1		1
Thane	2	1		7	18	1		29
Palghar	30			15		1	1	47
Dadra Nagar Haveli	1			3	1	1		6
Valsad	33	4		8	2	8	1	56
Navsari	1			2	1	1		5
Surat	4			5	3	1		13
Bharuch	1			1	1	1		4
Vadodara	14	1	4	3		2		24
Anand		1		1	5	4		11
Kheda				7	1	8		16
Ahmedabad	3			2	1		3	9
Grand Total	89	7	4	54	33	29	5	221
Percentage	40.3	3.2	1.8	23.5	14.9	14.0	2.3	100.0

Source: IOL Survey Data, Sep-Dec 2014

(3) Affected Land

HSRC project construction would essentially involve building of tracks, developing of other associated facilities such as stations, depots for maintenance and workshops etc. Various type track structures are proposed under the project namely as Cut Section, embankment, river bridge, tunnel, and viaducts, each requiring a specific minimum Cross Section Width (CSW). For the purpose of RAP preparation, this technical structural width is considered as ROW for the project (and this may be liable to change at design finalization stage later).

In the table below (Table 7.10-23), district wise length of various alignment structure types is presented.

Table 7.10-23 District Wise length of Different HSRC Alignment Structure Types

Districts	Cut Section (CSW*:22.2m)	Embankment (CSW: 32 m)	River Bridge (CSW:12 m)	Tunnel (CSW:12.6m)	Viaduct (CSW: 12m)	Grand Total
Mumbai				6,544.3		6,544.30
Thane	301.1	2,000.0	564.2	10,532.6	21,083.1	34,481.00
Palghar	11,900.0	68,682.7	2,119.4	10,071.6	22,293.9	1,15,067.60
Dadra & Nagar Haveli		979.0			1,291.2	2,270.20
Valsad	950.0	58,529.6	1,317.3	271.4	1,764.2	62,832.50
Navsari		25,896.0	558.4		10,206.3	36,660.70
Surat		25,670.2	548.6		15,192.4	41,411.20
Bharuch		55,291.2	458.1		7,044.0	62,793.30
Vadodara		39,225.7	108.8		19,620.9	58,955.40
Anand		23,173.3	542.9		1,811.6	25,527.80
Kheda		34,274.8	301.5		4,835.4	39,411.70
Ahmedabad		5,251.9	350.5		18,236.3	23,838.70
Grand Total	13151.1	338,974.4	6,869.8	27,419.9	123,379.4	509,794.60

Source: JIC Study Team
(Note) *CSW: Cross Section Width (of the structure type) , in metre
All length provided in metres

The total approximate area proposed for alignment between Mumbai-Ahmedabad corridor is 15,252,617.6 ㎡. Predominant tunnel construction will be in Mumbai and Thane. Viaduct construction will be in most of the districts and in its dense human settlement area (where the alignment passes) such as in Thane, Surat, Ahmedabad and Vadodara. The table following provides land acquisition area on account of alignment track construction and a brief overview of the land topography and settlement types in project affected districts. HSRC project will also require construction of associated facilities such as station and depots. Land acquired on this account along with area for alignment track structures provides the total land area that this project will require. As per the table below (Table 7.10-24), the project will have 12 stations, 7 maintenance depots, 2 depot & workshops and 2 confirmation car bases. Land area to be acquired for these associated facilities will be 1,659,143.20 square meter. The total project land requirement will be 16,911,760.80 square meters.

Table 7.10-24 Project Land Requirement

District	Associated HSRC Facilities						Alignment Area (㎡)	Grand Total Area (㎡)
	Station/ Depot	Station Area (㎡)	Maintenance Depot Area (㎡)	Depot & Workshop Area (㎡)	Confirmation Car Bases Area (㎡)	Total Area (㎡)		
Mumbai	Mumbai	33,961.50				33,961.50	142,423.90	176,385.40
Thane	Thane	26,109.50	55,177.90	3,24,415.5		405,702.90	585,164.30	990,867.20
Palghar	Virar	23,301.10				23,301.10	3,277,899.80	3,376,917.10
	Boisar	26,088.80	49,627.40			75,716.20		
Dadra Nagar Haveli							53,984.30	53,984.30
Valsad	Vapi	26,175.40	49,627.40			75,802.80	2,317,046.00	2,392,848.80
Navsari	Billimora	26,100.00			17,900.30	44,000.30	1,121,578.40	1,165,578.70
Surat	Surat	26,365.60	31,230.10			57,595.70	1,235,061.90	1,292,657.60
Bharuch	Bharuch	26,115.50	49,627.40			75,742.90	2,065,006.60	2,140,749.50
Vadodara	Vadodara	37,646.50	58,937.10			96,583.60	1,706,132.10	1,802,715.70
Anand							909,311.60	909,311.60
Kheda	Anand/ Nadiad	25,662.80			17,900.30	43,563.10	1,374,561.90	1,418,125.00
Ahmedabad	Ahmedabad	25,669.70				25,669.70	464,446.80	727,173.10
	Sabarmati	28,245.90		673,257.5		701,503.40		
Total		331,442.30	294,227.30	997,673.00	35,800.60	1,659,143.20	15,252,617.60	16,911,760.80
Percentage		2%	2%	6%	0%	10%	90%	100%

Source: JIC Study Team

(4) Tree and Crops Affected

District wise data on fruit trees identified during the tree census is mentioned in Table 7.10-25. As per data collected, out of 26,980 fruit bearing trees, 23,824 (88%) are mature fruit trees. Mango is the predominant fruit tree found along the corridor which is followed by Sapota (or Chikoo) trees. Out of total, 14,522 (54%) trees are Mango trees, 5,529 (20%) are Sapota trees and 4,205 (16%) are in others category which includes fruit bearing trees like Papaya, Date Palm, Almond, Pineapple, Litchi etc.

Table 7.10-25 Fruit Bearing Tree Census Data

	Total Fruit Tree							Mature Fruit Tree						
District	Tamarind	Blue Berry	Sapota	Coconut	Mango	Others	Total	Tamarind	Blue Berry	Sapota	Coconut	Mango	Others	Total
Mumbai	2	0	59	8	51	1	121	2	0	59	8	44	1	114
Thane	14	125	12	27	132	212	522	12	102	12	27	68	207	428
Palghar	416	98	871	829	2,386	3,111	7,711	403	98	839	739	2,143	2,931	7,153
Valsad	125	2	2,037	412	9,059	613	12,248	121	2	1,905	376	8,611	569	11,584
Navsari	21	1	2,400	115	1,598	15	4,150	21	1	1,320	109	1,157	15	2,623
Surat	27	7	52	115	199	12	412	22	7	45	97	180	12	363
Bharuch	123	2	30	44	108	23	330	111	2	30	40	44	22	249
Vadodara	63	8	68	34	324	108	605	55	8	68	21	290	75	517
Anand	12	21	0	23	342	16	414	10	17	0	20	294	15	356
Kheda	11	27	0	12	323	93	466	11	21	0	9	302	93	436
Ahmedabad	0	0	0	0	0	1	1	0	0	0	0	0	1	1
G. Total	814	291	5,529	1,619	14,522	4,205	26,980	768	258	4,278	1,446	13,133	3,941	23,824
Percentage	3%	1%	20%	6%	54%	16%	100%	3%	1%	18%	6%	55%	17%	100%

Source: IOL Survey Data, Sep-Dec 2014

Similar data was collected for timber trees, as per which out of total 53,457 timber trees identified, 42,092 (79%) are mature timber trees. Margosa (Neem) tree and Babool trees figure as the predominant mature timber tree species falling in the project corridor. Out of the 24,568 mature timber trees 6,912 (16.5%) trees are Margosa (Neem) trees, 6,325 (15.1%) trees are Babool trees and 27,188 (64.6%) are in others category which includes timber trees like Catechu (Khair), Ashoka, Gulmohar and trees of other species. Table 7.10-26 Timber Tree Census Data.

Table 7.10-26 Total Timber Tree & Mature Timber Tree

	Total Timber Tree						Mature Timber Tree					
District	Babool	Eucalyptus	Margosa	Banyan & Peepal	Others	Total	Babool	Eucalyptus	Margosa	Banyan & Peepal	Others	Total
Mumbai	0	27	20	0	380	427	0	27	20	0	375	422
Thane	2	15	14	4	2,236	2,271	2	9	13	4	2,112	2,140
Palghar	5,642	635	770	266	10,435	17,748	1,948	635	663	251	9,235	12,732
Valsad	83	361	1,460	329	7,575	9,808	79	342	1,239	315	6,480	8,455
Navsari	85	89	374	108	455	1,111	83	84	275	77	408	927
Surat	130	36	485	34	111	796	112	29	368	30	90	629
Bharuch	1,344	132	541	66	1,403	3,486	965	73	485	54	1,229	2,806
Vadodara	2,719	219	2,569	394	5,874	11,775	2,351	157	2,109	216	4,878	9,711
Anand	197	0	738	1	677	1613	138	0	596	1	500	1,235
Kheda	851	71	1,165	5	1,355	3,447	589	33	980	5	1,008	2,615
Ahmedabad	522	0	209	0	244	975	58	0	164	0	198	420
Grand total	11,575	1,585	8,345	1,207	30,745	53,457	6,325	1,389	6,912	953	26,513	42,092
Percentage	21.7%	3%	15.7%	2.3%	57.3%	100%	15.1%	3.3%	16.5%	2.3%	62.8%	100%

Source: IOL Survey Data, Sep-Dec 2014

(5) Major Crop Cultivation

While land based data and related agriculture data has not been collected in detail during the survey, limited information on crop cultivation was collected from a representative sample of 224 PAHs (selected randomly) as part of socio economic survey component. The following tables are based on the information collected from 224 PAHs and highlight the types of Khariff and Rabi Crops grown by the PAHs.

In addition, secondary data review suggests that Rice, Cotton, vegetables and Bajra are the predominant crops grown along the project corridor during Kharif season. During the Rabi season, Wheat, Onion, Barley and gram are the major crops grown.

Primary data for Kharif crops identifies only 13 percent of the surveyed PAH reporting cultivation of Rice, 10 percent reporting vegetable cultivation.

Similarly for Rabi crops, Wheat and Onions are the major reported crop variety by 17% and 8% of the PAHs respectively.

The figures reported is on the lower side, as the respondents are mostly from urban or peril urban settlements, where farming is not the mainstay. More detailed information will be available from land based survey to be conducted later upon alignment finalization and 20A notification by the MOR.

Table 7.10-27 Major Crops Cultivatation (Kharif) as Reported by PAHs

Districts	Rice	Chillies	Bajra	Jawar	Other Pulses	Vegetable	Cotton	Tobacco	Fodder	PAHs
Thane	1	1	-	-	-	2	2	-	2	12
Palghar	3	3		1	2	3	1	-	1	37
Dadra Nagar Haveli	1		-	-	-	-	-	-	-	2
Valsad	3	3	2	2	-	-	-	-	-	19
Navsari	1	1			1	2	-	-	-	11
Surat	1	1	1	1		3	2	3	2	26
Bharuch	8	3		-	-	1	-	-	-	18
Vadodara	2	3	-	2	4	4	2	1	2	20
Anand	4		-	-	-	2	1	-	1	12
Kheda	3	1	1	3		1	-	-	1	23
Ahmedabad	2	2	2	1	1	5	4	1	2	44
Total	29	18	6	10	8	23	12	5	11	224
Percent	13%	8%	3%	4%	4%	10%	5%	2%	5%	100%

Source: Census Survey Data, Sep-Dec 2014

Table 7.10-28 Major Crops Cultivatation (Rabi) as Reported by PAHs

Districts	Wheat	Barley	Gram	Onion	Oilseed	Cereals	Massar	Barseen	Others	PAHs
Thane	4	-	-	-	-	2	-	-	3	12
Palghar	4	2	1	5		2	1	1	1	37
Dadra Nagar Haveli	-	-	-	1	-	-	-	-	-	2
Valsad	3	1	-	2	2	-	-	-	2	19
Navsari	2	2	-	1	-	-	3		2	11
Surat	5	1	-	2	-	-	3	1	1	26
Bharuch	2	1	1	2		1		1	1	18
Vadodara	4	-	2	-	2		1	2	2	20
Anand	1	-	1	2	-	1			1	12
Kheda	5	1	2	3	-	2	1	2	1	23
Ahmedabad	8	4	2	1	2	1	2	3	5	44
Total	38	12	9	19	6	9	11	10	19	224
Percent	17%	5%	4%	8%	3%	4%	5%	4%	8%	100%

Source: Census Survey Data, Sep-Dec 2014

(6) Common Property Resources

In the surveyed area, 1610 structures were identified along the Mumbai-Ahmedabad corridor. District wise numerical figures for affected structures are presented in Table 7.10-29. Primary data suggests that affected structures are almost evenly distributed among the districts. Out of 1,659 structures identified 261 (16.2%) affected structures are in Valsad district followed by 231 (14.3%) structures in Palghar district, 180 (11.2%) structures in Vadodara district, 171 (10.6%)

structures in Navsari district, 177 (11%) structures in Ahmedabad and 170 (10.1%) structures in Kheda district.

Table 7.10-29 District wise Count of Affected CPR Structures

District	Total	Percentage
Mumbai	2	0.1
Thane	39	2.4
Palghar	231	14.3
Dadra Nagar Haveli	20	1.2
Valsad	261	16.2
Navsari	171	10.6
Surat	138	8.6
Bharuch	136	8.4
Vadodara	180	11.2
Anand	92	5.7
Kheda	163	10.1
Ahmedabad	177	11.0
Grand Total	1610	100

Source: CPR Survey Data, Sep-Dec 2014

District wise distribution of identified CPR structures is mentioned in Table 7.10-30. Out of the 1610 affected structures, 744 (46.2%) affected structures are electricity distribution poles followed by 358 (22.2%) roads, 76 (4.7%) electricity distribution lines/wires, 22 (1.4%) wells/tube wells/hand pumps, 69 (4.3%) railway buildings, 60 (3.7%) places of worship and electricity transformers each, 56 (3.5%) government buildings. Other CPR structures constitute of village common land, high transmission tower, panchayat building, community ponds, schools etc. In the context of road, it is understood that the impact will be of temporary nature, as the technical design is likely to have provisions of culverts and viaducts ensuring smooth passage way during operational phase. The impact may be only during the construction phase.

