Karachi Master Plan
2020

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Draft Development Plan

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Karachi Master Plan
2020

FOREWORD AND ACKNOWLEDGEMENT

With its 15 million population and an urban sprawl of 1300 sq km, the city of Karachi is the 7th largest city in the world. Karachi is recognized and valued for its enormous diversity that it represents. With its cultural cross section, it truly represents Pakistan in terms of its ethnic as well as cultural cross section in a unique urbane scenario. The range of dynamics and dimensions that governs this true Megapolise is more complex, than any one city can present. However, this diversity is the strength of the city. Ironically the true potential of Karachi has never been realized, for various reasons mentioned in this Master Plan. The plan suggests the strategies to enhance the quality of life for Karachities, as well as bring equity in living standards, provision of services consistent throughout the city. The strategies, if implemented, will bring synchronization to the urban fabric of city of Karachi.

It has been appreciated that, due to neglect, and inaction, the city has lost its flair and its title as the “Queen of the East” . To regain the national and international prestige, which the city deserve, an overall strategic framework is been proposed, which is flexible enough to adopt to ever changing needs of the city, while comprehensive enough to be implemented as it is. The plan proposes a holistic approach towards improvements, specifically pro-poor polices, suggested changes in the approach to make it more conforming to the ground realities.

The main theme and focus of the study is to create poly centric economic centres and empower them to become sustainable. Equitable distribution of amenities and standard of living.

In order to achieve the desired results, various agencies and line departments as well as the civil society, political representative and administrators of the city, were involved in the consultative process of planning.

This report presents a summary of all sectoral studies and proposals undertaken in the formulation of this Karachi Master Plan 2020. It was heart warming to see the commitment and participation in this process at all levels, specially from H.E. The President, The Prime Minister of Islamic Republic of Pakistan, The Governor of Sindh and Federal Ministers, Provincial Ministers, Secretaries to Federal and Provincial Governments, CDGK, DCO, EDOs and DOs and other officers of Public and Private organizations, who bestowed us with their valuable comments and wisdom. Last but not the least, the driving force in this exercise was the Worthy City Nazim.

With all the best intensions and co-operation, there were several tough challenges that consultants team had to face, due to various, but obvious, reasons for non availability of consistent data from various departments and agencies, not to mention, the coordination between the same. I would like to appreciate my team members, who have shown their commitment and resolve to complete this exercise of lasting importance and their perseverance in the face of many difficulties.

On the other hand, it is appreciated that the Technical Committees have been formed and they reviewed their respective sectors, the outcome of their recommendations have been incorporated. This has given KMP 2020 a holistic dimension. Furthermore, the inputs of our foreign associates M/s PADCO-AECOM, of USA, who has provided their valuable inputs all throughout the process in preparing this plan with the knowledge and wisdom that they had from being part of previous two master plans for the city.

During the course of this study, there were several, week-ends and nights, holidays spent working! both here in Pakistan and USA. It would not be out of place to extend profound thanks to the families of my collogue team members and specially to my family, who have compromise their personal time for this effort. However, as envisaged in this study, if this Master Plan 2020, brings positive changes to the life of present citizens and future generations of Karachi -- than all this hard work is well worth it.

Thank you all.

Naved Zaheer
Team Leader -- KMP 2020
December 2006

List of Participants in Annexure III

1. INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES

City District Government Karachi (CDGK) has today an unparalleled opportunity to guide the growth of Pakistan's commercial and industrial capital – Karachi. Over the past few years, a number of factors have combined to create the conditions for an effective and sustained effort on the part of local governments, the development community, and the general public to steer Karachi toward achieving its vision of becoming a "*world class city and attractive economic centre with a decent life for Karachites*".

- The local government law of 2001 created for the first time a metropolitan-level government (CDGK) with the authority to take a lead role in guiding the development of Karachi.

- The economy of Karachi is experiencing sustained growth, and employment and production are poised to continue rising in the coming years.

- CDGK and the development community have already begun to seize the opportunity to improve the quality of urban development by undertaking major investments in transportation, housing and infrastructure.

With these conditions, the time is ripe for CDGK to join forces with its development partners in the public and private sectors in order to enable future economic growth and improve quality of life for the residents of Karachi. To that end, CDGK has prepared this Karachi Master Plan 2020 (KMP 2020) to set out the strategic framework and overall development direction, pace and character of the city over the next 14 years. The objectives of KMP 2020 are as follows:

- Support the future growth of the metropolitan economy through identification of appropriate investment projects in infrastructure, industrial zones and commercial areas;

- Anticipate the future housing needs of the city and formulate appropriate proposals for meeting them;

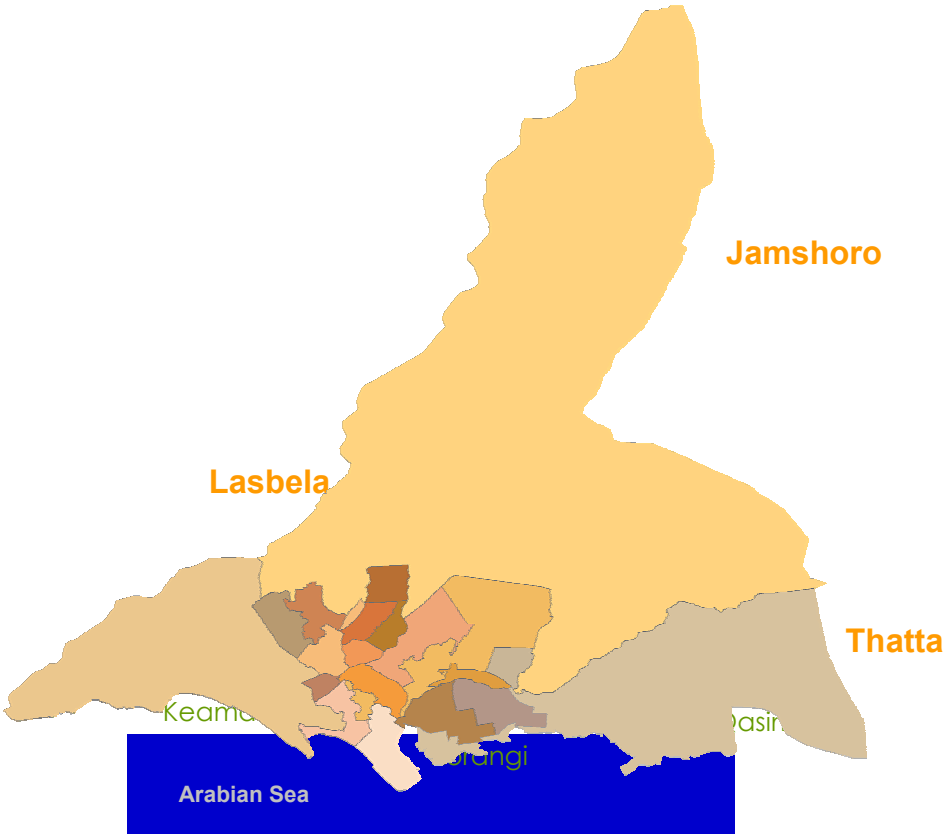
- Evaluate current infrastructure deficits, project future needs, and prepare programs for improving the coverage and service level of roads, public transport, water supply, wastewater, electrical power, and solid waste management services.

- Establish an institutional and financial paradigm that will ensure inclusion of key stakeholders into decision-making processes related to planning and development of the built environment and ensure the sustainability, social, financial, and environment, of the future growth of Karachi.

1.2 DEFINITION OF THE PLAN AREA

The Karachi Master Plan 2020 covers Karachi City District consisting 18 towns, six cantonments and other Federal, provincial / major land holding agencies and 178 union councils. The part of Gadap town north of Hub dam, to the extent that it is largely National Park reserve and would not be an appropriate site for urban expansion during the planning period, was not included in the study area during plan preparation.

Karachi District comprises of approximately 3600 sq km area and the internal 15 towns which are built, comprise of approximately 1300 sq km. The district is surrounded by Thatta, Jamshoro in east and Lasbela in west, with Arabian Sea in south.



1.3 METHODOLOGY

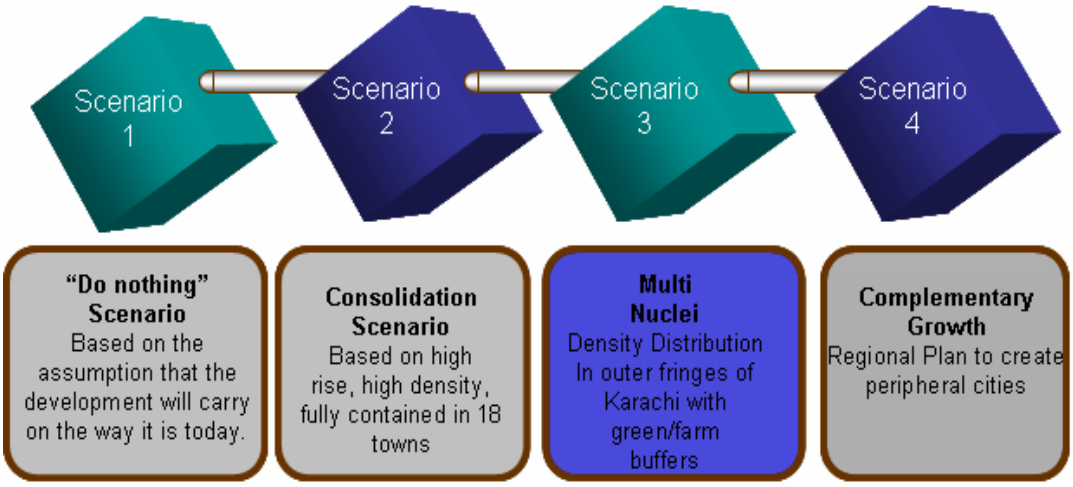
KMP 2020 is prepared on the basis of separate sub-sectoral analyses that were linked through a strategic framework and scenario-based planning of the development of Karachi City District. Each of the sectors included in the plan—land use, housing, transport, infrastructure services, social services, etc.—is the object of an analysis of historical conditions and current trends, focusing on the identification of specific constraints that impede the achievement of KMP 2020's vision and objectives. The sectoral analyses are written up in a series of separate analytical reports prior to the preparation of this Main Document.

A number of additional analytical tools are employed in the preparation of the Plan. A socioeconomic survey was conducted in late 2005 that covered a sample of 5,000 households living in the 18 towns/ 178 UCs of the Karachi City District. The overall objective of the survey was to investigate the living conditions of the population, existing provision of basic services and facilities, living style, economic conditions, social problems and felt needs of the population. A team of 80 surveyors, 10 supervisors and 20 data entry and controllers participated in the survey. The results are presented in Section 2.1. below.

An analysis of existing land use is carried out through a combination of satellite imagery analysis and field surveys. A detailed existing land use map is prepared and used as a key input into the planning of future development. Various teams were deployed, trained and given the satellite image print out to go in field and mark the land use from the same. The data was checked for constancy and reconfirmed if an inconstancy was found.

Infrastructure conditions and trends were evaluated through key informant interviews and analysis of existing secondary documents. A number of urban infrastructure providers operating in CDK provided their insight and guidance in the process of identifying key constraints and formulating proposals for addressing them. *(Please see acknowledgement for details)*

Alternative development scenarios for the City District are defined and analysed as described in the figure below. Scenario 3, Multi-Nuclei, is retained as the preferred scenario because of its ability to deconcentrate some economic and public service activities from the congested central business district to a series of new urban centres at the urban periphery.



1.4 STRUCTURE OF THE MAIN DOCUMENT

This Main Document of KMP 2020 presents the findings of the various surveys and assessments undertaken by the Plan preparation team in Section 2. Section 3 sets out projections of population and calculations of future requirements for urban land and infrastructure services. While Section 4 presents the strategic framework, Section 5 defines in more detail the four components of the plan:

1. Land use and housing
2. Transport
3. Infrastructure Services
4. Social Services

Section 6 provides an initial examination of the anticipated impact of the plan on the natural environment of the City District.

While Section 7 presents the plan cost and financing, Section 8 defines the proposed institutional arrangements for implementation of the Karachi Master Plan 2020.

2. SUMMARY OF MAIN FINDINGS OF SURVEYS AND ASSESSMENTS

2.1 SOCIO-ECONOMIC

2.1.1 Urban Economy

Rebounding from a sluggish period in the late 1990s, Pakistan's economy has been growing robustly in recent years. The finance and manufacturing sectors have exhibited double-digit annual growth since 2003. Commercial and agricultural growth have also been strong. Direct foreign investment in power, telecommunications, chemicals, pharmaceuticals, fertilizers, oil, gas, banking and finance have sparked growth in key sectors and improved infrastructure services that more broadly support economic development.

Karachi is the largest city in Pakistan and represents almost exactly 10% of the nation's population, but its economy is about one-quarter that of the national GDP. Karachi produces about 30% of manufactured goods, handles 95% of foreign trade, and contributes more than 65% of national revenue.

The structure of the Karachi economy is overwhelmingly service-oriented. The primary sector probably does not represent more than 1% of Karachi's gross regional domestic economy ("GRDP"). The secondary sector (manufacturing, construction, electricity and gas) represents one-quarter of the metropolitan economy. The tertiary sector (transport, storage, communications, wholesale and retail, financial services, real estate, public administration, household services…) represent the remaining three quarter's of GRDP.

Economies of scale support many large industries. Many foreign businesses operate large manufacturing plants and are active in the financial sector. The nature of the booming garment sector, however, has given rise to the large number of small and medium enterprises, including “cottage industries.” (The term “cottage industry” as used in Karachi today refers to small, informal, manufacturing shops, typically located in katchi abadis, which employ local residents, often on a part-time basis.) Small and medium enterprises complain they lack access to finance.

Traditional Karachi manufacturing industries are textiles, ready-made garments and food processing. New and important entrants in the last several years include chemicals, electronics, automotive assembly, and large engineering products such as ship building. Future manufacturing growth is expected to come from textiles, ready-made garments, engineering goods, heavy metals, chemicals, electronics and other high-technology products.

The largest constraints on the growth of the manufacturing sector are high fuel costs and power shortages. Law and order problems – particularly extortion by informal power groups in the slums – continue to be a threat and have contributed to capital flight; but this situation is better today than in the 1990s.

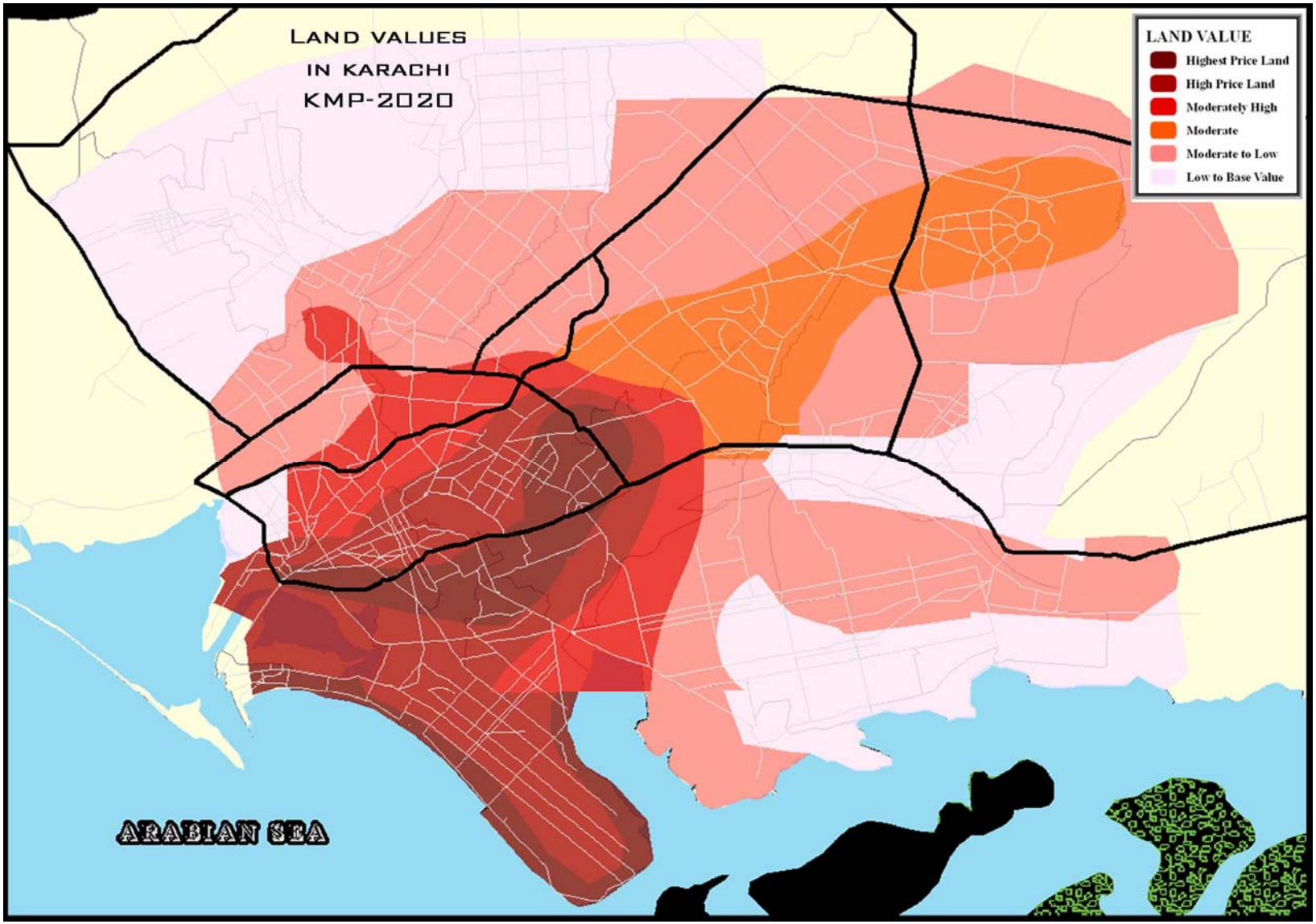
Much of manufacturing occurs in seven major industrial areas: SITE, Korangi, Landi, Federal “B” Area, North Karachi, Karachi Export Processing Zone, and Port Qasim. (The Karachi Export Processing Zone offers many tax breaks, but is not a duty-free export processing zone.) Most of these production areas lie along the coast, in the older parts of the city: but a few exist further away from the coast, and tend to be the newer ones. Smaller manufacturing plants and cottage industries can be found in any part of the city, including many katchi abadis.

Karachi’s construction businesses tend to concentrate on up-market housing and mega projects such as large shopping malls.

The largest sector and the engine of Karachi's growth is commerce. The city is the regional trading nexus, a commercial and financial hub, and a large retail center. Almost all of Pakistan's imports and exports (95%) pass through Karachi. Karachi Port Trust (KPT) and Port Qasim Authority (PQA) move a relatively large number of containers for an economy the size of Pakistan. Jinnah International Airport is the nation's largest airport. Foreign trade is growing: from 27% of GDP in year 2000 to 37% in year 2005.

Finance, insurance and real estate are important to the Pakistan economy. Most banks have national headquarters in Karachi, including the central bank, and the State Bank of Pakistan. The nation's largest stock exchange, KSE, is in the city. Forty percent of the country's banking and insurance transactions occur in Karachi. The real estate market is very lively.

Retail is the essence of Karachi. It is a regional shopping center for consumer durables. Shops occupy most of the street frontage on primary and secondary arterials; with intersections particularly congested. Apartment buildings increasingly offer retail on the first floors.



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The interesting trend has been the recent growth in accounting, medical, engineering, management, and software development. The business community is optimistic such knowledge-based services will capture an ever-increasing amount of foreign exchange earnings.

Commerce is expected to continue growing as a regional trade, retail and knowledge-based services center. Finance for small and medium enterprises is an unexploited market that holds great potential.

Karachi has seen a large increase in its labor force, and the labor force participation rate continues to increase. While higher than in other areas of the country, it remains quite low: 30.4%. This is partly explained by the low female participation rate. The male participation rate is 48%. However, this means less than half of all households have no regular formal-sector employment.

Karachiites are better educated than Pakistanis as a whole. Karachi has the highest literacy rate in the country and benefits from several important universities.

A city's physical development and its economic growth influence each other. Land and infrastructure are necessary, but not sufficient, conditions of growth. The city's ability to anticipate and respond to growth opportunities will determine its continued economic expansion. Different sectors represent different land use and infrastructure demand:

- The importance of commerce in general, and trade and retail in particular, in the metropolitan economy require that improvements be undertaken in all aspects of the transportation network: ports, airports, rail and highways. It also requires space for warehousing and logistics between transport nodes and manufacturing centers.

- The CBD's key role in commerce is based upon personal interaction and communications. The central city's transportation capacity in general and transit in particular must grow to support an increasing workforce. Telecommunications infrastructure is just as important.

- Manufacturing growth is encouraging, and the development of sites such as Textile City near port Qasim in the southeast requires water and wastewater facilities.

- Metal manufacturing, and electronics and textiles to a lesser degree, will pose great demands for electricity.

- All large-scale manufacturing requires industrial land with water, wastewater services, good drainage, and electricity, and road links.

- Extending water, wastewater, and electricity to cottage industries in katchi abadis will improve the productivity and health of this small and medium enterprise sector. The development of localized cottage industry parks with concentrated services and improved accessibility could do more to improve the cottage industry sector while generating employment in nearby katchi abadis.

- Much of the public remains dependent on low-skilled labor-intensive production opportunities for their livelihood. Skills development and education in general could do much to provide better employment opportunities for workers and increase Pakistan's competitiveness in world markets.

Karachi's GRDP per capita for year 2005/06 is about US$ 2,000 per person, much higher than the national figure of about US$ 700. However, there remain many families in katchi abadi communities living in poverty. As noted in the preceding section, monthly household incomes tend to be much lower, at about Rs 15,000 (US$ 250, or $3,000 annually).

Karachi's economy today can support US$ 0.4–0.7 billion a year expenditures on housing and housing service infrastructure by households and the government. This is equivalent to US$ 25–60 per person.

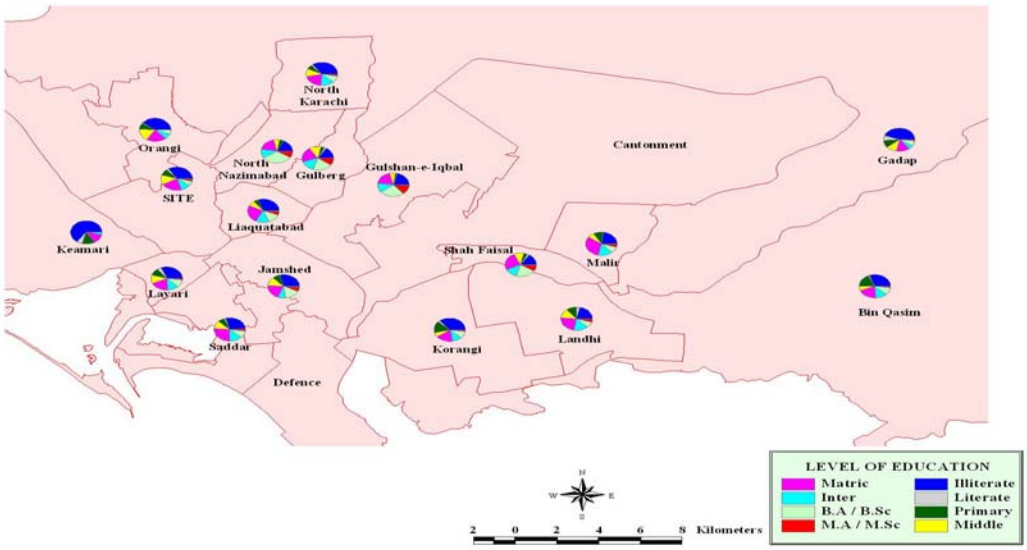
Assuming Karachi's population grows from its current level of 15.1 million to 25.7 million persons by the year 2020, and the economy grows at an average annual rate of 5–7%, annual investment (expressed in 2006 dollars) will rise to US$ 1–2 billion dollars per year.

2.1.2 Household Survey

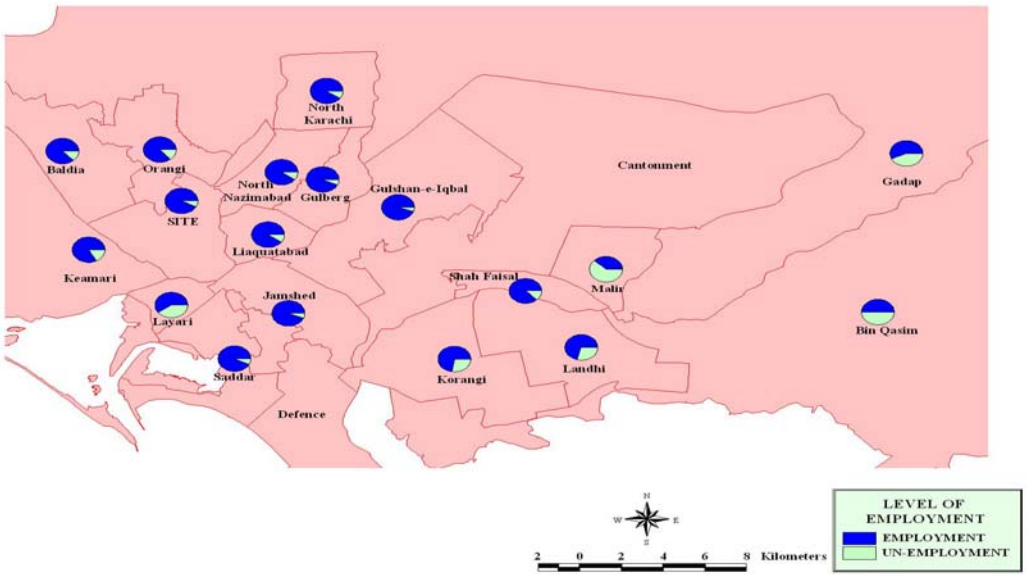
A socio-economic survey was conducted in late 2005 that covered a sample of 5000 households living in the 18 towns of the Karachi City District. The overall objective of the survey was to investigate the living conditions of the population, existing provision of basic services and facilities, living style, economic conditions, social problems and felt needs of the population.

Some of the major findings of the survey are:

- literacy rates are comparatively low and could be improved through non-formal education that includes both home and street schools;



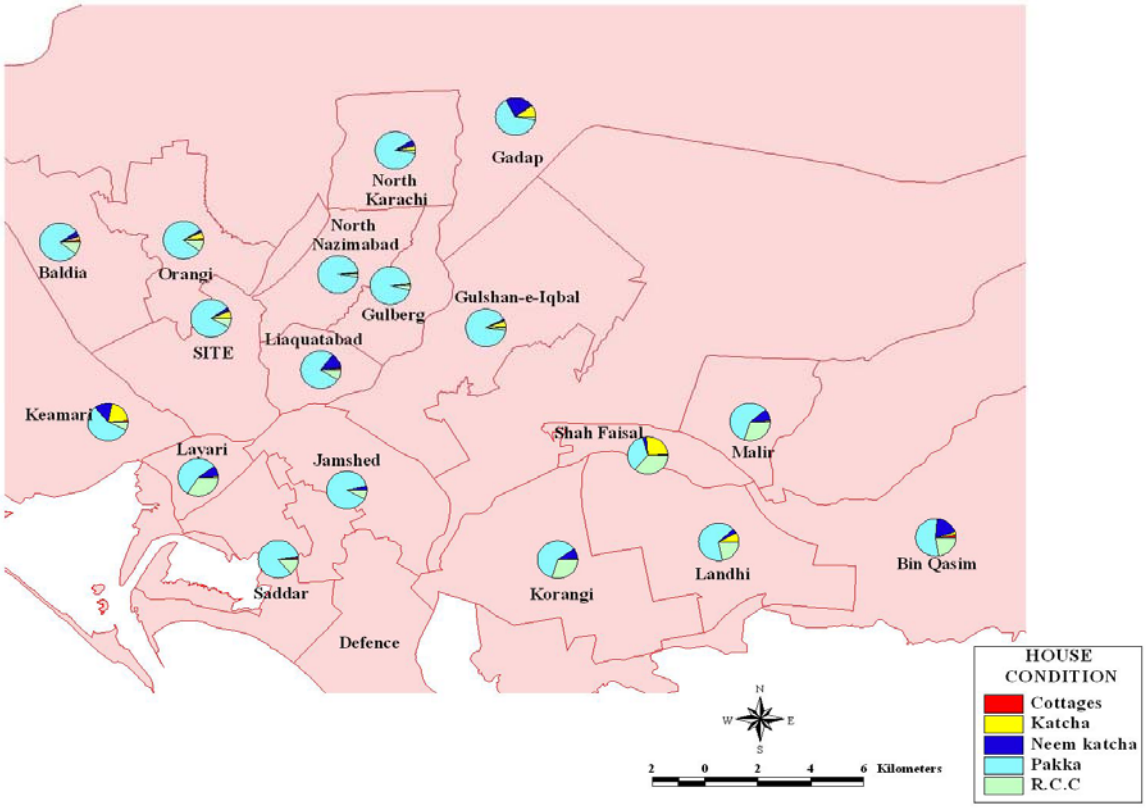
- health is the most neglected area. The present level of facilities is not sufficient to serve the population; small clinics, mother and child health centers and primary health care center in particular are needed;
- one of the main perceived needs of the population is better access to clean drinking water;



- participation of women in economic activities should be systematically encouraged and ensured in order to enhance household income and upgrade standards of living; and
- non-completion of development projects and programs has had a negative impact on development.

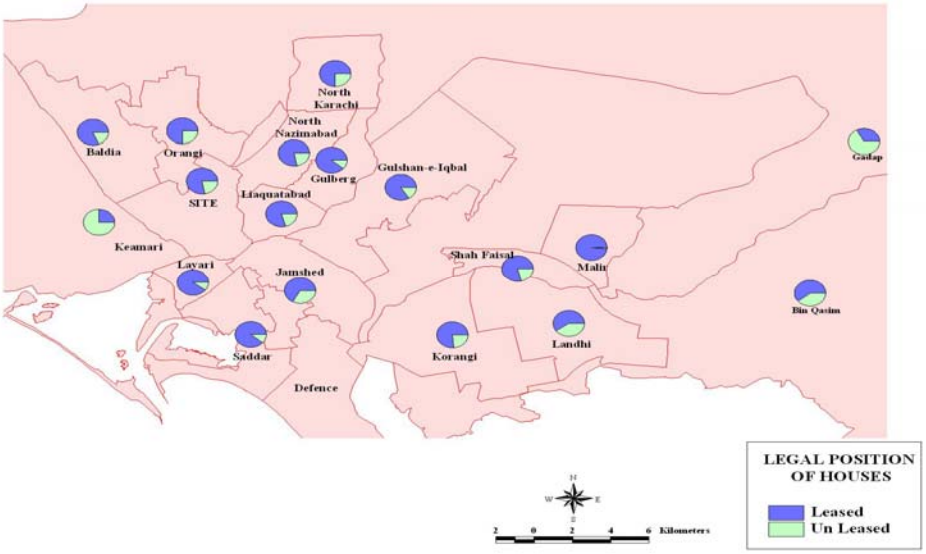
Some of the main indicators from the survey can be described as follows. In describing the characteristics of household heads:

- roughly 83 percent are male and 17 percent female;
- more than 30 percent are aged between 40 and 49 years, with only 7.4 percent less than 30 years of age;
- roughly 88 percent are married;
- about 29 percent are illiterate; the remainder literate and/or educated;
- 81 percent are employed;
- 50 percent of the employed are self employed with 31 percent working in the private sector, 3 percent in the semi-private sector and 16 percent in the public sector;
- 32 percent of the self employed are shopkeepers and 12 percent are laborers; and
- 41 percent earn between 3,000 and 6,000 rupees per month.



In terms of family characteristics:

- roughly 85 percent are nuclear families, with the remaining 15 percent living in joint family situations of two families or more;
- family composition includes 35 percent male adults, 32 percent female adults, 17 percent boys and 16 percent girls, both up through 15 years of age;



- 44 percent earned between 5,000 and 10,000 rupees per month;
- 34 percent spent less than 5,000 rupees per month;
- 19 percent were able to live within their planned monthly budgets;
- 75 percent of the monthly expenditure was for food, 19 percent for utilities. and less than 2 percent for housing;
- close to 39 percent of the male family members and 29 percent of the female members were literate; and
- more than 11 percent had members that were unemployed, with 89 percent male and 11 percent female.

