5 TRAFFIC PROJECTION AND ITS BASIS

5.1 Population Growth

Population growth has a direct impact on railway traffic demand. According to a reliable estimate, Bangladesh has a population of around 144 million in 2006. This indicates a population density of about 1,000/sq.km. Bangladesh is therefore, the world's most densely populated country. Lately, population growth has been decreasing but the density is still continuing to grow.

The population of Bangladesh is expected to grow considerably over the next twenty years. Unofficial forecasts prepared by the Bangladesh Bureau of Statistics (BBS) and the World Bank are shown in Table 5-1.

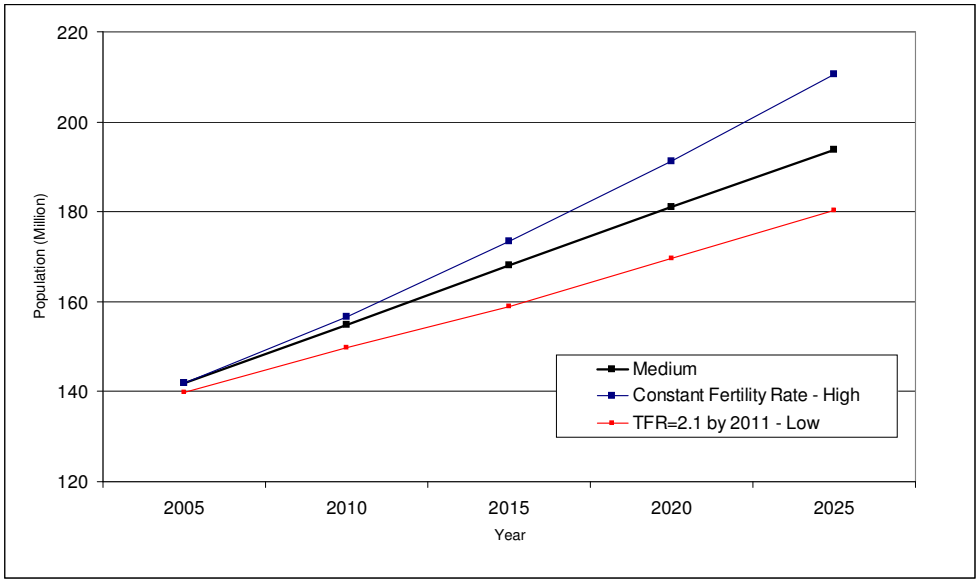
Table 5-1: National Population Forecasts

Year	Medium	High	Low	Constant Fertility Rate	TFR=2.1 by 2011	TFR=2.1 by 2016	TFR=2.1 by 2021
1970	64.9	64.9	64.9	64.9	64.9	64.9	64.9
1975	73.2	73.2	73.2	73.2	73.2	73.2	73.2
1980	82.2	82.2	82.2	82.2	82.2	82.2	82.2
1985	92.8	92.8	92.8	92.8	92.8	92.8	92.8
1990	104.0	104.0	104.0	104.0	104.0	104.0	104.0
1995	116.5	116.5	116.5	116.5	116.5	116.5	116.5
2000	128.9	128.9	128.9	128.9	128.9	128.9	128.9
2005	141.8	141.8	141.8	141.8	139.8	139.8	139.8
2010	155.0	156.5	153.4	156.7	149.7	150.5	151.5
2015	168.2	172.3	164.0	173.4	159.0	161.6	163.4
2020	181.2	188.0	173.5	191.3	169.5	172.2	175.0
2025	193.8	205.4	182.2	210.5	180.2	182.9	185.7

TFR = Total Fertility Rate

The forecasted population growth (Table 5-1) has been shown in graph form in Figure 5-1 below.

Figure 5-1: Population Forecasts adopted for Railway Master Plan



According to further analysis of population growth, over the next 20 years (2005-2025), based on low, medium, and high rate, the growth would be in the order of 27%, 36% and 48% respectively.