Table 7.10-30 Details of Affected CPR Structures

District	Well/ Tube wells/ Hand Pump	Community Ponds	Panchayat buildings	Electricity line	High Transmission Tower	Electricity Pole	Places of Worship	Burial / cremation grounds	Government Buildings	Railway Buildings	Schools	Village Common Land	Roads	Electricity Transformer	Others	Grand Total
Mumbai													2			2
Thane		1		1	6	17							14			39
Palghar	7	2	1	25	13	70			7		1	9	83	6	7	231
Dadra Nagar Haveli				4	1	10			2				3			20
Valsad	4	3	1	12	3	137	3	4	4		3	2	66	15	4	261
Navsari	1	2		5	7	104	3		2				38	3	6	171
Surat		3	4	3	5	62	1		8			3	41	6	2	138

Bharuch		2		1		60	2		4		1	30	26	9	1	136
Vadodara	1			1	3	85	13		11	27		2	24	6	7	180
Anand	2	1		4	1	57	6		1				18	2		92
Kheda	6	1		8	2	80	17	2	4		1	1	29	11	1	163
Ahmedabad	1			12	3	62	15		13	42			14	2	13	177
Grand Total	22	15	6	76	44	744	60	6	56	69	6	47	358	60	41	1,610
Percentage	1.4	0.9	0.4	4.7	2.7	46.2	3.7	0.4	3.5	4.3	0.4	2.9	22.2	3.7	2.5	100

Source: CPR Survey Data, Sep-Dec 2014

An assessment of extent of impact based on location of the structures related to project alignment and the type of CPR structure has brought forth the following table (Table 7.10-31). Out of 1,659 structures 1219 (73.5%) are expected to be fully affected (40 percent or more) structure and 440 (26.5%) structures are expected to be partially affected partially affected structures constitutes of roads mainly that will bear temporary impact during construction phase.

Table 7.10-31 Extent of Impact on CPR Structures

District	Fully Affected	Partially Affected	Grand Total
Mumbai	0	2	2
Thane	25	14	39
Palghar	140	91	231
Dadra Nagar Haveli	15	5	20
Valsad	187	74	261
Navsari	130	41	171
Surat	82	56	138
Bharuch	84	52	136
Vadodara	148	32	180
Anand	74	18	92
Kheda	128	35	163
Ahmedabad	157	20	177
Grand Total	1170	440	1,610
Percentage	72.7	27.3	100

Source: CPR Survey Data, Sep-Dec 2014

(7) Special Measures for Vulnerable Groups

Vulnerability among affected PAHs may be viewed from different perspectives and these can be in terms of:

1) Social group criteria
2) Economic criteria
3) Other vulnerability parameters as recognized by relevant policy framework

1) Social Group Criteria: Approximately 19 percent of the PAH belong to ST community and another 5.5 percent of them are from SC background. Socially, they constitute the most poor and vulnerable groups in the India community.

2) Economic Criteria: Recognized state parameters define a family as below poverty line based on their economic status. As per census data collected, nearly 33 percent of the PAHsare reported to BPL families. Another parameter of vulnerability, 60 families among the PAHs are beneficiaries of Antyodaya scheme; a scheme targeted for food security of poorest of poor.

3) Other Parameters: NRRP 2007 defines Vulnerable Persons as disabled, destitute, orphans, widows, unmarried girls, abandoned women or persons above 50 years of age; who are not provided or cannot immediately be provided with alternative livelihood, and who are not otherwise covered as part of a family (para 6.4 (v) NRRP 2007). As per the census data about 281 families have one or the more members who could be termed as vulnerable. The details are provided under Table 7.10-32 below.

Table 7.10-32 Vulnerability Status of PAHs

District	PAHs	PAHs with disabled	Orphans in Family	Abandoned women in Family	Elderly People	Widow in the family	Women headed family	Family in abject Poverty	Grand Total
Thane	50	-	-	-	-	3	2	1	6
Palghar	193	3	1	1		8	11		24
Dadra Nagar Haveli	4	-	-	-	-	-	-	-	0
Valsad	95				2	-	-	-	2
Navsari	54	0	1	1	0	6	5		13
Surat	86	4	3	2		10	11	0	30
Bharuch	64	3	2	2	16	9	8	0	40
Vadodara	105	4	2	0	0	6	6		18
Anand	65	1	1	1		12	10		25
Kheda	147	2	1	1	0	18	22		44
Ahmedabad	219	4	5	6	0	34	30		79
Grand Total	1,082	21	16	14	18	106	105	1	281
Percent		2%	1%	1%	2%	10%	10%	0.6%	26%

Source: Census Survey Data, Sep-Dec 2014

(8) Employment Loss of Wage Earners

Census data identifies a total of 539 PAPs who are wage earners and likely to lose existing employment opportunities because of project related impacts. Maximum existence of PAPs under this category is reported from Ahmedabad (222, 41% of the total). Other significant presence is found in Palghar (61 PAPs) followed by Navsari, Surat, Bharuch and Vadodara.
Nearly 56 percent of the wage earner PAPs report of earning less than INR 10,000 per month. Only about 6 percent of the PAPs (in wage earner category) have monthly income above INR 20,000.

Table 7.10-33 Employment Loss of Wage Earners

District	PAPs		Less than 5,000	5,000 -10,000	10,000 -20,000	More than 20,000
	No.	Percentage				
Thane	7	1%	2	2	3	0
Palghar	61	11%	15	20	23	4
Dadra Nagar Haveli	0	0%	0	0	0	0
Valsad	12	2%	3	4	5	1
Navsari	43	8%	10	14	16	3
Surat	43	8%	10	14	16	3
Bharuch	48	9%	12	15	18	3
Vadodara	41	8%	10	13	16	2
Anand	23	4%	6	7	9	1
Kheda	39	7%	9	12	15	2
Ahmedabad	222	41%	53	71	84	13
Grand Total	539	100%	129	172	205	32
Percent	100%		24%	32%	38%	6%

(Note) Figures are Monthly Income provided in INR
Source: Census Survey Data, Sep-Dec 2014

(9) Business Loss of Business Enterprises

Out of 1,082 Households surveyed, 177 (16.4%) PAHs have business establishments falling under the direct project impact corridor. The table7.10-34 reflects that out of 177, 13 PAHs have small mobile Kiosk/Khokha for sustenance of their livelihood. Majority of the 97 (54.9%) PAHs in the business category are involved in selling of garments, household items, manufacturing, forest products etc.

Table 7.10-34 PAHs with Affected Business

District	PAHs	Small mobile Kiosk	Market Stall/ Store	Restaurant	Hotel/ Guest House	Other Services Shop	Office	Workshop/ Garage	STD Booth	Fac-tory	Others	Grand Total
Thane	50		1							5	16	22
Palghar	193	4	2		2	8	1	7			4	28
Dadra Nagar Haveli	4			1						1		2
Valsad	95		7	1		2		2		1	6	19
Navsari	54										2	2
Surat	86	2	1						1	1	5	10
Bharuch	64			1								1
Vadodara	105	3	1	3	1	7		2		2	6	25
Anand	65										14	14
Kheda	147	3								4	39	46
Ahmedabad	219	1				2					5	8
G. Total	1,082	13	12	6	3	19	1	11	1	14	97	177

Source: Census Survey Data, Sep-Dec 2014

Business loss to these establishments may be inferred from the income earned from these sources. Information on this aspect was available from 176 of the 177 PAHs owning project affected commercial establishments, details of which are provided in the table7.10-35 below. Nearly half of the business properties earn their owners less than 10,000 per month, as reported during the census survey. Another 17 percent PAHs earn 10-20 thousand per month. 16 of the PAHs claimed to be earning more than one lakh from these properties. Project alignment suggests that all of 177 PAHs will be losing quoted income accruing from the affected business properties.

Table 7.10-35 Business Income from Affected Commercial Establishments

Row Labels	5000 or below	5001 -10000	10001 -20000	20001 -50000	50001-1 lakh	Above 1 lakh	Grand Total
Thane	1	1	1	6	6	7	22
Palghar	8	16	2	2			28
Dadra Nagar Haveli		1				1	2
Valsad	6	4	5	2	1	1	19
Navsari		1					1
Surat	2	5	2		1		10
Bharuch		1					1
Vadodara	7	7	6	3		2	25
Anand	4	5	1	1		3	14
Kheda	8	13	10	10	3	2	46
Ahmedabad	2	2	3		1		8
Grand Total	38	56	30	24	12	16	176
Percentage	22%	32%	17%	14%	7%	9%	100%

(Note) Figures mentioned are number of PAHs reporting respective monthly income range. Monthly income range is in INR.
Source: Census Survey Data, Sep-Dec 2014

(10) Income Loss from Rented out Structures

From the census data collected, rent related data is available for 142 tenants/properties. About 62 percent of these properties are earning its owners a rental value of less than 10,000 INR per month. However, there are about 20 such rented properties where the monthly income is above 50,000 INR per month. The details are provided in Table 7.10-36 below.

Table 7.10-36 Income Loss From Rented out Structures (Per Month)

District	PAHs as Tenants	Less than 5,000 INR	5,000 -10,000	10,000 -50,000	More than 50,000
Thane	6	1	3	1	1
Palghar	31	8	10	8	5
Dadra Nagar Haveli	-	-	-	-	-
Valsad	13	3	4	4	2
Navsari	6	2	2	1	1
Surat	17	6	5	4	2
Bharuch	2	-	1	1	-

Vadodara	38	8	14	9	7
Anand	8	3	2	3	-
Kheda	5	-	2	3	-
Ahmedabad	16	4	9	1	2
Grand Total	142	35	52	35	20
Percent	100%	25%	37%	25%	14%

Source: Census Survey Data, Sep-Dec 2014

(11) Shifting of Households /Shops Goods and Materials

As discussed in sections earlier in this chapter, the project will entail impact on 1,186 residential structures which 1,467 residence building blocks and another 221 commercial structures. The policy framework applicable for this project (discussed in detail in Chapter 4) provides for following provisions with regards to shifting of goods and materials

1) Advance and due notice to PAHs for vacating of the properties.
2) Provision to salvage materials from properties vacated/demolished.
3) One time shifting allowance to enable PAHs to move their goods and materials.

(12) Budgeting and Financial Plan

The financial plan for the project will essentially include making budget provisions under the following broad heads.

1) Compensation
   - Land Costs: Project will require acquisition of land for developing of tracks and associated facilities like stations, depots for maintenance, workshop and car maintenance etc. Hence the project will need to provide compensation for land acquired from legal titleholders, from other government departments. Current understanding drawn from the prosed alignment suggests that a significant proportion of the land required in Vadodara and Ahmedabad city falls parallel to existing railway tracks, and under railway ownership.
   - Structure Costs: On account of land acquisition, the project will cause loss of structures for which compensation will need to be paid to affected stakeholders (both titleholders and non-titleholders alike).

2) Resettlement &Rehabilitation (R&R) Cost: Budget provisions under this head will meet direct expenses made on account of various R&R benefits proposed to be provided to affected households and persons.

3) R& Implementation and M&E Costs: The project proponents will require engaging an external NGO/Consultant for implementation of R&R activities. Similarly, an additional independent agency is proposed to be engaged for M&E purposes. Related costs will be met from budget provisions made under this head. Proposed budget is assumed to be 15 percent of R&R costs.

Limitations: Current project compensation and R&R budgeting is based on the census and inventory of loss survey, and the land market survey, whereupon number of affected people and extent of loss was assessed. However, in the absence of land record and ownership data (likely to be available upon formal project approval and 20A notification), the land survey was not conducted. Hence, the number of project affected households is expected to be significantly higher with addition of land losers in the category. This will essentially require additional budget provisions for R&R costs (as it is linked to number of PAHs).

In absence of 20A notification and land record data, it is difficult to establish land ownership status of land parcels proposed to be acquired under HSRC at this stage.

(13) Budgeting and Financial Plan

No presumptive estimation has been done on this account and added to project budget provided below.

Table 7.10-37 Project Budget

A.	Compensation		
1.	Land Cost	111,982,610,683	As per actual prevailing market rates
2.	Structure Cost	1,127,468,697	Calculated as per market replacement cost
B	R&R Benefit Cost	777,322,000	Calculated as per LARR 2013 (item 3)
C.	R&R Implementation and M&E	116,598,300	Calculated as 15 % of R&R Benefit Cost (item 4)
	Total Project Cost	114,003,999,680	

These estimates and the budget must be regarded as provisional, given the need for updating the RAP (if required) during implementation. Final rates per unit for land, structures, trees and other affected properties will be determined by the SEMU. Based on the rate and RAP policy, a final resettlement budget shall be prepared and approved by the EA. All resettlement funds will be provided by the EA (RVNL/HSRC) based on the financing plan which is endorsed through MOR and agreed by the GOI.

7.10.9 Monitoring and Evaluation

The RAP implementation monitoring will be done both internally and externally to provide feedback to SEMU and to assess the effectiveness. Evaluation of the resettlement activities will be resorted to during and after implementation of the RAP to assess whether the resettlement objectives were appropriate and whether they were met, specifically, whether livelihoods and living standards have been restored or enhanced. The evaluation will also assess resettlement efficiency, effectiveness, impact and sustainability, drawing lessons as a guide to future resettlement planning.

(1) Internal Monitoring

Internal monitoring will be undertaken by the SMU with assistance from the Resettlement Specialist of Project Management Consultant and IA. The IA will gather information on RAP implementation covering relevant activities as per schedule. Internal monitoring reports on RAP implementation will be included in the quarterly Project Progress Report (PPR) to be prepared by SMU. The report of SMU will contain: (i) accomplishment to-date, (ii) objectives attained and not attained during the period, (iii) challenges encountered, and (iv) targets for the next quarter. Furthermore, internal monitoring would be carried out every half year in operation stage for at least two years. Table 7.10-38 shows the format for RAP implementation monitoring to be filled by SMU quarterly.

Table 7.10-38 Format for ARP Implementation Monitoring

Component	Total (unit)	Completed (unit)	Cumulative Achievement Total (unit)	Progress During Reporting Month (%)		Status & Remarks
				Target (%)	Achievement (%)	
Resettlement Preparation						
Distribution of Brochures						
Identification of AHs/CBEs						
Issuance of ID cards						
Consultation Meetings						
Formation of PVAT/RAC/GRC						
Payment of Compensation						
Compensation for land						
Compensation for tree/crop/fish						
Res/Commercial structure						
Payment for rent/leaseholder						
Shifting/relocation costs						
Social Development Activities						
Grant for loss of wages						
Loss of business grant						
Business restoration grant						
Payment for indirect impact						
LIRP activities						

Source: Study Team

(2) External Monitoring

External monitoring which involves social impact evaluation will be assigned to an independent External Monitoring Agency hired by RHD. TOR for External Monitoring is presented in Appendix-III TOR for External Monitoring Consultant.

7.11 Local Stakeholder Meeting

The HSR stretches for 500 km from Mumbai to Ahmedabad by crossing 2 states: Maharashtra and Gujarat, 11 Districts and 207 villages.
Keeping in mind the significance of consultation and participation of the people likely to be affected or displaced due to the proposed project, such activities were carried out during the entire socio-economic assessment process and preparation of this preliminary RAP draft. And, stakeholder meetings have planned to be divided into three stages in line with the progress of study presented as follows.

