



PERSPECTIVE PLAN

DELHI MUMBAI INDUSTRIAL CORRIDOR



FINAL REPORT VOLUME - I

October 2009



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EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Delhi-Mumbai Industrial Development Corridor (DMIC) embraces parts of six States and 89 Districts and has an estimated population of 231 million in 2009. At the heart of the Corridor will be a new dedicated freight railway. Twenty four regions comprising of industrial regions (IRs) and industrial areas (IAs) of 100-200 sq kms have also been identified across the Corridor to facilitate growth.

1.2 GOALS

The goals set for this Perspective Plan are:

- To create a world class industrial region with a large export market which attracts Direct Foreign Investment
- To facilitate industrial development by providing first class infrastructure particularly in the form of effective and efficient transportation, reliable energy supplies and efficient logistics.
- To facilitate more inclusive growth in line with the Eleventh Five Year Plan
- To increase the size of the skilled workforce.
- To provide adequate housing and services for people working in the new industrial areas
- To realise environmentally sustainable development by promoting exemplar eco-developments.
- To ensure the highest environmental standards in new mixed use developments in the region
- To protect and conserve air, water and soil quality, rivers and lakes, forests, biodiversity, wildlife habitats and productive agricultural land.

Map 0-1: DMIC Region boundary

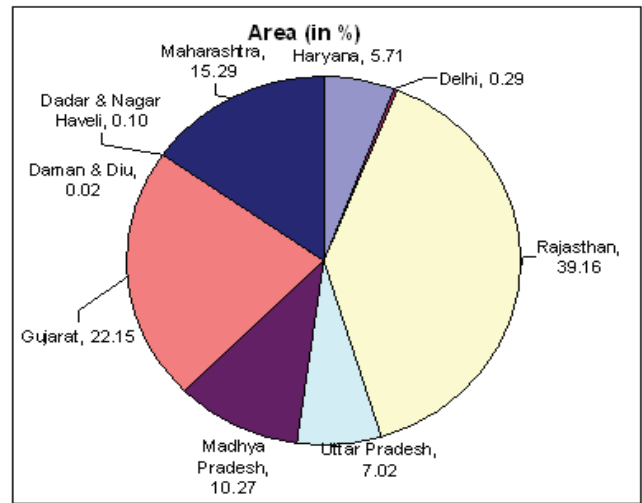


1.3 THE DMIC REGION

The DMIC region covers many socio-economic conditions and different cultures. It includes the rich agricultural fields of western Uttar Pradesh and Haryana, highly cosmopolitan centres like

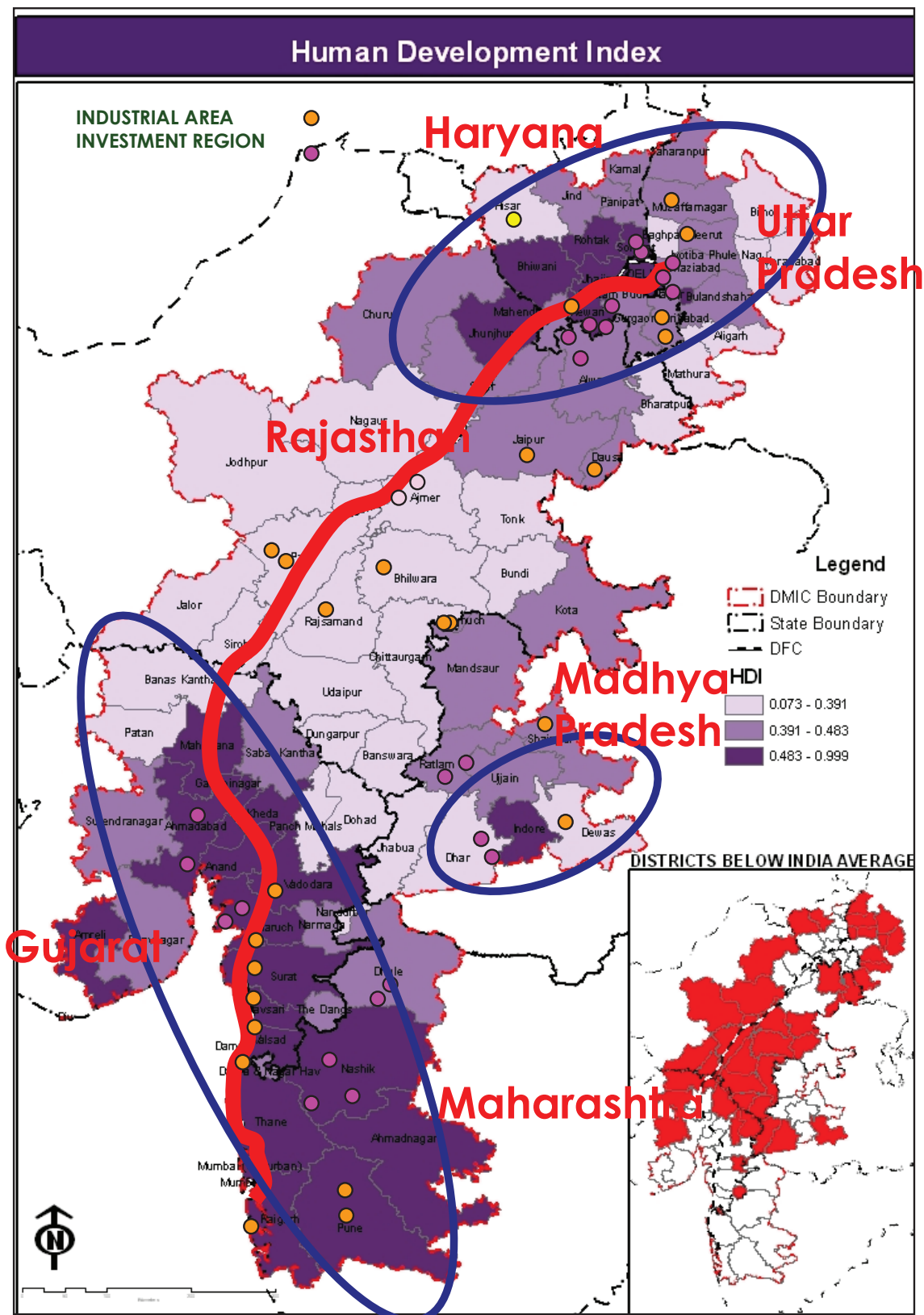
Delhi and Mumbai, arid and semi-arid areas of culturally rich Rajasthan, the industrialized plateau of western Madhya Pradesh; and the urbanized & industrial Gujarat.

The urban population of the Corridor represents 42% of the total whilst 54% of employees are engaged in the primary sector. Employment in the secondary sector, including manufacturing, only constitutes 19.5% of the total, whilst employment in the tertiary sector accounts for 26.5%. There are significant sub-regional variations within the Corridor. At the northern and southern extremities, there are two of India's three largest cities: Delhi and Mumbai. Gujarat, in the south, also has a vibrant economy and a high level of urbanisation. However, the central area of the Corridor, particularly in Rajasthan shows lower levels of economic activity and prosperity.



Sl. No.	State/ District	Area			Population (2001)		
		Area (Sq. Km.)	% of State	% of DMIC	Population	% of State	% of DMIC
1	Haryana (13) Karnal, Panipat, Sonapat, Jind, Hisar, Bhiwani, Rohtak, Jhajjar, Mahendragarh, Rewari, Gurgaon, Mewat, Faridabad	29,362	66.4	5.71	14,925,720	70.6	7.5
2	Delhi	1483	100.0	0.29	13,850,507	100.0	6.9
3	Rajasthan (22) Churu, Jhunjhunun, Alwar, Bharatpur, Dausa, Jaipur, Sikar, Nagaur, Jodhpur, Jalor, Sirohi, Pali, Ajmer, Tonk, Bundi, Bhilwara, Rajsamand, Udaipur, Dungarpur, Banswara, Chittaurgarh, Kota	20,1307	58.8	39.16	43,540,451	77.1	21.8
4	UP (12) Saharanpur, Muzaffarnagar, Bijnor, Moradabad, Jyotiba Phule Nagar, Meerut, Baghpat, Ghaziabad, Gautam Budh Nagar, Bulandshahar, Aligarh, Mathura	36,068	15.0	7.02	31,515,787	19.0	15.8
5	MP (10) Neemuch, Mandasaur, Ratlam, Ujjain, Shajapur, Dewas, Jhabua, Dhar, Indore, Raigarh	52,788	17.1	10.27	13,035,794	21.6	6.5
6	Gujarat (20) Banas Kantha, Patan, Mahesana, Sabar-Kantha, Gandhinagar, Ahmadabad, Surendranagar, Amreli, Bhavnagar, Anand, Kheda, Panch Mahals, Dohad, Vadodara, Narmada, Bharuch, Surat, The Dangs, Navsari, Valsad	113,886	58.1	22.15	41,028,625	81.0	20.5
7	Daman & Diu (2)	112	100.0	0.02	158,204	100.0	0.1
8	Dadra & Nagar Haveli	491	100.0	0.10	220,490	100.0	0.1
9	Maharashtra (10) Nandurbar, Dhule, Nashik, Thane, Mumbai (Suburban), Mumbai, Raigarh, Pune, Ahmadnagar, Aurangabad	78,610	25.5	15.29	41,604,877	42.9	20.8
10	Total Region	514,107			199,880,455		
11	India	328,7263			1,028,737,436		
	DMIC % w.r.t. India	15.6%			19.4 %		

Source: Statistical Abstract of Various States & Census of India, 2001.



Human Development Index (HDI)

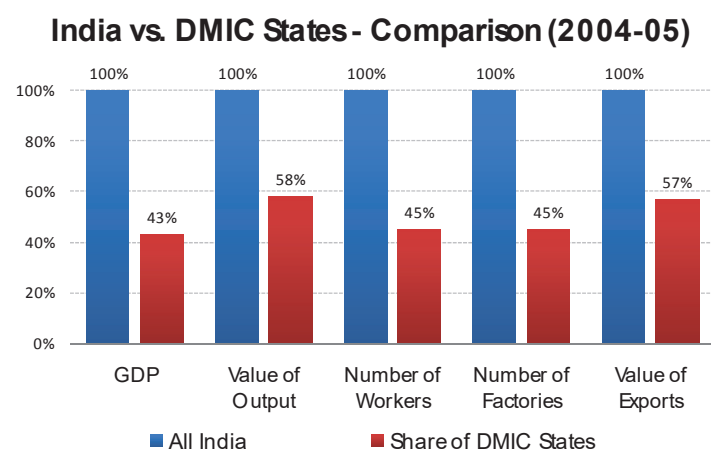
The HDI has been assessed for all the 89 districts lying in the DMIC Region based on three components – **economic background**, **education & awareness level** and **general health & well being** as it is

- Directly indicative of overall development status within the region.
- The areas that need attention such as districts with low HDI may need to have more economic activity, social & physical infrastructure to improve upon.

Conclusively there are four regions with high HDI, the National Capital Region, Maharashtra sub-region, half of Gujarat sub-region and industrialized belt of Madhya Pradesh sub-region.

1.4 ECONOMIC POTENTIAL

Consultant has made comprehensive analysis of the current industrial structure in the DMIC. and has examined global trends.



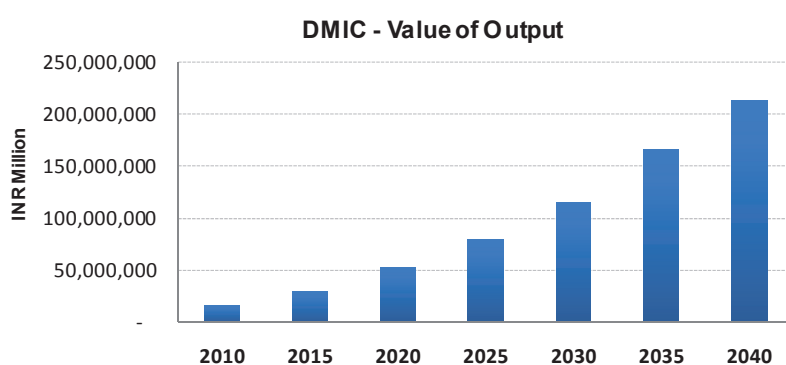
Source: Consultant's Research

The DMIC States; Haryana, Uttar Pradesh, Gujarat, Maharashtra, Madhya Pradesh and parts of Rajasthan consist of established economic & industrial destinations. There exist established economic nodes in the six states that form the DMIC region. This could be attributed to factors:

- DMIC States have been traditional centers of economic activity
- Approx. 43% contribution to the country's GDP in 2004-05
- Contributes to more than half of India's industrial production & exports generated
- Accounts for over 40% of workers & number of factories across India due to their existence as **traditional industrial base**
- Linkages to key urban & economic centers critical as an **Industry Growth Diver** along with the others such as;
- Proximity to prominent transport nodes

- Availability of raw material
- Developed basic & industrial infrastructure

Forecasts of potential growth in manufacturing in the Corridor for the plan period (2009-2039) have been made. These forecasts suggest that the value of manufacturing output could grow 3.5 times between 2010 and 2020 from 15.2Bn Indian Rupees to 52.8Bn. From 2010 to 2040, the increase is estimated at 14 times, growing to 212.6Bn IR. This equates to a CAGR of 13.2% between 2010 and 2020 and 9.2% overall from 2010 to 2040.



The projected industrial CAGR for DMIC region taken at 13% for the first ten years (2010–20) show that the results achieved are:

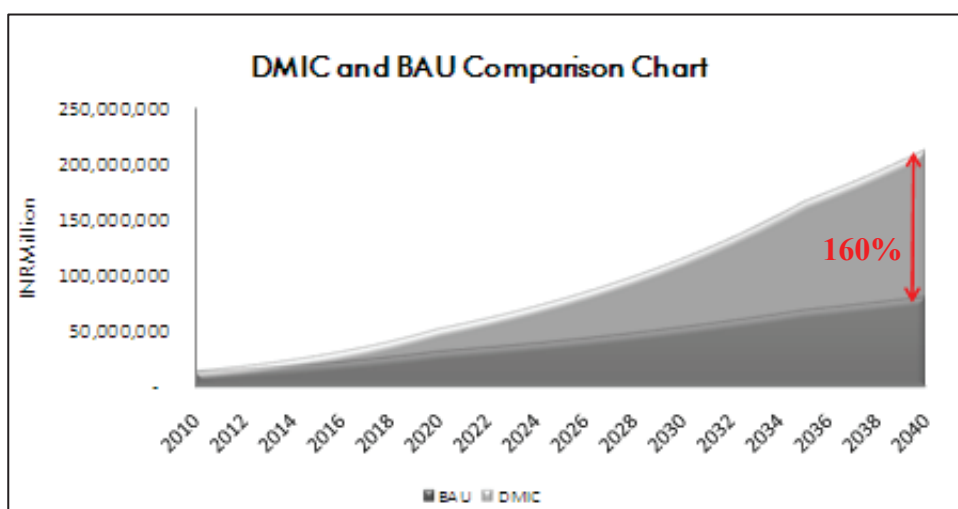
- Higher than historical all-India CAGR of 8.8% (2002-07) for IIP as per Planning Commission
- In line with future growth estimates of 12%-14%, required for 8%-10% GDP growth as per the 'National Strategy for Manufacturing' developed by NMCC, Govt. of India
- Projected industrial growth in line with historically exhibited global industry growth benchmarks. It could be noted that China increased its industrial output more than 10 fold in 27 years (1978 to 2005), Korea enhanced its industrial output by approx 13 times in 30 years (1970 -2000) and Japan increased its industrial output 8 fold in 30 years (1955 to 1985)

Based on further analysis It is concluded that six sectors offer the greatest potential for growth in the DMIC:

- Automobiles and Auto Components
- Textiles and Apparel
- Light and Heavy Engineering

- Chemicals including petrochemicals, plastics and pharmaceuticals
- Food products and beverages
- IT, ITeS

The DMIC project would lead to an expected doubling of industrial growth and with the induced infrastructure the industrial growth would propel so much so that Value of Output would grow to more than double vis-à-vis non DMIC Scenario. **DMIC induced growth would be witnessed across all regions of the project influence Area** esp. Madhya Pradesh, Haryana & Rajasthan expected to quadruple, triple and double industrial output respectively by 2040 through DMIC



Note:

BAU – Business As Usual Scenario; refers to non DMIC Scenario,

BIS: Business Induced Scenario

Source: Consultant's Projections

State	DMIC Value of Output (2040)	BAU Value of Output (2040)	DMIC Growth over BAU %
UP	14,512,882	6,102,362	138%
Haryana	22,257,525	5,591,793	298%
Rajasthan	16,498,258	4,935,486	234%
Gujarat	90,724,057	38,127,947	138%
Maharashtra	46,409,571	18,720,878	148%
MP	8,950,391	1,888,660	374%
Daman & Diu	4,733,953	1,744,403	171%
Dadra & Nagar Haveli	8,551,347	3,848,403	122%
Total	212,637,984	80,959,933	163%

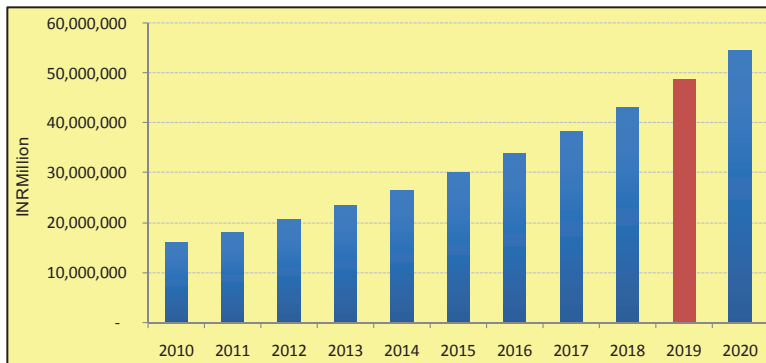
Table 0-1: Value of Output in INR Million

Source: Consultant's Projections

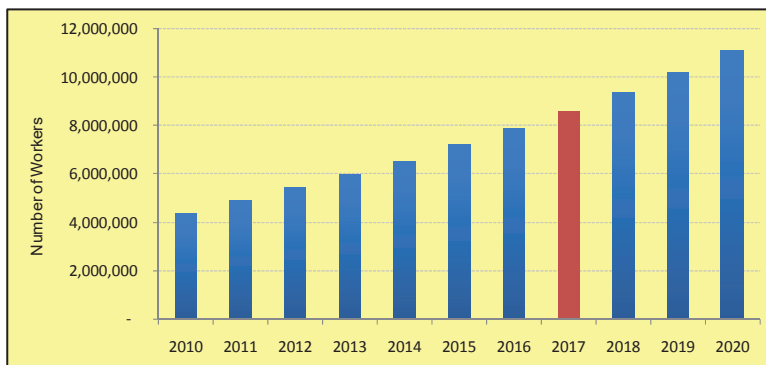
Employment

The employment needed to create this value of output is estimated to rise from a current base of 3.4M to 9.1m in 2020, 17.5M in 2030 and 28.7M in 2040. It is concluded that subject to adequate infrastructure provision and having regard to the current downturn,

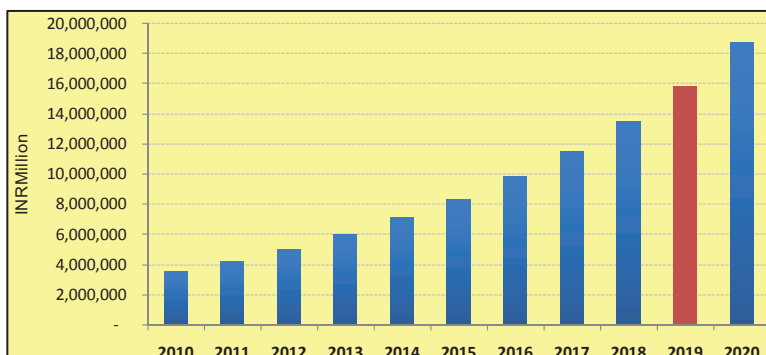
- **The value of output will triple within 9 years**



- **Employment will double in 7 years**



- **Exports will quadruple in 8-9 years**



Consultant has reviewed the proposals for IAs and IRs and considers that sufficient provision has been made overall for the projected growth of manufacturing up until 2039 although further allocations may be needed for supporting residential and service facilities. In addition,

some individual areas are forecast to exceed their capacity and some fail to realise capacity within the plan period. Detailed assessments of land absorption for each IR and IA have been assessed. We recommend that in preparing the individual master plans, the planners for the individual IA/ IR consider the forecast demand for industrial land and seek to exceed low forecasts through improved incentives and in relation to high forecasts consider the need for additional land to be allocated in a phased manner.