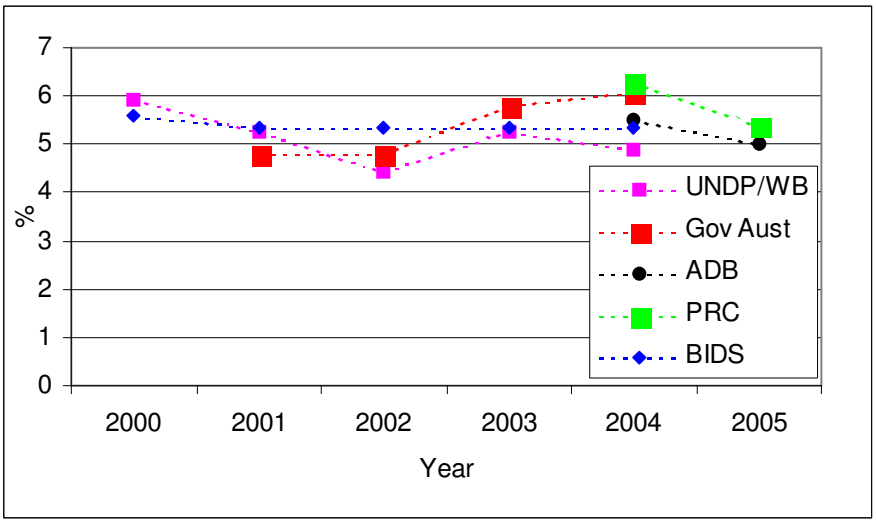
5.2 Economic Growth

A Long-run Perspective Study (1998): "Bangladesh 2020" suggested that the development strategy of Bangladesh must build on the synergies of growth and poverty alleviation, raising the productivity of the poor while instituting reforms that could promote the sectors of highest efficiency. Having achieved average annual Gross Domestic Product (GDP) growth nearly of five percent in 1990s compared to the four percent average of 1980s and Bangladesh had started moving in the right direction, which was clear from the average GDP growth of 5.5 percent per year up to 2007. The report Bangladesh 2020 also added that with a combination of correct policies and strategies over the short, medium and long-term, a seven percent annual average growth rate is quite feasible over a long period and an average growth of eight percent or more is quite possible.

It is important to recognise that there is a close relationship between the growth in rail freight and economic growth, which is measured by GDP. As such, the growth of the economy will have direct impact on transport demand in Bangladesh. From a sector perspective, the recent GDP growth rate is characterised by incremental growth of industry and services. The economy has undergone a major structural change over the last 25 years. Agriculture contributed more than 33% to GDP in 1980, which fell to less than 20% in 2006. On the other side, industry's share increased from 17% in 1980 to more than 28% in 2005. However, industry is expected to be the engine of growth supported by a strong and productive agriculture. Since 1990, industrial production growth averaged more than 7%. The export sector has been the engine of industrial growth, with Ready Made Garments (RMG) leading the way, having grown at an average of 30% over the last few years. Growth rate of the services sector increased from 3.7% in 1990 to 6.1% in 2006. However, growth rate of Bangladesh economy is sinusoidal trends by character.

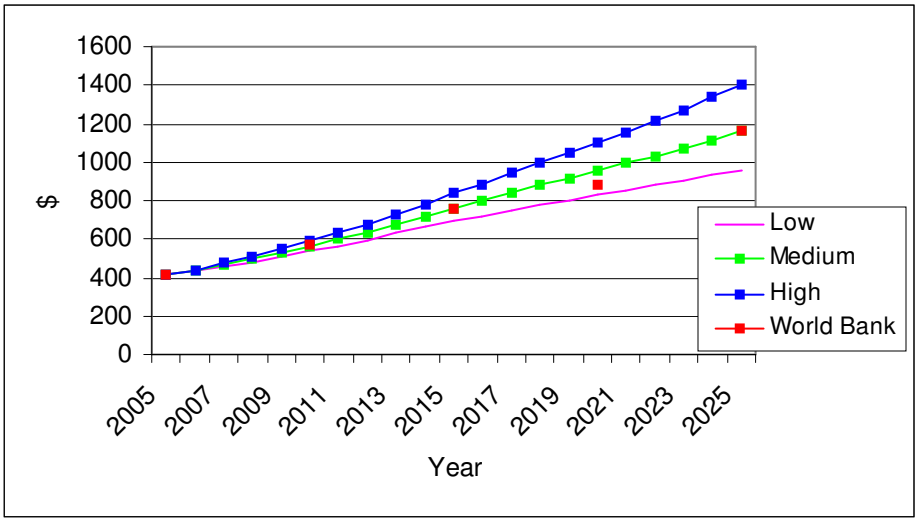
Recent GDP growth in Bangladesh has averaged around 5.5% per year, as shown Figure 5-2.

Figure 5-2: Year on Year GDP Growth, 2000 to 2005



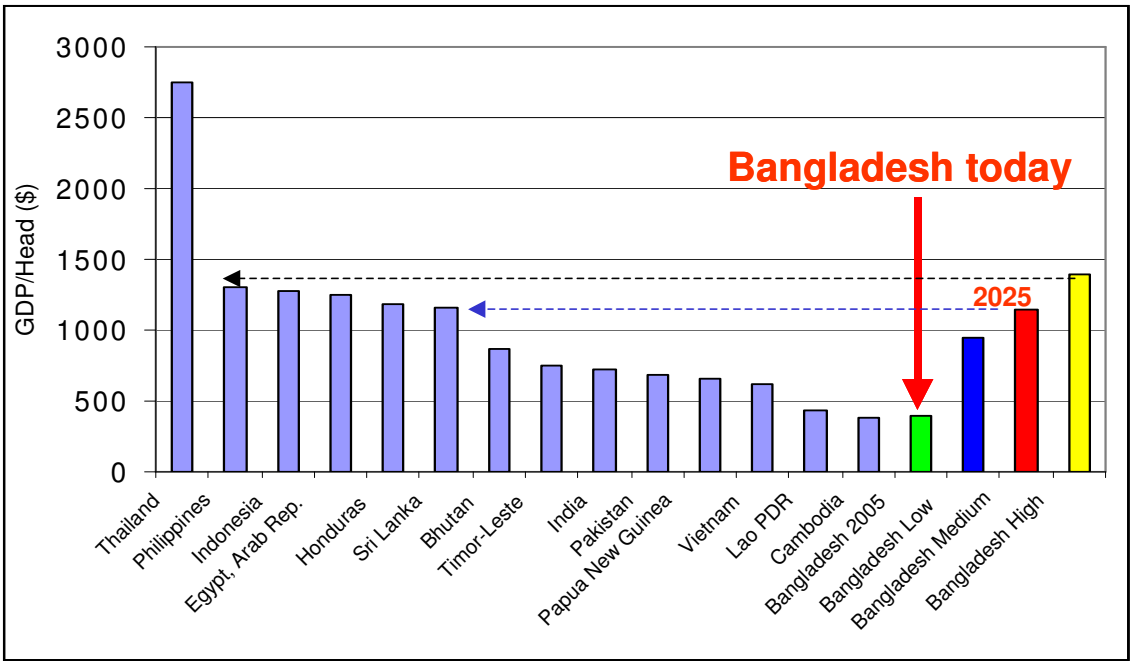
In developing assessments of what future economic growth might be, it was assumed that a continuation of the 5.5% growth would be a reasonable central assumption. This is very much in line with World Bank assumptions. On either side of this, a low of 4.5% per year, and a high growth of 6.5% per year were assumed. The forecast of GDP per capita resulting from these are shown in Figure 5-3.