Table 7.11-1 Outline of the Stakeholder Meeting

Stage of F/S	Implemented Date/Month/Year	Venue	Category of Stakeholders
1st Stage	2nd April, 2014	New Delhi	MOR, Local government, Embassy of Japan, JICA
	27th May, 2014	Ahmedabad in Gujarat	Local government agencies university/colleges, NGOs, common carriers, neighborhood communities, women support groups, representative from Schedule Caste and Schedule Tribe communities, senior citizens
	30th May, 2014	Mumbai, Maharashtra	
2nd Stage	4th Dec. – 18th Dec.,2014	11 Disticts in Ahmedabad and Gujarat	Local government agencies NGOs, common carriers, neighborhood communities, representative from affected communities
3rd Stage	20th Apr. – 30th Apr.,2015	10 Disticts in Ahmedabad and Gujarat	Local government agencies NGOs, common carriers, neighborhood communities, representative from affected communities

Source: Study Team

7.11.1 Stakeholder Meeting in 1st Stage

(1) Stakeholder Meeting with Related Agencies

This is the upstream meeting which aims at selecting the alignment and stations by the related agencies prior to commence the next meetings at Mumbai and Ahmedabad. The meeting with related central/local government ministries and agencies was held on 2nd April at New Delhi. Participants were selected and invited by MOR.
The objective of the meeting was to present and discuss the alternatives which involve various alignments and station locations worked upon after the site survey and seek opinions of representatives of railway concerned agencies in Maharashtra and Gujarat. Three alternatives for entry in Mumbai and Ahmedabad were explained with comparing the advantages and disadvantages from transportation, land-use, passenger demand, safety, cost and environmental aspects. Furthermore, the scoping was introduced and discussed among the participants.

Table 7.11-2 Participants of the Meeting

Date	Number of Participants*	List of Participants
02.04.14	20 (0)	Ministry of Railway, Central Railway, Government of Maharashtra, Western Railway, Gujarat Infrastructure Development Board, Embassy of Japan, JICA Indian Office
*No. in parenthesis denote female participants present in the meeting		

Source: Study Team

The followings are the highlights of the discussion:

1) What should be the alignment in Mumbai and Ahmedabad?
2) Where the station terminals be located in these two cities?
3) Where are the other station locations?

After the discussions, alignment in Mumbai & Ahmedabad, station terminals in two cities and other station location were agreed by all participants.

(2) Stakeholder Meeting with local Representatives

In India, there is no clear guideline on consultation for involvement of local stakeholders in the preliminary stage of the project.
However, in HSR Project, MOR has encouraged to consult with representatives of local stakeholders for enhancing their understanding about HSR project needs, the likely adverse impacts on the environment and alternative options at earlier stage of project in particular. Due it was difficult to ensure the significant participation from local stakeholders, invitations were sent to selected stakeholders of various fields.
The local SHM was held on 27th of May at Ahmedabad and 30th of May at Mumbai, respectively. 41 participants (male: 30, female: 11) joined at Ahmedabad and 40 participants (male:30, female:10) at Mumbai joined were categorized hereunder.

Table 7.11-3 Participants of the Meeting

Date	Venue	Number of Participants*
27.05.14	Ahmedabad	41 (11)
30.05.14	Mumbai	40 (10)
*No. in parenthesis denote female participants present in the meeting		

Table 7.11-4 Category of Participants and Age Groups

Age / Occupation	Less30	30 - 40	40 - 50	50 - 60	Over 60	Total
Staff of central government	0	1	3	4	1	9
Staff of local government	2	9	8	6	3	28
Staff of business company	1	0	1	0	1	3
Private management	1	2	4	1	1	9
Student	2	0	0	0	0	2
NGO	2	1	6	1	6	16
Others	2	1	7	2	2	14
Total	10	14	29	14	14	81

Source: Study Team

The comments and questions made in the meetings are presented in Table 7.11-5.

Table 7.11-5 Summary of Comments and Questions

Related to Environmental and Social Considerations
1) Necessary arrangement need to be made to study the impact of Noise on Wild Life and Flora during and after the implantation of HSR project.

2) Undertake the study for impact assessment on vegetation in surrounding area of the project.
3) The information about the various items incorporated for Social and Environment impact assessment considered in preliminary scoping before EIA Survey (indicating impact of various items incorporated in natural & social environment impact assessment) need to be kept on web site.
4) Hydro Geological and Geo Hydrological studies in and around the project site need to be conducted to assess its impact on sub-surface environment.
5) Items need to be identified and incorporated in assessing the indirect impact on environment due to this project development.
6) Impact on natural water resources due to this project development need to be studied.
7) Impact of energy used in this project on global warming.
8) Protective measures are required to save wildlife, birds and vegetation on account of HSR.
9) Systematic mapping of women displacement and appropriate mitigation plan is required.
10) Livelihood concept should be widening to cover all those tiny hawkers, Agents and sellers on the Railway as they will lose job due to HSR. Their displacement also should be considered.
11) Project should have "inclusive development character hence, those who displaced their Rehabilitation and compensation should be generous enough to resettle their life and it should be in time.
12) The mangroves along the alignment have been identified by Ministry of Environment and Forest (MOEF) as forest so what will be the line of action for the proposed project to deal with this.
13) What extent the Ecology and Biodiversity issues will be considered for this HSR project?
14) Instead of choosing the alternative and then conducting the environmental impact assessment, the process should be reversed. Environmental aspects should be one of criteria used for selection of alternative route.
15) Marine ecology should be one of the issues that are considered as part of the EIA process.
16) Stakeholders should be given awareness about the alternatives, decisions, considerations and results of every stage of the project.
17) What kind of guidelines will be used for the entire process?
18) Marine ecology was not one of the aspects in the initial scoping done and presented during the meeting.
19) What actions will be taken to prevent or reduce the delays that may occur during clearance procedures, land acquisitions and resettlement issues?
20) What guidelines will be followed for the different aspects? Indian Railway guidelines would be easier to implement here than an international one.
21) Mangroves and marine ecology are being damaged by various infrastructure project and Indian Railway projects. What is Indian Railway going to do to protect them?
22) Employment generation should be done for the poor people. 23) Concern about health (infection of HIV/AIDS) and should be addressed properly.
24) What parameters/measures to be taken for land acquisition and resettlement?

25) Project must have environmental cost benefit analysis for all alternatives. Noise models with vegetative noise barriers, green belt along the route etc.
Related to comprehensive HSR project
1) Necessary care need to be taken to protect under lying pipe line during laying new railway track of HSR to avoid loss/or any accident.
2) Existing Natural Drainage network affected during construction need to protected and necessary modification for providing proper drainage, if possible, it should be used for rainwater harvesting.
3) No 'gas lines' if comes in the way of rail lines construction should be damaged.
4) Indian Railways are not so safe for those who are crossing the lines, hence special measured will be needed to elimination Human/Animal accidents.
5) There will be international prestige that India will earn out of HSR project and attract foreign business Investment in India.
6) The business benefits will be much larger than imagine as the high speed train will not only save time, cost and business opportunities but also promote 'Family life' as one can work and comeback home from Ahmadabad to Mumbai and back.
7) HSR project will promote induced migration from home to work place without extra social and even economic benefits assuming net cost will less than HSR facility.
8) Natural resources management particularly with referenced to 'Land Use' must be done very carefully as discontent of people comes out of such 'Land' use related issues.
9) "Educate the people with regard to project cost" and benefits so that more favorable support and information/knowledge based constructive criticism could be made available from enlightened people.
10) New concepts like eco toilets or modular toilets to be introduced which will not only help to protect environmental pollution, but also shall provide clean, healthy hygienic conditions of nearly 60,000 villages across the country.
11) The Vasai Bridge is structurally becoming weak day by day whether the operation of HSR will not interfere and induce more damage to it.
12) The point of alignment passing through the village/s result the village/s to get separated by the HSR line. This may create a problem of trespassing which will hinder the operation of HSR and can cause accidents.
13) Raised questions about passenger dispersal movement and traffic movement around the stations after alighting at the stations.
14) What will be done to address the worsening hygiene condition of stations? 15) Raised an issue about the alignment covering the Boisar to Thane diagonal stretch and not western suburbs like Borivoli, etc.
16) How much time would be saved by this HSR from Mumbai to Ahmadabad?
17) Participant raised the issue regarding the integration of the ticketing system between the various transport systems available in the different parts of these states.
18) Expressed a concern regarding feasibility of the interconnecting systems between HSR and other railway systems like Metro / regular passenger railways.
19) Whether the modeling system used to calculate the population projection for these areas along the

alignment has taken into account various migratory changes that may occur?
20) What the projection for the indirect employment opportunities will be for the local public?
21) Why the Thane station is one of the section connected as it is already well connected as well as saturated and not a station at Ghodbundar area where lot of development is taking place?
22) There should be a better regulatory system for commuter's dispersal and connectivity.
23) Participants congratulated the panel for the kind of project that was proposed. Bandra-Kurla-Complex (BKC) would be a better terminus for HRS than any of the other populated stations.
24) Whether the HSR is in any way connected to the Mumbai-Delhi railway line and DFCC alignment and will they be connected at some point in the future?
25) Everyone to look at the project from a sustainable development point of view and not just environmental perspective.
26) The panel should calculate the equity / charges for the travel, etc. so that stakeholders can be assured that the project is feasible for all classes of the society.
27) What is economically, environmentally and socially sustainability for future generation?
28) Rather than taking the alignment up to existing stations or creating new station close to the already developed area station, stop the corridor closer to Thane & Mumbai and develop to existing stations for speedy dispersal. This will minimize the impact on existing infrastructure.
29) What is economically, environmentally and socially sustainability for future generation?

Source: Study Team

When the meeting was closed the Study Team conducted a questionnaire survey. After collecting the questionnaire from the participants, analysis of stakeholders carried out by focusing at;

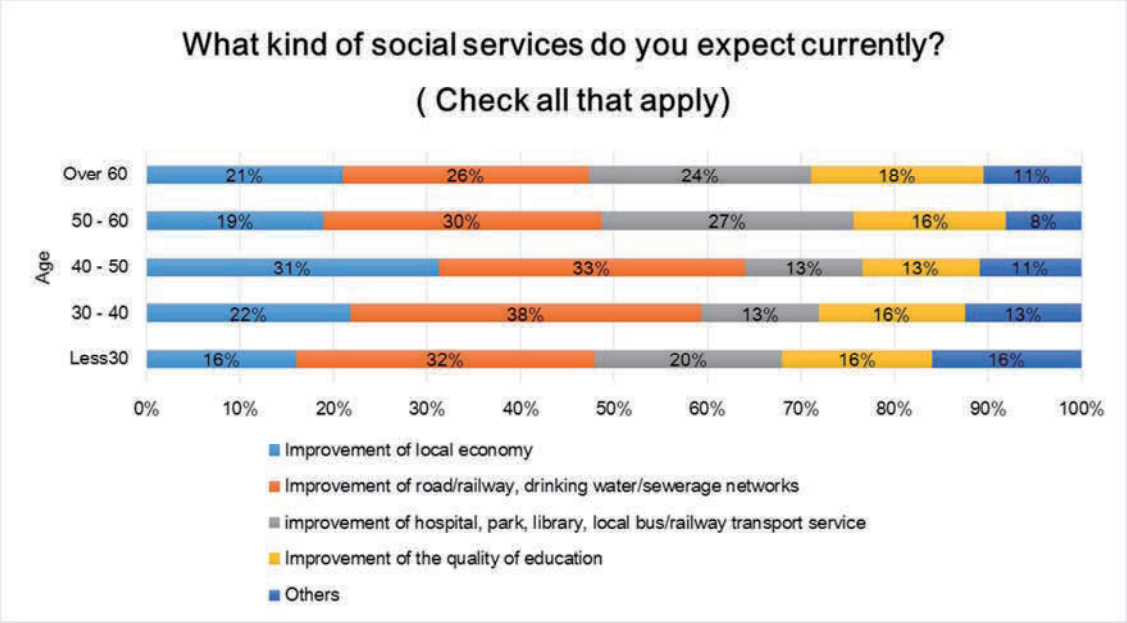
1) Kind of social services they expect currently
2) Kind of expectation from HSR project and,
3) Kind of anticipated worry caused by HSR project

Following figures presents the result from 81 respondents by check all that apply method:

Table 7.11-6 Expected Current Social Services

What kind of social services do you expect currently? (Check all that apply)

Answer / Age	Improvement of local economy	Improvement of road/railway, drinking water/sewerage networks	improvement of hospital, park, library, local bus/railway transport service	Improvement of the quality of education	Others	Total
Less30	4 (16%)	8 (32%)	5 (20%)	4 (16%)	4 (16%)	25 (100%)
30 - 40	7 (22%)	12 (38%)	4 (13%)	5 (16%)	4 (13%)	32 (100%)
40 - 50	20 (31%)	21 (33%)	8 (13%)	8 (13%)	7 (11%)	64 (100%)
50 - 60	7 (19%)	11 (30%)	10 (27%)	6 (16%)	3 (8%)	37 (100%)
Over 60	8 (21%)	10 (26%)	9 (24%)	7 (18%)	4 (11%)	38 (100%)



Source: Study Team

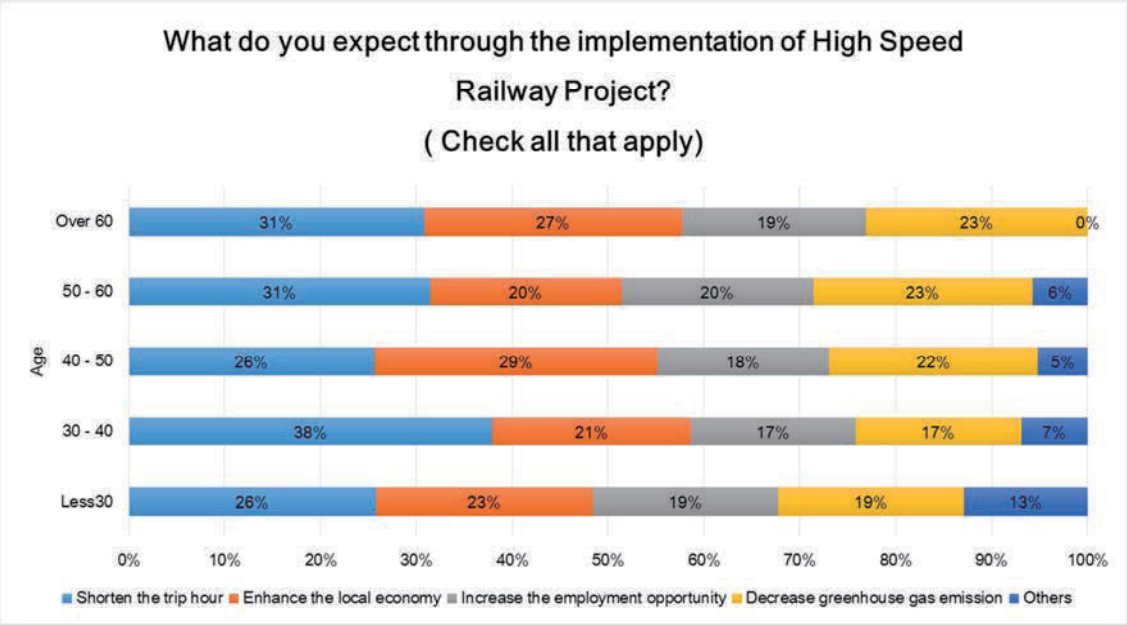
Figure 7.11-1 Expected Current Social Services

In term of current social services, every age group has a fixated interest in the improvement of road/railway, drinking water/sewerage networks in term of expected social services. Moreover, it appears that those groups at the center of 40 – 50 groups which are in most productive years have fixated interest in the improvement of local economy.