Land Demand across 24 Investment Regions (IRs) and Industrial Areas (IAs)

State	Gross Industrial Land Demand (in Sq Kms till 2040)	Gross Supply from IA & IR's (Sq Kms)	Demand Dynamics
UP	436	300	Significant demand differential ~ demand for industrial land spread across all districts.
Haryana	530	600	Significant demand for industrial land ~ however supply from IAs IRs sufficient
Rajasthan	776	700	Majority of demand differential spread across Udaipur and Chittorgarh
Gujarat	1,729	700	Majority of demand differential spread across Gandhinagar, Bhavnagar and Surat
Maharashtra	868	600	Majority of demand differential spread across Thane
MP	495	600	Significant demand for industrial land with sufficient supply from IA's and IR's
Daman & Diu	244	-	Significant demand for industrial land
D&N Haveli	125	-	Significant demand for industrial land

In terms of the policy context, Consultant has identified a variety of measures some of which have already been adopted by some State Governments and others have been derived from international best practice. We recommend that State Governments consider the following:

- Providing increased support to SMEs including in their own procurement
- Encouraging and facilitating cluster development of similar and complementary industries with shared facilities
- Promoting themed industrial parks
- Providing incentives and R & D facilities for next-generation industries such as fuel cells and robots

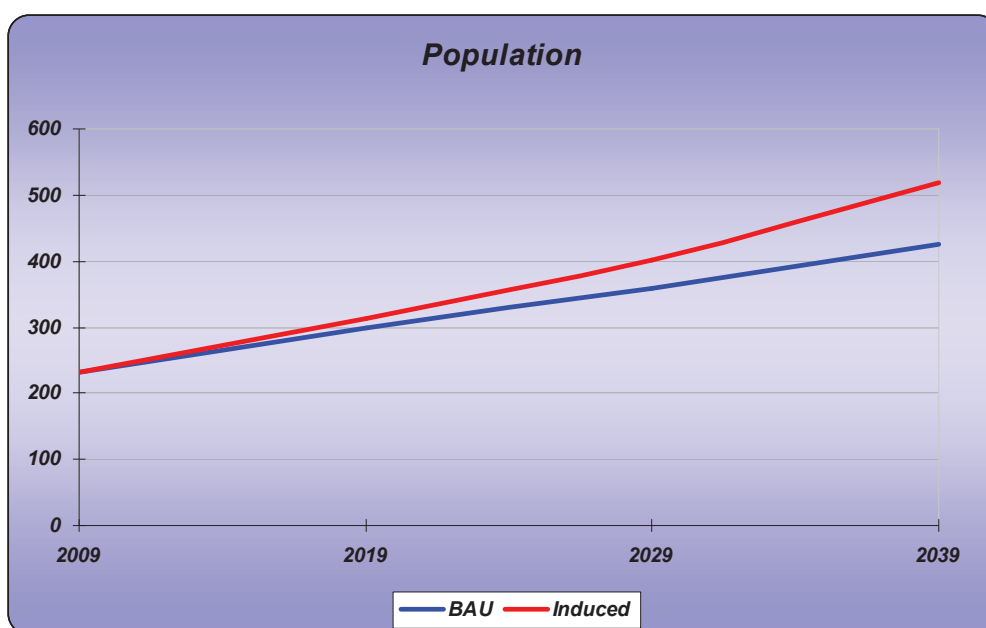
- Adopting simpler, one stop or one window consenting procedures
- Providing economic incentives especially for start-up businesses
- Promoting the DMIC as an investment location
- Considering a common branding for goods produced within the DMIC

1.5 POPULATION, MIGRATION AND URBANISATION

The economic growth forecasts suggest massive growth in the manufacturing sector which in turn implies significant in-migration and massive population growth. On the basis of the manufacturing figures, we suggest that the population of the region could grow from 231 million in 2009 to 314 million in 2019 and 518 million in 2039. Planning and implementing such a scale of development will be a unique challenge and raises some fundamental issues about the economic, social and environmental consequences.

Table 0-2: Projected Population for DMIC Region (2039)

Year	Population BAU (Millions)	Population BIS (Millions)	Year	Population DMIC/ Population of India
2009	231	231	2009	20 %
2019	300	314	2019	24 %
2029	358	402	2029	28 %
2039	425	518	2039	33 %



To begin to address such challenges we recommend that the Government of India:

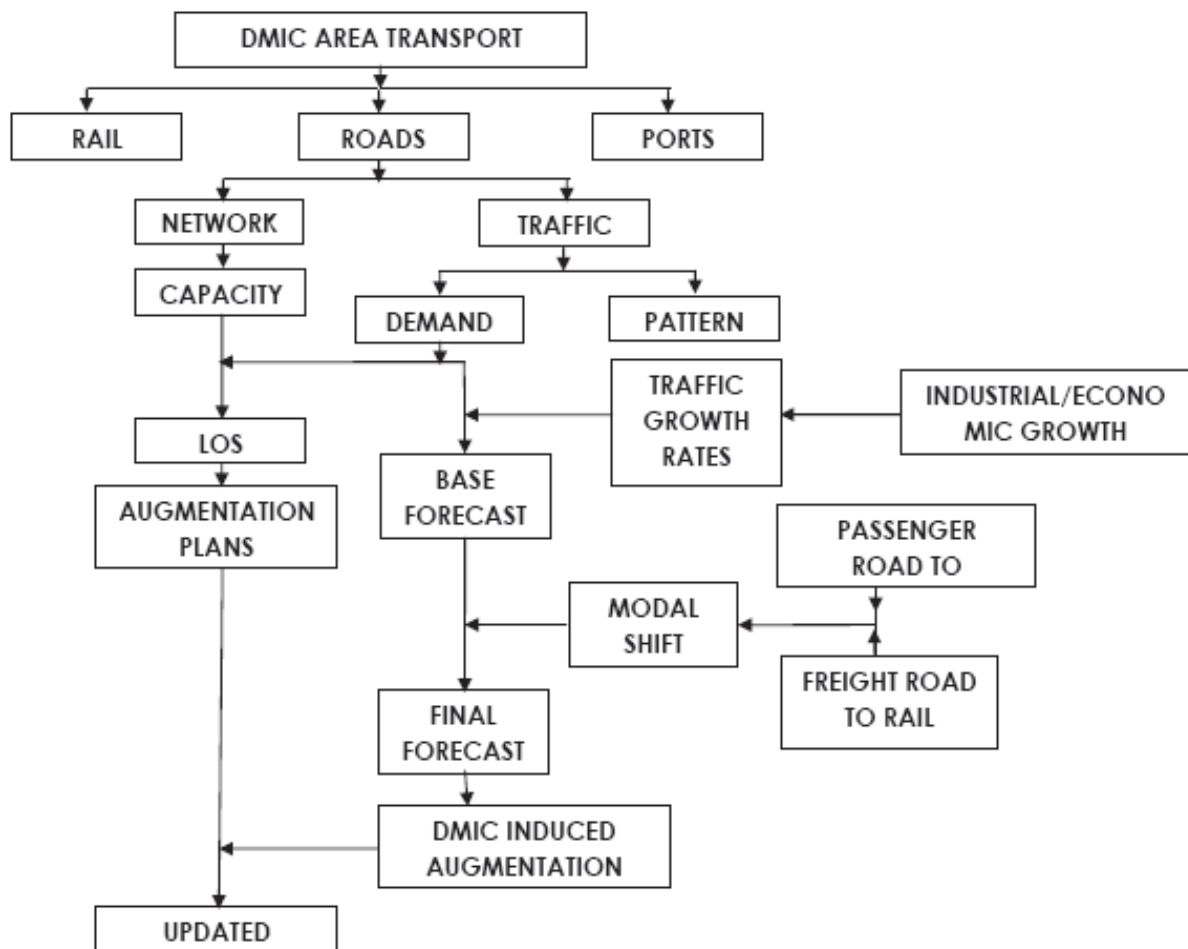
- Commission a study of the impact of the development of the DMIC on surrounding and adjacent areas.
- Commission a strategic environmental assessment of the DMIC development
- Review governance measures related to the powers and responsibilities of the DMICDC and to enhancing urban planning and management capabilities across the region

1.6 HIGHWAYS AND EXPRESSWAYS

1.6.1 Methodology

The broad methodology adopted for assessing the road transport demand and planning of the network considering the likely industrial development in the region and modal shift characteristics is shown in the form of a flow chart as presented in Figure 0-1.

Figure 0-1: Road Network Planning in DMIC Area - Methodology



1.6.2 Study Area

DMIC is being envisaged to be developed as an industrial corridor of international standards in an area of over 1500 Kms in length and 300 Kms wide with desired extensions considering the advantages of inclusion of some neighbouring areas. This corridor is being planned along and parallel (on both sides) to the W-DFC that is being developed between Mumbai (JNPT) and New Delhi (Dadri). The DMIC area is defined to comprise of select districts spread over 6 states – Maharashtra, Gujarat, Madhya Pradesh, Rajasthan, Haryana and Uttar Pradesh - in the region. In addition, DMIC area comprises of Delhi, Daman & Diu and Dadra & Nagar Haveli. The existing road transportation system serves the needs of the area in which it is located as well as those of neighbouring areas. Such areas which have an impact include states of Punjab, Himachal Pradesh and others to the north and eastern parts of Uttar Pradesh, Madhya Pradesh and Maharashtra to the east of DMIC area respectively.

1.6.3 Objective

The objective of this task is to prepare a Perspective Plan for the development of the Road network within the DMIC area that serves the needs of inter-IA/IR connectivity and also their connectivity with ports and neighbouring areas of the DMIC area

Map 0-1 Road Network in the Study Area



1.6.4 Network Definition

The National Highway (NH) network (as shown in Map 0-1) in the study area has been considered mainly as the basis for the development of the Perspective Plan of the road

network to meet the desired objective of the task, although consideration has additionally been given to State Highways (SH) and District Roads (DR) where required.

- **Primary Network** – NH corridors that are currently carrying bulk of the traffic, connecting to sea ports and; running along and across the DMIC area;
- **Secondary Network** – All other NHs in the DMIC area; and
- **Tertiary Network** – SHs and MDRs that are connecting zone centroids (those not connected by NHs).

Primarily there are two NH corridors which run all along the DMIC area from north (Delhi) to west (Mumbai) with a common section of NH-1 originating in the state of Punjab and connecting Delhi carrying bulk of the traffic in the study area. These include:

- i. **Corridor-NWC-1** – NH-1 and NH-8 – Amritsar-Ludhiana-Delhi-Jaipur-Ahmadabad-Mumbai
 - ii. **Corridor-NWC-2** – NH-1, NH-2 and NH-3 – Amritsar-Ludhiana-Delhi-Agra-Indore-Nashik-Mumbai
- The proposed W-DFC runs parallel to NH-8 and is expected to cater for the large volume of traffic moving along NWC-1.
- There are three corridors which run across the DMIC area from east to west connecting to sea ports on the west coast of the country:
- iii. **Corridor-EWC-1** – NH-25, NH-76, NH-14, NH-8A and NH-8B – Jhansi-Kota-Udaipur-Palanpur-Rajkot-Porbandar.
 - iv. **Corridor-EWC-2** – NH-86, NH-59, NH-8A and NH-8B – Bhopal-Indore-Ahmadabad-Surendranagar-Rajkot-Porbandar.
 - v. **Corridor-EWC-3** – NH-6 – Nagpur-Dhule-Surat.

These five corridors essentially constitute the primary network of the study area. Some sections of the primary network are outside the DMIC area but have been included in the definition for completeness and continuity of the primary network.

1.6.5 Traffic Flows

Traffic levels on the study network have been assessed based on the information obtained from traffic studies undertaken in the past from the following different sources:

- Detailed project reports for specific sections.
- Traffic reports of pre/post-tender services of road sections being upgraded on BOT format.

The base year for this task has been assumed to be 2008. The traffic levels assessed from the past studies have been standardized for the base year considering the growth rates specified in the respective studies.

Traffic levels on the study network were assessed considering passenger vehicles (cars and buses) and freight vehicles (LCVs and Trucks). Traffic assessment has been based on the modes of transport that are likely to move on the main carriageway of a road and not on service roads.

Classified traffic flows on the study network suggest that freight movement on most links/sections is high over 50 percent of the total traffic and the average is about 70 percent. There are only few links/sections with passenger traffic higher than that of freight traffic.

The current lane configuration of the links in the study network varies between 2 and 8 lanes (Dual-4 2x4). The assessed Volume-Capacity (V/C) Ratio based on the assessed traffic volumes on the links of the study network indicate that most links of the network are currently operating at LOS-B or LOS-C. In the near future the LOS category of certain links may upgrade to the higher level on completion of the capacity augmentation of the links in various phases of NHDP.

1.6.6 Travel Pattern

Travel patterns of the freight vehicles in the study area were assessed from the available observed origin-destination (O-D) matrices for various locations (Links) on the network. It is generally observed that a large portion of traffic moving in the study area moves mainly in the direction of North to West and vice-a-versa. This suggests why the two north-west corridors NWC-1 and NWC-2 are used more than the other links on the network.

The trip length distribution of freight traffic was studied to assess the likely shift from road to rail. It is observed that on an average over 50 percent of trucks have a trip length more than 300 Kms. Nearly 28 percent of the trucks have a trip length more than 800 Kms. The trip length distribution of LCVs suggests that over 70 percent have trip lengths less than 300 Kms. Over 13 percent of LCVs have a trip length of over 800 Kms which perhaps constitute those LCVs which have the capacity to carry higher loads, almost similar to that of 2-axled trucks.

It is observed that about 2500 truck trips per day move between Mumbai and Delhi and areas to the north of it. Almost similar number of truck trips (2350) move between Ahmadabad and the northern region. It is observed that traffic between Delhi and Mumbai moves along NH-8, NH-2, NH-3 and others.

Trip Rate

Link Influence Area (LIA) has been defined to comprise of the zones through which a link passes. Freight trips have been related to the value of the industrial output (VIO) in units of Rs.1000-million (K-million) and passenger trips with million-population.

- It is observed that on average 2 LCV trips per K-million of VIO in LIA are generated on a link. Truck trips on a link on an average would be 10 per K-million of VIO and are about 5 times that of LCVs.
- Bus trips on a link are about 100 per million-population in LIA and the same for cars is about 600.

1.6.7 Travel Demand

Traffic growth rates needed to assess the likely future traffic levels on a link (project road) are a product of the economic growth rate and the elasticity of the traffic demand vis-à-vis economic growth. This can be expressed by the following equation.

$$T_g = e \times E_g \dots\dots\dots 1$$

Where T_g = Traffic Growth Rate

e = Elasticity of Traffic Demand

E_g = Economic Growth Rate

The economic growth parameters at zone level were assessed considering the forecast industrial growth rates (refer Industry Study) at that level. Net District (Zone) Domestic Product (NDDP) and corresponding Primary/Secondary sector growth was assessed considering the historical relationship between industrial growth and NSDP and the relationship between NSDP and Primary/Secondary sector at the respective state level. These assessments were made for the following two scenarios based on the corresponding industrial forecast at the district level.

BAU – Business As Usual

BIS – Business in Induced Scenario

It is estimated that NSDP at DMIC region level is likely to grow at about 4.3 percent in BAU and 8.3 percent in BIS. It is assumed that GDP growth would be about 1.06 times to that of the

DMIC growth considering the historical relationship (elasticity) between GDP and NSDP of DMIC and the estimated GDP growth in BAU during the study period would be about 4.6 percent. This is due to the fact that the economic growth in three states Uttar Pradesh, Madhya Pradesh and Rajasthan is low and results in lower economic growth of DMIC region. This is expected to reverse (i.e. elasticity would be about 0.94) in the BIS as DMIC region would be growing at a much faster rate due to economic impetus being provided to the area. As a result the GDP would be lower than that of NSDP of DMIC and it is estimated to be about 7.5 in BIS.

The elasticity of traffic demand for the project was estimated based on the national level time series data on passenger/freight kilometers.

Base

Traffic estimates on the study network in the base case assumes the development W-DFC. The long distance (over 300 Kms) freight traffic has the potential to shift from road based system to a rail based system. These rates of shift from road to rail are for different distance slabs and would have a weighted impact on the volume of traffic on the road link. Considering this it has been assumed that the freight traffic demand on the road network would decrease incrementally (Table-0-4) over different phases of the study period. Base forecasts of future traffic levels in the DMIC area considering the impact of W-DFC were estimated.

Table 0-4: Share of Truck Trips likely to shift from Road to Rail (%)

Horizon Years	2013-14	2018-19	2028-29	2038-39
Share of Truck Trips	10	20	30	40

The Car and Bus traffic forecasts suggest that on an average, link volumes increase about 3 and 2.5 times in BAU and about 8 times in BIS by the horizon. Average link volume of LCV traffic increases about 3 times in BAU and 8 times in BIS.

Average link volumes of Truck traffic are forecast to increase about 2.5 times in BAU and 7 times in BIS. Impact of W-DFC would result in an increase of truck traffic to about 1.5 times in BAU and 4 times in BIS which is almost having the truck traffic load on the network.

Travel Demand – Mass Transport (Bus) Impact

Car and bus passenger forecast suggest that the respective passenger forecast is likely to increase about 3 times in BAU and about 8 times in BIS by the horizon. If the current trend of usage of cars continue in future the share of car passenger traffic of the total passenger traffic in the study area is likely to increase from 37 percent to 39 percent. In other words mass transport share is likely to decrease from 63 percent to 61 percent.