Figure 5-3: GDP Per capita forecasts ($)



The consequences of these levels of economic growth are seen in Figure 5-4 in which forecasts for Bangladesh in 2025 are compared with GDP per capita figures of 2005, for other Asian countries. The purpose of this is to enable a view to be taken of the *reasonableness* of the forecasts. For example, under the medium growth scenario Bangladesh would in 2025, have the same level of GDP per capita as did Sri Lanka in 2005. Under the high growth scenario, Bangladesh would have the same level of GDP per capita as did the Philippines in 2005.

Figure 5-4: Comparison of Bangladesh Forecast GDP with other Asian Countries



5.3 International Trade

Bangladesh's export performance in the last few years has been impressive. Export earnings increased by about 22% from US$ 8,654.52 million in 2005 to US$10,526.16 million in 2006. On the other hand, import payments increased by 12% from US$ 13,147 million in 2005 to US$ 14,746 million in 2006. This resulted in narrowing down the trade deficit, US$ 4,492.48 million in 2005 to US$ 4,219.84 million in 2006. Export is currently dominated by RMG, which accounts for more than 75% of the country's total export earnings. RMG export earnings increased by about 18% from US$ 6,717.67 million in 2005 to US$ 7,900.8 million in 2006. This increased earning has been only due to significant increase in volume, which more than offset the decrease in unit prices.

In 2005, frozen food including shrimp and fish was the second largest export commodity, accounting for 4.9% of total earnings. In 2006, its share dropped to about 4.4% although earnings increased by 9.2% to US$ 459.51 million – despite fall in unit prices. Jute including raw jute and jute products excluding carpets took over frozen food, accounting for 4.8% (US$ 509.3 million) of total export earnings in 2006. The increase reflects increase in both volume and unit prices.

Export Processing Zones (EPZ) share in both export and import has been significant. Its share in total import payments has been 7.2% of the total in both 2005 and 2006. On the other hand, EPZs' share in export earnings was more than 13% in 2005 and less than 13% in 2006; although, value increased by more than 16% from US$ 1,172.6 million in 2005 to US$ 1,363.2 million in 2006.

The five commodity groups are accounting for 60% of all imports in the recent years. Of them; (i) textiles and articles thereof, yarn and raw cotton accounted for more than 20%, (ii) petroleum oil and lubricants (POL) including crude oil accounted for 13.5%, (iii) capital machinery accounted for 10.4%, (iv) food grains and other food items accounted for 9.3%, and (v) export processing zones (EPZs) accounted for 7.2%. It is however, worth noting here that most of the above noted trading items have implications on railway transport demand in Bangladesh in the form of container traffic and railway oil tanker traffic.

5.4 Private Sector Participation

The current state of railway's performance has arisen largely because of insufficient rehabilitation funds resulting in inefficient operation below – cost tariffs and a relative lack of government or donor support, together with growing competition from roads. Consequently, opportunities for the private sector interest or government own corporate entity will depend to a large extent on reforms in pricing arrangements.

The process of involving private sector in the railway, in fact started since 1997 though computerised seat reservation and ticketing system at designated stations which was introduced from December 1994. To improve the quality of passenger-service, commercial operations of the train-service in different routes have already been privatised. Up to 2006, operations of 79 trains, which include mail-train, express-train and local-train, have been privatised. Moreover, on-board services of 10 inter-city trains have been outsourced to private sector. The private sector participation so far has only been in the form of operation of train rather than the ownership of rolling stocks and other ancillary facilities.

However, Bangladesh Railway is still a publicly owned entity with budgetary support for both train operations and infrastructure investment coming from the government. As such railway

cannot be financially self-supporting either as public or private company. In order to create opportunities for bring in efficiency as well as to attract more private sector involvement in railway, there is a strong argument as favour of separating infrastructure from operation, in the light of the National Land Transport Policy (NLTP) and the draft Integrated Multi-modal Transport Policy (IMTP). In fact, there are several reasons for separation. The first is to reduce unit costs by increasing railway traffic. The second reason is to create intra-rail competition. The third reason is to improve the focus on services provided. The fourth reason is to clarify public policy. By separation of rail infrastructure from operations, the government could target its support to loss making activities of railways. Moreover, infrastructure separation can also help improve the balance between the public and private sectors.