In terms of household residential stability:

22 percent had been living in Karachi for more than 59 years, 22 percent for 41 to 58 years; 30 percent for 24 to 40 years; 13 from 12 to 23 years; only 7 percent have been living in the city for less than 6 years;

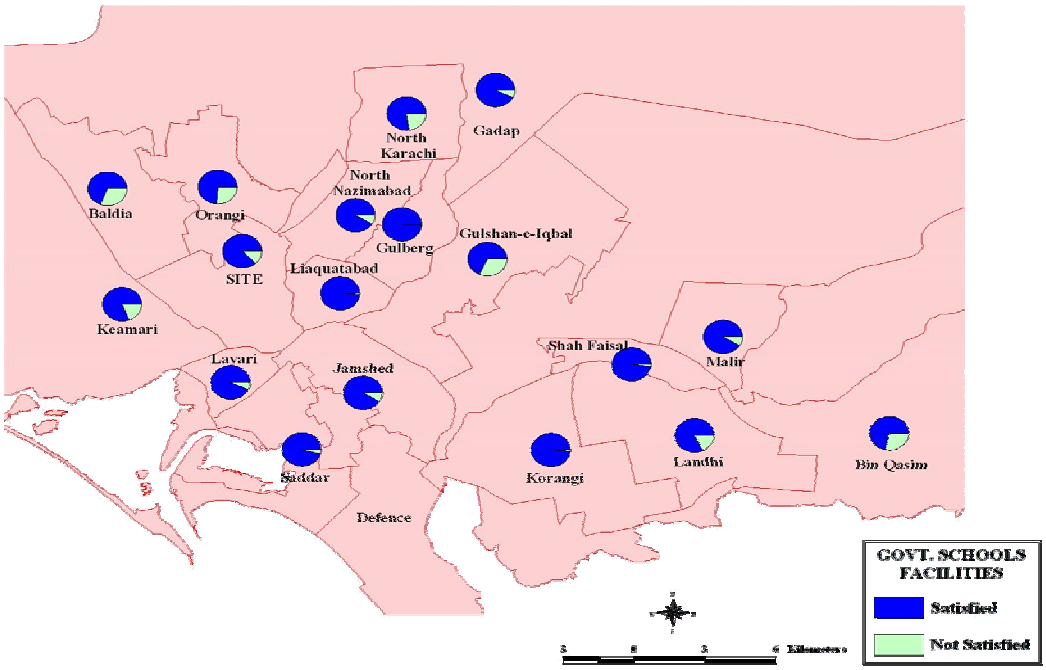
- 26 percent had been living in their present house for 10 years and 33 percent for more than 20 years;
- 74 percent had lived in the inner city prior to their current residence; and
- 70 percent had migrated to Karachi to obtain employment.

In terms of property and family assets:

- 75 percent of the houses were on land that was leased;
- 80 percent of the houses were owner occupied;
- 60 percent of the owner-occupied houses were self-purchased; 22 percent self-built and 19 percent inherited;
- 25 percent of the houses cost less than Rs 300,000, with 16 percent costing more than Rs 1.3 million.

In terms of housing conditions:

- 76 percent of dwelling units were pakka condition;
- 15 percent of units were below 60 square yards in size; 35 percent are 80 square yards; and 30 percent 120 square yards;
- 81 percent had only one portion;
- 98 percent of the houses had electricity;
- 97 percent had Sui gas;
- 89 percent had piped water into the house; and
- 36 percent were connected to the sewer line.



Other characteristics included:

- 96 percent stated that madrasas were available, 87 percent stated government schools; and 93 percent said private schools;
- 88 percent of survey respondents claimed that the general health of their families was good;
- 45 percent said they had time for recreation;
- 97 percent had some of their family members go to work on a daily basis; and
- 60 percent said that recreation and park facilities were the city's primary need.

This socioeconomic survey shows the population of Karachi is relatively stable, with most households having lived in the city for many years. This suggests a high level of commitment on the part of Karachiites to stay in the city and build a life for themselves over time. This in turn implies that residents are willing to invest in the improvement of their homes and the infrastructure services they receive at them. On the other hand, available resources for housing and infrastructure expenditures are fairly limited at the level of most households, given overall low incomes, high levels of expenditures on basic needs (75% of total), and already high expenditures for utilities (19% of total). The high percentage of owner occupation, however, suggests that home assets could be used as collateral to get access to finance for improvements. Priorities of Karachi residents include improved water supply quality.

2.2 Land Use and Housing

The Karachi City District is spread across an area of approximately 3,600 sq. km. More than half of this area (approximately 530,162 acres) consists of vacant land (see Figure 2 below, and Table 1 on next page) This include the area dedicated to Kirther National Park. Nearly nine percent (81,179 acres) of the area within Karachi is dedicated to agricultural uses; eight percent (67,000 acres) is dedicated to residential land uses, including pucca, semi-pucca and katcha houses; eight percent (71,930 acres) to governmental uses; five percent (46,155 acres) to infrastructure, including roads and utilities; four percent (30,848 acres) to industrial uses, such as cottage industries and factories; two percent (17,560 acres) to Goths and villages; and one percent each to institutional (4,555 acres), recreational (4,800 acres), mixed land uses (5,900 acres) and restricted areas (5,190 acres). Commercial uses occupy slightly less than one percent of the City District area.

Figure 2: Distribution of Existing Land Uses

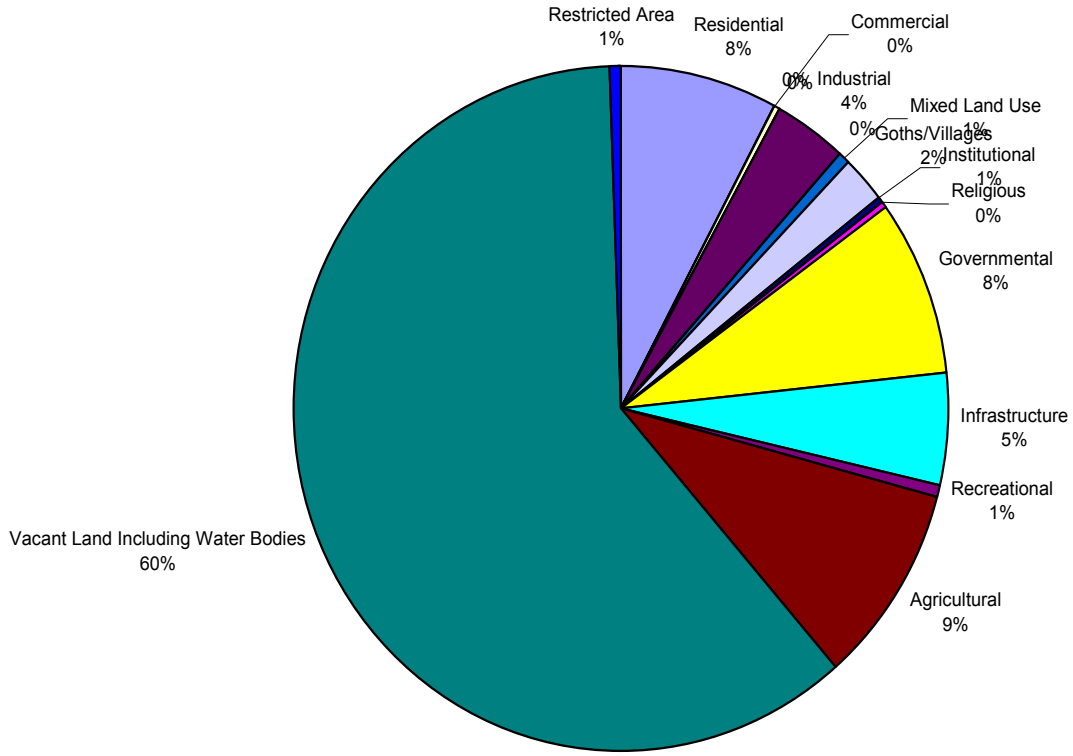
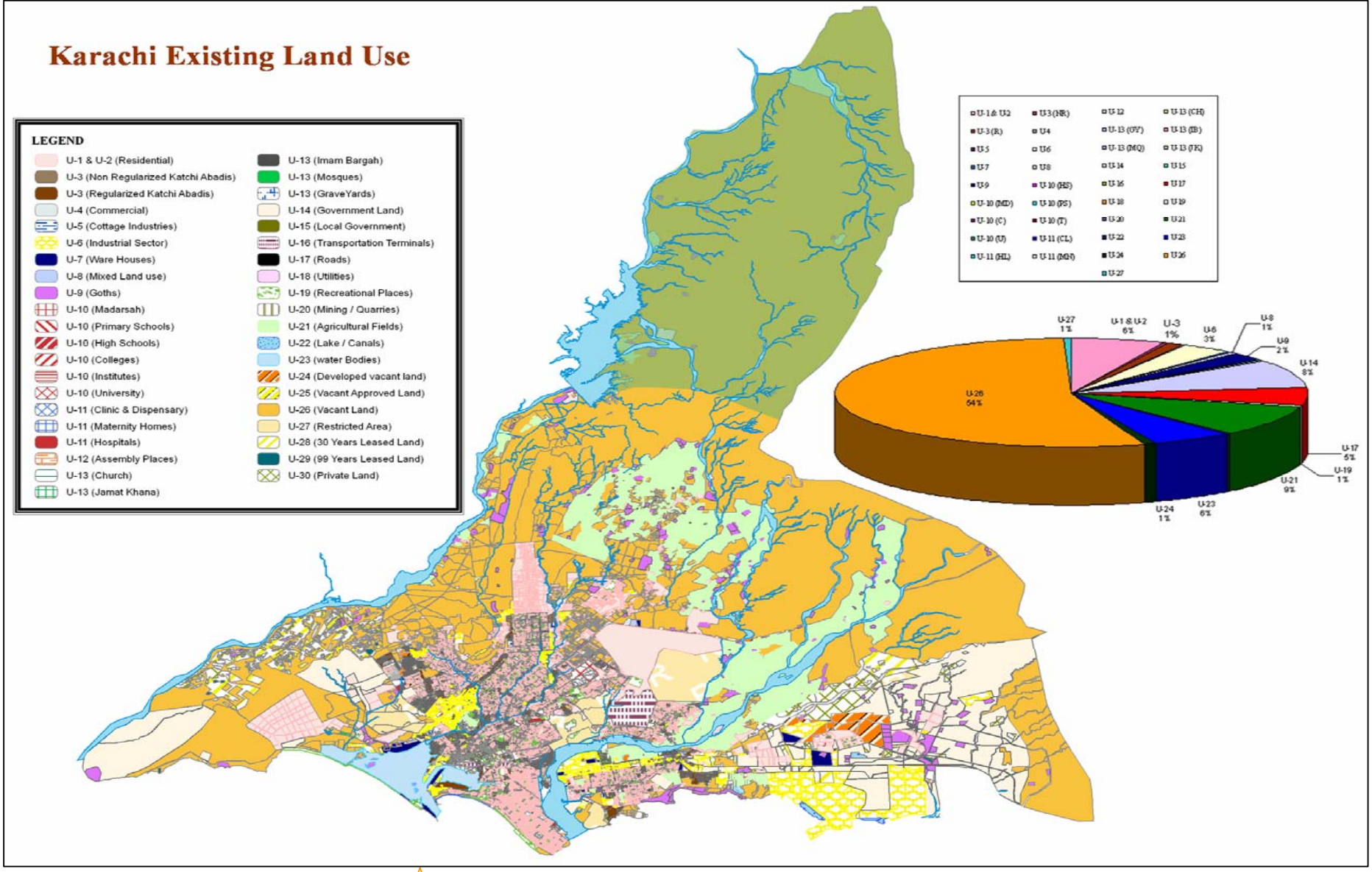


Table 1: Areas and Percentages of Various Land Use Types in the Karachi City District

Broad Category	Area (%)	Included Land Uses
Residential	67,020 acres (7.7%)	U-1: Pucca Houses, Flats, Hostels U-2: Semi-Pucca Houses U-3: Katcha & Temporary Huts & Dwellings
Commercial	3,169 acres (0.364%)	U-4: Whole Sale Dealers, Shops/Shopping Malls, Offices, Banks, Hotels, Meat/Poultry/ Fish Markets, Petrol Pumps, Fuel-Wood Stalls, Dhobi Ghat, Cement Sand Depots & Block/Slab Makers
Industrial	30,848 acres (3.54%)	U-5: Cottage Enterprises, Small Workshop Garages/Service Stations, Boat Making U-6: Factories/Mills/Iron Works, Stone Works/ Marble/Building Materials, Dockyards, Fishery, Yards U-7: Ware Houses, Railway Yard, Port Yard, Airport Storage, Petrol/Oil Depots, Other Godowns U-20: Quarries/Sand/Bajri Mining & Salt Works
Mixed Land Use	5,899 acres (0.677%)	U-8: Residential/Commercial, Industrial/Residential, Industrial/Commercial
Goths/Villages	17,959 acres (2.062%)	U-9: Goth/Village, Housing Cluster
Institutional	4,553 acres (0.52%)	U-10: University, College U-11: Hospital, Clinic/Dispensary U-12: Meeting Hall/Conference Hall/Auditorium, Arts Council, Hilal-E-Ahmari/Red Cross/Gymkhana/Clubs, Marriage Hall/Lawns, Community Buildings, Library/Museums, Historical Building, Cinema/Theatre
Religious	2,310 acres (0.265%)	U-13: Eidgah, Mosque, Imam Bargah, Church & Other Temples, Tomb/Shrine, Graveyard, Cemeteries
Governmental	71,929 acres (8.25%)	U-14: Government Offices U-15: Local Government Offices
Infrastructure	46,154 acres (5.3%)	U-16: Transportation U-17: Roads U-18: Utilities
Recreational	4,798 acres (0.55%)	U-19: Recreational Facilities
Agricultural	81,179 acres (9.31%)	U-21: Agricultural Activities U-22: Irrigation
Vacant Land Including Water Bodies	530,162 acres (60.85%)	U-23: Water Bodies U-24: Vacant Developed Land U-26: Vacant Land
Restricted Area	5,188 acres (0.596%)	U-27: Restricted Area

Most of the developed areas are concentrated in the inner ring towns of Saddar, Jamshed, Lyari, Liaquatabad, Gulshan-e-Iqbal, and Gulberg. See Existing Land Use Plan. These towns contain the most diverse mix of uses, and include most of the governmental and regional-scale industrial and commercial activities. The outer ring towns, including Bin Qasim, Gadap and Keamari Towns, predominantly consist of agricultural uses and vacant areas with very little governmental, commercial or industrial activities.

Karachi Existing Land Use



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GENERAL LAND USE TRENDS

- **Increase in Commercial Activity:** Primary and secondary arterial roads, and main intersections, across the city are increasingly becoming commercialized. Along major arterials, commercial uses such as shops, banks and offices are fast replacing existing residences on the ground floor. In some instances, commercial uses are also expanding upwards to occupy entire buildings. Along secondary roads, single story residences are converting to two- and three-storied buildings with shops on the ground floor. This trend also seems to be affecting residential neighborhoods where large plots (greater than 1,000 square yards in size) are changing from residential villas to offices or other commercial uses. This trend is changing the character of arterial roads and residential neighborhoods, and resulting in traffic congestion due to increased vehicular activity.

- **Expansion of Residential Development in Cantonment Areas:** Areas such as the Cantonments and Defence, under the control of the defence authorities are rapidly undergoing development. Due to their location near the Arabian Sea and commercial markets, these areas are highly desirable residential enclaves. The boards that manage development in these areas have become substantial players in the residential real estate markets and are developing and leasing serviced residential plots to non-military and military customers alike.

- **Growth of Industrial Activities Including Formal Zones and Informal Cottage Industries:** There is a general increase in industrial activities across the Karachi City District. Such increase includes the spread of informal cottage industries within residential, commercial and mixed use areas, as observed in Liaquatabad, Gulberg, Baldia, Shah Faisal, North Nazimabad, Orangi, and Korangi. Some of the industrial expansion is within planned areas, such as the proposed Textile City that would extend activities associated with Port Qasim to the east.

- **Conversion of Waterways to Open Sewers:** Due to lack of an adequate sewage disposal system, substantial amounts of waste ends up in the open storm drains and nallahs throughout the city. Most of these drains and nallahs flow into the Lyari and Malir Rivers that end up transporting this waste to the Arabian Sea. Not only is the waste a health concern, during storm events, it impedes the flow of water and contributes to localized flooding. This condition is further exasperated due to development that has encroached natural drainage nallahs and low lying areas which traditionally served to divert storm water away from built up areas.

- **Revival and Development of Parks and Open Spaces:** Another trend across Karachi City District is the recent interest in reviving existing recreational parks and open spaces and developing new ones. This trend affects parks at both the city- and town-levels. Some of the parks that are being improved include the Jinnah Park in the Clifton area, Polo Ground in Saddar Town area, Safari Park in Gulshan Town, and the Karachi Zoological Garden in Garden West area. New recreational areas include those being developed privately, such as Dream World, Cosy Water Park and Samzoo in Gadap, as well as those being developed by the local government, such as locality parks in Gulshan-e-Iqbal Gulberg, North Nazimabad, Clifton and Defence. With development beaches coming up in DHA and Clifton area.

- **Development of Social Assembly Facilities:** Along major arterial roads, especially in North Nazimabad, Gulshan, Gulberg and Malir Towns, one of the new commercial uses that are replacing large-sized residential plots is social assembly facilities such as Shaddi halls. These facilities bring large volumes of vehicular traffic, predominantly during evenings and weekends, and result in congestion on local neighborhood streets. These facilities also introduce high noise levels in predominantly residential areas and can be a nuisance to adjacent residents. On the other hand, entertainment areas such as cinema houses are fast diminishing across the city. In most of the areas, these facilities are converting into shops and market places.

- **Proliferation of Aggressive Signage:** Across towns such as Saddar, Gulshan-e-Iqbal and North Nazimabad that have high levels of commercial uses, there is an increasing proliferation of hoardings and neon signs. These signs appear in all sizes, heights and color. Rather than benefiting the commercial establishments by presenting a coherent message, these signs compete with each other for prominence and result in a highly inconsistent and cluttered visual environment.

TRENDS IN HOUSING

- **Vertical Development of Residential Neighborhoods:** Driven by a strong real estate market, residential neighborhoods are rapidly being developed across Karachi. Along main arterials, intersections and other land with high potential commercial value, offices and shops are replacing residences on the ground floor. In some cases, houses are being demolished and replaced by multi-storied buildings, with commercial uses on the ground floor and apartments above. In other cases, the G+1 height limit is being ignored and floors are being added to existing houses. This trend can be observed in towns such as New Karachi, North Nazimabad and Gulberg that are experiencing rapid commercial and cottage industrial growth. This growth results in increasing the burden on the infrastructure networks, without any associated investment to increase capacity.

- **Continuing Horizontal and Vertical Growth of Katchi Abadis:** There continues to be an increase of Kachi Abadis throughout Karachi. A significant and growing portion of the low income community in the city does not have access to public sector housing. To accommodate these persons and households, new units are being added to existing katchi abadis through additional land acquisitions and vertical growth. New housing is also being provided through continued informal sub-divisions of public land and rural areas, often mimicking formal sector KDA layouts with plot sizes typically ranging between 80 and 120 square yards. Housing is also being provided through informal construction in planned residential and commercial areas, especially in inner ring towns, and in labor colonies surrounding industrial areas.

  The densities in these informal settlements continues to remain significantly higher compared to regular housing areas, the quality and coverage of services remains inadequate, houses are built as katcha structures. The growth of these types of informal settlements is visible in the towns of Orangi, Baldia, SITE, Korangi, Landhi, Lyari and Keamari.

- Phased development of large number of lower/middle/high income residential plots at Taisar Town, New Malir, DHA Phase 8 and 9, Shah Latif Town, Scheme 33, Hawk's Bay, and now Halkani continue to remain unpopulated and presents a problem of investments vs utilization issues.

- **Increased Foreign Developer Participation:** There is significant interest from foreign developers in building high-income residential subdivisions across Karachi. The strong real estate market, and the predicted increase in income-levels due to growth of Karachi's commercial sector are some of the factors contributing to a continued demand for high-income housing. This demand is attracting foreign developers to invest in the housing market, as evidenced by a Dubai-based developer's proposal to build a US$43 billion complex on Bundal Island. Several other proposals at somewhat comparable scales are also being proposed in other parts of the city.

2.3 TRANSPORT

2.3.1 Introduction

The port city of Karachi with a population of about 15.12 million is the largest urban center in Pakistan. The population growth rate is around 6% and the literacy rate is about 66%. The mega-polis of Karachi is sprawled over an area of around 3600 square kilometers. The city is the economic backbone of Pakistan with a federal revenue contribution of around 25%, provincial revenue contribution of about 40% and the GDP contribution of around 15%. The total registered vehicles in Karachi are approximately 1.5 million and increasing at an alarming rate of 18% per annum. In order to provide an efficient, economical and well-managed transportation system for a mega-polis of the order of Karachi, there is an urgent need to develop a progressive, well integrated and a comprehensive Transportation Master Plan for Karachi.

2.3.2 History

Karachi's origin became prominent in the mid-eighteenth century when a port was established by Kalhoras. It became provincial capital in 1936.

In 1947, Karachi was made the capital of the new nation of Pakistan. At the time Karachi was a city of only 400,000 people and its growth accelerated as a result of its new status. Being a port city, Karachi became a focal point for the new nation. It became the country's principal urban centre. From 1961 to 1990, Karachi witnessed rapid urbanization and became the fastest growing cities. By 1990, the city had already grown to the level of 8.0 million. While the population was growing at the rate of 5%. Since 1961, the vehicular traffic growth had increased at 11% per annum. Buses provided an efficient form of road transport, there was insufficient capacity to meet demands. Karachi by 1990 had already expanded from 116 Sq.Km to 1300 Sq.Km. This phenomenal growth had resulted in tremendous transport problems, as Karachi accounted for about 45% of vehicles in Pakistan. Karachi's road network of 7,400 Kms under the jurisdiction of several different agencies has increased to 9,944 Kms. There continues to be wide spread lack of discipline on Karachi Roads and nearly 50% of accidents involve pedestrian and motorcyclist. In efficient road capacity, poor public transport, road safety and poor highway condition remains a burning issue in Karachi. This KMP 2020 comes at a time to identify issues of policy and projects and to address them with sound engineering technicalities.

Today with the national devolution of power plan in place, Karachi has the potential to resolve these urban transport problems with 18 towns, 178 UC's and the Cantonment areas in place. At present, Karachi is amongst the 13 mega cities of Asia and is listed in the 21 biggest cities of the world.

2.3.3 Transport Parameter

Demand for transportation services depends on five basic parameters:

1. Land use
2. Population
3. Economy
4. Employment
5. Education

Around 5.4% land is being utilized for roads, utilities and transportation purposes. A 2020 land-use sketch plan prepared by the KMP-2020 team indicates the metropolitan development corridors primarily in the north-east, east and western direction as shown in Map 2.3.1 as Annexure. The travel corridors will then be governed by the metropolitan development corridors. Most of the expansion corridors point a trend indicative of decentralization and expansion of an urban development; peripheral to the existing outer boundaries of the city.

For the land use for future KMP-2020, please see chapter 5.

The city's population has grown from around 400,000 in 1947 to an estimated over 15.12 million in 2006. Karachi being a metropolitan area attracts migrants not only from within Sindh, but also from all parts of Pakistan, and some from the culturally close countries. This has translated into a population increase of about 6 percent, which is about twice the national average.

Karachi is highly industrialized; Economic activities of various kinds are concentrated in several locations. It is estimated that about 38% of employment in manufacturing is in the SITE area, a further 18% in Korangi and Landhi, half of the retail trade and services together with more than 80% of business services are concentrated in the central area, while about 50% of employment in wholesaling and transport is in the port area and the central city.

It has a formal industrial sector based in seven major industrial estates and industrial zones that provide employment opportunities. The metropolis has equally large informal sector; dispersed throughout the metropolis and is the large scale generator of the person trips within the towns. The employment forecast reveals that Karachi has to generate approximately 3.5 million jobs every five year interval for the rapid growing population.

An important component of the morning peak hour traffic generated is the educational institutions. The person trip study of Karachi by JICA documents 15.43 million trips in 2005 with travel for purpose of schooling. The JICA study based on surveys has recorded 7.3 million person trips that are made by 3.7 million traveling persons. Thus out of 24.227 million trips made on a typical weekday, almost 60% trips are made by students in the various categories.

2.3.4 Major Road Network

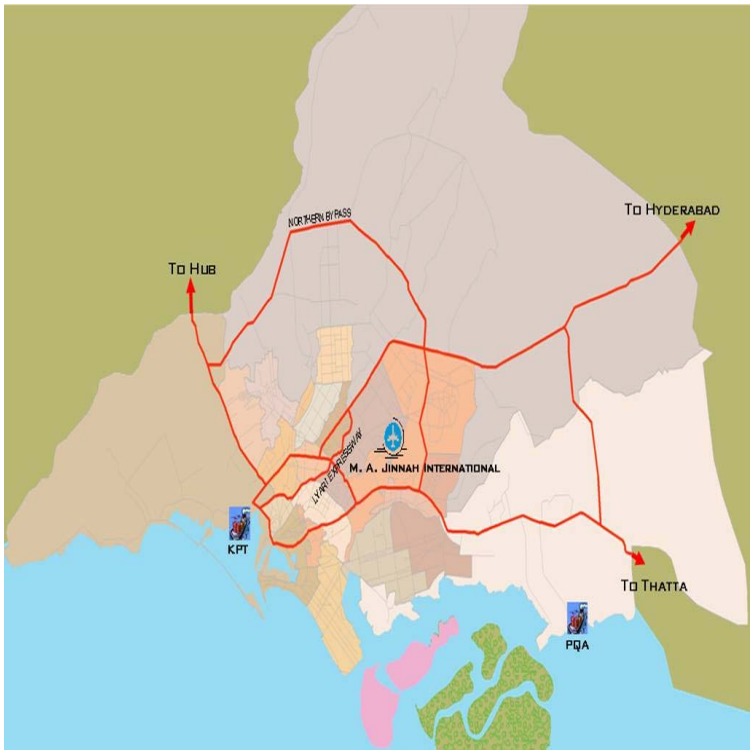
Karachi is served by a well defined but not an ideal network of major roads. At present approximately 9,944 Km of roads exist in Karachi. KMP-2020 proposes adoption of commensurate AASHTO functional classification of roadways (Map-2.3.2 as Annexure) for the existing network as listed below:

	Total Length (km) (Karachi)	Existing Mileage (Percent)	Standard Mileage (Percent)
• Expressways	77.171		
• Principal arterials	265.934	3.45%	5-10%
• Minor arterial	169.105	4.37%	15-25%
• Collector streets	234.279	2.36%	5-10%
• Local streets	9197.768	92.49%	65-80%
Total:	**9944.3**		

There are following three major road based gateways which links Karachi with the rest of the nation:

- Super Highway leading north-east, towards other cities in the provinces of Sindh, Punjab, and the NWFP.
- National Highway leading south-east, towards other cities in the provinces of Sindh, Punjab, and the NWFP.
- The RCD Highway links Karachi with the cities in Balochistan.

The Karachi's main port managed by the Karachi Port Trust (KPT) is the focus from this originates nine radial routes. As a principal sea-port of the country, almost all upcountry commercial traffic is routed through Karachi.



The completion of Northern by-pass and Lyari Expressway will link the Karachi Port area with the Super Highway and will bypass the city's internal roads. There is evidence of developing circular routes, but these have not had a significant effect in reducing congestion on the main radial highways.

The commercial Center of Karachi occupying the older areas of the city has the side walks and local streets somewhat irregular reflecting their haphazard development, in contrast with the regular gridiron layout of the newer areas.

In recognition of the massive investment requirements in the road sector, the CDGK since inception in 2002 has aggressively pursued long over due projects.

There are 55 rehabilitation schemes of roads, 11 Flyovers / Bridges / Interchanges, and three underpasses are underway as shown in Map 2.3.3 and 2.3.4 as Annexure. Some of them are already completed or in the process of completion. The presently existing bridges flyovers/interchanges and underpasses over the entire roadway system of Karachi are shown on Map 2.3.5 as Annexure.

The number of crossings over the rivers and railway line are limited and a source of major traffic bottlenecks; particularly along the mainline of Pakistan Railway. Several overpasses have either been constructed or are planned over the Circular Railway alignment; however, there remain about 30 at-grade crossings at present. As part of the revitalization plan of the KCR, all crossings are planned to be grade-separated.

2.3.5 Public Transport

The quality, quantity and safety of the public transport system in Karachi are in bad shape and are the cause of untold hardships for the common man. The public transport has a severe shortage during peak periods, appalling overcrowding and a poor service quality. So only the low-income transit dependent people are forced to use the public transport. This causes hardship to the common man.

The Public Transport characteristics found in Karachi can be summarized as follows:

- Absence of comprehensive public transport planning and policy. Elements of policy have formation to time have emerged as a result of specific schemes but have been consistently often at odds with existing policies.
- Poorly developed transport infrastructure, lack of bus terminal, depots, bus stops transfer facilities and narrow secondary and minor roads in dilapidated condition giving rise to high traffic congestion.
- Poor transport systems in that they are not integrated, coordinated and not properly interfaced.
- Poor public transport services.
- Inadequate consideration of institutional capacity to operate or manage the public transport system.
- Insufficient consideration of role of infrastructure provisioning and management.
- Inadequate attention to problems of designing regulatory reforms.
- Inadequate information base for planning and management.
- Inability to really know the effects of public transport on its population and economics.

- Poor timeliness in providing adequate finances for transport infrastructure, transport system development and implementation in regulatory reforms.

- Lack financial resources for public transport development.

- Lack professionally qualified and trained human resources in transport planning and management.

In year 2000, on a typical weekday about 10 million trips were estimated to be made in the city and of these 5.6 million were on the existing public transport system and the remaining around 5.0 million by private and Para-transit vehicles. A recent Person Trip Survey Study undertaken by JICA reports a total of 24.227 million trips being generated on a typical weekday, 60% of which were made by the public transport.

There are around 200,000 vehicles; which includes buses, mini buses, taxis, trucks and pick ups / delivery vans; and constitutes about 13% of the total vehicles in Karachi.

The public transport is privately owned and primarily consists of large buses and minibuses. These minibuses and buses compose about 80% of the public transport; and the remaining 20% are contract carriers owned by large employers, educational institutions and community groups.

The commonly used Para transit services generally in poor condition; include such as taxis and motor rickshaws. The failure to provide a decent public transport system has fuelled the growth of private motor cars and motor cycles.

Fleets of taxis and auto rickshaws provide a more personal and individual public service. At present 44,480 taxis and 20,209 mini-bus and coaches are operative on city road system.

Although there are only three proper intra-city bus terminals over 200 operative routes, there are almost no formal bus stops. Waiting for a bus is an unreliable process. The absence of bus shelters is inconvenient to patrons during hot and rainy seasons, and disrupts road traffic.

People who own vehicle don't generally ride the bus. However, given the low incomes of many of Karachi's residents, three-fourths of the public belong to the captive transit market.

There are around 2,800 intercity buses to service Karachi from upper Sindh and other provinces; and each day more than 1,300 buses either enter or leave Karachi. These buses are operated by some 175 privately owned companies from 200 illegal termini privately set up as booking offices.

In addition, the Karachi Circular Railway (KCR) deserves mention. This is a 50-kilometer at-grade rail service active in the 1960s, '70s and early '80s and only served a small portion of the commuting public. However, Karachi is now a denser city, demand for public transport all that greater, and transportation alternatives in the CBD needed; and as a consequence there is interest in reviving the KCR. At present KCR begins at City Station and circle around the center city ending at Drigh road station.

2.3.6 Traffic Congestion

The road system is congested, especially in the central city. As early as 1962, volumes were often double those of design capacity. More recent traffic counts reveal volumes are often 5 to 25 times that of capacity, with higher ratios in the central city. Peak travel speeds can be as low as 15 kph.

There are various causes of congestion in Karachi:

- The road network is not very well connected, with poor network links. This causes circuitous trips and overloads road capacity.
- Railway crossings are at grade, slowing vehicular traffic.
- Roads are narrow.
- Road maintenance is poor.
- Signaling is inadequate.
- Spotty lane marking and lack of signage are common.
- Haphazard parking, street hawkers and shops and other encroachment combine to obstruct lanes of traffic and underutilize the right-of-way, especially in the central city.
- There is no bypass road to and from Karachi Port Trust as of yet, and that forces a large share of trucks carrying goods to pass trough the central city.
- Bus stops, bus bays and shelters are few, causing unpredictable traffic obstruction.
- Lack of pedestrian facilities.
- Poor enforcement.

The shortage of suitable bus stops and poor access to transit in general prevents this form of transportation from becoming a sensible alternative to anyone but those with no other option.

The absence of formal intercity bus terminals have been the major cause of aggravated traffic congestion in more than 200 locations throughout the city.

Increased population, economic activity and vehicle ownership forecasted for the next several years (if not decades) are likely to contribute to a marked increase in traffic congestion.

2.3.7 Parking

There is a shortage of off-street parking lots and parking garages. This forces vehicle owners to park on the streets, often in a disorganized and even chaotic pattern that quickly obstructs lanes and reduces road capacity.