Table 7.11-7 Expected Current Social Services

What do you expect through the implementation of High Speed Railway Project? (Check all that apply)

Answer / Age	Shorten the trip hour	Enhance the local economy	Increase the employment opportunity	Decrease greenhouse gas emission	Others	Total
Less30	8 (26%)	7 (23%)	6 (19%)	6 (19%)	4 (13%)	31 (100%)
30 - 40	11 (38%)	6 (21%)	5 (17%)	5 (17%)	2 (7%)	29 (100%)
40 - 50	20 (26%)	23 (29%)	14 (18%)	17 (22%)	4 (5%)	78 (100%)
50 - 60	11 (31%)	7 (20%)	7 (20%)	8 (23%)	2 (6%)	35 (100%)
Over 60	8 (31%)	7 (27%)	5 (19%)	6 (23%)	0 (0%)	26 (100%)



Source: Study Team

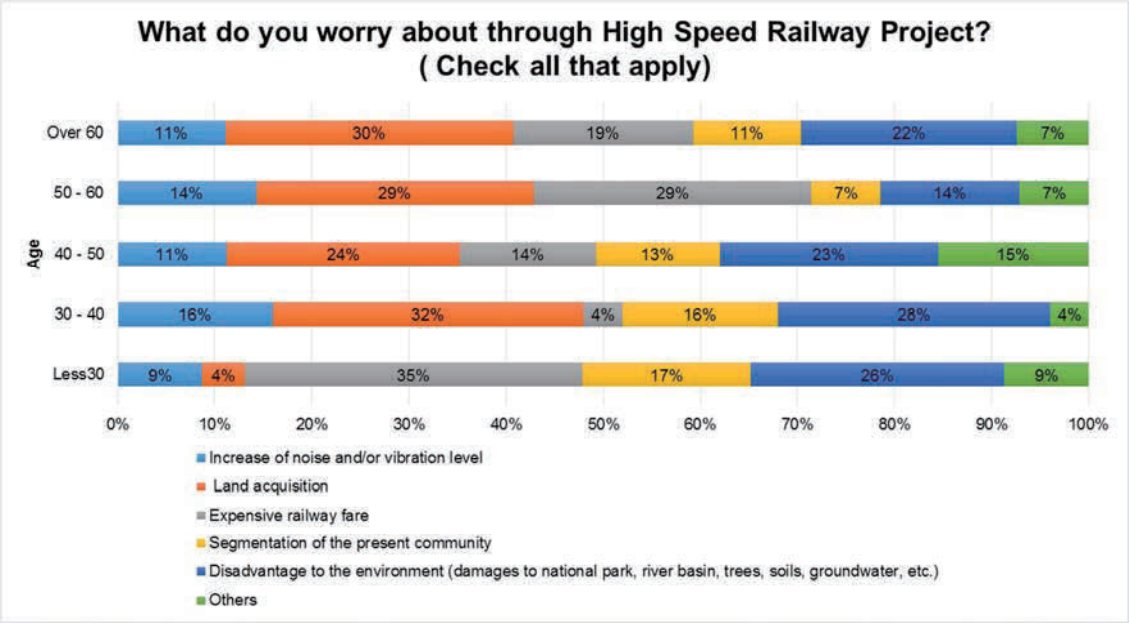
Figure 7.11-2 Expectation on HSR

Every age group places more expectations to shorten the trip and enhance the local economy in term of expectation to HSR. Moreover, it is construed that interest about decrease of greenhouse gas emission at every group indicates their extensively concern about the global warming.

Table 7.11-8 Expected Current Social Services

What do you worry about through High Speed Railway Project? (Check all that apply)

Answer / Age	Increase of noise and/or vibration level	Land acquisition	Expensive railway fare	Segmentation of the present community	Disadvantage to the environment (damages to national park, river basin, trees, soils, groundwater, etc.)	Others	Total
Less30	2 (9%)	1 (4%)	8 (35%)	4 (17%)	6 (26%)	2 (9%)	23 (100%)
30 - 40	4 (16%)	8 (32%)	1 (4%)	4 (16%)	7 (28%)	1 (4%)	25 (100%)
40 - 50	8 (11%)	17 (24%)	10 (14%)	9 (13%)	16 (23%)	11 (15%)	71 (100%)
50 - 60	4 (14%)	8 (29%)	8 (29%)	2 (7%)	4 (14%)	2 (7%)	28 (100%)
Over 60	3 (11%)	8 (30%)	5 (19%)	3 (11%)	6 (22%)	2 (7%)	27 (100%)



Source: Study Team

Figure 7.11-3 Worry on HSR

In terms of worries anticipated, age group less 30 has strong worry about expensive railway fair and other age groups have strong worry about land acquisition. Furthermore, averaged 20% of worry is indicated related to disadvantage to the environment among every generation.

7.11.2 Stakeholder Meeting in 2nd Stage

(1) Stakeholder Meeting at District Level

Though invitation had sent to women many of them did not participate the meeting except the its at Mumbai. Detailed and extensive consultations were carried out during base-line and socioeconomic survey stage held with various sections of affected persons such as traders, women, squatters, kiosks and other inhabitants. These consultations were held at all level with representation from prospective PAPs and officials from key Government department. Objective of such consultations were to inform affected persons about the project, its features (such as nature of physical constructions, alignment etc.), expected impacts, policies that govern project related land acquisitions and R&R benefits such as compensation, income restoration, employment generation, information flow, grievance redress etc. This report incorporates all issues raised during public consultation and recommends institutional strengthening measures in response to issues raised. The following methods were adopted for conducting public consultation.

- Informal individual/group consultation during the course of census and IOL survey by the field surveyors that informed the PAPs about the project, purpose of survey and clarifications on their queries
- In-depth individual interviews/discussion with key informants from community, opinion leaders and from the government departments
- District level stakeholders meetings with the affected families and district officials

While the first two of the approaches qualify more of an informal approach, the district level public consultations were organized in a more formal setting. Formal stakeholder meetings were held at district level. One such meeting was organized in each of the project affected districts, keeping in view that the project is still at its feasibility assessment stage. A more detailed exercise will be taken up at later stage, once the project is conceptualized and formal go ahead is

given by the MOR, inviting all PAPs and the event organized at village/taluka level or as per directions from the project proponents. Because the RAA 2008 provides land acquisition process and procedures for the special railway project such as HSR project, including valuation method of land compensation and makes MOR available to join the SHM.

Table 7.11-9 Primary Detail of District Level Consultations

S. No	Date	District	No. of Participants*	Representation from District Department**
1	04.12.14	Navsari	20 (5)	Deputy Collector (Land Acquisition), Navsari
2	05.12.14	Surat	15 (1)	*Mamlatdar,* Surat City, Head Clerk, District Agriculture Office
3	06.12.14	Valsad	30 (0)	Deputy Collector, Valsad
4	06.12.14	Dadar and Nagar Haveli	6 (0)	
5	08.12.14	Palghar	22 (3)	SDO&SDM, Palghar
6	10.12.14	Thane	28 (0)	
7	12.12.14	Vadodara	18 (2)	Special Land Acquisition Officer and Deputy Mamlatdar
8	15.12.14	Bharuch	15 (0)	
9	16.12.14	Anand	21 (0)	
10	17.12.14	Kheda	27 (0)	District Agriculture Office
11	18.12.14	Ahmedabad	96 (21)	
Source: Stakeholder Meetings Attendance Register, 2014 *No. in parenthesis denote female participants present in the meeting ** In addition to the above, in 2 districts there was representation from local NGOs (Adivasi Ekta Parishad, Palghar, Conservation Action Trust, Mumbai. Local Media presence was also observed in Navsari stakeholder consultation				

Source: SHM consultations, December 2014

The box below presents outline of a typical consultation event held in project districts.

Stakeholder Meeting: Content Outline

1. Welcome and Registration of the participants
2. Sharing of objective of the meeting that were
   - To brief potential stakeholders about proposed High Speed Passenger Railway
     - About track route
     - Type of construction
   - Brief about various stages/processes associated with an infrastructure project of such nature
   - To collect stakeholder perception, concerns, opinion and suggestion and share with project proponents
     - About Impacts and its mitigation
     - About possible land acquisition process
     - About R&R policy and process
3. Brief about the project: Sharing the proposed alignment (on google earth), list of major towns, villages etc falling along the alignment, types of construction involved (bridges, viaducts, tunnel etc)- *participants were informed that project is currently at feasibility assessment stage*
4. Project Cycle: Briefing on various stages/milestones associated with infrastructure projects of this nature. Informing on various stages that this project will pass through till its closure. These typically include project conceptualization, pre feasibility and feasibility studies, project

finalization and DPRs, Detailed SIA and EIA, systematic R&R and Land Acquisition related activities, project construction and subsequent closure activities- *Participants were informed that JICA/World Bank policies would influence R&R activities under this project.*

5. Current project status: Progress status of the project in the chain of activities/millstones
6. Key features of R&R policies of JICA (including concept of cut-off date)
7. Project related opinions/suggestions and concerns
   - About Impacts and its mitigation
     - What are these (positive and negative) and how?
     - Who will be most impacted if they are?
     - How best these can be mitigated considering project significance
   - About applicable land acquisition process
     - Opinion and suggestions
   - About R&R policy and processes
     - Suggestions on type of assistance and support (besides compensation)
     - Institutional and implementation arrangements
     - Any other suggestions?
8. Thanks and Meeting Closure (with refreshment and tea)

As discussed in the previous section 11 district level meetings have been organized to understand perceptions, concerns and suggestions of affected persons and the local officials. In this section we are presenting the summary of outcome from these meetings.

Table 7.11-10 below summarizes the discussion held at various district level consultations.

Table 7.11-10 Summary of Discussion of District Level Consultations

Sl. No	Districts	Key Outcomes/Concerns/Suggestions from Meeting
1	Navsari	*On Alignment and Structure* ➢ Alignment should consider avoidance of impact to religious structures, open/dug wells, to the extent possible; Participants also identified a school in Manekpur village, having historical importance and requested for route alignment in a manner that avoids damage to it. *On Impact* ➢ Most of the participants belong to farming communities and hence acquisition of their farm land will impact their livelihoods. Government should therefore consider land against land for compensation *On LA and R&R Policy, Process and Measures* ➢ Compensation for land acquisition should be done at more than the market rate. ➢ Disbursement of compensation should be done within a reasonable time; ➢ Sufficient advance notice should be served to affected families to enable them to shift affected structures. ➢ People have already lost their land under various government projects in the past. Further, they have not received adequate compensation for their losses hence requested for minimizing land acquisition. *Others* ➢ The ADM present in the meeting summed it up saying that people would not object to land acquisition, if proper and adequate compensation is provided to them. The participants, most of them agreed to the statement made!
2	Surat	*On Impact* ➢ Safety should be the first priority during construction and operation of the project.

		On Alignment and Structure ➢ Width of land for HSR Track should be reduced to minimize land acquisition. ➢ Flyovers / under passes should be constructed near important crossing especially near school and temples. *On LA and R&R Policy, Process and Measures* ➢ Compensation for affected land and structures should be provided more than the prevailing market rates. Market rates should not be decided as per the circle rate/stamp duty register (*Jantri rate)* and fresh market value assessment should be done by the government before acquiring land. ➢ In addition to the compensation for loss of land and assets, MOR/GOI should give priority to affected households for jobs in government departments in accordance with the qualification of the candidate. ➢ All shop keepers should be rehabilitated by constructing market complex in nearby area. Compensation should be given for loss of land and structures. ➢ Most of the business persons of village Chhedcha and Antroli were of the view that they would prefer to relocate their shops at Surat for which adequate support shall be provided by the project. ➢ Disbursement of money should be done before the commencement of civil works; advance notice period should be served to the PAF.
3	Valsad and Dadra and Nagar Haveli	*On Alignment and Structure* ➢ Participants suggested that alignment should be redesigned or should be underground to avoid dismantling of any structures or acquisition of land so as to minimize impact on their livelihoods. ➢ Existing vacant land at Valsad District should be used for station instead of commercial and residential land of local people. *On Impact* ➢ Majority of the villagers are dependent on agriculture for their livelihood and hence loss of agriculture land will have adverse impacts on their livelihood. *On LA and R&R Policy, Process and Measures* ➢ Affected persons should be duly consulted before finalization of options for rehabilitation and resettlement. *Others* ➢ Participants also strongly recommended for organizing meetings at village level rather than at the district level for ensuring larger participation. Some of the stakeholders resisted the proceeding in the consultation and remarked all affected people should be invited for consultation about the project and allowed to make meaningful choices or preferences. *It was though explained to them such an exercise will be conducted once the project gets finalized.* ➢ Participants also asked for presence of MOR representative in such consultations in future
4	Palghar	*On Alignment and Structure* ➢ Participants opposed the proposed route alignment as it will result in considerable damage to residential structures (particularly in Vasai taluka in Mumbai suburbs) and homestead land and requested re-consideration of the same. ➢ Existing vacant land should be used for infrastructure creation rather than acquiring additional commercial and residential land.