Infrastructure separation means that the operators of transport services work at arm's length from the provider of the fixed facilities. In railways separation can begin with merely keeping the accounts for infrastructure and operations separate, but it can extend to having different entities to own, provide, and control the infrastructure, and an entirely independent set of operators. However, it is true that infrastructure separation is messy and expensive. Operating companies will have to scramble to find customers at the right balance of prices, quality, and costs, competing with other transport modes aggressively, and defending and expanding their market shares in a business climate that demands high-quality, seamless service. Infrastructure agency will have to offer track capacity in a way that permits their only customers-the operating companies-to survive and prosper in a transport market that would happily extinguish rail service. However, the full involvement of private sector in railway operation is necessary to improve the services and to reduce the budgetary burden of the government.

5.5 Review of earlier Forecasts of Passenger and Freight Traffic Growth

A review of the previous studies on railway traffic forecasts was undertaken. The detailed findings of the review are shown in Tables 5-2 and 5-3.

Table 5-2: Passengers Growth Rates from Previous Studies in Bangladesh

Reference studies	Possible growth rates
Jamuna Bridge Railway Approaches Study (1995)	3.3% up to year 2020
Bangladesh Regional Rail Traffic Enhancement Project (2004)	5.0% for Intercity (IC) and 0.0% for local trains
Dhaka-Chittagong Trunk Railway Transportation Capacity Enhancement Project (2006)	5.0% IC, 2.0% Mail/Express, 3.8% average up to year and 2.5% up to year 2021
Feasibility Study for Conversion/Construction of Dhaka-Chittgaong Railway Line into Double Track with Electric Traction (2006)	5.0% up to 2035

Before adopting GDP as the basis for projection of passenger and freight traffic in Bangladesh, an analysis was also made of the GDP and traffic growth relationship in other countries including Advanced and Less-Advanced, as well as India, and compared these with the different types of traffic and different types of commodities to be used in the preparation of Rail Master Plan.

Advanced Countries

A study on 14 EU countries and Finland, using time series data for 1970-1999 found the following:

- GDP grew least among the variables;
- Passenger traffic increased most; and
- From 1990, GDP elasticity of transport for:
    - Passenger dropped from 1.014 to 0.9
    - Freight increased from 0.85 to 1.0

Less advanced countries

A more recent study 'transport connection with socio-economic variables', using 1990-2003 data found GDP elasticity of transport as follows:

- Group 1 countries (Austria, Greece and Italy)
    - Passenger traffic growth rate is 1.0
    - Freight traffic growth rate is 1.01625

Table 5-3: Freight Growth Rates from Previous Studies in Bangladesh

Reference studies	Possible growth rates
Bangabandhu Bridge Railway Approaches Study (1995)	6.0%up to 2020.
Dhaka-Chittagong Trunk Railway Transportation Capacity Enhancement Project (2006)	Container: 12.0% up to 2010, 10.0% up to 2015, and 7.0% thereafter POL: 10.0% up to 2009 and 5.0% thereafter Other freight: 5.0% fertilise, 5.0% food grain up to 2010, 20.0% stone and stone products and 2.5% other freights
Feasibility Study for Conversion/ Construction of Dhaka-Chittgaong Railway Line into Double Track with Electric Traction (2006)	Container: 12.5% up to 2008, 15.0 up to 2010, and 3.6% thereafter Petroleum: 6.7% up to 2008, 5.4% up to 2010, and 3.6% thereafter Other commodity: 6.7% up to 2008, 5.4% up to 2010, and 3.6% thereafter Food grains: 1.3% up to 2035 Fertiliser and declining commodity: 3.6% up to 2035
Improving the efficiency of Transport Logistics in the Dhaka-Chittgaong Corridor (2007) The considered elasticity of the study was1.0.	Textiles and Ready Made Garments: 11.3% for 2004/5-2009/10 and 10.4% at 2009/10-20014/15 Frozen Seafood:11.3% for 2004/5-2009/10 and 10.4% at 2009/10-20014/15 Petroleum Products : 10.5% for 2004/5-2009/10 and 9.75% at 2009/10-20014/15 Jute products: 7.0% for 2004/5-2009/10 and 6.5% at 2009/10-20014/15 Leather and Leather Products: 7.0% for 2004/5-

	2009/10 and 6.5% at 2009/10-20014/15 Chemicals Products: 7.0% for 2004/5-2009/10 and 6.5% at 2009/10-20014/15 Food Grains: 3.5% for 2004/5-2009/10 and 3.25% at 2009/10-20014/15 Edible Oils: 3.5% for 2004/5-2009/10 and 3.25% at 2009/10-20014/15 Fertilisers: 3.5% for 2004/5-2009/10 and 3.25% at 2009/10-20014/15 Other Commodities : 7.0% for 2004/5-2009/10 and 6.5% at 2009/10-20014/15

- Group 2 countries (Bulgaria, Czech Republic, Hungary, Lithuania, Poland, Romania, Slovakia, Slovenia and Turkey)
    - Car passenger traffic growth 1.0155
    - Coach Passenger traffic growth – 1.0168
    - Freight traffic growth (by road) 1.0
- Group 3 countries (Belarus, Bosnia and Herzegovina, Croatia, Georgia, Serbia and Montenegro, Russia, Ukraine and Moldova)
    - Local traffic 1.0125
    - Total traffic including international 1.0168

India

The country is consistently maintaining a robust growth in GDP; and GDP elasticity of transport is assessed to be 1.0125 for freight and around 1.0 for passenger-traffic for all modes of transport.

