CHAPTER 5:

URBAN AND REGIONAL DEVELOPMENT PLANS

5.1 Urban and Regional Development Policies

5.1.1 National Urban Policy

India is expected to have an urban population of about 350 million in the year 2000. There are around 22 cities with a population of more than one million as per the 1991 census. The unplanned and haphazard growth of these cities has led to formulation of many national and regional level development policies. Some of the important policies and strategies specified by the National Commission of Urbanization, which aims at regional development around the city are:

- The cities should be grown to become vibrant centers, making the best use of the natural and human resources in the region where they are located, and, over time, expand their economic base to enable them to assume economic functions which transcend regional boundaries.

- Spatial planning should be given due consideration and a pattern of human settlements should evolve which would minimize the present ills of urbanization. A more viable regional equilibrium can be established if new development centers are equitably distributed in space.

The Commission identified 49 Spatial Priority Urbanization Regions (SPURs) for regional development. These regions were constituted not only between various States but also within States, between sub regions and clusters of districts. One such SPUR identified was the National Capital Region (NCR) to enable a wide dispersal of population and activities through accelerated development of several existing cities, in order to deflect migratory forces away from the metro center.

5.1.2 National Capital Region Development Policy

The NCR was constituted due to the unprecedented growth of Delhi, which has been a cause of serious concern to the Central Government. The gap in availability of essential services like water supply, power, transport and management of solid waste is continuously increasing. The problem is further aggravated due to increasing migration. Thus the NCR development policies, programs and plans aim to:

- Relieve the Capital City from additional population pressures,
- Avoid adding new population pressures on the Capital; and,
- Remodel the pattern of settlements in the National Capital Region to enable them to play their assigned role.

The detailed of the plan is reviewed in the next section.

5.2 Existing Urban and Regional Development Plans in NCR

There are several development proposals in the National Capital Region as well as surrounding major urban centers. The important master plans, which were prepared by the respective urban development authorities, are briefly reviewed in this section.

The list of existing plan is shown in Table 5.2.1.

Table 5.2.1 List of Existing Plan

Name	Prepared by	Target Year	Major Recommendations
Regional Plan-2001	NCRPB	2001	Strategies and Plan Implementation Counter Magnet Area Future Land Use Environmental Management Transportation Development Implementation Plan
Master Plan for Delhi-2001	Delhi Development Authority	2001	Environmental Management Special Area Development Transportation Development Land Use Control
Ghaziabad Master Plan-2001	Ghaziabad Development Authority	2001	Development proposals for NH2 Commercial area development District center development
Meerut Master Plan-2001	Meerut Development Authority	2001	Existing developed area development Industrial area development Development of ring road Development of Expressway
Modinagar Master Plan-2001	Modinagar Developemnt Authority	2001	Industrial area development Control development along main road New town development Improvement of the existing roads

Source: JICA study team

5.2.1 National Capital Region (NCR) Regional Plan-2001

The National Capital Region covers an area of 30,242 sq.km. The region includes the National Capital Territory of Delhi (NCTD) and, parts of the States of Haryana, Rajasthan and Uttar Pradesh. The main administrative constituents of NCR are:

- National Capital Territory of Delhi (NCTD) (1,483 sq.km)
- Haryana Sub-region comprising Faridabad, Gurgaon, Rohtak and Sonepat districts, Rewari and Bawal tehsils of Mahendragarh district and Panipat tehsil of Karnal district. (13,413 sq.km).
- Rajasthan Sub-region comprising tehsils of Alwar district, namely, Alwar, Ramgarh, Behror, Mandawar, Kishangarh and Tijara. (4,493 sq.km).
- Uttar Pradesh Sub-region comprises three districts, namely, Merrut, Ghaziabad and Bulandshahr. (10,853 sq.km).

The prime objective of the Regional Plan of NCR was to obtain Delhi's population size within manageable limits at least by the turn of the Century. The study concluded that economic activity with potential for large-scale employment should necessarily be located outside the Delhi Metropolitan Area (DMA), preferably at a distance which discourages daily interaction with Delhi.

Delhi has experienced a rapid growth during the post-independence period. Delhi's urban population has only 1.4 millions in 1951, but it reached 5.8 millions in 1981 and 9.1 millions in 1991. One of the major contributions of such growth is in-migration to the city. The inflow of migrants was 150 thousands during 1989-1991 and it is equivalent to 50 percent of growth of the population. Therefore, it is obvious that Delhi will continue to growth population, despite physical capacity of the city. According to the population projection made by the National Capital Region Planning Board (NCRPB), Delhi's population is estimated to reach 14.1 millions in 2001 and 20.5 millions in 2011.

In order to manage population increase in Delhi and the DMA towns, NCRPB prepared a plan of "The Region Plan-2001", which intends to deflect approximately two millions of the projected increase population from Delhi and DMA towns to eight identified Priority Towns during 1991 to 2001. The Priority Towns, which are identified in the Regional Plan, are located within the NCR, at distance ranging from

40 to 100 kilometers from Delhi.

Table 5.2.2 List of Regional Centers in the NCR

State	Regional Centers
Uttar Pradesh	1. Meerut
	2. Hapur
	3. Bulandshahr-Khurja Complex
Haryana	4. Palwal
	5. Panipat
	6. Rohtak
	7. Rewari-Dharuhera
Rajastan	8. Bhiwadi Complex
	9. Alwar

In the Plan, the area is subdivided into three categories, namely NCTD (Delhi), Delhi Metropolitan Area (DMA) excluding Delhi and beyond Metropolitan area inside the NCR and adopted it different development strategies.

The NCR Regional Plan-2001 advocated to relief inflow of population pressure from the surrounding states and created a new regional development structure within the region. The reason of deflecting some of the population from Delhi and DMA towns is to reduce pressures in providing the infrastructure and services required for such a large population increase. The provision of urban infrastructure, especially transport sector, has become a target of increasing attention to the government sectors because of large amount of investment needs.

The development policies of each planning zone are summarized as follows:

- Delhi Union Territory has to strict control population increase as well as creation of employment opportunities.
- Delhi Metropolitan Area has to moderate control population and creation of employment opportunities and
- The rest of the NCR should encourage absorbing migrants and creation of employment opportunities.

The Plan identified different development strategies for the respective development zones. In Delhi (NCTD), the immigration should be limited to 84,000 per annum

during 1991-2001. The population of the Delhi Metropolitan Area (DMA) has to be managed as a development policy adopted by the Delhi Government. Priority towns, which are identified in the plan, should develop to absorb population increase to in NCTD and DMA towns. The future population of the DMA towns and the Priority Towns are shown in Table 5.2.3.

Table 5.2.3 Population of the Priority Towns

(Unit: persons)

Name	Area (km^2)	Census 1991	Projection 2001	2011	2016	Density in 1991 (person/km^2)
NCTD	1,483.0	8,471,625	1,436,600	1,950,700	2,100,800	5,712
Delhi Metropolitan Area Towns						
Ghaziabad	70.3	511,759	831,100	1,312,973	1,610,416	7,277
Noida	90.4	146,514	507,601	700,664	804,749	1,620
Faridabad	178.2	847,340	1,114,345	1,975,417	2,704,718	4,754
Gurgaon	24.1	135,884	181,166	243,648	293,524	5,631
Bahadurgarh	9.0	57,235	86,550	109,515	169,586	6,359
Sub-Total	372.1	1,698,732	2,720,762	4,342,217	5,582,993	4,565
Priority Towns						
Meerut	177.6	849,799	1,230,932	1,741,668	2,025,112	4,785
Hapur	14.2	146,262	190,255	241,725	266,334	10,300
Bulandshahar-Khurja	10.4	127,201	142,792	456,336	159,827	12,278
Palwal	5.5	59,168	73,195	91,325	105,965	10,719
Rewari-Dharuhera	11.5	75,342	109,041	159,297	200,057	6,557
Bhiwadi	-	15,285	69,895	209,810	334,228	-
Alwar	-	211,162	256,980	329,133	381,685	-
Rohtak	28.4	216,096	276,675	356,791	420,685	7,614
Panipat	20.8	191,212	262,426	363,375	444,215	9,184
Sub-Total	268.4	1,891,527	2,612,191	3,949,460	4,338,108	7,049
Total		12,061,884	6,769,553	10,242,377	12,021,901	

Source: Census 1991, NCRPB

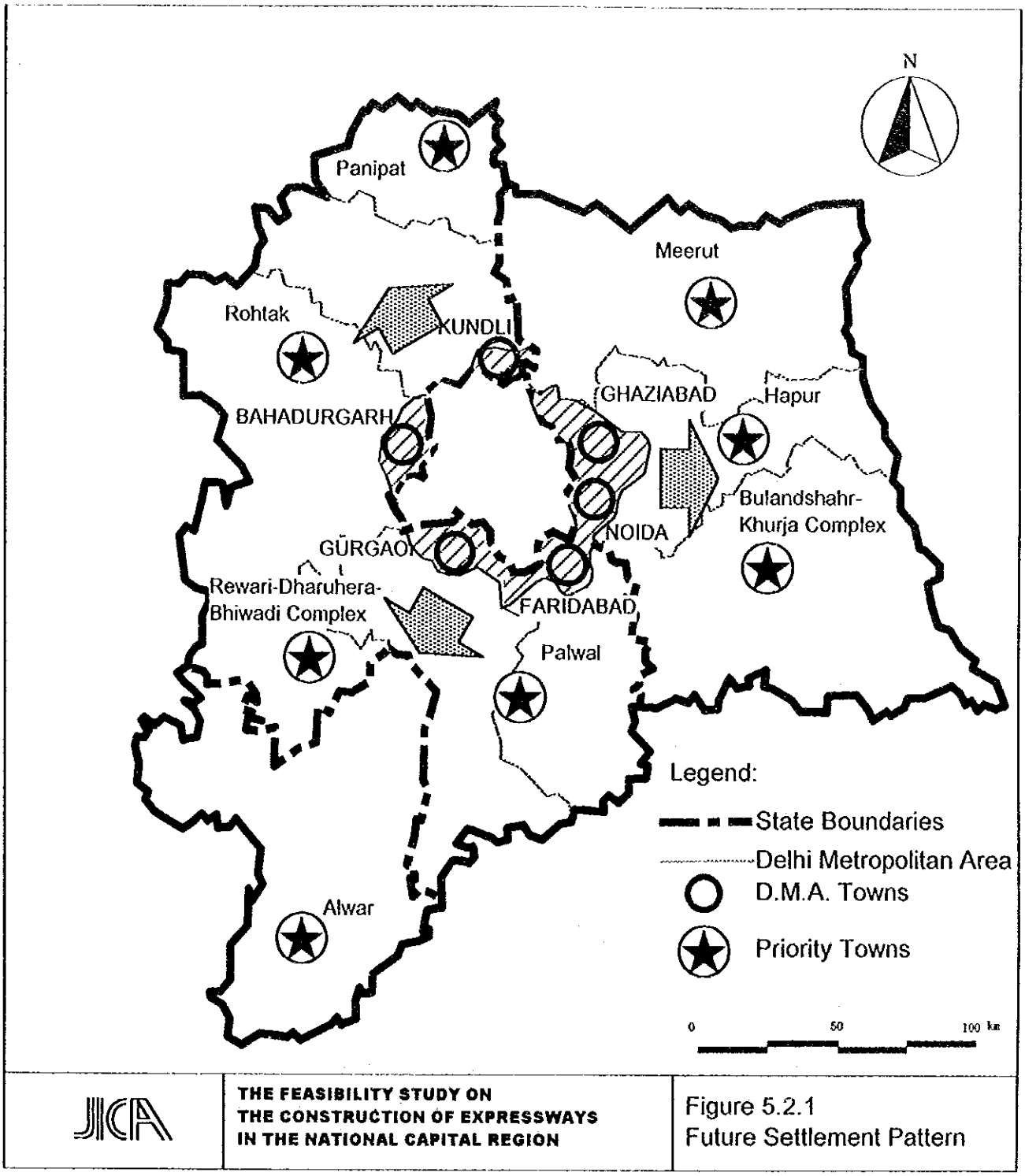
In order to achieve those policies, the Plan divided the settlement system region-wise in such a hierarchical manner as:

- Regional Centers (300,000 population or above)
- Sub-Regional centers (50,000-300,000 population)
- Service centers (10,000 to 50,000 populations)
- Basic Villages (Less than 10,000)

The Plan attempts to distribute the Delhi-bound potential migrants to the nine regional centers by creating employment opportunities in secondary and tertiary sectors. Those regional centers are located outside DMA area about 50-60 km from Delhi except Panipat of Haryana and Alwar of Rajasthan. The settlement system within the NCR is shown in Figure 5.2.1.

The future land use plan prepared by the NCRPB classified land as urbanisable area,

green belt/green wedge, area along the major transport routes and remaining rural land. The land use plan shows that the development of Delhi and other regional centers is limited by a green belt of two kilometers width of on either side of NCTD boundaries.



JICA	THE FEASIBILITY STUDY ON THE CONSTRUCTION OF EXPRESSWAYS IN THE NATIONAL CAPITAL REGION	Figure 5.2.1 Future Settlement Pattern

Figure 5.2.1: Future Settlement Pattern in the NCR

The transport network should be established within the NCR to connect important regional centers with Delhi and the DMA towns. The Figure 5.2.2 shows the development of transportation network in the NCR.

The plan proposes to establish transportation networks within the region to meet the growing traffic demand on roads and railways. The proposed road network includes the following projects:

- Expressway on new and parallel alignment.
  1. Delhi-Modinagar-Meerut Expressway
  2. Sonipat-Panipat Expressway
  3. Faridabad-NOIDA-Ghaziabad Expressway
- Upgrading of the existing National Highway i.e. NH8, NH24, NH10 and NH2 in various sections.
- Development of inner and outer grids
- Sub-regional road network

For the railway network, the Plan recommends regional bypasses passing through Meerut, Hapur, Bulandshahr, Khurja, Palwal, Rewari, Roftak and Panipat. The development proposals for the future transport network are shown in Figure .5.2.2.

5.2.2 Master Plan for Delhi-2001

In the decade 1971-81, the urban population of Delhi has increased at an annual growth rate of 4.7. If the same rate of population growth continue, the urban population by the year 2001 could reach 14.4 million. The Master Plan for Delhi in 2001 was prepared by the Delhi Development Authority (DDA) in 1990 and it aims to ensure an appropriate balance among the spatial allocations of housing, employment, social infrastructure, shopping centers, public and individual transport and so on and adequate arrangements and preservations to accommodate different kinds of physical infrastructure and public utility systems. To accommodate the 14 million populations in 2001, a two-pronged strategy has been recommended by the Plan:

- To increase the population holding capacity of the area within urban limits till 1981; and

- To extend of the present urban area the extent necessary.

The Master Plan shows the future land use of Delhi in 2001 and it divides Delhi into 15 zones to achieve orderly development.

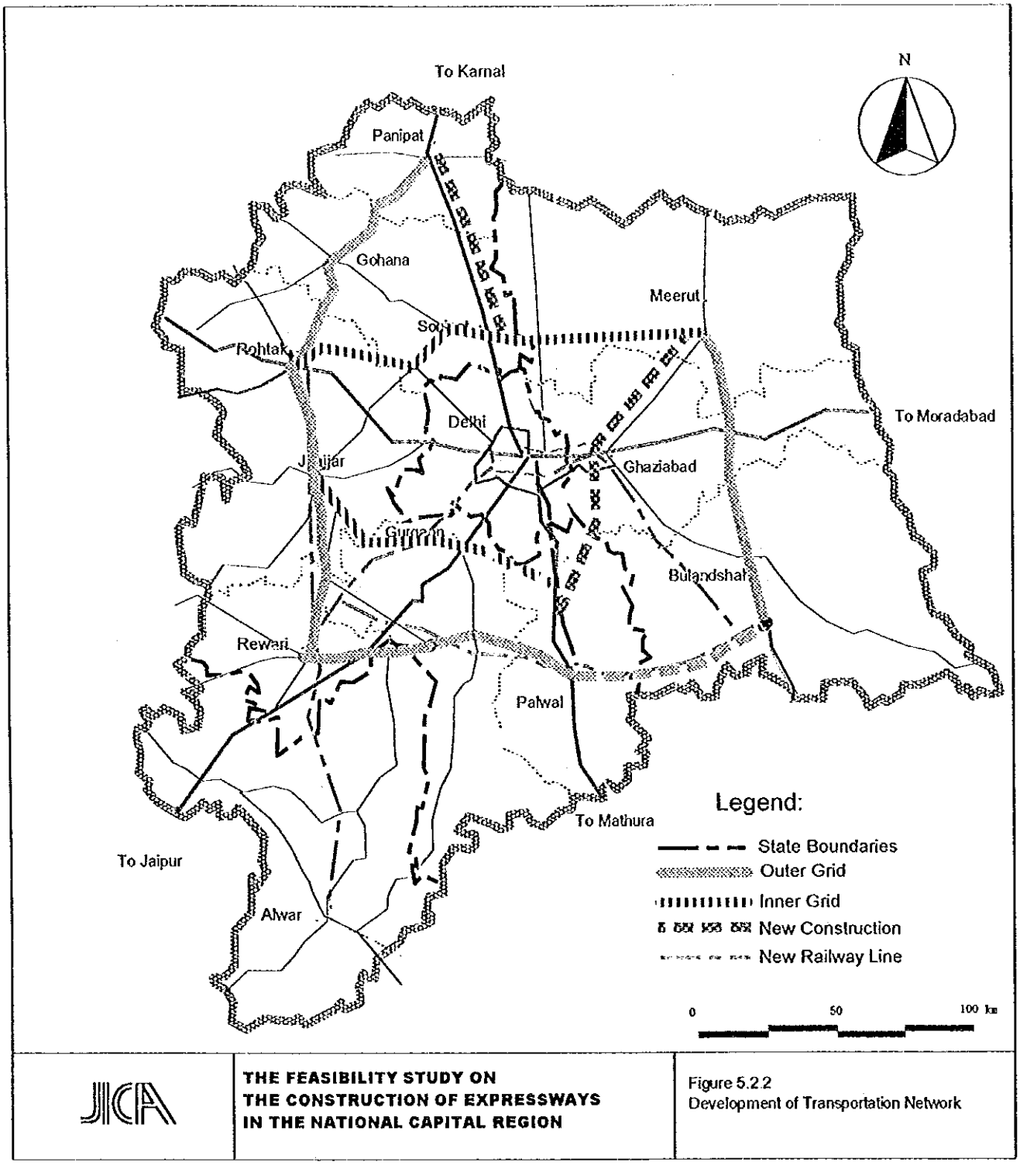


Figure 5.2.2: Development of Transportation Network in the NCR

Land Use Plan-2001 has been established by the DDA taking into accounts of (1) the policies enunciated for different urban activities in the chapter, (2) requirements of additional physical and social infrastructure, transportation and work entrees, (3) intensity of land use along with ring rail, (4) restructuring land uses based on the studies for the Perspective-2001 and considering the inter relationship of urban activities, environment and image of the city and (5) land use modifications already approved.[1] The Land Use Plan-2001 designated 37 use zones and categorized into nine land use such as residential, commercial, manufacturing, recreational, transportation, utility, government, transportation, agricultural and water body.

5.2.3 Ghaziabad Master Plan-2001

Main objectives of the Master Plan of Ghaziabad (1981-2001) are stated as follows:

- To control the unplanned and uncontrolled development and to recommend measures for planned development of the town.
- To develop the town on the basis of the proposed population and density in the National Capital Regional Plan.
- To allocate land for different land uses for social infrastructure development.
- To control the conversion of agricultural land to other land uses.
- To allocate land for uses like industries, trade, commerce and other utilities and services.
- The main proposals for the implementation of development strategies are as follows:
- The future development was proposed along the National Highway 2 and in the Trans Hindon area. The area along the Hindon River was found unfit for further development.
- It was proposed to develop the main commercial complex along the Grand Trunk (GT) road and the Hapur road.

[1]Delhi Development Authority, 1996, Master Plan for Delhi, New Delhi p48

- It is proposed to develop five sub district centers in the city.

- It was proposed to develop a set of development control rules and zoning regulations for the city.

5.2.4 Meerut Master Plan-2001

Main objectives of the Master Plan of Merrut (1981-2001) are as follows:

- To achieve the population target of 1.5 million by 2001 set by the National Capital Region Plan and to develop land accordingly.

- To evaluate the development in previous of Master Plan (1961-1981).

- To evaluate the impact of changes in land use policies on the adjacent land area.

- To evaluate the changes made by the Meerut development authority and the housing and urban development agency.

- The main proposals for the implementation of the development strategies are as follows:

- To develop the existing developed area for further residential development by reducing the growth of non-residential development and declaring the area as the 'Developed Residential Area'.

- To develop the land adjacent to the 'Developed Residential Area' for colonies and for other conforming mixed uses, which would include mainly the public, and semi public uses.

- To develop the industrial area along the Gagol Road due to its proximity to Delhi and to develop light industrial area with low levels of pollution along the road to Delhi.

- To develop the town on the basis of the existing radial pattern by widening the roads.

- To develop three concentric rings along with radial pattern within the city. The outer ring is proposed to serve the regional traffic.