		On Impact ➢ Project area (specifically in Talasari and Dahanu taluka) is mainly inhabited by tribal population. Most of the participants (from tribal community) vehemently shared their opposition to the project saying that they solely depend on farming for livelihoods and hence any acquisition of their farm land will impact their livelihoods. Alternatively they should be provided land against land. *On LA and R&R Policy, Process and Measures* ➢ Participants requested for similar consultations to be held at village level, allowing all affected persons to participate in the meeting. ➢ One of the PTGs named *F.B.C 001* are living in the area, so their needs and livelihood security need to be protected. ➢ People expressed the view that most of the area of Palghar district is coming under PESA rule wherein panchayat's written permission is required to take up any kind of work. ➢ Participants believe that there are separate rights for indigenous people who protect them from projects that may have adverse impact and such an eventuality the projects cannot come up. *Others* ➢ They fear that many other industrial and infrastructure projects are coming up in future in this district and most of the people from this area will be relocated which is not a sustainable way of development. The participants also shared that people have already given them land for ongoing Expressway (Road) in the district. ➢ One of the participants also expressed his displeasure, recalling a past instance where 4,000-6,000 acre of land was acquired in Dabtari village for dairy project, resulting in massive displacement. Later the project failed and the land instead of being returned to farmers, was sold for some other project at a higher price.
5	Thane/ Mumbai	*On Alignment and Structure and Impact* ➢ *F.B.C 002* (Teritory Manager, BPCL) BPCL has started a company owned petrol pump at BKC which caters to around 2600 vehicles with 8000 lt. petrol/diesel per day. Hence any relocation of the petrol pump will also affect the local population. Company representative also shared that many of their petrol pumps have been closed due to litigation and finding a suitable place in such places is extremely difficult. ➢ Indian Corporation, a private company has warehouse structures in 754 acre and 117 acre plots in Bhiwandi and requested for minor realignment of the track to spare the infrastructure. The affected parties are willing to allow viaducts to pass over vacant land parcel owned by them however, a minor realignment will spare damage to the physical infrastructure. ➢ In Vasai common ground for large residential areas is being affected by the prospective alignment and hence realignment is requested. ➢ In Kaman proposed track alignment is cutting the infrastructure of Siddhi Press diagonally which will result in loss of structure and livelihoods. Shall be compensated appropriately at market rate. ➢ In Shilphata, Datta Mandir, a 200 year old temple is being affected by the proposed alignment. Also a lot of residential structure will be affected if the proposed alignment is finalized. Participants have suggested an alternative line to avoid this loss- The proposed route can be via Nilgegaon and Daighar which will minimize the impact and thus save government's money on compensation *Others* ➢ Sufficient land has already been acquired for the proposed express

		highway between Mumbai – Ahmedabad. Participants requested if the proposed high speed railway line can use this already acquired land.
6	Vadodara	*On Alignment and Structure* ➢ Proposed track alignment should be parallel and along the Dedicated Freight Corridor. ➢ Inverted "S" shape alignment near Chhani (on northern outskirts of Vadodara) is very sharp, which may not be technically feasible. ➢ Major physical structures (Rajpath Club hotel, Lalita Tower, etc.) around the Baroda railway station may be damaged if the proposed alignment is approved. Alternate option of underground track and station (tunnel structures) should be considered within the city should be considered. *On Impact* ➢ There are many villages such as Sihor, Ikhriya, Berpur, Mezat, Khusipur and Kotwada which will face water inundation problem if the line is constructed as it would interfere with existing drainage pattern. Appropriate measures should be taken avoid such problems. *On LA and R&R Policy, Process and Measures* ➢ Replacement cost should be given to PAPs including costs for both land and infrastructure. Acquisition benefits should also be given prior to land acquisition. ➢ Large part of Ambika Vijaya Society near Chani, where 48 families are residing, will be affected. These families are living in row house tenement. Most of them have business within 2 km of radius of their place of living. Hence any involuntary relocation should provide them resettlement site around their business locations only. Similar issue was raised by residents of Shilalekh society. ➢ All the acquisition should be done under the supervision of court.
7	Bharuch	*On Alignment and Structure* ➢ The proposed track alignment should be along the DFC line or the national highway as sufficient land has already been acquired for creation of these infrastructures, much of which remain unused. *On Impact* ➢ Talkeswar Mahadev Temple in Telod village will be affected by the project. The temple is highly revered and place of high importance to the locals, as evident from the fact that village of its location too derives its name from the temple. Hence, the participants suggested that alignment would require to be changed, in absence of which the project will face vehement opposition from villagers and the matter would become sensitive. The villagers will also object to shifting of the temple as they consider the temple deity origin to be of natural creation and not manmade. ➢ There is no land (of converted land use for residential purpose) available for constructing houses apart from their farmland and existing residential houses, the families would find it difficult to get new residential plot and construct their houses. ➢ People will also face difficulty in getting electricity connection for their farm bore wells which may be affected by the proposed project. *On LA and R&R Policy, Process and Measures* ➢ Monetary compensation has to be provided at market value to people whose properties/assets are being affected by the proposed track. ➢ Many of the affected are living in joint families while the ownership is with one person. Hence compensation should consider these complexities also and provide benefits to individual family units.
8	Anand	*On Alignment and Structure*

		➢ Participants recognized the benefits and significance of the project. They however, suggested the alignment to be shifted along the express highway for expansion of which sufficient land has already been acquired. ➢ Three over bridges will be required in Boriavi only as the proposed track is passing through 3 state highways- Chandra Nagar – Chaklasi, Samarkha – Sakti Nagar, Jivapara – Samarkha *On LA and R&R Policy, Process and Measures* ➢ There are several commercial establishments (shops, marriage plots, etc.) that draw and depend on location advantage. These affected people should be compensated with equally sized land parcels and the cost of construction/ land development (at market value) and within 2 km of their existing structure. ➢ People whose 60 percent or more land is likely to be acquired would prefer the entire land parcel to be acquired by the government. ➢ Participants also wanted to know about the fate of wells (irrigation resource) if the line passes between the well and agriculture land, making the irrigation source redundant.
9	Kheda	*On Alignment and Structure* and *Impact* ➢ Participants suggested that the track should be shifted and taken along the express highway which has surplus land (acquired) by its side. ➢ In Malataj (Also Sandra, Sanket, Nenpur) village, the proposed track is passing between houses of the village and their farms. This will make it difficult for people to approach their farms. Hence foot Over Bridges should be provided at appropriate places. ➢ The proposed track is crossing a number of important connecting roads such as Nenpur-Malataj, Memdabad-Kheda, Bavra-Kakatpura-Memdabad, Kheda-Mahuda, etc. As per the alignment as shown on the google earth imagery, the proposed track is an embankment type structure. The participants therefore suggested for bridges over these road crossings. ➢ In Bavra village, the school and the dairy cooperative society will fall on the other side of the proposed track. These two places are frequently visited by the villagers and children and hence the proposed track will create lot of inconvenience. Further, there is no government land available in the village where the school can be relocated. Hence acceptable solutions and consideration must be made by government while executing this project. ➢ In Degam village too, government school is being affected by the line and there are no alternative government land for its relocation. ➢ Fencing of the line is suggested by the villagers to avoid accidents as this is high speed railway line and the response time (during crossing of the track) will be less. *On LA and R&R Policy, Process and Measures* ➢ Villagers of Bavra said that they should be given land and construction cost (as per market rate) should be given as compensation to the people whose house will be affected.
10	Ahmedabad	*On Alignment and Structure* ➢ The track alignment should be such designed that it minimizes impact on residential and commercial structures. *On Impact* ➢ Participants from Shahibaug area opined that both house (slum) and livelihoods will be affected. ➢ People from Asarva Bridge/Fatwa Masjid said the affected people are mostly Muslims with poor economic status

		On LA and R&R Policy and Process and Measures Shahibaugh area: ➢ People in this area are mostly earning their livelihoods within a radius of 2 km therefore any relocation plan shall consider this fact so that their livelihoods are protected. ➢ These people have been paying taxes for the places where they have been living, however they are not the owner of these houses rather their status in the receipt are shown as secondary occupant. ➢ All the affected families from same locality shall be shifted to same place which is near to their present location. ➢ They shall be given house against house not money and or land as relocation benefit. Asarva Bridge/Fatwa Masjid area ➢ Families residing in houses that may be affected by the proposed line will be interested in cash compensation (at market rate) only as they fear that in case of relocation they may not be relocated in adjacent locality/preferred location. ➢ There are a few people who have purchased houses recently but they do not have legal documents for ownership. Compensation and R&R benefits should factor in these complexities as well. ➢ Most of the affected are slum dwellers whose livelihood activities/operations are based out in nearby areas only. Hence any relocation and resettlement should be done in areas in vicinity of their current residence only.

Source: SHM consultations, December 2014

(2) Discussion with District Level Officials

In addition to the public meetings held at district level, discussions were held with various district department officials. Discussions were focused on the existing policy and practices on land acquisition pertaining to projects of the nature of HSRC (DFCC in particular), challenges faced, suggestions and recommendations, perceived project impacts etc. Key discussion outcomes are summarized below:

1) One of the key problems faced by the district implementing authority is the lengthy time frame in processing of proposals / issuance of notifications and disbursement of payment.
2) Another important problem is non-availability of proper land records / very old records with land revenue department, resulting in challenges in establishing land ownership etc.
3) Inadequate manpower at Block / District level to implement the land acquisition plan is another problem.
4) Absence of policy for dealing with encroachers/squatters who have encroached/settled recently, establishing their period of occupation and estimation of compensation.
5) Other expected challenges are on account of local resistance and subsequent law & order situation; non-standardization of procedures – varying with projects and state boundaries.

SHM, Vadodara

SHM, Ahmedabad

SHM, Thane

SHM, Kheda

SHM, Palghar

SHM, Valsad

અમદાવાદ-મુંબઈ હાઈસ્પીડ ટ્રેન અંગે ૨૪ ગામોનો સર્વે હાથ ધરાયો

■ ૧૧ જિલ્લામાંથી પસાર થનારી શક્યતાદાર્ગી અહેવાલ માટે તરૂ કન્સલટન્સી દ્વારા ગ્રામજનો સાથે સોશ્યલ ઇકોનોમી સર્વે હાથ ધરાયો

નર્મદા બંધ ખાતે સુવિધા છિનવાઈ

SHM News Coverage, Gujarat Mitra, Surat (5/12/14)

મંજૂરીની રાહમાં ત્યાં સુધી કાર તૈયાર

હાઈસ્પીડ ટ્રેનના સરવેથી ખેડૂતોમાં સળવળાટ

SHM News Coverage, Divya Bhaskar, Surat (5/12/14)

Source: Study Team

Figure 7.11-4 Stakeholder Consultations

7.11.3 Stakeholder Meeting in 3rd Stage

The second round of stakeholder consultations was held during the period 20/04/15 to 30/04/15. The second round of consultations held at all districts headquarters and primarily aimed at sharing of key contents of the RAP document prepared specifically the entitlement matrix. Further, this was also used as a platform to assure the stakeholders about transparency in the process such as incorporation of feedback and suggestions, received in the first round of such consultation, in to RAP document draft. The meetings witnessed participation from project affected persons, representatives from district level departments and local NGOs, details of which are provided in the table below:
From now on, the declaration of RAA 2008 will be announced and SHM will be conducted at community (village) level. The detailed discussion between MOR and stakeholders will play an important role to build consensus on HSR.

Table 7.11-11 Summary of Discussion of District Level Consultations

Sl. No	**Date**	**District**	**No. of Participants***	**Representation from District Department****
1	20.04.15	Ahmedabad	60 (20)	None
2	21.04.15	Kheda	8	None
3	22.04.15	Anand	14	None
4	23.04.15	Vadodara	13	None
5	24.04.15	Bharuch	14	None
6	25.04.15	Surat	7	None
7	27.04.15	Navsari	9	None
8	28.04.15	Palghar	36 (13)	
9	29.04.15	Thane	14	ADM and Sub Collector (2) from Dist. Collectorate
10.	30.04.15	Valsad (and Dadra)***	-	-

Source: Stakeholder Meetings Attendance Register, 2015
*No. in parenthesis denote female participants present in the meeting
** In addition to the above, in 1 district there was representation from local NGOs (Adivasi Ekta Parishad, Palghar).
*** *the meeting could not be organized in Valsad (and Dadra), as planned on account of prevailing antagonism among the participants who approached for the event. Various participants (from among the affected households) were approached over phone to attend the event. A sizeable number among them are from villages around Vapi and in Pardi and Umbergam taluka such as Kocharva, Tal, Rata etc. The participants, repeated their demand from the first round of SHM, wherein they wanted representation of MoR, meeting to be held at village level or in Vapi (instead of Valsad), change of alignment and non acceptance of proposed alignment. The response received was laced with extreme hostility and threat to disturb (not allow) the very conduct of the SHM, if actually held. Hence, as precaution (and in view to not sensationalize the matter given that the project is currently at feasibility stage only), the meeting was cancelled.*

Source: Study Team

The summary of consultation outcomes is presented below.

Table 7.11-11 Summary of Discussion of District Level Consultations

Sl. No	**Districts**	**Key Outcomes/Concerns/Suggestions from Meeting**

1	Ahmedabad	*On Alignment and Structure* • People wanted to know by when the track alignment will be finalized. *On Impact* • Participants from Shahibaug area perceive that both their residences (slum) and livelihoods will be affected. • People from Asarva Bridge/Fatwa Masjid reiterated the affected people are mostly Muslims with poor economic status *On LA and R&R Policy and Process and Measures* • Participants appreciated the proposed entitlement matrix and R&R mechanism (as proposed in the RAP) and said that this would address all of their concerns. • Some of the attendees opined that each PAF should be given the opportunity to exercise option which he/she prefers such as cash compensation or cash plus land or constructed house • People from Shahibaug area (Maku Bhai's chal) and Asarva Bridge/Fatwa Masjid area once again (as they did in the 1st SHM) reminded that they should be relocated within a radius of 2 km as their livelihood activities and education of children are based out of the area where they are currently residing. They further added that if PAHs are to be shifted/ relocated in groups to distant place they should be provided with transportation facility for easy access to their existing work places located in the vicinity of project affected areas. • People stressed that there are multiple families residing in one single residential unit and should be compensated considering family as the unit. Consultants assured them of similar recommendation being made in the entitlement matrix proposed. • Other suggestions included that most of the affected families are slum dwellers whose livelihood activities/operations and education of their children are based out in nearby areas. Hence any relocation and resettlement should be done in areas in vicinity of their current residence only. It was conveyed to the participants such views are reflected in the RAP document as well.
2	Kheda	*On Alignment and Structure* and *Impact* ➢ All concerns raised during the first round of meeting were reiterated by the participants. ➢ Major concern and dilemma expressed was regarding the timeline of the project as to when the track will be finalized and work will start- Some of the households have plans of up-gradation, new construction, repairing, etc. of their houses. However they are clueless on whether to start the work or wait and if wait till when? ➢ Participants wanted project to provide approach road to reach agriculture land if access is severed by the proposed railway line. ➢ People are concerned that their residential structure may be affected by the vibration caused by the train running at such high speed (they are more concerned as even the trains that run on the existing Mumbai Ahmedabad line are learnt to be causing vibration). ➢ Participants repeated their demand that the track should be shifted and

		taken along the express highway which has surplus land (acquired) by its side. *On LA and R&R Policy, Process and Measures* • A query was raised that if the line passes through the middle of a land or house what will happen to the remaining land or house which is not useful for the owner. It was clarified that in such cases recommendation has been made to compensate for the entire property (if it is unviable or rendered orphan). • One of the participants raised the concern that he has bought a parcel of agriculture land for which registration has been done but ownership has not yet transferred to him. The ownership transfer is entangled in existing state policies that disallows (in his perception) state outsiders (which he is) to purchase agricultural land in the state. He is thus worried that if the said land parcel is to be acquired, who will be compensated by the state. • Participants from villages also felt that many among them do not have any formal estimate of the built structure and are thus not sure if the proposed compensation amount will be adequate and matching to the replacement cost or not. It was clarified that the recommendation has been made for replacement cost to be the basis of compensation. • Participants suggested that families whose businesses are affected by the project should be given permanent job if there is educated person in those families. • Participants also expressed concern about the adequacy of compensation amount and timing of payment.
3	Anand	*On Alignment and Structure* ➢ Participants reiterated their suggestion of shifting the alignment and taking it along the express highway for expansion of which sufficient land has already been acquired. ➢ People are a little worried regarding when the alignment will be finalized and also sharing information to all the affected families. *On LA and R&R Policy, Process and Measures* ➢ Participants suggested that farmers should be given detailed information such as whose land will be acquired, how much, line alignment, etc. before taking suggestions from them regarding LA and R&R. It was shared that such detailed information can be made available only when the alignment is finalized and the project approved. ➢ Few of the attendees want each impacted family to be given a permanent government job in lieu of losses suffered. ➢ Suitable land should be given to farmers if their cultivable land is acquired. ➢ Land ownership records may not be updated and hence actual ownership status should be properly assessed first and compensation should be given accordingly. ➢ Participants also shared prevailing worry among the people regarding the fate of their planned investments - when line will be finalized, if they invest now and line is finalized then will they be compensated for the new investment, etc. ➢ Participants also expressed the view that the consultations should be organized at the village level so that all the affected families should be