Bangladesh

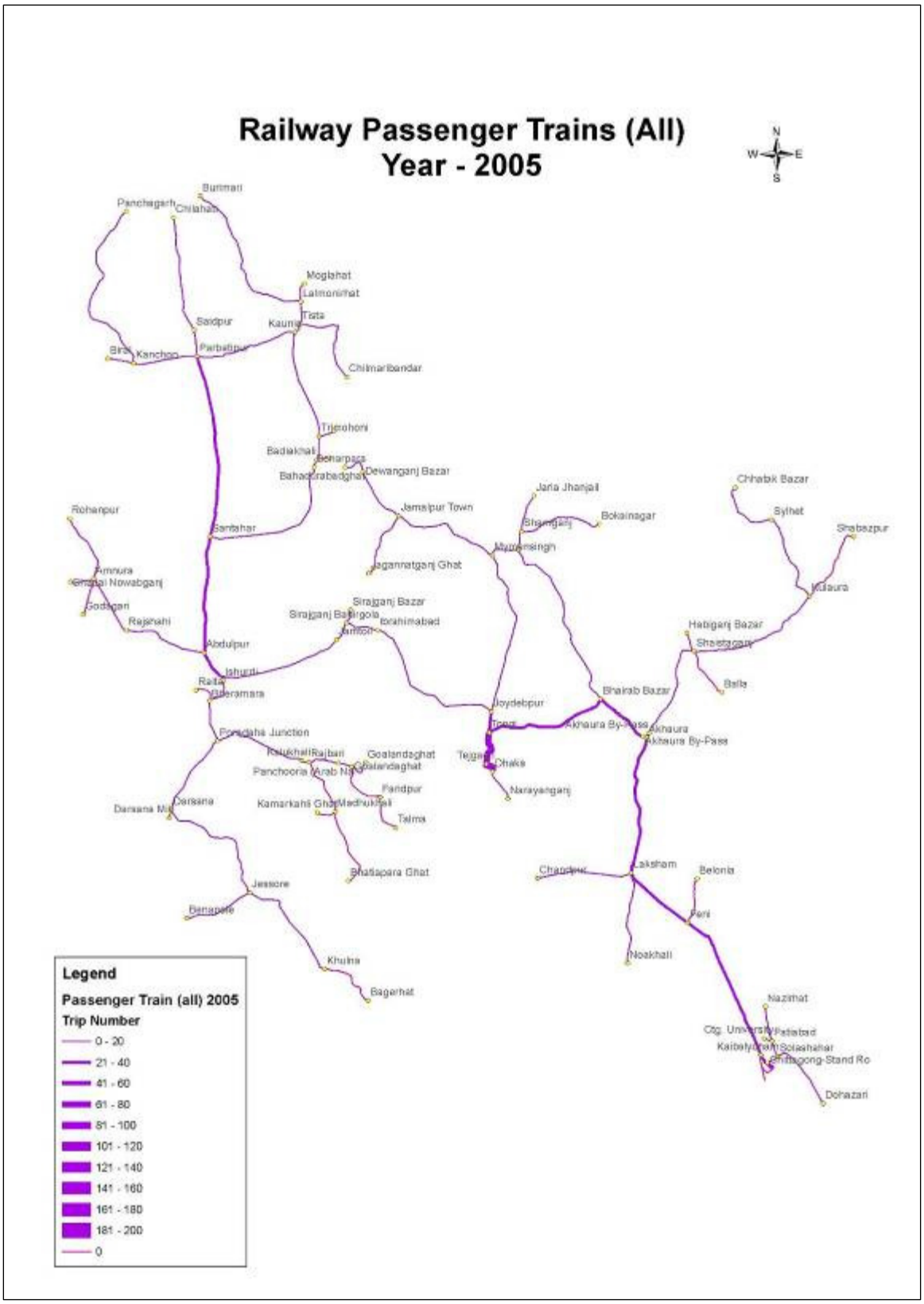
In light of the literature review and an analysis of the BR's traffic information, it was found that the traffic growth varies by commodity type and passenger train classes. Though, there is a correlation between GDP growth and traffic growth, it is expected to vary over time. Table 5-4 shows the overall growth factors by type of commodity and passenger with respect to GDP growth.