The current share of mass transport and the base forecast of Cars and Buses suggest that greater emphasis need to be given in upgrading of the road based mass transport system. It is assumed that about 20 percent of the car passenger traffic on any link would shift to bus in every time period such that the car passenger traffic share would not be lower than 10 percent. That is mass transport share on any link would be a maximum of 90 percent. The impact of this phased increase of mass transport would be that by the horizon car passenger traffic share would be 15 percent of the total passenger traffic and that of bus passengers 85 percent. This results in the car traffic growth to increase by about 1.1 times in BAU against 3 times in the base case and about 3 times in BIS against 8 times in the base case. The bus traffic is likely to increase by about 3.5 times in BAU against 2.5 times in the base case and about 10 times in BIS against 8 times in the base case.

Travel Demand – Mass Transport (Rail) Impact

Link volume of buses on an average would increase from about 800 in the base year to about 2000 by the horizon in BAU and about 6000 in BIS. A very high volume of buses are likely to flow on the network and would be desirable to consider other forms of mass transport that would reduce the load on road network.

The other forms could be Sub-Urban Rail System (SURS) or Rapid Rail Transit System (RRTS) or any other form of rail based system. However, development of the same is time dependent and may result in gradual shift of bus passenger traffic to it. Assumed bus to rail shift rates of passenger traffic is given in Table 0-2.

Table 0-2 Share of Passenger Trips likely to shift from Bus to Rail (%)

Horizon Year	2013-14	208-19	2028-29	2038-39
Shift - Bus to Rail	10	25	50	75

The impact of rail based mass transport system is that the bus traffic volume on a link on an average would decrease by 0.9 times in BAU and by 2.5 times in BIS by the horizon. These results in potential traffic to a rail based system on a route would be about 4 thousand passengers initially and would increase to about 60 thousand passengers by the horizon in BAU. The corresponding figures in BIS are 5 and 175 thousand respectively.

1.6.8 Traffic Forecasts

Traffic on the study network was forecast for the following three different cases of transport infrastructure development.

- i. **Base** – Considers Bus Transport (Mass Transport) share – Current trend.
- ii. **RD-MT** – Considers reduction in traffic flows due to anticipated changes in Road based Mass Transport share (Shift from cars to buses).
- iii. **RD/RL-MT** – Considers reduction in traffic flows due to anticipated shift from Road based Mass Transport to Rail based Mass Transport.

The forecast indicates that the traffic levels on the study network would increase by about 2.5 times on an average in BAU and about 7 times in BIS in the base case. Traffic in RD-MT case is likely to increase by about 1.6 times in BAU and about 4.5 times in BIS. Traffic in RD/RL-MT case is likely to increase by about 1.4 times in BAU and about 4 times in BIS. This suggests that improvements in mass transport services will result in decrease of augmentation of road infrastructure from 7 to 4 times in BIS scenario.

1.6.9 Network Improvements

The existing planned improvements need to be implemented to support the DMIC area i.e. NHAI plans, NCR and Mumbai Structure and Regional Plan proposals.

The traffic forecasts on the study network suggest that the two primary north-west corridors NWC-1 and NWC-2 will need to have their capacity augmented up to 8 or 10 lanes and also suggest the necessity of identification of new corridors for effectively serving the traffic needs of the future BIS scenario. The forecast also suggests that all the three east-west primary corridors EWC-1 to EWC-3 require high capacity augmentation and need alternate corridors/alignments at least in certain section to cater to the high traffic needs. The east-west corridors also directly connect sea ports. All the other links/sections in the study network would require capacity augmentation of 6 to 8 lanes.

It is necessary to develop the third north-west corridor NWC-3 to serve the needs of the traffic moving between the north and sea ports (Kandla, Mundra) such as those in Gujarat.

In addition the traffic forecasts suggest the development of regional ring roads – termed DMIC Ring Roads (DRR) – in four different regions in the DMIC area.

These are described as:

Thus DRR-1 (DMIC Ring Road – 1) is defined as: DRR-1 – NH-93-NH-3- NH 11B- -NH 11A- New Link -NH-11-NH-65-New Link-NH-93

DRR-1 will function as a bypass to the NCR region reducing the traffic loads to certain extent or releasing capacity for movement intra-regional traffic.

Thus DRR-2 is defined as: - DRR-2 – NH-11-Existing Alignment (Lalsot- Sawai Madhopur)- New Link- NH-11A-NewLink-NH-65-NH-11

DRR-2 functions as a bypass to the region formed by Jaipur-Ajmer-Jodhpur.

DRR-3 surrounding Indore, Dewas, Shajapur, Ratlam and Dhar is proposed as these areas are likely to develop very significantly with the forecast high industrial growth and the resultant traffic growth. DRR-3 will reduce the traffic load in the core area of this region and provides easy movement facilities for the long distance north-west traffic.

Traffic forecast of NH-3 between Indore and Mumbai suggests the need for alternate facilities in addition to the augmentation of the capacity of NH-3 itself. A new parallel corridor to NH-3 (Southern Section) from a point on the south-eastern section of DRR-3 is proposed to intersect NH-50 with extension towards Dighi Port. This results in the formation of NWC-4.

The NWC-4 is defined as: - NWC-4 – NH-93-NH-3(Northern Section)-New Link

Extension of NH-50 from Nashik to Valsad through Silvassa would function as a bypass to the Mumbai region. Additionally it would provide access between the areas in Pune-Nashik region and sea ports in Gujarat.

DRR-4 is defined as:- DRR-4- Silvassa-Nashik –intersection of NH-50 and NH-222- Khopoli- Panvel- Silvassa.

Traffic forecast of NWC-1 and NWC-2 suggests the need to develop a new corridor between Delhi and Mumbai. It is proposed to develop NWC-5 such that it runs parallel and in between the two corridors. It not only reduces the traffic load on NWC-1 and NWC-2 but also provides connectivity to IAs and IRs developing along its alignment.

NWC-5 is defined as: - NWC-5 – New Corridor – Delhi-Alwar-Dausa-Kota-Chittoragarh-Dahod-Rajpipla-Silvassa-Thane-Dighi

A new link between Patan and Bhavnagar passing through Surendranagar could be planned. This will give an alternate route to ports in Gujarat bypassing Ahmedabad.

Lane configuration requirements of each of the links on the study network which require capacity augmentation and of the proposed new links were assessed considering shifting of traffic from the existing links to new links. The assessed traffic volume and lane requirements on the proposed new links and expressways are shown in the Table 0-3.

Table 0-3: Future Traffic Lanes Requirement on the Proposed New Links and Expressways

Link	BAU							
	Link - Traffic Forecast (PCUs)				Lanes Required			
	2009-14	2014-19	2019-29	2029-39	2009-14	2014-19	2019-29	2029-39
Proposed New Links								
Narwana-Panipat	6700	9500	12900	15100	2	2	2	2
Panipat-Muzaffarnagar	12600	13400	25400	30000	2	2	4	4
Muzaffarnagar-Bijnor	15600	16900	30800	42500	2	2	4	6
Bijnor-Moradabad	15200	18100	33800	39400	2	4	4	4
NH11A-Bundi	9000	13500	18000	20700	2	2	4	4
Bundi-Bhilwara	17000	23100	27800	35000	2	4	4	4
Bhilwara-Rajsamand	15800	16800	20000	23600	2	2	4	4
Rajsamand-Pali	14400	16000	17400	18600	2	2	4	4
Dahod-(Indore-Dhule)	14500	19900	24700	27200	4	4	4	4
Shajapur-Ratlam	6600	10500	11900	21400	2	2	2	4
Ratlam-Banswara	2100	4000	7500	7600	2	2	2	2
Satara-Aurangabad	10400	14200	18500	22900	2	2	4	4
Murud-Pune	15800	16600	17400	19500	2	2	4	4
Pune-Thane	20700	35300	42400	47600	4	4	6	6
Thane-Silvassa	52200	82300	114100	130400	6	8	8	8
Nashik-Silvassa	13800	14300	15900	17900	2	2	2	4
Silvassa-SuratNH6	54400	65000	97400	104800	6	8	8	8
SuratNH6-Anand	39100	57200	89000	93600	4	6	8	8
Patan-Surrendranagar	15800	16700	17500	24900	2	2	4	4
Surrendranagar-Bhavnagar	30000	35000	41200	43500	4	4	6	6

Link	BAU							
	Link - Traffic Forecast (PCUs)				Lanes Required			
	2009-14	2014-19	2019-29	2029-39	2009-14	2014-19	2019-29	2029-39
Anand-(Surrendranagar-Bhavnagar)	9100	10500	25100	36200	2	2	4	4
Patan-Mahesana	8200	9900	11000	11400	2	2	2	2
Mahesana-Himatnagar	9300	11300	12700	13600	2	2	2	2
Himatnagar-Godhra	4200	4800	5100	5600	2	2	2	2
Godhra-Anand	12000	14600	16900	19900	2	2	2	4
Godhra-Bharuch	24200	28300	31400	37500	4	4	4	4
Delhi-Alwar-Dausa	28600	32800	44100	46000	4	4	6	6
Proposed Expressways								
Mumbai-Vadodara**	35000	35000	35000	52000	4	4	4	6
Vadodara-Ahmedabad(NE1)-(Existing)	35000	52000	52000	52000	4	6	6	6
Delhi-Jaipur**	0	17500	17500	35000	0	4	4	4
Delhi-Agra	17500	17500	17500	17500	4	4	4	4

Link	BIS							
	Link - Traffic Forecast (PCUs)				Lanes Required			
	2009-14	2014-19	2019-29	2029-39	2009-14	2014-19	2019-29	2029-39
Proposed New Links								
Narwana-Panipat	10000	13000	20000	56000	2	2	4	6
Panipat-Muzaffarnagar	16000	22000	55000	79000	2	4	6	8
Muzaffarnagar-Bijnor	18000	23000	55000	79000	4	4	6	8
Bijnor-Moradabad	19000	25000	58000	82000	4	4	6	8
NH11A-Bundi	17000	27000	36000	62000	2	4	4	8
Bundi-Bhilwara	17000	27000	37000	63000	2	4	4	8
Bhilwara-Rajsamand	19000	28000	39000	66000	4	4	4	8
Rajsamand-Pali	18000	28000	38000	62000	4	4	4	8
Dahod-(Indore-Dhule)	23000	44000	60000	80000	4	6	6	8
Shajapur-Ratlam	11000	25000	38000	81000	2	4	4	8
Ratlam-Banswara	5000	10000	28000	38000	2	2	4	4
Satara-Aurangabad	12000	27000	29000	40000	2	4	4	4
Murud-Pune	19000	23000	29000	29000	4	4	4	4
Pune-Thane	24000	47000	53000	82000	4	6	6	8
Thane-Silvassa	61000	80000	80000	80000	8	8	8	8
Nashik-Silvassa	17000	21000	28000	31000	4	4	4	4
Silvassa-SuratNH6	67000	67000	80000	80000	8	8	8	8
SuratNH6-Anand	50000	67000	80000	80000	6	8	8	8
Patan-Surrendranagar	18000	23000	35000	56000	4	4	4	6
Surrendranagar-Bhavnagar	38000	57000	91000	113000	4	6	8	8
Anand-(Surrendranagar-Bhavnagar)	11000	15000	47000	80000	2	2	6	8
Patan-Mahesana	10000	14000	22000	27000	2	2	4	4
Mahesana-Himatnagar	11000	17000	27000	34000	2	2	4	4
Himatnagar-Godhra	5000	7000	10000	12000	2	2	2	2

Link	BIS							
	Link - Traffic Forecast (PCUs)				Lanes Required			
	2009-14	2014-19	2019-29	2029-39	2009-14	2014-19	2019-29	2029-39
Godhra-Anand	14000	20000	29000	34000	2	4	4	4
Godhra-Bharuch	31000	47000	74000	112000	4	6	8	8
Delhi-Alwar-Dausa	40000	56000	103000	112000	4	6	8	8
Proposed Expressways								
Mumbai-Vadodara**	17500	35000	52000	70000	4	4	6	8
Vadodara-Ahmedabad(NE1)-(Existing)	35000	52000	70000	70000	4	6	8	8
Delhi-Jaipur**	10000	27500	60000	80000	2	4	6	8
Delhi-Agra	17500	17500	35000	35000	4	4	4	4
Surat-Dhule	17500	35000	52000	70000	4	4	6	8
Dhule-Thane	17500	35000	35000	52000	4	4	4	6
Pune-Nashik-50*	0	0	0	52000	0	0	0	6
Nashik-Silvassa*	0	0	0	35000	0	0	0	4
Surrendranagar-Bhavnagar	0	0	35000	52000	0	0	4	6

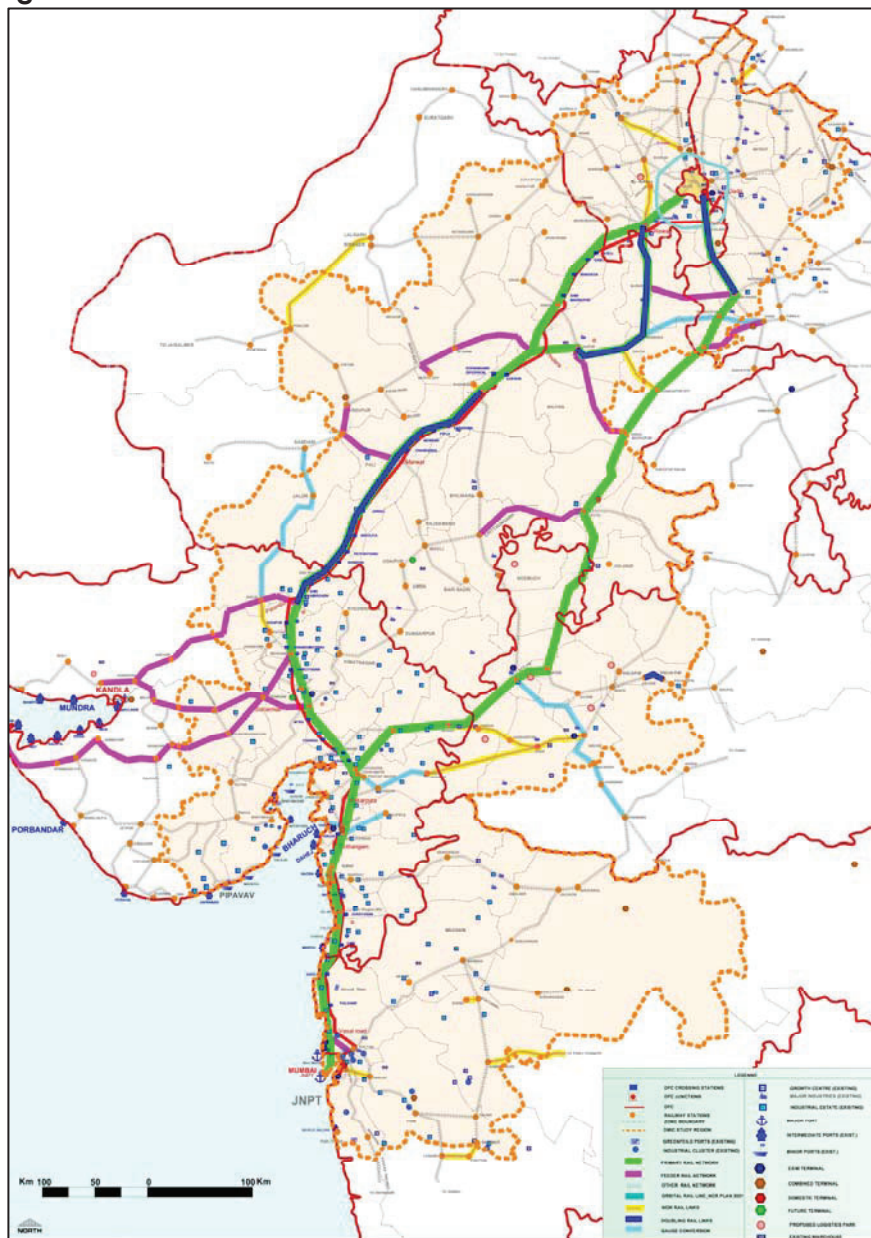
Note: ** Already Proposed * Same Alignment to be converted to Expressway

1.7 RAILWAYS

1.7.1 CURRENT STATUS OF RAIL NETWORK

Current status of existing rail network including two primary routes and nineteen feeder routes in DMIC influence region was reviewed. Two primary routes namely Delhi-Ratlam-Vadodara-J.N.Port and Delhi – Rewari – Jaipur – Phulera – Ahmedabad – Vadodra – J.N.Port are already congested with capacity utilisation of more than 100% on most of their segments. Both routes are passenger dominant and freight trains receive lowest priority for movement. Most of the 19 feeder routes have surplus capacity except four sections viz; Sabarmati -Viramgam-Surender Nagar, Palanpur – Gandhidham, Rewari – Hissar and Rewari-Delhi, which are almost saturated.