- To develop the proposed expressway joining Meerut as per the National Capital

Region Plan.

5.2.5 Modinagar Master Plan-2001

- Main objectives of the Master Plan of Modinagar (1981-2001) are as follows:
- To achieve the population target of 0.2 million by 2001 set by the National Capital Region Plan and to develop land accordingly.
- To develop the industrial are a on Hapur-Niwadi road as proposed in the Master Plan.
- To evaluate the impact of changes in land use policies on the adjacent land area.
- The main proposals for the implementation of development strategies are as follows:
- To construct the proposed industrial area for future towns
- To control the conversion of residential use to non-residential use along the main roads.
- It is proposed to develop 575 ha of land with a density of 230 persons/Ha in order to achieve the population target of 0.2 million by 2001.
- To widen the following roads: Niwadi road, Begamabad road, Hapur Road and Delhi road.

5.2.6 Industrial Area Development

There are several industrial development proposals from the state governments as well as the NCRPB to diversify economic activities within the NCR. The list of proposed areas is shown in Table 5.2.4.

Table 5.2.4 List of Industrial Areas

Name of the Indestrial Area	Location State, District	Areas (ha)	Expected Year of Completion
Tronica	Uttar Pradesh, Ghaziabad	528.5	2006
Panipat	Haryana, Panipat	54.6	2001
Kundli	Haryana, Sonepat	185.1	2001
Ganaaur	Haryana, Sonepat	54.7	2006
Faridabad	Haryana, Faridabad	268.0	2006
Alwar	Rajasthan, Alwar	198.3	2011
Bhiwade	Rajasthan, Alwar	201.1	2011
Khuskhera	Rajasthan, Alwar	265.5	2011
Chopanki	Rajasthan, Alwar	331.8	2011
Neemrana	Rajasthan, Alwar	70.2	2011
Tapakurna	Rajasthan, Alwar	265.2	2011
Bawal	Haryana, Rewari	791.8	2006
Merrut	Uttar Pradesh, Merrut	38.9	2001
Khurja	Uttar Pradesh, Bulandshahr	487.5	2006
Total		3,741.2	

Source: NCRPB

The total areas for industrial development are about 3,741.2 ha and those are distribute equally over the NCR. Some industrial areas include residential area development as well. Those industrial areas are expected to complete within the year 2011.

5.3 Future Social and Economic Development Framework

India has conducted the census every 10 years since 1951. The latest census was carried out in 1991 and collected data, for example; area, number of towns including statutory towns and census towns, number of household, population and various population indicators including participation rate and percentage of main workers in the primary, secondary and tertiary sectors. For the urban and regional planning purpose, the social and economic framework could be established in the very census year until 2021 due to data limitation of India. Therefore, social and economic framework should be established in 2001, 2011 and 2021 as the planning years.

For the traffic demand forecast proposes, indicators should be determined based on the social and economic framework, which is established for planning purposes. It is assumed that K-G and G-M expressways would be open to traffic in the year 2006 and the concession is given to the private investor for 30 years from the opening year. Therefore, the estimated years for future traffic demand are 1999 (existing), 2006, 2016 and 2026 as the target years. For the purpose of the estimate planning data, India is divided into seven areas as shown below:

Table 5.3.1 Division of India

Areas	State
NCR	Delhi, Haryana (NCR), Uttar Pradesh (NCR), Rajasthan (NCR)
Rest of NCR	Haryana (Rest of NCR portion), Uttar Pradesh (Rest of NCR portion), Rajasthan (Rest of NCR portion)
North India	Punjab, Ghandiganh, Jammu and Kashimir, Himachal Pradesh
West India	Maharashtra, Gujrat, Goa, Daman and Div, Dadra Nagar Havel
Central India	Madhy Pradesh
South India	Andhra Pradesh, Karnataka, Kerala, Tamul Nadu, Pondicherry, Andaman, Lakshadweep
East India	Arunachal Pradesh, Assam, Bihar, Manipur, Meghalaya, Nagaland, Orissa, Sikkim, Tripura, West Bengal, Mizoram

In order to estimate future traffic demand, a social and economic framework should be determined each traffic zone.

The following shows the steps for establishing future framework.

Step 1 Establishment of 1999 social and economic framework as a base year based on 1991 census data.

Step 2 Establishment of the future social and economic framework in year 2001, 2011 and 2021

Step 3 Determination of the social and economic framework for traffic demand forecast in the year 2006, 2016 and 2026 based on the social and economic framework established in the

The following section shows assumptions and methods for establishment of future framework.

5.3.1 Population

Step 1 : Establishment of Existing Population

To estimate 1999 population, the 1991 census results are applied to reflect condition. The state population of 1999 are determined by past population growth rates of two census of 1981 and 1991 that are shown in Statistical Abstract India in 1997[2]. The growth rates are applied to each state to obtain existing population in 1999 and adjust

[2] Ministry of Planning and Programme Implementation, 1997 Statistical Abstract India 1997, New Delhi

those figure based on the total population. The results of calculation are shown in Table 5.3.2.

Step 2 : Establishment of Future Population

Total population in India is estimated by the Registrar General of India and Population Foundation of India until 2026, and which is adopted for this study. The population projection in the NCR was made by NCRPB through the Office of the Registrar General of India for use in the 9th Plan until 2016 and it is applied to determine the NCR population until 2016. Outside NCR, the population is projected by the past trend of each state and adjusted, accordingly.

Its based on Indian total population which is estimated by the Population Foundation of India.

To determine population beyond the year 2016, the Study Team took the following steps:

- Total population in India is applied the estimation made by the Office of the Registrar Central of India and Population Foundation in India until 2026.
- Calculation of the ratio of the NCR population to India's population from
- Projection of the NCR population to India's population in 2021 using proportion trends
- Calculate the NCR population and constitute states population i.e. Delhi, Haryana, Uttar Pradesh and Rajasthan.
- Define urban and rural population by using Urban-Rural Growth Differential method and
- Calculate zonal population.

The results of calculation are shown in Table 5.3.3.

Table 5.3.2 Existing Population Estimate

(unit: thousand)

	1981 Census	1991 Census	1999 Estimate		Growth Rate 1981-1991
			Calculated	Adjusted	
India	683,329.1	846,302.7	1,005,436	990,292	1.96
National Capital Region	19,019.2	26,446.2	34,220	34,220	3.30
Delhi	6,220.4	9,420.6	13,250	13,250	4.15
Haryana (NCR)	4,867.8	6,643.6	8,349	8,349	3.11
Uttar Pradesh (NCR)	6,969.0	9,002.0	10,815	10,815	2.56
Rajasthan (NCR)	962.0	1,380.0	1,806	1,806	3.61
Rest of National Capital Region	145,248.1	182,556.6	219,215	215,917	2.29
Haryana	8,054.3	9,820.0	11,507	11,330	1.98
Uttar Pradesh	103,893.9	130,110.6	155,772	153,452	2.25
Rajasthan	33,299.9	42,626.0	51,935	51,135	2.47
NCR Constitute State Total Populati	164,266.9	209,002.5	253,809	250,137	2.41
Delhi	6,220.4	9,420.6	13,250	13,250	4.15
Haryana	12,922.1	16,463.6	19,984	19,679	2.42
Uttar Pradesh	110,862.5	139,112.3	166,813	164,267	2.27
Rajasthan	34,261.9	44,006.0	53,762	52,941	2.50
North India	27,508.7	33,813.6	39,916	39,307	2.06
Punjab	16,788.9	20,282.0	23,593	23,233	1.89
Chandigarh	451.6	642.0	851	838	3.52
Jammu and Kashimir	5,987.4	7,718.7	9,458	9,313	2.54
Himachal Pradesh	4,280.8	5,170.9	6,014	5,923	1.89
West India	98,059.0	121,656.7	144,599	142,392	2.16
Maharashtra	62,782.8	78,937.2	94,806	93,359	2.29
Gujarat	34,085.8	41,309.6	48,176	47,441	1.92
Goa	1,007.7	1,169.8	1,318	1,298	1.49
Daman and Diu	79.0	101.6	124	122	2.52
Dadra and Nagar Haveli	103.7	138.5	175	172	2.89
Central India	52,178.8	66,181.1	80,043	78,822	2.38
Madhya Pradesh	52,178.8	66,181.1	80,043	78,822	2.38
South India	165,381.8	197,582.8	228,015	224,535	1.78
Andhra Pradesh	53,551.0	66,508.0	79,097	77,890	2.17
Karnataka	37,135.7	44,977.2	52,427	51,627	1.92
Kerala	25,453.7	29,098.5	32,387	31,892	1.34
Tamil Nadu	48,408.1	55,858.9	62,637	61,681	1.43
Pondicherry	604.4	807.8	1,019	1,003	2.90
Andaman and Nicobar Islands	188.7	280.7	386	380	3.97
Lakshadweep	40.2	51.7	63	62	2.52
East India	175,933.9	218,066.0	259,054	255,100	2.15
Arunachal Pradesh	631.8	864.6	1,111	1,094	3.14
Assam	18,041.3	22,414.3	26,664	26,257	2.17
Bihar	69,914.7	86,374.5	102,291	100,730	2.11
Manipur	1,421.0	1,837.1	2,256	2,222	2.57
Meghalaya	1,335.8	1,774.8	2,228	2,194	2.84
Nagaland	774.9	1,209.5	1,727	1,701	4.45
Orissa	26,370.4	31,659.7	36,645	36,086	1.83
Sikkim	316.4	406.5	497	489	2.51
Tripura	2,053.1	2,757.2	3,491	3,437	2.95
West Bengal	54,580.7	68,078.0	81,242	80,002	2.21
Mizoram	493.8	689.8	901	888	3.34

Source: Census 1981 and 1991, JICA Study Team

Table 5.3.3 Future Population Projection in India

(Unit percent)

Region	1999	2001	2011	2021	1981-1991	1991-1999	1991-2001	2001-2011	2011-2021
		(in thousand)							
India	990,293	1,012,386	1,178,889	1,341,000	2.14	1.96	1.10	1.52	1.29
National Capital Region	34,220	36,367	48,994	58,518	3.30	3.22	3.19	2.98	1.78
Delhi	13,250	14,366	19,507	21,698	4.15	4.26	4.22	3.06	1.06
Haryana	8,349	8,796	12,062	15,227	3.11	2.86	2.81	3.16	2.33
Uttar Pradesh	10,815	11,284	14,656	18,009	2.56	2.29	2.26	2.61	2.06
Rajasthan	1,806	1,921	2,769	3,584	3.61	3.36	3.31	3.66	2.58
Rest of National Capital Region	215,917	223,874	266,839	311,682	2.29	2.10	2.04	1.76	1.55
Haryana	11,330	11,499	13,085	14,588	1.98	1.79	1.58	1.29	1.18
Uttar Pradesh	153,452	159,953	191,108	223,742	2.25	2.06	2.06	1.78	1.17
Rajasthan	51,135	52,421	62,646	73,351	2.47	2.28	2.07	1.78	1.49
North India	39,307	39,842	45,655	51,298	2.06	1.88	1.64	1.36	0.94
West India	142,392	145,445	169,039	192,563	2.16	1.97	1.79	1.50	1.18
Central India	78,822	80,661	95,530	110,852	2.38	2.18	1.98	1.69	1.30
South India	224,535	226,788	252,953	276,430	1.78	1.60	1.38	1.09	0.55
East India	255,100	259,409	299,878	339,658	2.15	1.96	1.74	1.45	1.82

Source: Census 1991, JICA Study Team

The results show that the population of NCR would have 36.4 million in 2001, 49.0 million in 2011 and 58.5 million in 2021. Delhi would have 21.7 million populations by 2021.

The population of urban area was estimated using urban-rural differential method that is applied by the NCRPB estimation until 2016. The result shows that the urban population in the NCR will increase to reach 58.5 million people or 67 percent of urbanization rate in 2021. In Delhi, 21.3 million people, who account for 98 percent of total population, will live in urban area in 2021. The results of the estimation are summarized in Table 5.3.4

Table 5.3.4 NCR Urban Rural Population by State

(unit: million)

Sub-region	1991(Census)			1999 (Existing)		
	Rural	Urban	Total	Rural	Urban	Total
NCTD	949	8,472	9,421	1,122	12,344	13,467
Haryana (NCR)	4,808	1,835	6,643	5,834	2,649	8,484
Uttar Pradesh (NCR)	5,884	3,118	9,002	6,393	4,600	10,993
Rajastan (NCR)	1,116	264	1,380	1,447	389	1,836
Total (NCR)	12,757	13,689	26,446	14,796	19,982	34,780

Sub-region	2001			2011			2021		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
NCTD	1,164	13,202	14,366	699	18,810	19,507	405	21,292	21,698
Haryana (NCR)	6,079	2,717	8,796	7,907	4,154	12,062	9,404	5,822	15,226
Uttar Pradesh (NCR)	6,475	4,809	11,284	7,027	7,629	14,656	6,751	11,257	18,009
Rajastan (NCR)	1,531	390	1,921	2,174	595	2,769	2,770	814	3,584
Total (NCR)	15,249	21,118	36,367	17,807	31,188	48,994	19,330	39,185	58,517

Source : NCRPB

Note : The estimation in 2021 is made by JICA Study Team

5.3.2 State Economic Activities

Step 1 : Existing Economic Activities

The only available data in state economic activities that cover whole India are per capita Net State Domestic Product (NSDP) at current price as well as constant prices at 1980 from Statistical Abstract India 1997[3]. The economic activities in the states are calculated by using those figures and then obtain India's economic activities. To determine 1999 economic activities in each state, the state economic growth rate from 1991 to 1996 is applied to obtain state economic activities. The results of calculation are shown in Table 5.3.5.

The results show that the economic growth rate in India during 1991-1996 is 5.7 percent per annually, while the NCR has grown at rate of 6.1 percent same period. The NCR growth rate is higher than that of India.

[3] Ministry of Planning and Programme Implementation, 1998 Statistical Abstract India, New Delhi, India

Table 5.3.5 Economic Activities in the Study Area

(Rs. Millions)

	1991		1996		1999		Growth Rate	
	Constant at 1980 price	Current	Constant at 1980 price	Current	Constant at 1980 price	Current	Constant at 1980 price	Current
India	**1,864,460**	**4,180,740**	**2,399,570**	**8,812,160**	**2,812,784**	**12,046,701**	**5.7**	**16.1**
National Capital Region*	**91,622**	**190,977**	**119,699**	**407,885**	**141,708**	**637,854**	**6.1**	**16.4**
Delhi	49,911	101,260	66,929	218,790	80,620	347,361	6.8	16.7
Haryana	60,321	122,380	75,109	245,530	86,156	372,856	4.9	14.9
Uttar Pradesh	243,967	494,960	270,884	885,520	288,816	1,255,380	2.2	12.3
Rajasthan	90,107	182,810	103,114	337,080	112,045	486,601	2.9	13.0
Punjab	82,502	167,380	108,544	354,830	129,101	556,943	6.3	16.2
Chandigarh	-	-	-	-	-	-	-	-
Jammu and Kashimir	13,619	27,630	16,173	52,870	17,993	78,038	3.8	13.9
Himachal Pradesh	12,426	25,210	15,084	49,310	17,020	73,748	4.3	14.4
Maharashtra	286,746	581,750	408,140	1,334,210	511,812	2,195,416	8.5	18.1
Gujarat	119,622	242,690	164,163	536,650	200,839	863,922	7.4	17.2
Goa	5,047	10,240	6,412	20,960	7,452	32,214	5.4	15.4
Daman and Diu	-	-	-	-	-	-	-	-
Dadra and Nagar Haveli	-	-	-	-	-	-	-	-
Madhya Pradesh	130,693	265,150	144,509	472,400	153,675	668,038	2.1	12.2
Andhra Pradesh	153,613	311,650	196,883	643,610	230,158	994,480	5.6	15.6
Karnataka	101,291	205,500	138,428	452,520	168,879	726,664	7.3	17.1
Kerala	60,001	121,730	78,929	258,020	93,869	404,955	6.3	16.2
Tamil Nadu	136,268	276,460	182,680	597,180	220,011	947,958	6.8	16.7
Pondicherry	2,859	5,800	3,068	10,030	3,203	13,932	1.5	11.6
Andaman and Nicobar Is	-	-	-	-	-	-	-	-
Lakshadweep	-	-	-	-	-	-	-	-
Arunachal Pradesh	2,267	4,600	3,019	9,870	3,620	15,605	6.6	16.5
Assam	46,816	94,980	47,507	155,300	47,928	208,591	0.3	10.3
Bihar	112,520	228,280	102,823	336,130	97,507	423,966	-1.7	8.0
Manipur	3,564	7,230	4,319	14,120	4,869	21,099	4.2	14.3
Meghalaya	3,781	7,670	4,864	15,900	5,700	24,624	5.7	15.7
Nagaland	3,268	6,630	4,411	14,420	5,337	22,985	7.0	16.8
Orissa	47,634	96,640	65,188	213,100	79,602	342,483	7.4	17.1
Sikkim	1,050	2,130	1,364	4,460	1,610	6,949	6.0	15.9
Tripura	4,520	9,170	4,763	15,570	4,917	21,391	1.1	11.2
West Bengal	155,264	315,000	189,226	618,580	214,060	927,357	4.4	14.5
Mizoram	1,508	3,060	2,328	7,610	3,087	13,146	10.9	20.0

Source: Statistical Abstract of India

* JICA Study Team's estimate

Step 2 : Future Economic Activities

To determine India's future economic activities, the economic growth rate of 5.0 percent per year is applied until 2021. As matter of fact, India has recorded 5.8 percent average economic growth rate since 1980[4]. The economic growth rate in the NCR is higher than that of the national average (see Table 5.3.6). Therefore, the economic growth rate in the NCR is set at 6 percent per year.

[4] The World Bank, 1999, World Development Report 1998/99,Oxford University Press, Washington D.C.

Table 5.3.6 Future Economic Activities in India

	Net State Domestic Product (at 1999 Price)				Growth Rate		
	1999	2001	2011	2021	1999-2001	2001-2011	2011-2021
	(in Rs. Million)						
India	11,884,386	13,072,824	19,609,237	29,413,855	5.0	5.0	5.0
NCR	636,182	712,523	1,140,037	1,824,060	6.0	6.0	6.0
North India	668,443	724,006	1,021,778	1,414,877	4.2	4.1	3.9
West India	3,189,479	3,688,777	6,494,423	11,203,840	7.8	7.6	7.3
Central India	665,689	703,927	907,199	1,145,764	2.9	2.9	2.6
South India	2,775,276	3,084,245	4,764,755	7,213,573	5.6	5.5	5.1
East India	2,080,436	2,210,111	2,904,602	3,766,847	3.1	3.1	3.0

Source: JICA Study Team

5.3.3 Employment

Step 1 : Estimation of Existing Employment

The census classified workforce as main worker, marginal worker and non-worker. For the purpose of modeling the impact of employment on traffic demand, only the worker categorized to have direct impact on the transportation has been accounted as a employment that is defined as the main worker excluding for cultivators, agricultural labor and marginal workers. The worker participation rate is determined to the employment to the total population. To estimate employment, it is assumed that the rate of main worker to the total population will increase at the same rate of 1981 to 1991 censuses in each state. The national average of 2.21 percent is applied only if negative growth rate is found. The existing employment is calculated main worker minus cultivators and agricultural labor that are obtained from census.

For traffic demand forecast, the data on jobs (the number of employment at work places) are required. To obtain the job data, it is assumed that the number of jobs in the NCR is same as total employment in the area. Only Delhi has provided net surplus job opportunities for outside state inhabitants. Therefore, the total job in Delhi is the total residential employment in Delhi pulse commuter from surrounding states. The number of the commuter traffic is estimated by JICA study team as the results of traffic survey.

In the morning period, the roadside survey estimates that there is a net inflow of 15,000 persons entering Delhi. The surveys undertaken in this study did not include all crossings of the Delhi boundary. However in data available from other sites, it was possible to estimate this impact. Further allowance was made for rail trips,

resulting in the net estimation of 30,000 work trip to Delhi.

Table 5.3.7 Existing Employment Estimate

(unit:thousand)

	1981 Census Main Worker	PR*	1991 Census Main Worker	PR*	1999 Estimate Main Worker	PR*	Estimate Employment
India	228,573.6	33.5	288,758.5	34.1	354,619	35.8	136,775
NCR	5,431.9	28.6	7,939.8	30.0	10,521	30.7	7,577
Delhi	1,986.2	31.9	2,968.4	31.5	4,721	35.6	4,638
Haryana	1,330.4	27.3	1,883.2	28.4	2,516	30.1	1,391
Uttar Pradesh	1,858.6	26.7	2,473.3	27.5	2,854	26.4	1,382
Rajasthan	256.8	26.7	414.9	30.6	513	28.4	165
Rest of NCR	42,801.4	29.5	54,921.8	30.8	65,920	31.5	19,188
Haryana	2,333.0	28.5	2,705.3	27.6	3,174	28.0	1,168
Uttar Pradesh	30,546.5	31.9	38,868.9	29.9	46,299	30.2	12,740
Rajasthan	10,186.2	29.8	13,447.1	31.6	16,447	32.1	5,280
North India	8,558.3	31.1	10,667.6	31.6	12,599	32.1	5,290
West India	35,664.1	36.4	45,591.2	37.4	54,934	38.6	23,892
Central India	20,041.9	38.4	24,976.7	37.7	30,231	38.4	7,827
South India	62,348.9	37.7	77,408.0	39.2	90,736	40.4	47,007
East India	53,026.5	30.1	67,241.0	30.8	79,832	31.3	25,994

Source: 1981 and 1991 Census, JICA Study Team

* Paticipation Ratio (PR) here is defined as the main worker to the total population.