		able to express their views.
4	Vadodara	*On Alignment and Structure* • Participants asked whether the line is finalized or not as some of them are planning various kinds of investment such as coloring of house, extension of existing structure, etc. which they fear will not be appropriately compensated if the line is finalized. • The proceedings also brought out prevailing confusion among the people whether this survey is for high speed train or bullet train which was clarified during discussions. *On Impact* • Participants feel that the assessed impact (as reflected in the RAP document) is less than actual impact likely to be caused by the proposed alignment. It was clarified that survey was carried out meticulously however the observation made may be partially true as few residential units in and around Vadodara station did not permit the survey team to enter their premises and hence affected household related numbers may have remained underestimated. *On LA and R&R Policy, Process and Measures* ➢ Participants fear that they will not have any opportunity to voice their concern as the new land Acquisition Act has no scope for public consultation. ➢ Some of the participants felt that they should get appropriate compensation (2 times of market rate in urban areas and 4 times of market rate in rural areas) and if done, they will have no problem in parting with their land/assets.
5	Bharuch	*On Alignment and Structure* ➢ Participants proposed track alignment should be along the DFC line or the national highway as sufficient land has already been acquired for creation of these infrastructures, much of which remain unused. ➢ Participants were eager to know whether the alignment is final or not and if not by when would it be finalized. *On Impact* ➢ Participants reiterated their earlier stated position that the current alignment will affect controversial assets such as temples which will be difficult to be relocate. ➢ Participants, during telephonic conversation, felt that such consultations should be conducted at the village level to secure a better participation and views of all affected people. It was conveyed to them such micro level events would be organized once the project is finalized and approved by the government. ➢ Participants raised a concern that train running at such high speed will cause disturbance due to vibration for the people living in vicinity to the proposed tracks. *On LA and R&R Policy, Process and Measures* ➢ Participants appreciated the proposed entitlement matrix by saying that it reflects their demands and responds to various loss aspects. ➢ Some of the participants (who are farmers) said that land should be

		provided against land acquired as they do not have any other skill for earning their livelihoods. ➢ Many of the affected are living in joint families while the ownership is with one person. Hence compensation should consider these complexities also and provide benefits to individual family units. ➢ Participants also repeated their earlier demand that monetary compensation should be provided at market value against losses incurred.
6	Surat	Participation in the meeting was very low as most of the affected people who were called to inform about the meeting were busy in their daily activities and further they felt that participation in such meetings would be useful only when the alignment and the project is finalized. *On Impact* ➢ Some of the participants raised the concern that if they are relocated from their place of residence then their business will also be affected. *On Alignment and Structure* ➢ Few participants also have the notion that the project has been shelved given there is no provision for this project in the railway budget. It was told to them that such knowledge is unfounded and not true. ➢ Some of the participants reiterated their demand of having adequate provisions of flyovers / under passes constructed near important crossing especially near school and temples. *On LA and R&R Policy, Process and Measures* ➢ Some of the participants have been allotted residential land by the government for house construction, they wanted to know whether they will be given alternative land or not. ➢ Participants felt that in case of relocation they should be given an opportunity to identify land suitable to them.
7	Navsari	*On Alignment and Structure* ➢ Participants were very eager to know when the line will be finalized. ➢ Demand was also raised regarding detailed and advance sharing of alignment with affected households. It was explained to the participants such sharing (at this stage) has already been done to the affected households during census survey and this will be done again once the alignment is finalized. Further, two rounds of SHMs have also been conducted with same objective. They were also informed that upon finalization of the alignment and project approval, the government will make public disclosure (through local newspapers) of plot wise information of land parcels to be acquired. ➢ Participants also made queries about the width of alignment for which land will be acquired. It was explained to them and further added that this alignment and the width is not finalized and will be made known to them once it is done. *On Impact* ➢ Participants were concerned regarding how the impact on temples will be avoided/ addressed by the project proponents?

		➢ People have suggested the possibility of taking the line under or above ground in order to minimize the impact. *On LA and R&R Policy, Process and Measures* ➢ Farmers among the participants expressed their preference for land against land as the basis of compensation. ➢ Participants also raised concerns regarding compensation rate as to whether this will be on market rate and who will decide the market rate and how. The participants were briefed about the recommendations of the RAP and the entitlement matrix in this context. ➢ Few people in this district are in the process of developing residential and/or market colonies. The participants in this context raised their concerns arising out of time line of the project specifically its finalization/approval. The uncertainty around this is making them unable to take decision on continuing continue with their projects as this may have high financial implications.
8	Palghar	*On Alignment and Structure* ➢ Participants once again opposed the proposed route alignment as it will result in considerable damage to residential structures (particularly in Vasai taluka in Mumbai suburbs) and homestead land as well as farm land and requested re-consideration of the same. ➢ They do not see any benefit from this project to them and do not want to part way with their farm land as they have invested a lot on their farm land which is their only source of income. ➢ They do not want to this line to pass between the existing railway line and NH8 (set apart by 20 km distance). One of the participants questioned the need to align the line within this stretch, and wanted the proposed line to be aligned somewhere else. Alternatively the suggestion was made for the line to be laid along the sea or along the forest. *On Impact* ➢ Large area of agriculture land that has been developed by the local tribal population will be acquired- was a major impact related concern raised by particpants *On LA and R&R Policy, Process and Measures* ➢ They fear that financial compensation given to them will not be of any use as they tend to misuse it. ➢ Participants felt that they such consultations at village level will be of more useful. *Others* ➢ They fear that many other industrial and infrastructure projects are coming up in future in this district and most of the people from this area will be relocated which is not a sustainable way of development. The participants also shared that people have already given them land for ongoing Expressway (Road) in the district. ➢ Participants said that the report shall clearly mention that the project will impact indigenous people in Palghar district as they feel that external agencies should restrict themselves from funding such projects.

		➢ People felt that in any infrastructure projects smaller farmers, etc. are often relocated while people with large land holding or influential households are never relocated which is not fair.
9	Thane/ Mumbai	*On Alignment and Structure and Impact* • In Shilphata, Datta Mandir, a 200 year old temple is being affected by the proposed alignment. Also a lot of residential structure will be affected if the proposed alignment is finalized. • Participants have suggested an alternative line to avoid the above loss- The proposed route can be via Niljegaon and Daighar which will minimize the impact and thus save government's money on compensation • Further suggestion was for the proposed alignment to pass in between Bhopar and Betwade villages that has large patch of open land belonging to Premier Car Company, MMRDA corridor has already been sanctioned near to this patch of land. • Between Dongripada and Kaman Railway station a marginal shift of around 100 ft towards left of line (Mumbai-Ahmedabad) will save around 200 structures both commercial (60) and residential (40) falling along 2 – 3km stretch. While acknowledging the suggestion made, it was clarified that all such alignments are finalized keeping the macro impact aspects in view and that any such suggested changes can/will be done only if it is technically feasible and also in the view that changes brought in do not result in larger impacts some where else. *On LA and R&R Policy, Process and Measures* • People raised their concern regarding who will be compensated in case the land is being cultivated by someone who is not the legal owner of the patch of land. • Participants expressed satisfaction with the entitlement matrix disclosed during the meeting specifically on the provision made on replacement cost as the basis of compensation. *Others* • ADM and sub collector representing the district administration shared their knowledge of projects where affected/displaced stakeholders have been given the option of share-holding in the company managing project operation and such options may be explored in this project as well. • Quota and preference should be given to the PAFs in the business/commercial opportunities (such as shops/outlets serving passengers) arising out of this infrastructure development project.
Source: SHM- Disclosure consultations, April 2015		

7.12 Indigenous People Plan

Scheduled Tribes in India, as recognized the Constitution of the Indian Republic; there are total of 645 district tribes. The term "Scheduled Tribes (STs)" refers to specific indigenous peoples whose status is acknowledged to some formal degree by national legislation. The HSR alignment will across some of their places of residence .Therefore, The Indigenous Peoples Planning Framework (IPP) is prepared in compliance with the Government's National Policy, JICA Environmental & Social Consideration Guidelines and World Bank's Policies on Indigenous People (OP): 4.10. The IPP provides a framework and a plan within which the resettlement, livelihood and other impacts linked/associated of the indigenous people with the project will be addressed.
It provides guidance in formulating Indigenous Peoples Plans, and to ensure that if indigenous populations are affected by the HSR such as:

i) They are adequately and fully consulted,

ii) They receive benefits and compensation equal to that of the mainstream population,

iii) They are provided with special assistance as per laws and policies because of their vulnerabilities opposite to the mainstream population, and

iv) They receive adequate protection against project adverse impacts on their culture identities. The proposed framework is prepared in consultation with the tribal families/peoples of District Palghar (Maharashtra) and Valsad (Gujarat). The villages located within the project influence districts have Schedule Tribe population varying in a range of 70 percent to 80 percent of the total population. In order to have a more focused indigenous plan framework, these issues have been grouped into:

- Issues that are directly related to the project development for which measures will have to be taken up under the project to address them and;
- Issues which are outside the scope of the project but institutional collaboration could help the tribal in their development.

7.12.1 Contents of the Report

The Indigenous People's Plan report has been presented in 7 chapters.

i) Chapter-1 deals with the Project background and layout of the report.

ii) Chaper-2 deals with objective and scope of work, approach and methodology for the study.

iii) Chapter-3 deals with Legislative and Regulatory framework for indigenous people.

iv) Chapter-4 deals with Socio-Economic and Cultural Status of Indigenous Groups and Communities in the project areas.

v) Chapter-5 has highlighted on the project impact on indigenous Communities and tribal groups.

vi) Chapter-6 describes the entitlements and Assistance framework of the indigenous people. It also describes the identification of development activities and project proponent's commitment on IPDP.

vii) Chapter-7 highlights the implementation strategy, grievance redress mechanism, implementation Action Plan, institutional arrangements and monitoring and evaluation for IPs.

viii) Finally, Chapter-8 describes Budget cost and Estimates.

7.12.2 Location of Affected IP Groups

In the HSR Project, some of the districts such as Navsari, Valsad, Surat, Bharuch, Vadodara and Thane are shown to have high to significantly high tribal population. However, it may be noted that the alignment largely passes along existing railway and road highways and hence tribal population in affected land corridor may not be as significant as is apparent from the table presented here. In most of the districts, the tribal pockets are largely situated in the eastern part of the district boundaries. However in the districts of Palghar (newly carved out district from Thane) and selected blocks of Valsad bordering Maharashtra the alignment passes through tribal dominated areas. According to the Census of India 2011, 8.61 percent of the Indian population is classified as ST. In comparison to the national figure, Gujarat has 14.75 percent and Maharashtra has 14.75 percent of its populations classified as ST. The STs in Gujarat comprised 8.9 million of the total State population of 60.43 million, whereas in Maharashtra 10.5 million of the total 112.37 state population. The major tribes of Gujarat are (i) Varli (ii) Bhil (iii) Dhodia (iv) Vasava, (v) Dhanka, (vi) Rathawa, (viii) Padvi (ix) Halpati (x) Nayaka and some of the major tribes of Maharashtra are (i) Koknas (ii) Korku (iii) Thakar (iv)Koli, (v) Malhar Koli, (vi) Gabit, (vii) Mangela.
The summary profile of the studied villages of ST population in comparison to total population as described in Table 7.12-1.

Table 7.12-1 Village Wise ST Population

Villages	Taluka	No. of HHs	Total Population	Total ST Population	Male ST Population	Female ST Population	% of ST Population to Total Population
GUJARAT							
Achchhari	Umbergaon	404	2,047	1,499	779	720	73.2%
Zaroli	Umbergaon	1,093	5,469	4,755	2,378	2,377	86.9%
MAHARASHTRA							
Chari	Dahanu	125	464	462	229	233	99.5%
Jamshet	Dahanu	294	1,775	1,743	886	857	98.2%
Kapase	Palghar	412	1,689	1,105	534	571	65.4%
Varkhunti	Palghar	159	792	539	279	260	68.1%
Karajgaon	Talasri	338	1,849	1,834	901	933	99.2%
Zari	Talasri	806	4,602	4,541	2,183	2,358	98.7%
Mori	Vasai	263	1,158	810	394	416	69.9%
Shilottar	Vasai	73	333	286	129	157	85.9%

Source: Census of India-2011

7.12.3 IPP Budget

The cost required for IPP is involved in Item C: R&R Implementation and M&E, Table 8.1 Project Budget of RAP.

Appendix I Form of Monitoring (*for reference only*)

The latest results of the below monitoring items shall be submitted to the PIU as a part of Monthly Progress Report throughout the construction phase.

(1) Response/Actions to Comments and Guidance from Governmental Agencies and Public

Monitoring Item	Monitoring Result during Report Period
Number and contents of formal comments made by the public	
Number of contents of responses from Government agencies	

(2) Air Quality

Item	Unit	Measured Value (Mean)	Measured Value (Max)	Indian Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method)
SO_2	$\mu g/m^3$			80 (24h)		
NO_2	$\mu g/m^3$			80 (24h)		
PM_{10}	$\mu g/m^3$			100 (24h)		

(3) Water Quality

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Indian Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method)
pH	-			5.5 to 9.0		Discharge to a river
SS	mg/l			100		Ditto
Oil and Grease	mg/l			10		Ditto
Total Coliform	MPN /100ml				Should not be detected during 100ml	Ditto
Temperature						Ditto

(4) Waste

Monitoring Item	Monitoring Result during Report Period
Inventory record of waste disposal (volume, methodology)	

(5) Noise/Vibrations

Item	Unit	Measure Value (Mean)	Measure Value (Max.)	Indian Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method)
Noise level	dB(Leq)			50 to 75 (day)		General house measured near by the site location
Vibration level	dB					The baseline will decide by each land usage.

(6) Land Contamination monitoring

Monitoring Item	Monitoring Results during Reporting Period
Check the maintenance of construction machine	

(7) Occupational Health Monitoring

Monitoring Item	Monitoring Results during Reporting Period
Opinion or complaint of construction worker	

(8) Involuntary resettlement, Poor

Monitoring Item	Monitoring Results during Reporting Period
Hiring RAP implementation Consultant (NGO) Monitoring by internal and external monitoring agency	

(9) Social Aspects

Monitoring Item	Monitoring Results during Reporting Period
Opinion or complaint of residents near the construction site	

The latest results of the below monitoring items shall be submitted to the PIU / HSRC as a part of Monthly Progress Report throughout the operation phase.