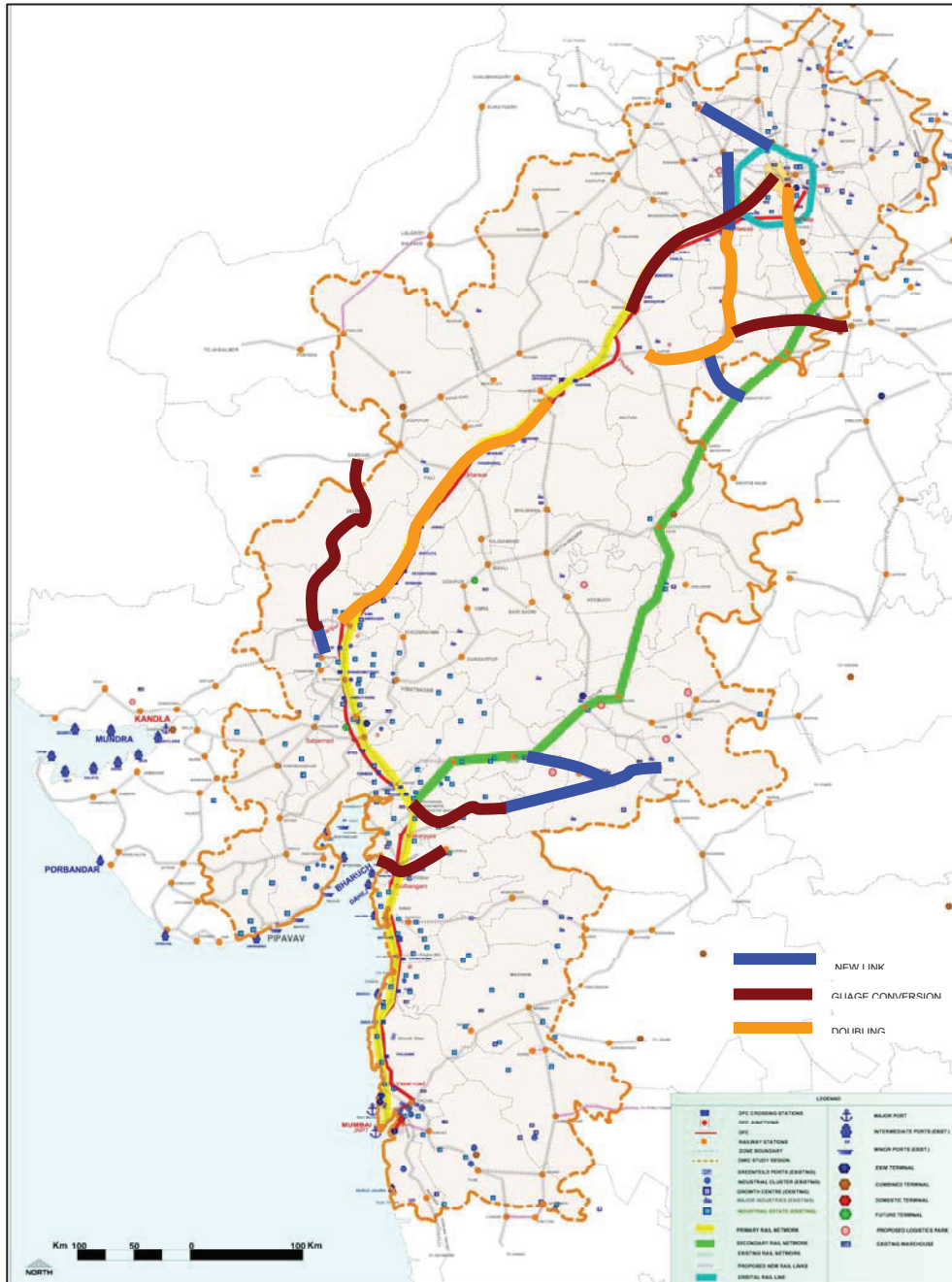
Map 0-2 Existing Rail Network



1.7.2 ONGOING DEVELOPMENT WORKS

Projects for 800 Kms of new rail links, 850 kms of doubling of single line and 1100 Kms of conversion from metre/narrow gauge to broad gauge has already been planned by Indian Railways in DMIC region.

Map 0-1 Ongoing Development Works



Projected Container Traffic (EXIM) at West Coast Ports in PETS-II Report and Perspective Plan

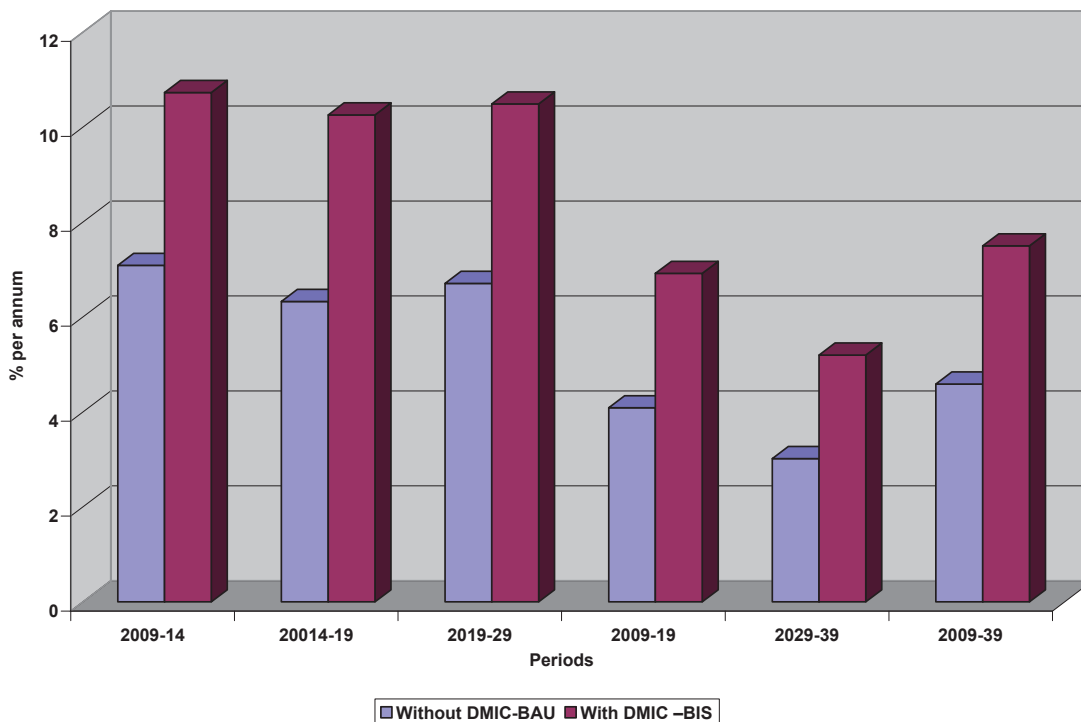
Two distinct groups of traffic viz; Containerised Cargo and non-containerised goods are likely to use W-DFC. Container traffic accounts for the maximum number of trains and their share is predicted to increase to over 80% in 2021 – 22 as indicated in PETS II report. Most of container traffic in DMIC-influence region is EXIM traffic. Domestic container traffic is still relatively small,

accounting for only 3% of container trains in the Down direction and about 6% in the UP direction.

Container traffic on W-DFC is dependent on the EXIM container traffic handled at ports on west coast.

DMIC is anticipated to have positive impact not only on the economy of the six states Involved but also on the national economy. Two GDP-growth scenarios were evolved, one without DMIC and the other with DMIC.

Figure 0-1: GDP Growth rates for various periods

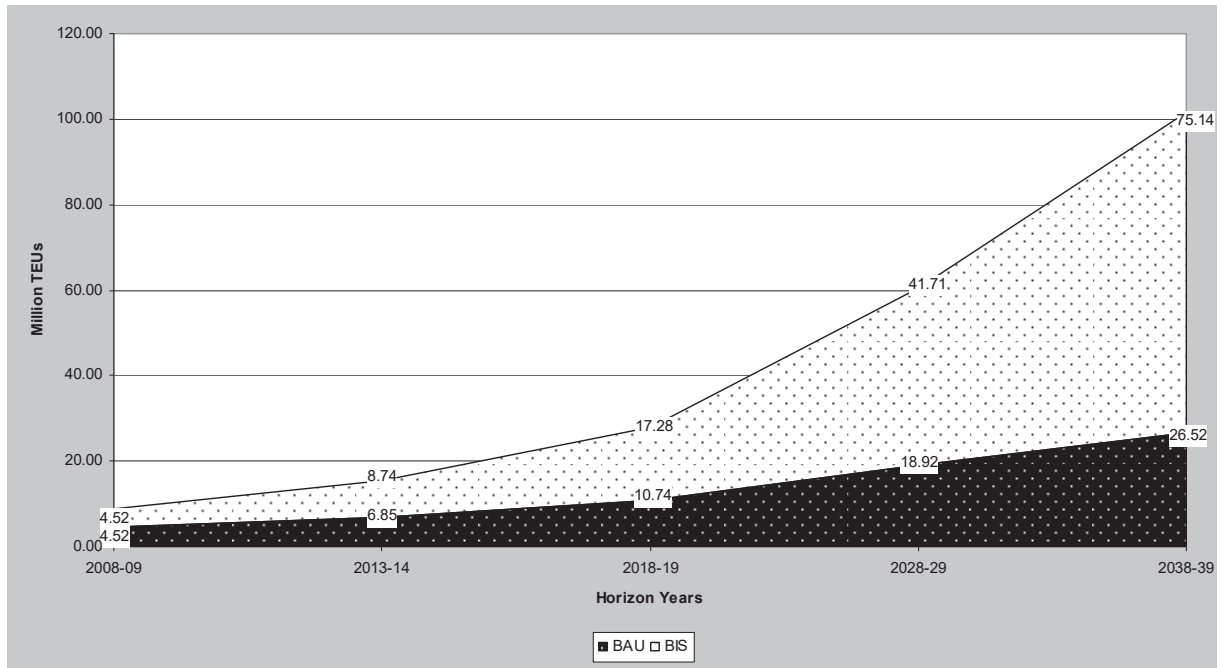


Based on these two GDP growth rates EXIM Container traffic was projected for all major Ports. Share of western ports (Jawaharlal Nehru port terminal, Mumbai port trust, Kandla port) currently at 66% is likely to reduce to around 53%. Thus two sets of projections have been prepared, one for BAU scenario and the other for BIS scenario.

1.7.3 Projected Container Traffic at West Coast Ports

Available information about expansion plans of ports on west coast, container handling capacity is likely to be around 42-43 million TEUs. Non availability of adequate container handling capacity at west coast ports may reduce the level of traffic likely to move on W-DFC.

Figure 0-2: Projected Volume of Export Traffic at Western Ports under BAU and BIS Scenario

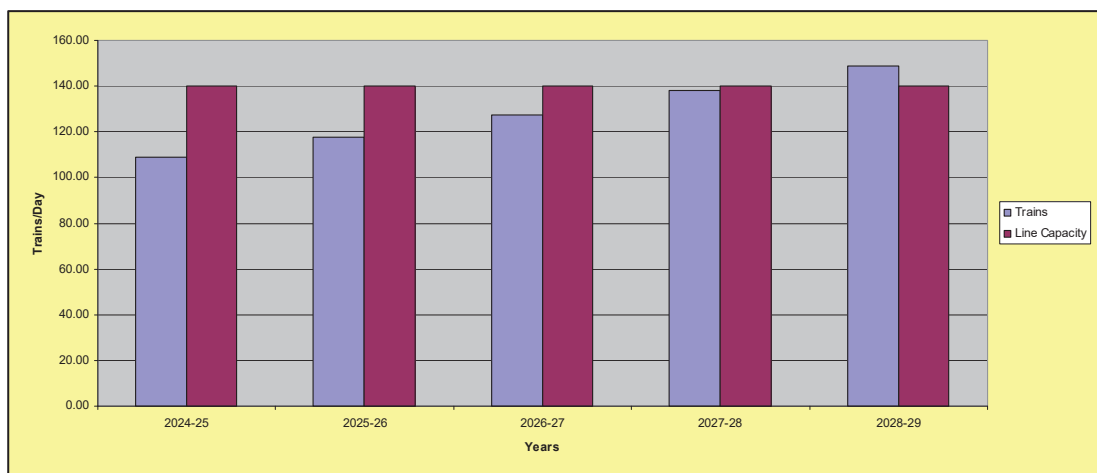


Adequacy of designed capacity of DFC

● Designed capacity of W-DFC at 140 trains each way will be adequate with single stack container trains :

- without DMIC up to 2038-39,
- With DMIC by up to 2027-28,

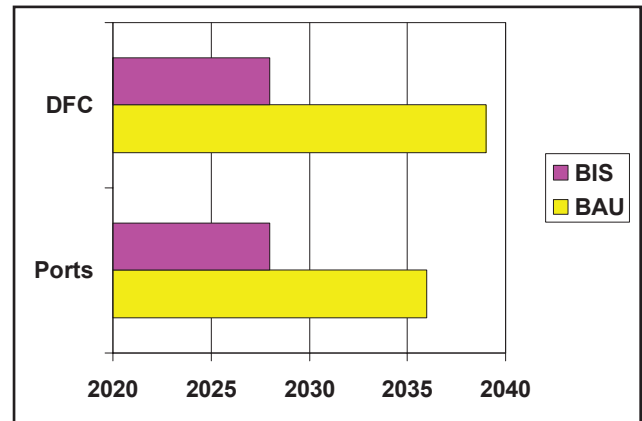
Figure 0-3: Max. No. of Projected Trains Vis a Vis Line Capacity on W-DFC



Issues and Constraints and Ports Scenario

- Under the BAU scenario ports would have the capacity to handle projected traffic only up to 2035-36.
- W-DFC would have capacity to handle trains upto 2038-39
- Under Business Induced Scenario (BIS) scenario ports would have capacity to handle traffic only up to 2027-28.

Figure 0--4: Capacity of W-DFC under BAU and BIS



- W-DFC will have capacity to handle traffic upto 2027-28.

Hence Western coast port's capacity requires augmentation to meet the projected traffic for 2039

Potentials for capacity augmentation on W-DFC

- Containerised cargo hauled by Double Stack Container (DSC) Trains:
- With 50% DSC capacity met till 2032-33.
- With 75% DSC capacity met 2035-36.

Further improvement by running coupled DSC Trains

Primary Route –Capacity situation

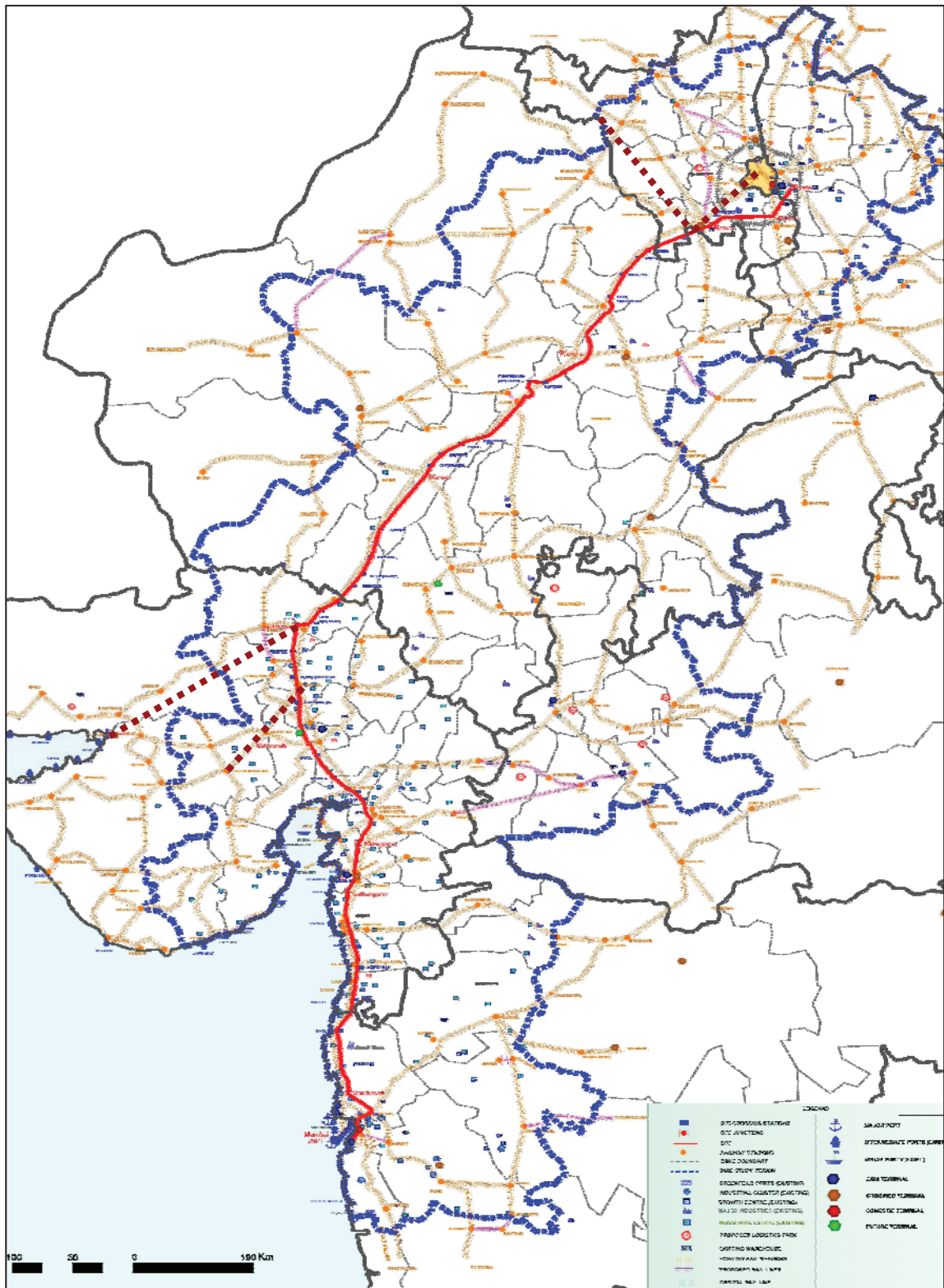
- Capacity released in the two Primary Routes by diversion of long distance freight trains to W-DFC would be consumed by unsatisfied dormant demand for passenger trains and growth in balance freight traffic.
- These routes would need capacity augmentation by up gradation of signaling & operating Systems.