Step 2 : Estimation of Future Employment

To estimate future employment, it is assumed that the rate of main worker to the total population will increase in past participation rate that is obtained by the difference between 1981 to 1991. Table shows the number of the employment and participation rates in the different part of India.

Table 5.3.8 Work Participation Rate

(as a % of total population)

State	1991 Total	1991 Male	1991 Female
Delhi	31.60	51.70	7.40
Haryana	31.00	48.50	10.80
Utter Pradesh	32.20	49.70	12.30
India	37.50	51.60	22.30

Source: Census of India 1991

Table 5.3.9 Future Employment Projection

	1999	2001	2011	2021	1999	2001	2011	2021
		(in thousands)				(precent)		
India	136,775	144,350	194,360	247,642	13.8	14.6	16.49	18.47
NCR	7,577	8,350	13,132	16,351	22.14	22.96	26.8	27.94
Delhi	4,638	5,169	8,044	8,948	35.01	35.98	41.34	41.24
Haryana	1,391	1,530	2,484	3,641	16.67	17.4	20.59	23.91
Uttar Pradesh	1,382	1,470	2,297	3,292	12.78	13.03	15.67	18.28
Rajasthan	165	180	306	468	9.16	9.37	11.06	13.08
Rest of NCR	19,188	20,094	25,242	31,001	8.89	8.98	9.46	9.95
Haryana	1,168	1,199	1,440	1,691	10.31	10.42	11.01	11.59
Uttar Pradesh	12,739	13,401	16,752	20,490	8.3	8.38	8.77	9.16
Rajasthan	5,280	5,494	7,049	8,821	10.33	10.48	11.25	12.03
North India	5,290	5,429	6,608	7,856	13.46	13.63	14.47	15.31
West India	23,891	24,839	31,417	38,660	16.78	17.08	18.59	20.08
Central India	7,827	8,139	10,403	12,957	9.93	10.09	10.89	11.69
South India	47,007	50,733	74,734	101,502	20.94	22.37	29.54	36.72
East India	25,994	26,766	32,825	39,314	10.19	10.32	10.95	11.57

Soure: JICA Study Team

To determine participation rate within the NCR, the previous study done by the NCRPB ("Transport Sector Plan and Investment Strategy 2011" financed by Canadian International Development Agency (CIDA)[5]) was based, and which states as follows:

In Delhi in 1991, the male participation rate was almost 52 %, whereas the female participation rate was only 7.5%. An increase in the female participation rate to 15 percent by 2001 with no increase in the male participation rate would result in an overall workforce participation rate of 35 %. A further increase of female participation to 25% by 2011, again with no increase in the male participation rate, would bring the overall workforce participation rate to approximately 40%.

This report shows the participation rate in the NCR is 20.0 percent in 1994, 23 percent in 2001 and 25.4 percent in 2011. This study also applies those figures to estimate future employment in the NCR. Beyond 2011, the participation rate was assumed to be the same as 2011.

[5] National Capital Region Planning Board, 1997, Transport Sector Plan and Investment Strategy, Funded Under the Canadian International Development Agency Inc: Programme, Project No. E 4936-K 048128

Table 5.3.10 Employment in India and the NCR

Area Classification	1999	2001	2011	2021	1999	2001	2011	2021
	Employment (in thousands)				(Participation Rate (%)			
DUT	4,607	5,134	7,989	8,887	34.8	35.7	41.0	41.0
DMA Towns	742	859	1,621	2,514	29.1	30.0	35.3	41.4
Priority Towns	757	817	1,322	1,902	24.8	25.4	30.0	35.4
Mixed Areas	694	742	1,246	1,936	13.5	13.8	15.6	17.7
Rural Areas	776	796	954	1,111	8.5	8.5	8.4	8.3
Total	7,576	8,348	13,132	16,350	22.1	23.0	26.8	27.9

The summary of the social and economic framework is shown in Table 5.3.11.

Table 5.3.11 Summary of Social and Economic Framework

	1999	2001	2006	2011	2016	2021	2026
	Population (in thousands)						
INDIA	990,293	1,012,386	1,095,637	1,178,889	1,259,944	1,341,000	1,415,000
NCR	34,220	36,367	42,681	48,994	53,756	58,518	66,308
Rest of NCR	215,917	223,874	245,357	266,839	289,261	311,682	327,773
North India	39,307	39,842	42,749	45,655	48,476	51,298	53,946
West India	142,392	145,445	157,242	169,039	180,801	192,563	202,504
Central India	78,822	80,661	88,096	95,530	103,191	110,852	116,575
South India	224,535	226,788	239,871	252,953	264,692	276,430	290,701
East India	255,100	259,409	279,644	299,878	319,768	339,658	357,193
	Net State Domestic Product (in Rs. Billion)						
India	11,884	13,073	16,341	19,609	24,512	29,414	36,767
NCR	636	713	926	1,140	1,482	1,824	2,371
Rest of NCR	1,869	1,949	2,164	2,378	2,612	2,845	3,547
North India	668	724	873	1,022	1,218	1,415	1,764
West India	3,189	3,689	5,091	6,492	8,848	11,204	13,968
Central India	666	704	806	907	1,026	1,146	1,428
South India	2,775	3,084	3,924	4,765	5,989	7,214	8,993
East India	2,080	2,210	2,557	2,905	3,336	3,767	4,696
	Employment (in thousands)						
INDIA	136,775	144,350	169,355	194,360	221,001	247,642	261,308
NCR	7,577	8,350	10,741	13,132	14,741	16,351	18,527
Rest of NCR	19,188	20,094	22,668	25,242	28,122	31,001	32,150
North India	5,290	5,429	6,018	6,608	7,232	7,856	8,262
West India	23,892	24,840	28,128	31,417	35,039	38,660	40,656
Central India	7,827	8,139	9,271	10,403	11,680	12,958	13,627
South India	47,007	50,733	62,733	74,734	88,118	101,502	106,743
East India	25,994	26,766	29,795	32,825	36,069	39,314	41,344

Source: JICA Study Team

CHAPTER 6:

INITIAL ENVIRONMENTAL EXAMINATION

6.1 Regulatory Procedure of Environmental Clearance

6.1.1 Environmental laws

The Ministry of Environment and Forests (MOEF) is the nodal Ministry for environmental legislations. But several States and Union Territories have enacted their own legislation besides the major ones enacted by the MOEF. The State Pollution Control Boards (SPCB) established in every State of the country, are responsible for implementing these legislation's as well as issuing the rules, regulations and notifications thereof, which prescribe the standards for emissions and effluents of air and water pollutants and noise levels. In the case of Union Territories (UT), the Pollution Control Committee (PCC) is responsible for this. The establishment and functioning of any project in the country is governed by the following Acts of the MOEF besides the local zoning and land use laws of the States and UTs.

- The Water (Prevention and control of Pollution) Act, 1974-as amended from time to time (Water Act)

  The main provisions of this Act aim at prevention and control of water pollution as well as restoration of water quality, through the establishment of State Pollution Control Boards.

- The Water (Prevention and control of Pollution) Cess Act, 1977-as amended (Water Cess Act)

  The purpose of this Act is to levy and collect cess on water consumed by certain categories of Industry specified in the schedule. The Central and State Pollution Control Boards to prevent and control water pollution use the money thus collected.

- The Air (Prevention and control of Pollution) Act, 1981-as amended (Air Act)

  The main objective of this Act is to prevent, control and reduce air pollution including noise pollution and to establish Boards at the States/UTs for this.

- The Environment (Protection) Act, 1986 (EPA)

  This Act is umbrella legislation providing a single focus for the protection of environment and seeks to plug the loopholes of earlier legislation relating to environment. Several sets of Rules relating to various aspects of management of

  hazardous chemicals, wastes, microorganism's etc. have been notified under this Act. Under the EPA, certain activities are prohibited in the Coastal Regulation Zone declared by the Government of India.

- The Public Liability Insurance Act, 1991 as amended (PLI Act)

  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.

- The Forest (Conservation) Act, 1980

  This Act checks the indiscriminate diversion of forestland for non-forest purposes.

6.1.2 Environmental Guidelines for Rail/Road/Highway Projects

The Ministry of Environment and Forests (MOEF) issued a notification in 1994, which made The Environmental Impact Assessment statutory for 29 projects listed in Schedule I. This also included transportation (rail/road/highways) projects.

The MOEF has prepared environmental guidelines in order to assist the project authorities in planning and carrying out Environmental Impact Assessment (EIA) and evolving Environmental Management Plan (EMP) for Rail/Road/Highway projects. The guidelines are prepared with the basic assumption that the EIA is to be used as a planning tool and environmental considerations should be incorporated at the initial stage of project planning, and the cost of environmental protection measures should be treated as integral component of total project cost. The guidelines discuss the following contents:

(a) Identification of Impacts

This section identifies the following impacts, which can be associated with a rail/road/highway project:

- Physical Resources: Hydrology, Surface Water Quality, Air quality Impacts, Soils and Noise Impacts
- Ecological Resources: Fisheries, Forestry, Wildlife and Ecosystems
- Human Use Values: Navigation, Flood Control and Land Use
- Quality of Life Values: Socio-economic, Resettlement, Public Health, Aesthetics and Archaeological/Historical Values.

(b) Environmental Impact Assessment

This section establishes the need of an Environmental Impact Assessment and identifies the following parameters to be considered for the assessment:

- Natural Physical Resources
- Natural Ecological (or Biological) Resources
- Human/Economic Development Resources
- Quality of life values including aesthetic and cultural values

(c) Environmental Impact Statement

This section discusses the following items, which are to be considered for the Environmental Impact Statement:

- A brief description of the project
- Description of the Existing Environment
- Likely Impacts of the Proposed Project
- Mitigation, protection and enhancement measures
- Consideration of Alternatives
- Consideration of 'No Change Alternative'

- Summary and Conclusions

(d) Environmental Management Plan

This section discusses the contents of several implementation plans submitted as a part of the EMP. These contents are:

- Objective
- Work Plan or Design Criteria
- Implementation Schedule
- Man-power Requirements
- Monitoring

(e) Measures for Mitigation of Adverse Impacts

This section discusses the various enhancement and protection measures, which can be used to offset adverse environmental impacts.

(f) Environmental Monitoring

This section discusses the monitoring programme for various impacts.

(g) Management Considerations of Rail/Road/Highway Projects in Hilly Areas

This section discusses the considerations, which should be kept in mind for implementation during construction of rail/road/highway projects in hilly areas.

6.1.3 Procedures for Acquiring Environmental Clearance and Forest Clearance

(1) Environment Clearance

The notification issued by the Ministry of Environment and Forests (MOEF) includes details of the procedures for obtaining Environmental Clearance and for Public Involvement besides setting time schedules for decision making. The documents required with the Application Form for environmental clearance are listed below:

- Summary of Feasibility/Project Report
- No Objection Certificate from the SPCBs (State Pollution Control Board) and other local authorities
- Environmental Appraisal Questionnaire
- Environmental Impact Assessment Report/Environmental Management Plan
- Rehabilitation plans if large-scale displacement of people (more than 1000 people) is anticipated.
- Commitment regarding availability of water and electricity from the competent authority.

The Ministry has also prepared comprehensive guidelines for each of the sector. Detailed questionnaires have also been prepared for submission of project proposals in different sectors.

The procedure for Environmental Clearance is described in Figure 6.1.1. Other points to be noted down for the Environmental Clearance are:

- The documents submitted to the MOEF are first scrutinized by its multi disciplinary staff, which may also undertake site visits wherever required interact with the investors and hold consultations with experts on specific issues as and when necessary.
- The Environmental Appraisal Committee may also undertake site visits on specific cases and interact with the affected people and environmental groups directly if it is felt necessary.
- In case of special/controversial projects for which a public hearing has to be

arranged,

the announcements should be made at least 30 days before through newspapers.

- The clearance granted shall be valid for a period of five years for commencement of the construction or operation.
- No construction work, preliminary or other wise, relating to the setting up of the project may not be undertaken till the environmental and/or site clearance is obtained.
- If no comments from the Impact Assessment Agency are received within the time limit, the project proposed by project authorities will be deemed to have been approved.

(2) Forest Clearance

When a project requires both environmental clearance as well as approval under the Forest (Conservation) act, 1980, proposals for both are required to be given simultaneously to the Ministry. The processing is done simultaneously for both the clearances. The procedure for Forest Clearance is described in Figure 6.1.2.

The investor is required to furnish a brief note giving essential details of the project relating to the following:

- Cost and outlay
- Justification for locating the project in the forest area, indicating alternative sites that were examined and reasons for their rejection.
- Financial and social benefits
- Total population benefited
- Employment generated

A comprehensive land use plan of the area required should be attached if land is required for more than one purpose.

(3) Time Frame

Once all the requisite documents and data from the project authorities are received and public hearings have been held, assessment and evaluation of the project from the

environmental angle is completed within 90 days and the decision of the Ministry is conveyed within 30 days thereafter.

(4) Post Project Monitoring

The Appraisal committee of the Ministry stipulates a set of recommendations and conditions, which have to be compiled with by the investor once the project is commissioned. The investor are therefore required to submit a half-yearly compliance report to the Ministry after the project is commissioned to enable the Ministry to monitor the implementation of the recommendations and conditions.

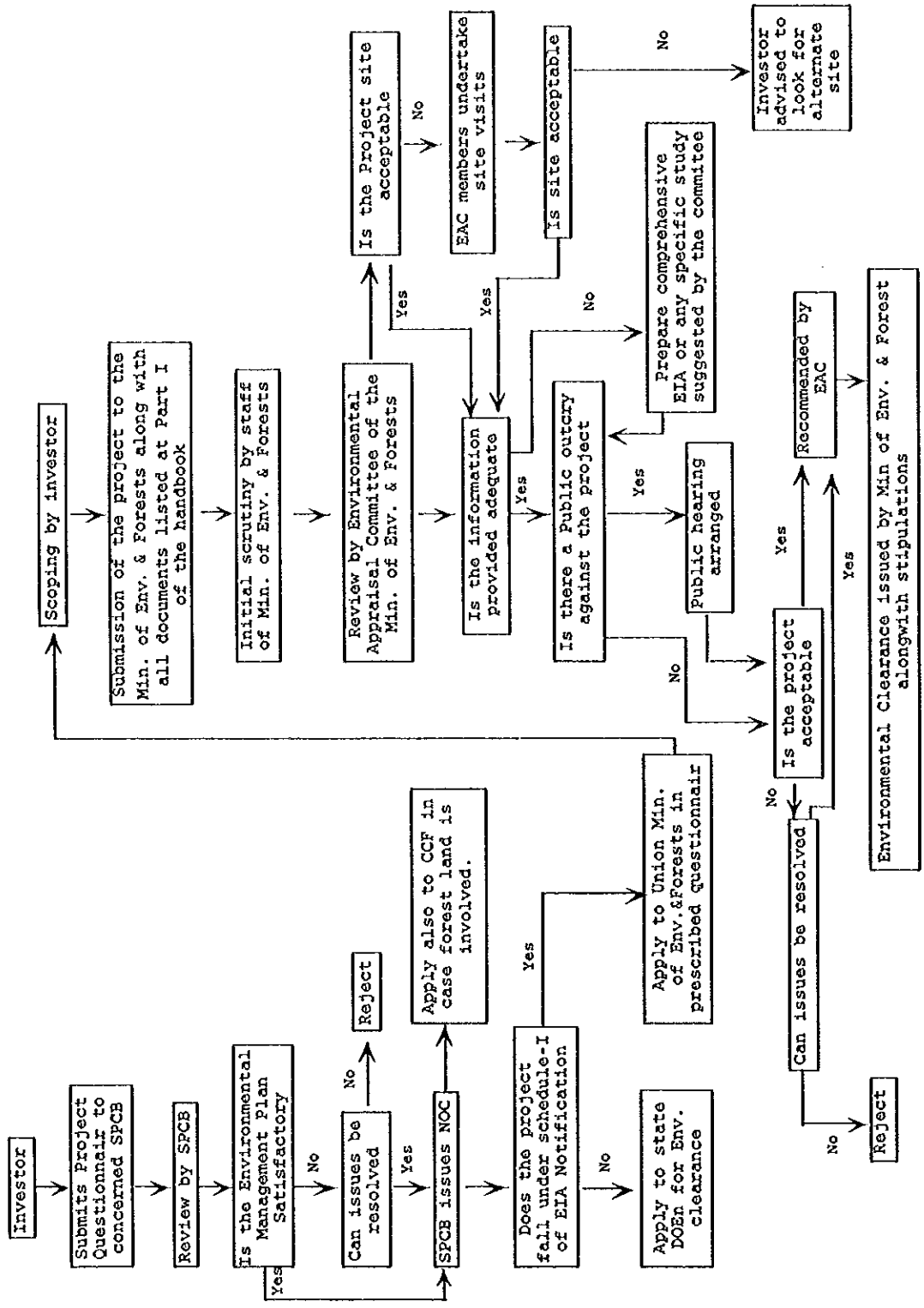
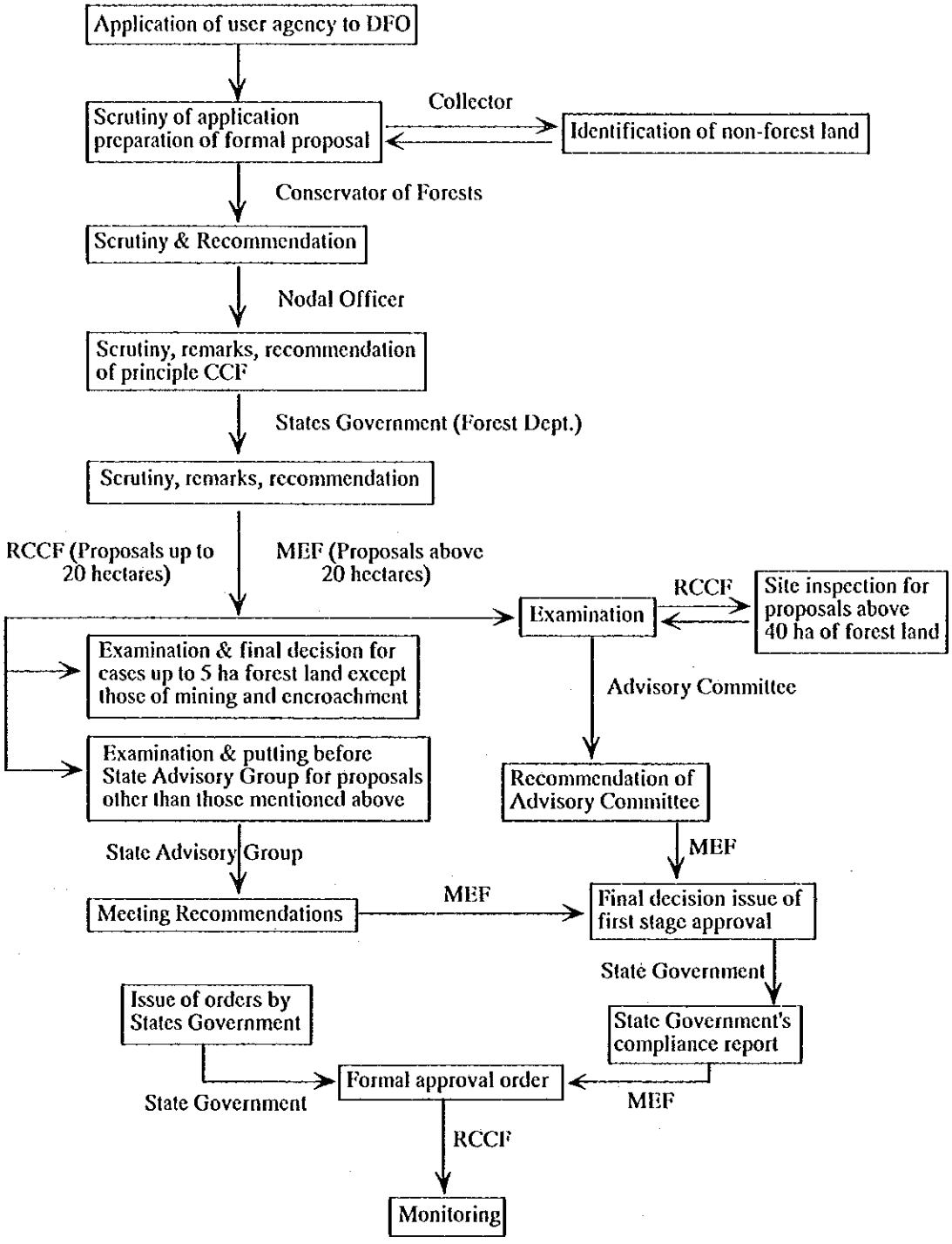


Figure 6.1.1 Procedures for Obtaining Environmental Clearance



DFO: District Forest Office
CCF: Chief Conservator of Forest
RCCF: Regional Chief Conservator of Forest
MEF: Ministry of Environment and Forest

Figure 6.1.2 Procedures for Forest Clearance

6.2 Land Acquisition Act

6.2.1 General

The Land Acquisition Act (LAA) identifies the persons who may have to be addressed by the State in this process. The LAA refers to them as "interested persons". By definition, "interested persons" must have a stake in the compensation. There must be a direct or indirect interest either in the title to the property or in the amount of compensation. The law has narrowed down the categories of persons whom the State must take into account.