2.3.8 Road Safety

The road safety has become a major issue in the city of Karachi, where the vehicular traffic is increasing at a very rapid pace. There are around 550-600 fatal accidents per year in Karachi. The mean fatality rate for Karachi in 2003 has been estimated to be 5.05 fatalities/100,000 populations. The majority of accidents took place in Saddar Town, but the fatality rate is highest for Bin Qasim Town, 15.34 fatalities/100,000 populations. This rate is very high when compared internationally as shown in Table 2 below. The reason for this high fatality rate may the number of high trip generators in the Town, such as Port Qasim and Pakistan Steel Mill etc.

Table 2- Fatality Rates by Country

Country	Year	Fatality Rate per 100,000 Population
Iran	1995	5.0
Sweden	1999	5.8
U.K	1999	6.0
Bahrain	1996	10.0
Australia	2000	9.5
Jordan	1996	13.0
France	1996	13.8
USA	2000	15.2
Saudi Arabia	1994	21.0
Oman	1996	24.0

2.3.9 Special Generators

Manifold increase in the population of City during the last decade has resulted in creation of locations which are major causes for traffic generation. These include Railway Stations, Airports, Ports, Hospitals, Schools, Hotels, Recreational areas, etc. which have put excessive pressure on the existing road network. Some of these locations generate traffic during certain specific time periods such as schools and offices, etc. whereas other locations such as Airports, Railway Stations, Hotels, Recreational areas may generate traffic throughout the day, depending upon their schedules.

The most important regional and international transportation nodes that generate large volumes of traffic are the seaports, Railway Station and the International airport in Karachi.

Karachi is the home of Pakistan's principal deep water ports: Karachi Port Trust south of the central city and Port Qasim to the east. Together, these two ports handle 95 percent of the nation's exports and imports. Karachi Port Trust south of the central city handles almost triple Port Qasim's volume. Together, the two ports handle 18 million tons of general and dry bulk cargo, substantial liquid quantities, three million tons of iron ore and coal, and 1.3 million TEU of container traffic in 2004-05.

Jinnah International Airport to the east is the nation's largest international and domestic commercial air destination. 10 million passengers a year use the facility. However, various inadequacies and bureaucratic practices are causing some international airlines to cease service to Karachi.

A railway line links northern Pakistan with Karachi Port Trust and Port Qasim, as well as internal links within the ports and to nearby industry. Karachi is linked by double-track connections as far as Bahawalpur in southern Punjab, and then the larger Pakistan rail network. There is a container handling facility at Karachi Bandar near Tower. Roughly one-eight of the two ports throughput is carried by train. There are thirteen stations in Karachi, and 45-50 thousand passengers board and alight every day. Pakistan's national railways are in poor health.

2.3.10 Environment

Carbon monoxide levels in Karachi are above WHO standards. NOx and PM_{10} emissions approach world limits. Noise levels are also above international standards. There are many causes of the environmental degradation. Thirty percent of vehicles have 2-stroke engines, and most trucks consume diesel fuel. Almost all vehicles are poorly maintained. All petrol sold in Pakistan is leaded, and the diesel has high sulfur content.

2.3.11 General Issues and Problems

The specific traffic and transport problems of Karachi include:

- Absence of transportation planning, traffic engineering and transportation systems management.
- Absence of an integrated multi-modal plan with local and regional linkages.
- Lack of traffic management and enforcement of traffic regulations.
- Inadequate public transport.
- Poor quality of service provided by the public transport.
- Lack of an integrated multi-modal infrastructure.
- Poor road conditions in terms of road geometry, pavement and structures.
- Absence of an integrated road drainage plan.
- High traffic accident rate, particularly fatal accidents.

- Lack of facilities for pedestrians.
- No additional facility for freight traffic to and from Karachi Port without traversing downtown Karachi.
- Highway schemes are designed and implemented without the benefit of an overall urban transport plan and with little regard for land use planning.
- Severe parking and encroachment problems.
- Responsibilities for urban transport is fragmented, divided between several agencies and often get mixed-up.
- Weak institutional and regulatory setups.
- The rules and regulations need to be updated to implement them more efficiently.
- Inadequate financial base and resource generation.

Most of the problems listed above are closely interlinked and are due to the inconsistent planning and lack of established criteria for undertaking improvement projects on an overall network on a priority basis.

2.4 INFRASTRUCTURE SERVICES

2.4.1 Water Supply

Water supply services in Karachi face major challenges with respect to water quantity and quality. Existing surface water supplies are not sufficient to meet demand today; much more water will be required to enable the anticipated growth of the city district over the next 15 years. Drinking water is not adequately filtered and treated, resulting in quality shortfalls. Underlying both dimensions of the water supply challenge is the issue of management: with non-revenue water at 40% of production and tariffs too low to cover costs, the Karachi Water and Sewerage Board can greatly improve the efficiency of the water supply system by strengthening operational and financial performance.

Bulk Water Production and Transmission:

The current water supply sources for the population, business and institutions of Karachi are the Indus River (646 million gallons per day [MGD]) and the Hub River Dam (60 MGD). The supply is not sufficient to meet existing demand; water is therefore delivered on schedule, for only a few hours per day.

Karachi competes with many other agricultural and urban water users for water from the Indus. The K-IV project, which is intended to generate another 650 MGD of water for Karachi from the Indus, thereby satisfying most future needs of the city district through 2020, is currently under study.

The water flow of the Hub River has been depleted in recently years because of low levels of precipitation. While it has the potential to generate significantly more water, its contribution to meeting metropolitan water needs depends on weather patterns and rainfall.

Sixty percent of the bulk water supply is filtered, while the remaining 40 percent is only disinfected through chlorination. The inadequacy of water treatment results in frequent quality problems for end users.

Water from the Indus flows by gravity through transmission mains to the south east of Karachi City District, and then by a combination of pressurized and gravity mains along the National Highway to the eastern edge of the built-up area and in to the center of the city. Some transmission mains are too small for the volume of water they are now expected to carry. Many illegal and legal direct connections, especially in peripheral neighbourhoods, have been made to the transmission mains over the years, undermining their technical performance.

Storage tanks are insufficient at the metropolitan and town levels most water supply zones do not have sufficient storage to meet the “eight hour rule,” thereby putting local residents at risk of potentially longer periods without water service. Katchi abadis and other low-income settlements are particularly underserved.

Water Supply Distribution

The distribution system is about 40 years old on average and in an advanced state of disrepair. Many pipes are corroded, which reduces effective capacity to transport water. Many pipes are now five to seven feet under ground as a result of repeated build-up of the wearing course of city streets. Valve chambers and air relief valves are buried underground.

The distribution system is pressurized only for short periods (a few hours a day); the continual depressurization and repressurization of the system causes wear and tear on the pipes and allows contamination (wastewater and other) to enter the water supply mains when the pressure is low, causing public health risks.

As a result of the deterioration of the distribution system, technical losses are estimated at 25% of production. The net water supply is thereby reduced to about 530 MGD.

Connections are not metered, and customers pay by norms rather than by actual consumption. There exist no incentives to conserve water. Consumption is generally excessive and inefficient in relation to uses of water. Piped drinking water is used for firefighting, while non-potable ground water is generally available in the city. Piped water is also used extensive for horticulture. There is little or no water re-use.

Operational Issues:

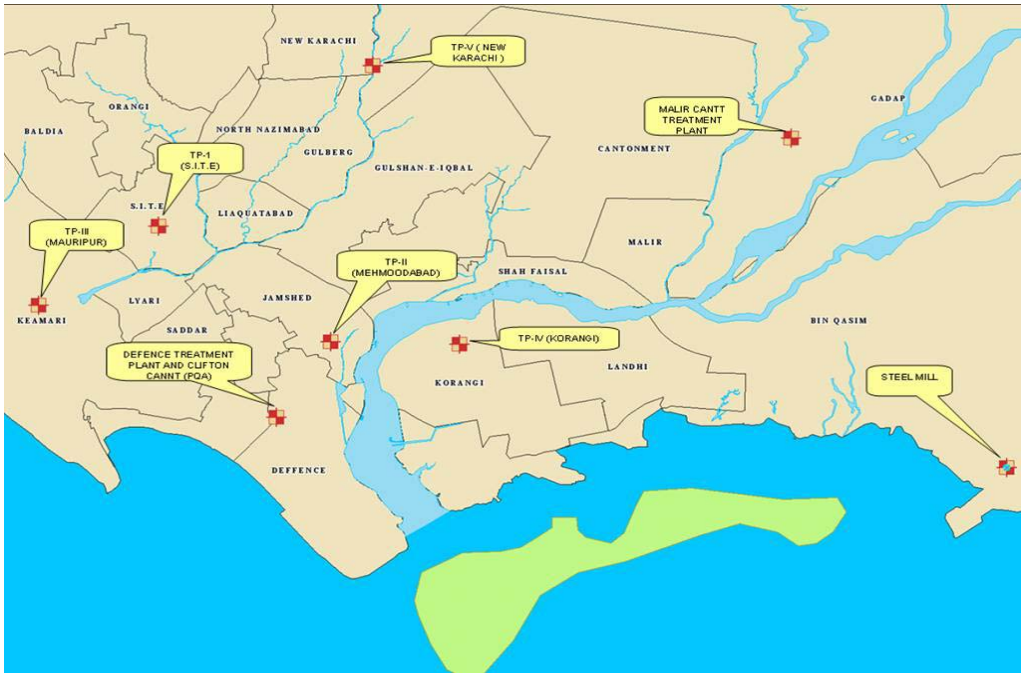
Non-technical losses in the system, including unbilled water, represent about 15% of total production. Non-revenue water is therefore 15% (non-technical losses) + 25% (technical losses) = 40% of total production. It clearly would not be advisable to address current and future water shortages only through capital investment in additional bulk water production. Demand management and operational improvements should be the first line of attack.

Existing water supply tariffs are too low to cover the cost of operation and maintenance, never mind capital investment. There is no sewerage tariff. Developers build projects that require improved infrastructure services, but do not systematically make financial contributions toward the necessary investments. Under the current service pricing scheme, Karachi Water and Sewerage Board is overly dependent on intergovernmental transfers and international assistance to improve the performance of the system and meet the future water supply needs of the Karachi City District.

Collections represent only 60% of billings. Non-payment for services has become endemic in many katchi abadis and other informal areas. At this time KW&SB does not enjoy sufficiently open and trusting relations with customers to embark upon a consensus-based, demand-driven program of improving services, raising tariffs, and increasing collection rates.

2.4.2 Sewerage

Three sewered areas of central and southern Karachi are connected by interceptors to existing treatment plants at SITE, Mehamoodabad, and Mauripur. (see Map 2.3.1) Other areas are sewered but discharge directly into nallah, rivers or the sea without treatment. The main problems in the system are low coverage of the collection network, lack of major interceptors, insufficient treatment capacity, and low operational efficiency of existing treatment plants.



Collection:

The share of the population connected to the piped sewerage system in 1990 was 37%. No more recent data are available. Some neighbourhoods are sewered and connected to interceptors; others are sewered and discharge directly into the natural environment. Katchi abadis and other informal areas have no piped sewerage collection; waste flows through open drains and is discharged without treatment into nallah and rivers. Industrial waste generally flows into open drains and into rivers or the sea without treatment.

Built 25-35 years ago, the sewer network was originally laid close to the road surface but is now located five to seven feet below the wearing course of many roads, complicating maintenance and repair activities. Due to the "crown effect" the absence of vent shafts in larger pipes causes pipes to sink further along main arterial roads and zones of high commercial and industrial activity. Manholes are insufficient in number and poorly maintained. Wastewater pumping in trunk sewers is exacerbated by frequent power cuts, causing effluent overflow through manholes. As a result of poorly sealed joints and damaged manholes, there is a high degree of infiltration of ground water into the network; this increases the volume of wastewater and the loan on treatment facilities.

Due to the lack of sewer interceptors, most sewage collects in nallahs and the Malir and Lyari Rivers, which have in effect become open sewers throughout the length of their passage through the built-up area of Karachi. The unsanitary conditions in the city's main waterways pose serious health risks for local residents and create unpleasant odors in adjacent neighbourhoods.

Treatment:

The current wastewater treatment situation in Karachi is summarized in the table below. In comparison to a net sewage flow estimated at 392 MGD, the capacity of the three operational domestic/mixed use wastewater treatment plants (WWTP) is only 151 MGD. Due to operational inefficiency, only 87 MGD — or 21% of demand — is actually treated in those plants today.

The plants provide primary treatment (filtration) and some secondary (aerobic) treatment. No tertiary (chemical) treatment of wastewater is provided. The WWTPs suffer from blocked pipes, stagnant waters, and mechanical failure. Overall they are working at only about 50% efficiency.

Sewage Treatment Plant Status

Current Situation of Sewage Flow 2005-2006

Present Water Supply		
Indus Source	646	MGD
Maximum Hub Supply	60	MGD
Total:	**706**	**MGD**
Total Losses 25%	176	MGD
Net Supply	530	MGD
Sewage flow 80%	424	MGD

Present Sewarage Treatment Plants

Existing Treatment Plan	Treatment Capacity	Present Treatment MGD	Disposal	Remarks
TP-I (SITE	51.00 MGD	30.00 MGD	Lyari River	Under capacity 60%
TP-II (Mehamoodabad)	46.00 MGD	25.00 MGD	Sea	Under capacity 55%
TP-III (Mauripur)	54.00 MGD	32.00 MGD	Sea	Under capacity 60%
TP-IV (Korangi)	50.00 MGD	-	Sea	To be constructed
TP-V (New Karachi)	5.00 MGD	-	Lyari River	Out of order
Industrial combined flow (Korangi)	10 MGD	-	Sea	Under construction
Malir Cantt Treatment Plant	1.00 MGD	1.00	Reuse	Full Capacity
Defence Treatment Plant and Clifton Cantt. PQA	5.50 MGD	2.00 MGD	Reuse	30%
Steel Mill	15 MGD	15.00 MGD	Reuse	Full Capacity
Retain STP Steel Mill	TOTAL: 237.50	TOTAL 105.00		

Raw sewage in river and nallah and final disposal into sea **319.00 MGD**

Most industrial waste is not treated prior to being dumped into the sea or rivers. The exception is Pakistan Steel, which has on-site pre-treatment of waste; treatment facilities for wastewater from tanneries are also under construction in Korangi. Organized pre-treatment of industrial waste at SITE and Port Qasim are required before such waste can enter the municipal system and undergo additional treatment at conventional WWTPs.

There is no re-use of treated wastewater for uses such as washing cars, watering private lawns or public green areas, or recharging the aquifer.

Operational Issues:

The operational and management problems related to the sewerage system are similar to those for water supply (see above). The service provider, Karachi Water and Sewerage Board, levies no tariffs for sewerage services; the water tariff provides the only own-source funding for operation/improvement of the sewerage system. Developers that build new housing and mixed use projects do not make financial contributions toward the cost of associated required sewerage system improvements. KW&SB does not enjoy sufficiently good relations with customers to embark on a consensus-based and demand-driven program to improve services and raise user charges. As a result, the utility is overly dependent on intergovernmental transfers and international assistance to improve the performance of the system and meet the future sewerage needs of the Karachi City District.

2.4.3 Solid Waste Management

Karachi has a rudimentary and inefficient solid waste management system today. Wastes are not separated before they are collected and hauled long distance to two sites near Karachi's western border. One site may be nearing capacity within the next five years. Most of the transport and one of the two sites are privately operated.

Solid Waste Generation

Karachi's 15.12 million persons and substantial manufacturing and construction sectors produced approximately 9,000 metric tons of household, commercial, industrial, construction and institutional solid waste per day in 2005. Food markets are particularly large generators.

The composition of solid waste is as follows: 55% organic and 5% garden waste, 18% inert, 15% recyclable or reusable, and 7% is suitable for incineration.

Estimate of solid waste generation indicates Karachi will produce 16,000 – 18,000 tons of solid waste each day in the year 2020.

Collection and Transportation:

The collection process is not very well developed. Most households remove their waste to community dustbins. There are more than 4,000 community dustbins across the city. Private-sector contractors to the CDGK and government teams operate a variety of vehicles to clean the community dustbins a few times a week. There are no garbage transfer stations, so the same small vehicles needed to maneuver narrow roads in the city must make long trips all the way to the landfill sites northwest of town.
Estimates indicate 60% of the waste is collected and transferred to landfills. The remaining forty percent is recycled, burnt, dropped in drains and sewers, or eaten by cattle.

Recycling is an effective method to reduce the volume of waste and environmental impact. Certain groups of people in Karachi are able to make a living by scavenging and sorting garbage and finding new uses for selected materials. They sell scrap metal to foundries, discarded bread to livestock farmers, broken glass to makers of bangles and other kinds of jewelry, and used paper to informal vendors of paper bags and wrapping materials. More than 50,000 families earn a living by scavenging the city's refuse. Karachi is probably able to recycle a larger share of solid waste than many cities in the world. Still, one estimate indicates scavengers only process about 10% of all the solid waste Karachi generates.

Some pharmaceutical and fertilizer factories dispose of wastes in incinerators. Some factories have their own incinerators on site, while others utilize commercial services.

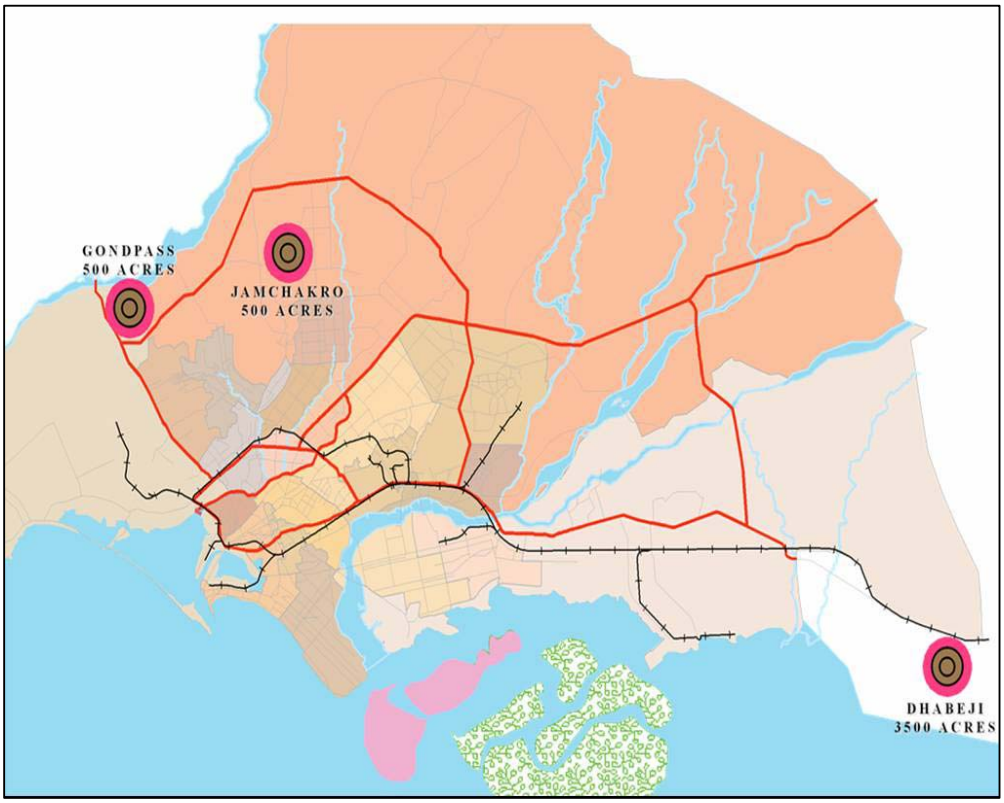
Specialized incinerators designed to destroy hazardous wastes exist to serve hospitals and clinic, but are not said to function well. The management of many more health facilities are unaware of, or not interested in, the service and often dispose of dangerous liquids and chemicals in the general solid waste system.

Existing Site, Capacity, and Processing:

Karachi has two working landfill sites. The Gondpass and Jam Chakro landfills are about 30 kilometers northwest and west of the central city. Both sites cover 500 acres (200 hectares) each, although the volumes of these sites are not known. Jam Chakro has recently been privatized. CDGK now pays the Jam Chakro operator by the truckload to use the site. Gondpass may reach capacity and close in the near future.

All wastes from different sources, including construction, are dumped in Gondpass and Jam Chakro, and there is no separation. There is no processing to compact or otherwise reduce the garbage volume. Open burning and dangerous smoke are common nuisances.

Data on the soil type, preparation and lining, and leachate outflow of these landfill sites are not readily available.



Another solid waste site exists in Dhabeji, east of Karachi's outskirts. The suitability of Dhabeji as a 1,200 to 3,500 acre (480-1,400 hectare) capacity landfill site is being studied. In fact, some waste has already been dumped in Dhabeji, but more arrangements and construction are necessary before it will be a true working landfill able to handle the volumes Karachi generates.

Meanwhile, two more sites along the northern bypass road have been identified and are currently under study. These sites are within the city district, and represent lower transportation costs than Dhabeji.

2.4.4 Electrical Power

Energy is the lifeline of economic growth. Pakistan has historically has been subjected to energy demand suppression due to limited supplies and lack of infrastructure development for provision of energy to the industrial sector. The unavailability of sustained and affordable energy to industry has suppressed economic growth and created declining tendency for industrial investment in the country. The per capita energy consumption, which is one of the key development indicators as well as a measure of quality of life of a country, is low with only 14 million BTUs, as compared to 92 million BTUs for Malaysia and 34 million BTUs for China.

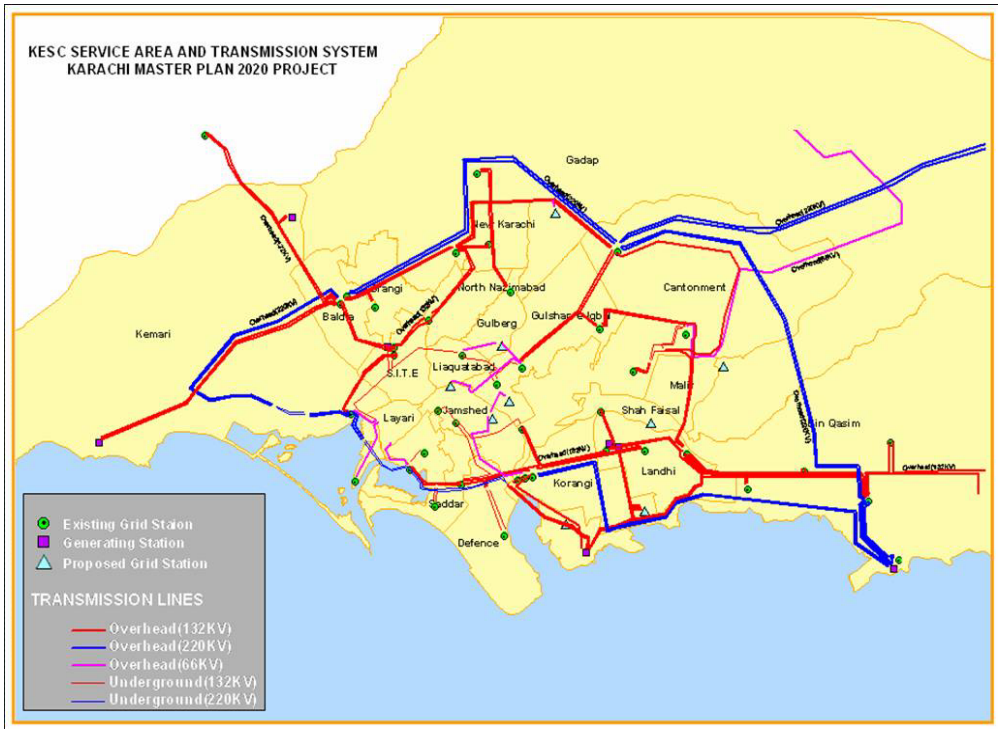
Generation

The electric power is generated by KESC in the following power stations and their available capacities are as follows table 3:

Table-3
POWER GENERATION

Station	Available Capacity (MW)	Source of Energy
Bin Qasim Power Station	1130	Natural Gas & Furnace Oil
Korangi Power Station	215	Natural Gas & Furnace Oil
Site Gas Turbine Power Station	90	Natural Gas
Korangi Gas Turbine Power Station	72	Natural Gas
TOTAL	**1507**	

(Source: KESC Annual Report 2005)



While KESC operates four generating plants, but the bulk of the total energy that it distributes comes from only one plant — Bin Qasim Power Station. The most efficient plant in the grid, it generates energy at the lowest cost per kWh of the four plants.

KESC generating plants employ two fuels, natural gas and furnace oil. KESC is the biggest customer of Sui Southern Gas Company. Due to limitation in natural gas supply, KESC is able to run SITE and Korangi Gas Turbine only during evening peak hours.

The operating capacity, peak demand and load factor for the FY 2004-2005 was as follows in table 4:

Table-4
KESC OPERATING CAPACITY, PEAK DEMAND AND LOAD FACTOR

Description	2004 - 2005
Actual Capacity	1387* MW
Evening Peak Demand	2197 MW
Day Peak Demand	2104 MW
Base Demand (Night)	860 MW
Load Factor	70.25%

(Source: KESC Annual Report-2005)
**BQPS Units 2,3 & 5 were under restoration.*

Therefore to meet power demand, KESC had to import power from the following power plants:

Tapal Energy (IPP).....114 MW
Gul Ahmed Energy (IPP).....113 MW
Kanupp (Karachi Nuclear Power Plant).....40 MW
PASMIC (Pakistan Steel Mills).....10 MW
WAPDA (NTDC).....500 MW
Total.....777 MW

The shortage of power generation led to some extent to load shedding in Karachi.

The KESC transmission system has been integrated with WAPDA since 1978. The links are via 220 kV and 132 kV transmission network. Power import by KESC from NTDC, WAPDA, is via 220 kV. Jamshoro–Karachi double circuit transmission line has a transmission capacity of 500 MW.

KESC is also interconnected with the Karachi Nuclear Power Plant (KANUPP). The plant is inside KESC licensed area under the jurisdiction of Pakistan Atomic Energy Commission. Commissioned in 1970, the KANUPP plant is relatively small plant, with an installed capacity of 125 MW. Presently, it could support only 40 MW via a 132 kV transmission link.

Private power plants Tapal Energy and Gul Ahmed Energy are connected to KESC network via 132 kV transmission lines.

There are at present 52 132/11 kV Grid Stations and 5 220/132 kV Grid Stations linked primarily by a system of overhead transmission lines.

A map showing the existing generating stations, grid stations and transmission lines is attached.

Distribution System:

As of June 2005, KESC had roughly 6,200 kilometers of overhead and underground 11 kV distribution network and 10,500 kilometers of 400 volt lines fed by 9,293 11 kV distribution substations. About 60% of the primary distribution network is underground.

More specifically, electrical power is distributed through:

- 2200 km overhead 11 kV distribution system,
- 4000 km underground 11kV distribution system,
- 9300 distribution substation (11/0.4 kV),
- 9600 km over-head L.T and
- 921 km under-ground L.T network

Customer of KESC break down as follows:

- 1.4 million residential,
- 0.4 million commercial
- 32,000 industrial

Total energy supplied to different types of customers last year (2004-05) in Mwh was as follows:

Residential 3,508,000

Commercial 888,000

Industrial 3,023,000

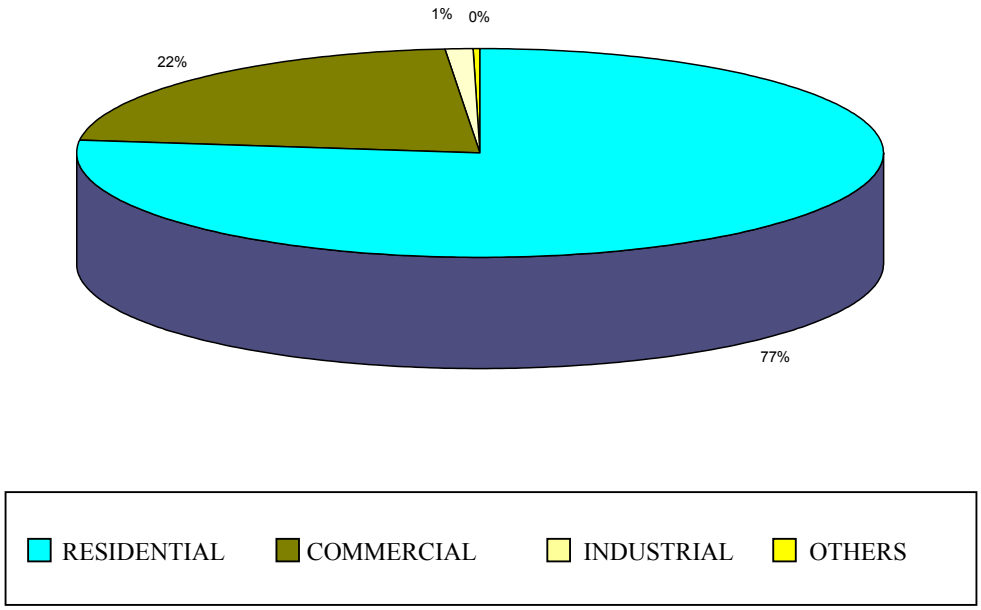
Others* 997,367

*Agricultural, street lights and special contracts

Number of consumers, categories wise, and their consumption is shown in figure below 5.

ELECTRICAL ENERGY SUPPLIED Vs NUMBER OF CONSUMERS
Fig 5 MWh

2004-05
NUMBER OF
CONSUMERS



2.5 SOCIAL SERVICES

2.5.1 Health

Introduction

Karachi's health care system is facing issues that are both challenging and growing as the city rapidly expands. Health care needs by the year 2020 will have grown exponentially from where they are today. An estimated 90 percent the city's population will have to rely primarily on the public health care system, including its primary, secondary, tertiary and specialized centers.

Pakistan as a whole is in the middle of an epidemiological transition. Almost 40 percent of the total burden of disease is now due to infectious/communicable diseases such as diarrheal disorders, acute respiratory infections, malaria, tuberculosis, hepatitis B and C, HIV/Aids and preventable childhood illnesses. Non-communicable diseases, including a high rate of breast cancer, hypertension, diabetes, systemic heart disease and lung cancer present more traditional problems for Karachi's overtaxed health care facilities.

The majority of health related issues for both communicable and non-communicable disease are basic in nature. A public awareness campaign through all forms of media, meetings and events is needed to increase population awareness of key health and environmental issues. People need to know more about potential diseases, what to do about them, and where they can be treated. At the same time, efforts to improve the health care system must also be coordinated with health education, improved water supply, sanitation and solid waste collection, improved food quality control, population planning and inoculation against disease.

Facilities:

Public Health System facilities in Karachi include: (1) outreach and community-based activities that focus on immunization, malaria control, maternal and child health, family planning and the Lady Health Workers program; (2) primary care facilities that focus on outpatient care; (3) taluka and district headquarters hospitals for basic inpatient and outpatient care; (4) tertiary care hospitals; and (5) teaching hospitals and centers of excellence.

Major deficiencies exist in both the quantity and quality of these public health care facilities. The current system has 33 hospitals, 271 health centers and 152 dispensaries. It includes an estimated 15,000 beds, of which 9,000 are in the tertiary and teaching hospitals and the remaining 6000 dispersed among the primary and secondary facilities. The ratio of beds to people is 1 to 1700 in the tertiary and teaching hospitals and 1 to 1020 for all public health facilities. The private health care system has 356 hospitals (of which 145 are large), 391 maternity homes, 2,347 dispensaries and about 6,600 beds.

Requirements for the year 2020 indicate the need for more than 2,000 public health care facilities, many of which will be primary and secondary level health centers, and 52,000 beds, based on standard ratio of 1 bed for 500 people.

The maintenance of buildings, medical equipment and vehicles is not properly funded nor managed and has become a major problem at the primary and secondary levels. Considerable budgetary savings could be achieved if funds were made available and maintenance done in a timely and proper manner.

Staffing:

There are 4,600 registered doctors and 10,739 public and private sector health care workers active in the city. The National Planning Commission has set a standard of 1 health care worker per 1,000 people, which translates into a requirement for at least 25,000 health care workers by the year 2020. By that time, the number of health care workers will need to more than double with an increase of some 15,000 workers. This includes nurses, paramedics, medical technicians, pharmacists and other technologists. There is also an urgent need for trained health care managers who can deploy existing health care resources in an effective manner. Much of this type of management, including referrals, currently is being done by doctors who are not trained in the art of delegating services to different levels and/or members of the health care system. At present, there is no well-defined policy on human resource development or in-service training opportunities that would enable health care workers to upgrade their skills.

Access to Health Care Services:

Many people in Karachi either do not use public health facilities at the primary level. They do not use health facilities at all or prefer to go to private ones. If they do use public facilities, they try to attend the larger hospitals, even for minor ailments that could be treated more effectively at the primary or secondary levels. Hospitals are overburdened as a result of this situation and the cost of delivering simple services is increased.

This problem is due in part to the inequitable distribution and poor geographic location of many primary health facilities. Most of these centers are housed in run down buildings that operate for only a few hours per day. Many are also deficient in female staff and basic medicines. The quality of care they provide is highly variable. but generally perceived to be poor.