1.7.4 PROPOSED FEEDER ROUTE AUGMENTATION

Four feeder routes would need capacity augmentation by way of electrification, doubling, & automatic block signaling. These routes are:

1. Sabarmati -Viramgam- Surender Nagar,
2. Palanpur - Gandhidham
3. Rewari - Hissar &
4. Rewari-Delhi

Map 0-2 Proposed Feeder Route Augmentations

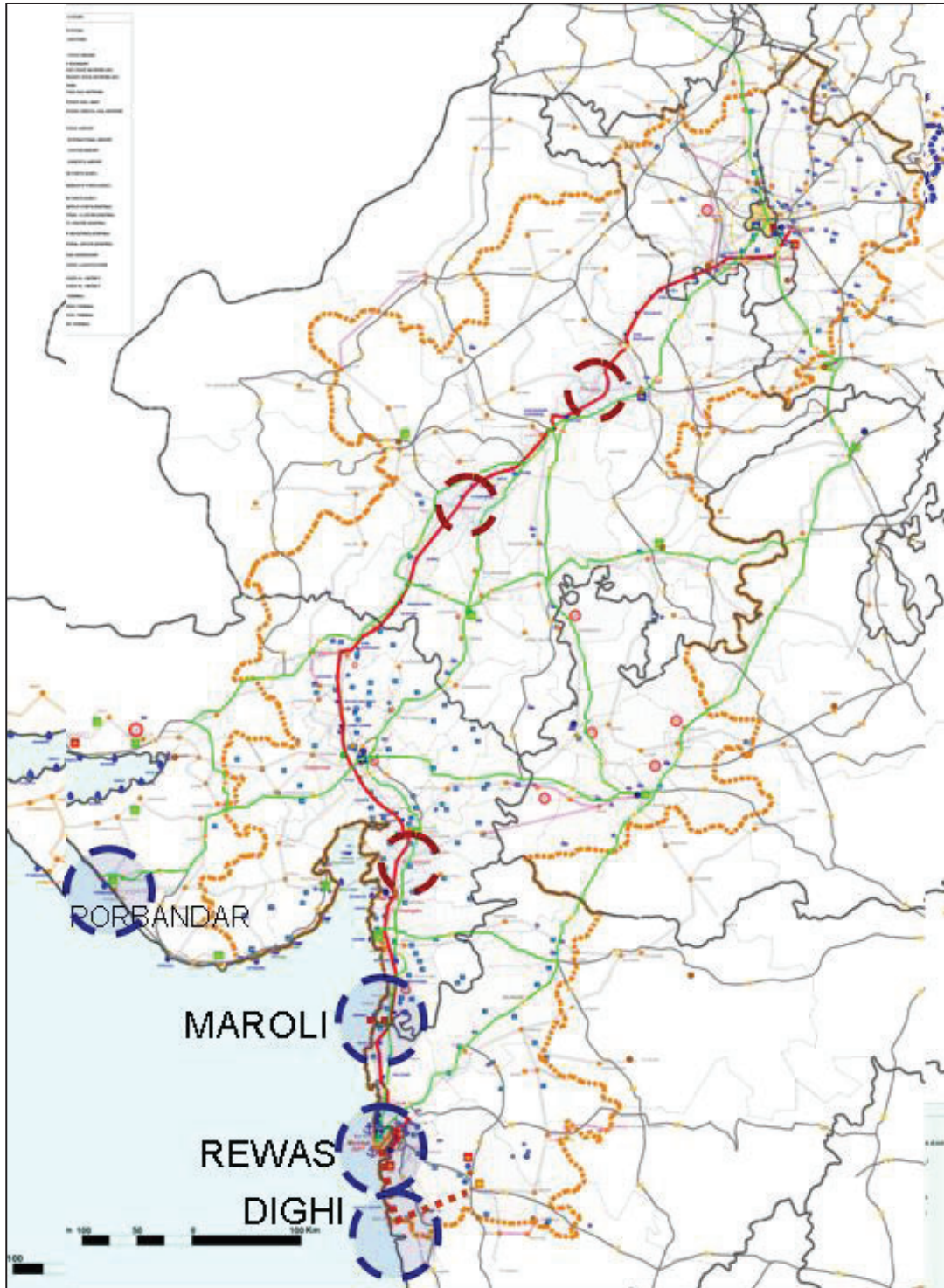


Connectivity to be provided at the following points:

1. Non-major port, e.g. Alewadi, Rewas, Dighi, Maroli, Porbandar, and
2. Makarpura (Vadodra), Marwar and Phulera between Primary route and W-DFC

3. Five proposed Logistic Parks

Map 0-3 Rail Connectivity

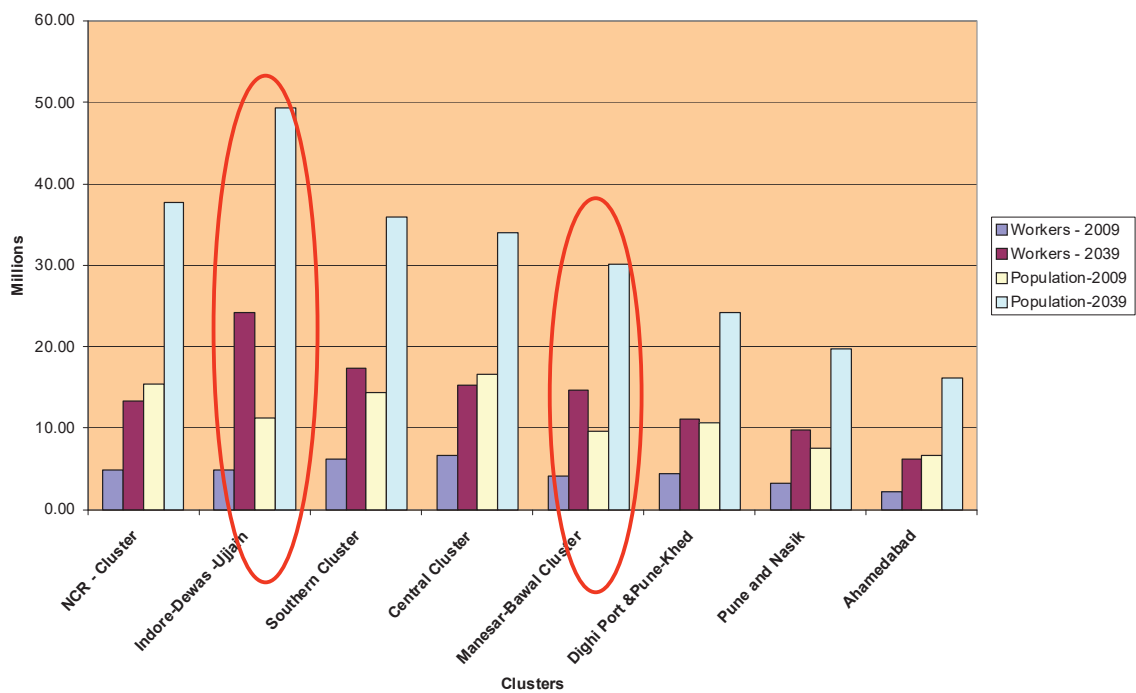


Rail Based Regional Rapid Transit System (RRTS):- The Consultants are to undertake a Pre-feasibility of High speed rail transit for a regional Mass transportation the next stage. The factors influencing the selection of the route are:

- Derivative of Growth in
 - Workers &
 - population
- The fact that Indian Railways had announced Study for five High Speed Rail Corridors
 - between Pune, Mumbai and Ahmedabad
 - which also serve southern Cluster along Valsad-Vadodra-Ahmedabad
- For NCR the DMRC already has Plans for Metro Network and Indian Railways is progressively electrifying non electrified rail sections, introducing MEMU/EMU Services
- Indian Railways is
 - electrifying Non Electrified Rail Sections
 - Introducing MEMU/EMU Services.

Further investigation of the feasibility of passenger rail systems in Manesar-Bawal areas is recommended.

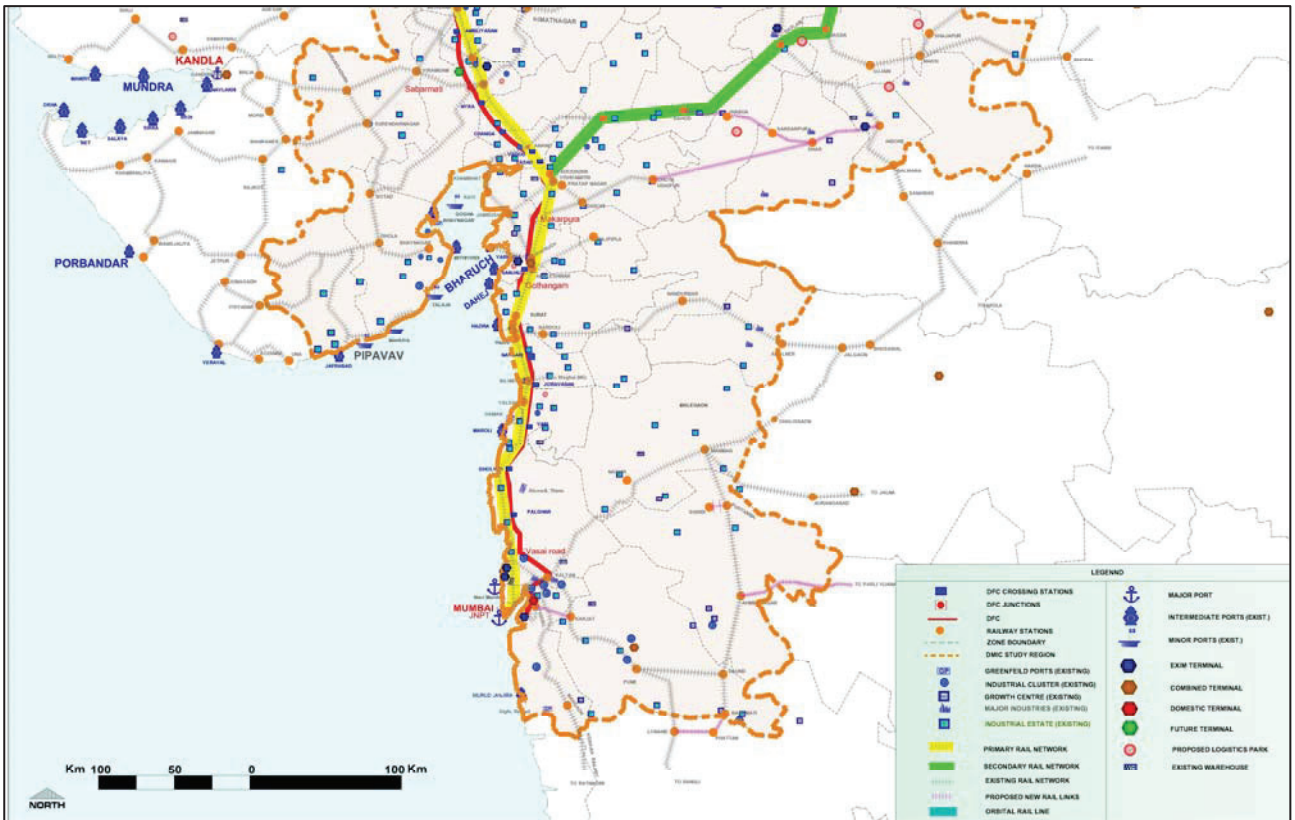
Figure 0-5: Workers and Population in Various clusters in 2009 & 2039



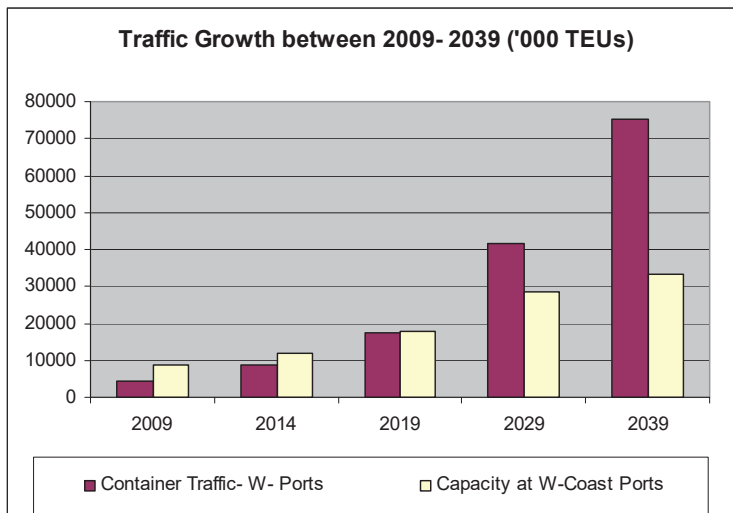
1.8 PORTS

We have reviewed and studied the current network of Ports in the Gujarat and Maharashtra sub-region of DMIC.

Map 0-4 Map showing Existing Port Network in DMIC Region



We have examined the capacity of the existing ports and planned expansion and compared the planned capacity with the predicted cargoes.

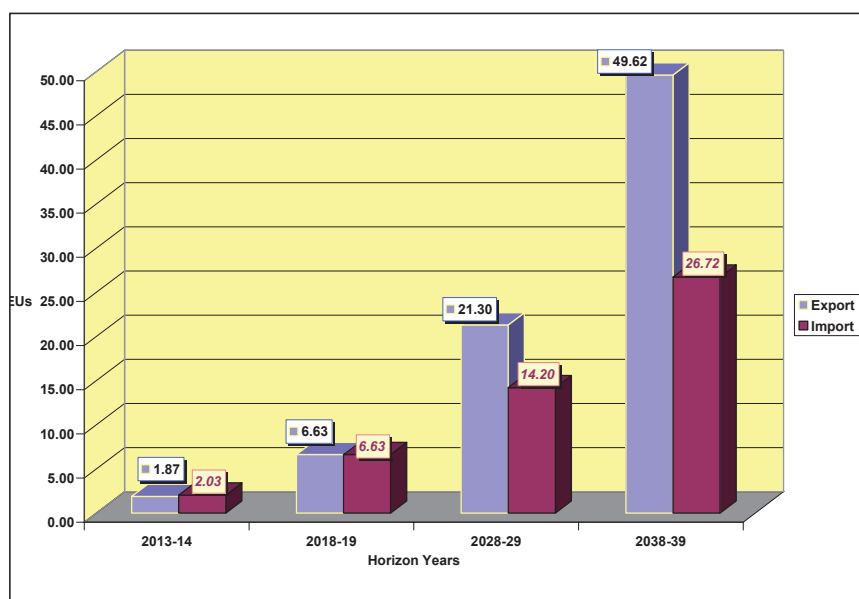


The Container handling capacity of the ports in the western region has been assessed.

PORT	2007-08	2011-12	2016-17	2019-20	2021-22	2026-27	2029-30	2031-32	2036-37	2039-40	2041-42
JN PORT	4500	5750	8250	9210	9850	10600	10600	10600	12100	12100	12100
MUMBAI	700	750	1500	1500	1500	2500	3000	3000	3250	3500	4000
KANDLA	500	750	1250	1400	1600	1800	2000	2500	3000	3500	4000
MUNDRA	2250	3000	3750	4200	4500	6000	6900	8000	9000	10,000	12,000
PIPAVAV	750	750	1250	1400	1500	2000	2150	2250	2500	2750	3000
HAZIRA	0	0	1250	1400	1500	2250	2250	2500	2500	3000	3000
REWAS	0	0	750	1200	1500	2250	2700	3000	3000	3000	3000
DIGHI	0	0	250	500	750	750	1000	1500	2000	2500	3000
TOTAL CAPACITY	8700	11000	18250	20810	22700	28150	30600	33350	37350	40350	44100
Ports with Potential Yet to be Explored											
POSITRA	0	0	750	1000	1250	1500	1750	2000	3000	4000	5000
DAHEJ	0	0	0	500	750	1000	1250	1500	2000	2500	3000
MAROLI	0	0	0	0	2000	3000	4000	4500	5000	5000	5000
<i>Probable addition</i>	<i>0</i>	<i>0</i>	<i>750</i>	<i>1500</i>	<i>4000</i>	<i>5500</i>	<i>7000</i>	<i>8000</i>	<i>10000</i>	<i>11500</i>	<i>13000</i>
Maximum Capacity	8700	11000	19000	22310	26700	33650	37600	41350	47350	51850	57100

(Notes: Whereas capacity growth at the first four ports is based on their current development plans, capacity estimates at the remaining 7 under planning ports are based on market intelligence, state govt plans and their development potential for container traffic. **Sources:** Business plans, announcements.)

Projected container traffic EXIM at west coast ports from DMIC



Conclusions

- The result shows a significant shortfall in port capacity during the plan period.
- Gap between demand and availability in container traffic at Ports due to incremental growth in DMIC Region is around 20 million TEUs.
- Need additional development of new green field sites for container traffic.
- At least three new Greenfield ports of JNPT capacity need to be set up

Accordingly we recommend that a site selection study be undertaken to locate and plan Greenfield port infrastructure in the coastal states of Gujarat and Maharashtra in the DMIC region.

1.9 LOGISTICS

Road transportation accounts for more than 60% of inland transportation of goods, and highways that constitute 1.4% of the total road network, carry 40% of the freight movement by roadways. Slow movement of cargo due to bad road conditions, multiple check posts and documentation requirements, congestion at seaports due to inadequate infrastructure, bureaucracy, red-tape and delay in government clearances, coupled with unreliable power supply and slow banking transactions, make it difficult for domestic exporters to meet the deadlines. However since economic liberalization in 1991, the government of India has realized the importance of efficient logistics and has made strides in developing the infrastructure and upgrading related policies. Several infrastructural and policies changes have been set in motion to facilitate logistics. These Infrastructure developments include:

- Golden quadrilateral project with 4/6 lane roads connecting the four major cities of Delhi, Mumbai, Chennai and Kolkata in India. The total length of the road corridor is 5,846 km out of which 5501 km (about 94.10%) of the length has been constructed.
- East-west and north-south road corridor connects Srinagar in the north to Kanyakumari in the south including spur from Salem to Kochi and Silchar in the East to Porbandar in the west. The NS-EW corridor is about 7,300 KM.
- Port connectivity project includes roads (380 KM) connecting the 12 major ports.
- Expansion of the port capacities to handle 1.2 billion metric tonnes (MT) by the year 2012 and also increase container handling capacity from about 7M TEU to about 70 M TEU by 2025.
- Eastern and western dedicated rail freight corridors totaling 2,700 KM long railway line at an investment of Rs. 28,000 Cr. The Eastern corridor is 1,232 km long between Ludhiana to Sonnagar, Kolkata) and the Western corridor is 1,483 KM long from Jawaharlal Nehru Port (JNPT) to Dadri in the NCR region.
- Increase the rail freight loading capacity to 1,100 million tonnes by 2011/12
- Delhi Mumbai Industrial Corridor connecting the major production, consumption and EXIM markets of India along the DFC. The focus is on high-impact development within a band of 150- 200km on either side. Alignment of DFC Development of DMIC also entails

augmentation of feeder road and rail connectivity to hinterland, markets and selected sea ports along Western Coast.

The profile for existing status of logistics in the DMIC region has been drawn between Delhi and Mumbai (JNPT) route including the different State wise sub regions being examined in the following section. In this process an insight was gained in the generated total production volumes, the exports which are targeted and the subsequent quantum and direction of their flows. With most of the industrial production being targeted in the DMIC region having a possibility of being containerized, the focus of Logistics has been on the containerized movements between Delhi to JNPT and other ports lying in the western region.

Indian Railways, Eastern and Western DFCs, Multi-modal parks

The railways have identified 11 sites along the proposed Delhi-Mumbai industrial corridor and have invited requests for qualification to appoint consultants, who will prepare a detailed project report for setting up such logistics parks. Railway ministry indicates Special purpose vehicles (SPVs) for the parks would be ready within one year. These parks will be connected by rail and road and some will be located near airports. These multi-modal logistics hubs have been planned to provide total transport solution and other value-added services to industry in and around the dedicated freight corridor. Each logistics park will have a container terminal for both domestic and international operation, mineral-handling terminals, a cement and fertiliser terminal, automobile terminals, storage and distribution as well as trans shipment facilities, conventional, cold storage and product-specific warehouses as well as hotels, banks, food parks and entertainment centres.

The logistics park would be built through public-private partnership. The railways would subscribe to the equity capital of the SPVs, which would implement these projects.

Logistic facility currently proposed by Private entities

Majority of the upcoming logistics parks are being planned in close proximity to state capitals and industrial clusters. However, availability of large land parcels at relatively low cost, connectivity to multiple markets across states and proximity to industrial clusters has led to the emergence of some tier-2 and tier-3 cities as favoured destinations for the development of logistics parks and warehouses.

Table 0-1 Proposed Logistics Park Development in India

Proposed Logistics Park Developments in India		
Name / Location	Developer	Area (approx acres)
Dronagiri Node, near Jawaharlal Nehru Port (JNP), Maharashtra	Central Warehousing Corporation (CWC) and Hind Terminals Pvt. Ltd	74
DRS Logistics Park, Khajuri, Haryana	DRS Logistics Park	8
DRS Logistics Park, Palwal, Haryana	DRS Logistics Park	15
Kalinganagar Logistics Park, Orissa	Apeejay Infra Logistics Pvt Ltd	30
Haldia, West Bengal	Apeejay Infra Logistics Pvt Ltd	83
MIHAN Road Terminal, Nagpur, Maharashtra	MADC, Sical Logistics	148
Rewas Port Based SEZ, Maharashtra	Reliance Logistics Park	160
Patli, Patuadi Road, Haryana	Adani Logistics Park	185
Navi Mumbai SEZ, Maharashtra	Reliance Logistics Park	395
Navi Mumbai, Maharashtra	Global Logistix Navi Mumbai Investment Company	400
Kona, West Bengal	Unitech-Salem-Jurong, KMDA	108
Reliance Haryana SEZ, Haryana	Reliance Logistics Park	865
Mumbai SEZ, Maharashtra	Reliance Logistics Park	1235

(Source: Johns Lang Lassale Meghraj, *Retail Distribution in Warehousing*, 2009)

Estimated Demand for Freight in DMIC region

The estimation for Freight assessment in the DMIC region has been based on the understanding derived from primary interactions with various Freight Management Companies, 3PL Service Providers, End user companies, Transporters/Fleet Operators and Experts in the Logistics sector. Table below highlights the current volumes of Transportable units in the different IA/IR of the DMIC region as projected from the Industrial Production Forecasts.