There can be several categories of "interested persons": landlord and tenant, the members of a joint Hindu family, mortgager and mortgagee, and others. An interested person's ability to file a claim often depends on his social and economic position. In affected villages throughout the country, tenants have found it difficult to register claims. In some cases, powerful and knowledgeable persons have been able to demonstrate "interest" in the property easily. In order to acquire Project Affected Person (PAP) status, persons from outside the project area have backdated loan agreements, land transfers, mortgages or leases. The number of PAPs in industrial project areas increased substantially after land acquisition procedures started.

The LAA does not empower individuals to prevent alienation from their land. Individuals can only delay acquisition, by objecting that the purpose is not a public one, or that the land is not suitable for the purpose. As the Government never defines the purpose of acquisition in the Section 4.1 notice, detailed information on the proposed project would be required. Such information rests with the Government and is out of bounds for most Indians, even though they are legally entitled to such information. Objections must be raised within one month. However, the Act also grants the Government emergency powers to enable it to do away with the notice procedure and deny citizens their right to object.

The method by which compensation is determined is inadequate, and always disadvantageous to the oustees. Often the compensation for land is not enough to replace even 50 percent of the land lost. Further, opportunities to invest the compensation are lacking. Compensation is almost always individualized and monetised. The LAA lists factors to be taken into consideration in determining compensation, and factors to be ignored (including, for example, "any disinclination of the person interested to part with the land acquired"). The Act prescribes that the

land is acquired "by agreement on such terms and at such a price as may be approved by the Standing Committee" appointed under the Act. However, the illusion of voluntary co-operation collapses altogether in the succeeding provision, which enables the Government to acquire property for public purpose without the owner's consent in case of difficulties in reaching an agreement.

With a few exceptions, compensation is computed in money terms. The compensation for land is strictly regulated within the framework of the Act. The value of the land can be fixed in terms of the market price for land of comparable quality in the area at the time the section

4.1 notice was issued, but if land is not widely sold in the area, market prices may not be readily available. In such cases, a proxy for the market value is determined. The actual, immediate or prospective profits or rent which the owner might expect from the land are multiplied by the appropriate rate of interest for a specified period in order to arrive at the value of the land. In general terms, 15 times the net income of land is taken to be a reasonable compensation. For land acquired before 1984, 15 percent of the market value was awarded as solatium in addition to the market value of the land. Further, an interest of five percent per annum on the market value of the land was paid for the period between the issuance of the Section 6.1 notice and the actual payment of compensation. After the amendment in 1984, the solatium and the interest increased to 30 percent and 12 percent respectively.

The LAA accepts the concept of "present depreciated value" only for assets carrying ownership titles, which always puts the displaced at a disadvantage. The value of houses is determined on the basis of their size, nature and the quality of the material used in the construction. Those with financial means often have their land and house revalued, courts sometimes raise the compensation amount by 15 to 50 percent of the amount originally determined. The 1984 Amendment Act ruled that if a court raised the compensation money for any piece of land, all other lands covered in the Section 4.1 notice claim enhancement. Normally, most of the land acquired from a village is covered in a common Section 4.1 notice.

Further, land owned by tribal is generally undervalued, based on the perception that land in tribal areas was a less productive asset. Since land is rarely traded in tribal areas, the market value of the land is not known. Thus, the land acquisition officer normally uses the capitalization method, and prejudices about productivity depress the estimates. Tribal lands are granted very low compensation, because tribal has been increasingly pushed onto marginal lands. Both movable and immovable properties

on the land are valued at the depreciated cost rather than at the level of replacement cost. In the case of compensation for trees, the prices rarely correspond to the true value. Trees such as Mango, Mahua, and other long-term fruit yielding trees are not seen as productive assets. Thus, the compensation for land, trees and other movable and immovable properties is insufficient to even partially place the assets lost.

6.2.2 Land Acquisition Procedures

According to the Land Acquisition Act (LAA), whenever any Government Department or a Public Authority wants to acquire any land, they will not themselves directly undertake the various stages of acquisition but they must send their requisition proposal to Land Acquisition Collector (the appropriate office of the Government) who will on behalf of the Department, which needs the land, go through the various stages of land acquisition procedure until he takes possession of the land and hands it over to the Department. Government Department or local body or a company which intend to acquire land should send an application for the same to the Land Acquisition Collector and this application should specify or contain the following;

(1). the purpose for which the land is acquired,

(2). a plan of the land,

(3). schedule defining the land (by specifying area of the land to be acquired and also its boundaries or survey numbers of the lands to be acquired),

(4). an approximate estimate of the cost of the acquisition,

(5). a statement that necessary financial provision has been made in the budget of the concerned Department or public authority for meeting the cost of the acquisition.

The stage in the Land Acquisition Procedure according to the LAA are;

Preliminary Investigation

1. Preparation of Land Acquisition Plans

Land acquisition plans based on revenue maps have to be prepared along the approved alignment, giving names of the owners, identify of the land, area of land to be acquired, etc.

2. Submission of Land Acquisition Plans

Land Acquisition Plans prepared as in Step (1) are then submitted to the District Collector.

3. Verification of Land Acquisition Plans

The Land Acquisition Plans as submitted to the District Collector are then verified by them in field and compensation payable indicated.

4. Deposition of estimated compensation

The estimate for full compensation of the land proposed to be acquired will then be sanctioned and the amount deposited with the District Collector.

5. Publication of Preliminary Notification

District Collector after field verification and on receipt of compensation will issue a notification under Section 4 (i) in the Official Gazette as well as in two daily news papers, one of which must be in the local regional language.

Objections

6. Public Hearing/Objections

The District Collector would receive objections under Section 5A, if any, up to 30 days from the date of notification and resolve the issues.

Declaration of intended acquisition

7. Declaration that Land is required for a public purpose

Subject to the provisions of Part VII of this Act, if any particular land is needed for a public purpose, or for a company, a declaration shall be made to that effect under the signatures of a Secretary to such government or of some officer duly authorized to certify its orders.

8. After declaration, District Collector shall take orders for Acquisition of Land. Whenever any land shall have been so declared to be needed for a public purpose or for a company, the appropriate government, or some officer authorized by the appropriate government on their behalf, shall direct the District Collector to take orders for acquisition of the land.

9. Land to be Marked-out, Measured and Planned

The District Collector shall thereupon cause the land (unless it has been already marked out under section 4) to be marked out. He shall also cause it to be measured, and if no plan has been made thereof, a plan to be made of the same.

10. Notice to Persons Interested

The District Collector shall then cause public notice under Section 9 to be given at convenient places on or near the land to be taken, stating that the government intends to take possession of the land, and that claims to compensation for all interests in such land may be made to him.

Enquiry into measurements, value and claims and award by the Collector

11. Enquiry and Award by Collector

On the day so fixed, or on any other day to which the enquiry has been adjourned, the District Collector shall proceed to enquire into the objections (if any) which any person interested has stated pursuant to a notice given under Section 9 of this Act to the measurements made under Section 8, and into the value of the land [at the date of the publication of the notification under Section 4, sub-section (1)], and into the respective interests of the persons claiming the compensation and shall make an award under his authorization.

12. If the owner of the land is not satisfied with the compensation amount, they make a reference to the court for adjudication and fixation of reasonable compensation amount.

13. Period within which an Award shall be made

The District Collector shall make an award under Section 11 within a period of two years from the date of the publication of the declaration and if no award is made within that period, the entire proceedings for the acquisition of the land shall lapse.

14. Award of Collector to be Final

Such award shall be filed in the Collector's office and shall, except as hereinafter provided, be final and conclusive evidence, as between the Collector and the persons interested, whether they have respectively appeared before the Collector or not, of the true area and value of the land; and the appointment of the compensation among the

persons interested. The Collector shall give immediate notice of his award to such of the persons interested as are not present personally or by their representatives when the award is made.

Taking Possession

15. Power to take possession

When the Collector has made an award under section 11, he may take possession of the land, which shall thereupon vest absolutely in the Government, free from all encumbrances.

16. Special Powers in case of Urgency

The District Collector may utilize special powers under Section 17 to take possession of the land immediately after the publication of the notice mentioned under Section 9 of this Act.

The Land Acquisition procedures are schematically shown in Figure 6.2.1.

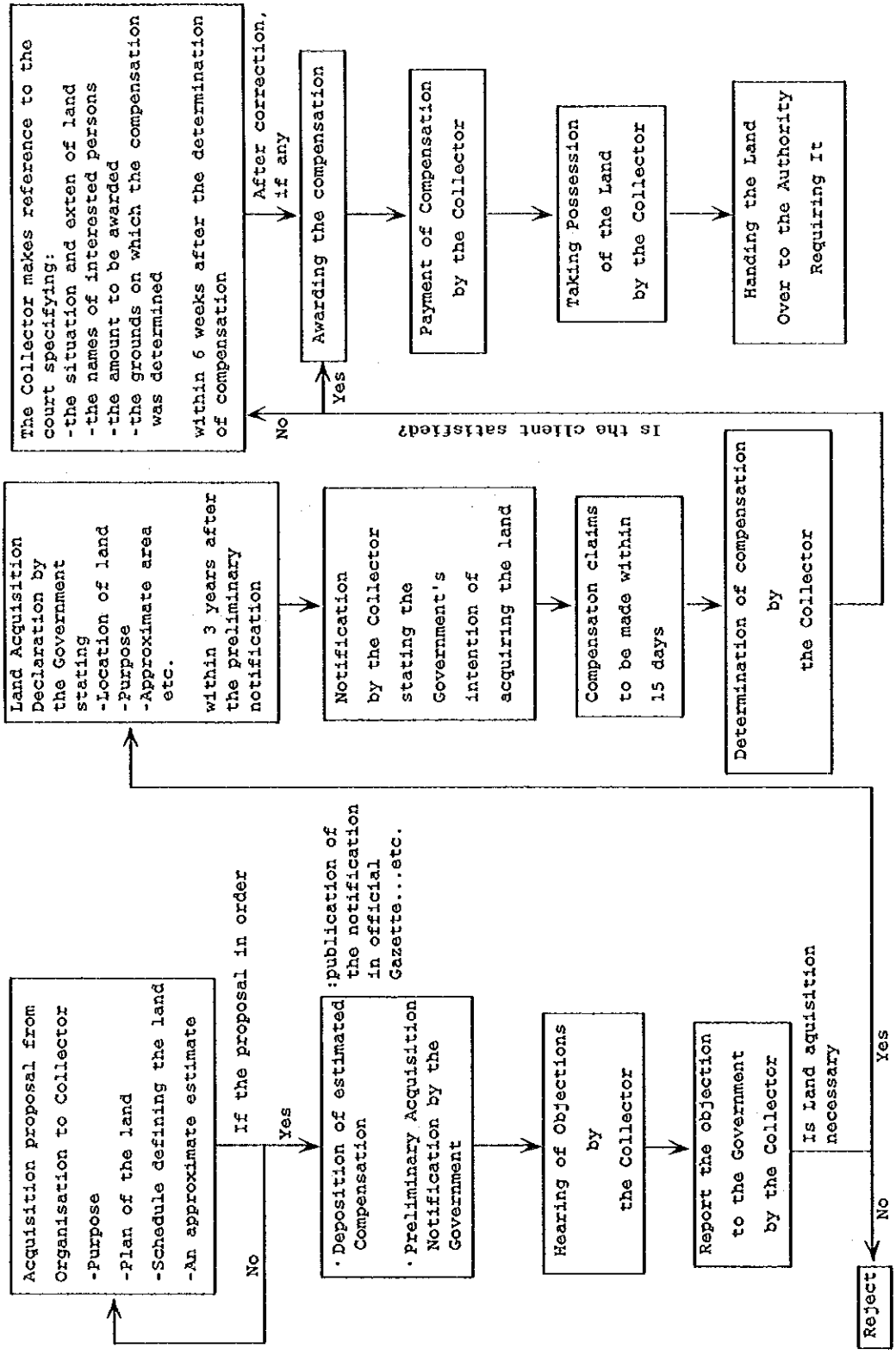


Figure 6.2.1: Procedures for Land Acquisition

6.3 Initial Environmental Examination

6.3.1 Existing Environmental Conditions

(1) General

The contents of this section stem from field reconnaissance, literature survey and personal discussions with experts on the subject. The data on air quality, water quality, noise level and vibration, and ecology, have been retrieved from existing records and studies. All studies have been carried out on a 10-km wide corridor covering both sides of the proposed expressway, as seen in Figure 6.3.1.

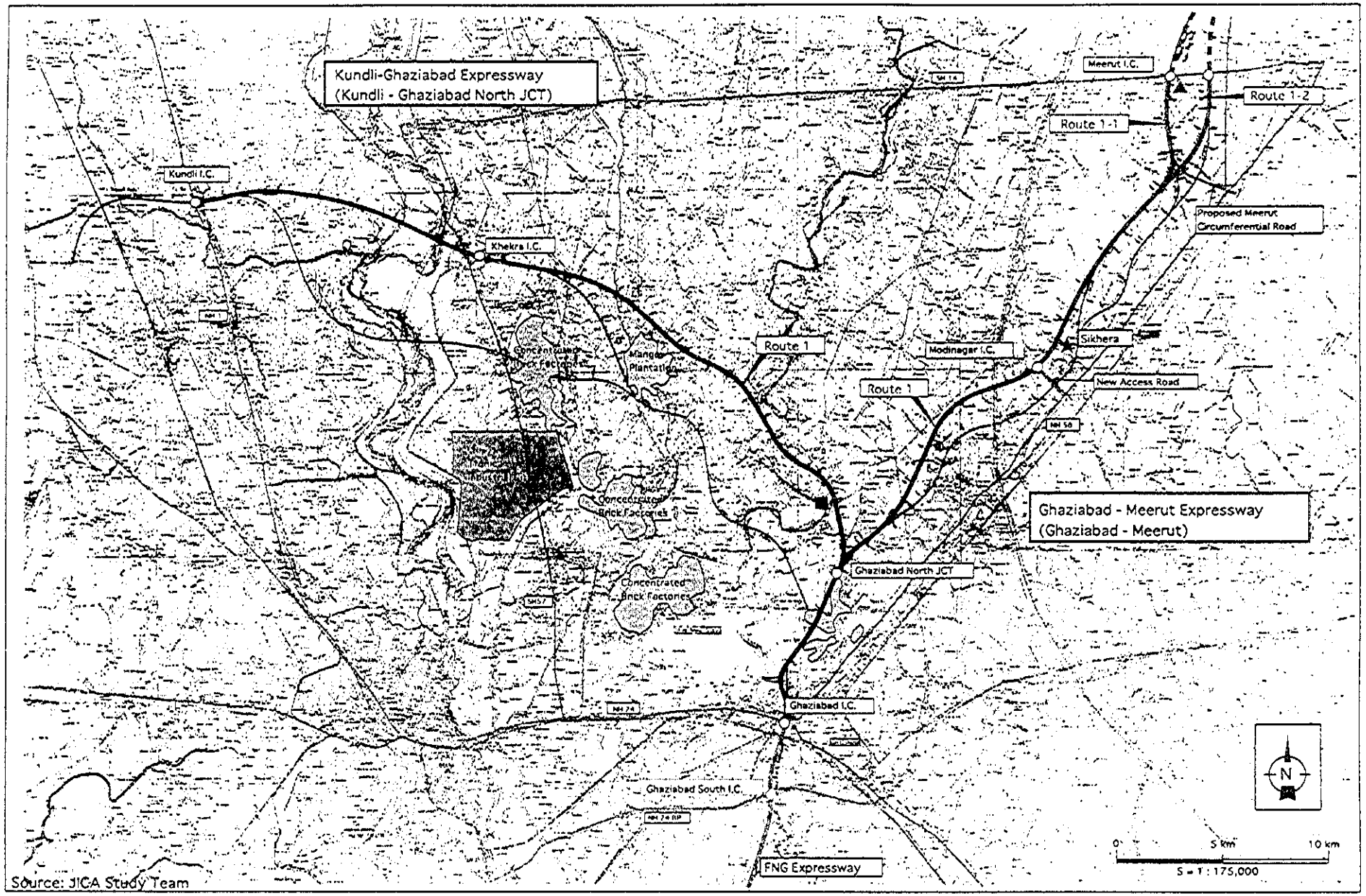
The national capital territory of Delhi is situated at an average altitude of 216 m above MSL and lies between 28°24' and 28°53' N latitudes and 76°50' and 77°20' E longitudes. It covers a geographical area of 1483 sq. km and being cut by river Yamuna. It occupies a strategic position on the Indian subcontinent. All sides of this territory are encircled by Haryana except in the east, where Uttar Pradesh has a common border with Delhi.

National Capital Territory of Delhi had a population, of 26.59 lakhs in 1961, 40.66 lakhs in 1971, 62.20 lakhs in 1981 and 94.21 lakhs in 1991. Delhi has been having an overwhelmingly high proportion of urban component which was 89.7% in 1971, 89.9% in 1981 and as high as 92.7% in 1991. As per the Report of the Technical Group on Population Projections constituted by the Planning Commission, Aug. 1996, Delhi's projected population is estimated at 144 lakhs by 2001, 172 lakhs by 2006, 195 lakhs by 2011 and 210 lakhs by March 2016 when the urban segment will stand at 98.1% of the total population as compared to 91.5% in 1996.

(2) Transportation

Transportation corridors in the National Capital Region exhibit a radial pattern converging on Delhi. These corridors include five national highways: NH-1 to the north, NH-24 to the east, NH-2 to the south, NH-8 to Rajasthan in the southwest, and NH-10 to Haryana and the west and north-west. These are four-lane divided highways for varying distances from the capital. There are also twelve state highways, which provide linkages between the national radial

Figure 6.3.1 Survey locations for Kundli-Ghaziabad Expressway and Ghaziabad-Meerut Expressway



Source: JICA Study Team

highways and outlying towns and villages. According to the National Capital Region Planning Board (NCRPB), total daily passenger trips by all modes in

The NCR was of the order of 884,000 in 1987 (NCRPB, 1988), per capita trip rates for road vehicles range from 0.007 to 0.65 per day.

The NCR has three zone railways (Northern, Western, and Central), and five divisions. Five of these railroads converge on Delhi. Rail passenger movements accounted for 23.7% of total passenger trips in 1987.

The NCRPB proposed in 1988 a regional plan for the year 2001, which included an improved road and rail network. Within the broad framework of the plan, the NCRPB adopted the objective of achieving a manageable Delhi by the year 2001 and developing policies for control of land use and infrastructure development to avoid haphazard development. The transportation development policy for the NCR includes the following five strategies:

- Interconnection of regional centers with the capital by an efficient and effective transport network
- Integrating road and rail network system in Delhi, Delhi Metropolitan area and the rest of the region
- Provision of shortest and fastest network to interconnect the maximum traffic generating and attracting urban nodes in the NCR to diminish the centrality of Delhi
- Decongesting Delhi roads and terminals by diverting bypassable traffic away from Delhi
- Provision of an efficient suburban commuter system

The substantial travel demand between the communities presently must pass through the congestion of Delhi. Estimates of regional traffic in 1994 and the expected traffic till 2018 are given in Table 6.3.1.

Table 6.3.1 Showing Regional Traffic Estimates

Mode	Total Daily Traffic	
	1994	2018
Cars	49,663	261,402
2 & 3 wheelers	48,921	239,700
Trucks	31,373	154,307
Buses	5,478	40,784
Others	13,008	22,186
Total Passenger Car Units(PCU's)	148,442	718,379

(3) Land Environment

A current status of the natural environmental condition for the project site is as follows:

(a) Topography

The project lies largely within the flood plains of Yamuna and Hindan rivers. The average elevation of the project area is approximately 200 meters above the sea level and is quite flat. The Yamuna River is the major water feature of the area. The Hindan River lies in parallel to the River Yamuna for many kilometers and joins together to the south of Faridabad. In the southern portion of the project area, the expressway lies largely in the Yamuna flood plain and in northern end of the project, the expressway falls in the Hindan river flood plain. The flood plan width varies from 2 to 3 kilometers in the project area, and generally consists of series of levees (bands) on the banks. There are several canals in the area.

(b) Soil, Geology and Drainage

• Soils:

The soils in the expressway project area are characterized generally as sands and silts occurring at depths in excess of 50 meters. According to bore hole investigations carried out for the ISBT bridge design, the soil was generally of two types. The upper stratum (ranging in depth from 10 m to 20 m) consists of non-plastic fine silty sand. The lower stratum (from 20 to 45 m below ground level) consists of low-plasticity inorganic silt with fine sand.