(10) Response/Actions to Comments and Guidance from Governmental Agencies and Public

Monitoring Item	Monitoring Result during Report Period
Number and contents of formal comments made by the public	
Number of contents of responses from Government agencies	

(11) Noise/Vibrations

Item	Unit	Measure Value (Mean)	Measure Value (Max.)	Indian Standards	Referred International Standards	Remarks (Measurement Point, Frequency, Method)
Noise level	dB (Lmax,LAeq)				70 (Lmax) 60 (LAeq)	25m from the nearest track center, above the ground 1.2m
Vibration level	dB				70 (Lmax)	Lmax is referring to the Japanese standard, Laeq is overseas HSR reference standards

(12) Restoration of Livelihood

Monitoring Item	Monitoring Results during Reporting Period
Monitoring by external monitoring agency	

Appendix II TOR for RAP Implementing Agency

AII-1 Introduction

The Government of India with the financial loan from Japan International Cooperation Agency (JICA) has undertaken a project named Mumbai-Ahmedabad High Speed Railway (HSR) Corridor Project in order to improve the volume of travelling people and goods being transported in the country. The HSR will be constructed approximately 500 km long stretch between Mumbai and Ahmedabad. The Indian Ministry of Railway (MOR) has prepared Resettlement Action Plan (RAP) that will govern adverse social impacts due to the project. The RAP is consistent with the JICA Guidelines for Environmental and Social Considerations which is equivalent with World Bank's OP 4.12 Annex A. A RAP Implementing Agency (IA) i.e. NGO or local Social Consulting Firm will be engaged by the MOR for an implementation of the said RAP.

This RAP for the project complies with the Resettlement Framework (RF) is prepared based on relevant national law (Government of India (GOB) Railway Amendment Act 2008, National Rehabilitation and Resettlement Policy 2007)[1] and with the policy of the JICA Guidelines for Environmental and Social Considerations and World Bank OP 4.12. An RAP Implementing Agency (IA) i.e. NGO or Social Consulting Firm will be engaged by the RVNL/HSRC for implementation of the RAP. The location map of planned HSR is shown in Figure AII-1.1.

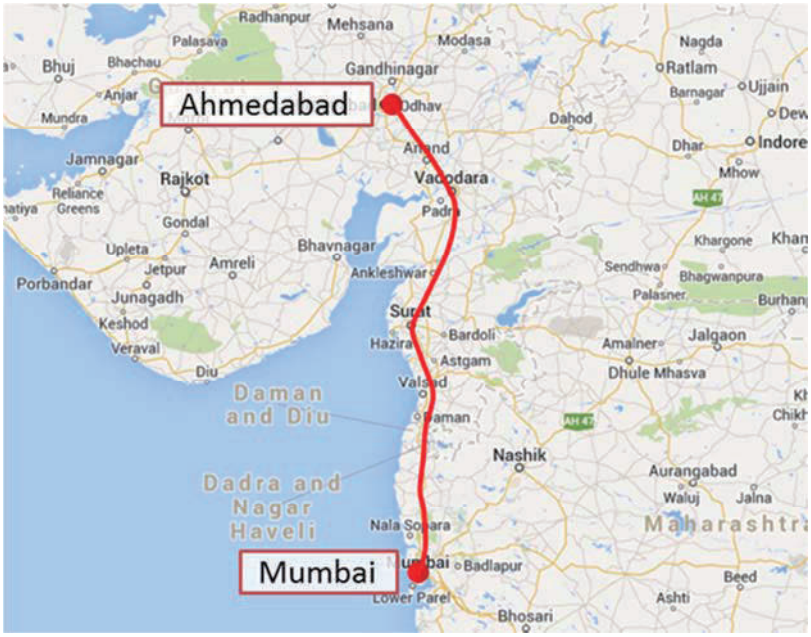


Figure AII-1.1 Location of the Project

Context:

A RAP based on census survey of the affected structures (based on the understanding of the current alignment) has been developed. The details of impacted land and displacement have been provided below.

Table AII-1.1 Displacement and other Impacts

Sl. No.	Loss type	No/Total

[1] HSRC project may be brought under the purview of LARR 2013 Act, which is currently being debated in the Indian Parliament for proposed amendments in the Act. One such amendment pertains to inclusion of Railway Projects within the fold of LARR 2013 applicability.

1	Total quantity of land (Hectare) affected	1691.2
2	Total number of households affected	2761
2a.	Total No. of Physically Displaced Families	1451
3	Total number of vulnerable PAH affected	281
4	Total number of private structures affected	1688
4a.	Total No. of Residential Structures	1467
4b.	Total No. of Commercial Structures	221
5	Total number of fruit tree affected	26,980
6	Total number of timber tree affected	53,457
7	Total number of common property resources affected	1,610

Note: The details of affected land losers are not available in the current RAP and will be available during the detailed design stage. Similarly the details of impacted structures/families produced above are based on the current understanding of the ROW.
A list of the affected households with demographic and socioeconomic information will be provided to the implementing agency (IA) by RVNL/HSCR.

AII-2 Scope of Work - General

The general scope of work shall include two tasks (these have been elaborated in the detailed scope of work):
Task I: **Updation of the Census Survey of the Affected People;**
Task II: **Assist the project implementing agency in the implementation of the RAP:**

AII-2.1 Task I: Updation of the Census Survey of the Affected People;

A RAP based on census survey of the affected structures (based on the understanding of the current alignment) has been developed. The RAP in its current form does not include the details of the affected land losers and other dependent categories (like sharecroppers, agricultural labourers). The scope of work for Task one would specifically include the following:

(1) Verification of the existing census survey of all physically displaced/impacted structures/households based on the final alignment. This final alignment (ROW) will be defined/detailed in the detailed engineering design;

(2) Census survey of all land losers based on the final alignment and the ROW and details of impacts on land of each of the affected land losers;

(3) Updating inventory of losses for all impacted households falling in the ROW;

(4) Census survey of all other impacted groups (like the land losers, tenants, agricultural workers etc.);and

(5) Making a detailed micro plan listing down all entitlement and benefits as per the entitlement framework (as described in the RAP).

AII-2.2 Task II: Assist the Project Implementing Agency in the Implementation of the RAP:

The implementing NGO/Social consultant would as a part of Task II be involved in and work with the the project implementing agency in the implementation of the RAP.

Key delivery components under this task include: (i) consultation and stakeholder participation; (ii) dissemination of relevant information; (iii) assisting executing agency (RVNL/HSCR) in payment of compensation and other resettlement grants (iv) assisting affected persons (PAPs) in the process of resettlement.

The key activities that would be undertaken as a part of task II would include:

(1) **Information Campaign:** The consultant will design, plan and implement an information campaign in the affected areas to facilitate the implementation of RAP. The campaign would include measures such as distribution of information booklets, leaflets, notices and other materials among the PAPs, carrying out community meetings, public announcements and any other measures necessary to provide information to all PAPs in the project area. The consultant will assist the PAPs during pre and post relocation period. The IA staff will also assist PAPs, where necessary, in preparing grievance redress cases for consideration by the grievance redress committee (GRC). Assistance to RVNL/HSCR in payment of resettlement benefits to PAPs. The selected Implementing agency will be responsible to assist RVNL/HSCR in processing entitlements for the PAPs and making payment of resettlement benefits to them. The IA will compile and process data and develop & operate a menu driven computerized Management Information System (MIS) for preparation of entitled persons (EPs) file and entitlement card for EPs.

(2) **Dentification of EPs/PAPs**: Based on the verification and census survey prepare final list of affected households, commercial business enterprises and community establishment now staying within the ROW from the list.

(3) **Assistance to PAPs during relocation**: The IA will assist the PAPs during pre and post relocation period in close coordination with Resettlement Advisory Committee (RAC) and RVNL/HSCR. The IA will inform the affected households, especially the vulnerable ones, about the "compensation in cash and/or kind" option stipulated in the RAP and ensure fulfillment of the choices made by them. It will also provide Counseling and helping the households, whose previous incomes have been seriously affected, to find alternative source of income.

(4) **Assistance to RVNL/HSCR in Payment of Resettlement Benefits to PAPs:** The selected Agency will assist RVNL/HSCR in processing entitlements for the PAPs and making payment of resettlement benefits to them. The Agency will compile and process data and develop & operate a menu driven computerized Management Information System (MIS). The IA will prepare Entitled Person (EP) files with type and quantity wise losses and Entitlement Card (EC) mentioning amount of compensation/benefits for each of the EPs and prepare Indent mentioning category wise amount of compensation /benefits. The indent would be approved by the Project Director before making payment. The IA will prepare payment debit voucher on behalf of RVNL/HSRC and assist RVNL/HSRC in preparing Measurement Book. The debit voucher will be signed jointly by IA and EA representative and the cheque will be signed by IA and be issued in public place in presence of local government institution (LGI)/district administration representatives. The RVNL/HSCR will place fund with Implementing Agency for making payment and the IA will submit vouchers with other documents on regular basis to the Project Director after making payment.

(5) **Notice for Encumbrance Free:** the IA will deliver written notice to individual affected persons at completion of payment of all compensation/entitlement from RVNL/HSCR. The RVNL/HSCR will keep records of issuance date of notice for making ROW encumbrance free signed by both RVNL/HSCR and EPs.

(6) **Taking-over and handing-over sites:** The IA will assist RVNL/HSRC take-over acquired land from DC office and then hand-over to contractors. Contractors will move into sites the day following expiration of the encumbrance free notice.

(7) **Implementation of the Grievances redress procedure:** The selected IA will play vital role in the grievance redress process. The most important preconditions for doing this with maximum effectiveness are that the IA operatives will build personal rapport and confidence with the PAPs and will be fully aware of all socioeconomic problems/issues arising from the project. Among other things, the IA will:

1) Ensure that the PAPs are fully aware of the grievance redress procedure and the process of bringing their complaints to the GRC.

2) Assist the PAPs in any usual manner (e.g., preparing applications, accompanying them to the hearing and explaining the grievance to the GRC and the like) to bring the complaints to the committee.

3) Impartially investigate the veracity of the complaints and try to settle them amicably, fairly and transparently before they go to the redress committee or the courts of law.

4) For more focused work in this area, the IA will prepare a list of problem cases in implementation of RAP. In doing so, the IA will pay special attention to the problems and needs of the vulnerable PAPs and recommend to the RVNL/HSCR with probable mitigation measures.(v) And to ensure easy access to PAPs, the IA will appoint, and let this be in the knowledge of the PAPs, a dedicated staff to deal with grievance redress issues at project locations (at district level at least).

(8) **Information management:** The selected IA will collect computerized Census and SES data related to the pre-acquisition condition of the affected households and the nature and magnitude of all categories of losses as well as the compensation thereof determined by RVNL/HSCR. All essential information will have to be generated by using one or more menu-driven MIS. Among other things, the IA will:

1) Collect cash compensation under law (CCL) from the DC office and prepare statement for assessing additional payment on the basis of quantity of affected properties and RAP Property Valuation Advisory Team (PVAT) rate.

2) Collect and computerize all information related to different types of payments and additional supports provided to the EPs and update the EPs file and ECs.
3) Prepare ‘entitlement card’ for the individual EPs as per their types of losses and the amount of compensation due for each type of loss from legal title and the amount of additional compensation/resettlement benefits if any, to be paid by through IA.

4) Record and maintain details of the issues/disputes causing delay in the disbursement/receipt of compensation and the persons involved in them,

including the cases brought to the courts of law, if there is any.

5) Document information on the cases, with reasons, brought to and resolved by the GRC, with decisions going in favor of or against the complainants.

6) Collect and maintain relocation information on the homestead losers by categories of EP households such as legal owners, squatters, tenants and others.

(9) **Prepare and Submit Progress reports:** The RAP requires that all PAPs are paid the stipulated compensations/entitlements before they are evicted from the properties and/or construction work begins. The selected IA will provide RVNL/HSRC weekly report on the progress in RAP implementation, including any issue that might be hindering progress, separately for each bridge. The report will be brief consisting of both quantitative and qualitative information on:

1) The IA in its report should reflect the status of total number of EPs identified by DC for compensation and progress of payment in a particular period and resettlement benefits paid against DC's payme**n**t and other benefits as per RAP policy by zones and EP categories.

2) Number of focus groups formed and meeting held with the affected persons with issues discussed.

3) Number of vulnerable affected households male headed and female headed have received cheques and be deployed in project civil works according to their eligibility.

4) Number of cases received by the GRC indicating the types of grievance made in favor of or against the complainants.

5) Any other issues that are relevant to implementing the policies stipulated in the RAP.

AII-3 RAP Implementation Sshedule and Tasks

The implementation of the RAP is proposed to be completed within the timeframe mentioned below:

(1) Task I: May 2016 to November 2016 (Census IOL data updation) and December 2016 to March 2017 (Micro Plan Preparation)
(2) Task II: December 2016 to July 2018 (Disclosure, RAP Implementation GR Activities)

The Project Director, in consultation with the Resettlement Specialist (NRS) will provide time schedule as per the requirement of the resettlement program and supervise IA's performance.

AII-4 Staff Requirements

The IA is free to determine the number of members to be working in the team. A bar chart shall indicate the proposed timing of their input. The team members shall meet the following criteria:

(1) The Team Leader (Resettlement Specialist) is the spokesperson for the Implementing Agency. He/she shall hold Masters in Social Science or any other relevant field and have at least 10 years of relevant experience in implementation of RAP, report writing etc. He shall

have conducted at least 5 trainings/ workshops in Resettlement Issues, and must be fluent in English. S/He must also have relevant experience of not less than 10 years related to Task I of the Scope of Work.

(2) The Deputy Team Leader (Resettlement Expert) will assist Team Leader in RAP Implementation process. He/she shall hold Masters in Social Science or any other relevant field and have at least 10 years of relevant experience in preparation/implementation of RAP. He/she shall have conducted at least 5 trainings/ workshops in Resettlement Issues, and must be fluent in English.

(3) MIS specialist shall hold a degree in Statistics, Mathematics or Computer Science having more than 10 years of relevant experience in Resettlement tools (EP/EC), data collection, management and analysis and be fluent in English.

(4) Gender and livelihood development specialist will have at least masters in any discipline with 7 years experience in the relevant field.

(5) Area Manager shall hold Masters in Social Science and have at least 5 years of relevant experience in implementation of RAP. He shall have conducted at least 3 trainings/ workshops in Resettlement Issues, and must be fluent in English.

Enumerators shall be graduates with at least two years relevant experience

AII-5 Implementing Agency Selection Criteria:

The IA should have registration with concerned Authorities and experience in preparation and/or implementation of RAP. The IA will be selected through quality and cost based selection method.

AII-6 Implementation Arrangements

The Implementing Agency has to keep office near the concerned locality (more than one in each zone) during the time of implementation of the RAP in order to ease contact with the PAPs, the cost of which will be specified in the budget. The IA will make its own transport arrangements, which will be reflected in the budget.