The projections for new industrial developments with the induced industrial and infrastructure development through the proposed Investment regions/ Industrial areas in the DMIC region provide a clear understanding of the scale of volumes of production in the different districts, state sub-regions and the individual Investment regions/ Industrial areas of DMIC. This combined with the current volumes generated, provide a trend for the amount of corresponding Freight generated in the future horizon. For a spatial assessment, Map below provides the location attributes to the scale of production from manufacturing in the focused sectors in different districts of DMIC.

been converted to transportable units (Million Trucks) and finally to Million TEU in order to assess the desired capacities for new Logistics facilities as shown in Table

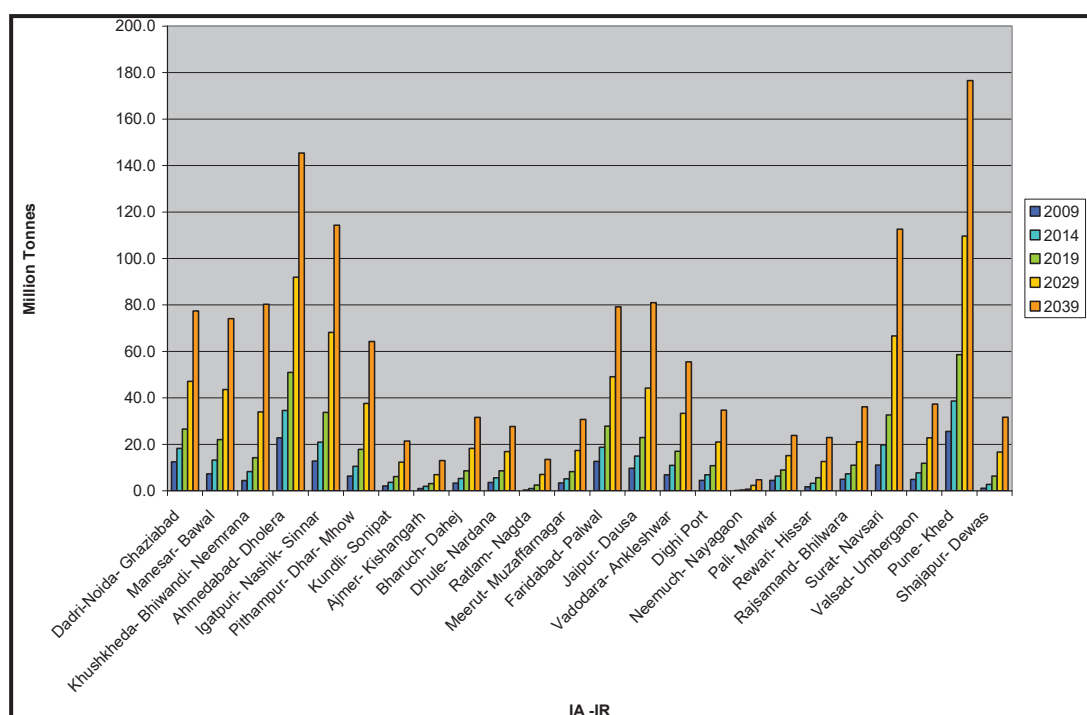
It would be appropriate to delineate major zones of production in the DMIC region than to do specific analysis for each IA/IR as this is a Micro level study, to be conducted in the Development plans for each of the IA / IR of the identified 24 nodes. The domestic consumption of freight, the domestic flows for each Logistics facility would be dealt with in these 24 Development plans and cannot be ascertained in this Macroscopic study. The Perspective plan would broadly identify the total Cargo volume generation in different regions of DMIC spatially, the industrial area/Investment regions have been further clustered for Cargo volume analysis and the catchment is delineated taking the following criteria:

- IA/ IR lying in close proximity
- Currently using common Logistics facilities
- Potential to club for allocation of new Logistics facilities with the proposed transport infrastructure.

Table 0-2 Clusterisation of IA –IR

No.	Cluster	IA- IR	District
1	NCR	Dadri-Noida- Ghaziabad	Gaziabad, Gautam Budh Nagar
	NCR	Meerut- Muzaffarnagar	Meerut, Muzaffarnagar
	NCR	Faridabad- Palwal	Faridabad
2	MANESAR BAWAL	Manesar- Bawal	Gurgaon
	MANESAR BAWAL	Khushkheda- Bhiwandi- Neemrana	Alwar
	MANESAR BAWAL	Kundli- Sonipat	Sonipat
	MANESAR BAWAL	Rewari- Hissar	Rewari, Hissar
3	CENTRAL CLUSTER	Ajmer- Kishangarh	Ajmer
	CENTRAL CLUSTER	Jaipur- Dausa	Jaipur, Dausa
	CENTRAL CLUSTER	Neemuch- Nayagaon	Neemuch
	CENTRAL CLUSTER	Pali- Marwar	Pali
	CENTRAL CLUSTER	Rajsamand- Bhilwara	Rajsamand, Bhilwara
4	AHMDBD	Ahmedabad- Dholera	Ahmedabad
5	VADODRA	Vadodara- Anleshwar	Vadodara
	VADODRA	Pithampur- Dhar- Mhow	Dhar, Indore
	VADODRA	Ratlam- Nagda	Ratlam, Ujjain
	VADODRA	Shajapur- Dewas	Shajapur, Dewas
6	VALSAD	Dhule- Nardana	Dhule, Nandurbar
	VALSAD	Igatpuri- Nashik- Sinnar	Nashik
7	SOUTHERN	Bharuch- Dahej	Bharuch
	SOUTHERN	Surat- Navsari	Surat, Navsari
	SOUTHERN	Valsad- Umbergaon	Valsad
8	DIGHI	Dighi Port	Raigarh
9	PUNE	Pune- Khed	Pune

Figure 0-6 Cargo Volumes forecast in different Clusters of DMIC region



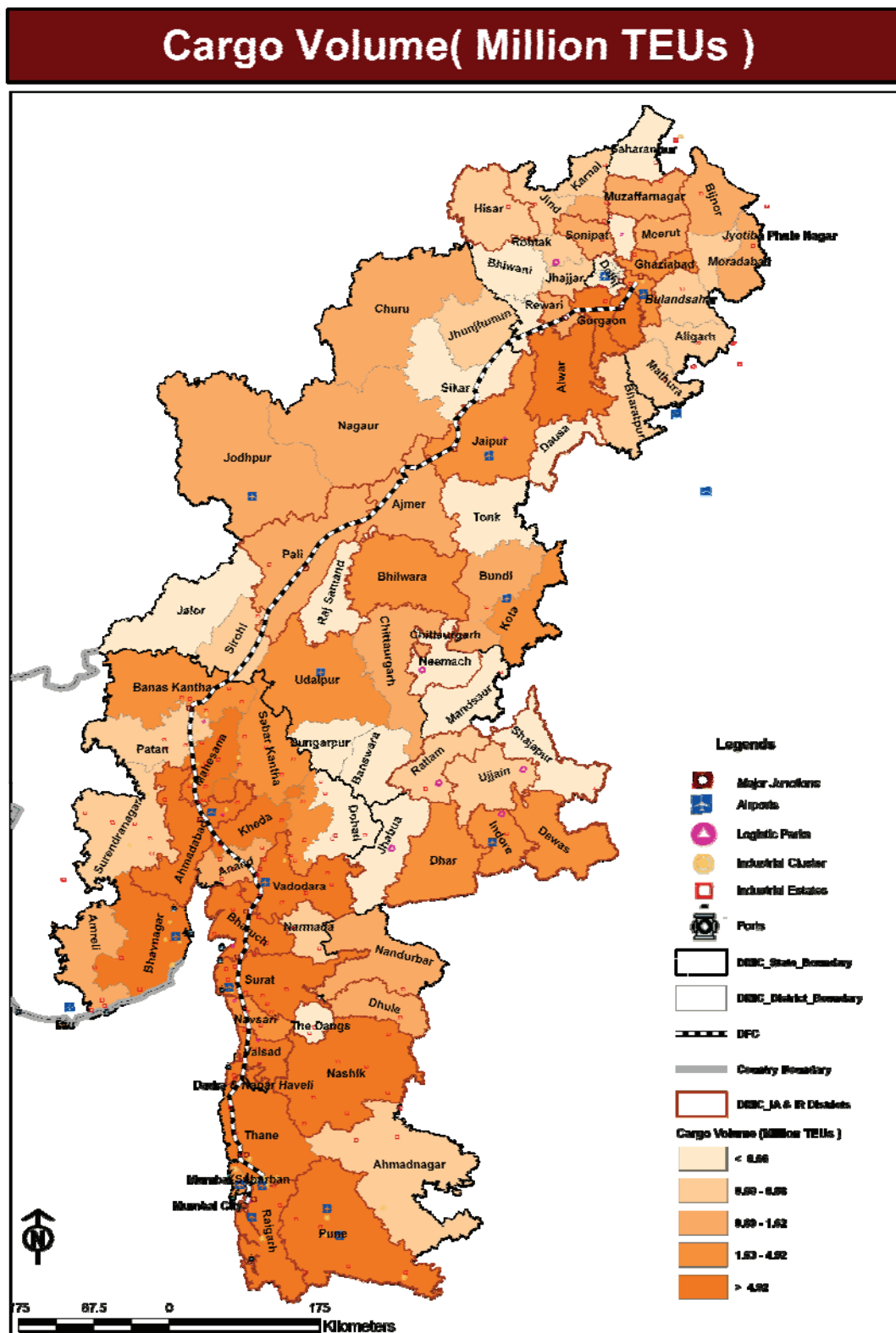
The total export volume has been assessed in the port section. The total production volume for the overall DMIC region has been assessed and summarized below.

Table 03 Cargo Volumes Forecast in different Clusters of DMIC region

										Production
	NCR	Manesar-Bawal	CENTRAL	AHMDBD	VADODRA	VALSAD	SOUTHERN	DIGHI	PUNE	Total Trucks
2014	3777606	3076705	2981202	6849979	10388730	2692751	10328751	2982358	3861990	46940071
2019	5571408	5054361	4517021	10212406	16526754	4240900	16768380	5117406	5873152	73881789
2029	10060843	9782071	8044545	17355830	28213381	7987633	30848614	9197967	10635883	132126765
2039	16525631	17803796	13515789	25708634	40891097	12809006	46884176	13557379	16712733	204408241

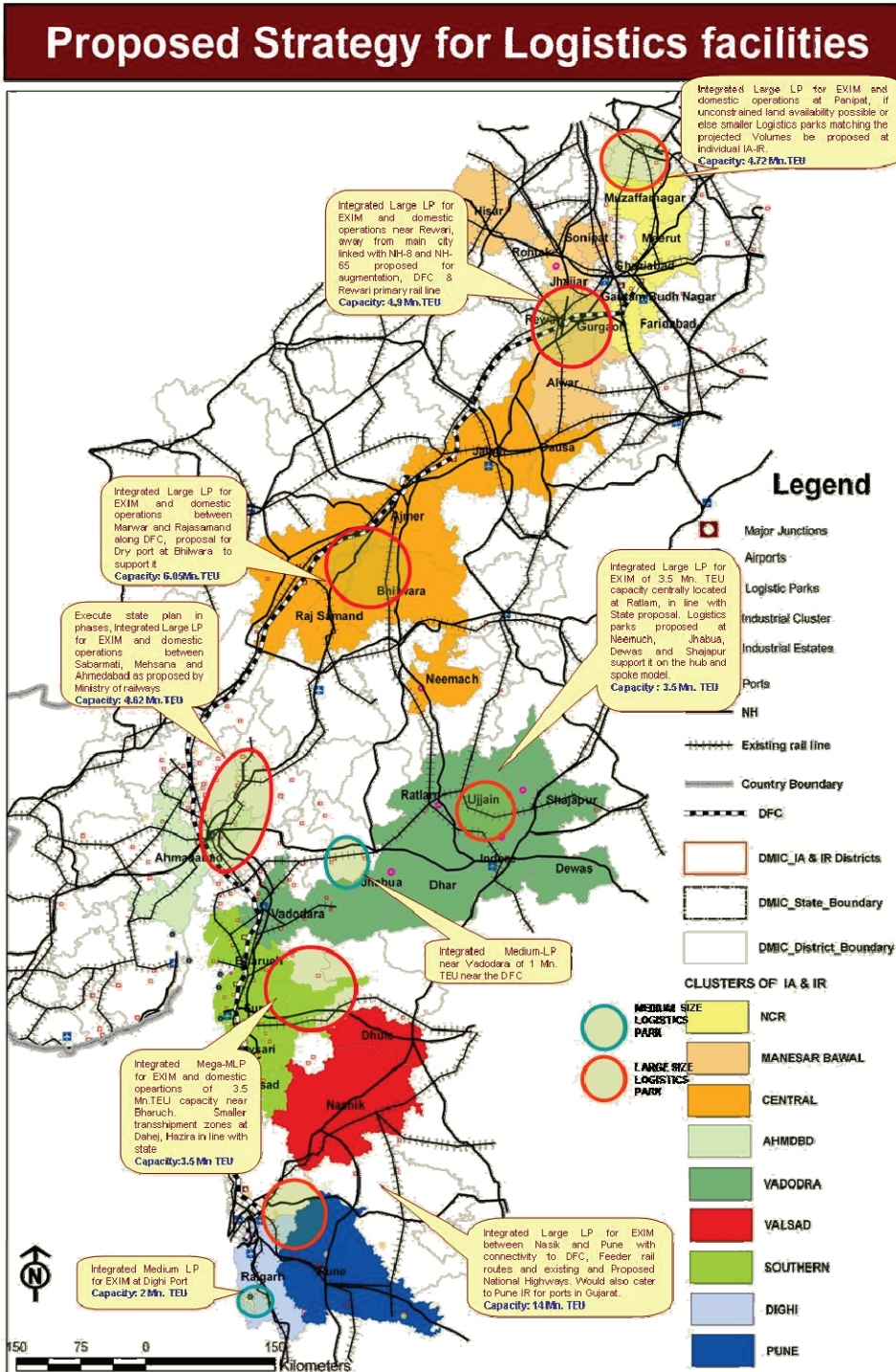
An effort is made to integrate the above facilities; proposed/ developed by the DFCCIL/ Ministry of Indian Railways in the overall Perspective plan based on the estimated freight traffic generation due to induced Industrial development in DMIC region with the introduction for additional facilities for the incremental demand over the base scenario. The other facilities existing and proposed such as Container terminals, Warehousing zones, SEZ, Airport Transit hubs, Distribution logistics parks, etc by Private entities of significant scale with respect to the total capacities have also been integrated. The current trend exhibits that the existing logistics facilities are used for handling freight destined for EXIM, especially for containers. Also, absolute volumes that are produced do not generally reach the ports through a Logistics facility (some are directly transported to the Ports through road). Hence 80 % of the overall targeted EXIM volume from DMIC region has been assumed to be handled in the proposed logistics Parks.

Figure 0-7 Projected Cargo volumes corresponding to Industrial production in 2039 (Million TEU)



The suggested Logistics facilities have been broadly mapped. Proposed Logistics facilities have to be further explored with respect to the proposed Highway/ Expressway, New Ports and Rail network by the IR/ IA Master Planners in detail keeping the parameters of:

- 1) Accessibility to DFC/Feeder rail network,
- 2) Access to existing key National highways,
- 3) Ability to serve maximum catchments area and
- 4) Not to compete with existing and already proposed facilities, rather should be able to compliment them.



1.10 POWER

Resources and Concept Plan to meet Additional demand in DMIC Region

a) Resources & Potential

The additional power and energy needs of the DMIC Region shall be largely met by power purchases from generation schemes set up within the DMIC Region or elsewhere through power purchase agreements by the DMIC Authority as per modalities for transfer and transmission through the mechanism notified by state and central regulatory commissions. The detailed power demand projections for the country for preparation of 12th Plan (2012-17) are to be soon taken up by the CEA as a part of the preparation of the next National Electricity Plan. In a similar manner the CEA is expected to take note of and provide for the required generation and transmission capacity to meet BIS generated additional demand for Power and energy. However, the detailed plans of the power consumption by the industrial and allied developments in the DMIC region will need to be shared with the CEA in consultation with the concerned states.

A summary of the resources and their contribution to creating an in-house generating capacity within and outside DMIC Region to meet the additional Power/ Energy demand in the DMIC Region from various fuel mixes is as follows:

- Up to 25 to 30 % from Hydro generation mainly in the North and North- East regions; besides within DMIC Region in Gujarat & Madhya Pradesh.
- Up to 50% from super thermal and Ultra Mega Power Projects located at coal pit heads in Madhya Pradesh & Lignite deposits in Rajasthan & Gujarat and imported Coal based UMPPs located near the Ports in Gujarat & Maharashtra.
- About 10% from Nuclear Power Plants to be located near the sea coast or in the interiors of Rajasthan, Madhya Pradesh & Maharashtra.
- Up to 5- 10% from Natural Gas fuelled power plants located within NCR and other heavy load centers.
- Balance 5- 10% from non- conventional and Renewable energy schemes (Wind & Solar Energy, etc.) located in the resource rich states of Rajasthan & Gujarat and Mini Hydro/ run of the river schemes in riverine states of Madhya Pradesh & Gujarat.
- It is recommended to mandate that all Industrial, domestic & Commercial Units in the DMIC Region shall be required to use Solar and Other locally available natural resources for meeting major requirements of lighting, heating and cooling of the buildings and premises.

b) Strategies to meet shortages and Peaking

Despite the failure to achieve the planned targets, power shortages during the 10th Plan period were in the range of 11.2-13.5% in peak times and 7.1-9.9% for energy supplies overall. The economy has registered a growth of 9% during this period. The utilities have, by and large, spared the industries from power cuts by restricting the hours of supply to agriculture, grouping agricultural loads and restricting supply hours in rural and semi-urban areas. This strategy could address any future power shortages to industry in the BAU/ BIS scenarios; but it is intended to plan for full Peak Power demand and energy requirement in the DMIC Region.

c) Captive generation

DMIC States are bound to face power shortages in the beginning of the plan on the pattern of power supply position in the state concerned before the planned program & schemes specifically designed to alleviate the shortages in the DMIC region start getting materialized. Some of the processes in the potential industries & Business that are projected to grow in this

region shall also need process & stand by captive power. It is also advisable for certain industries with steep & high power peak requirements to meet the base load from the grid and the peak load from its own captive generation. The captive generation is therefore likely to play important role not only in taking care of initial shortages but also for other techno-economic reasons. Initially the requirement of total captive generation and Group Power Plants (GPP) is assessed at a little over 10-15% of Industrial Demand in the entire DMIC Region. The Captive Generation Capacity required only for process & peaking is bound to come down to 2- 5% of total demand in the IAs/ IRs after stabilization of DMIC specific power generation & Transmission schemes.

d) Additional Generation Capacity Dedicated to BIS Induced Demand

Major demand for additional power induced by BIS scenario shall be met through inter regional transmission of surplus power from north east region of India. Besides the following power plants shall be installed dedicated to cater for the additional BIS induced demand within DMIC region itself. Normal demand in BAU scenario shall be taken care of through National Electricity Plans.