• Geology:

The Delhi area is moderately seismic, falling as per ISI Code No. 1893-1970 in Zone IV for design purposes. Historical records indicate that no earthquakes in the area have exceeded intensity of VIII on the modified Mercali scale (which corresponds to 6 to 6.5 on the Richter scale).

The surface geology of the area is dominated by thick alluvial deposits, with bedrock generally below 50 m. Yamuna sand occurs to a depth of 10 m to 20 m, and this is underlain by sandy silt with minor kankar beds. The succession of rock formations in the area have been identified as follows,

Quaternary: Recent and sub-recent soils, alluvium, blown sand and nodular limestone (kankar)

Post Delhi Intrusive: Pegmatites and basic intrusive

Delhi Group: Alwar quartzites

• Drainage:

The alignment cuts across river Yamuna, and Hindan. The Ghaziabad-Meerut section also cuts across upper Ganga canal between Sanda and Didauli villages.

(c) Land Use:

Agriculture is the predominant use of land in the region. The cultivated area constitutes about 80% of the total area of the NCR. The land put to non-agricultural uses viz. urban and rural settlements, transport network, rivers and canals works out to 10.0% of the total area. The area of barren land, which includes rocky area, saline patches, and derelict land is 4.7% of the total area while that which is covered by forests is 2.1 %.The area under permanent pastures and other grazing land is 1.2% of the total area of the region. The percentages of land under cultivatable waste and miscellaneous tree crops and groves are 1.8% and 0.2% respectively of the total area. The area under water bodies (lakes, reservoirs, tanks and rivers) is 0.28% of the total area of the region.

The NCRPB developed in 1988 a land-use plan that is expected to guide the

development of the NCR through the turn of the century.

The NCRPB plans to achieve a slowing in the population growth of the Delhi metropolitan area through strategies to control development, as follows,

i) "....revitalize the economy of the stagnating regional urban centers and to integrate them in a well-knit system of settlements with specific functions to encourage an orderly development of economic activities and increase their complementarily."

ii) "...the development of small urban centers and villages should be integrated in relation to priority towns."

iii) "...hierarchical system of regional centers, sub-regional centers, service centers and basic villages with functionally specialized organized structure."

iv) "...to attract and contain the Delhi bound potential migrants to the extent of 19 lakhs, the selected regional centers would be developed on an intensified scale."

The plan identifies eight regional centers to be strengthened economically: Meerut, Bulandshahr, Panipat, Alwar, Hapur, Khurja, Rohtak and Palwal. Six towns in the Delhi metropolitan area were also identified for development: Ghaziabad, Kundli, Bahadurgarh, Gurgaon, Faridabad, and Noida.

(4) Meteorological Data

Meteorological data collection is an indispensable part of any air pollution study. The meteorological data is used in proper interpretation of base line status and to simulate the meteorological conditions for prediction of impacts.

The Meteorological data for five years i.e. 1993-97 was collected from India Meteorological Department (IMD). This data shows consistency and is considered adequate for any predictions. The temperature, rainfall and meteorological data are interpreted below:

(a) Relative Humidity

Relative Humidity is the highest during the monsoon from July to August (75-

87.5%) and minimum during April to May (32-34%).

(b) Temperature

Extremely hot summers with temperature reaching as high as 46-47°C during daytime in the month of June and 26-28°C during night. The summer lasts for almost a period of four months from the end of March to the end of July or beginning of August. The cold weather lasts for 3-4 months from late November to February with temperature ranging from 6-8°C during night and 20-22°C during daytime.

(c) Rainfall

The south-west monsoon season lasts for about 3 months from mid July to the beginning of September. The number of rainy days are, however, 40 or so with an average rainfall of 725 mm, of which August alone has 370 mm. About 75% of the annual rainfall occurs during monsoon months. There is practically no rainfall from mid September to January.

(d) Wind

The normal wind speed is 10-12 m/hr. during June-July and 3-4 m/hr. during November-January. Thunder storms, squalls, dust storms are also occasionally witnessed in Delhi during summer.

(e) Visibility

The visibility in this area is normally good. However, foggy conditions prevail during winter and heavy rainy season. The number of days during which visibility is poor (up to 4 km) is relatively few. Visibility is 4 to 10 km during 25% of the days in the year.

(5) Water Environment

(a) Surface Water

The principal waterways in the project area include the Hindan River, the Yamuna River, the Agra Canal, the Hindan Cut, and various smaller canals and drainage. A maximum discharge of 7,000 m^3/s was observed in 1988 at the Wazirabad Barage on the Yamuna River.

The Yamuna, one of the sacred rivers of India and a major tributary to the Ganga, carries a large suspended sediment load during the monsoons, and in addition has relatively high BOD levels and coliform levels. Coliform counts at Okhla have been measured at 240,000 MPN/100ml compared to a recommended permissible level of 50 MPN for water sports and bathing. In addition, approximately 1,700 million liters of untreated sewage are dumped into the river daily. There are a large number of industrial effluent sites discharging directly into the river through one of 18 drainage ways. Table 6.3.2 and table 6.3.3 presents some typical water quality data for the Yamuna as measured just upstream of the Okhla Barrage and Hindan as measured at Ghaziabad, respectively. Table 6.3.4 shows CPCB Primary Water Quality Criteria.

Table 6.3.2 Water Quality of the Yamuna River at Okhla

Parameter	Desired Water Quality Level	January 1988 Sampling	October 1989 Sampling
pH	6.5 to 8.5	7.84	7.7
DO (mg/l)	5 or more	3.36	1.57
BOD (mg/l)	<3	18	7
Total coliform (mpn/100ml)	<500	140,000	160,000

Table 6.3.3 Water Quality of the Hindan River at Ghaziabad

Paremeter	Desired Water Quality Level	January 1993 Sampling	October 1993 Sampling
pH	6.5 to 8.5	7.6	7.8
DO (mg/l)	5 or more	4.6	6
BOD (mg/l)	< 3	5.6	5

Table 6.3.4 CPCB Primary Water Quality Criteria

Designated Best Use	Class of Water	Criteria
Drinking Water source without conventional treatment but after disinfection	A	1. Total coliform: 50mpn/100ml 2. pH between 6.5 and 8.5 3. Dissolved Oxygen:6mg/l 4. BOD5:2mg/l
Outdoor bathing (organized)	B	1. Total coliform: 50mpn/100ml 2. pH between 6.5 and 8.5 3. Dissolved Oxygen:5mg/l 4. BOD5:3mg/l
Drinking water source	C	1. Total coliform: 50mpn/100ml 2. pH between 6.0 and 9.0 3. Dissolved Oxygen:4mg/l 4. BOD5:3mg/l
Propagation of Wildlife, fisheries	D	1. pH between 6.5 and 8.5 2. Dissolved Oxygen:4mg/l 3. Free Ammonia:3mg/l
Irrigation, Industrial Cooling, Controlled Waste	E	1. pH between 6.0 and 8.5 2. Electric Conductivity at 25C 2250 Micromhos/cm 3. Sodium absorption ration 26 4. Boron:2mg/l

(b) Ground Water

Ground water is found at relatively shallow depths in the Project area. It exists at ground level in the wetland areas throughout the flood plain. Withdrawals in the Delhi area average about 0.31 million cubic meters per day. A recent study of heavy metals in groundwater showed that groundwater was, in general, of good quality, but that there were saline deposits in certain area primarily north of the Najafgarh Drain on the West Side of Yamuna.

(6) Air Environment

(a) Ambient Air Quality

Ambient air quality in the project area is monitored by the Central Pollution Control Board, Government of India. According to the existing information, it is only the suspended particulate matters (SPM), which exceed the prescribed tolerance limits. Table 6.3.5 and table 6.3.6 show the ambient air quality at Delhi and Utter Pradesh, respectively. The ambient air quality along the proposed alignment is undoubtedly better than any of the adjacent urban areas, specially the more congested part of Delhi. Most of the diverted traffic from NH-1 and GT road is expected to use the expressway. It will definitely reduce the air pollution level as well as traffic congestion in the area fed by the existing highways.

Table 6.3.5 Ambient Air Quality at Delhi

Air Quality Monitoring Station:

City	Industrial	Residential	Sensitive	Total
Delhi	5	4	0	9

Ambient Air Quality Status

		Annual Mean Concentration (AMC) Range (ug/m³)			Annual Mean Concentration (AMC) Range (ug/m³)	
	Industrial(I)	SO_2&NO_2	SPM	Residential(R)	SO_2&NO_2	SPM
Low	■	0-40	0-180	▲	0-30	0-70
Moderate	■	40-80	180-360	▲	30-60	70-140
High	■	80-120	360-540	▲	60-90	140-210
Critical	■	>120	>540	▲	>90	>210

		1993			1994		
		SO_2	NO_2	SPM	SO_2	NO_2	SPM
City/Location City:Delhi	Area Class	AMC	AMC	AMC	AMC	AMC	AMC
Nizamuddin	I	■	■	■	■	■	■
Ashok Vihar	I	■	■	■	■	■	■
Shahzada Bagh	I	■	■	■	■	■	■
Shahdara	I	■	■	■	■	■	■
Janakpuri	R	▲	▲	▲	▲	▲	▲
Siri Fort	R	▲	▲	▲	▲	▲	▲
Town Hall	R				▲	▲	

Note: * I: Industrial Area.
* R: Residential Area.
The value of annual means of three monitored.

Air Quality Statistics: Parameters (SO_2, NO_2 and SPM) of the monitored days in which 16 or more hours of measurements were done.

Table 6.3.6 Ambient Air Quality at Utter Pradesh

Air Quality Monitoring Station:

City	Industrial	Residential	Sensitive	Total
Ghaziabad	3	0	0	3

Ambient Air Quality Status

		Annual Mean Conc. (AMC) Range (ug/m³)			Annual Mean Conc. (AMC) Range (ug/m³)	
	Industrial(I)	SO_2&NO_2	SPM	Residential(R)	SO_2&NO_2	SPM
Low	■	0-40	0-180	▲	0-30	0-70
Moderate	■	40-80	180-360	▲	30-60	70-140
High	■	80-120	360-540	▲	60-90	140-210
Critical		>120	>540		>90	>210

		1993			1994		
		SO_2	NO_2	SPM	SO_2	NO_2	SPM
City/Location City:Ghaziabad	Area Class	AMC	AMC	AMC	AMC	AMC	AMC
G.T.Road	I	■	■	■	■	■	■
NH-24 Bypass	R	▲	▲	▲			

Note: * I: Industrial Area.
* R: Residential Area.

Air Quality Statistics: Parameters (SO_2, NO_2 and SPM) of the monitored days in which 16 or more hours of measurements were done.

(b) Ambient Noise and Vibration

Ambient noise standards have been promulgated by the Govt. of India, the same are shown in Table 6.3.7.

Table 6.3.7 Showing Ambient Noise Standards

No.	Land Use Type	Maximum Leq(h) dBA	
		Day time	Night time
1	Industrial	75	70
2	Commercial	65	55
3	Residential	55	45
4	Silence Zone	50	40

Note: Daytime is 6 A.M. to 9 P.M.
Night time is 9 P.M. to 6 A.M.
Silence zone is defined as areas up to 100 meters around hospitals, educational institutes and courts.

Table 6.3.8 Showing Field Noise Sampling Results

	Bypass	GT Road
Time of day	10.0	11.3
Max. (dBA)	85.7	92.8
Min. (dBA)	41.8	61.3
Leq. (dBA)	69.1	77.7

The Table 6.3.8 indicates that noise levels in the immediate vicinity of the existing roads with high levels of traffic are high and exceed the acceptable standards. However, a reduction of about 4.5 dBA per doubling of distance from the noise source can be expected. For example, the reading or 77.7 dBA taken 3 meters from the edge of the GT road would be reduced to 73.2 dBA at 6 meters, 68.7 dBA at 12 meters and so forth. Therefore, the "commercial" standard of 65 dBA would be reached about 20 meters from the road, and the "residential" standard of 55 dBA would be met about 100 meters from the road without any noise mitigation measures.

Delhi, Ghaziabad and Meerut urban environment is noisy in general yet the rural areas through which the expressway will be located comprising agricultural land is quiet and serene and issues of noise may not be a major hurdle. Noise level in the urban area will be definitely reduced on account of reduction of traffic congestion with the implementation of the proposed expressway project.

No data is available about vibration effects. Some vibration is likely to occur during the execution of the project, but it would be a temporary phase.

(7) Ecological Environment

(a) Forestry and Wildlife

There is neither any forest area nor any wildlife sanctuary or National Park which falls in the project area. Adequate afforestation on both sides of proposed bypass needs to be included while designing the Environmental Management Plan to improve the ecology of the area.

Sultanpur Lake Bird Sanctuary is beyond this project influence area. Hence, there will be no disturbing effect on the bird population in the lake. Even then

a thorough detailed study is suggested while conducting the detailed EIA.

(b) Gardens and Parks

The main horticulture gardens in the vicinity of the proposed expressway in Delhi area are Roshanarah Park situated in North East Delhi area and Kudisia Gardens along river Yamuna near ISBT. Though the flora of these gardens are not natural representative vegetation, many exotic species of plants have been introduced.

(c) Other important items

- Disposal of debris and construction spoils
- Spillage of oil and grease
- Disposal of vehicle, clean-up and wash-water

It would be necessary to formulate an efficient management plan for disposal of waste in the region.

6.3.2 Examination of the Impact by the Project

(1) Economic Activities

The NCR's economy is based on agriculture, although there has been significant industrial and commercial development. The three main economic generators are government, wholesale trade, and industry. The Delhi metropolitan area serves as a regional wholesale distribution center, and also has a large employment base in the public sectors. Industrial employment has been increasing at a fast pace, showing an average growth rate of over 11 percent annum between 1970 and 1985. In the suburban towns of Modi Nagar and Ghaziabad, similar patterns are documented in 1991, Ghaziabad census recorded 30 percent in industry, 1 percent in construction, 0.5 percent in agriculture and 55.5 percent in other categories. In the year 2001, Ghaziabad expects the same distribution of work force but with a population increase from 654,000 (1994) to 1,297,000 (1999). The continued strong growth in employment opportunities in the government, trade, and industrial sectors in Delhi, together with increasing land prices in the urbanized area of Delhi, indicates an increasing

demand for efficient access to and from Delhi from the adjoining parts of the region. High levels of traffic congestion in the city center emphasize the need for circumference facilities.

The present government policy consists of not allowing the location of new medium and large industries within the Union Territory of Delhi (UTD) in contrast to the policies of Ghaziabad, NOIDA, Greater NOIDA and Faridabad where industrial growth is planned and encouraged. However, complementing the organized industrial sector, there is also a fast-growing informal economic sector within Delhi. These small-scale activities rely on indigenous resources, low-skill labor, labor-intensive technologies, low capitalization and generally low use of available infrastructure. These activities also represent a significant latent demand for transportation facilities.

Economic impacts will be both positive and negative. On the positive side, the project will strengthen the economic ties between different sections of proposed alignment like Delhi, Jaipur (Rajasthan), Agra, Moradabad, Ghaziabad, Modi Nagar, Meerut, Dehradun, Rishikesh (U.P.) by providing fast and convenient access between these areas and assist in the overall economic development of the region. This project will also provide Meerut and Delhi with improved access to rail terminals. Since NOIDA is presently planning a truck-on-flat-car (TOFC) warehousing area, the expressway will provide access to eastern Delhi and hinterlands. Additionally, the development of the project will provide large construction employment opportunities.

(2) Land Use Impacts

Land use patterns will change as a result of the Project's implementation as well as the implementation of Faridabad Noida and Ghaziabad Expressway. Changes may include strip commercial development along the approach roads, intensified development in NOIDA, western Ghaziabad and southern Faridabad as a result of the enhanced access. These changes will most likely fall within the patterns anticipated in the three master-planning efforts described earlier. As the master land use plans are updated, care should be taken to include the effects of the new expressway.

(3) Resettlement and Rehabilitation

No human resettlement and rehabilitation plan can be indicated at this stage. It can be indicated while preparing detailed Environmental Impact Assessment. Therefore, no resettlement and rehabilitation plan is being submitted now.

(4) Traffic and Public Facilities

Infrastructure facilities of all types are being stretched to their limits in the Delhi region. Roads, housing, power, water supply, sewerage, solid waste disposal, communications, community health facilities, schools, and recreational facilities are all being used to capacity, and the continued growth of the Delhi metropolitan area indicates that this situation is not likely to improve rapidly. In the immediate expressway Project area, the primary facilities that will be affected will be the local pucca road network and tracks which presently cross the proposed alignment of the expressway. The Grand Trunk Road, along with NH-1, NH-2 and NH-58 to Meerut, the Dadri Road, the proposed connection link will all experience changed travel patterns and likely increased traffic near the interchanges. The engineering feasibility study will need to address the range of impacts and determine the level of mitigation required to minimize negative impacts. Additionally, numerous tracks cross the proposed alignments. These tracks provide access to fields from villages and access to markets in Delhi or elsewhere, as well as paths for herding domestic animals, and are part of the village fabric, as streets are to a city. The tracks which serve the needs of the rural population will be affected by the proposed expressway. How much these are affected depends on the frequency and designs of overpasses and underpasses. The final feasibility study and preliminary design will need to address these requirements.

In the urban areas, water supply is drawn from the perennial rivers in the region (the Yamuna, Hindan, and Ganga), and from wells of various depths and capacities. Water shortages occur in areas west of the Yamuna, especially in drier months. Water treatment is partial at best in the urban centers, and per capita supplies range from 17 to 240 lpcd. For the main expressway corridor, no water treatment is available. Wells provide the entire supply for the village communities and smaller cities. In the rural areas of the Project, water is available at all villages but is untreated, typically well water.

Sewage treatment is not available in most urban areas (except Delhi where about 30 percent of the population is served), or in rural communities. Most sanitary and storm sewers drain directly into the Yamuna and Hinda as well as other drains, although there are three treatment plants (Okhla, Keshopur, and Coronation) in the Delhi area. Sewerage and wastewater treatment is not available along the expressway corridor but will need to addressed to improve the water quality in Yamuna river.

Educational facilities of all levels exist in Delhi, and are perhaps the best in the country. Literacy and education rate and standard go down rapidly with distance from the capital, the literacy rate for the Delhi UT is about 62 percent, for NCR as a whole it is 44 percent, and for all of India it is 36 percent. In the rural portions of the Project area, literacy is about 31 percent, slightly higher than the national average for rural population. Elementary Government schools are available in villages throughout the expressway corridor.

(a) Traffic

The proposed alignment of the KGM expressway is shown on the road map for the NCR. It clearly shows that the alignment would cut across some roads, which would serve as access roads during construction of this project. Simultaneously, the crossings would have to be designed considering the severance factor and maintaining the access controlled character of the expressway.

Traffic patterns in the eastern and southern portion of the Delhi region will undergo significant changes. These changes will be as per the transportation planning strategies of the National Capital Region Plan 2001. The expressway also reinforces and caters to the needs of urban and industrial development for the concerned population. Isolated and short-term traffic problems will need to be studied and addressed during construction phase, especially at interchanges or location of underpasses. Delays and congestion may occur during the construction phase, but in the long run, the expressway will provide an efficient as well as safe levels of service.

(b) Public Facility

No additional public facility problem such as water supply, severance to

schools and hospitals etc. is expected as a result of construction of this expressway.

(5) Split of Communities

It may be stated that this aspect also deals with some negative impacts such as split of communities or the taking of properties which lie within the proposed project's right of way. There will be a substantial amount of farmland taken out of cultivation and used for the roadway. Also, borrow material will need to be acquired from locations along the expressway alignments, which will need temporarily taking over of additional agricultural lands.

Relocations are expected to be very low, considering the length of the Project. The details can be reported only after actual alignment finalization and detailed studies thereafter. Nevertheless, the field inspection of the area permits a curvilinear alignment with no relocations. Exceptions to this could result from the specific requirements of interchanges to be determined during the final design. Additionally, property values are likely to substantially increase in the vicinity of interchanges.

Some additional impacts are expected due to influx of workers coming into the project area. Therefore, these camps should be meticulously planned and purposely implemented to avoid any inconvenience to the workers. After the project is completed, plan should be made in advance to shift these workers from the site.

Cultural Properties

Cultural properties like historical monuments, archaeological sites, historical settlements and other heritage sites, sacred groves and other sensitive cultural properties are not existing in the proposed alignment.

Hazards

In the proposed alignment, there is no possibility of danger of landslide and accidents. Therefore, there is no possibility of occurrence of hazards in the proposed region.

(6) Air Quality and Noise

(a) Air quality impacts

There is no doubt that the air quality will get affected during construction activity due to both mobile and non-mobile machinery but the area being a low density population area covering villages scattered here and there, the adverse impact is likely to be negligible and does not require detailed consideration at this stage. During the operation phase, air quality gets affected by the vehicular exhaust but adverse impact on account of air pollution is likely to be more pronounced in urban areas.

(b) Noise

The generation of noise caused by road traffic can be classified into three categories:

i) Noise generated by the various parts of the vehicle

ii) Noise contributed by the interaction between the vehicles and the road surface

iii) Noise depending upon the speed, flow and density of traffic

However, an important source of noise generation is the vehicle itself and amongst vehicles, trucks are the main source of traffic noise. Further, older vehicles generate more noise because of deterioration in their mechanical condition. Noise level also increases with the increase in roughness of the roads. Thus the level of noise will reduce with the improvement in the riding quality of road surface after the completion of the project as also re-distribution of the traffic.