Funding for new and improved health care services is inadequate. While health care funding has increased from Rs 9,257 million in 2004-2005 to Rs 12,885 million in 2005-2006, its percentage of the budget has remained at 28-29 percent. Administrative devolution has empowered CDGK as an important financial intermediary that will need to account for 60 percent of the total government health expenditure in its budget. The regularization of user fees within the total health care delivery system will be important for the overall sustainability of the system.

Finally, the city's emergency and ambulance system needs to be improved. At present, the Edhi system is the only organized system able to provide efficient health related transport and work with first responders trained to provide initial treatment.

2.5.2 Education

The SES of 1987/1988 showed a literacy rate of 75% in the formally planned areas of Karachi and 49% in the unplanned ones. Subsequently, key development priorities were identified in Plan 2000 that included an increase in literacy and primary school enrollment in the unplanned areas of the city. A particular emphasis was placed on education for girls. The Government of Sindh, Federal Government, the then KMC, private sector and voluntary organizations all provided education facilities in the city.

The Pakistan Social & Living Measurement Survey of 2004-05 showed a 72% literacy rate for the urban areas of Sindh. The rates were 80% for men and 62% for women as shown in the following table 6. The overall literacy rate for urban areas in Pakistan was 71%. A socio-economic survey conducted by consultants in 2005 showed a similar rate of 71% for city of Karachi.

Table 6: Literacy Rates in Pakistan and Provinces (% population)

Area	1998-99 PIHS			2001-02 PIHS			2004-05 PIHS		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Pakistan	45.0	59.0	31.0	45.0	58.0	32.0	53.0	65.0	40.0
Rural	36.0	52.0	20.0	36.0	51.0	21.0	44.0	58.0	29.0
Urban	65.0	73.0	56.0	64.0	72.0	56.0	71.0	78.0	62.0
Sindh	51.0	65.0	35.0	46.0	60.0	31.0	56.0	68.0	41.0
Rural	35.0	53.0	15.0	33.0	51.0	14.0	38.0	56.0	18.0
Urban	69.0	79.0	58.0	64.0	74.0	54.0	72.0	80.0	62.0

Source: Pakistan Social & Living Measurement Survey 2004-2005

About 73% of the overall primary school-aged group was enrolled in school, with some 79% of enrolled in public schools. At the same time, roughly 40% of the secondary school-aged population was enrolled in school. While teacher/student ratios were generally adequate, many of these schools lacked necessary facilities. Most did not have playgrounds or had only limited facilities for indoor games. Karachi had 221 tertiary educational facilities that included colleges and technical / vocational institutions. The participation rate dropped substantially at the tertiary level of schooling, with only about 3% of the school aged population enrolled.

Table 7: Percentage of School Age Population and Enrolment Targets

Percentage of School Age Population in the City Population	
Primary Schools	14%
Secondary Schools	13%
Tertiary Schools	11%
University	9%
Enrolment Targets in Terms of School Age Group	
Primary	100%
Secondary	90%
Tertiary	20%
University	5%

There are some 465 voluntary agencies registered with the Government of Sindh's Department of Social Welfare. Many of these agencies (22.2%) are reported to be inactive, so no details were available concerning their activities. Others, such as the Edhi Welfare Center, Orangi Pilot Project and All Pakistan Women' Association, render multiple social and welfare services to Karachi's resident population.

Table 8: NGOs by Focus of Activity

Activity	Number	Percentage of Total
Education	25	5.4
Health	32	6.9
Multi Purpose*	98	21.1
Industrial / Vocational Center for Women	18	3.9
Community Welfare	12	2.6
Service to Handicapped	17	3.7
Women, Children and Youth	60	12.9
Welfare Service	58	12.5
Other Purpose	42	9.0
(not mentioned in survey)	103	22.2
Total	**465**	**100.0**

* Included industrial homes, MCH Centers, education and recreational services

Current statistics for Karachi show that 44.4% of the 566,998 enrolled students are male and 55.6% female. Though these figures appear progressive in terms of gender development, the number of female students enrolled in secondary schools drops by an average of 25% from those enrolled in primary school in many of Karachi's towns. In some towns, including Jamshed, Shah Faisal, Landhi, Korangi, North Nazimabad, New Kararachi and Gulberg, there is an encouraging increase in the number of female students in secondary schools when compared to primary. Nevertheless, the number of female students drops even more dramatically when going from secondary schools to higher educational institutes. Only in North Nazimabad does the number girl students increase.

Though most towns have a high ratio of girls to boys, Malir, Bin Qasim and Gadap have more boys than girls attending schools. This is especially true for secondary schools. The teachers, however, are predominantly women (66.8%) compared to men (33.2%).

The Sindh Education Department has executed a complete census of government run educational institutions and analyzed the results by town. These data have been entered into the Sindh Education Management Information System (SEMIS), which provides statistics on institutions, student enrollment and teachers for the year 2002. Some of projected needs for 2020 are shown in the following table:

KARACHI MASTER PLAN-2020

Town No.	Town Name	EDUCATION FACILITIES AS PER UC'S DATA								
		Primary School	Enrolment	Teachers	Secondary School	Enrolment	Teachers	Colleges	Enrolment	Teachers
1	Kaimari	119	13,685	761	84	13,356	537	16	27,712	464
2	S.I.T.E	107	13,375	642	159	33,867	1,876	10	21,650	290
3	Baldia	141	14,664	578	287	69,167	3,214	32	13,856	928
4	Orangi	269	29,859	1,156	261	66,555	2,427	6	3,897	174
5	Lyari *	198	27,324	1,446	169	39,208	2,028	8	3,464	145
6	Saddar	198	23,166	1,782	278	69,500	4,448	28	24,248	812
7	Jamshed	190	32,490	1,900	249	56,523	4,233	54	23,382	1,566
8	Gulshan-e-Iqbal	231	39,501	2,310	285	62,700	4,845	56	136,385	1,624
9	Shah Faisal	146	23,214	1,520	206	67,568	3,708	17	13,086	493
10	Landhi	263	63,120	2,104	255	116,535	4,335	13	13,509	377
11	Korangi	271	65,040	2,168	180	82,260	3,060	9	7,794	261
12	North Nazimabad *	101	13,837	1,515	417	56,712	4,587	9	5,631	261
13	New Karachi	252	48,636	2,016	228	88,008	2,964	11	7,938	319
14	Gulberg	99	17,424	990	181	45,250	3,185	25	10,825	725
15	Liaquatabad	244	38,064	2,440	164	34,276	2,624	16	11,084	464
16	Malir	206	20,394	824	156	19,812	936	7	3,464	203
17	Bin Qasim	188	30,644	564	146	20,440	1,022	11	9,526	319
18	Gadap	227	11,350	295	188	5,828	376	31	13,423	899
TOTAL:		**3,450**	**525,787**	**25,011**	**3,893**	**947,565**	**50,405**	**359**	**350,874**	**10,324**

** Data from semis only*

High enrollments are projected for the towns of Landhi Korangi, New Karachi, Jamshed-Gulshan and Lyari. The lowest needs for educational facilities are expected in the towns of Gadap, Keamri and North Nazimabad. These needs ultimately will need to match the real population and spatial growth of each town over the period until 2020, as well as their socioeconomic standing.

Special Education:

Special education is a relatively new area of education in Pakistan. The education and rehabilitation of persons with disabilities was previously a concern of the Ministry of Education and Social Welfare. This continued for some time until observance of International Year of the Disabled in 1981 led to greater recognition of the need to provide better accessibility and means of communication for the disabled population.

Disabled Population in Pakistan:

According to the 1961 population census, 0.34% of Pakistan's population disabled. The 1973 Housing and Economic and Demographic survey showed that 0.8% of the total population was disabled, while the 1981 census reported 0.45%. The total number of disabled persons based on the1998 population census was 3.3 million, or about 2.5% of the total population. The following table 9 shows the distribution of these disabled persons by nature of their disability.

Table 9: Disabled Population by Disability Category

Disability		Percentage of All Disabled
A	Blind	8.06
B	Deaf and Mute	7.04
C	Crippled	19.0
D	Insane	6.40
E	Mentally Retarded	7.60
F	Having more than one Disability	8.21
G	Others	43.33
Total		**100 00**

2.5.3 Recreation

Karachi has a good number of recreational parks and gardens at the metropolitan level, but an inadequate number of playgrounds and sporting facilities for different age groups and genders at the local levels. There are too few local level playgrounds, stadiums, indoor gymnasiums, football and hockey grounds, cricket fields and tennis courts. The limited facilities that do exist are generally in substandard condition and not well maintained.

Thus, while there are a number of major recreational facilities at the metropolitan level, they are noticeably lacking in the different towns and neighbourhoods. This is particularly true for the heavily built up areas of the inner city, including, for example, Lyari, Liaquatabad, Kharadar and their immediate surroundings.

The Land Use survey of 2005 showed roughly 4,800 acres being used for recreational activities. This gives an overall city average of 0.34 acres per 1000 persons. Most of the towns in Karachi have less than 0.5 acres of recreational area per person. Some, like Korangi and North Karachi, have been subject to land grabbing and have lower ratios of only 0.17 and 0.19 acres per 1000 persons. Three of the 18 towns have ratios that are even less than 0.1. These include Liaquatabad and Lyari, both with 0.06 acres per 1000 persons and Baldia with 0.03. Gulshan-e-Iqbal is at the upper end of the scale with a ratio of 0.75 acres per 1000 persons. This is due to the location of Safari Park, one of the largest recreational areas in Karachi covering some 354 hectares, and the National Stadium and Coaching Center which covers roughly 104 hectares.

The Karachi coastal zone runs for several miles along the southern edge of the city. It offers a unique opportunity for both local recreation and international. It is open to swimming most of the year, except the summer when tides are too high, and presents a variety of spatial experiences that include beaches, bays, back water areas, creeks, mangroves and small islands.

2.6 Urban Environment

The urbanization of Karachi has seriously impacted the natural environment on which it depends and must be considered if the city is to sustain future development. To do this, the necessary infrastructure facilities and regulations must be put in place to properly manage its natural resources and prevent their further pollution. This section provides an examination of the current environmental problems and trends in Karachi city district, presented by the following components: land use, water supply, sewerage and wastewater disposal, industrial pollution, coastal marine environment, and air pollution.

Water – With it's close proximity to the Arabian Sea, the Indus river and the Malir and Lyari rivers, Karachi enjoys ready access to major water sources in an otherwise arid country. Karachi's maritime desert ecosystem provides Karachi with a relatively mild climate and near-constant high humidity, ideal for it population to flourish. But the unfettered development of Karachi's growth has begun to have seriously negative impacts on the natural environment that sustains it, particularly its water resources.

Water Supply – Karachi faces a shortage in water due to growing demand and non-dependable supplies. Wells dug in the Malir river bed at Dumlotti, the city's original source of water, are no longer a dependable source of water as overuse and bulk consumption by farmers has dried up the wells. Water sourced from the Hub Dam was cut off in 2002 when its supply dried. To help fill the gap in supply, Phase 3 of the Greater Karachi Bulk Water Supply Scheme was launched in 2006.

Inadequate water supply has given rise to use of ground water from depth exceeding 10 metres in core areas and 150 metres in the suburban areas. In Orangi Town and Gadap Town signs of salinity intrusion are apparent.

Water Pollution – Poor installation and maintenance of the water supply lines has reduced the distribution systems capacity and polluted the water reaching the end users. In old Karachi in particular much of the pipes have deteriorated and are due for replacement. Faulty pipe connections and ruptures have allowed water to leak and pool underground and at the ground surface. This has provided a breading ground for biological contaminates and infiltration of sewage from leaking sewerage pipelines that are crisscrossing the supply lines. These pools of water are sucked back into the supply lines during idle hours contaminating water piped from the Hub Dam and Indus river. Plugging the seepage could help in making a major improvement in the quantity of water available to the end user.

Many studies have found widespread contamination including one conducted by the Aga Khan University which found pathogenic organisms in 335 out of 338 samples of water taken from different parts of the city. As a result, much of the water available in Karachi does not meet the water quality guidelines as proposed by World Health Organization.

Open sewerage channels cutting through Karachi's neighborhoods have also exposed residents to many diseases. And their release into the Malir and Lyari rivers which traverse the city have turned them also into open sewers, impacting the harbor marine environment downstream. Any water that might dilute this discharge in the rivers has virtually dried up from consumption upstream.

Excessive loading of nutrient and chemical contaminants into the Lyari River system, have rendered much of the natural aquatic and terrestrial habitat associated with a river of this size virtual uninhabitable. Air pollution, solid waste, dumping of industrial sewage, and runoff from adjacent agricultural and other land uses further contaminate the Lyari River.

The excavation of millions of tons of sand and gravel from these riverbeds has extensively degraded them and the Hub River and caused irreversible damage to their environment by exposing the rock bottom of the respective riverbeds thus making it vulnerable to flash floods.

Sewage and Wastewater Disposal - More than 300 million gallons (mgd) wastewater is generated daily in Karachi out of which only approximately 90 mgd is treated daily at the wastewater treatment plants and the rest is dumped in the Arabian Sea where it causing tremendous pollution. Poor industrial wastewater disposal practice and lack of private and public industrial waste water treatment facilities also results in the direct discharge into surface drains and nallahs. The treatment plant capacity of Karachi must be increased if the city's growth is to be sustained.

Coastal Marine Environment - The Karachi coastline, which stretches over 135 km, is facing severe pollution from industrial, port, municipal, and transportation activities in the area. Effluent of Malir and Lyari rivers is also a major contributor. The marine environment is being overwhelmed with pollution discharged in the shipping process into the marine environment. A recent study found that some of the marine life was contaminated with lead. When consumed by humans through seafood, this has been linked to anemia, kidney failure, and brain damage.

The coast line is heavily dependent on the mangrove forests that line the coast to maintain the marine environments ecological balance. The mangroves provide habitat for a complex and interdependent community of invertebrates, fish, birds, and reptiles.

Air pollution – air pollution is a significant environmental problem in the Karachi City District caused by automobile exhaust, industry emissions, open burning of garbage, and domestic/commercial fuel sources. Firewood, cow dung and solid wastes are still used as alternative sources of energy in certain parts of the city, particularly the villages and Katchi Abadis biomass is used by 17,000 households, or 2.01%, of dwellings in the city, according to Bureau of Statistics.

Vehicular traffic has increased significantly in recent years, far exceeds the capacity of the city district's roads. Air pollution and noise pollution levels along road sides and at intersections exceed the limits recommended by World Bank and WHO Guidelines as well as National Environmental Quality Standards of Pakistan. Such high levels of air pollution cause serious public health concerns such as asthma and respiratory ailments. Traffic safety and negative impacts on urban ecology such as early senescence and dwarfing of trees are also of concern.

Open burning of **garbage** at the landfill sites is another major source of air pollution. Solid waste disposal from the industries has also contributed to environmental degradation. The waste is dumped outside the factory premises (especially in the case of ceramic industries) or burned in an incinerator on the factory premises. Incinerators are not always designed for hazardous waste being disposed such as pharmaceutical factory waste, hospital waste or other chemicals like pesticides.

Land Use – The urban sprawl covering the largely flat or rolling plains of the greater Karachi area is taking its toll on flora and fauna habitat and its biodiversity. This is caused from disturbance or destruction of sensitive habitats for birds, mammal and reptile species during construction. Encroachment of the built environment into rural areas and vacant recreational land or otherwise natural habitat is further driving habitat fragmentation and destruction. The increase in impervious surface is also increasing run-off which caries pollution, decreases groundwater recharge, and increases chances of flash floods.

2.7 LOCAL GOVERNMENT FINANCE

2.7.1 Summary of Main Findings

This section describes the financial situation of the City District Karachi Government and lower-level government under the national Local Government Law of 2001, the Sindh's Local (City) Government Ordinance of 2001, and other statutes that define their ability to plan, budget projects, and raise revenues. More important, the following text describes local government's revenue, expenditures; the budgeting process, and the city's overall financial health. Above all, this fiscal section discusses the local government's ability to generate operating surpluses and raise capital to fund the expansion of infrastructure.

2.7.2 Structure and Responsibilities of Government

There has been considerable effort to decentralize government decision making in recent years. Local governments remain dependent upon the province and federal government for transfers of fund for their budgets. The financial and underling planning institutional roles are relatively new arrangements.

The only government responsible directly for the entire Karachi study area is the City District Government of Karachi (CDGK.) It comprises 18 subsidiary districts (or towns), and each district contains several union councils.

The City District also has important planning responsibilities for the entire city's physical development through the Karachi Building Development and Control Agency. Meanwhile, districts and union councils retain the responsibility to prepare detailed local level plans. They can use their revenues to fund specific infrastructure investment projects, although their funding base is small when compared to KCDG's.

Meanwhile, under the Karachi Building and Town Planning Regulations of 2002 (and amended in 2005) Karachi shares planning responsibilities with various national and provincial government bodies with important roles in the city – such as Cantonment Boards of the Ministry of Defence, Karachi Port Trust, Pakistan Railways, Ministry of Works (GOP), Sindh Industrial Trading Estate (Karachi), Sindh Katchi Abadies Authority, and Sindh Board of Revenue. These bodies can draw on their internal revenue streams to implement specific plans concerning land they control.

The finance of investment, maintenance and general operations of the capital improvements described under Karachi Master Plan 2020 are the responsibility of local governments. The 18 districts comprising Karachi are responsible for planning, infrastructure and services within their boundaries (except for those services the CDGK are responsible for.) However, the principal of transfer funds descending from one level of government to the lower means that districts are much more limited than the city in what they can actually implement, and union councils all that much more so.

CDGK manages the Karachi Water and Sewerage Board and supplies the necessary investment funds to expand and upgrade its operations. The city government is also responsible for roads and bridges and associated functions (e.g. street lighting.) A large city-wide project such as the proposed light rail system would presumably be a city government responsibility.

2.7.3 Planning

Karachi Master Plan 2020 provides a framework to guide the city government in planning and decision making. It aims to ensure CDGK practices sound financial management in its operations while maintaining and expanding its capital stock. All planning leads to specific capital development proposals, and those proposals require budgets.

Development plans for specific projects should follow this series of stages:

- Planning
- Identification
- Preparation/formulation
- Appraisal
- Approval
- Implementation
- Management
- Evaluation

The appraisal includes evaluations of a project's financial and economic feasibility. (The last three stages refer to post-approval execution of the project.)

Many planning inputs will come from union councils to districts and from districts to CDGK.

2.7.4 Local Government Budgeting

Each local government must develop financial policies to articulate the direction of government actions and related financial plans. The policy statement should articulate each local government's missions and visions, service deficiencies, management and staffing changes; and the consequent cost implications, revenue improvements or expenditure adjustment.

The essential elements that must appear in a local government budget are the numbers representing:

- Grants (or transfers) from other levels of government
- Amounts available under different funds
- Expected revenues for the next year
- Expected expenditures in the next year

The budget document should also highlight new expenditures, and detail the development program.

There should be complete information about the budgeted and actual expenditures in the last year, and statement of the local government's accounts.

The focus of the local government budget is on its expenditures. The budget presentation should separate out recurrent (i.e. operating) expenditures and development (i.e. capital) expenditures.

The relevant local government Council must approve the budget. A budget's expenditures and revenues must balance, and requires participatory discussions on the underlying plan before the Council can seriously consider it. Many local governments discuss their plan and budget with a Citizen Community Board containing non-elected officials, so as to involve members of the public and engage them in the vision associated with the development program.

The Nazim presents the budget to the Council before the commencement of each fiscal year. Adjustments made to the budget during the fiscal year require Council approval.

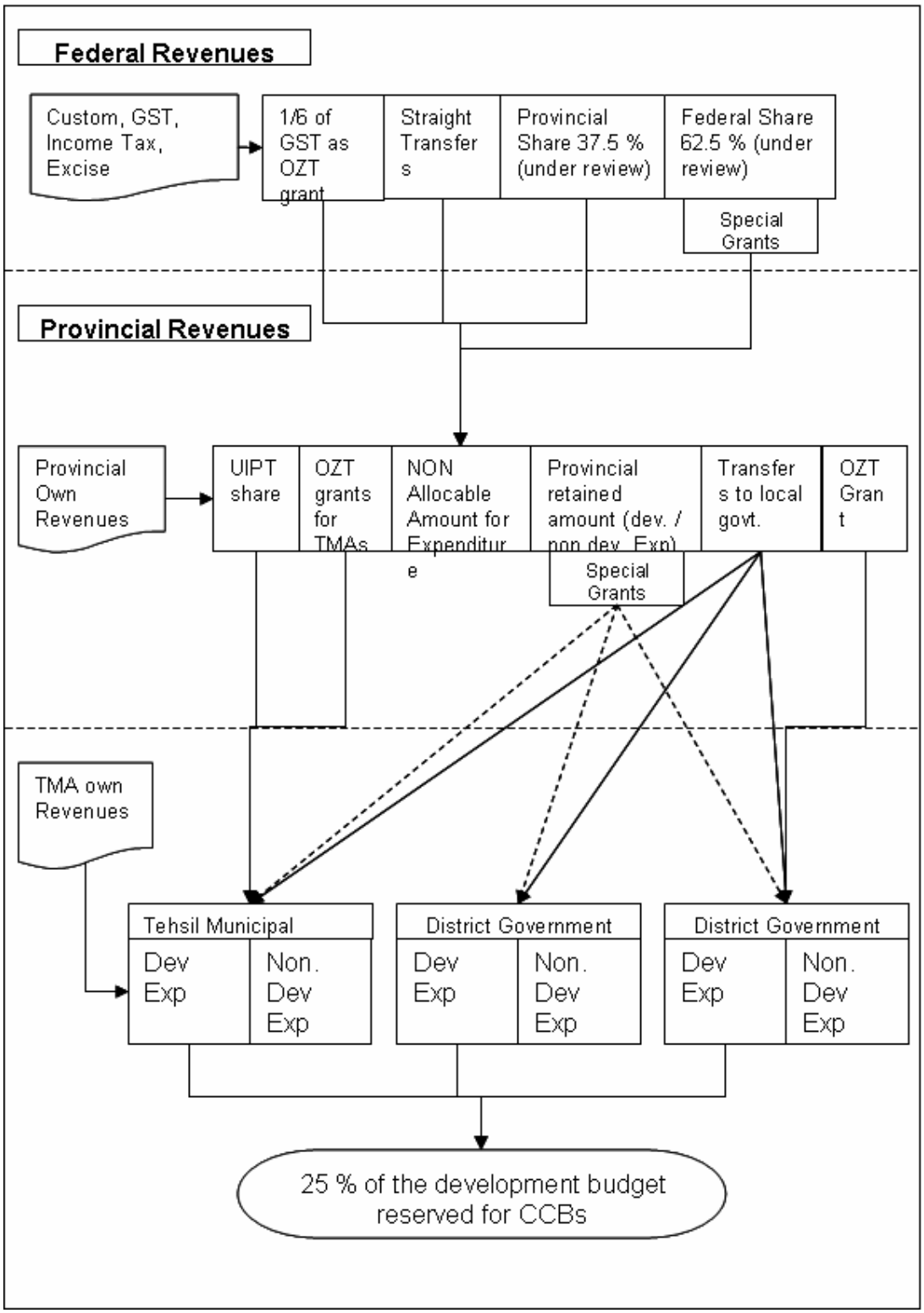
The CDGK's projected surplus in the current fiscal year is quite substantial: 897.2 crore Rupees (5,305.9 crore revenues minus 4,408.7 crore expenditures.) This represents 20 percent of expenditures, or 17 percent of revenues. This fiscal year's budget surplus is extraordinary: in previous years Karachi ran small (3 percent) deficits. This year's surplus is largely a result of the large transfers of funds to the Tameer-e-Karachi Programme (PRSP) program.

2.7.5 Local Government Revenues

The SBNP Ordinance 2001 prescribes the following funding sources to be utilized by districts and unions:

- Transfers and grants from other levels of provincial and federal government,
- Authorized taxes and charges,
- Rents and profits from local government assets, investments, bank accounts
- Gifts and grants from outside institutions and individuals,
- Fees, fines,
- Refundable deposits,
- Receipts accruing from trusts,
- Deferred liabilities.

Figure 10: Transfer of Funds Across Governments



Transfers are the most important source of local government revenue. Provincial governments receive many of their revenues from the federal government, and agree to provide 25 percent of that to local governments under a formula agreed upon by provincial and local government officials. KCDG receives provincial and federal transfers and consolidates them in their budget, including those transfers they then pass on to constituent districts and union councils.

The chief transfer derives from the 2.5% GST the federal government collects and dedicates to local governments. Grants for annual development plans (ADPs) are discretionary or special-purpose funds the federal and the provincial governments transfer to the city, the districts, and the union councils. Transfers may also come from foreign donors.

A local government council has the power to create, adjust, or abolish its own taxes, cesses, fees etc… according to the law.
Local governments cannot assume debt.

The revenue estimates for the 2006/07 fiscal year budget are as follows:

Sources of Revenue
City District Government of Karachi
2006/07 Fiscal Year

	Value (Crore Rupees)	Share of Total
Government Grants	1,348.0	25%
Taxes	309.4	6%
Receipts from Other Agencies	150.0	3%
Fees, Rents, Rates, Local Taxes…	593.2	11%
Other Receipts	2,905.4	55%
Total Revenues	5,305.9	100%

"Other Receipts" represent half of KCDG's revenue. This includes 1,496 crore earmarked for districts, but consolidated in the financial plan. A large bulk of the transfers from the province and federal government fund devolved functions now operating in the city government. “Other Receipts” also include the Tameer-e-Karachi Programme; and receipts from KWSB and KDA.

“Other Receipts” also consolidates 1,496 crore Rupees Town [i.e. District] Annual Development Plan transfers to lower-level government for development projects. CDGK will transfer this money to districts and union councils.

The chief taxes are property tax, as well as advertisement and hoarding fees, and parking charges (which are classified as taxes.)

The chief fee income sources derive from the sale of scrap and suplus stores, "income from revenue offices," and from land rents.

2.7.6 Expenditures

CDGK's expenditures for the 2006/07 fiscal year are as follows:

Expenditures
City District Government of Karachi
2006/07 Fiscal Year

	Value (Crore Rupees)	Share of Total
Recurrent Expenditures	571.0	13%
Development Expenditure	3,837.7	87%
Total Expenditures	4,408.7	100%
Surplus/Deficit	897.2	20%

Seven-eights of all CDGK's expenditures are for development: capital expenditures. The principal development expenditures are devoted to lower-level Town [i.e. District] Annual Development Plan (Rs. 1,496 crore), the Malir and Lyari Development Projects (Rs. 1,396 crore), KW&SB (Rs. 531 crore), and Community and Social Services Infrastructure (Rs. 337 Crore) Expenditures on roads and bridges are only Rs. 77 crore.

Many of Karachi's public service – electricity and public transportation – are completely privatized, and do not factor into the city's expenditures above. The KW&SB on the other hand, is an arm of the CDGK; and this utility's expenditures appear consolidated within the city's budget. Large transfer from higher-level governments to be passed on to districts and union councils are similarly consolidated.

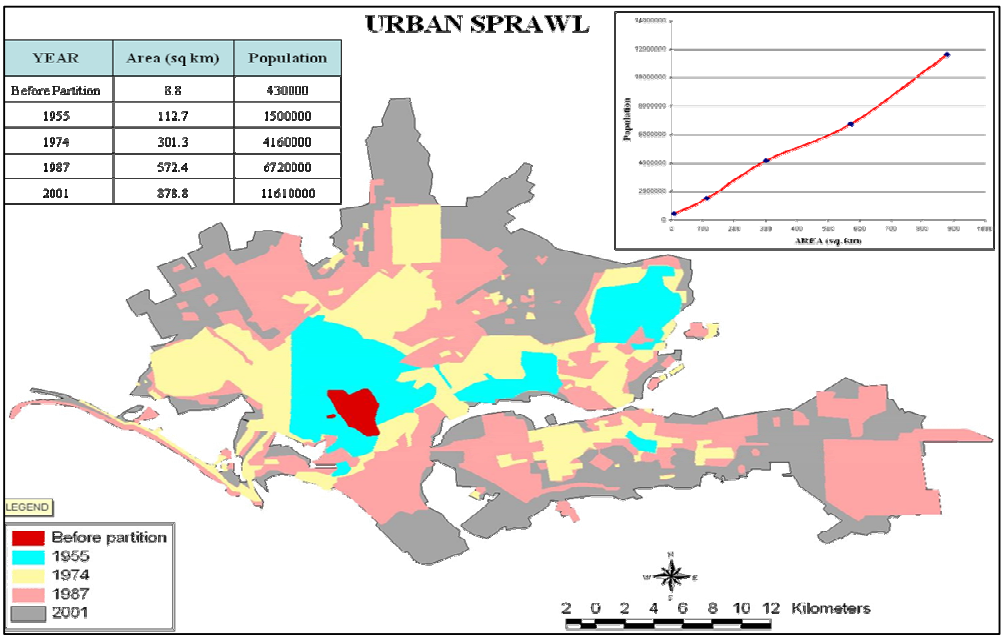
2.8 LESSONS FROM IMPLEMENTATION OF PREVIOUS DEVELOPMENT PLANS

The previous Master Plans, especially those of 1974 and 1998 which were major efforts in this sophisticated field, were studied and evaluated by the consultant. An Evaluation Report covering various sectors and Plan components was also prepared. Emanating from that certain lessons learnt from this evaluation exercise and some basic conclusions drawn in selected sectors, with the objective of pointing to the gaps as also to certain positive policy recommendations are summarized in the following sections.

An objective and professional study of the macro urban planning endeavors undertaken for Karachi since the creation of Pakistan leads to the conclusion that due to non-legislative cover and lack of follow-up during implementation, master planning exercises have not achieved the intended results.

The Development Plan 1974-85, for example, was not approved and put into effect as a statutory plan by the relevant agencies. A high level Metropolitan Planning and Development Committee, set up under the chairmanship of the Chief Minister of the Province, also stopped functioning prematurely. The status of the plan was relegated to that of a local level document, although it was conceived as an important national level project. The Plan's coverage of areas beyond the then Karachi division boundaries, thus overstepping the KDA's jurisdiction, may also have contributed to erecting a handicap in its smooth approval.

The planning process envisaged in the plan relied on the Karachi Development Authority, especially its Master Plan and Environmental Control Department, to be responsible for controlling and monitoring development and guiding it within the framework of the Plan. However lack of required resources, absence of clear mandatory backing and possibly political support, and also perhaps an indifferent professional commitment, all would seem to have contributed to ineffective realization of the Plan.



The Development Plan 1974-1985 also emphasized the need for developing a rapid transit system and for identifying and earmarking adequate right of way for a light rail system, to cater to the daily commuters. In 1980, a Karachi Mass Transit system was planned but did not make much headway. Meanwhile a Traffic Engineering Bureau was also set up for traffic management and control functions and to plan widening of city roads, etc. As per Plan recommendations, a regional road network was designed. Also the location of Marshalling Yard at Pipri was finalized in accordance with the Plan.

During 1975-78 no new housing scheme was launched by the KDA, except for Metroville-I. By the end of Seventies however, the KDA planned 200,700 residential plots in various schemes. Of these, about 55,800 plots actually materialized for occupation. Due to the slow pace of progress on formally developed plots/ schemes, the phenomenon of informal sector shelters began to grow. All types of public owned land tended to be vulnerable and most of it was brought under illegal occupation. The land mafia also took the opportunity and grabbed land as and where it could to sell it to the poor families desperately needing a modest and affordable shelter. The land grabbers served as an intermediary for settling in-migrants and other low-income families into newly set up hut clusters and unplanned settlements. The gap between available residential facilities in properly planned schemes and blocks of flats etc, and the demand with low affordability, grew with time to the extent that now over half the city population is said to be living in katchi abadis or in informal and mostly illegal settlements.

It is now to be acknowledged and realized, albeit belatedly, that for any Plan to be successful, it has first and foremost to house the incrementally growing population and provide needed services. And as far as possible, realistic standards may be set to keep the costs of such development and basic provisions within the reach of the common man with limited affordability.

The planners have to realize the fact that in Karachi, like many other cities of the developing world, a lot of infrastructure development takes place in the absence of any plan. Integration of such ad-hoc or haphazard development in the planned city structure will always pose a challenge to the planners.

The city planners and managers have to acknowledge the increasingly vital role of the informal sector and to be prepared to channel its contributions for the development of the city.

KDP 2000 proposed densification, but did not elaborate specific schemes, policies, or mechanisms for achieving it. Greater precision and elaboration are required.

Involvement of all the stakeholders, NGOs, CBOs, media, professional and academic institutions during various stages of project formulation from concept to finalization stage may be ensured for evolving more acceptable Plan, proposals and strategies.

The implementation team should be equipped with new skills and should also be ready to apply an unconventional approach to manage the Plan even when there are any abrupt socio-political changes in the society.

Thus in this scenario, the most important lesson for the planners is that master planning needs to be undertaken with clear commitment and political will for proper implementation of the Master Plan recommendations.