Table 5-4: Growth Factors in Respect to Traffic Type and Time horizon

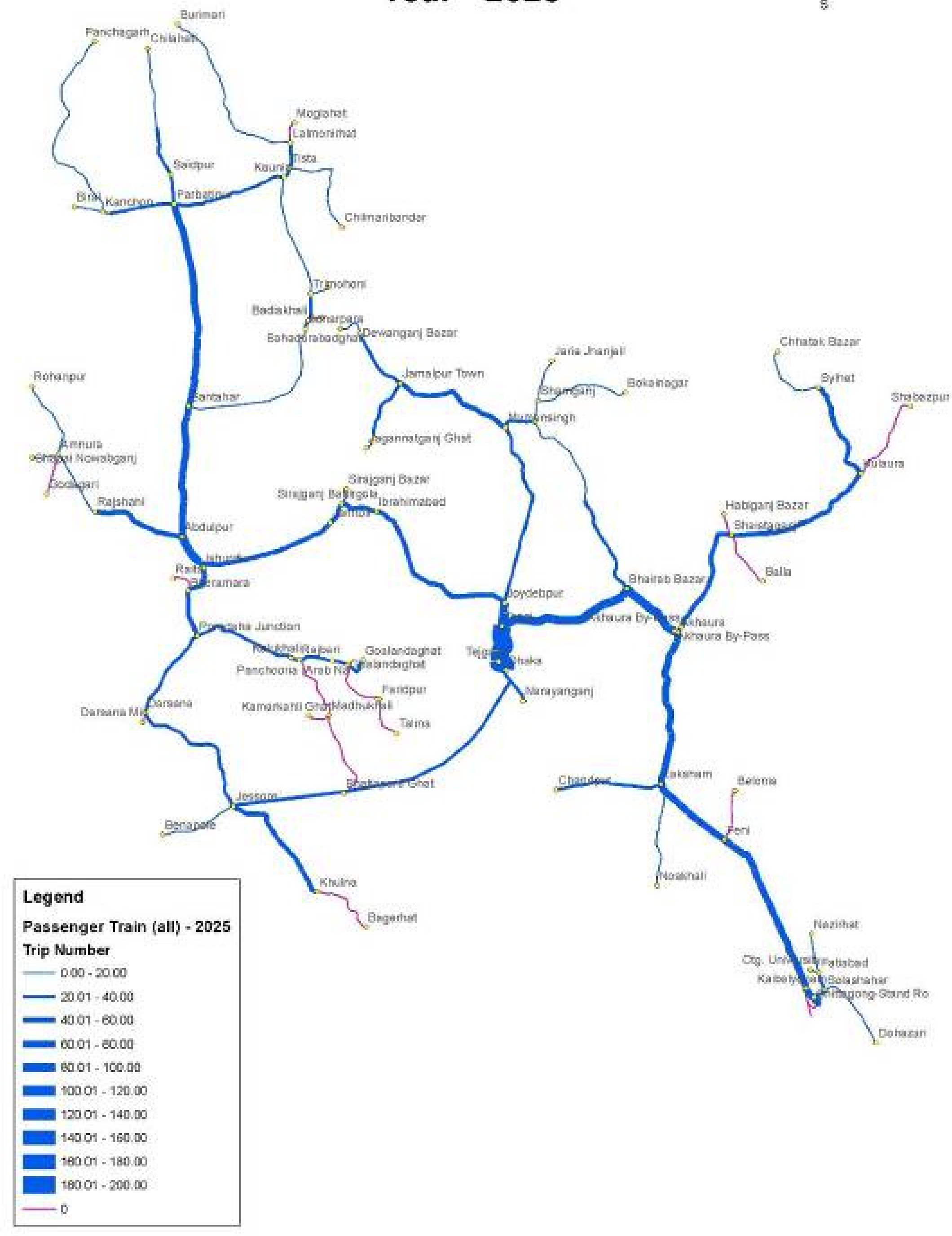
Type of Traffic	Growth factors used in Railway Master Plan
Passenger	
Inter-City train	0.91 up to 2010, 1.09 up to 2020 and 1.0 thereafter
Mail/Express train	0.36 up to 2010, 0.55 up to 2020 and 0.45 thereafter
Local train	0.27 up to 2010, 0.36 up to 2020 and 0.29 thereafter
Freight	
Container	2.05 up to 2010, 1.89 up to 2020 and 1.0 thereafter
Petroleum products	1.22 up to 2010, 1.77 up to 2020 and 1.0 thereafter

Type of Traffic	Growth factors used in Railway Master Plan
Food grains	0.91 up to 2010, 0.82 up to 2020 and 0.55 thereafter
Fertiliser	0.91 up to 2010, 0.82 up to 2020 and 0.55 thereafter
Chemical products	1.27 up to 2010, 1.18 up to 2020 and 1.09 thereafter
Leather & its products	1.27 up to 2010, 1.18 up to 2020 and 1.09 thereafter
Edible oil	0.64 up to 2010, 0.59 up to 2020 and 0.55 thereafter
Stone & stone product	1.82 up to 2010, 1.45 up to 2020 and 1.27 thereafter
Other declining freight	0.55 up to 2010, 0.65 up to 2020 and 0.44 thereafter