Appendix III TOR for External Monitoring Consultant

AIII-1 Introduction

The Government of India with the financial loan from Japan International Cooperation Agency (JICA) has undertaken a project named Mumbai-Ahmedabad High Speed Railway (HSR) Corridor Project in order to improve the volume of travelling people and goods being transported in the country. The HSR will be constructed approximately 500 km long stretch between Mumbai and Ahmedabad. The Indian Ministry of Railway (MOR) has prepared Resettlement Action Plan (RAP) that will govern adverse social impacts due to the project. The RAP is consistent with the JICA Guidelines for Environmental and Social Considerations which is equivalent with World Bank's OP 4.12 Annex A. A RAP Implementing Agency (IA) i.e. NGO or local Social Consulting Firm will be engaged by the MOR for an implementation of the said RAP. The location map of planned HSB is shown in Figure AIII-1.1

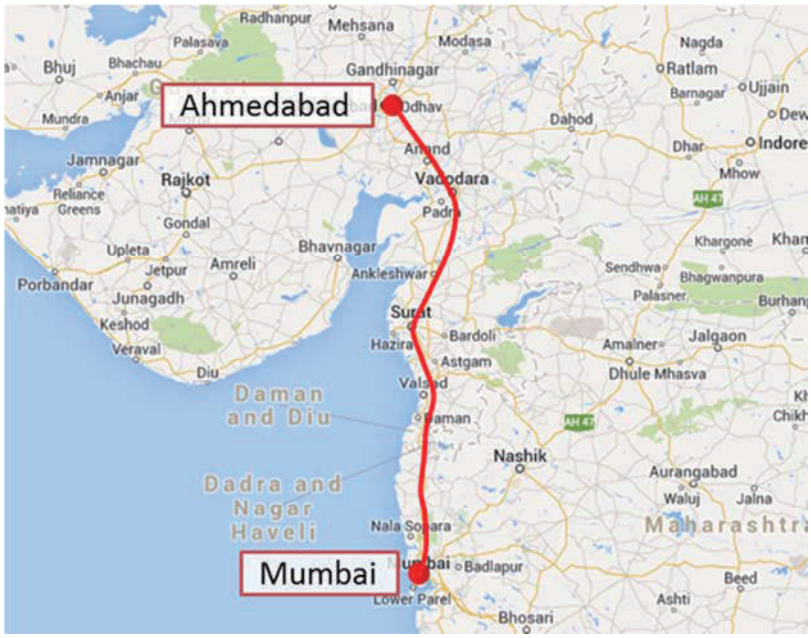


Figure AIII-1.1 Location of the Project

AIII-2 Key Objective of External Monitoring

Monitoring involves the collection and analysis of data on resettlement activities with the applying accruing information. Monitoring allows project participants to keep track of resettlement activities, to determine whether resettlement objectives are being achieved, and to make whatever changes are necessary to improve resettlement performance.

Evaluation is an assessment of resettlement performance and results in light of stated the objectives. Evaluation for purposes of the RAP is proposed to include a participatory component allowing the project participants to comment on their experience of the project. To be successful, monitoring and evaluation begins with clear resettlement design followed by identification and elaboration of appropriate criteria and indicators.

Indicators and Means for Verification

Indicators form the key elements of any monitoring and evaluation system. Indicators also make possible the comparison of inputs with the completion of outputs and achievement of objectives and goals, thus providing the basis for performance evaluation. Four categories of indicators have been formulated to facilitate monitoring of Progress, Outputs, Effects, Impacts and Compliance in implementing the resettlement.

Effect Monitoring
This will be used to measure the extent to which the immediate objectives have been achieved and give an idea of the results emanating from implementing the RAP e.g., percentage of project affected persons (PAPs) now accessing better housing or improved livelihoods on account of being successfully resettled.

Impact Monitoring
This is the process through which, assessment of the overall achievement of the resettlement goal will be made. Specifically, this is the system that will generate data to gauge success towards implementation of this RAP in terms of impact of the resettlement on the PAPs. The basis for impact monitoring is the baseline social-economic survey data against which the wellbeing of PAPs will be compared.

Resettlement Completion Audit
A resettlement completion audit has been proposed to assess the success of the resettlement programme. This completion audit would using the baseline indicators/parameters compare the success of the resettlement programme in bettering lives and livelihoods of affected people. The audit would be taken one/two year after the completion of the resettlement programme. The project would engage an external and qualified third party to undertake this audit.
The independent External Monitoring Agency (EMA) will review implementation process as per set policies in the RAP and assess the achievement of resettlement objectives, the changes in living standards and livelihoods, restoration of the economic and social base of the affected people, the effectiveness, impact and sustainability of entitlements, the need for further mitigation measures if any, and to learn strategic lessons for future policy formulation and planning.

Scope of Work
The scope of work of the Independent EMA will include the following tasks:

(1) To review and verify the progress in land acquisition/resettlement implementation of the Project and whether they have been followed as provided in the RAP.

(2) Provide a summary of whether involuntary resettlement was implemented (a) in accordance with the RAP, and (b) in accordance with the stated policy.

(3) Verify expenditure & adequacy of budget for resettlement activities.

(4) Describe any outstanding actions that are required to bring the resettlement activities in line with RAP. Describe further mitigation measures needed to meet the needs of any affected person or families judged and/or perceiving themselves to be worse off as a result of the Project. Provide a timetable and define budget requirements for these supplementary mitigation measures.

(5) Describe any lessons learned that might be useful in developing the new national resettlement policy and legal/institutional framework for involuntary resettlement.

(6) To Identify, quantify, and qualify the types of conflicts and grievances reported and resolved and assess whether the consultation and participation procedures followed in accordance with the RAP.

(7) To identify the strengths and weaknesses of the land acquisition/resettlement objectives and approaches, implementation strategies.

(8) Identification of the categories of impacts and evaluation of the quality and timeliness of delivering entitlements (compensation and rehabilitation measures) for each category and how the entitlements were used and their impact and adequacy to meet the specified objectives of the plans. The quality and timeliness of delivering entitlements, and the sufficiency of entitlements as per approved policy.

(9) To review the quality and suitability of the relocation sites from the perspective of the both affected and host communities.

(10) Review results of internal monitoring and verify claims through sampling check at the field level to assess whether land acquisition/resettlement objectives have been generally met. Involve the affected people and community groups in assessing the impact of land acquisition for monitoring and evaluation purposes.

(11) To monitor and assess the adequacy and effectiveness of the consultative process with affected PAPs, particularly those vulnerable, including the adequacy and effectiveness of grievance procedures and legal redress available to the affected parties, and dissemination of information about these.

(12) To provide an assessment of pending grievances and suggest redressal mechanisms including any financial liability that they may have for the company/project

AIII-3 Methodology and Approach

The general approach to be used is to monitor activities and evaluate impacts ensuring participation of all stakeholders especially women and vulnerable groups. Monitoring tools should include both quantitative and qualitative methods. The external monitor should reach out to cover:

(1) Sample PAPs (upto 25%) who had property, assets, incomes and activities severely affected by Project works and had to relocate either to resettlement sites or who chose to self-relocate, or whose source of income was severely affected.

(2) Sample persons (upto 5%) who had property, assets, incomes and activities marginally affected by project works and did not have to relocate;

(3) Sample (upto 5%) of those affected by off-site project activities by contractors and sub-contractors including employment, use of land for contractor's camps, pollution, public health etc.;

AIII-4 Other Stakeholders and their Responsibility

(1) **Rail Vikas Nigam Limited (RVNL)/High Speed Railway Corporation (HSRC)** RVNL/HSRC will establish, for the Project, a Project Implementation Unit (PIU) headed by a Project Director (PD), at the project office that will be responsible for the overall execution of the Project. The PIU will consist of two units namely Engineering Service Unit (ESU) and Resettlement Unit (RU) for total implementation of the project. The PD will work on deputation from RHD at the level of Superintend Engineer or Additional Chief Engineer. The project will be overseeing by the PD, RVNL/HSRC. One implementation committee will be formed to provide overall guidelines and cooperation for project implementation and keep liaison with various stakeholders including Donor, different government organizations and other relevant agencies.

1) Acquire, hold, manage and dispose of land and other property to private sector developers, to carry out the planning, engineering, design, construction, marketing, sales and other operations under the regulations of master plan

2) Execute works in connection with the utilization of infrastructure such as supply and discharge of water, electricity, transportation and other services and amenities and generally to do anything necessary or expedient for purposes of such development and for purposes incidental thereto, provided that save as provided in this Act, nothing contained in this Act shall be construed as authorizing the disregard by the Authority of any law for the time being in force.

3) Lead, monitor and evaluate the implementation of the project.

(2) **Implementing Agency (IA):**

RVNL/HSRC will engage an experienced Implementing Agency (IA) for implementation of the RAP in the field level in coordination with the DC, RHD and consultants. The IA will be engaged to assist the supervision consultant for updating of RAP during detailed design phase and will be continuing for implementation of the RAP. The tasks of the IA are to:

1) Verify results of internal monitoring;
2) Assess whether resettlement objectives have been met; specifically, whether
3) Livelihoods and living standards have been restored or enhanced;
4) Assess resettlement efficiency, effectiveness, impact and sustainability, drawing
5) Lessons as a guide to future resettlement policy making and planning; and
6) Ascertain whether the resettlement entitlements were appropriate to meeting the objectives, and whether the objectives were suited to AP conditions.
7) Undertake any other assessment relevant to the resettlement process.

AIII-5 Team Composition of the Independent External Monitoring Agency

Table AIII-5.1 Team Composition and Qualifications

Position/expertise	Qualification and experience
1.Team Leader/ Resettlement Specialist	Degree in social science with 10 years working background in planning, implementation and monitoring of involuntary resettlement for infrastructure projects. Experience in institutional capacity analysis and implementation arrangement for preparation and implementation of resettlement plans, and knowledge in latest social safeguard policies of the international development financing institutions in India.
2. Deputy Team Leader/ Livelihood Restoration Specialist	Degree in social science with 5 years working experience in social impact assessment including census and socio-economic surveys, restoration of livelihood in compliance with social safeguard policies of the international development financing institutions and national legislations. Experience of preparing/monitoring livelihood restoration program for externally financed projects is essential.
3. Gender Specialist	Degree in social science with 5 years working experience in social impact assessment including census and socio-economic surveys, gender in compliance with social safeguard policies of the

	international development financing institutions and national legislations. Experience of preparing/monitoring a gender program is essential.
4. Human Relation Specialist	Degree in social science with 5 years working experience in social impact assessment including census and socio-economic surveys, stakeholder meeting in compliance with social safeguard policies of the international development financing institutions and national legislations.
5. Data Analyst	Graduate with working experience and knowledge of software, preferably relational, those are most commonly used in India; demonstrated ability to design and implement automated management information system (MIS) for monitoring progress, comparing targets with achieved progress and the procedural steps

AIII-6 Time Frame and Reporting

External monitoring of the RAP will be undertaken alongside that of other project components. EMA will take place as follows:

Post Project Monitoring

In order to determine final impacts due to the resettlement activity, evaluation of impact assessment will be undertaken twice a year for three years after conclusion of resettlement to evaluate whether the intended objectives are realised. For this, suitable baseline indicators related to income, assets, land ownership, expenditure pattern of key activities, housing conditions, access to basic amenities, demographic characteristics, indebtedness, etc. will be applied. The monitoring reports should be submitted to RVNL/HSRC. An evaluation report at the end of the project should be submitted to the RVNL/HSRC and concerned parties with critical analysis of the achievement of the program and performance of RVNL/HSRC and IA.

The external monitors will provide monitoring and evaluation report covering the following aspects:

- Whether the resettlement activities have been completed as planned and budgeted;
- The extent to which the specific objectives and the expected outcomes/results have been achieved and the factors affecting their achievement or non-achievement;
- The extent to which the overall objective of the resettlement plan, pre project or improved social and economic status, livelihood status, have been achieved and the reasons for achievement / non achievement;
- Major areas of improvement and key risk factors;
- Major lessons learnt; and
- Recommendations.

Formats for collection and presentation of monitoring data will be designed in consultation with RVNL/HSRC, consultant's resettlement specialist.

AIII-7 Personnel Organization and Man Months of EMC

Table AIII-7.1 Personnel Organization and Man Months of EMC

Position	No of Persons	Months	Overall Duration of Services (years)
Team leader/Resettlement Specialist	1	18	3
Deputy TL/ LR specialist	1	18	3
Gender Specialist	1	18	3

Human Resource. Communication Specialist	1	18	3
Data Specialist	1	24	3

AIII-8 Qualification of the Independent External Monitoring Agency

The I-EMA will have at least 5 years of experience in resettlement policy analysis and implementation of resettlement plans. Further, work experience and familiarity with all aspects of resettlement operations would be desirable. NGOs, Consulting Firms or University Departments (consultant organization) having requisite capacity and experience as follows can qualify for services of and external monitor for the project. NGOs, Consulting firms duly registered with GOI agencies or a department of any recognized university is eligible. The applicant should have prior experience in social surveys in land based infrastructure projects and preparation of resettlement plans (RP, RAP/RAP, LARAP) as per guidelines on involuntary resettlement of any of the JICA, ADB, World Bank and DAC-OECD. The applicant should have extensive experience in implementation and monitoring of resettlement plans, including the preparation of implementation tools. The applicant should be able to produce evidences of monitoring using tools such as computerized MIS with set criteria for measuring achievement.
The applicant should have adequate manpower with capacity and expertise in the field of planning, implementation and monitoring of involuntary resettlement projects as per donor's guidelines. The applicant should not have involved in resettlement planning, as they have a vested interest in reporting smooth implementation. The profile of consultant agency, along with full signed CVs of the team to be engaged, must be submitted along with the proposal.

AIII-9 Budget and Logistics

Consultants should quite for respective time inputs and other deliverables within in the framework of a Quality Cost based selection criteria.

Table AIII-9.1 Criteria for Independent External Monitoring Agency

Criteria for monitoring	Indicators for monitoring
Basic Information on AP Households	Location
	Composition and structure, ages, educational and skill levels and gender of household head
	Ethnic group
	Access to health, education, utilities and other social services
	Housing type
	Land and other resource owning and using patterns
	Occupations and employment patterns , income sources and levels
	Agricultural production data (for rural households)
	Participation in neighbourhood or community groups and access to cultural sites and events
	Value of all assets forming entitlements and resettlement entitlements
Livelihood Restoration Programme	Were house compensation payments made free of depreciation, fees or transfer costs to the PAPs?
	Have perceptions of “community” been restored?
	Have PAPs achieved replacement of key social and cultural elements?
	Were compensation payments free of deductions for depreciation, fees or transfer costs to the PAPs?

	Were compensation payments sufficient to replace lost assets?
	Did income substitution allow for re-establishment of enterprises and production?
	Have enterprises affected received sufficient assistance to re-establish themselves?
	Have vulnerable groups been provided income earning opportunities? Are these effective and sustainable?
	Do jobs provided restore pre-project income levels and living standards?
Levels of Satisfaction	How much do PAPs know about resettlement procedures and entitlements? Do PAPs know their entitlements?
	Do they know if these have been met?
	How do PAPs assess the extent to which their own living standards and livelihoods have been restored?
	How much do PAPs know about grievance procedures and conflict resolution procedures?
Effectiveness of Resettlement Planning	Were the PAPs and their assets correctly enumerated?
	Was the time frame and budget sufficient to meet objectives?
	How did resettlement implementers deal with unforeseen problems?
	Were there unintended environmental impacts?
Other Impacts	Were there unintended impacts on employment or incomes?