3.0 PROJECTED POPULATION AND REQUIREMENTS

Population Projections

The consultant developed four population growth scenarios to analyze the impact of a number of different variables on the current and projected population of Karachi:

- To what extent did the 1998 census undercount the population of Karachi?
- At what annual growth rate did the population of Karachi grown over the period 1998-2005?
- What will the population growth rates be over the plan period?

Many demographic experts believe that the 1998 census underreported the population of Karachi (9.96 million officially) by excluding some residents in katchi abadis, other illegal settlements, vertical and horizontal additions to existing buildings, etc. Some growth scenarios therefore included adjustments to the 1998 population of 0.7 – 1.0 million people.

The growth rate of Karachi has been decreasing steadily since the 1950s. United Nations population sources cite a decline in the annual average growth rate from 5.86% in 1950 to 4.92% in 1970 to 3.39% in 1990. The current population growth rate is probably between 3.5% and 5.0%. The different scenarios used straight line projections from a base of 3.5% annual growth and decreasing rate projections from a base of 5.0% annual growth. The assumptions of the four scenarios and their results in terms of future population of Karachi are shown in the table 11 below.

Table 11: Karachi Population Growth Scenarios, 1998-2020
(Thousands)

Scenario	1998	2005	2010	2015	2020
Scenario A					
Population	9,960	12,720	15,160	18,050	21,510
AAGR*		3.5%	3.5%	3.5%	3.5%
Scenario B					
Population	10,660	15,120	18,010	21,460	25,560
AAGR		5.0%	3.5%	3.5%	3.5%
Scenario C					
Population	10,960	16,110	19,200	22,880	27,250
AAGR		5.5%	3.5%	3.5%	3.5%
Scenario D					
Population	10,660	15,120	18,930	23,130	27,550
AAGR		5.0%	4.5%	4.0%	3.5%

Source: 1998 Census
*AAGR = Annual Average Growth Rate

Scenario D was selected as the preferred scenario because (i) the 1998 population estimate is considered the most accurate, and (ii) the decreasing growth rates continue the trend observed without exception over the past 50 years. Through a combination of in-migration and natural population growth, today's population of 15.12 million is expected to increase to 27.55 million by 2020, the end of the planning period.

The table 12 below translates the population increase into households. A total of 1.78 million households will be formed or will migrate to Karachi by 2020. The number of additional households in the first 5-year period (2005-2010), projected to be 545,000, is anticipated to increase by about 11% during 2010-2015 and then by another 5% during 2015-2020. In absolute numbers as well as percentage growth, therefore, the population of Karachi will grow increasingly slowly during the planning period.

Table 12: Karachi City District Population Projections, 2005-2020 (000s)

	2005	2010	2015	2020	Change 2005-2010	Change 2010-2015	Change 2015-2020	Total Change 2005-2020
AAGR*	5.0%	4.5%	4.0%	3.5%	-0.5%	-0.5%	-0.5%	-1.5%
Population	15,120	18,935	23,127	27,550	3,815	4,192	4,422	12,430
Households	2,160	2,705	3,304	3,936	545	605	632	1,776

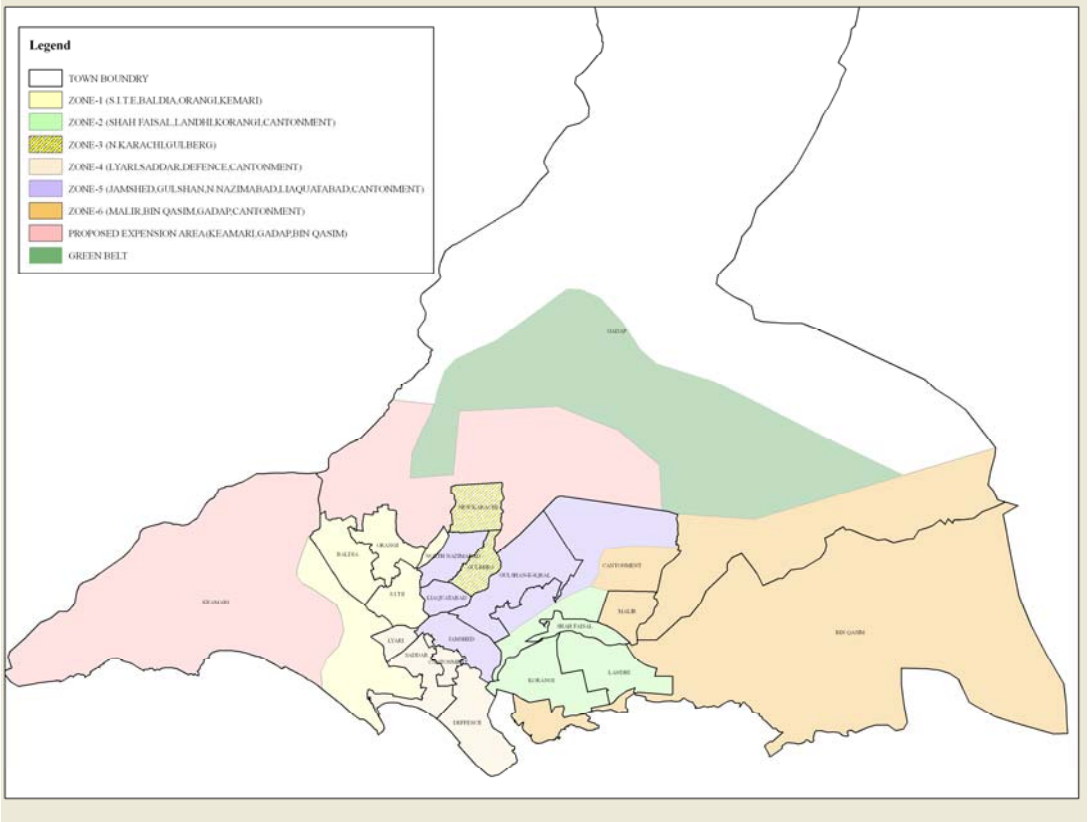
Source: 1998 Census
*AAGR = Annual Average Growth Rate

Notes:

1. Figures may not add up due to rounding.
2. Average household size = 7.0

Densification of the Existing Built-Up Area

The Karachi Master Plan 2020 should make provisions to accommodate the projected number of new households. Some of the new households can be absorbed into the existing built-up area of the city (roughly equivalent to 15 towns, excluding Keamari, Gadap, and Bin Qasim). Gulshan-e-Iqbal town has some vacant parcels on which new housing and/or mixed-use projects can be built; horizontal development is still possible there. The other 14 towns are largely built-out to the extent that most sites have been developed. However, vertical densification is possible and in fact is taking place in many neighbourhoods across Karachi. As discussed in Section 2 above, many home owners are adding additional floors on “ground plus two” buildings in residential neighbourhood. Other developers and property owners are building mid-rise commercial or commercial/residential buildings along main arterial roads. Both of these trends are economically efficient to the extent that the new development takes advantage of existing infrastructure networks adjacent to the plots (although upgrading may be required to increase capacity of water, sewerage, power systems, etc.).



The Master Plan seeks to reinforce and encourage these trends by modifying development regulations to (i) allow G+2 development in most types of residential or mixed use areas, and (ii) promote mid-rise (G+4 or G+6) development along selected major arterial roads identified in the land use plan. These regulatory changes will have the effect of amplifying existing trends. The densification of existing centre-city and peripheral neighbourhoods will accommodate a significant percentage of the new households requiring housing in future.

The following table 13 presents the analysis of densification potential of all 15 existing built-up towns in Karachi City District. The factors contributing to the "Densification %" over the plan period include:

- The existing densification trend in the town
- The desirability of additional densification (some towns are extremely dense and further densification would impact negatively on residents' quality of life)
- KMP 2020 proposals to densify selected areas (e.g., by allowing G+2 dwellings or promoting development corridors along selected roads)
- The ability of the development control authorities to impact future densification activity

Table 13: Densification Analysis of 15 Existing Urbanized Towns in CDGK

Town	Population 2005	Households 2005	Densification %	Densification Households	Total Households 2020
SITE	709,944	101,421	0%	-	101,421
Baldia	616,722	88,103	10%	8,810	96,913
Orangi	1,098,859	156,980	5%	7,849	164,829
Lyari	923,176	131,882	0%	-	131,882
Saddar	935,566	133,652	5%	6,683	140,335
Jamsheed	1,114,235	159,176	5%	7,959	167,135
Gulshan-e-Iqbal	949,351	135,622	10%	13,562	149,184
Shah Faisal	509,915	72,845	5%	3,642	76,487
Landhi	1,012,391	144,627	5%	7,231	151,858
Korangi	829,813	118,545	10%	11,855	130,400
North Nazimabad	753,423	107,632	5%	5,382	113,014
New Karachi	1,038,865	148,409	0%	-	148,409
Gulberg	688,580	98,369	5%	4,918	103,287
Liaquatabad	985,581	140,797	0%	-	140,797
Malir	604,763	86,395	5%	4,320	90,715
Subtotal	12,771,184	1,824,455	--	82,211	1,906,666
Cantonment	464,882	66,412	10%	6,641	73,053
Defence	379,601	54,229	48.7%	26,400	80,629
Total	**13,615,667**	**1,945,095**	**--**	**115,252**	**2,060,348**

The analysis suggests that approximately 115,252 households can be absorbed through densification of the existing city fabric. This means that the balance of the 1,776,000 new households must be accommodated in new expansion areas at the urban fringe.

Total new households 2005-2020…….1,776,000
Households absorbed through densification……..115,252
Balance households for urban expansion …….1660748

Table No. 14
TOWN WISE POPULATION GROWTH AS PER DENSIFICATION SCENARIO KMP, 2005-2020

Area/ Towns	2005	2010	2015	2020	Change 2005-2010	Change 2010-015	Change 2015-2020
1. Keamari							
Population	583,640	730,905	892,730	1,063,461	147,265	161,825	170,731
Population in existing/ pipeline vacant scheme	-	320,600	641,200	961,800	320,600	320,600	320,600
Additional population balance	-	31,206	62,412	93,611	31,206	31,206	31,206
Total population to be accommodate	-	351,806	703,612	1,055,441	351,806	351,806	351,806
Grand population	583,640	935,446	1,287252	1,639,081	351,806	351,806	351,806
2. SITE							
Population	709,,944	889,,079	1,085,023	1,293,602	0	0	0
Population after 0% densification	709,944	709,944	709,944	709,944	-	-	-
-HH after 0% Densification	101,421	101,421	101,421	101,421	-	-	-
Pop. to be settled in existing vacant schemes	-	179,135	375,079	583,658	179,135	195,944	208,579
3. Baldia							
Population	616,722	772,336	943,333	1,123,742	155,614	170,997	180,409
Population after 1 0% densification	616,722	637,279	657,835	678,392	20,556	20,556	20,557
HH after 10% Densification	88,103	91,040	93,976	96,913	2,937	2,937	2,937
Pop. to be settled in existing vacant schemes	-	135,057	285,498	445,350	135,057	150,441	159,852

Area/ Towns	2005	2010	2015	2020	Change 2005-2010	Change 2010-015	Change 2015-2020
4. Orangi							
Population	1,098,859	1,376,126	1,680,805	2,002,252	277,267	304,679	321,447
Population after 5% densification	1,098,859	1,117,173	1,135,487	1,153,796	18,314	18,314	18,315
HH after 5% Densification	156,980	159,596	1 62,212	16,4828	2,616	2,616	2,616
Pop. to be settled in existing vacant schemes	-	258,953	545,321	848,456	258,953	286,368	303,135
5. Lyari							
Population	923,176	1,156,114	1,412081	1,682,136	232,938	255,967	270,055
Population after 0% densification	923,176	923,176	923,176	923,176	-	-	-
HH after 0% Densification	131,882	131,882	131,882	131,882	-	-	-
Pop. to be settled in existing vacant schemes	-	232,938	488,905	758,960	232,938	255,967	270,055
6.Saddar							
Population	935,566	1,171,630	1,431,032	1,704,712	236,064	259,402	273,680
Population after 5% densification	935,566	951,159	966,752	982,344	15,593	15,593	15,592
HH after 5% Densification	133,652	135,879	138,107	140,335	2,227	2,227	2,228
Pop. to be settled in existing vacant schemes	-	220,470	464,296	722,360	220,470	243,806	258,084

Area/ Towns	2005	2010	2015	2020	Change 2005-2010	Change 2010-015	Change 2015-2020
7. Jamsheed							
Population	1,114,235	1,395,382	1,704,323	2,030,268	281,147	308,941	329,945
Population after 5% densification	1,114,235	1,132,806	1,151,377	1,169,947	18,571	18,571	18,571
HH after 5% Densification	159,176	161,829	164,482	167,135	2,653	2,653	2,654
Pop. to be settled in existing vacant schemes	-	262,576	552,946	860,323	262,576	290,370	307,377
8. Gulshan-e-Iqbal							
Population	949,351	1,188,893	1,452,117	1,729,829	239,542	263,224	277,712
Population after 10% densification	949,351	981,001	1,012,641	1,044,286	31,645	31,645	31,645
HH after 10% Densification	135,622	140,143	144,664	149,185	4,521	4,521	4,521
Pop. to be settled in existing vacant schemes	-	207,892	439,469	685,541	207,892	231,577	246,074
9. Shah Faisal1							
Population	509,915	638,578	779,961	929,126	128,663	141,383	149,165
Population after 5% densification	509,915	518,413	526,911	535,410	8,498	8,498	8,499
HH after 5% Densification	72,845	74,059	75,273	76,487	1,214	1,214	1,214
Pop. to be settled in existing vacant schemes	-	120,165	253,050	393,716	120,165	132,885	140,666

Area/ Towns	2005	2010	2015	2020	Change 2005-2010	Change 2010-015	Change 2015-2020
10. Landhi							
Population	1,012,391	1,267,,840	1,548,544	1,844,697	255,449	280,704	296,153
Population after 5% densification	1,012,391	1,029,264	1,046,137	1,063,011	1,6873	1,6873	1,6874
HH after 5% Densification	144,627	147,037	149,448	151,858	2,411	2,411	2,410
Pop. to be settled in existing vacant schemes	-	238,576	502,407	781,686	238,576	263,831	279,279
11. Korangi							
Population	829,813	1,039,193	1,269,273	1,512,017	209,380	230,080	242,744
Population after 10% densification	829,813	857,473	885,133	912,794	27,660	27,660	27,661
HH after 10% Densification	118,545	122,497	126,448	130,399	3,951	3,951	3,952
Pop. to be settled in existing vacant schemes	-	181714	384,137	599,223	181,714	202,423	215,086
12. North Nazimabad							
Population	753,423	943,528	1,152,428	1,372,826	190,105	208,900	220,398
Population after 5% densification	753,423	765,975	778,533	791,091	12,557	12,557	12,557
HH after 5% Densification	107,631	109,425	111,219	113,013	1,794	1,794	1,794
Pop. to be settled in existing vacant schemes	-	177,553	373,895	581,735	177,553	196,342	207,840

Area/ Towns	2005	2010	2015	2020	Change 2005-2010	Change 2010-015	Change 2015-2020
13. New Karachi							
Population	1,038,865	1,300,995	1,589,038	1,892,936	262,130	288,043	303,898
Population after 0% densification	1,038,865	1,038,865	1,038,865	1,038,865	-	-	-
HH after 0% Densification	148,409	148,409	148,409	148,409	-	-	-
Pop. to be settled in existing vacant schemes	-	262,130	550,173	854,071	262,130	288,043	303,898
14. Gulberg							
Population	688,580	862,324	1,053,245	1,254,674	173,744	190,921	201,429
Population after 5% densification	688,580	700,056	711,532	723,008	11,476	11,476	11,476
HH after 5% Densification	98,369	100,009	101,647	103,287	1,640	1,639	1,640
Pop. to be settled in existing vacant schemes	-	162,268	341,713	531,666	162,268	179,445	189,953
15. Liaquatabad							
Population	985,581	1,234,265	1,507,535	1,795,845	248,684	273,270	288,310
Population after 0% densification	985,581	985,581	985,581	985,581	-	-	-
HH after 0% Densification	140,797	140,797	140,797	140,797	-	-	-
Pop. to be settled in existing vacant schemes	-	248,684	521,954	810,264	248,684	273,270	288,310

Area/ Towns	2005	2010	2015	2020	Change 2005-2010	Change 2010-015	Change 2015-2020
16. Malir							
Population	604,763	757,358	925,039	1,101,949	152,595	167,681	176,910
Population after 5% densification	604,763	614,842	624,921	635,001	10,079	10,079	10,080
HH after 5% Densification	86,395	87,835	89,275	90,715	1,440	1,440	1,440
Pop. to be settled in existing vacant schemes	-	142,516	300,118	466,948	142,516	157,602	166,830
17. Bin Qasim							
Population	480,854	602,184	735,509	876,173	121,330	133,325	140,664
Population in existing/ pipeline vacant scheme	-	546,000	1,092,000	1,638,000	546,000	546,000	546,000
Additional population balance	-	53,396	106,792	160,181	53,396	53,396	53,396
Total population to be accommodate	-	599,396	1,198,792	1,798,181	599,396	599,396	599,396
Grand population	480,854	1,080,250	1,679,646	2,279,035	599,396	599,396	599,396
18. Gadap							
Population	439,674	550,614	672,521	801,138	110,940	121,907	128,617
Additional population to be setteled in new schemes	-	2,661,764	5,323,528	7,985,292	2,661,764	2,661,764	2,661,764
Population after settlement in existing scheme	-	262,115	524,230	786,352	262,115	262,115	262,115
Remaining population to be accommodated	-	2,923,879	5,847,758	8,771,644	2,923,879	2,923,879	2,923,879
Grand population	439,674	3,363,553	6,287,432	9,211,318	2,923,879	2,923,879	2,923,879

Area/ Towns	2005	2010	2015	2020	Change 2005-2010	Change 2010-015	Change 2015-2020
Cantonment							
Population	464,882	582,183	711,079	847,071	117,301	128,896	135,992
Population after 10% densification	464,882	480,378	495,874	511,370	15,496	15,496	15,496
HH after 10% Densification	66,412	68,626	70,840	73,054	2,214	2,214	2,213
Pop. to be settled in existing vacant schemes	-	101,805	215,205	335,701	101,805	113,400	120,496
Defence							
Population	379,601	475,382	580,633	691,677	95781	105,251	111,044
Population after 48.7% densification	379,601	441,203	502,808	564,408	61,602	61,600	61,600
HH after 48.7% Densification in phase 8	54,229	63,029	71,829	80,629	8,800	8,800	8,800
Pop. to be settled in new vacant or pipe lin schemes	-	34,179	77,825	127,269	34,179	43,681	49,404

Table No. 15

UC'S WISE POPULATION GROWTH & DENSITIES AS PER DENSIFICATION SCENARIO KMP, 2005-2020

Towns	Area									
		%	2005	Density	2010	Density	2015	Density	2020	Density
1. Keamari										
Bhutta Village	1468.2	16.2	94,331	64	151,192	103	208,053	142	264,917	180
Sultanabad	1447.5	12.9	75,228	52	120,574	83	165,920	115	211,269	146
Keamari	2743.5	14.4	84,150	31	134,874	49	185,598	68	236,325	86
Baba Bhit	8370.5	5.0	28,915	3	46,344	6	63,774	8	81,204	10
Machar Colony	462.6	15.3	89,261	193	143,066	309	196,870	426	250,679	542
Mauripur	16345.2	12.5	72,769	4	116,633	7	160,496	10	204,363	13
Sher Shah	1249.5	13.9	81,204	65	130,152	104	179,100	143	228,051	183
Gabo Pat	74129.7	9.9	57,783	1	92,613	1	127,444	2	162,276	2
Total	**106216.8**	**100.0**	**583640.0**	**5**	**935,446**	**9**	**1,287,252**	**12**	**1,639,081**	**15**
2. SITE		**Population at 0% densification**								
Pak Colony	171.5		83,444	487	83,444	487	83,444	487	83,444	487
Old Golimar	188.2		64,778	344	64,778	344	64,778	344	64,778	344
Jahanabad	1455.4		66,307	46	66,307	46	66,307	46	66,307	46
Metrovile	2585.9		84,889	33	84,889	33	84,889	33	84,889	33
Bawani Chawli	343.4		76,262	222	76,262	222	76,262	222	76,262	222
Frontier Colony	249.2		67,677	272	67,677	272	67,677	272	67,677	272
Banaras Colony	334		96,994	290	96,994	290	96,994	290	96,994	290
Qasba Colony	300.3		89,663	299	89,663	299	89,663	299	89,663	299
Islamia Colony	658.3		79,930	121	79,930	121	79,930	121	79,930	121
Total	**6286.2**		**709,944**	**113**	**709,944**	**113**	**709,944**	**113**	**709,944**	**113**
3. BALDIA		**Population at 10% densification**								
Gulshan-e-Gazi	1794.6	12.6	77,584	43	80,170	45	82,756	46	85,342	48
Ittehad Town	2235.4	13.4	82,943	37	85,708	38	88,472	40	91,237	41
Islam Nagar	1457.2	9.8	60,552	42	62,570	43	64,589	44	66,607	46
Nai Abadi	531.1	9.6	59,139	111	61,110	115	63,081	119	65,053	122
Saeedabad	431.8	13.8	85,158	197	87,997	204	90,835	210	93,673	217
Mohajir Camp	215.7	15.6	96,505	447	99,722	462	102,938	477	106,155	492
Muslim Mujahid Colony	223.7	12.5	76,787	343	79,347	355	81,906	366	84,465	378
Rasheedabad	327.7	12.7	78,053	238	80,655	246	83,256	254	85,858	262
Total	**7217.2**	**100.0**	**616,722**	**85**	**637,279**	**88**	**657,835**	**91**	**678,392**	**94**
4. Orangi		**Population at 5% densification**								
Azad Nagar	430	7.8	85,273	198	86,694	202	88,115	205	89,536	208
Haryana Colony	412.7	8.9	98,043	238	99,677	242	101,311	245	102,945	249
Hanifaabad	212.5	7.5	82,559	389	83,935	395	85,311	401	86,687	408
Mohammed Nagar	410.2	8.8	96,803	236	98,416	240	100,030	244	101,643	248
Madian Colony	378.1	6.9	75,917	201	77,182	204	78,448	207	79,712	211
Ghaziaabad	657.3	8.2	90,196	137	91,699	140	93,202	142	94,705	144
Chishti Nagar	1372.1	8.1	88,951	65	90,433	66	91,916	67	93,398	68
Bilal Colony	492	9.0	98,356	200	99,995	203	101,634	207	103,273	210
Islam Chouk	425	8.6	94,518	222	96,093	226	97,669	230	99,243	234
Gabol Colony	266.9	7.8	85,214	319	86,634	325	88,054	330	89,474	335
Data Nagar	407.7	7.9	86,494	212	87,936	216	89,377	219	90,818	223
Mujahidabad	257	7.2	78,753	306	80,066	312	81,378	317	82,690	322
Baloch Goth	81.5	3.4	37,781	464	38,411	471	39,040	479	39,670	487
Total	**5803**	**100.0**	**1,098,859**	**189**	**1,117,173**	**193**	**1,135,487**	**196**	**1,153,796**	**199**

Towns	Area	%	2005	Density	2010	Density	2015	Density	2020	Density
5. Lyari		**Population at 0% densification**								
Agra Taj Colony	130.6		69,377	531	69,377	531	69,377	531	69,377	531
Darya Abad	139.9		90,012	643	90,012	643	90,012	643	90,012	643
Naw Abad	66.4		68,491	1,031	68,491	1,031	68,491	1,031	68,491	1031
Khada Memon	152.7		88,619	580	88,619	580	88,619	580	88,619	580
Bhagdadi	111.5		86,022	771	86,022	771	86,022	771	86,022	771
Shah Baig Lane	124.3		88,260	710	88,260	710	88,260	710	88,260	710
Behar Colony	112.6		67,677	601	67,677	601	67,677	601	67,677	601
Rangiwara	215.3		91,288	424	91,288	424	91,288	424	91,288	424
Singo Lane	169		75,205	445	75,205	445	75,205	445	75,205	445
Chakiwara	209.2		100,530	481	100,530	481	100,530	481	100,530	481
Allama Iqbal Colony	545.7		97,696	179	97,696	179	97,696	179	97,696	179
Total	**1977.2**		**923,176**	**467**	**923,176**	**467**	**923,176**	**467**	**923,176**	**467**
6. Saddar		**Population at 5% densification**								
Old Haji Camp	92.9	11.0	103,279	1,112	105,000	1,130	106,722	1,149	108,443	1,167
Garden	99.7	10.4	97,389	977	99,012	993	100,635	1,009	102,259	1,026
Kharadar	304.9	10.5	97,891	321	99,523	326	101,154	332	102,786	337
City Railway Colony	793.6	7.0	65,294	82	66,382	84	67,471	85	68,559	86
Nanakwara	142.7	10.2	95,722	671	97,317	682	98,913	693	100,508	704
Gazdarabad	182.9	10.6	99,294	543	100,949	552	102,604	561	104,259	570
Millat Nagar	159.6	8.5	79,106	496	80,425	504	81,743	512	83,061	520
Saddar	379.4	10.6	99,171	261	100,824	266	102,477	270	104,130	274
Civil Line	389.6	7.3	68,137	175	69,273	178	70,408	181	71,544	184
Clifton	1813.1	6.2	57,710	32	58,672	32	59,634	33	60,596	33
Khekeeshan	1608.8	7.8	72,572	45	73,782	46	74,991	47	76,201	47
Total	**5967.2**	**100.0**	**935,565**	**157**	**951,159**	**159**	**966,752**	**162**	**982,344**	**165**
7. Jamsheed		**Population at 5% densification**								
Akhtar Colony	201.6	7.3	81,354	404	82,710	410	84,066	417	85,422	424
Manzoor Colony	844.4	8.5	94,615	112	96,192	114	97,769	116	99,346	118
Azam Basti	171.3	6.5	72,248	422	73,452	429	74,656	436	75,860	443
Chanesar Goth	203.9	7.1	79,654	391	80,982	397	82,309	404	83,637	410
Mehmoodabad	255.9	7.0	77,531	303	78,823	308	80,115	313	81,408	318
PECHS-1	1087.0	9.0	100,814	93	102,494	94	104,175	96	105,855	97
PECHS-2	876.7	8.4	93,288	106	94,843	108	96,398	110	97,952	112
Jat Lane Line	167.4	9.4	104,708	625	106,453	636	108,198	646	109,943	657
Jacob Line	416.3	8.9	99,144	238	100,796	242	102,449	246	104,101	250
Jamsheed Qrtrs	572.6	8.6	95,334	166	96,923	169	98,512	172	100,101	175
Garden East	276.0	7.6	84,320	306	85,725	311	87,131	316	88,536	321
Soldier Bazzar	390.9	5.9	65,741	168	66,837	171	67,932	174	69,028	177
Pakistan Qrtrs	325.8	5.9	65,387	201	66,477	204	67,567	207	68,656	211
Total	**5789.8**	**100.0**	**1,114,235**	**192**	**1,132,806**	**196**	**1,151,377**	**199**	**1,169,947**	**202**

Towns	Area	%	2005	Density	2010	Density	2015	Density	2020	Density
8. Gulshan-e-Iqbal					**Population at 10% densification**					
Dehli Mercantile Societ	1027.3	7.4	70,704	69	73,061	71	75,418	73	77,774	76
Civic Center	910.4	9.4	89,170	98	92,143	101	95,115	104	98,087	108
PIB Colony	236.5	6.0	57,224	242	59,132	250	61,039	258	62,946	266
Essa Nagri	274.5	10.2	96,405	351	99,619	363	102,832	375	106,045	386
Gulshan-e-Iqbal-1	443.9	6.7	63,261	143	65,370	147	67,478	152	69,587	157
Geelani Railway Statio	881.7	9.2	87,606	99	90,527	103	93,446	106	96,367	109
Shanti Nagar	545.5	7.0	66,371	122	68,584	126	70,796	130	73,008	134
Jamali Colony	363.7	6.8	64,647	178	66,802	184	68,957	190	71,112	196
Gulshan-e-Iqbal-2	552.8	6.4	61,104	111	63,141	114	65,178	118	67,214	122
Pehlwan Goth	2559.2	6.9	65,044	25	67,212	26	69,380	27	71,548	28
Metrovile Colony	2148.1	10.5	99,234	46	102,542	48	105,850	49	109,157	51
Gulzar-e-Hijri	2287.5	6.7	63,973	28	66,106	29	68,238	30	70,370	31
Safooran	1029.1	6.8	64,608	63	66,762	65	68,915	67	71,069	69
Total	**13260.2**	**100.0**	**949,351**	**72**	**981,001**	**74**	**1,012,641**	**76**	**1,044,286**	**79**

9. Shah Faisal					**Population at 5% densification**					
Natha Khan Goth	548.1	16.9	86,065	157	87,499	160	88,934	162	90,368	165
Pak Sadaat Colony	399.8	14.1	71,842	180	73,039	183	74,237	186	75,434	189
Drigh Colony	127.6	13.3	67,683	530	68,811	539	69,939	548	71,067	557
Reta Plot	131.4	12.8	65,243	497	66,330	505	67,418	513	68,505	521
Morio Khan Goth	114.5	14.0	71,593	625	72,786	636	73,979	646	75,173	657
Rafah-e-Aam	503.4	12.7	64,708	129	65,787	131	66,865	133	67,943	135
Al-Falah Society	1075.6	16.2	82,782	77	84,162	78	85,541	80	86,921	81
Total	**2900.4**	**100.0**	**509,914**	**176**	**518,413**	**179**	**526,911**	**182**	**535,410**	**185**

10. Landhi					**Population at 5% densification**					
Muzzafarabad	556.4	9.4	95,351	171	96,940	174	98,529	177	100,118	180
Muslimabad	772.4	6.3	64,239	83	65,310	85	66,380	86	67,451	87
Dauod Chowarangi	771.6	9.3	93,818	122	95,382	124	96,945	126	98,509	128
Moinabad	279.1	6.7	68,322	245	69,461	249	70,599	253	71,738	257
Sharafi Goth	2073.5	7.4	74,623	36	75,867	37	77,110	37	78,354	38
Bhutto Nagar	591.4	8.1	82,161	139	83,530	141	84,900	144	86,269	146
Ajmer Colony	596.6	9.2	93,118	156	94,670	159	96,222	161	97,774	164
Landhi	1147.8	8.0	80,773	70	82,119	72	83,465	73	84,812	74
Awami Colony	2100.5	9.1	92,106	44	93,641	45	95,176	45	96,711	46
Burmee Colony	306.9	8.0	80,541	262	81,883	267	83,226	271	84,568	276
Korangi	129.3	9.2	93,092	720	94,643	732	96,195	744	97,747	756
Sherabad Colony	344.5	9.3	94,249	274	95,820	278	97,391	283	98,961	287
Total	**9670**	**100.0**	**1,012,392**	**105**	**1,029,264**	**106**	**1,046,137**	**108**	**1,063,011**	**110**

11. Korangi					**Population at 10% densification**					
Bilal Colony	3998.8	11.4	94,823	24	97,984	25	101,144	25	104,305	26
Nasir Colony	1709.7	11.3	93,834	55	96,962	57	100,090	59	103,217	60
Chakra Goth	849.5	11.2	92,902	109	95,999	113	99,095	117	102,192	120
Silver Town	542.7	10.9	90,465	167	93,480	172	96,496	178	99,511	183
100 Qrtrs	922.3	10.6	87,865	95	90,794	98	93,723	102	96,651	105
Gulzar Colony	433.4	11.6	96,379	222	99,592	230	102,804	237	106,017	245
Korangi 33	524.8	11.3	93,626	178	96,747	184	99,868	190	102,989	196
Zaman Town	600.5	11.1	91,724	153	94,781	158	97,839	163	100,896	168
Hasrat Mohani	665.4	10.6	88,195	133	91,135	137	94,075	141	97,014	146
Total	**10247.1**	**100.0**	**829,813**	**81**	**857,473**	**84**	**885,133**	**86**	**912,794**	**89**