Table 0-4 Dedicated power plants for DMIC Region

S.No	Name of Power Plant	Location	Capacity (MW)
Nuclear Power Station			
1	Mega Power Plant	Fatehabad (Haryana)	2800
2	Mega Power Plant	Kota (Rajasthan)	1400
Thermal Power Station (Coal / Lignite)			
3	Ultra Mega Power Plant	Udaipur (Lignite)	3960
4	Ultra Mega Power Plant	Alibagh (Imported Coal)	3960
5	Ultra Mega Power Plant	Satpura (M P Coal fields)	3960
6	Ultra Mega Power Plant	Daman (Imported Coal)	3960
7	Mega Power Plant	Dewas (M P Coal fields)	1320
Gas Power Stations			
8	Mega Power Plant	Palwal	2100
9	Mega Power Plant	Gandhi Nagar	2100
10	Mega Power Plant	Surat	2100
11	Mega Power Plant	Dhule	2100
12	Mega Power Plant	Ratlam	2100
Wind Frames			
13	Wind Power Plants	Kutch (Gujrat), Jaisalmer,	2000

		Jodhpur	
Solar Power Fields			
14	Solar Power Plants	Barmer, Jaisalmer, Jodhpur, Sikar, Jhunjunu, Jalor	2000
Total			35860

e) Transmission System Augmentation

Transmission Plan geared to meet BIS induced additional requirement of transmission capacity shall similarly be part of National Electricity Plans developed from time to time by CEA. However, as part of concept for a system dedicated to DMIC Region for additional transmission capacity, it is proposed to lay one (or two) high capacity backbone super feeder(s) of 765 KV or one super feeder on next higher voltage with multiple upload/download and distribution nodes to run along the proposed NWC-5 (Delhi Kota- Dighi) Transit Corridor as identified in Transportation Strategy. The backbone super feeder may connect through transmission inter connectors from proposed Generation Units in the area for uploading and through 400KV/ 220 KV local transmission systems for downloading of power to the individual IAs / IRs in the DMIC states. The first backbone super feeder should be ready for operation by 2014- 17.

Conclusions

It is to be kept in view that the electricity Generation units and Transmission networks of all the states/region are interconnected. Any changes in the spatial distribution of loads that may arise could be met by suitable changes/modifications to the transmission systems. DMIC Region Specific Projections only have limited utility in planning generation and transmission network dedicated to the region; but the National Electricity Plan ought to take care of the fresh/ additional demands generated in BIS scenario.

Recommendations

For the supply of adequate and quality power to meet the energy requirements in DMIC region we recommend the following:

- DMICDC should feed the power demand forecasts into the next National Electricity Plan, (2012-17) to be prepared by Central Electricity Authority (CEA) and continue to follow the procedure in future.

1.11 WATER

The detailed profile of ground water and surface water in the DMIC Region has been outlined. Conclusions could be drawn at State level sub regions of DMIC as the following:

1. Gujarat:

- a. Major uses for domestic and irrigation from Ground water are likely to leave hardly any balance for industrial use. The state policy of Gujarat would need to allocate water for industrial use from the resources for irrigation depending upon the priority and requirement in the investment regions of Gujarat.
- b. There is considerable salinity in ground water resources in many districts, which will also require treatment for fluorides and other minerals.

- c. The existing utilizable surface water resources in Gujarat are not sufficient to handle the annual industrial demand. A long term plan needs to be adopted to fulfill the industrial water demand by the year 2039.
- d. The districts of Ahmadabad, Banas Kantha, Gandhinagar, Mahesana and Patan are over-exploited with respect to Ground water sources. This factor should be considered for deciding the location of the water intensive industries in the DMIC area of Gujarat and the economic analysis of such industries. It is also suggested to restrict the use of ground water in such areas.
- e. There should be greater emphasis on water provision through canals. The water from projects like the Sardar Sarovar project should be utilized judiciously.
- f. The water demand should be met after a conjunctive use of surface water and ground water (where available). The development should take into account the increase in the costs due to scarcity of water in some regions.

2. Haryana

- a. Major uses for domestic and irrigation from Ground water are likely to leave hardly any balance for industrial use. The state policy of Haryana would need to allocate water for industrial use from the resources for irrigation depending upon the priority and requirement in the investment regions of Haryana.
- b. In spite of availability, Bhiwani, Gurgaon, Hissar, Jhajjar, Jind, Mahendragarh, Rewari, Rohtak, Sirsa and Sonapat cannot depend much on ground water due to high salinity and also it can be utilized only after treatment for fluoride.
- c. Inland Canals are the main source of water for the state of Haryana. The surface water from the river basins is not sufficient to address the industrial water demand.
- d. The Indira Gandhi Nahar project serves as the surface water resource to the state of Haryana. A well spread network of the western Yamuna canals also provide surface water in the region
- e. There is the need for immediate action as well as a long term plan for utilization of water resources to maximum extent practicable.

3. Madhya Pradesh

- a. Indore, Jabua, & Ujjain districts cannot depend much on ground water due to salinity influx.
- b. Dewas, Dhar, Mandasaur, and Shajapur districts should resort to limited use of ground water and that too, after treatment to reduce fluoride content.
- c. Artificial Recharge of Ground Water is recommended throughout the region.
- d. The surface water availability in the DMIC region of M.P. for Industrial water allocation is sufficient to cater to the needs of industries in DMIC.

- e. Indore District has to depend totally on surface water. Indore Industries have to survive by extensive water saving techniques within the individual industries and also use more ground water, increased through artificial recharging of ground water.

4. Maharashtra

- a. A substantial increase in groundwater abstraction has resulted in limited quantity of stored ground water, accentuated by low and variable rainfall.
- b. Irrigation and drinking water wells are in competition for the same limited resource and increasing over-abstraction has led to removal of the utilizable proportion before the onset of summer and progressive depletion of the water table. Leakage from the shallow aquifers to the deeper ones and increased abstraction from the deeper aquifers is also affecting the stability of water tables.
- c. The DMIC districts in Maharashtra are in the safe region for ground water exploitation except Ahmednagar which is in a semi-critical zone.
- d. Ground water resource in Nasik is contaminated with high salinity and has to depend on surface water.
- e. The ground water source in Dhule can be used only after treatment for Fluoride.
- f. The existing utilizable surface water resources in Maharashtra are not sufficient to handle the annual industrial demand except Dhule & Nandurbar.
- g. It is imperative that the state pursues water conservation measures and the available resources are utilized to the maximum extent practicable. The water resources from Narmada, Tapi, Godavari & Sahyadri basins should be utilized to their optimum levels. The state policy of Maharashtra would need to allocate water for industrial use from the resources for irrigation depending upon the priority and requirement in the investment regions of Maharashtra. The establishment of the Maharashtra Water Resources and Regulatory Agency (MWRRA) is a positive step towards efficient water management in the state.
- h. As in Nashik, recycling of sewage treatment effluent by tertiary treatment is a must for all the water shortage districts so that the tertiary treated sewage can be fed back to the rivers and in exchange gets more water allocated from the Irrigation Dept. for drinking, commercial and industrial uses. Baitarna Project is certain to meet the shortcoming of Mumbai (suburban) and Thane in the long run.

5. Rajasthan

- a. While most of the districts will be fed from the Indira Gandhi Canal shortly, Sikar district has only to depend on ground water as there is no surface water source available now or in the near future. Hence, in Sikar, the ground water has to be fully used after proper treatment against salinity and iron.
- b. Artificial Recharge of Ground Water is recommended in Sikar region

- c. A few districts such as, Churu, Jhunjhunu, Nagaur, and the surroundings have to depend on surface water from Indira Gandhi Nahar, where the total industrial water demand is around 0.322 BCM against an availability of surface water from IGN to the extent of about 0.5 BCM, which is also adequate.
- d. Entire water for Jaipur is being provided from Bisalpur Dam Reservoir on Chambal River Basin and is designed to cater to the ultimate water demand of Jaipur.
- e. Water Saving techniques have to be practiced by all industries.

6. Uttar Pradesh

- a. Although the ground water status in every district shows a good surplus, major uses for domestic and irrigation and slow replenishment are likely to leave hardly any balance for industrial use.
- b. The present industrial status of the state calls for a quantum jump in industrial development, which shall have substantial requirement of water to be used consumptively. The state water policies should account for adequate provision in water resource planning shall be made for industrial use also.
- c. The allocation of water for industrial purposes out of the total available surface water will not be able to meet the increasing industrial water demand.
- d. In spite of availability, Mathura district cannot depend at all on ground water due to salinity influx.
- e. In spite of availability, Aligarh and Muradabad districts should resort to very limited use of ground water and that too, after treatment to remove fluoride and arsenic.
- f. Artificial Recharge of Ground Water is recommended throughout the region.
- g. The industries need to use more ground water and also practice extensive water saving techniques to survive.
- h. Mathura District has to depend totally on surface water. Hence Mathura Industries have to survive by extensive water saving techniques within the individual industries.

In order to tackle above recommendations, state level interventions are required which is also reflected in state policy. Drinking water demand is/should be the top priority. The state water policies should allow for allocation of water to the industrial sector from the irrigation sector in order to meet the rising industrial demand. Maharashtra already has a pro- industrial policy for water allocation, and it would aid in water augmentation if other states in the DMIC region follow suit.

WATER SYSTEM INFRASTRUCTURE NEEDS

Water systems are faced with ever increasing costs associated with providing safe and adequate drinking water to its customers. Compliance with numerous and complicated

drinking water regulations is costly especially to smaller systems. Larger systems are faced with aging infrastructure, especially distribution systems.

Requirements

- Need to create infrastructure for sustainable water supply
- Conserve fresh water by watershed development through PPPs
- Revegetation to improve water storage, agriculture productivity and creation of jobs
- Legislation to ensure withdrawal of water in appropriate quantities.
- Recycling of industrial effluents and domestic sewage
- Small scale industries which contribute majorly to the problem of pollution should be offered incentives for proper treatment of water
- Key ingredients for successful water management are awareness, appropriate technology, training in operation and maintenance, approval mechanisms, finance availability, transparency and accountability

Recommendation for DMIC Region Water Resource Infrastructure up gradation

- Large Scale Industries should determine the adequacy of the water system supply and keep adequate storage to provide acceptable service during non-supply periods.
- These systems should determine their water usage and conduct a water audit on an annual basis.
- Large Scale Industries that are approaching their capacity should prepare a capital improvement plan that ensures the sufficient capacity will be available for a planning period of 30 years.
- Industries should be prepared to accept enhance water tariff.
- Reuse and recycling of water: Two distinct advantages –
 - Reduction of pollution in the receiving water bodies.
 - Reduction in the requirement of fresh water for various uses. In case of some of the industries, effluent can be treated in the premises and reused for the industry's cooling water, horticultural and floor washing systems.

1.12 ENVIRONMENTAL ISSUES

Previous urbanisation and industrialisation in India has not been achieved without severe impacts on the environment. Thus, for example, New Delhi and Mumbai fail to meet World Health Organisation standards for air quality. The development of the DMIC needs therefore to pay more consideration to environmental issues. This is important not only in the context of climate change and the health and welfare of citizens but also in attracting foreign direct investment and in participating in the new technologies emerging to address the environmental imperatives. We recommend that:

- At least three of the IRs/IAs and associated integrated townships be planned and designed as exemplar eco-developments in accord with emerging international best practice.

- Master plans for the individual IRs and IAs:
 - Maximise development on previously developed or waste land and minimise the use of productive agricultural land

 - Maximise the provision and efficiency of public transport in order to limit the growth of car traffic, control pollutant emissions and safeguard air quality.

 - Make adequate proposals for wastewater treatment, minimise water consumption, encourage rainwater harvesting and reuse of grey water.

 - Make adequate proposals for solid waste management, minimise solid waste, encourage waste sorting, reuse, recycling and the use of waste to generate energy.

 - Consider existing rural land uses, tree cover and drainage, maintain existing ecological systems and to provide adequate green space and tree cover.

 - Consider the likely impacts of climate change and plans adapted accordingly.

 - Establish detailed design codes covering sustainable construction, building design, densities and layout.

1.13 SKILL UP-GRADATION RECOMMENDATIONS

According to Skill development report of the Planning Commission,

“The huge number of people added to the workforce each year and their low preparedness to avail of the emerging employment opportunities makes the issue of skill development self evident. Of the 120 lakh new entrants to the workforce, the ITIs (private and public put together) are able to handle about 7 lakh only. The rest either are fresh hands – they come into the workforce untrained or are trained by the employer on the job. Some others get trained at an unorganized local shop, but mostly they remain untrained or under-trained.” Another report also mentions that *‘although, every year, India is producing about 300,000 graduates from universities and colleges in majors of science and engineering, it is not sufficient enough to meet the industrial needs.’*

This highlights the central paradox of an army of 'educated' unemployed (and mainly unemployable) persons on the one hand, and an acute shortage of skilled people on the other. Considering these and other aspects, government has identified the following challenges:

- a. Large scale skill development is an imminent imperative
- b. Response to the challenge is urgently required to keep the economy growing
- c. Skill development needs to widen its focus. It must include non-manufacturing skills, apart from the more traditional organized sector manufacturing skills

To address these challenges, the National Knowledge Commission (NKC) was set up by the Hon'ble Prime Minister of India to prepare the blue print and effectively tap the enormous knowledge base of the people of the country to face challenges of 21st Century. NKC has submitted its recommendations on five key areas as Access to Knowledge, Knowledge Concepts, Creation of Knowledge, Knowledge Application and Delivery of Services.

It is obvious that government of India is very concerned and effortful to meet these challenges in the field of education and training. However the DMIC project poses some challenges which are very specific and time bound to the project period. If the vision that - *'Delhi-Mumbai Industrial Corridor is to be conceived as a Model industrial Corridor of international standards with emphasis on expanding the manufacturing and services base and develop DMIC as the 'Global Manufacturing and Trading Hub', infusing worldwide technological advancements to the grass root level of local production sources and upgrade human skills of influencing region and the country.'* - is to be achieved, availability of adequate manpower in terms of quality and volume is very critical. It has to be planned well in advance so that it is available as and when project progress requires.

There is thus an urgent need to upgrade the level of higher education and training particularly in the fields of engineering and management required by the manufacturing and financial industries. In order to address this situation, it may be an effective approach to follow the policies adopted by Singapore and Malaysia. That is, under an open policy, the engineering sections at universities were created and upgraded by utilizing the funding from the official development assistance and private schools, increase the number of higher education institutes accordingly. Hence it is recommended that,

- The establishment of an Industrial Training Board (ITB) in each DMIC state where representatives from the three sectors, namely industry, education or training, and the state government gather to discuss and plan training needs as required periodically.
- State Governments to consider specific training programmes for the unemployed along with training programme in Micro-entrepreneurship

- By the year 2039, the demand for ITI trained workforce will increase by 9 times- i.e., the demand of trained workforce will increase at a CAGR of 7%

Hence out of the total workforce educational background comprising of technical degree, diploma & ITI certificate holders, the ITI trained workforce may be the strategic requirement not only for their requirement in large numbers but also because they would ensure employment benefit to the less educated & marginalized section of local society.

Existing Education break up for Manufacturing Worker (2002)					
	Technical Degree	Technical Diploma	Graduate & Post Graduate	Certificate in Eng Trade/ ITI	Others including Illiterate
Total Manufacturing Workers	8.50%	5.50%	20.50%	10.00%	55.50%

Based on the above assumption, the education requirement for 'Factory Worker' is estimated in the following table on a state wise basis.