The noise problem needs more consideration in urban areas and industrial areas because the annoyance and discomfort caused by noise can at times assume serious proportions meriting urgent attention. Noise attenuation is rapid as the distance from the source increases. Further, landscaping and difference in level between locations of noise generation and habitation also have some attenuating effects. The noise problem does not merit any consideration because firstly the habitation exists some distance away from the expressway boundary and

secondly, the trees are planted in the road land width, which will absorb the noise to some extent.

(7) Soil Erosion

Minor soil erosion may occur at exposed earthwork sites during construction, but this is not considered a major environmental threat. Measures to control erosion as required need be detailed while deciding the project.

(8) Ecological Resources

(a) Fisheries

No private fishery is existing in the influence area. However, fishing activities in Rivers Yamna and Hindan are under State Government's control. There are no fishing rights available to any community in the area.

(b) Forestry

The area primarily comprises of agricultural fields. There are no reserve or any unclassified forests in the project area. Thus the tree felling activity is almost negligible. Even then adequate afforestation program must be designed to improve the environment quality of the area.

(c) Wildlife

There are neither protected or reserved forests nor any National Park & Wild Life Sanctuary in the project area.

Scooping checklist is shown in Figure 6.3.2.

No	Environmental Items	Evaluations	Grounds
Socio-economic Environment			
1	Resettlement	B	No human settlement is to be removed. Resettlement of agricultural holding will occur due to construction of this expressway.
2	Economic activities	B	Construction of new roads and physical distribution of terminals will cause changes of economic activity like commercialisation of appurtenant land.
3	Traffic and public facilities	B	Traffic led hazards are not contemplated because of access control facility. However, due to possibility of commercialisation of appurtenant land, there will be nee to examine future locationing of public facilities like Hospitals, Schools, etc.
4	Split of communities	D	Split of community will not occur.
5	Cultural property	D	No cultural property exists.
6	Water rights and rights of common	D	No impact on water rights and rights of common is anticipated.
7	Health and sanitation	D	Large amounts of refuse will not occur.
8	Waste	B	Solid waste such as construction refuse produced during construction of expressway should be properly disposed off.
9	Hazards	D	No hazards.
Natural Environment			
10	Topography and Geology	D	No permanent change in valuable topography and geology is expected.
11	Soil Erosion	D	Large scale changes such as forest felling is not involved in the construction of this expressway.
12	Ground Water	D	Ground water reserve would not be affected by the construction of this expressway.
13	Hydrological Situation	B	Effect of construction of bridges and Dyke Road improvement should be studied.
14	Coast and Sea area	D	Land locked
15	Flora and Fauna	D	Valuable flora and fauna do not exist in the study area.
16	Climate	D	Large scale felling and construction of high building are not planned.
17	Landscape	B	The land use pattern may change with the escalation of the expressway. Its possible future impact on the landscape needs to be studied.

Figure 6.3.2 (1): SCOPING CHECK LIST

Environmental Pollution			
18	Air Pollution	B	Air pollution levels may increase to some extent during construction phase, however this is temporary. In the operation stage the expressway will attract large traffic volumes, and its impact on the environment will have to be evaluated. However, the existing heavily congested routes would get relieved, due to the traffic diversion on to the expressway.
19	Water Pollution	B	Temporary water pollution during construction phase is anticipated, requisite preventive measures should be adopted to check the same.
20	Soil Contamination	D	There will be no action which causes soil contamination.
21	Noise and Vibration	B	As the major stretch of the expressway passes through rural area, the impact of noise and vibration may not be large.
22	Ground Subsidence	D	Construction of sub-way, tunnel and cut roads are not planned.
23	Offensive Odors	D	There are no factors producing offensive odors.

Classification of Evaluation:

A	Serious impact will be anticipated.
B	Impact will be more or less anticipated.
C	Unknown (it needs investigation)
D	No impact will be anticipated.

Figure 6.3.2 (2): SCOPING CHECK LIST (Continue)

6.4 Social Survey

6.4.1 Objectives

The scope of 'Social Survey' done in Phase 2 was limited to collection of detailed data/information and /or interviewing with revenue/land record officers at each district headquarter in the sampled communities and places/areas. Moreover, it tried to identify project affected persons (PAPs) and conduct socio-economic surveys concerning the PAPs to assess the social impacts due to acquisition of land and property. Another aim of this survey conducted in Phase 2 was to provide these collected socio-economic data/information and analysis to Environmental Impact Assessment (EIA).

The Social Survey has the overall objectives of (i) enhancing of quality of life and environment in and around the project locations, (ii) preventing and minimizing adverse environmental and social situations, and (iii) mitigating possible negative environmental and social situations.

6.4.2 Description of The Project Area

The project area has several noteworthy characteristics such as (i) two rivers are going down in the project area, (ii) most of the survey area is covered by agricultural and fertile land with intensive cultivation, and (iii) the major crops are wheat, sugarcane and rice.

6.4.3 Scope of Work and Methodology

The methodology is accordance with the 'Terms of Reference' for social survey submitted to JICA.

In the project area, there are about 48 villages of districts – Ghaziabad, Meerut and Baghpat in Uttar Pradesh State, and Sonipat in Haryana State, which are in closer proximity to the expressway route and fall on either side of the expressways (Table 6.4.1).

More specifically following criteria are considered to select a total of 17 villages (35%) out of 48 villages of the project area.

Proximity of Village:

The villages falling within 500 meters radius of the expressway routes, as the general impacts of the project are likely to be more in such villages than the other villages.

Close to Inter Change (I.C.) Points:

The villages, which are relatively near to inter change points of the expressways, are likely to have higher economic impacts.

Loss of Accessibility:

The villages likely to loss existing accessibility to National and state Highways leading to adversely affect their future growth.

Vulnerable Groups:

The villages having predominance of scheduled caste and scheduled tribe communities, minority population (mostly Muslims), primary workers, female agriculture labors etc., whose existing job opportunities are likely to be influenced by the project.

To meet the above criteria of the villages, a matrix (Table 6.4.1) has been prepared, and these 17 villages are mapped on Figure 6.4.1.

Table 6.4.1: Basic data of villages in the survey area and 17 villages selected by different criteria

Blocks/Dist.	Location		Villages (with Census Codes)	Proximity (distance in M.)	Population (1991 Census)	Pop. of SC/ST (1991 Census)	Female Pop. (1991 Census)	Religion (Muslim Pop.)	Agricultural Labors			Cultivators	Main Workers	Total Primary Workers	% of SC/ST Pop. to Total Pop.	% of Muslim Pop.	% of Main Workers to Total Pop.	% of Primary Workers (Cult. and Agri. Lab.) to Main	% of Female Agri. Lab. to Main	% of Cultivators to Main Workeers	Village near IC.	Village Connection to NH/SH
									Total	M	F											
Rajapur	L	1	Moti (65)	200	1220	221	545	0	25	25	0	158	346	183	18.1	0.0	28.4	52.9	0.0	45.7		
(Gzb.)	R	2	Bhawapur (64)	100	1490	830	704	0	215	214	1	105	400	320	55.7	0.0	26.8	80.0	0.3	26.3		
		3	Shahpur (58)	500	2793	183	1290	0	206	206	0	311	740	517	6.6	0.0	26.5	69.9	0.0	42.0		
		4	Bhikampur (68)	250	4106	1208	1889	362	444	376	68	194	1093	638	29.4	8.8	26.6	58.4	6.2	17.7		
	L	5	Mahmudabad (66)	600	299	234	133	21	3	2	1	13	71	16	78.3	7.0	23.7	22.5	1.4	18.3		
Muradnagar	L	6	Chakarpur (105)	1000	1144	292	518	580	71	71	0	134	289	205	25.5	50.7	25.3	70.9	0.0	46.4		
(Gzb.)		7	Sultanpur (104)	750	2226	598	1006	NA	178	178	0	246	601	424	26.9	NA	27.0	70.5	0.0	40.9		
		8	Kurrampur (106)	100	2362	599	1088	26	95	95	0	227	614	322	25.4	1.1	26.0	52.4	0.0	37.0		Y
		9	Kakara (82)	600	1834	314	823	NA	140	126	14	307	567	447	17.1	NA	30.9	78.8	2.5	54.1		
		10	Bandipur (81)	1000	1064	206	495	NA	42	39	3	118	302	160	19.4	NA	28.4	53.0	1.0	39.1		
		11	Firozpur (80)	1000	684	5	320	NA	5	5	0	79	187	84	0.7	NA	27.3	44.9	0.0	42.2		
		12	Sonda (73)	500	4833	1673	2189	2500	558	549	9	281	1230	839	34.6	51.7	25.5	68.2	0.7	22.8	Y	
		13	Niwari (70)	2000	85	0	35	NA	9	9	0	0	34	9	0.0	NA	40.0	26.5	0.0	0.0		
		14	Bhadoli (99)	100	1446	258	688	65	0	0	0	195	197	195	17.8	4.5	13.6	99.0	0.0	99.0		Y
	R	15	Nabipur (111)	350	676	278	303	NA	8	4	4	88	177	96	41.1	NA	26.2	54.2	2.3	49.7		
		16	Jalalpur Raghunathpur (110)	350	947	776	429	0	22	12	10	40	237	62	81.9	0.0	25.0	26.2	4.2	16.9		
		17	Ajabpur Mangloi (107)	300	403	30	195	NA	0	0	0	1	104	1	7.4	NA	25.8	1.0	0.0	1.0		
		18	Didauli (83)	500	3125	457	1414	NA	176	174	2	504	909	680	14.6	NA	29.1	74.8	0.2	55.4		
		19	Fatehpur (74)	750	425	53	196	NA	21	21	0	29	84	50	12.5	NA	19.8	59.5	0.0	34.5		
		20	Rewara (95)	300	2868	394	1255	72	141	136	5	518	782	659	13.7	2.5	27.3	84.3	0.6	66.2		
		21	Manauli (98)	500	1195	169	480	100	43	41	2	161	481	204	14.1	8.4	40.3	42.4	0.4	33.5		
		22	Bihang (90)	800	622	87	278	NA	28	28	0	117	172	145	14.0	NA	27.7	84.3	0.0	68.0		
Bhojpur	L	23	Nangla Musa (17)	1000	1325	307	581	800	60	60	0	143	366	203	23.2	60.4	27.6	55.5	0.0	39.1		
(Gzb.)		24	Sherpur (16)	750	1761	389	800	200	66	66	0	164	487	230	22.1	11.4	27.7	47.2	0.0	33.7		Y
	R	25	Yaquatpur Mavi (15)	150	1722	654	748	192	110	108	2	155	482	265	38.0	11.1	28.0	55.0	0.4	32.2		

Table 6.4.1(Continue): Basic data of villages in the survey area and 17 villages selected by different criteria

Blocks/Dist.	Location		Villages (with Census Codes)	Proximity (distance in M.)	Population (1991 Census)	Pop. of SC/ST (1991 Census)	Female Pop. (1991 Census)	Religion (Muslim Pop.)	Agricultural Labors			Cultivators	Main Workers	Total Primary Workers	% of SC/ST Pop. to Total Pop.	% of Muslim Pop.	% of Main Workers to Total Pop.	% of Primary Workers (Cult. and Agri. Lab.) to Main	% of Female Agri. Lab. to Main	% of Cultivators to Main Workeers	Village near IC.	Village Connection to NH/SH
									Total	M	F											
		26	Sikhera (12)	1150	1270	366	584	0	10	8	2	53	291	63	28.8	0.0	22.9	21.6	0.7	18.2		
		27	Sara (10)	250	4311	1109	1927	NA	158	153	5	403	1306	561	25.7	NA	30.3	43.0	0.4	30.9		
Merrut (Meerut)	R	28	Chajjupur (108)	100	3330	755	1515	746	489	313	176	325	1200	814	22.7	22.4	36.0	67.8	14.7	27.1		
Jani Khurd	L	29	Soharka (101)	150	800	236	377	0	199	147	52	76	275	275	29.5	0.0	34.4	100.0	18.9	27.6		
(Meerut)		30	Kalanjri (74)	1250	4337	1099	2031	12	613	459	154	490	1421	1103	25.3	0.3	32.8	77.6	10.8	34.5		
	R	31	Panchli Khurd (72)	100	5374	671	2409	782	324	315	9	501	1381	825	12.5	14.6	25.7	59.7	0.7	36.3	Y	
		32	Dimoli (107)	250	1636	749	737	0	65	62	3	141	427	206	45.8	0.0	26.1	48.2	0.7	33.0		
Khekra	L	33	Phalaira (247)	300	1454	97	677	0	0	0	0	329	452	329	6.7	0.0	31.1	72.8	0.0	72.8		
(Baghpat)		34	Alamgirpur Tukali (245)	300	611	171	284	0	93	85	8	25	143	118	28.0	0.0	23.4	82.5	5.6	17.5		
		35	Singauli (244)	100	1639	89	764	92	111	111	0	212	395	323	5.4	5.6	24.1	81.8	0.0	53.7		
		36	Shekhpur (233)	Uninhabitated																		
		37	Nagla Baheri (233)	Uninhabitated																		
		38	Mawi Kalan (205)	100	4556	830	2090	930	285	260	25	478	1429	763	18.2	20.4	31.4	53.4	1.7	33.4		
	R	39	Gauna (243)	500	2302	358	1017	NA	42	41	1	432	624	474	15.6	NA	27.1	76.0	0.2	69.2		
		40	Sharfabad (246)	100	1662	18	761	1300	36	36	0	346	450	382	1.1	78.2	27.1	84.9	0.0	76.9		
		41	Lehchora (240)	850	1921	254	876	NA	129	85	44	402	638	531	13.2	NA	33.2	83.2	6.9	63.0		
		42	Rawan (Badegaon) (221)	250	4777	582	2275	286	340	318	22	595	1336	935	12.2	6.0	28.0	70.0	1.6	44.5		Y
		43	Katha (201)	40	6769	1503	3089	3445	630	381	249	839	2430	1469	22.2	50.9	35.9	60.5	10.2	34.5	Y	
Rai (Sonipat)	L	44	Manoli (35)	200	2130	272	994	0	214	209	5	233	564	447	12.8	0.0	26.5	79.3	0.9	41.3		
		45	Atrena (44)	1100	3932	486	1781	200	132	132	0	429	1079	561	12.4	5.1	27.4	52.0	0.0	39.8		
		46	Nagla Kalan (43)	175	5130	494	2283	600	72	70	2	539	1357	611	9.6	11.7	26.5	45.0	0.1	39.7		
		47	Badh Khalsa (41)	100	2342	263	990	44	21	20	1	167	550	188	11.2	1.9	23.5	34.2	0.2	30.4	Y	
	R	48	Patla (40)	100	1410	257	652	16	68	68	0	153	378	221	18.2	1.1	26.8	58.5	0.0	40.5		

Source: Social Survey Report in the Expressways Project Area, MDP Consultants Limited.

Table 6.4.2:: Infrastructure

No.	Name of the village	NP-HQ	PS	JHS	HS	IC	VDO-HQ	SF Ctr.	C.S.	FP Shop	P.O.	W. Mkt.	Bus Stop	Tel.	TLG	Bank	PHC	V.H.	Police Stat.	Govt. Tub.	Reg. Mkt.	Power House	Elect-ricity	Com. Ctr.	G.P.O	Other related village in importance
Muradnagar (Gzb.)																										
1	Kurrampur	N	2	N	N	Y	N	N	N	1	N	N	N	Y	N	N	Y	N	N	Y-1	N	N	Y	N	N	Muradnagar
2	Sonda	Y	2	2	N	Y	Y	1	Y	Y	Y	Fri.	N	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	Y	Modinagar
3	Bhadoli	N	1	1	N	N	N	N	N	1	Y	N	Pri.	Y	Y	N	N	N	N	N	N	N	Y	N	N	Muradnagar
4	Jalalpur Raghunathpur	N	4	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	Y	N	N	Muradnagar, Ghaziabad
5	Rewara	N	2	1	N	N	N	N	N	Y	Y	Wed.	N	Y	N	N	N	N	N	Y-3	N	N	Y	N	N	Murad., Ghaz.
Bhojpur (Gzb.)																										
6	Sherpur	N	1	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	Y	N	N	Modinagar, Sonda
7	Sikhera	N	1	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N	Y	N	N	Modinagar, Sonda
	Merrut (Meerut)																									
8	Chajjupur	N	1	1	N	N	N	N	N	1	Y	Sat., Tue.	N	N	Y	N	N	N	N	N	N	N	Y	N	N	Muhddinpur, Modinagar, Meerut
Jani Khurd (Meerut)																										
9	Soharka	N	1	1	N	N	N	1-Pri.	N	1	N	N	N	Y	N	N	N	N	N	N	N	N	Y	N	Y	Meerut
10	Panchli Khurd	Y	2	N	N	1	N	1	N	1	Y	N	Y	Y	Y	Y	N	Y	N	N	Y	N	Y	N	N	Meerut
Khekra (Baghpat)																										
11	Alamgirpur Tukali	N	1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y-1	N	N	Y	N	N	Rataul
12	Mawi Kalan	N	2	N	N	1	N	N	N	1	N	N	N	Y-23	N	N	Y	Y	N	Y-1	N	N	Y	N	Y	Baghpat, Khekera, Katha
13	Sharfabad	N	1	N	N	N	N	N	N	1	N	N	N	N	N	N	N	N	N	Y-2	N	N	Y	N	N	Rataul, Churali
14	Rawan (Badegaon)	Y	2	2	N	N	N	2	Y	2	Y	Thu.	y	2STD	Y	Y-2	Y	Y	N	Y-2	N	N	Y	N	Y	Baghpat, Khekera
15	Katha	N	2	Y	N	N	N	1	Y	1	Y	N	Y	Y40	Y	Y	N	N	N	N	Y	N	Y	N	N	Baghpat
Rai (Sonipat)																										
16	Manoli	N	N	1	N	N	N	N	N	1	1	N	Y	N	Y	N	Y	N	N	Y-1	N	N	Y	Y	N	Sonipat, Rai
17	Badh Khalsa	N	1	1	N	N	N	N	Y	1	1	N	Y	Y	Y	N	N	Y	N	N	N	N	Y	N	N	Sonipat, Badh Malik

NP-HQ: Nayay (Judicial) Panchayat Headquarters, PS: Primary School, JHS: Junior High School, IC: Inter College, DO-HQ: Village Development Officer Headquarter,

SF Ctr.: Seed & Fertiliser Center, C.S.: Co-operative Society, FP Shop: Fair Price Shop, P.O.: Post Office, W.Mkt.: Weekly Market, Tel.: Telephone, TLG: Telegram,

PHC: Primary Health Center, V.H.: Vetenary Hospital, Police Stat.: Police Station, Govt.Tub.: Government Tubewell, Reg. Mkt.: Regular Market,

Com. Ctr.: Community Center, Gram Panc. Off.: Village Panchayat Office, Pri.: Private, Murad.: Muradnagar, Ghaz.: Ghaziabad, STD: subscriber Trunk Dialling

Tue.: Tuesday, Wed.: Wednesday, Thu.: Thursedady, Fri.: Friday, Sat.: Saturday

Source: Social Survey Report in the Expressways Project Area, MDP Consultants Limited.

6.4.4 Socio-Economic Profile

(1) Infrastructure

By seeing the extent of infrastructure facilities in the survey area villages that are 17 selected sample villages on which would most probably have negative impacts due to the expressway, the infrastructure is overall poorly facilitated like:

(a) Out of these 17 villages, several villages are not connected telephonically.

(b) Only 4 villages have banks.

(c) Only 4 villages have primary health centers out of 17.

(d) Some villages have sub-urbanized characteristics.

(e) Only one village i.e., Badh Khalsa has program related to women (vocational training center).

(2) Caste and Community Dominance

Caste plays an important role in the rural society. The village society is divided into the caste, class, religion, and landholding basis. Caste hierarchy is drawn in the pattern of Hindu system. It is observed that the people belonging to higher castes own more land than those belonging to lower castes. However over period of time, this caste based inequality has changed paving way for another type of inequality in terms of access to modern technology and skill based job opportunities.

One can still find an interdependence on caste based occupations in rural areas, which means that village artisans (Blacksmiths) make and mend agricultural tools for farmers in return of some crops. Weavers weave clothes in return of crops or earthen pots if they are weaving clothes for potters. This is a unique feature of rural India. Over the years, this system of dependency has been changing, though not completely, it is still manifested today.