Towns	Area	%	2005	Density	2010	Density	2015	Density	2020	Density
12. North Nazimabad					**Population at 5% densification**					
Paposh Nagar	349	14.0	105,236	302	106,989	307	108,743	312	110,497	317
Pahar Gang	235.1	8.5	64,197	273	65,267	278	66,337	282	67,407	287
Khandu Goth	497	10.6	79,962	161	81,294	164	82,627	166	83,960	169
Hyderi	718.8	11.8	88,647	123	90,124	125	91,601	127	93,079	129
Sakhi Hassan	518.9	12.0	90,072	174	91,573	176	93,074	179	94,575	182
Farooq-e-Azam	545.8	7.9	59,881	110	60,879	112	61,877	113	62,875	115
Nusrat Bhutto Colony	269.8	7.9	59,215	219	60,202	223	61,189	227	62,176	230
Shadman	324.7	7.7	57,693	178	58,654	181	59,616	184	60,577	187
Buffer Zone 2	385.9	11.6	87,755	227	89,217	231	90,680	235	92,142	239
Buffer Zone 1	281.9	8.1	60,765	216	61,777	219	62,790	223	63,803	226
Total	**4126.9**	**100.0**	**753,423**	**183**	**765,975**	**186**	**778,533**	**189**	**791,091**	**192**
13. New Karachi					**Population at 0% densification**					
Kalyan	471.8		71,840	152	71,840	152	71,840	152	71,840	152
Sir Syed	646.9		67,655	105	67,655	105	67,655	105	67,655	105
Fatima Jinnah Colony	260		84,004	323	84,004	323	84,004	323	84,004	323
Godhra	492.7		106,952	217	106,952	217	106,952	217	106,952	217
Abu Zar Gaffari	240.1		66,492	277	66,492	277	66,492	277	66,492	277
Hakim Ahsun	221.9		61,384	277	61,384	277	61,384	277	61,384	277
Madina Colony	432.2		94,296	218	94,296	218	94,296	218	94,296	218
Faisal	377.2		89,636	238	89,636	238	89,636	238	89,636	238
Khamiso Goth	589.2		90,899	154	90,899	154	90,899	154	90,899	154
Mustafa Colony	349.2		87,748	251	87,748	251	87,748	251	87,748	251
Khwaja Ajmer	349.2		81,514	233	81,514	233	81,514	233	81,514	233
Gulshan Said	260.4		62,863	241	62,863	241	62,863	241	62,863	241
Shah Nawaz Bhutto C	366.8		73,580	201	73,580	201	73,580	201	73,580	201
Total	**5057.6**		**1,038,865**	**205**	**1,038,865**	**205**	**1,038,865**	**205**	**1,038,865**	**205**
14. Gulberg					**Population at 5% densification**					
Azizabad	465.6	15.0	103,043	221	104,760	225	106,478	229	108,195	232
Karimabad	188.3	9.8	67,637	359	68,764	365	69,891	371	71,019	377
Aisha Manzil	651.6	13.8	94,721	145	96,299	148	97,878	150	99,457	153
Ancholi	483.4	14.0	96,554	200	98,163	203	99,772	206	101,381	210
Naseerabad	379.8	15.3	105,625	278	107,385	283	109,146	287	110,906	292
Yaseenabad	316.1	10.5	72,337	229	73,542	233	74,748	236	75,954	240
Water Pump	339.8	9.5	65,398	192	66,488	196	67,578	199	68,668	202
Shafiq Mill Colony	592.7	12.1	83,266	140	84,654	143	86,041	145	87,429	148
Total	**3417.3**	**100.0**	**688,581**	**201**	**700,056**	**205**	**711,532**	**208**	**723,008**	**212**
15. Liaquatabad					**Population at 0% densification**					
Rizvia Society	247.2		95,190	385	95,190	385	95,190	385	95,190	385
Firdous Colony	229.6		92,618	403	92,618	403	92,618	403	92,618	403
Super Market	167.2		79,066	473	79,066	473	79,066	473	79,066	473
Dak Khana	189.9		82,876	436	82,876	436	82,876	436	82,876	436
Qasimabad	215.4		101,452	471	101,452	471	101,452	471	101,452	471
Bandhani Colony	173.8		81,500	469	81,500	469	81,500	469	81,500	469
Sharifabad	277.9		92,006	331	92,006	331	92,006	331	92,006	331
Commercial Area	201.8		94,847	470	94,847	470	94,847	470	94,847	470
Mujahid Colony	481.5		101,725	211	101,725	211	101,725	211	101,725	211
Nazimabad No 1	252.5		80,427	319	80,427	319	80,427	319	80,427	319
Abbasi Shaheed	248.4		83,869	338	83,869	338	83,869	338	83,869	338
Total	**2685.2**		**985,577**	**367**	**985,577**	**367**	**985,577**	**367**	**985,577**	**367**

Towns	Area	%	2005	Density	2010	Density	2015	Density	2020	Density
16. Malir		Population at 5% densification								
Model Colony	942.3	16.0	96,879	103	98,494	105	100,108	106	101,723	108
Kala Board	397.4	15.1	91,101	229	92,619	233	94,138	237	95,656	241
Saudabad	288.7	15.0	90,612	314	92,122	319	93,632	324	95,143	330
Khokrapar	553.4	14.5	87,774	159	89,237	161	90,700	164	92,163	167
Jaffar Tayyar	565.6	13.6	82,261	145	83,632	148	85,003	150	86,374	153
Garibabad	832.7	13.3	80,349	96	81,688	98	83,027	100	84,366	101
Gazi Brohi	814.4	12.5	75,790	93	77,053	95	78,316	96	79,579	98
Total	**4394.5**	**100.0**	**604,763**	**138**	**614,842**	**140**	**624,921**	**142**	**635,001**	**144**
17. Bin Qasim										
Ibrahim Hyderi	4113	13.8	66,177	16	148,668	36	231,159	56	313,650	76
Rehri	3335	9.9	47,839	14	107,471	32	167,104	50	226,736	68
Cattle Colony	6036	13.3	63,726	11	143,162	24	222,598	37	302,033	50
Quaidabad	3135	18.3	88,158	28	198,049	63	307,940	98	417,830	133
Landhi	12938	12.4	59,523	5	133,720	10	207,917	16	282,113	22
Gulshan-e-Hadeed	15664	20.6	99,064	6	222,550	14	346,035	22	469,519	30
Ghaghar	92741	11.7	56,368	1	126,632	1	196,896	2	267,159	3
Total	**137961.2**	**100**	**480854**	**3**	**1080250**	**8**	**1679646**	**12**	**2279035**	**17**
18. Gadap										
Murad Memon	6758	13.1	57,529	9	440,102	65	822,675	122	1,205,249	178
Darsanno Channo	70517	10.5	46,266	1	353,939	5	661,612	9	969,286	14
Gujjro	34859	17.2	75,709	2	579,181	17	1,082,652	31	1,586,125	46
Gadap	311270	10.5	45,998	0	351,889	1	657,780	2	963,671	3
Songal	71978	10.2	44,854	1	343,137	5	641,420	9	939,704	13
Yousuf Goth	2127	14.6	64,361	30	492,367	231	920,374	433	1,348,382	634
Maymarabad	6314	11.7	51,229	8	391,906	62	732,584	116	1,073,262	170
Manghopir	34367	12.2	53,729	2	411,032	12	768,334	22	1,125,638	33
Total	**538190**	**100**	**439675**	**1**	**3363553**	**6**	**6287432**	**12**	**9211318**	**17**
Sub Total	871,168		14,275,349	16	18,342,252	21	22,409,151	26	26,476,076	30
Defence	**9454.4**		**379,601**	**40**	**441,203**	**47**	**502,808**	**53**	**564,408**	**60**
Cantonment	**31335.7**		**464,882**	**15**	**480,378**	**15**	**495,874**	**16**	**511,370**	**16**
Grand Total	**911,958**		**15,119,832**	**17**	**18,934,910**	**21**	**23,127,151**	**25**	**27,550,131**	**30**

Table No. 16
Over All Total Population Growth As Per Densification Scenario KMP 2005-2020

	2005	2010	2015	2020	Change 2005-2010	Change 2010-2015	Change 2015-2020
Total Population of 15 Towns + Cant/Defence Natural Growth	13,615,663	17,051,204	20,826,389	24,809,357	3,435,541	3,775,185	3,982,968
Population of 15 Towns + Cant/Defence after densification	13,615,663	13,822,986	14,030,300	14,237,617	207,323	207,314	207,317
Population of 3 Town at Natural Growth	1,504,168	1,883,703	2,300,760	2,740,772	379,535	417,057	440,012
*Pop. to be settled in new schemes/ 3 Towns	-	3,228,213	6,795,198	10,571,734	3,228,213	3,566,965	3,776,558
Grand Total All Towns & Cantts/ Defence	15,119,833	18,934,910	23,127,151	27,550,131	3,815,077	4,192,241	4,422,980

* See distribution of individual Population of 3 Towns I-e Keamari, Bin Qasim and Gadap separately

Land Requirements for Future Urban Expansion:

The following tables present the land requirements for future urban expansion. The 1.66 million new households are distributed among three 5-year phases and three socio-economic groups, each with its own average plot size. To the extent that some new expansion areas will include apartment buildings or other multi-unit housing, the calculations are liberal and may overestimate the actual land required for development over the period. In the "Total Future Urban Land Requirements" section at the bottom of the table, the new residential area is converted into total new residential/mixed use area by figuring in proportional notional area requirements for circulation, neighbourhood commercial, neighbourhood institutional, and open space. Regional commercial and regional industrial needs, calculated in sub-sectoral reports prepared earlier by the consultant, are added to the "neighbourhood" needs to produce a grand total requirement figure for new expansion areas of 149,000 acres.

Table 17: Calculation of Future Urban Expansion Areas

Phase 1: 2005-2010

Household Category	% Total	No. HHs	Avg. Plot Size (yd2)	Net Area (acres)
Low Income	64%	324,213	120	8,038
Middle Income	30%	151,975	240	7,536
High Income	6%	30,395	500	3,140
Total:	**100%**	**506,583**	**--**	**18,714**

Phase 2: 2010-2015

Household Category	% Total	No. HHs	Avg. Plot Size (yd2)	Net Area (acres)
Low Income	62%	351,281	120	8,709
Middle Income	31%	175,641	240	8,709
High Income	7%	39,661	500	4,097
Total:	**100%**	**566,583**	**--**	**21,515**

Phase 3: 2015-2020

Household Category	% Total	No. HHs	Avg. Plot Size (yd2)	Net Area (acres)
Low Income	60%	356,150	120	8,830
Middle Income	32%	189,947	240	9,419
High Income	8%	47,486	500	4,906
Total:	**100%**	**593,583**	**--**	**23,155**

Total Future Urban Land Requirements

Land Use	% Total Local	Acres
Local Mixed Use		
Residential	60%	63,384
Commercial	5%	5,282
Institutional	10%	10,564
Open Space	5%	5,282
Circulation	20%	21,128
Total Local Mixed Use	100%	105,640
Regional Commercial	25%	26,410
Industrial	16%	16,902
Total:		**148,952**

It is important to note that there are many existing residential land development projects, in various stages of approval and implementation that will satisfy part of the future demand for residential and neighbourhood-level mixed use land. The largest such projects are identified in the table 18 below.

Table 18: Large Residential Project on the Market or in the Pipeline

Scheme	Owner	Area	Total HH	%	Target Market
Taisar	MDA	20,570	246,840 @ 12	14.9%	Low/middle income HHs
Taisar Extension	MDA	4,000	48,000 @ 12	2.90%	Low/middle income HHs
Halkani	LDA	38,467	461,604 @ 12	27.87%	Low/middle income HHs
Hawk's Bay	LDA	11,450	137,400 @ 12	8.30%	Low/middle income HHs
Shah Latif	MDA	7,500	90,000 @ 12	5.43%	Low/middle income HHs
Ghagar Patak/MDA #1 / New Malir	MDA	6,000	72,000 @ 12	4.35%	Low/middle income HHs
Gulzar Hijri | Sch # 33	CDGK	26,026	312,312 @ 12	18.86%	Low/middle income HHs
DHA Phase 9	DHA	12,000	72,000 @ 6	8.69%	High income HHs
Islands	PQA	12,000	72,000 @ 6	8.69%	High income HHs
Total:		**138,013**	**1,512,186**	**100%**	-

The total area of these projects (of which only Taisar town includes industrial uses) surpasses the estimate of required “Total Local Mixed Use” land in the previous table. However, many of the plots in the existing schemes have already been purchased and are being held by speculators. Since they are not likely to enter the market in a way that will satisfy future housing requirements, it is not possible to simply subtract 138,013 from the estimated future requirements and conclude that no urban expansion is required. Rather, it is advisable to assume that a share of the plots in existing or planned residential subdivisions can satisfy some of the future needs. Total future area of future residential development over the planned period can be assumed to be in the 20,000 to 40,000 acre, depending on the number of plots in the above table that actually enter the market.

This analysis also suggests that government should modify the process of producing and marketing residential subdivisions to reduce speculation and encourage swifter, more efficient return on infrastructure investments (both off-site and on-site). This might include introduction of “sunset clauses” on publicly financed (totally or partially) projects, by which recipients of land use rights would be required to develop their plots within a given time period (say, two years) or lose their rights thereto. Provision of infrastructure to the site can also be made contingent on progress on construction of housing.

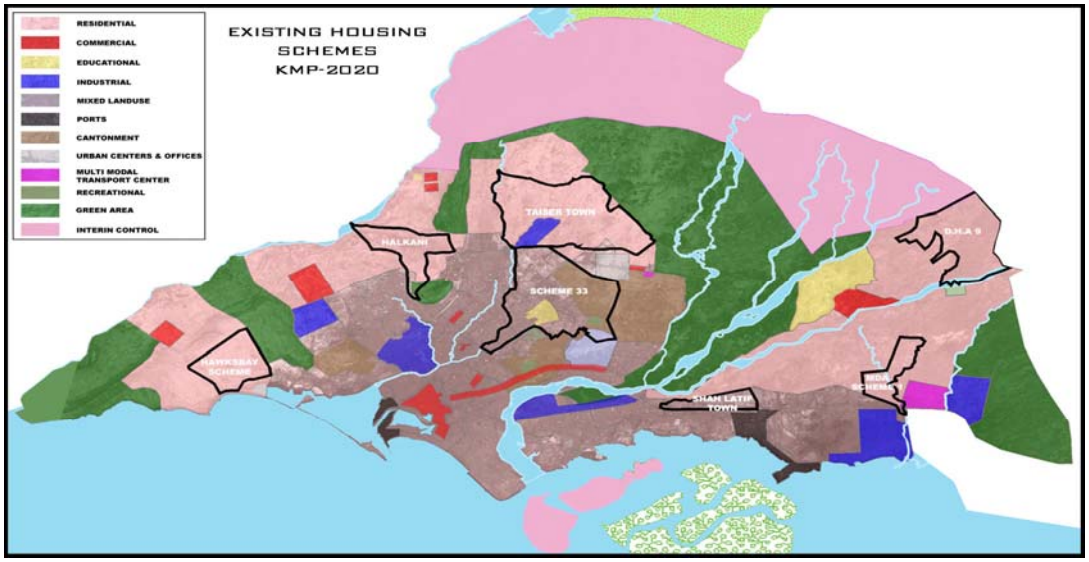


Table No. 19

Town Wise Expected H.H & Population in Three Expansion Town for Plan Period (2020)									
Town	Existing Population 2005	H.H in existing / pipeline vacant scheme	Population	%	Additional / Balance H.H	Total H.H to be Acommodated	Total population to be accommodate	Additional Area Require Acre	Grand Population
Keamari	583,640	137,400	961,800	9.0	13,373	150,773	1,055,441	1,115	1,639,081
Bin Qasim	480,854	234,000	1,638,000	15.4	22,883	256,883	1,798,181	1,907	2,279,035
Gadap	439,674	1,140,756	7,985,293	75.6	112,336	1,253,092	8,771,644	9,360	9,211,318
G.Total	**1,504,168**	**1,512,156**	**10,585,093**	**100**	**148,592**	**1,660,748**	**11,625,266**	**12,382**	**13,129,434**

Infrastructure Requirements:

This section sets out the global requirements for infrastructure improvements necessary to support the envisioned urban growth over the period of KMP 2020.

Water Supply and Sewerage

Karachi City District was divided up into three water supply zones that reflect the spatial structure of the water supply system. Future water supply requirements were then calculated by zone and by town, using the following assumptions:

- Unaccounted-for water reduced to 25% of total water production
- Combined residential, commercial, institutional demand of 180 liters/capita/day (l/c/d)
- Factoring in the industrial water supply requirements, per capital consumption rises to 225 l/c/d.

Presents water supply requirements by town over the 2005-2020 period for population growth Scenario D (preferred scenario). The following table summarizes projected consumption by type of customer.

Table 20: Projected Water Demand by Type of Customer, 2005-2020 (MGD)

	2005	2010	2015	2020
Population	15.12	18.93	23.13	27.55
Domestic Water Demand	414 MGD	518 MGD	633 MGD	752
Other Users Water Demand	338.0	423.0	518.0	616
Total Water Demand	752	941.0	1151.0	1368

The growth in requirements for wastewater collection in treatment can be estimated at 80% of the water delivered to customers, with adjustment for industrial production of wastewater by sector for certain selected large producers.

In fact, however, the growth in effective demand for collection and treatment of wastewater depends less on the population growth of the city and more on the capital program for collecting more wastewater through new trunk sewers and treating it in new plants. At the moment only a small share of the wastewater is delivered to treatment plants. The rest is collected either in networks and open drains and dumped into the environment untreated, or discharged directly into the environment without collection.

Over the period of the Master Plan 2020, the sewerage “requirements” therefore outstrip the capacity of KW&SB to deliver the necessary capital works. The objective is to increase the collection and treatment capacity of the sewerage system as quickly as possible.

Solid Waste Management

Estimate of solid waste generation indicates Karachi will produce 16 - 18 thousand tons of solid waste each day in the year 2020.

170 million cubic meters (0.17 cubic kilometers) space will be necessary to store this waste in compacted form over the next 15 years (not including cover materials.)

Electrical Power

Generation — The objective over the period 2006-2010 is to close the 1628 MW gap between electrical power supply and demand with the following fast-track approach to generation expansion. Further, it will be necessary to respond to the anticipated increase in power demand of 1,140 MW over the period 2011-2015 and 1425 MW over the period 2015-2020.

Transmission System — KESC has already begun projects to expand the 220KV and 132KV transmission system to meet requirement through 2010. It is estimated that to meet the growing power demand of Karachi towns after that date, grid stations shall be required mostly in North East and East Karachi, where the population and industrial load will be growing at a faster rate compared to other areas and in South of Karachi due to conversion of residential buildings to commercial use. Load growth of 1,140 MW is projected over the period 2011-2015 and of 1.425 MW over the period 2015-2020.

Distribution System — In order to meet the load demand growth during 2006-2011 KESC will have to increase by about 350 to 400 the number of 11 kV primary distribution feeders and will have to establish about 4,000 11kV distribution substations. To meet the load demand growth during 2011-2020, KESC will have to increase about 700 to 800 number of 11 kV primary distribution feeders and will have to establish about 8000 numbers 11kV distribution substations during this period. The number of consumers is expected to increase by about 1 million during 2011-2020, on an average of about 100,000 consumers per year.

4.0 STRATEGIC FRAMEWORK FOR THE DEVELOPMENT OF KARACHI CITY DISTRICT

One measure of the success of KMP 2020 will be the extent to which it achieves its mission: "transforming Karachi into a world class city as an attractive economic centre with a decent life for Karachites". Within this mission lie a number of objectives and target attributes:

- A "world class city" will tend to be large and cosmopolitan; influential in terms of culture, religion or politics; and/or well-connected with other financial or business capitals.

- An "attractive economic centre" should exert a strong pull on labor and capital to locate in the city and engage in economic activity. The qualities that contribute to this contraction are a good governance environment for business (including respect for the rule of law, functional legal system, respect for contracts, adequate labor rights, etc.), reliable infrastructure services, good transport connections, and access to inputs and markets.

- A "decent life for Karachiites" would include economic opportunities, good education and health services, a healthy and attractive urban environment, and opportunities for recreation.

The strategic proposals presented below are formulated with a view to achieving the objectives set out above. The objectives are translated into specific indicators in Section 8.4, "Performance Monitoring".

Land Use, Housing, and Transport

- Promote the development of a polycentric city that deconcentrates economic and public service activities from the existing central business district/port area to new urban centres in peripheral areas

- Connect the new urban centres to existing ones through new or improved radial and concentric roads and improved public transport services

- Mix land uses in new development areas so that people can live near where they work

- Regulate building heights so that mid-rise development can be undertaken along most major arterial roads and high-rise development is limited to selected new urban centres, rather than spread randomly on a permit-by-permit basis throughout the urban fabric of the city.

- Accommodate a share of future housing development requirements by enabling densification of existing residential areas. Increase building height limits to G+2 throughout the city and to G+6 / G+4 along major arterials with high commercial value. Plan and execute infrastructure system upgrades required for densification.

- Achieve balanced, simultaneous development of road network and the public transit system. Recognizing that (i) most Karachiites will ride public transit and (ii) the bus system is and will continue to be the backbone of the public transit system, enhance and develop bus service

- Relieve congestion on the metropolitan road network through:

  - Construction of new expressways and arterials
  - Widening and upgrading of existing roads in peripheral neighbourhoods that have expansion room in existing rights-of-way
  - Expanding public transport services, especially Bus Rapid Transit (BRT)
  - Improving traffic management
  - Mixing land uses in new urban centres so that employment areas are located in and around residential areas, thereby shortening commuting distances.

- Build high-capacity, at-grade or depressed expressways. Use underpasses and overpasses where required to eliminate traffic signals, but generally de-emphasize construction of elevated roadways so as to preserve the design integrity of Karachi's neighbourhoods and public spaces.

- Restrict development in existing agricultural areas along Malir River and NE of Northern Bypass to create Green Reserve for metropolitan area and concentrate future urban expansion in high-priority areas near the Northern Bypass, in Keamari, and northeast of Port Qasim expansion area.

- Use the community-based, one-window, "incremental housing development" approach to systematically and comprehensively regularize and upgrade the majority of katchi abadis in Karachi City District over a five-year period. This will be critical for improving the housing of low-income groups throughout the city.

- Facilitate the creation of partnerships between landowners and developers to build mid-rise, mixed-use apartment buildings along major arterials. Develop, pass and enforce regulations requiring greater transparency in contractual relations concerning unit sale prices and unit construction/delivery schedules.

Urban Environmental Services:

- Improve the quality and coverage of water supply and sewerage services through a combination of (in descending order of importance) demand management, improved system efficiency, and capital investment in service extension and upgrading. Include low-income neighbourhoods in network expansion plans.

- Use participatory demand management techniques to reduce water and power consumption, thereby relieving stress on the system, decreasing technical losses, and lowering operational costs.

- Emphasize the transfer of additional water supply resources from the Indus River to Karachi city district as the priority means of meeting future supply requirements for the growth of the city through 2020. Undertake desalination only as a last resort.

- Increase wastewater collection and treatment rates through construction of new collectors along Liari and Malir Rivers; rehabilitation of existing sewage treatment facilities in an around the city centre; and construction of new neighbourhood sewage treatment facilities in new expansion areas.

Implementing Arrangements:

- Develop Master Plan implementing arrangements that channel and focus the strong political will at the city district, provincial, and national levels to improve urban management, development quality, and overall performance of the city of Karachi. In collaboration with other key public and private sector actors, CDGK will drive the process of preparation and approval of large-scale investment proposals central to the implementation of the plan.

- Reflecting the Master Plan's function as a strategic guideline for the growth of Karachi, rather than a detailed blueprint identifying all development projects and initiatives over the next 15 years, establish collaborative implementation arrangements that can be used as a forum for developing and approving subsidiary plans and/or the capital investment projects to be implemented under them.

- Reinforce CDGK's lead role in Master Plan implementation by:

➢ Actively seeking participation of subsidiary local governments, large landowners like cantonment boards (excluding Military operational area) KPT, PQA, Pakistan Railways, Port Qasim, DHA, MDA & LDA and other development agencies, and local communities—including low-income communities—to ensure that their priorities with respect to future development of the city are reflected in the statutory approved Master Plan and future revisions thereto.

➢ CDGK approval of the plan, rendering it binding upon all subsidiary local governments and upon all landowners and development agencies, public and private, within the municipal jurisdictional area of the Karachi Master Plan.

- Clarify through implementing regulations the role of CDGK in setting guidelines for land use, density, building intensity, and other parameters of physical development through the Master Plan as against the roles of towns, village councils, special development agencies and other entities in preparing more detailed and specific plans for selected towns, village councils, special development zones, and/or local areas.

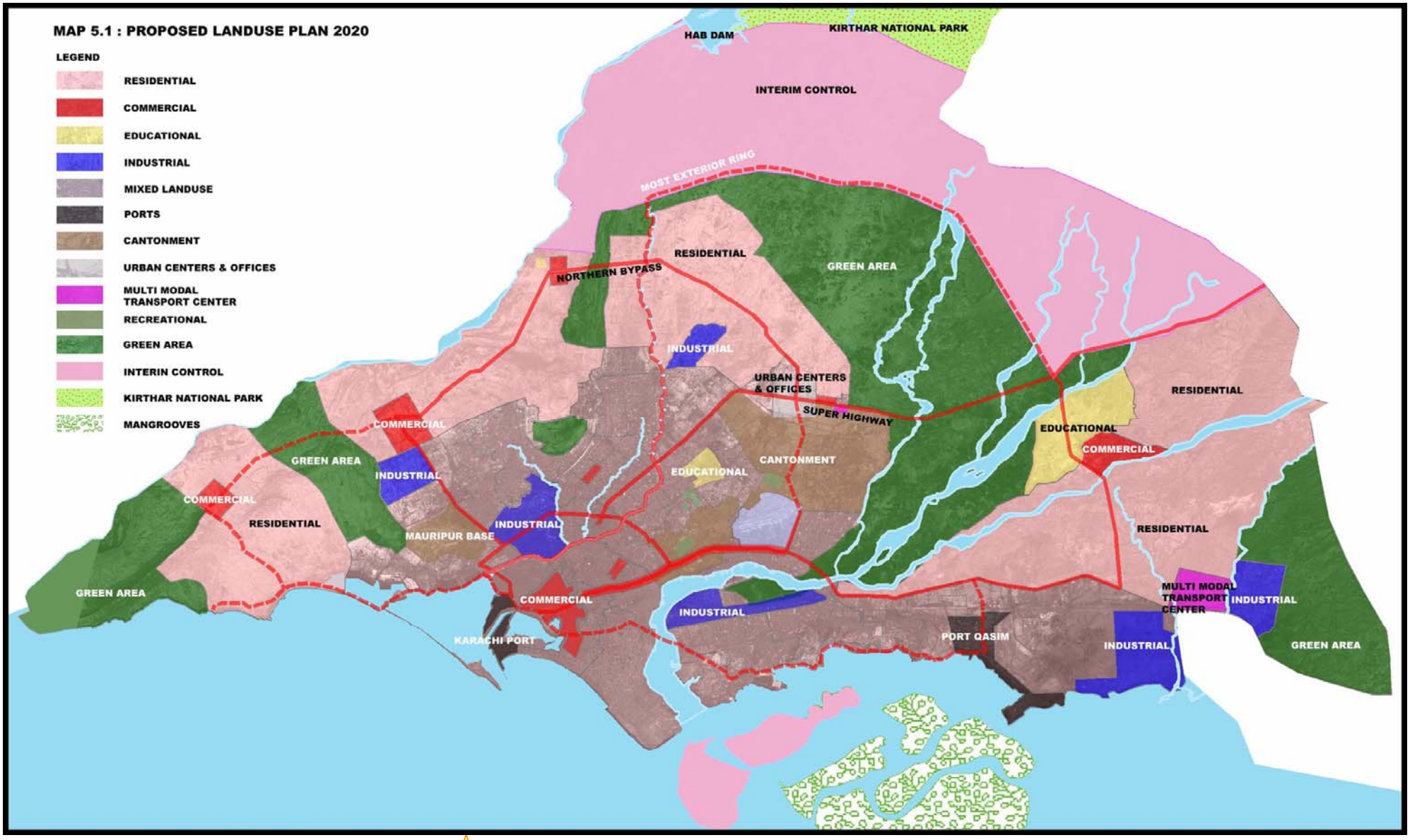
Development Finance:

- Maximize the contribution of the robust real estate market in Karachi towards the financing of infrastructure improvements under the Master Plan. Refine property valuation methodologies, property tax rates, and collection systems and procedures in order to capture a large share of the unearned increment of property value increases resulting from public sector investments in infrastructure.

- Take advantage of investment flows into the real estate and industrial sectors in Kararchi to generate public funding for trunk infrastructure. Develop and approve regulations for exaction fees and other financial levies on private sector developers that are earmarked for primary infrastructure improvements associated with large-scale real estate development projects.

- Establish cross-subsidies between high/middle income developers and home buyers on the one hand and low income residents on the others. In some cases, shift a disproportionate share of the financial burden for developing off-site infrastructure to high/middle income housing projects. In other cases, negotiate with developers to have them include a share of future units (for sale or for rental) in selected housing projects be set aside for low/middle income households.

- Improve the financial performance of infrastructure services (water supply, sewerage, electrical power, solid waste management) by decreasing the level of “non-revenue” services, increasing collection rates on billing, and increasing tariffs where affordable to customers.



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5.0 KARACHI MASTER PLAN COMPONENTS

5.1 LAND USE AND HOUSING COMPONENT

As discussed under Chapter 3, the population of Karachi is expected to grow from today's population of approximately 15.12 million to approximately 27.55 million by 2020. Also, being the key focal point for trade where nearly all of Pakistan's imports and exports pass through Karachi Port and Port Qasim, the city is anticipated to experience a continued growth in commercial and industrial activity. To accommodate the spatial needs for future housing, commerce, industry and infrastructure, the following land use policies are recommended:

- **Develop New Urban Centres at the Urban Periphery:** Karachi's current urban centre, focused primarily around Karachi Port, in Saddar, part of Keamari Town and Jamshed Town, is extremely dense and congested. Most activities associated with the flow of commerce through the port are concentrated here. This area also accommodates most local and provincial government functions.

Developing additional urban centres in peripheral areas would help to decentralize the existing economic activity and public services from the centre, as well as spur growth in areas that could be planned for new development. The mix of uses within these centres could vary where some could be predominantly commercial with office and trade-related uses, while others could include a mix of light industries, offices and shops. The type of mix use should be dependent of the existing natural and built conditions, environmental considerations, infrastructure capacity and characteristics of the surrounding areas. There are atleast three locations where new growth centres should be planned (see Map 5.1 Proposed Land Uses). The development of these new urban centres should be closely coordinated with

new or improved radial and concentric roads and improved public transport services to ensure that they don't become isolated islands of development.

- **A New High-Density Mixed Use Centre at Interchange of RCD Highway and Northern Bypass (C1):** Locate a new mixed use centre at the interchange of the Northern Bypass and RCD Highway. A new centre here would spur growth in this predominantly vacant area that is well connected to the existing city centre and the region. Further, the accessibility of this area will improve considerably once the proposed loop extension of the Northern Bypass is extended to the west. The new centre should be planned as a high density node to capture some of the anticipated growth in the retail and warehousing and office sectors. Also, accommodate housing within and immediately adjacent to the commercial and office development to minimize commute time to and from the new centre.

- **A New Medium-Density Mixed Use Centre in Gadab(C2):** Businesses and institutions that compete in a global market often seek to locate offices close to airports. Due to its proximity to the Jinah International Airport, and improved connectivity from the planned Northern Bypass extension, a new mixed use centre, focused on office development should be located in Gadap. The area to the southeast is somewhat developed with residences. Locating offices at the fringes of existing development would provide alternate employment opportunities for area residents in this part of the city, and would promote new housing development associated with the centre.

- **A New Medium-Density High-rise Mixed Use Centre in Bin Qasim(C3):** With the development and advancement in ICT Businesses that compete in a global market often seek to locate offices close to education centers for R&D purposes. Due to its proximity to the the education city in north and proximity to Industrial area and Bin Qasim Port and improved connectivity from the existing link road and its future extension to form the external loop expressway, a new mixed use centre, focused on Business Process Outsourcing, Knowledgebase services as well as commercial offices, R&D parks, and trading office related to shipping industry should be located in Bin Qasim. The area to the southeast will be developed for mix use housing to support the influx of the workers, in low density suburban living. Locating offices at the fringes of existing development would provide alternate employment opportunities for area residents and will creat an economic center in the east of the city.

- **A New Government Centre at the Intersection of the Northern Bypass and Super Highway (U1):** Currently, most of Karachi's and Sindh's government functions are housed in the city centre. These include the relocating some of these functions to a new centre at the intersection of the Northern Bypass and Super Highway would help to distribute the functions and reduce associated congestion in the city centre. Further, a new centre would provide an opportunity to the city and provincial governments to upgrade some of their facilities which are from the pre-Independence era. Clearly presenting an opportunity to create a World Class Facilities. While decongesting the city CBD.

- **Promote Mixed Use Developments in New Development Areas:** Encourage mix of uses, especially offices, neighborhood-scale retail and residences in new development areas so people can live and shop near where they work. As the trend of increasing car ownership continues, especially amongst the middle- and upper-class populations, promoting pedestrian-oriented developments would help to reduce some of vehicular movements that would otherwise be generated if one had to drive everywhere. This requires promoting pedestrian-oriented developments, where people can walk between multiple uses, as well as to public transit stops. This also requires a well designed pedestrian system with sidewalks that are safe for all types of users, including elders, children and the disabled. Multiple neighborhoods should be linked into one urban centre where services are coordinated and linked by a pedestrian system.