Education Requirement of Factory Workers									
	Haryana	Rajasthan	UP	MP	Gujarat	Daman & Diu	Dadar & Nagar	Maharashtra	DMIC Region
2009									
Technical Degree	42000	27604	30259	9338	76587	8595	5967	69632	269982
Technical Diploma	27176	17862	19579	6042	49556	5561	3861	45056	174694
Graduate & Post Graduate	101293	66575	72977	22522	18471	0	20729	14392	167935
Certificate in Eng Trade/ ITI	49411	32476	35599	10986	90102	10112	7020	81920	317626
Others including illiterate	274233	180241	197572	60973	50006	8	56119	38963	454654
									3
2014									
Technical Degree	66260	43835	50019	21241	12866	1	14492	9639	104112
Technical Diploma	42874	28364	32365	13744	83251	9377	6237	67366	283579
Graduate & Post	159804	105720	120634	51228	31030	0	34951	23247	251093
									7

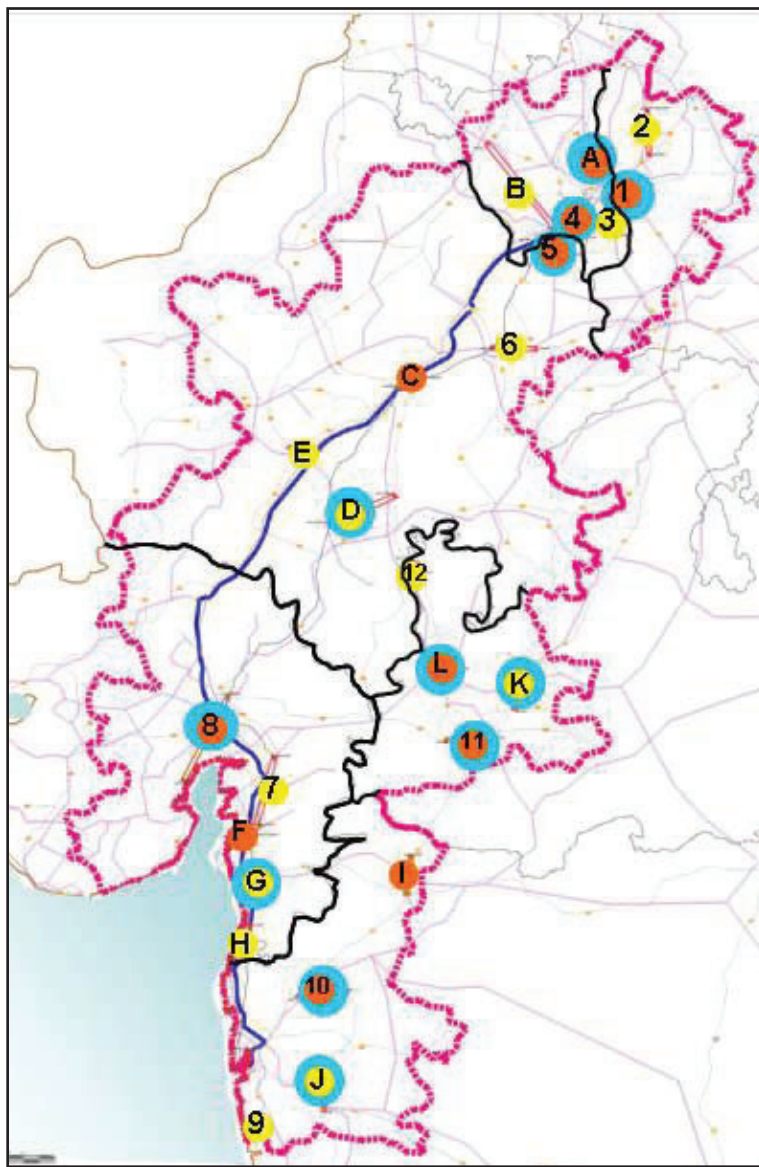
Graduate										
Certificate in Eng Trade/ ITI	77953	51571	58846	24990	15136	6	17049	11340	122484	515598
Others including illiterate	432639	286218	326594	138692	84008	1	94623	62937	679787	286157
2019										
Technical Degree	104767	69618	81098	47942	20699	2	22942	14851	154722	702932
Technical Diploma	67790	45047	52475	31021	13393	6	14845	9609	100114	454838
Graduate & Post Graduate	252673	167902	195589	115625	49921	6	55330	35816	373154	169530
Certificate in Eng Trade/ ITI	123255	81904	95410	56402	24352	0	26990	17471	182026	826978
Others including illiterate	684067	454564	529523	313032	13515	35	149797	96965	1010246	458973
2029										
Technical Degree	206908	136102	162737	124629	41115	7	44950	28520	281262	139626
Technical Diploma	133881	88066	105300	80642	26604	3	29086	18454	181993	903466
Graduate & Post Graduate	499013	328245	392483	300576	99161	3	108410	68784	678339	336746
Certificate in Eng Trade/ ITI	243421	160120	191455	146622	48371	4	52883	33553	330897	164266
Others including illiterate	135098	888664	106257	813754	26846	12	293500	186219	1836478	911678
2039										
Technical Degree	354739	237874	281831	226930	67551	5	73234	46115	442393	233863
Technical Diploma	229537	153918	182361	146837	43709	8	47387	29839	286254	151323
Graduate & Post Graduate	855546	573695	679711	547303	16291	83	176624	111218	1066947	564022
Certificate in Eng Trade/ ITI	417340	279851	331566	266977	79472	4	86158	54253	520462	275133
Others including illiterate	231623	1553175	184019	148172	44107	15	478177	301103	2888564	152698

The above table may not reflect the cumulative requirement, but suggests the changing trend due to DMIC proposal.

Proposed locations for Knowledge Hubs and Skill Development centers

IA/ IR	Knowledge Hub/Skills Dev.
Ahmedabad-Dholera	Knowledge Hub/skill upgradation center at Dholera & Gandhinagar
Surat-Navsari	Chemicals, maritime industry, IT/ITES, Biotechnology sectors and Gems & Jewelry industry
Manesar-Bawal	Centre to support automobile, IT/ITES and engineering
Kundli - Sonapat	Agro-processing, leather technology, carpet and textile industry
Pithampur-Dhar-Mhow	Engineering/textile/apparel Automobile/auto component. Software technologies, agro-processing
Shajapur-Dewas	Engineering / textile, science and technology- Science City
Ratlam-Nagda	Engineering/ textile / apparel Automobile/auto component. Software technologies, agro-processing
Igatpuri-Nashik-Sinnar	Engineering, automobile, wine production, agro-processing
Pune-Khed	Engineering, automobile, wine production/ agro-processing
Khushkheda-Bhiwadi-Neemrana	Nimarana to support auto components, IT/ITES and biotechnology
Rajsamand-Bhilwara	Textile & marble industry
Dadri-Noida-Ghaziabad	Agro-processing, engineering, leather, handicraft, IT/ITES/Biotech

These have been also mapped for understanding a spatial distribution over the region.

Figure 0-8 Location of Skill development Centers

1.14 SPATIAL DEVELOPMENT STRATEGY

International best practice suggests that in preparing the Perspective Plan, alternative strategies should be developed and evaluated leading to the selection of a preferred strategy. However, in the case of the DMIC, decisions have already been taken about the overall distribution of development. The 24 IRs and IAs have been identified on the basis of an equitable distribution among the six states involved. This distribution recognizes the need to promote development not only in those areas which have inherent attractions for investors but also in areas where there is a need for development to address problems of poverty and under-development.

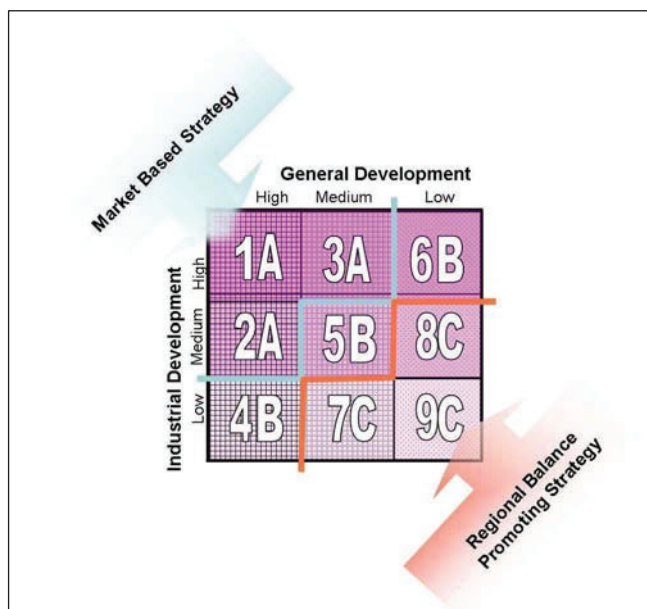
The economic forecasts suggest that development in some IRs and IAs will proceed more quickly and on a larger scale than development in some other IRs and IAs. Investors are likely to choose to invest in areas with an established tradition of manufacturing, with a reserve of

skilled and unskilled labour and with good access to local and international markets. Thus, the established industrial areas around Delhi, Mumbai and in Gujarat are likely to continue to grow. The only obstacle to continued success, given the likely scale of development, is increasing congestion, higher labour, land and housing costs and deteriorating environmental conditions: the problems associated with economic development. Therefore, **Strategy X** will focus on market driven, rapid economic development and seek to ensure that the economic forecasts are met primarily by focusing on the established industrial areas and the potential problems that might arise from over-development.

The Eleventh Five Year Plan takes as its theme "inclusive growth" arguing that there is now a need to address the inequalities in the society and specifically to address issues of under-development in particular regions and in particular sectors of society (e.g. scheduled tribes and scheduled castes). The analysis of socio-economic conditions in the DMIC confirms that there are significant sub-regional inequalities and that the central part of the region, particularly in Rajasthan and MP, is suffering from under-development. The identification of IRs and IAs within this area is recognition of the need for development to address inequalities. Therefore, **Strategy Y** will focus specifically on encouraging and facilitating those IRs and IAs which will make the most positive contribution to inclusive growth. This strategy will seek to intervene in the predicted outcome from the economic forecasts, encouraging more extensive and rapid development in those IRs and IAs in areas in need of development.

Understanding the Planning zones

Broadly the 89 districts have been zoned in three categories A, B and C where,



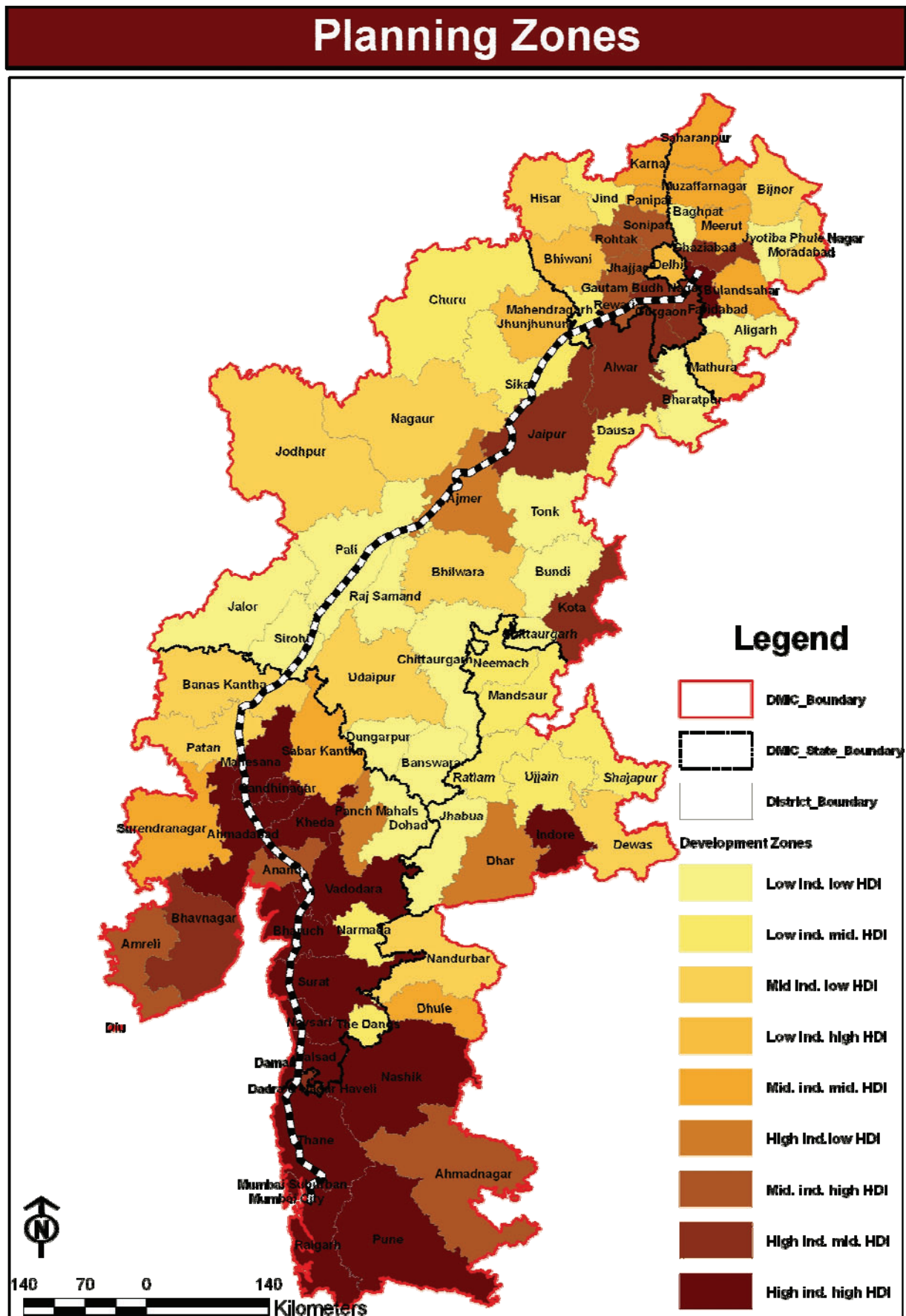
- Zone A consists of 35 districts which have i) high industrial and high general development status (19 districts) along with ii) medium industrial, high general development (8 districts) and iii) high industrial and medium general development (8 districts) status. This zone consists of the corridor from Mumbai to Ahmedabad, Delhi with some adjoining districts up to Jaipur, Kota and Indore – where Strategy X is relevant.
- Zone B comprises of the least number of districts (14) as it has either high and low development combination of the two aspects (5 districts) or both being (9 districts) of medium status. These are the districts of either tertiary sector (service, trade etc) or secondary sector (industries) dominance or equal in both aspects.

and low development combination of the two aspects (5 districts) or both being (9 districts) of medium status. These are the districts of either tertiary sector (service, trade etc) or secondary sector (industries) dominance or equal in both aspects.

- Zone C is a group of those 39 districts where industrialisation and development are low (15 districts), low industrialisation with medium development (12 districts) and low development with medium industrialisation (12 districts). Most of these districts are in the middle of the region under Rajasthan and Madhya Pradesh. Zone wise districts are listed in the following figure and also shown spatially.

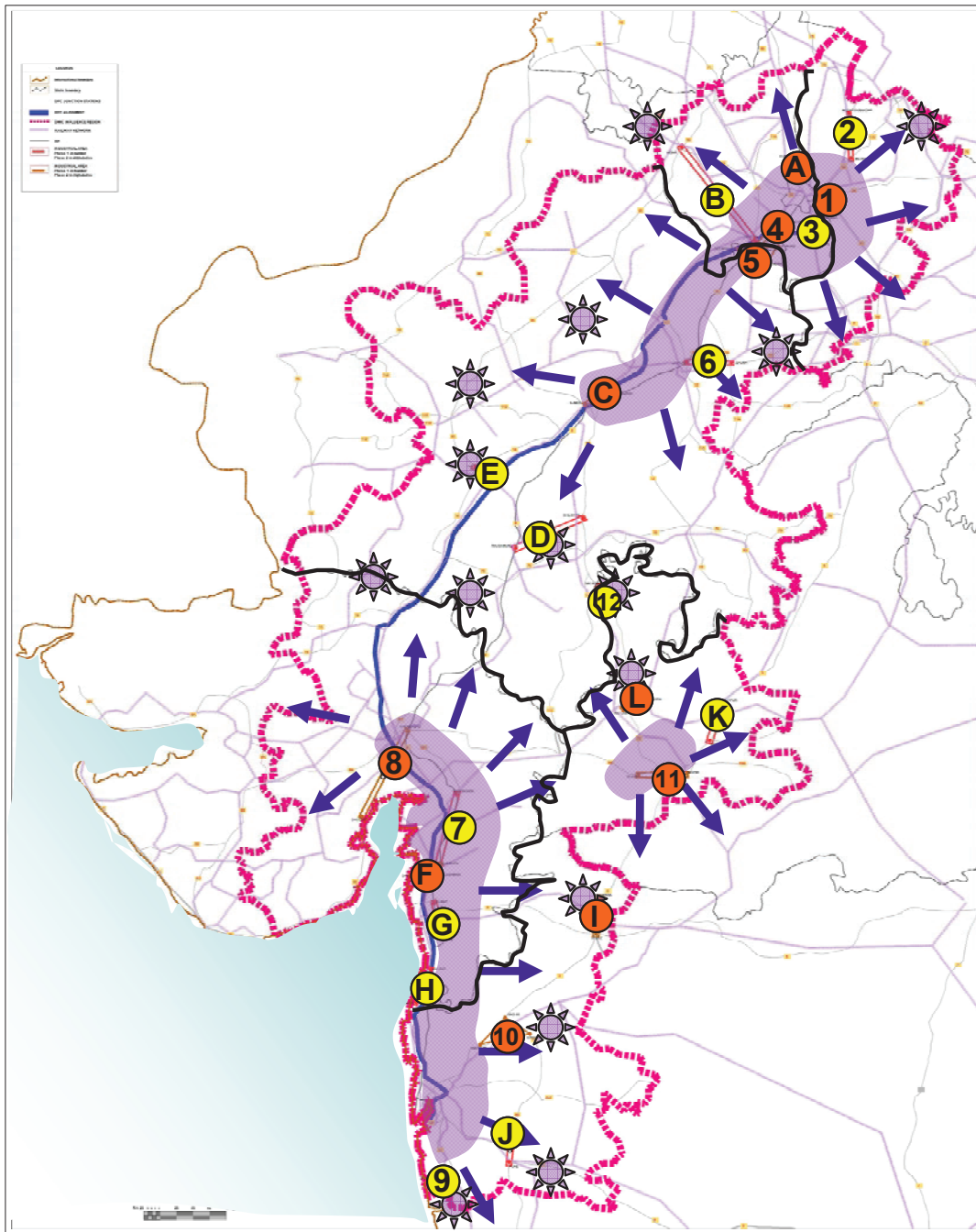
Figure 0-9 Industrial Development Zoning of the districts in DMIC region

HDI		HIGH	MEDIUM	LOW
INDUSTRIAL DEVELOPMENT	HIGH	Navsari Indore Kheda Mumbai Daman Mahesana Mumbai (Suburban) Gautam Budh Nagar Gandhinagar Valsad Nasik Raigargh Bharuch Thane Pune Surat Ahmadabad Delhi Vadodara Total 19	Kota Ghaziabad Jaipur Faridabad Alwar Bhavnagar Dadar & Nagar Gurgaon Total 8	Ajmer Panch Mahals Dhar Total 3
	MEDIUM	Rohtak Ahmednagar Jhajjar Anand Amreli Rewari Diu Sonipat Total 8	Saharanpur Surendranagar Dhule Bulandshahar Karnal Sabar Kantha Muzaffarnagar Meerut Panipat Total 9	Nagaur Bhilwara Nandurbar Patan Jodhpur Udaipur Hisar Mathura Bijnor Banas Kantha Moradabad Dewas Total 12
	LOW	Jhunjhunu Bhiwani Total 2 Zone B	Dangs Sikar Churu Dausa Mandasaur Neemuch Shajapur Mahendragargh Ratlam Narmada Ujjain Jind Total 12 Zone C	Dungarpur Jalore Banswara Tonk Sirohi Pali Rajsamand Bundi Jhabua Bharatpur Dohad Chittorgargh Baghat Jyotiba Phule Nagar Aligarh Total 15



Considering the vision and objectives of the DMIC project as well as the Inclusive approach of the 11th FYP it becomes imperative to adopt a **combination of Strategies X and Y** to harness the market forces for rapid development as well as to have balanced regional development.

In order to address regional disparities in development, we recommend that two Industrial Areas be brought forward from Phase 2 to Phase 1: Rewari-Hissar (Haryana) and Pali-Marwar (Rajasthan). In addition on a policy level the following are recommended.



POLICY FRAMEWORK FOR SPATIAL DEVELOPMENT

- Infilling and expansion of the existing Developed Areas
- Developing New Nodes (Economic Activity Areas)
- Addressing development in the central areas of the DMIC region –i.e. Rajasthan
- Phasing of the IA-IR to supplement above

1.15 LOCATING GREENFIELD MEGACITY

Six districts have been identified across DMIC region for locating potential sites for the Greenfield Township, based on the following key parameters:

- **Industrial potential** : Projected industrial investment & employment
- **Infrastructure** : preliminary mapping of social, basic & industrial infrastructure
- **Population sustainability index** : identified districts from a population perspective
- **Regulatory environment**: policies, incentives, administrative facilitation, etc.
- **Resource availability** : presence of Waste-land & availability of water

The identified Districts with potential for locating Greenfield Mega-city are **(1) Dhar, (2) Pune, (3) Surat, (4) Alwar, (5) Rewari, (6) Muzaffarnagar.**