Table 6.4.3: Population, Caste, Community Dominance and Land for Religious Purposes

No.	Name of the village	Household no. (91 Census)	Total Pop. (91 Census)	Muslims (Primary Data)	Scheduled Caste (91 Census)	Caste dominance in the village (Primary Data)	Temple	Mosque	Graveyard
Muradnagar (Gzb.)									
1	Kurrampur	350	2362	26	599	Jat	2	N	2
2	Sonda	614	4833	2500	1673	Tyagi, SC &Muslims	3	1	3
3	Bhadoli	216	1446	65	258	Tyagi	2	N	2
4	Jalalpur Raghunathpur	158	947	Nil	776	SC	2	N	1
5	Reora	398	2868	72	394	Gujar	1	N	3
Bhojpur (Gzb.)									
6	Sherpur	239	1761	200	389	Jat	1	1	3
7	Sikhera	188	1270	Nil	366	-	2	N	3
	Merrut (Meerut)								
8	Chajjupur	469	3330	746	755	SC	2	1	2
Jani Khurd (Meerut)									
9	Soharka	111	800	Nil	236	SC	1	N	3
10	Panchli Khurd	744	5374	782	671	Gujar	2	1	3
Khekra (Baghpat)									
11	Alamgirpur Tukali	86	611	Nil	171	SC	1	N	N
12	Mawi Kalan	674	4556	930	830	Jat	3	1	1
13	Sharfabad	225	1662	1300	18	Gujar&Muslims	1	1	1
14	Rawan (Badegaon)	694	4777	286	582	Tyagi&Brahmin	5	2	2
15	Katha	997	6769	3445	1503	Muslims&Jat	3	2	2
Rai (Sonipat)									
16	Manauli	295	2130	Nil	272	-	1	N	1
17	Badh Khalsa	305	2342	44	263	Jat	1	N	1

Brahmin, Tyagi: They are belonging to a highest caste group.
Jat: They are basically agricultural cultivators, and originally from Haryana.
Gujar: They are basically agricultural workers, and originally from Rajasthan.
Source: Social Survey Report in the Expressways Project Area, MDP Consultants Limited.

(3) Social and Religious Structure

Religious structures, cremation ground, graveyards play an important part in any rural setting. The cremation ground for Hindus and graveyards for Muslims are generally situated outside the village either close to river/canal or wastelands/agricultural fields. Both the communities attach a great deal of value with these structures, as it is the only place for the burial of the family members (See Table 6.4.3).

(4) Education, Health and Sanitation

Education

The data on literacy rate for the villages located either side of the expressway is given in Table 6.4.4. For calculation of literacy percentage, instead of total population of the villages, population only above 6 years has been considered

(which is normally the age for admission in school, in rural areas). It is noted that the overall literacy in these villages is around 52%. The female literacy rate is much lower (32.7%) than the male literacy rate (69.1%). There are only six villages having literacy rate above 60%. The highest literacy (71.6%) is reported in village Jalalpur Raghunathpur (Muradnagar Block, Ghaziabad District). The lowest literacy rate is found in village Soharka (Rohta Block, Meerut District), and surprisingly the female literacy rate in this village is only 3.5%.

Health & Sanitation

There are two dominant influences on the rural society, viz., religion and caste system. Various rituals including conjuration, exorcism and holy baths are performed, even by the educated people, for the prevention and cure of diseases, and during epidemics, floods and famines to appease gods. A large majority of the rural people first look out for the magical/religious physician in whom they still have indomitable faith, and then the next in their preference is the use of herbal medicines. These herbal medicines are extensively used at home made by Vaids and Hakims (unqualified doctors). One reason why people who are usually poor go for these various ritual is probably due to uneducated background and lack of money for medical care.

Table 6.4.4: Literacy rate (%) in the survey area villages

Villages Names	Population > 6yrs			Number of Literates			% of Literacy		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Ghaziabad District									
Block - Muradnagar									
Bidauli	1,171	614	557	640	430	210	54.7	54.7	37.7
Chakarpur	896	489	407	503	368	135	56.1	56.1	33.2
Sultanpur	1,828	1,007	821	940	734	206	51.4	51.4	25.1
Kurrampur	1,922	1,041	881	1,153	805	348	60.0	60.0	39.5
Kakra	1,537	840	697	960	669	291	62.5	62.5	41.8
Bandhipur	846	455	391	485	336	149	57.3	57.3	38.1
Firozpur	552	309	243	324	220	104	58.7	58.7	42.8
Sunda	3,920	2,165	1,755	2,210	1,560	650	56.4	56.4	37.0
Niwari	68	43	25	36	31	5	52.9	52.9	20.0
Nabipur	559	305	254	379	263	116	67.8	67.8	45.7
Jalalpur Ragunathpur	775	418	357	555	363	192	71.6	71.6	53.8
Ajabpur Mangoli	343	179	164	280	160	120	81.6	81.6	73.2
Manauli	925	588	337	510	385	125	55.1	55.1	37.1
Didauli	2,615	1,430	1,185	1,438	1,023	415	55.0	55.0	35.0
Fatehpur	342	185	157	206	142	64	60.2	60.2	40.8
Bihang	521	294	227	279	203	76	53.6	53.6	33.5
Block - Bhojpur									
Nagla Musa	1,053	595	458	411	290	121	39.0	39.0	26.4
Sherpur	1,458	804	654	878	619	259	60.2	60.2	39.6
Yaquatpur Mavi	1,426	808	618	618	495	123	43.3	43.3	19.9
Sikhera	1,033	558	475	533	372	161	51.6	51.6	33.9
Sara	3,452	1,921	1,531	1,717	1,189	528	49.7	61.9	34.5
Baghpat District									
Block - Khekhera									
Phalaira	1,220	651	569	550	397	153	45.1	45.1	26.9
Alamgirpur Tokai	445	244	201	261	205	56	58.7	58.7	27.9
Singauli	1,282	694	588	671	479	192	52.3	52.3	32.7
Shekhpur	In-habitated								
Mawi Kalan	3,546	1,953	1,593	1,603	1,205	398	45.2	45.2	25.0
Gauna	1,832	1,009	823	845	670	175	46.1	46.1	21.3
Lechora	1,547	853	694	863	655	208	55.8	55.8	30.0
Nagla Behari	In-habitated								
Rawan (Bada Gaun)	3,970	2,107	1,863	2,211	1,457	754	55.7	55.7	40.5
Katha	5,297	2,907	2,390	2,558	1,853	705	48.3	63.7	29.5
Meerut District									
Block - Rohta									
Idrispur	1,091	581	510	390	296	94	35.7	35.7	18.4
Papla	1,494	805	689	789	548	241	52.8	52.8	35.0
Block - Jani Khurd									
Soharka	636	324	312	114	103	11	17.9	17.9	3.5
Kalanjari	3,574	1,921	1,653	1,789	1,289	500	50.1	50.1	30.2
Dimoli	1,275	692	583	706	550	156	55.4	55.4	26.8
Panchli Khurd	4,245	2,335	1,910	2,399	1,770	629	56.5	56.5	32.9
Afzalpur Paoti	1,310	701	609	558	422	136	42.6	42.6	22.3
Block - Meerut									
Chhajjupur	2,684	1,468	1,216	1,602	1,135	467	59.7	77.3	38.4
OVERALL	62,690	34,293	28,397	32,964	23,691	9,273	52.6	69.1	32.7

Data Source: Data from National Informatics Center; 1991 Census data from diskettes and records from Tehsils.

Table 6.4.5: Health & Sanitation Facilities, and Fair & Festivals

No.	Name of the village	Primary Health Center	Private Latrine	Government Toilet	Fair	Festivals
Muradnagar (Gzb.)						
1	Kurrampur	CHC	50%	10	Awla Ekadashi	Y
2	Sonda	N	60%	-	Awla Ekadashi	
3	Bhadoli	N	50	-	Awla Ekadashi	Y
4	Jalalpur Raghunathpur	N	Very Less	-	Awla Ekadashi	Y
5	Reora	N	20	-	Awla Ekadashi	Y
Bhojpur (Gzb.)						
6	Sherpur	N	30	-	Awla Ekadashi	Y
7	Sikhera	N	65	-	Awla Ekadashi	Y
	Merrut (Meerut)					
8	Chajjupur	N	50%	14	Dhashara	Y
Jani Khurd (Meerut)						
9	Soharka	N	4	8	Jhar Mela&Dhashara	Y
10	Panchli Khurd	N	30	20	Holi, Dulhana, Telhada	
Khekra (Baghpat)						
11	Alamgirpur Tukali	N	Very Less	N	Shivratri	Y
12	Mawi Kalan	Maternity Center	40%	-	Mangal Mela	Y
13	Sharfabad	N	200	N	Shivratri	Y
14	Rawan (Badegaon)	1	65%	-	Jain Mela&Nav Ratri	Y
15	Katha	N	60%	-	Nil	Y
Rai (Sonipat)						
16	Manauli	1	25	-	Nil	Y
17	Badh Khalsa	N	50%	-	Shivratri	Y

CHC: Community Health Center
Source: Social Survey Report in the Expressways Project Area, MDP Consultants Limited.

6.4.5 Land Use, Quality and Value

(1) Land Use

Agricultural is the predominant use of land in the region. The cultivated area constitutes about 80% of the total area of the National Capital Region (NCR). The land put to non-agricultural – urban and rural settlements, transport network, rivers and canals – works out 10.0% of the total area. The area of the barren land, which includes

Table 6.4.6: Cropped area, area under orchards, major crops and their productivity

Sample Villages		Gross cropped area (ha			No. of orch.	Net sown area (ha)			Major crops and
		Irri.	Unirri.	Total	& area (ha)	Irri.	Unirri.	Total	their production
1	Katha	466	Non	466	Non	767	Non	767	Wheat (35-40q/ha), Sugarcane (500q/ha), Vegetables (45q/ha)
2	Badh Khalsa	NA	NA	NA	Non	NA	NA	NA	Wheat, Paddy, Vegetables
3	Sonda	182	Non	182	Non	448	Non	448	Wheat, Sugarcane
4	Pancai Khurd	343	Non	343	3 (7.5, 1, 0.5)	600	Non	600	Sugarcane, Wheat, Potato
5	Sherpur	45	Non	45	Non	142	Non	142	Wheat, Sugarcane, Vegetable
6	Kurrampur	86	Non	86	Non	355	Non	355	Wheat (40-50q/ha), Sugarcane (600q/ha), Paddy (40q/ha)
7	Rawan (Badegaon)	485	Non	485	Non	722	Non	722	Wheat (35-40q/ha), Sugarcane (500q/ha), Rice (45q/ha)
8	Bhidoli	130	Non	130	1 (1.0), in which grape (0.75)	398	Non	398	Wheat, Sugarcane
9	Jalalpur Raghunathpur	68	Non	68	Non	112	Non	112	Wheat, Sugarcane
10	Mavi Kalan	294	Non	294	Non	523	Non	523	Wheat (35-40q/ha), Sugarcane (500q/ha), Vegetables (60q/ha)
11	Sharfabad	98	Non	98	Non	213	Non	213	Wheat, Sugarcane, Sorghum
12	Sikhera	56	Non	56	Non	127	Non	127	Wheat, Sugarcane
13	Alamgirpur	66	Non	66	Non	70	Non	70	Wheat, Sugarcane
14	Soharka	50	Non	50	Non	88	Non	88	Wheat, Sugarcane
15	Rewara	325	Non	325	Non	752	Non	752	Wheat, Sugarcane
16	Chajjupur	114	Non	114	Non	270	Non	270	Wheat (50-60q/ha), Sugarcane (450-50q/ha)
17	Manauli	-	-	1807	2 (0.75, 0.75)	-	Non	342	Wheat, Paddy, Vegetables

orch.: Orchard, Irri.: Irrigated, Unirri.: Un-irrigated, q/ha: 100kg/10000square meter

NA: Not Available

Source: Social Survey Report in the Expressways Project Area, MDP Consultants Limited.

rocky area, saline patches, and derelict land is 4.7%, while forests cover 2.1% of the total area. The area under permanent pastures and other grazing land is 1.2% of the total area of the region. The percentages of land under cultivate waste and miscellaneous tree crops and groves are 1.8% and 0.2% respectively of the total area. The area under water bodies (lakes, tanks and rivers) is 0.28% of the total area of the region.

Major crops in these districts are wheat, sugarcane, rice and vegetables. The sugarcane and vegetables are cash crops, and give relatively higher returns per unit of cultivated area. Because of presence of enough sugarcane factories in this area, possibility of increasing sugarcane zone is likely to be occurred (See Table 6.4.6).

(2) Quality and Value

Apart from proximity to roads, the land value depends on the condition of land, the productivity, and the irrigation facilities available. In Haryana, the land value is high due to the fast industrialization in and around Sonepat, whereas the land value is not that high in U.P., as compared to the land value of Haryana.

In some area, the land prices have gone up due to the infrastructure facilities. In Sonepat, agricultural lands in the villages were being sold at a premium last year. It has been observed that the prices are shooting up further with the information of the proposed Expressway. The cost of land in Ghaziabad is again higher than that of Baghpat of Meerut due to its proximity and easy accessibility to Delhi.
(More details, please see Appendix 6.4.1: Land Value)

6.4.6 Ground Water Rights

To begin with it is important to realize that groundwater is under totally private legal regime. Rights in ground water belong to the landowners, since it forms a part of the dominant heritage, and land ownership is governed by the Tenancy Laws of the State. The Transfer of the Property Act necessitates that this right to groundwater can be given to anyone only if the dominant heritage land is transferred. Conversely, the Land Acquisition Act asserts that if someone were interested in getting rights over groundwater he/she would have to be interested in land. In short, groundwater is attached to land property. There is no limitation on how much groundwater a landowner may withdraw.

The consequence of such legal framework is that only landowner can own ground water in India. It leaves out land less and tribal people who may have group (community) rights over land, but not private ownership. It also implies that rich landlords can be water-loads, and sell as much water as they wish. To ensure proper and equitable distribution of underground to even those who don't own land, it appears necessary to separate water rights from land rights. No such legal steps have been taken in states and union territories except Gujarat tate[1].

[1] Gujarat has attempted to partially de-privatize groundwater in 1988. Recently Maharastra has enacted a Groundwater Act, which is similar to the Bill drafted by Groundwater Board of Gujarat. All these water laws in Gujarat and Maharastra don't touch the issues of water rights.

6.4.7 Likely Impacts of the Expressway and Mitigation

(1) Social Implication

Due to the alignment of the expressway, there are several case of loss of houses and shelters. Furthermore, there are 5 Hindu Temples, 2 graves and 2 schools which are likely to be relocated. In addition to that, there are some buildings, brick kilns, and orchards which are likely to be compensated. Therefore, Resettlement and Rehabilitation (R&R) procedure would be likely to be taking some time and need careful concern, especially for the people's and religious resettlement.

There are roughly 7 distinguished impacts (positive or negative) which are shown in 7 types of flow charts following next pages, and these impacts are interrelated. There is no simple explanation for social implication of impacts on and mitigation for the expressway.

(Some details about 'Land Acquisition, Resettlement and Rehabilitation' written in Appendix 6.4.3.)

Figure 6.4.1: Survey locations for Kundli-Ghaziabad Expressway and Ghaziabad-Meerut Expressway

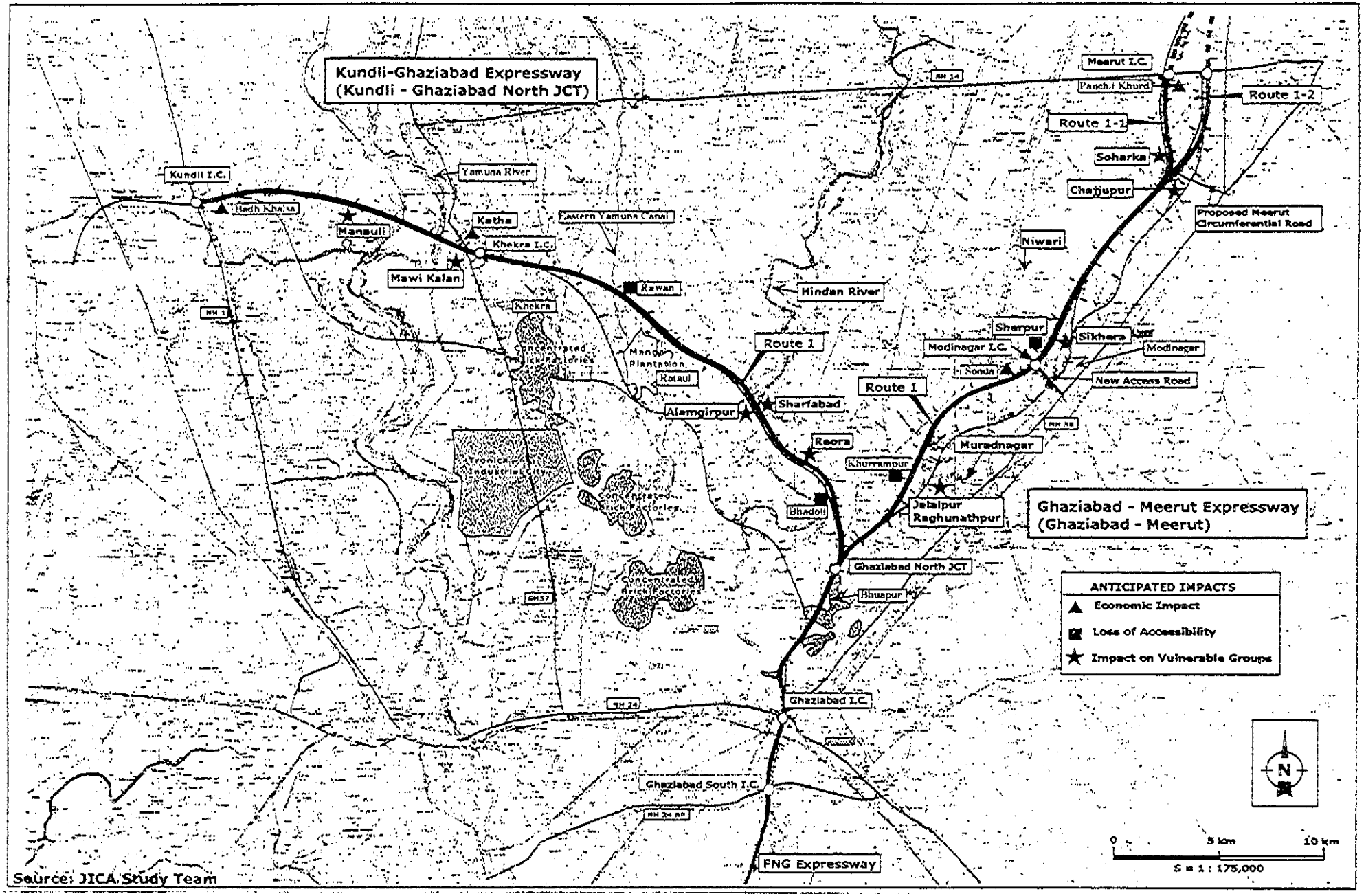


Table 6.4.7: Salient Features of Villages Selected for Detailed Investigation.

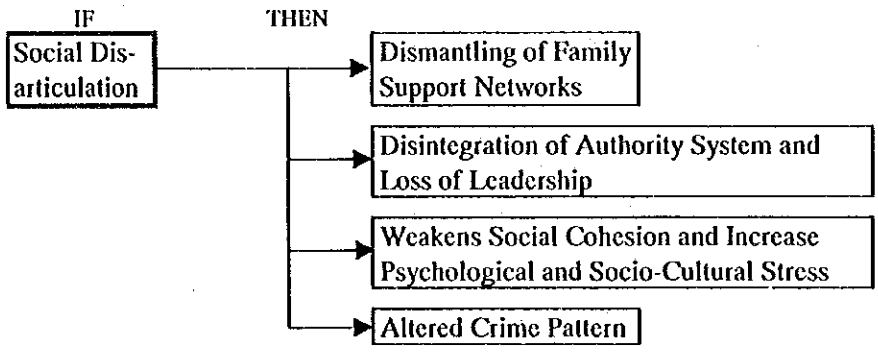
ANTICIPATED IMPACT	SELECTION METHOD	VILLAGES SELECTED	CONCERNED BLOCK/DISTRICT
Economic Impact	**Villages near the I.C.**		
	Khekra I.C.	Katha	Khekhara / Baghpat - Meerut
	Kundli I.C.	Badh Khalsa	Rai / Sonipat
	Modinagar I.C.	Sonda	Muradnagar / Ghaziabad
	Merrut I.C.	Panchli Khurd	Jain Khurd / Meerut
Loss of Accessbility	**Villages near the NH/SH/River**		
	To NH 58 and Modinagar	Sherpur	Bhojpur / Ghaziabad
	To NH 58 and Muradnagar	Khurrampur	Muradnagar / Ghaziabad
	To SH 57	Rawan (Bada Gaon)	Khekhara / Baghpat - Meerut
	Samdwiched between Hindan and Expressways	Bhadoli	Muradnagar / Ghaziabad
Impacts on Vulnerable Groups	**High proportion of**		
	Scheduled Caste (%)	Jalalpur Raghunathpur	Muradnagar / Ghaziabad
	Minority (Muslims %)	Mawi Kalan	Khekhara / Baghpat - Meerut
		Sharfabad	Khekhara / Baghpat - Meerut
	Female Agricultural Labors (%)	Chajjupur	Meerut / Meerut
	Primary Workers (%)	Soharka (U.P)	Jain Khurd / Meerut
		Rewara (U.P)	Muradnagar / Ghaziabad
		Manoli (Haryana)	Rai / Sonipat
	Lower proportion of		
	Main workers (%)	Sikhera	Bhojpur / Ghaziabad
		Alamgirpur Tokai	Khekhara / Baghpat - Meerut

Source: Social Survey, JICA Study Team.