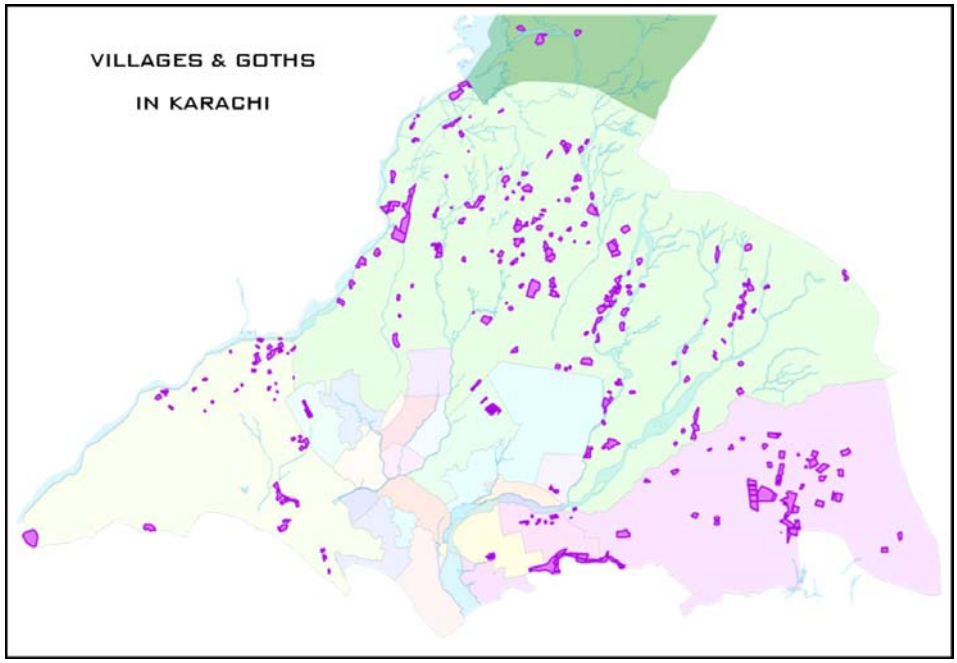
- **Permit and Guide Vertical Development and Densification**: To accommodate anticipated growth in Karachi's population, encourage vertical development in specific new areas. In addition, promote densification of existing neighborhoods through vertical and infill development. This would help to alleviate some of the need for additional space that would otherwise continue the horizontal spread of the city. The following policies are aimed at promoting vertical development in existing and new neighborhoods:

- **Promote high-rise development (greater than G+6) in specific new urban centers.** Karachi is predominantly a horizontal city with very few areas where buildings exceed five or six stories. Promote taller buildings in specific areas, preferably in selected new urban centres, and restrict them from being built in a sporadic manner all across the city. These high-rise developments should be designed in a coordinated manner with a mix of uses, including a variety of housing types, good connectivity to public transit, and well planned vehicular, pedestrian and open space systems to ensure that they become desirable places to live and work.

- **Promote mid-rise development (G+4 to G+6) along major commercialized arterial roads.** This pattern of development is already visible along existing corridors. The Town/Local Area Plans should determine exact land use mix, where some corridors could become primarily retail in nature, others dominated by offices, while others would remain primarily residential. The allowed heights should be dependent on the width of the road right-of-way and also identified in Town/Local Area Plans. The future traffic patterns, parking needs, as well as utility needs of future uses should be taken into consideration during designation of allowed mix of uses.

- **Enable densification (vertical development) of existing residential areas.** Existing neighborhoods throughout Karachi are mostly restricted to G+1 in height. As per densification scenario increase building height limits to G+2 to encourage required densities. Also, as described above, allow building heights to be up to G+6 along major arterials. This would require the city to plan and execute infrastructure system upgrades to accommodate additional people in existing neighborhoods.

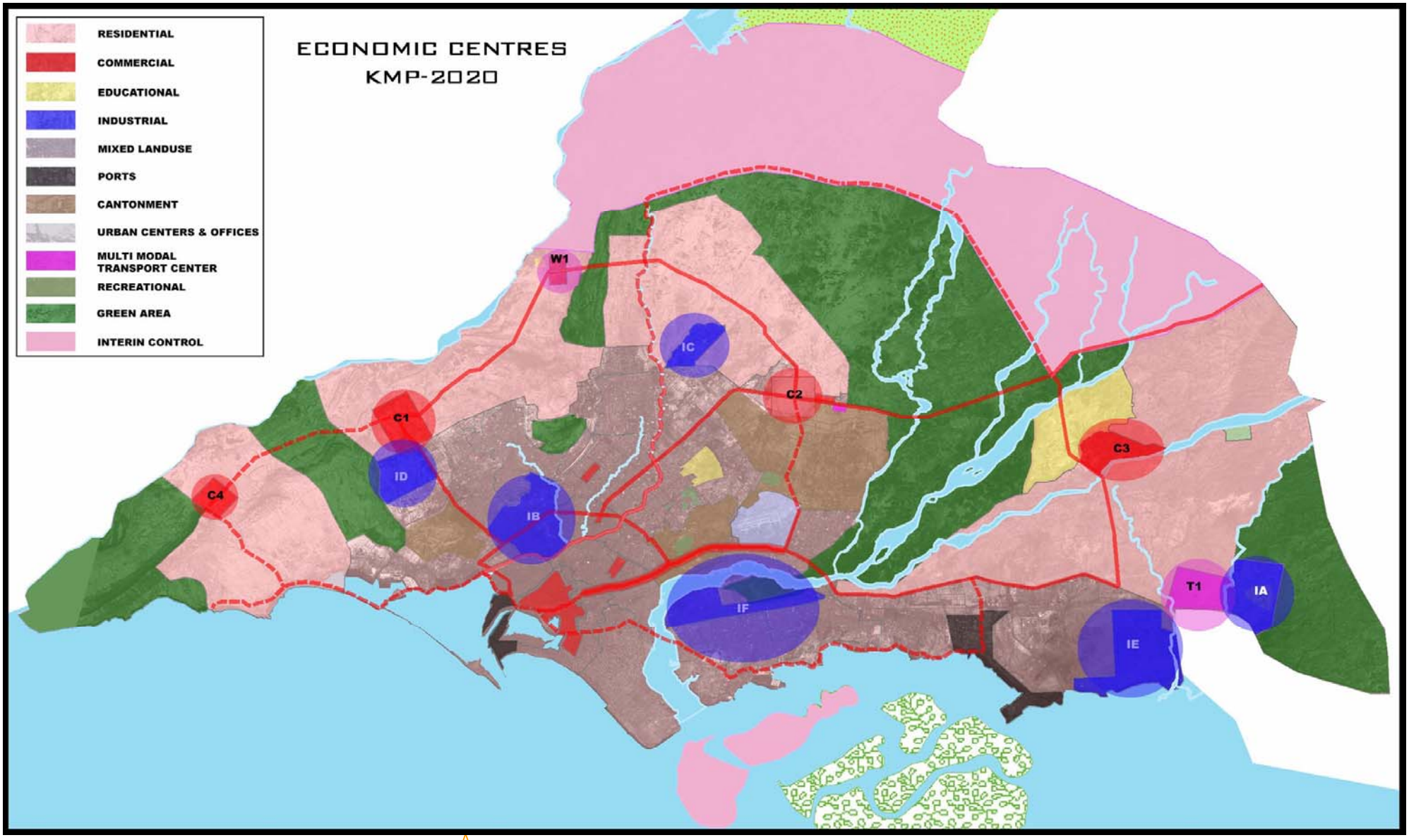
- **"Grandfather" Existing Goths (villages) into Proposed Residential/Mixed Use Development Areas:** Goths occupy nearly two percent (17,560 acres) of land within the Karachi City District. These villages, such as in northern Keamari along the Hub River and northwest of Port Qasim industrial zone extension, provide livelihoods and housing to a large segment of Karachi's low income population. The Goths also serve as a cultural resource representing a form of development that has existed for several generations. To prevent these villages from succumbing to development pressures, they should be grandfathered into proposed residential and mixed use development areas in Town and Local Area Plans.



- **Relocate some of the warehousing and wholesaling activities in the central business district to land along the Northern Bypass (W1):** To further reduce congestion in the city centre and to allow for future growth, relocate some of the wholesale and warehousing activities from the city centre to a new centre along the Northern Bypass Road, near Manghopir Road. This area is predominantly vacant and should be planned as a hub for distribution activities. A new centre would allow space for larger warehouses and newer wholesale activities, and would reduce the need for regional trucks to enter the city centre.

- **Relocate trucking and warehousing activities to a new site along RCD highway, south of intersection with Northern Bypass:** Relocate some of the existing truck and bus terminal and warehousing activities associated with the port. Due to shortage of space, the growth of these facilities is limited at the current location. Also, the constant movement of trucks and buses from the facility contribute considerably to roadway traffic in the city centre. Relocating some of the activities from the current facility to this location would provide space for growth, as well as help to reduce some of traffic congestion in the city centre.

- **Inclusion and Absorption of all Cantonments and other land Holding Agencies like KPT, PQA Pakistan Railway, Pakistan Steel etc.** To bring uniformity in zoning regulations i.e land use zoning, height zoning and density zoning and Building Control Regulations all the cantonments and other land holding agencies like Karachi Port Trust, Port Qasim Authority, Pakistan Railways, SITE, Defence Housing Authority, Malir Development Authority and Lyari Development Authority should come under the Municipal Jurisdiction of City District Government Karachi. Only Defence operational areas and operational areas of these land holding agencies should be with them. All Municipal services like water supply, sewerage, solid waste management should be under one umbrella of CDGK. Similary all the municipal rights of revenue collections should rest with City District Government.



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Housing:

Low-income

- Use the incremental housing development approach already practices by several NGO such as SAYBAN etc. to develop new residential subdivisions for low-income families
    - work through local CBOs to select and develop contract with beneficiaries
    - allocate plot with pit latrine, access to road and water in tank
    - collect monthly charge from household for neighborhood services
    - incrementally developed piped water, sewerage, stormwater drainage and paved roads
- Relaunch a katchi abadi regularization drive that includes:
    - "one window" approach to relations with residents
    - peer pressure to achieve participation of majority of residents in program
    - residents participation in planning of infrastructure improvements
    - residents pay fees to cover cost of improvements, land and management
    - no improvements or granting of title until residents pay 75% of lease charges
    - regularization of all katchi abadis within 5 years

- For upgrading and redevelopment of congested Katchi Abadis develop a pilot project to offer with a high value interface of Kachi abadi to the developer, for relocating the household to a high rise (G+4) development, in lieu of development rights for a commercial / mixuse highrise development on the main corridore. This can be achieved by working closely with the CBO and local NGOs. Resultantly, the residents will get a better facility as well as the face of Karachi will change.

Middle-income

- Encourage development of mid-rise apartment blocks on main arterial and selected secondary roads.
    - Locations, height and land use mix to be determined by town/local area plans on a street-by-street or zone-by-zone basis
    - Encourage partnerships between developers and landowners. Latter can be compensated by combination of apartments in finished buildings and/or cash
    - Use pre-financing by apartment buyers
    - Prohibit sale price changes after contract signing,
    - Include and enforce penalties on developers for late delivery of units

High-income

- Regulate the production of high-income housing by domestic and international private developers
    - Ensure that total production of units is consistent with demand to avoid glut in market
    - Ensure consistency of approved projects with land use, infrastructure and transport plans in this Master Plan
    - Use developer exactions to pay for necessary off-site infrastructure improvements

5.2 TRANSPORT COMPONENT

International experience has proven that road expansion alone can not solve traffic congestion. Instead, road improvements seem to allow more drivers to enter the queue, quickly returning the road system to a state of congestion again. A transportation plan therefore requires the development of alternatives. Improvements to the road system must also support other modes of transportation, particularly public transit, and still offer benefits to private automobile owners and freight movers.

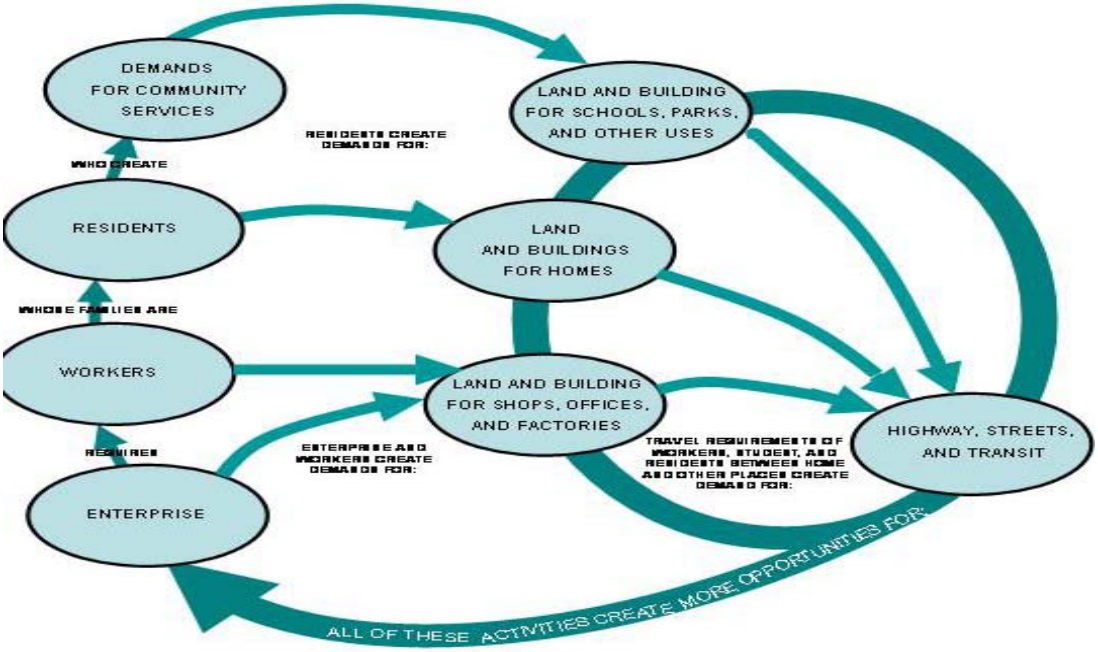
The overarching goal of the transport component of the Karachi Master Plan 2020 is to create a "Multi-Modal Transportation System." (T1) This incorporates four associated goals:

1. Equitably satisfy the mobility, accessibility and circulation needs of the Community for inter and intra city multi modal transportation center (Rail / Bus / Trucks),
2. Effectively accommodate the movement of people, goods, and services at the optimum level of safety, economy, energy efficiency and air quality,
3. Support and complement the orderly growth of the Karachi area.
4. Transportation planning must be comprehensive and approached within the framework of a Master Plan which should ensure maintenance and strengthening of transportation modal choices.

This leads to a series of objectives:

- Maintain and improve the existing highway and transit and transshipment network.
- Extend both networks to serve growth areas, consistent with sound transportation management principles and National Air Quality Standards.
- Reduce travel times, especially to and from major traffic generators.
- Promote maximum efficient use of vehicular and facility capacities, energy efficient transportation and air quality improvement to at least meet international standards.
- The street and highway system must be upgraded to meet both existing and future traffic demand.
- Provision of sufficient terminal and transfer facilities to support efficient rail, truck, intercity and intra city bus services.
- To improve and extend the public transportation services throughout the community, particularly to transit dependent areas.
- To develop and manage the roadway system in a manner which will help to ensure the safe and efficient movement of traffic on major roadways and will help to minimize through travel on local residential streets.
- To improve the accessibility to and the circulation within, the Central Business District.
- Maximize the flexibility to readily adapt to unknown and perhaps unanticipated future changes in urban demography, socio-economic conditions, travel behaviour, technological advances, resource availability, and land use patterns.
- Maximize opportunities for desirable joint development activities which create a more viable and efficient community.

The transportation is a dynamic and interlinked mechanism as shown in the diagram below:



The future development strategy for the transport sector plan can be classified as follows:

i) Public Mass Transportation Strategy

ii) Highway Network Strategy

iii) Parking Strategy

iv) CBD Circulation Plan

v) Traffic System Management

vi) Environmental Friendly Transport System

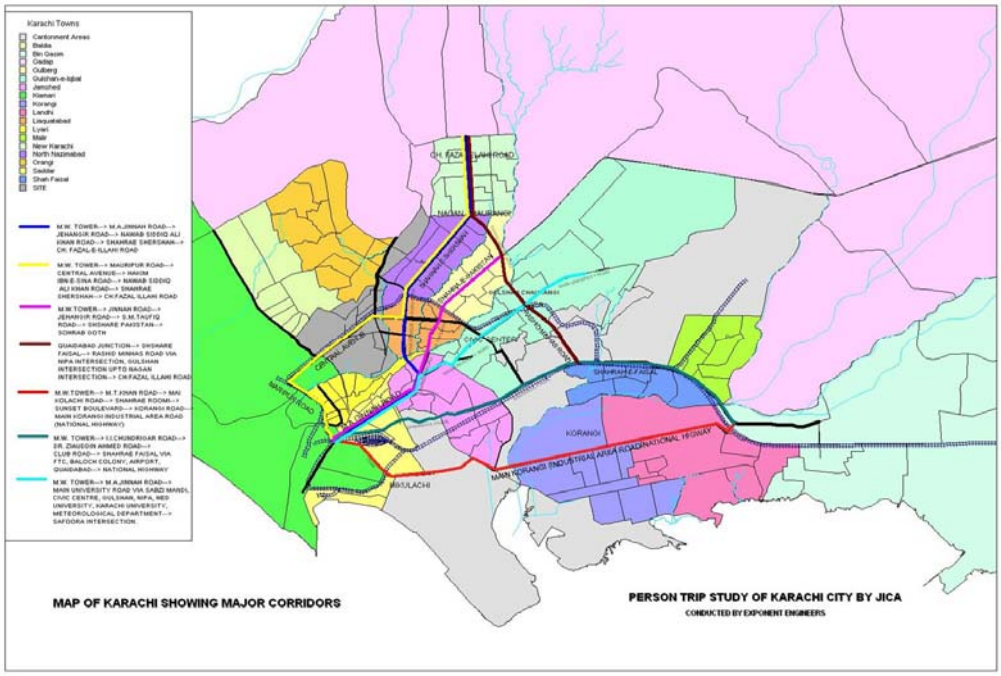
5.2.1 Roads

Highway Development Strategy:

The purpose of the Transportation component of the Master Plan is to provide guidance for the development and management of the transport system for Karachi area consistent with the goals, objectives to guide the social and physical growth of the area to the year 2020. Central to the development of this strategy was the need to overcome the weakness in the structure of the present road system.

The Structural weakness of the present road network is manifested by excessive volumes of traffic towards the city centre, in most cases the traffic having to pass through the area in a zigzag manner. The second major weakness of the road network is the absence of adequate circumferential roads to allow traffic movement to by pass congested areas.

The highway strategy presented herein has been based on information gathering, analysis and review. The basic purpose for this endeavor being establishing a regional and city wide network which embodies the needs of emerging development needs and overcoming the weaknesses in terms of missing links and bottlenecks that will have to be addressed by projects to over come than most logical and next stage analysis will be a process to undertake Travel Demand modelling as an acceptable approach in conventional transport planning. The next stage processes will quantity the travel demand resulting from the forecasted land use development which, in turn, is related to the population forecast.



The JICA person trip study of Karachi has documented 10 (ten) most traveled intersections located in five (5) major corridors of vehicular traffic. One of the key requirements therefore will be to ensure that these locations are developed to a level to provide efficient movement of vehicular traffic to augment the network components.

In those cases where traffic demand outstrips the potential capacity of the arterial system in a corridor, special purpose, high capacity facilities such as expressways must be developed. When these special purpose facilities are required, they should be designed to both supplement and complement the arterial street system. In order to supplement the arterial network adequately, expressways and or transit ways should provide sufficient capacity and access capability to relieve congestion on over loaded arterials. However, major up gradation of facilities has an important dimension of environmental acceptability. The overall impact on urban landscape will be an important consideration.

The feasibility studies may therefore include in their scope the identification and analysis of other parallel alignments which may be more suitable to achieve the purpose of added capacity. Existing long range mass transit plans will have to be incorporated to consider an integrated development of high speed facility model forecast of future traffic needs especially public vs. private may have important policy implications to consider readjustment of facility need.

In order that the highway system can be planned effectively, and achievement of systematic operations, the establishment of a hierarchy of roadway system by function is essential. On ground the function of each type of roadway is clearly indicated by the speed limit, pavement width median strips, channelization, traffic signals, traffic signs and other devices or characteristics. As a part of this report, a set of recommended roadway sections or standards were developed. These standard sections denote the desirable roadway cross-sections and differentiate between roadway classification access control and route function, the number of moving lanes of traffic required (based on design capacity) and whether a median is to be provided.

The basic principle of traffic management is how travel can be most logically and efficiently channelized within this network. The criteria therefore being, the land use service, travel service and system performance.

The land use service criterion consists of:
- Access and mobility
- Service to major activity centers

The travel service criterion is composed of:
- Average trip length
- Traffic volume
- Volume – Trip length index

The system performance criteria include:
- Access control
- Speed
- System continuity
- Facility spacing
- Mileage guidelines

Road Network Development:

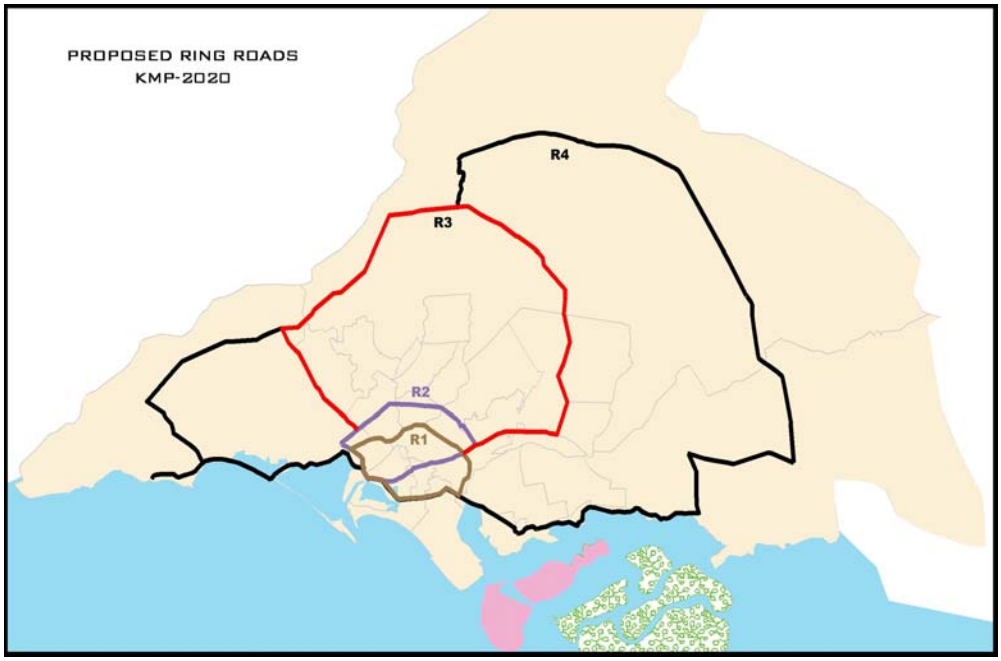
The Urban Road Network development for the KMP-2020 *(Map 5.2.1)* period has been based on following points:

1. The policy to continue the strengthening of the existing network.
2. To provide for completion of missing links.
3. Continuation of the policy to add capacity at critical intersections.
4. Widening of roadways that have experienced increasingly high volumes of traffic.
5. Bridge widening along arterials of heavy volumes.
6. Rehabilitation of existing locations that experience choke points in the network.
7. Up gradation of roads in accordance with the functional classification of the facility to bring it to required standards.
8. Develop ring roads i.e. Inner Ring road, Central Ring road, Northern Ring road and Outer Ring road to provide efficient distribution and rationalize trip lengths.

The concept of circumferential ring roads in the CDGK area will have to be given priority as further expansion of the urban boundaries will place much heavier demands on the radial roadways. The ring roads will provide an approximately for better distribution of traffic loads bypassing the congested radials roadways. The ring roads will provide an opportunity for better distribution of traffic loads by passing the congested radials, thus reducing excessive volumes of traffic that otherwise will have to go through areas without the necessity of being there. Better origins to destination travel will be possible, with more efficient speeds, reduced travel times and possibly shortened distances.

The planning and development of ring roads are required to be pursued at two levels:

1. **Inner ring road (R1)** will utilize the Lyari Expressway alignment, its intersection with Tin Hatti bridge along Nishter Road, to Jail Road and new M.A. Jinnah Road intersection along Shaheed-e-Millat Road, intersecting Baloch Colony at Sh-e-Faisal, following the Shaheed-e-Millat Expressway extension to its intersection at Hino Chowk with Korangi Road, connected to Khayaban-e-Roomi, passing Boat Basin connecting to Mai Kolachi By-Pass and onwards along M.T. Khan Road up to Jinnah Bridge, northwards along Mauripur Road till it reaches the starting point of Lyari Expressway, thus completing the loop.



2. **The second ring road (R2)** has a completely separate Northern and Eastern alignment but shares the south & western portion of the alignment with the first inner ring road. In the west alignment begins at the Lyari Expressway intersection with Mauripur Road proceeds up to Gulbai, turning eastward along Shershah Road, intersects with RCD Highway, Manghopir Road until it reaches the underpass at Nazimabad Chowrangi and eastwards to the second underpass at Liaquatabad No 10, to Sir Shah Suleman Road, south ward crossing the Pir Sibghatullah Shah/Stadium Road interchange with Shahrah-e-Faisal. If the Malir river right bank expressway is constructed, this ring road will connect and end at this terminus. If the elevated expressway is constructed first on Shahrah-e-Faisal, it will proceeded with and Malir river Expressway if not constructed, the ring road will terminate at Shahrah-e-Faisal.

3. **The Northern Ring Road. (R3)** The present alignment of the Northern Bypass begins from the Super Highway Northwards towards Taiser Town, turns in the North Westerly through Surjani township, North of Orangi and Baldia Town until its confluence with RCD Highway and thereafter runs parallel to it, intersecting the SITE/Shershah area at Paracha Chowk proceeding along SITE Ave up to Gulbai where from it runs Southwards parallel to Mauripur Road till its intersection with ICI bridge. The Northern Bypass has a total length of 65 Kms. It has all the characteristic to serve as regional ring road provided it is developed South of Super Highway, connecting the University road in its last road and proceeds Southwards just west of the Malir Cantonment and connecting with Jinnah Avenue east of Karachi Airport will be possible with Malir River Expressway on the right bank thus completing the outer loop around the present Urban proximities of Karachi.

4. **The Outer Ring Roads (R4)** have been envisioned with the future growth and development, consolidating and strengthening the future highway network with an advanced vision to support the growth strategy for Karachi. These details are shown on the Master Plan 2020 map-prepared for future development scenario. These roadway facilities are part of the detailed structural plans prepared for the outlying town where much future development is directed. The Eastern directions of growth will require accessibility to sound and effective roadway facilities if it is to benefit the Karachi regional and its development initiatives. This ring road will also entail development of Southern by-pass that will ling the western most tip of Karachi (Paradise point) with Link road and shall connect both the Ports of Karachi (KPT/PQA). This will also encourage the tourism and realize the housing potential of Kimari Town.

The radial roadways of Karachi are the backbone of its traffic system. The roadways serve a well defined but not necessarily an ideal network of major roads in the early development of Karachi.

As Karachi grows, fortunately the roadways were developed with generous rights of way. Most radials in these areas consist of developed and planned carriageways, with wide Central Island and sidewalks. The right of way varies from 40 to 50m. The connectivity roadways in the planned schemes developed more or less in a grid iron pattern making the use of radial arterials more amenable to efficient traffic operations. However, the radial roadways have lacked the quality of a fast, continuous, traffic service due to encroachments of its carriageways and service roads by intense concentration of commercial and retail establishments.

Construction of flyovers interchanges and grade separation at key intersections including widening of bridges on the other land.

The highway projects proposed for KMP-2020 are categorized as follows:

- At Grade reconstruction of intersection.
- Construction of grade separations
- Widening or reconstruction of major structures
- Widening and reconstruction of entire roadway
- Creation of additional through roadways in the corridor.
- Development of circumferential (ring roads) to compliment radial roadway

The entire urban area for which the master plan has been developed for the purpose of Transport Sector is divided into four quadrants and Area wide improvements. For example the concept of ring roads can either be perceived as an area wide improvement or benefiting the quadrants from which the alignment may traverse. Similarly, the Bus Transit way may pass through two quadrants of the Karachi area. The quadrants are North East, North West, South East and South West. The List of the Proposed Projects is shown in Table 5.2.1 as Annexure**.**

Work Zone Traffic Control

General:

Whenever work is done on or near the roadway, drivers are faced with changing and unexpected traffic conditions. These changes may be hazardous for drivers, workers and pedestrians unless protective measures are taken.

Drivers do not make a distinction between construction, maintenance, or utility operations. Proper traffic control and safety are needed for all types of work.

The City of Karachi has a very poor track record of Traffic Control Planning during construction activities. It is a matter of record that serious injuries, accidents and numerous fatalities have been recorded due to inadequate safety measures, poor practices and almost no provision in the project for this important activity. The TCD Department of CDGK is never consulted when it comes to traffic detours or Traffic Safety provisions are concerned. The KMP-2020 proposes this to be adopted as a long range policy in the future to ensure all construction activities are safely carried out based on fundamental principles detailed below.

Fundamental Principles:

Construction and maintenance areas can present to the motorist unexpected or unusual situation as far as traffic operations are concerned. Because of this, special care should be taken in applying traffic control techniques in these areas.

Principles and procedures which experience has shown tend to enhance the safety of the motorists and workers in the vicinity of the construction and maintenance work areas include the following:

- Traffic safety in construction zones should be an integral and high priority element of every project from planning through design and construction. Similarly, maintenance work should be planned and conducted with the safety of the motorist, pedestrian, and worker kept in mind at all times.

- Traffic movement should be inhibited as little as practicable.

- Motorists should be guided in a clear and positive manner while approaching and traversing construction and maintenance work areas.

- To ensure acceptable levels of operation, routine inspection of traffic control elements should be performed.

- The maintenance of roadside safety requires constant attention during the life of the construction zone because of the potential increase in hazard.

- All future projects shall have an exclusive provision titled “Traffic Control Plan” and a budget provision will be identified separately.

- All Traffic Control Plans shall be reviewed and approved by TCD. The TCD will ensure that control activities are accordingly executed and periodically inspected as a Safety Audit.

5.2.2 Public Transport

Public Mass Transportation Strategy:

The public transport strategy has three elements,

- Bus services,
- Para transit and
- Rail based mass transit.

The development strategy includes related infrastructure facilities and their traffic management aspects. Bus services in Karachi will continue to be the back bone of any future transport system. On one hand the ability of the bus systems has to be expanded and extended for them to meet the quantum of the total demand, their quality and safety has to be ensured. The issue is clear; there must be more capacity to meet travel demands. This challenge is complicated by the issue of increased vehicle ownership. The bus services of superior class must be made available to those who consider this option open. This in effect, means superior class facility superimposed on a standard class service. This distinction from a consumers point of view is possible as masses require the cheapest possible fare but do not object to some overcrowding, while the middle strata of society requires reasonable comfort but is prepared to pay a higher fare. The Urban Transport Service (UTS) is popular amongst this class. Earlier, KMTS has proposed double Decker buses with an upper deck set aside for higher class and the lower deck for standard service. This was a whole new operational concept.

The strategy must be developed to provide a phased program to concentrate on the following:

1. Immediate needs, designed to replace lower capacity buses to higher capacity, replacement of outdated buses by deletion to ultimate development of a comprehensive bus system to meet the broader needs of public transport.
2. The options for management, operation and control of the system if centrally coordinated bus network is to be realized.

This approach suggests that free entry de-controlled competitive system for bus service will have to be replaced while encouraging the private sector to continue operations.

Replacement of minibuses with larger buses must be governed by following policy considerations:

(i) Where minibuses operate at 50 minibuses each way on the maximum peak hour, the route may be classified for large buses only.

(ii) Distinction of fare deferential on such routes should be done away with. The larger buses may not be subjected to fare limitations as is presently the case.

(iii) Routes that require penetration in areas that have narrow unpaved and tortuous vehicular access where larger buses cannot be operated should be classified for minibuses.

(iv) If a route serving particular origin-destination that have relatively low patronage only sufficient to warrant a limited minibus service at reasonable headway, they may be classified for smaller buses on financially feasible grounds.

(v) Should the travel demand warrant Para transit for short routes and enhanced access into neighbourhoods should be formalized, ensuring that such services connect to public transit network for proper transfers.

(vi) The fare differential between minibus service and same size coaches should be withdrawn and both may be operated at same level.

The present operating tactics of the Transport Cartels in Karachi particularly in the minibus industry known as the “Token System” has been attributed to be a root cause of driving indiscipline Transport Planners believes this to be the failure of the institutional policy and weak regulatory control of the authority.