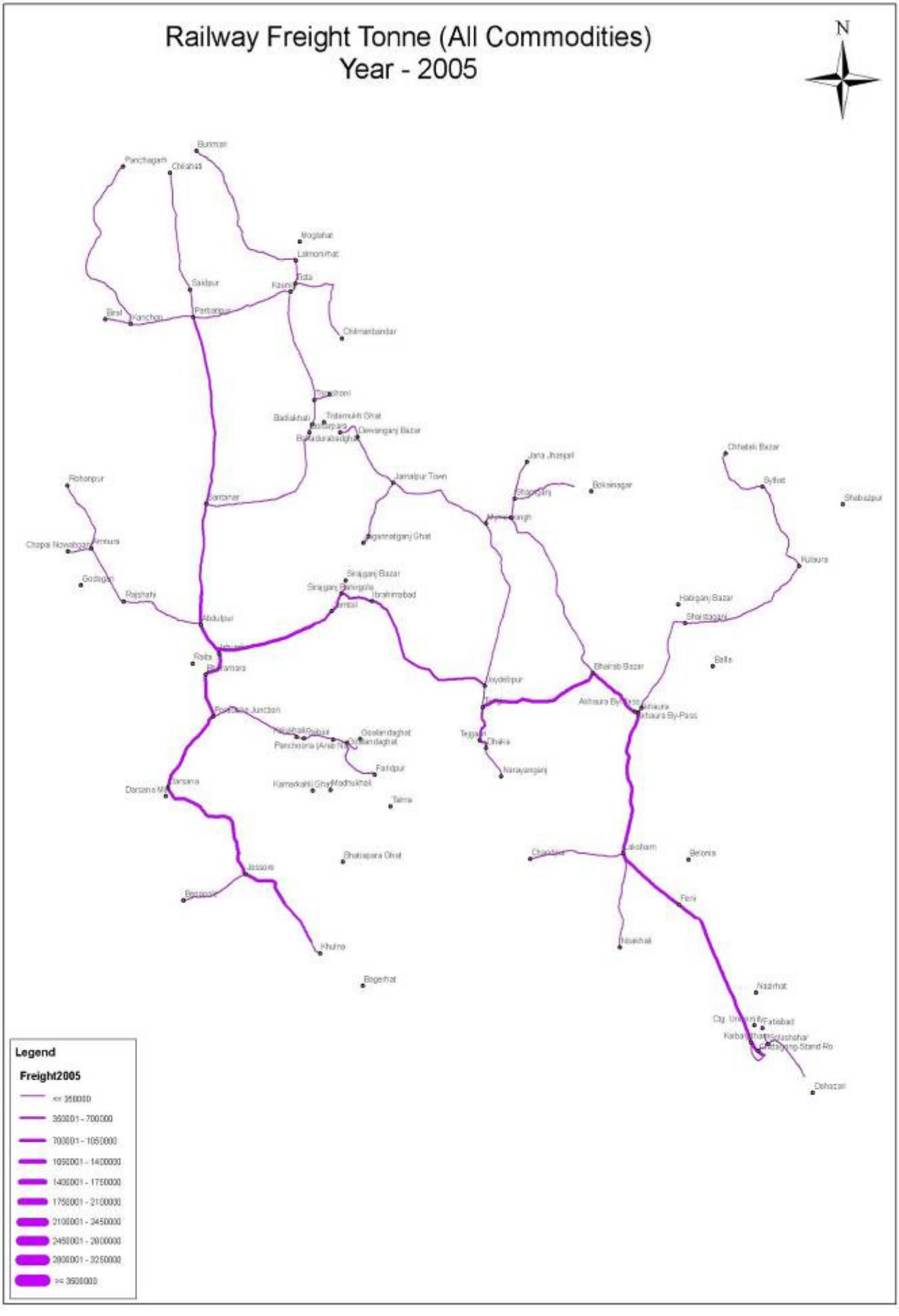
However, the following railway route maps show the passenger train O-D and freight O-D matrix for the year 2005 and projected year 2025. It is found from the year 2025 map, the most important corridor is Dhaka-Chittagong section of Dhaka-Chittagong-Cox's Bazar and followed by Parbatipur-Khulna section of Chilahati-Khulna-Mongla corridor.


Railway Passenger Trains (All)
Year - 2005
N
W
E
S
Burimari
Panchagarh
Chilahati
Moglahat
Lalmonirhat
Tista
Kaunia
Saidpur
Parbatipur
Birol
Kanchon
Chilmaribandar
Tetrohoni
Badarkhat
Benarpara
Bahadurabadghat
Dewanganj Bazar
Rohanpur
Santahar
Jamalpur Town
Jaria Jhanjail
Bhangani
Bokainagar
Mymensingh
Chhatak Bazar
Sylhet
Shabazpur
Kulaura
Habiganj Bazar
Shaistaganj
Balla
Bhairab Bazar
Aricha
Akhaura By-Pass
Akhaura
Tejgaon
Dhaka
Narayanganj
Joydebpur
Jagannatganj Ghat
Sirajganj Bazar
Sirajganj Bazargola
Ishwardi
Ishakhali
Rajbari
Goalandaghat
Pangsha
Pabna
Abdulpur
Rajshahi
Godagari
Amnura
Chapai Nowabganj
Iswardi
Ratna
Beramara
Poradaha Junction
Kushtia
Panchooria
Arab Nagar
Kamarkahi Ghat
Madhukhali
Pandpur
Telma
Darsana Mail
Darsana
Bhatiapara Ghat
Jessore
Benapole
Khulna
Bagerhat
Chandpur
Laksham
Belonia
Feni
Noakhali
Nazirhat
Chtg. University
Kaibalyadham
Patiatad
Solashahar
Chittagong-Stand Ro
Dohazari
Legend
Passenger Train (all) 2005
Trip Number
0 - 20
21 - 40
41 - 60
61 - 80
81 - 100
101 - 120
121 - 140
141 - 160
161 - 180
181 - 200
0