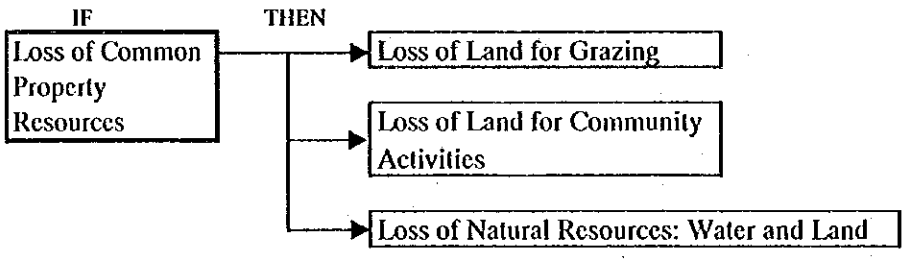
(a) **Social Factor**

There could be complete break-up of social groups, support system, access to welfare services and eventual forced displacement among agricultural laborers, marginal and small farmers who lose their land because of the land accession (More details are discussed in vulnerable groups case). And also the acquisition of the fertile land would also affect the agricultural productivity, thereby causing unemployment, reduction in income and shortage of food grains for self-consumption and for supply to nearby areas. There are 2 flow charts that show anticipated impacts and cause & result relation. (please also see Figure 6.4.1 and Table 6.4.7)

Flow Chart "Social Disarticulation"



Flow Chart "Loss of Common Property Resources (CPRs)"



In order to mitigate the anticipated problems, first, it needs a Land Market Value Survey objectively, and then it is required to obtain Solatium (additional compensation) by Land Accession Act (LAA). Regarding loss of income opportunities, new employment opportunities are needed such as work with construction or maintenance of the expressway. Longer term earning opportunities provided through vocational training, employment counseling, including income generation schemes and access to credit are also required.

(b) Minority and Vulnerable Groups

Small and Marginal Farmers

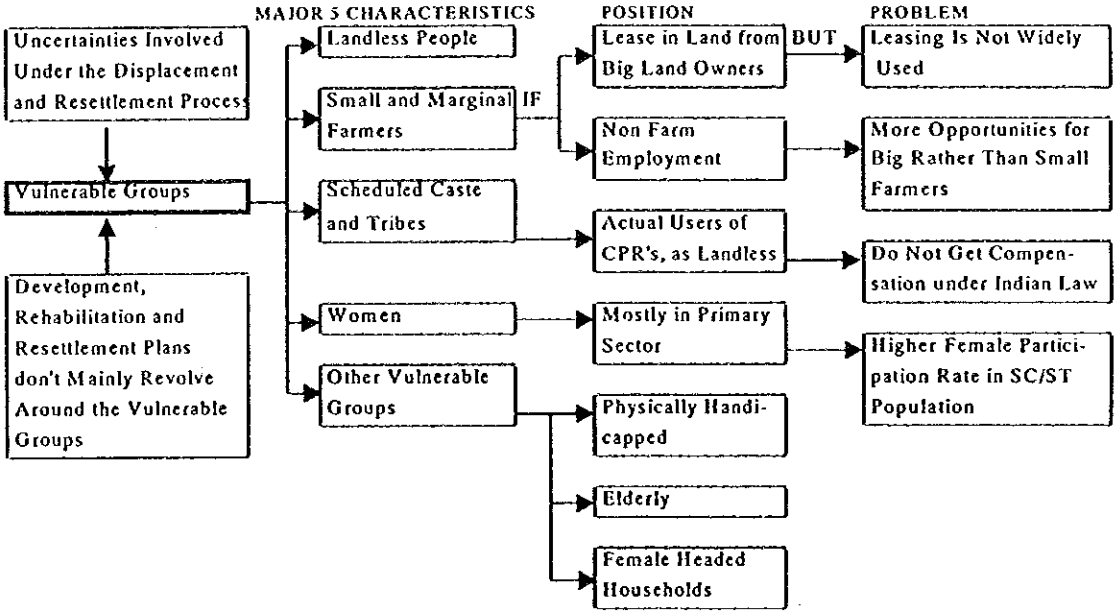
The average land holding sizes of marginal farmers and small farmers are so small that it is difficult for them to fight poverty without other sources of income. There are two options for marginal and small farmers to alleviate their poverty. One is to lease-in land from medium size and big landowners, and the other is to non-farm employment. Regarding the first option i.e., leasing-in land, the practice is not widely reported. Only in some villages absentee landlords lease-out their land once in a while. Leasing practice is not common because of high productive and irrigated land, and to some extent fear of loosing the land (land belonging to one who cultivates it). The second option i.e., non-farming employment was found to be relatively higher in the project area. It was because of the fact that the area has relatively more developmental and construction activities (private and government) as well as opportunities for jobs in industries located in nearby town (near Ghaziabad, Modi Nagar, Meerut, Delhi, etc.). However, the increasing dependency of the marginal and small farmers on non-farm work doesn't necessarily mean a sufficient income for each marginal farmer. On the other hand, it was reported that the big farmers who have less necessity to get non-farm employment have more opportunities to get better non-farm employment (especially at the government and other jobs) because of their superior socio-economic and political position from higher education and greater influence. There are a flow chart that show anticipated impacts and cause & result relation. (please see Figure 6.4.1 and Table 6.4.7)

Status of Scheduled Castes and Tribes

Since agriculture is sill the mainstay of Indian economy , and a large number of SC/ST depend on agriculture. Structure changes in agriculture are a good indicator of what is happening to SC/ST. The fact that the proportion of cultivators among the SCs and STs has declined sharply shows that their economic condition has further deteriorated. 85% of SC/ST households are landless or nearly landless at the national level. There is no doubt that the Indian constitution took serious note of the low socio-economic status of SC/ST. The Indian constitution guarantees liberty, equality and towards ensuring them, provides for reservations both in socio-economic and political fields.

There are lands called 'patta' (community land allotted to landless, marginal and small farmers) which could be considered as compensation for them when the land gets acquired. Most of time, pattas (document of ownership) are not updated, and in due course of time, the actual owners passed away, but the lands still remain owned by the dead person's names. Instead of legal heir to the lands, at the time of compensation, many illegal claimants turn up to claim the lands. Thus there is a need not only for updating the records, but also tackle the SC/ST cases based on humanitarian approach. There is a flow chart that shows anticipated impacts and cause & result relation. (please see Figure 6.4.1 and Table 6.4.7)

Flow Chart "Vulnerable Groups"



In order to mitigate the negative impacts, the Rehabilitation Action Plan is supposed to have (a) institutional support for the PAPs, (b) participation of local people through their representative in all stages of project, (c) in case of loss of/damage to protected and sanctified territory by expressway, a fresh or alternative alignment to be taken to mitigate any controversy, and (d) provision for corridors to crossover or across to minimize problems related to accustomed travel pathways.

(C) Economic Factor

Table 6.4.8 indicates that a large proportion of area in these districts is irrigated by private sources of irrigation, which mainly consist of private shallow tube-wells either diesel operated or electrical. The diesel engine operated tube-wells have boring depth varying between 13 and 25 meters. The farmers have such borings in almost every parcel of his land. The diesel engine is mobile mounted on a trolley, and move from one boring to another for irrigation purpose. On the other hand, electrical operated shallow tube-well boring depth varies between 40 and 50 meters. Majority of electrically operated private tube-wells has house for the pump set. It would be relatively difficult to dislocate these electrically operated tube-wells which are in quite large numbers

in area not served by the canal irrigation in the survey area. If the expressway has to pass through this tube-well command area, it would be a problem for acquiring the land.

Social Survey Team visits also indicted that brick kilns are mostly concentrated around village Fakharpur and Muhamma Sahpur (near Ghaziabad-Kundli expressway route. These are located mostly on the road sides. These brick kilns employ local work forces during most of year (especially during dried summer season), and are ensured source of income for laborers. These kilns cater to local construction needs as well as to metropolitan areas like Ghaziabad and Delhi. These brick kilns mostly belong to influential persons and may, therefore, pose a problem in acquisition of such land. (Some details of brick kilns, see Appendix 6.4.2)

Social Survey Team visits indicted that around Rataul village(near Khekra railway station falling on Ghaziabad-Kundli expressway route. See Figure 6.4.1) there is a large strip of mango plantations. The proposed expressway might require clearance of few orchards at these locations. This is expected to create real problem in acquisition of lands under mango orchards. Majority of these mango orchards is quite old, and new plantations have come up in this area during last 15 years. There are more than 100 varieties of mangoes in these plantations. The mango orchards are commercial, and the rate or returns from these orchards are quite high as compared to areas cultivated under food crops.

Table 6.4.8 Sourcewise irrigated area

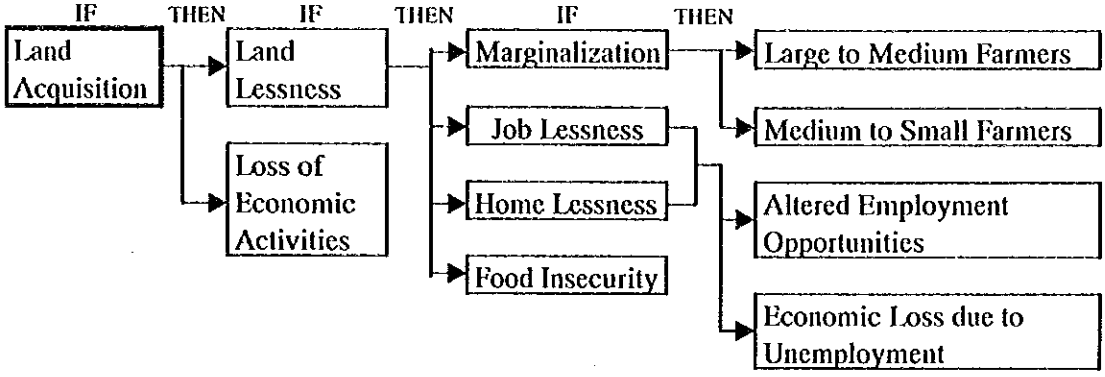
(in ha)

Sources of Irri.	Canal	State TWs	Pvt. TWs	Wells	Others	Total
Ghaziabad: Blocks:						
- Bhojpur	4543	262	9266	350	0	14421
- Muradnagar	7153	886	8669	102	0	16810
Meerut: Blocks:						
- Rohta	2687	762	10360	--	--	13809
- Jani Khurd	8263	656	5513	--	--	14432
- Meerut	1574	369	6524	--	42	8509
Bhagpat: Block:						
- Khekhar	2319	846	7835	93	84	11177
Area (ha)	26,539	3,781	48,167	545	126	79,158
Perentage	33.5%	4.8%	60.8%	0.7%	0.2%	100.0%

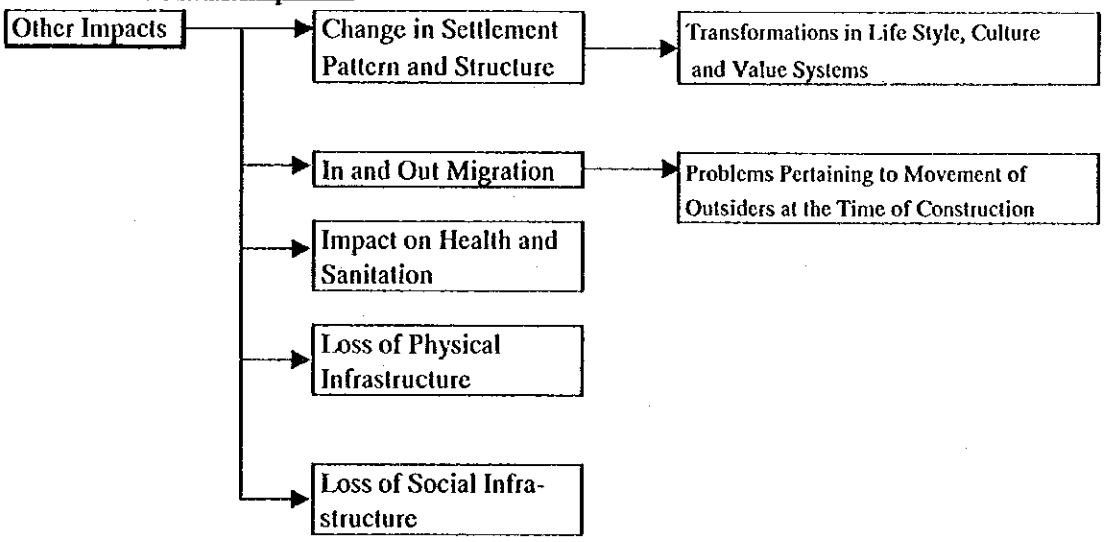
Source: social Survey Report in the Expressways Project Area, MDP Consultants Limited.

There are 3 flow charts below that show anticipated impacts and cause & result relation. (please see Figure 6.4.1 and Table 6.4.7)

Flow Chart "Land Acquisition"

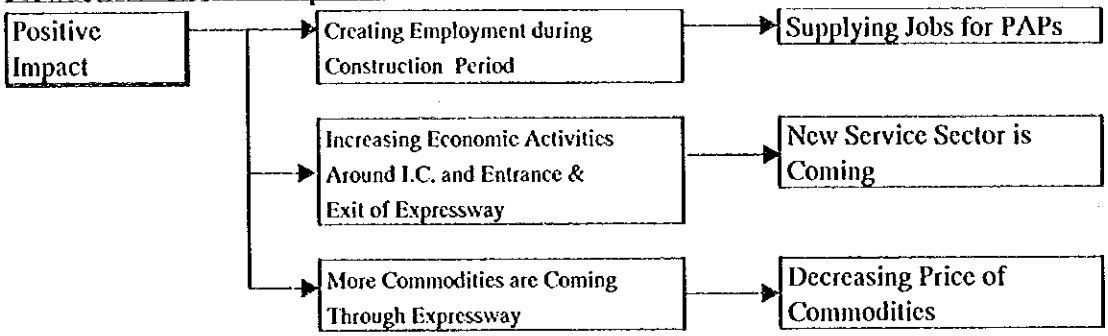


Flow Chart "Other Impacts"



In order to mitigate the negative impacts, the Rehabilitation Action Plan should have (a) compensation given to the affected population to reestablish their livelihood and income, and compensate for temporary losses, (b) participation of local people through their representative in all stages of project, (c) new employment opportunities such as work with construction or maintenance, and (d) longer term earning opportunities provided through vocational training, employment counseling, including income generation schemes and access to credit.

Flow Chart "Positive Impacts"



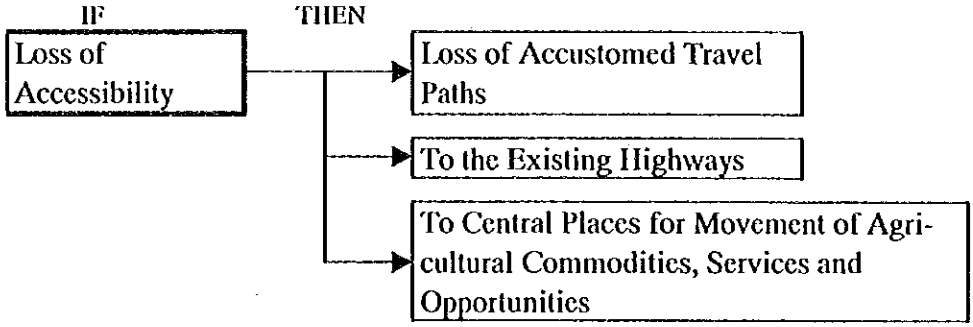
(D) Transportation Factor

Urban towns like Modi Nagar and Muradnagar have many markets, banks, post office, bus stops for NH58, seed & fertilizer centers, schools, inter colleges, hospitals, and places where villagers meet their requirements and work.

There are two Jain[2] temples in Rawan village (See Figure 6.4.1). These temples fall in close proximity to the proposed expressway. There is a possibility of one of them getting affected by the expressway. One could see an immense potentiality if there is an access point to these temples. The newly constructed temple is built over an area of 1.75ha, and is one of the costliest temples in India. The other one is 100 years old 'Digamwar Jain Temple' which has some historical and strong religious importance. There are 2 flow charts below that show anticipated impacts and cause & result relation. (please see Figure 6.4.1 and Table 6.4.7)

[2] This religion was born in the almost same period when Buddhism was born. The number of believers is about 2 million.

Flow Chart "Loss of Accessibility"



In order to mitigate the negative impacts, it is necessary to do provision for corridors to crossover or across the expressway to minimize problems related to accustomed travel pathways.

(E) Rural Women

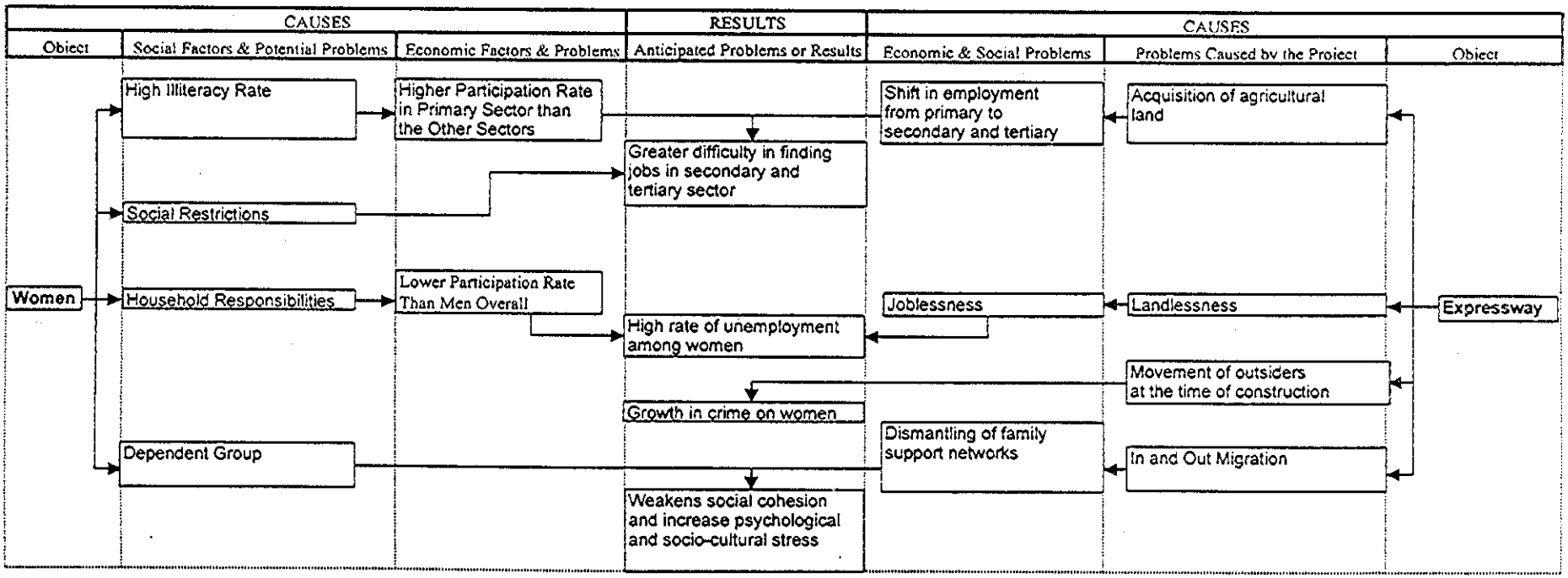
The loss of traditional sources of livelihood such as agricultural land, cattle and access to common resources is going to affect women in all social strata. Generally, expressways cause displacement, which further leads to complete marginalization of women and land less people from the labor force. When the traditional source of livelihood is replaced with employment in the organized industrial sector, women are at a disadvantage to find viable employment. Experience elsewhere shows that men displaced by the developmental projects are able to find jobs as unskilled laborers in industry, but women with less educated or illiterate than men are unable to obtain industrial employment. For higher caste women, who are mostly engaged in their own cultivation activities, displacement from land means a complete withdrawal from the labor force. Women from lower caste and Dalit (scheduled caste) households are assumed to compete with migrant men and women for poorly paid casual labors.

In the proposed expressway area, women belonging to higher castes concentrate on so called 'Inside World' i.e., domestic work, but at times help in the extension activities of family farm. On the other hand, women belonging to lower income strata and caste participate actively in various economic activities. Wage variation is also observed on the basis of gender. One of the primary reasons of wage variation is abundance of unskilled women labor in absence of men who are shifting to non-farm activities and migrating to cities. This in fact

is burdening the rural women more, as they are unskilled and have limited access to basic services. Rural women's low literacy rate and limited nutrition are furthering the cause of less employment opportunities (also see Appendix 6.4.4: The National Commission for Women).

The likely adverse impacts on women are drawn in Flow Chart "Women and Expressways" in the next page:

Causes and Likely Results Regarding Between Women and Expressways



Source: Social Survey, JICA Study Team.

In order to mitigate the negative impacts, identification of women who might have adverse effect from the project is very important. Thus the women who are identified have to receive targeted support and special attention from the project. The project also needs to seek active participation and make explicit the social factors affecting the development impacts and results.