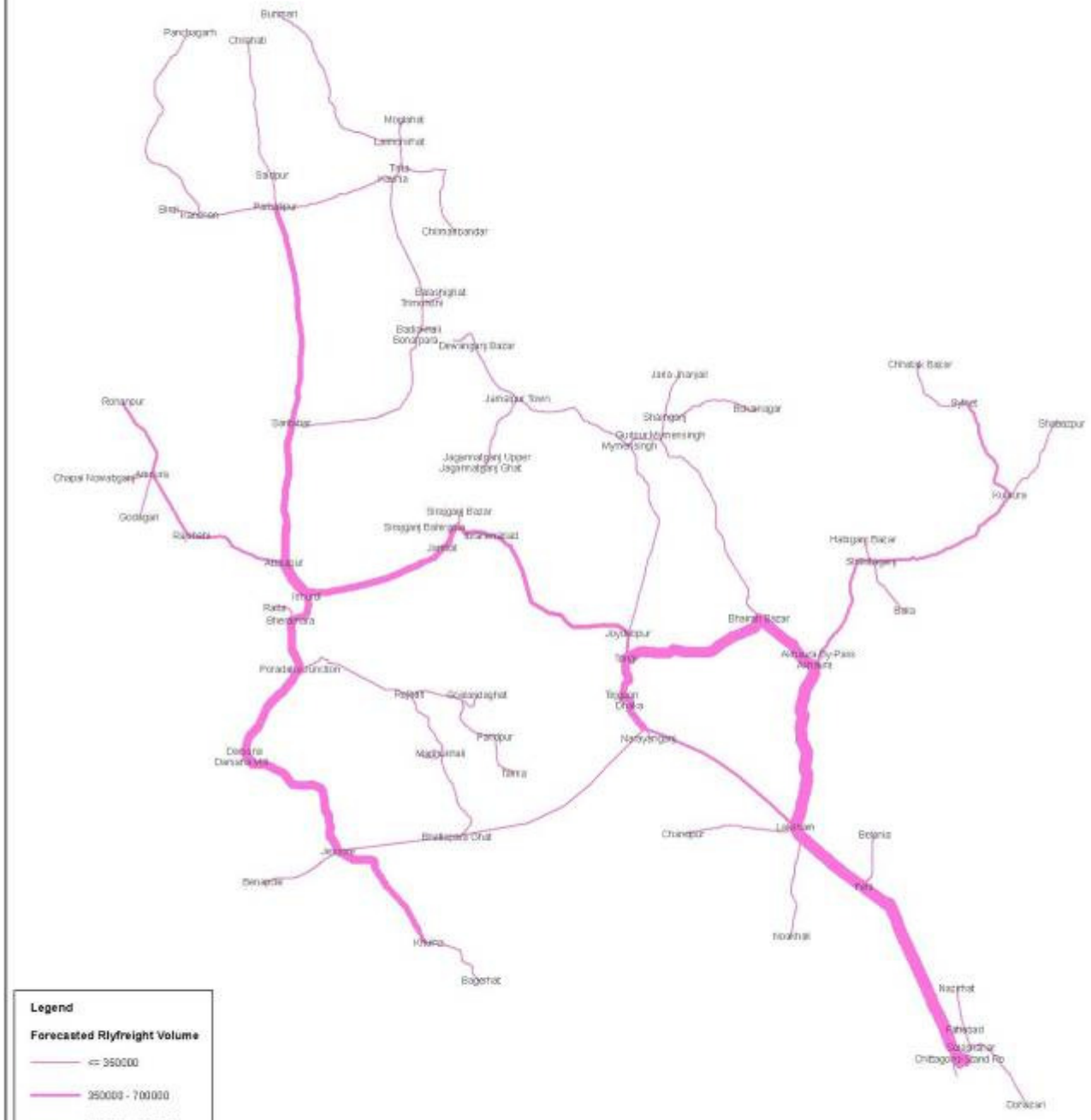
Railway Passenger Trains (All)
Year - 2025



Railway Freight Tonne (All Commodities)
Year - 2005



Railway Freight Tonne (All Commodities)
Year - 2025



Legend

Forecasted Rlyfreight Volume

- <= 350000
- 350000 - 700000
- 700000 - 1050000
- 1050000 - 1400000
- 1400000 - 1750000
- 1750000 - 2100000
- 2100000 - 2450000
- 2450000 - 2800000
- 2800000 - 3150000
- >= 3500000