The allowance of superior class services in form of Urban Transport Scheme (UTS) is compatible with longer term aims. The service has minimal fare control; the service operates competitively and appears to be popular with commuters. The UTS should be examined for its problems as perceived by its operators. Be they financial, technical or institutional. It is only through resolution of these constraints and development of sincere and real roles of both Public and Private Sector in letter and spirit that it will be possible to convert such schemes into a comprehensive facility. Notwithstanding these provisions, this step towards the ultimate goals could be affected immediately. In so doing it would also give a measure of the demand for this type of facility.

This replacement of large bus to smaller buses would allow for fewer buses to enter into Saddar – tower area. In some cases this may not be possible; some minibus routes cannot properly be replaced by larger buses and will have to be accommodated in the CBD area, particularly those minibus routes that traverse difficult areas for larger buses.

Considering the demand for orientation of bus services in the CBD area and the overall issue of traffic circulation, the development of Downtown Transport Terminal (DTT) is taken up as a serious matter. The Government therefore needs to undertake a search for suitable sites for this purpose.

The shuttle service could be financed from additional levy of a service tax by Saddar Town administration from the existing businesses and partly paid for from the revenue proceeds of the joint commercial use of terminal facilities.

The City of Karachi, its 18 towns must embark on a major roadway improvement program where practicable specifically aimed to make the bus routes road surface quality and width adequate for operation of larger vehicles and minibuses to improve their accessibility into difficult neighborhoods.

In terms of, public transport bus and Para transit options there are three options that are envisioned for institutional policy development:

1. If the free transport policy is to be continued, the following corrective measures can be taken. These include

a. The freedom of operators to choose vehicle size according to the economics of their operations; the first of which could be the elimination of the fare differential between minibus and large size vehicles.

b. Presently expanding its scope to include EURO technology and or CNG buses with related incentives the Government is already planning.

c. The service will be superior class service and the regulatory regime will initiate serious efforts to enforce limits on the overloading of buses. Other operational controls as included in the agreement will be enforced.

2. Central authority such as a KMTA with greater powers of control can also be introduced and undertake additional regulation within the free transport policy including: requiring compliance with minimum schedules which would cover early and late hours when services are scare.

3. Establish a complete central authority to formulate but not necessarily to operate the entire bus and mass transit system, completely controlling routes, fares and vehicle types their storage and maintenance.

The UTS scheme as originally conceived some years ago was based on sound footing but unfortunately a thorough review to ensure that, if, it is the best way of meeting its policy objectives has never been undertaken. Discussions informally with groups of citizens in Karachi tends to show that people are generally satisfied with the addition of UTS services, in that the year image of bus service has been over combed. There is however, disappointment by most travellers that the services have not been expanded to the level required in the city. With better quality the quantity of services have not been paid attentions to. Mechanisms must be built in to give greater confidence in the stability of future levels of bus service provision.

The critical institutional requirements are:

(i) Political supervision of public transport to be separated from professional management.
(ii) Service planning is separated from service provision both being adequately staffed and skilled.
(iii) In case of contracting new procurement skills are acquired.
(iv) Operations be privatized and commercialized.
(v) Public operations or management if included in the restructured organization must be organized in a form to conducive to competition.

(vi) Contracts executed for service provision define rights and duties of the parties. They provide mechanizing for fare adjustment, provision of facilities, regulatory measures etc

(vii) As roads are built, transport services must be planned and followed as credible plans. Bus services initially could consist of limited park and ride service in the out skirts of the city as construction of new transport corridors (such as ring roads) are improved and developed.

(viii) As an uplift of image of bus services, traffic priority measures must be introduced to provide better competitive environment with the use of private transport (cars). Construction of extensive lengths of busways, bus lanes, priority at traffic signals, contra flow lanes, bus set backs and access are some examples. With newer buses of less polluting standards when introduced, newer bus shelters, good in formation and quality management measures must be visibly introduced, comprehensive bus corridor improvements must be included as part of any program initiated with institutional reforms.

In view of the above details, the projects/schemes have been proposed for KMP-2020 in Table 5.2.2 Annexure, Map 5.2.2. Projects relating to shorter improvement have been described in the Traffic Management and CBD Action Plan.

Para Transit:

Karachi has recently witnessed growth of publicly available passenger transport services outside the traditional public transport system, the Para transit. These services are usually unscheduled on demand responsive routes and fill gaps in formal public transit provision. The vehicles operated are typically small, simple a few places where non motorized tangas are used.

The City Government needs to develop a regulatory and administrative framework within which the potential of the sector can be mobilized and developed. Such arrangements will make it possible to address issues related to congestion in local areas, also insuring inter model coordination with formal services.

Mass Transit:

The Karachi Mass Transit Program (KMTP) is a well entrenched program and considered in principle at all levels of Government and the people in Karachi as one of the main objectives of urban development policy. Comprehensive studies have already been carried out, that have addressed capacity, performance, efficiency, reduction in impact of poverty, improved quality of life, environmental benefits and support to land use structure. This has been addressed by selection of suitable technology, their networks and propulsion. There has been tendency in the recent past to deviate from selected technology in form of consideration for Magnetic levitation and monorail which had been ruled out by KMTS on grounds well documented in the report.

The reduction of road congestion, with its consequent economic and environmental benefit continue to be the driving force for the Governments resolve to purse development of Mass Transit Corridors. In the interest of continued vitality of the city centre activity the city may now adopt the policy that

rail based mass transit lines will be developed underground as they pass through areas in the city centre and adjoining in the immediate vicinity.

For the city centre the development of mass transit corridors should be viewed to improve and quality of access to the centre and should be developed in the context of comprehensive transport plan.

The mass transit corridors should be designed and developed to conform to the urban fabric of Karachi. The needs for its supporting facilities and ancillary developments must be generously recognized and all necessary space requirements provided.

Although no decisions have been finalized, in this respect as yet, it is proposed that one; the policy of the KMTS adopted plan should in any case be followed. This policy of building convertible transit ways should always be borne in mind. While substantial capacity will be added in various mass transit corridors, they should be viewed as an interim stage in the development of rail based mass transit system or converted to rail based when demand justifies.

As an alternative, it has been proposed in the investment program of this transport sector report, to initially construct a bus rapid transit corridor (Bus way) along Nawab Siddiq Ali Khan road which has sufficient bus volumes to justify exclusive bus way development.

One of the main challenges to the City Government once the Mass Transit, Bus related reforms and Para Transit facilitation goes into effect will be effective modal integration including creation of effective transfer points.

The CDGK is required to be cognizant of following facts:

(i) Route Permits to bus services legally exist; the operators may be reluctant to assume the role of changed role secondary to KMTP. They may approach the court of law to circumvent any directives not in their interest.

(ii) With the possibilities of the resurrection of the National Mass Transit Authority (NMTA) the institutional capacity of CDGK will be compromised to the extent that, they may not be in a position to bring about the required changes favourable to Mass Transit.

(iii) Restructuring of the Bus Services (KBOA as well minibus services) has to be done by the CDGK to be seen as beneficial by both the operators as well as the users (passengers) to succeed.

(iv) CDGK will have to plan for a transfer system that can be perceived by operators as well the passengers to compensate for transfer penalties (such as transfer system from one level of mode to another).

(v) The establishment of a central authority will have to be a necessary prerequisite.

Please see Public Mass Transportation Plan Map 5.2.2

KCR Revitalization:

KCR was opened to service in 1964 with 16 stations and 2932 Kms long railway service to the commuters of Karachi. It adequately served the needs of the city till 1984. With the enlargement of the city, it started loosing patronage due to reduced frequency of items, longer running time, lack of punctuality and lack of integration of rail and urban road traffic. The operational efficiency of KCR was further compromised. Government some how didn't undertake investment to upgrade the infrastructure, rolling stock and its operational efficiency. A four staged plan has now envisioned revival of 50 km KCR to include the main line and overall up gradation based on feasibility Studies undertaken by ECIL. The project is presently proposed for an implementation at a project cost of U.S $ 1 billion of which part cost will be paid by GOS and a major portion by the investment company. A Karachi Urban Transit Corporation has been proposed to be formed to take over this project.

5.2.3 Parking Strategy:

Parking Authorities:

Purpose of Parking Authorities:
Parking authorities are charged with full responsibility for a city's entire off-street parking program. Through proper engineering, financial and administrative techniques, space deficiencies are determined, suitable sites are selected and prudently sound facilities are provided. Flexibility in manner of operation is a prime asset of the parking authority. Its intent is not to exclude private enterprise from the parking field. Rather, where substantial services are rendered by privately developed facilities, parking authority activity is aimed at supplementing such operation and stimulating extension of private installation.

In areas where private initiative in parking is ineffective or non-existent, authority activities are directed toward coordinating city-sponsored facilities into a comprehensive system. Merchant and businessman cooperation in the development of attractive, serviceable parking areas is possible under authority parking management.

Summarized, the purposes of parking authorities would provide an outline for the development of a logical action program of authority activity.

1. Conduct detailed factual studies to locate sites and determine suitable size and type parking facilities to meet requirements.
2. Make the results of these studies and conclusions available to private individuals as a means of stimulating their interest and investment activity.
3. Assist organized groups, merchants, business men and others in any parking activity they may undertake.
4. Acquire property, finance, construct and operate facilities.
5. Control the location, operation, servicing and maintenance of parking meters at both curb and off-street locations.
6. Administer minimum operating regulations for both public and privately owned parking installations.
7. Prepare a rational master plan of off-street facilities to meet present and probable future parking needs.
8. Periodically re-evaluate parking needs to update the master plan in the light of changing parking conditions.

Legal Aspects:

A Parking authority law shall be passed by the assembly which should illustrates according to the language of the law,

"To conduct necessary research activity, to maintain current data leading to the efficient operation of parking facilities, planning, designing, locating, acquiring, holding, constructing, improving, maintaining and operating, owning, leasing either in the capacity of leaser or lessee, land and facilities at reasonable rates to be determined exclusively by it."

STRATEGY:

1 Short Term

a) Comprehensive Parking Needs Study
b) Identification of Potential sites for surface Parking
c) Feasibility study for critical locations
d) Preparation of development Plans for Critical Locations
e) Restoration of Parking as per building code
f) Regulation of Building Bye-laws (TCD'S role Parking Design approval)
g) Formation of Parking Advisory Committee
h) Formation of Parking Warden Squad
i) RFP for parking Garage Development

2 Immediate Action Strategy

- Phased initiation of on-street parking plaza on selected locations e.g. Saddar, Tariq Road, I.I. Chundrigarh Road, Clifton etc.
- Phased initiation of surface parking lots and prohibition of adjacent on-street parking.
- Initiate action of building Code Violation.
- Start a parking Stall. Marking program and installation of Traffic signs.
- Initiate study of parking generators.
- Co-ordination of special purpose and special event parking.
- Initiate Truck Terminal Management Plan (Off-street Truck facilities)
- Establish Loading zones (Curbs and Buildings)
- Rationalization of parking fee.
- Policy on school parking.

5.2.4 CBD Circulation Action Plan:

Traffic congestion in the central business district (CBD) cost money, causes stress, waste gasoline, and pollute the air. Traffic congestion and the parking remain acute problems in the Karachi CBD. With the growth in the Karachi in the last decade, it is evident that several poly centres have now developed. The city of the Karachi has grown both vertically and horizontally. With it, the growth of the vehicles on the road has been phenomenal. The Saddar – Tower area spreading east to west continues to be very important activity centre with multiple commercial and the employment centres. Pressure is building in the Karachi to "do something "to improve urban mobility. This demand joins the need for improved and efficient Traffic management and the desire to clean up the air we breath, reduce the noise we must endure, and the quality of the surroundings.

The Master Plan 2020 proposes a phase wise improvement plan of CBD in which the plan is divided into three phases which are:

1. Immediate Action Program
2. Short Range Improvement Plan
3. Medium Range Improvement plan

IMMEDIATE ACTION PROGRAM

This improvement plan is based on the following pre-requisites:

- ❑ There is little or no cost involved.
- ❑ They require action on continuous basis to ensure sustainability
- ❑ Active participation of enforcement agencies
- ❑ Relevant notifications to be issued
- ❑ Must be supported by all agencies and accordingly published

There are 8 main categories of immediate action proposals:

i. Removal of encroachments
ii. Issues related to public transport in Saddar area
iii. Parking control
iv. Stopping of vehicles at stop line.
v. Restriction of left turn on red light.
vi. Restriction of animal driven carts.
vii. Traffic signal operation
viii. Removal of intersection (signal control) on Preedy street

SHORT RANGE IMPROVEMENT PROGRAM (SRIP)

The short range improvement plan has been designed exclusively to solve the traffic congestion problem in CBD and its adjoining areas for at least 8 to 10 years. The underlying concept is to address the ever increasing commercialization trend and corresponding changes with the trend and the high growth rate of traffic.

The completion of Lyari Expressway will require better accessibility to CBD area which will further extend the performance period of SRIP.

The salient features of SRIP are:

1. Change in directional movement of traffic
2. Conversion of two way movement into one way
3. Decentralization of public transport from Saddar area

Infrastructure involved

Major Arterials:

1. M.A Jinnah Road
2. I.I Chundrigar Road
3. Shahra-e-Liaquat
4. M.T Khan Road
5. Preedy Street Extension
6. Saddar Area Road linking Sh-e-Faisal to M.A. Jinnah Road

Intersections:

Approximately 60 numbers of intersections are there in the study area i.e. in CBD, in which 46 intersections are signalized (under UTC Plan), 6 intersections are manually controlled and 9 intersections are self-regulatory.

Following are the primary objectives for the short range improvement plan:

- Reduction In Road Accidents
- Environmental Improvement
- Improved Access And Flow Of People & Goods
- Improved Traffic Flows On Primary And Distributor Roads

CRITICAL INTERSECTIONS:

The following critical intersections have been identified in the CBD area:

1. Khandawala building
2. Tibet centre
3. Eid Gah.
4. Saddar Dawa Khana.
5. Jehangir Park.
6. Court road.
7. Fresco Chowk.
8. Art council.
9. Sarwar Shaheed road/ Dawood Pota road.
10. Fleet club.
11. Musical fountain.
12. Masjid-e-Khizra
13. Empress market

The major reasons of congestion at the critical intersections are:

- Increased traffic volume decreases road level of service & increases parking demand
- Rampant public transport movement.
- Road side and footpath encroachment.
- Parking at turning area of the junction.
- Widening at intersection restricted.
- Stopping of public transport at intersections.
- Abnormal increase in traffic volume during certain hours of day due to number of schools and institutions.
- High pedestrian movement.

TRAFFIC IMPROVEMENT PLAN:

Two proposals were developed and presented to the Governor Sindh in 2005.

SALIENT FEATURES OF PROPOSAL - I:

- Mostly the existing traffic flow pattern has been adopted
- One way system on M.A. Jinnah road, Shahrah-e-Liaquat & Sarwar Shaheed road has been extended.
- New link has been created providing direct access from Saddar area to Shahra-e-Quaideen.
- Four new junctions will be created as a signalized intersection.
- Number of conflict points & signal phases has been reduced at seventeen intersections within study area. To provide extended green time period.
- The existing road way width has been utilized.
- Concentration of public transport from Saddar area has been decongested.
- Sir Ghulam Hidayat-ullah road to be widened.
- Contra flow bus lane has been created near tower
- Public transport will be prohibited on I. I. Chundrigar road.
- Return journey of public transport towards north east will take place from rotary Jinnah Bridge.
- Right turning movement at major intersections is prohibited to increased intersection capacity.
- Five signalized intersections will be eliminated.

SALIENT FEATURES OF PROPOSAL – II:

- The existing road way width has been utilized.
- Major changes in traffic flow pattern is proposed on
  - M. A. Jinnah Road
  - Shahra-e-Liaquat
  - Dr. Ziauddin Ahmed Road
  - Strachen Road
  - Sarwar Shaheed road
  - M. Bin Qasim Road.

- Decongestion of public transport from Saddar area.
- Numbers of conflict points & signal phases have been reduced at critical intersections within study area.
- Sir Ghulam Hidayat-ullah road need to be widened.
- Number of conflict points & signal phases has been reduced at 21 intersections thus providing extended green time.
- New link has been created providing direct access from Saddar area to Shahra-e-Quaideen.
- Three new junctions will be created as a signalized intersection.
- Contra flow bus lane has been created near tower.
- Public transport will be prohibited on I. I. Chundrigar road.
- Return journey of public transport towards north east will take place from rotary (Jinnah bridge).
- Right turn movement at major intersections is prohibited to increased intersection capacity.
- Signalized intersections have been eliminated.

MEDIUM RANGE IMPROVEMENT PLAN

Following actions are required for preparations towards a medium range investment program:

i. Development of a long range urban transport (highway plan) plan for Karachi city. Concept clearance for IDA participation pending with P & D, Govt. of Sindh.

ii. UTC phase-ii also included in IDA discussions must be activated

iii. Feasibility study and engineering design of following projects to be initiated :
   - linking of Mai Kolachi road and Moulvi Tameezuddin khan road with I. I. Chundrigar road
   - linking to Preedy street extension with FTC flyover
   - linking of Lyari express way with the truck stand
   - multi-storeyed car parking at KBX yard
   - development of transport terminal
   - implementation of road widening under KB&TP regulation 2002
   - Widening of Shahra-e-Faisal from Metropole hotel to FTC intersection.
   - Grade separated facility on Sharae Faisal at hotel Mehran intersection and hotel regent plaza intersection Or
   - Elevated road from hotel Metropole up to hotel Regent plaza.
   - Grade separated facility on M.A. Jinnah rd. From Capri cinema to Tibet centre.

iv. Mass transit implementation must be finalized as soon as possible.

v. Implement road widening scheme as per details of KBCA commercial corridors.

vi. Construction of missing link
   - Preedy street extension to Shahra-e-Faisal (FTC)
   - Preedy street extension to Shahra-e-Quaideen
   - Linking of Nizami road with Shahra-e-Quaideen

5.2.5 Traffic System Management:

INTRODUCTION

The objective of Urban Traffic System Management is to make the most productive use of existing (road based) transport system resources. It seeks to adjust, adapt, manage and improve the existing transport system and meet specified objectives. By maximizing the efficiency of existing facilities and systems capital expenditure can be deferred or avoided, time gained in which to develop longer term policies-measures, while at the same time improving traffic safety and reducing the adverse impact of road traffic on the city environment.

TRAFFIC MANAGEMENT:

Traffic Management is the process of adjusting or adapting use of existing road system to meet specified objectives without resorting to substantial new road construction.

There is a strong need to implement proper Traffic system management scheme in Karachi because the high growth rate of traffic which is twice as compared to population growth has its great impact on traffic problems. The ever increasing commercialization trend further aggravates the situation. Further lack of enforcement, absence of off-street parking facilities reduces road carrying capacity which results in traffic congestion, delays, accidents etc.

The major problems facing by Karachi are traffic congestion, overtaxed urban arterials, land use services, clash additional facilities to separate functions very costly, maximization of existing arterial capacity reduce friction, maintain some level of conditions conducive to patronage of I.U.

GENERAL TRAFFIC FLOW IMPROVEMENT PROCEDURES

Following are the basic and general improvement procedures for the Traffic flow which includes:

TRAFFIC CONTROL MEASURES

- Turning Movement Controls At Intersections
- Turning Movement Controls In corridors
- Parking Restrictions
- Unbalanced Lane Operation
- One-Way Street Operation
- Improved Signal Operation
- Through Street Systems
- Signs And Markings
- Simple Channelization
- Transit Operations
- Clearance Restrictions
- Street Lighting
- Pedestrian Controls
- Enforcement Of Regulations

MEASURES INVOLVING MODERATE EXPENDITURES AND / OR CONSTRUCITON

- Correction Of Specific Bottlenecks
- Upgrading Of Major Intersections
- Upgrading Of signalization
- Resurfacing Of Street Within Existing Basic Width
- Widening At Selected Mid block Locations
- Effective Night Lighting

MEASURES INVOLVING MAJOR EXPENDITURES AND CONSTRUCITONS

- At-Grade Reconstruction Of Intersections
- Construction Of Grade Separations
- Widening Or Reconstruction Of Major Structures
- Widening And Reconstruction Of Entire Street
- Creation Of Additional Through Streets In The Corridor

Traffic Management System can be adopted or Undertaken on a small or large scale to improve conditions in specified area where new transport infrastructure is not envisaged. The system will be greatly works as an interim measure pending new construction. It could be implemented as a temporary arrangement to accommodate short term demands.

Traffic management system can also be undertaken in association with construction of new Road constructions.

To implement the Traffic management scheme successfully, following problems should be addressed immediately as Key points to the success of traffic Management Schemes:

- Removal of encroachment
- Illegal Parking
- Illegal Stoppage of Public Transport Vehicle
- Signal Operation
- Completion of Missing-Links
- Preedy Street Extension
- Lines Area to FTC
- Mai Kolachi to I.I. Chundrigar Road

Although the Road system of Karachi comprises of defined network of major and minor arterials but the traffic conditions are deteriorating. The major reasons for the deterioration have been identified which are listed as follows:

- High level of motor vehicle growth
- High incidence of accidents
- Lack of pedestrian facilities
- Lack of road safety awareness
- Increasing number of traffic violations
- Enforcement difficulties
- Lack of traffic control devices (signs & road marking)
- Traffic signal maintenance / operation difficulties
- Inadequate public transport
- Un-controlled parking
- Road side / footpath encroachments
- Poor maintenance of road system
- Need for bye-pass roads
- Lack of coordination between agencies
- Financial constraints
- Lack of proper terminals
- Lack of will

Road Network Circulation Improvement Plan

A Proper Transport Master Plan is always non-existent for the city of Karachi and due to the absence of any Transport Master Plan, the development in the transportation sector have always been undertaken on adhoc basis.

This Master Plan identifies various schemes / plans under the Road Network circulation improvements plan so that road network has uniform operational and geometric features.

The overall traffic circulation improvement requires attention for the following actions:

1) Removal of encroachment on sustainable basis
2) Road widening & up gradation
3) Missing links
4) By passes
5) Construction of flyovers/under-passes/bridges
6) Local / intercity bus / minibus termini
7) Pedestrian facilities
8) UTC phase II
9) Drivers training institute
10) Motor vehicle inspection
11) Enforcement of traffic laws
12) Capacity buildings and fiscal support to TCD
13) Central business district (CBD) improvement scheme

Table 5.2.3 attached in Annexure 1 identifies a list of Traffic Management System Projects to improve over all traffic circulation on major arterials in the city road network.

5.2.6 Environmental Friendly Transport:

The subject that needs immediate attention is change in focus towards having a fuel efficiency related transportation plan. Survival of the automobile as an economically sound and viable transportation system is being put to stake with ever increasing price of even the locally produced fuel. Survival of Fossil Fuel driven automobiles will now on be possible only if better management practices prevail on the waste of energy by reducing energy consumption and harmful emission of greenhouse gases and other pollutants at source.

It has been shown by the surveys on status of pollution on roads that the critical limits of sustenance with high NO_x and PM as well as CO level have since been reached. The impact of a reduced oxygen level on the roads is already apparent from the blood picture of the people residing in or making a living at the observation points. Any addition of a polluting system or technology that may increase the concentration of the pollutant by a mere 1 $\mu g/m^3$ is likely to be catastrophic. Accordingly further addition of automobiles to the existing fleet of vehicles should be stopped forth with.

There is therefore an urgent need to:

- Improve fuel efficiency of the road transport vehicles all over the metropolitan area,
- Monitor the performance of vehicles on road by emission related testing/tuning procedures.
- Introduce a well managed transportation plan. Set up Workshops for emission related tuning of all vehicles, old or new, should be allowed to run on city roads after checking for their emission related efficiency.
- Initiate deletion of Old Public Transport Vehicles with replacement of newer environmental friendly buses.
- Follow up the 2nd phase of the Transportation Control Plan to detail control measures for implementation of bring Karachi in compliance to the international standards of vehicular emission.
- Finalize and implement replacement of 2 stroke Para transit vehicles with 4 stroke engines or CNG/LPG based technologies.

5.3 INFRASTRUCTURE SERVICES COMPONENT

5.3.1 Water Supply

Meeting the water supply challenges of Karachi city district over the next 15 years will require a combination of demand management, enhanced water utility management, and capital investment.

Demand Management

The first line of attack is demand management. Karachi's water supply system is inefficient and wasteful. Pumping more water into it will proportionally amplify the technical and financial losses, increasing waste in absolute terms. The top priority is therefore reducing consumption in order to reduce losses, energy use, and bulk water supply requirements.

It is recommended that KW&SB simultaneously implement a series of different measures designed to reduce water consumption by end users:

- Progressively meter all water supply customers. The utility will create incentives for decreased water consumption through mandatory, phased installation of water meters at all customer connections: domestic, industrial, government, commercial, etc. The cost of the metering investment will be built into the water tariff and spread out over a 3-5 year period. Pakistani firms will be encouraged to produce water meters that meet government standards for flow measurement accuracy and reliability. Review and revise block tariffs to ensure appropriate incentives to limit water consumption.

- Educate the public on the need to conserve water. Prepare and implement primary school teaching modules to teach young children about the value of water and the need to conserve it in a dry southern Pakistan. Prepare and implement education campaigns for the general public through radio, newspapers, and/or television to raise awareness of the need to be more conservative in water use in order to preserve existing supplies and improve service levels and coverage in Karachi. ("If each of us uses less, existing supplies will go farther.")

- Develop (as required), make mandatory, and market the use of plumbing fitting and fixtures that will reduce water consumption, especially for domestic users.

- Provide alternatives to piped water for uses that do not require drinking water quality. Drill wells throughout the urban area to mobilize low-quality ground water for fire protection. Re-use treated grey water for irrigation. Re-use treated wastewater for watering plants and recharging the aquifer.

	2005	2010	2015	2020
Population	15.12	18.93	23.13	27.55
Domestic Water Demand (MGD)	414.0	518.0	633.0	752.0
Other User Water Demand (MGD)	338.0	423.0	518.0	616.0
Total Water Demand(MGD)	752.0	941.0	1151.0	1368.0

Utility Management and Water System Operation

KW&SB can undertake a range of management improvements to increase the technical, financial and administrative efficiency. The driving principle behind these improvements is the operation of the utility like a business. KW&SB should operate on a commercial basis, become attuned and responsive to customer demand, seek to improve relations with customers and satisfy their needs, and operate increasingly on a cost recovery basis.

Operational efficiency and cost reduction — To reduce costs, KW&SB should reduce (or slow the increase of) technical losses by reducing the volume of water through system. This involves water conservation measures, including customer meter installation, as described above. The utility should also create water pressure zones to regulate pressure on a zone-by-zone basis, thereby reducing very high pressure in some mains that increases leakage and the likelihood of pipe breakages. At the same time, KW&SB should implement a strategic pipe replacement program.

The Board should also reduce energy consumption by replacing or fine-tuning energy inefficient equipment. In particular, replace pumps and motors in pump stations. Refine the operation of water treatment facilities, where energy savings can be achieved.

KW&SB should strive to achieve 24/7 water supply service both to satisfy customer preferences and to reduce contamination of the water supply and associated public health risks.

Service pricing — A detailed study of customer ability-to-pay should be carried out to determine how much tariffs could be raised and still be affordable to different income groups. Then Karachi Water and Sewerage Board should carry out public education and customer outreach activities to educate the public about the need to increase tariffs *in order to improve service coverage and quality*. Tariff change options should be presented to customers in public forums and through the press in packages along with different service levels; customers should have a say in deciding how much more they want to pay for what level of service improvement.

Customer relations — Service pricing and tariff collection initiatives must be carried out in a participatory fashion in order to secure customer buy-in, reduce public opposition, and increase willingness-to-pay. This is part of a larger effort to be responsive to customers' preferences and priorities, as would any private sector business in order to increase sales, raise customer satisfaction, and expand its customer base. Admittedly, there are limits to the comparison between a private firm selling a "substitutable" product (like a cell phone) and a publicly owned utility enjoying a monopoly over provision of a networked public service; but the more KW&SB acts like a business and treats its customers as if it could lose them, the better its technical and financial performance is likely to be.

Billing and collection — KW&SB loses a huge amount of revenue through non-payment of bills. This greatly impacts the ability of the utility to maintain and expand the system. The Board should move to increase its collection rate by (i) improving relations with customers, (ii) raising public awareness of the need to collect fees in order to provide services on a sustainable basis, (iii) simplify and streamline payment procedures, and (iv) intensify direct contact with the highest debtors, including but not limited to public sector institutions (v) study to put the bulk meter as well as reservoir in each town. Billing should be recovered from the town administration, while the recovery form the consumer should be the responsibility of the town administration.

Capital Investment:

In addition to the higher priority water supply proposals above (demand management, enhanced utility management), substantial investment in the water supply system will be required to support the envisioned growth of Karachi city district over the next 15 years. This section identifies the major capital investments required to increase bulk water supply, expand storage. Capital investment proposals set out here should be reviewed and validated by the JICA team developing Karachi water supply and sanitation master plan, as their data collection and analysis activities are being conducted in greater detail than the preparation of this overall development plan (master plan) will allow.

While other local sources can be exploited more fully, the Indus represents the only surface or ground water supplies that can meet the bulk of future demands of Karachi. The main solution to the city district's bulk water supply needs is therefore to implement the K-IV project to double the amount of water that the Indus supplies to the metropolitan area. Due consideration should be given to the proposal to bring a new water transmission line along Super Highway in order to (more cost-effectively) serve new expansion areas north and northeast through gravity flow.

New water storage and filtration facilities should be built and evenly distributed throughout the existing and new urban fabric to improve water quality and security of water provision (see Map 5.4). Rain water harvesting should also be carried out in the vicinity of storage reservoirs in selected low-density areas.

A pipe replacement program should be prepared and implemented to reduce technical losses. Prioritization of investments should be done on a financial rate of return basis, taking into account investment cost and reduction of leakage. Corrosion-resistant pipe to be laid at shallow depths and equipped required accessories, valves, and chambers. New water disinfection stations should be installed at intermediate levels in distribution.

S. No.	Water supply proposal
1	Water storage and filtration plant in all 18 towns.
2	Construction of new pumping station
3	Installation of injection well
4	Improve recharging measured
5	Leakage and loss reduction program
6	Development of new big reservoir
7	Development of interceptor drain to main Arterial Lyari and Malir at each town
8	Double line Water supply system is recommended for industrial and recreational area and along medians of road where effluent is required
9	Zoning meters for Union Council and Towns
10	Upgradation of Water Supply System in 18 Towns

The benchmarks for service improvement in the water sector, by which progress will be measured, are set out in the following table.

Table 21: Benchmarks for Water Supply System Performance, 2005-2020

Indicator	2005 Baseline	2010 Target	2015 Target	2020 Target
% households connected to water supply network	60%	85%	100%	100%
Hours of water service per day	1	6	24	24
Tariff collections/billings	60%	70%	80%	85%
Non-revenue water	40%	35%	30%	25%

5.3.2 Sewerage

The proposals for increasing the capacity and performance of the sewerage system can be broken down into capital and non-capital measures.

Capital Investment

Capital investment proposals set out here should be reviewed and validated by the JICA team developing Karachi water supply and sanitation master plan, as their data collection and analysis activities are being conducted in greater detail than the preparation of this overall development plan (master plan) will allow.

- Build more interceptors to link collection areas to treatment facilities. It is proposed to construct trunk sewers on both sides of the Lyari River and Malir River (see Map 5.5). These large sewer pipes will carry most of the city's wastewater to WWTPs; the rivers will be channelised for storm water drainage. A new expressway is under construction in the Lyari River right-of-way and another is under discussion along the Malir River. Sewage will be detained for a few days on its way to the plants in order to induce maturation and decrease contaminants in the wastewater prior to entry into the WWTP.

- Construct a network of new small/medium wastewater treatment plants. New interceptors will transport wastewater to a series of small and medium-sized WWTPs that serve a town or other urban area. The plants will be fed to the extent possible through gravity mains, with pumping required only from depressions. A larger network of more smaller plants (average capacity 25 MGD) will reduce wastewater transmission requirements and costs, thereby resulting in greater overall economic efficiency than small set of very large treatment plants. The risk of service interruption will also decrease, since it is spread over more facilities.

- Rehabilitate existing plans to improve their operational efficiency and allow them to function at or near their capacity.

- Prepare and implement a pipe replacement program to reduce wastewater leakage. Prioritization of investments should be done on a financial rate of return basis, taking into account investment cost and reduction of leakage.

- Industrial park managers and/or industrial firms to construct new industrial waste pre-treatment facilities (see "trade waste policy" below).

S. NO	Sewerage system proposal
1	Development of new sewerage treatment plants
2	Deep sea industrial Waste disposal scheme
3	Proposed Sewerage improvement Plan for Lyari and Malir River interceptor
4	Bitumen coated R.C.C pipe should be used in sewerage network
5	Pre cast manholes should be used in the sewerage network
6	Improvement of sewerage Treatment Plant for its efficient functioning Desludging Sludge digestion and dry sludge bed need improvement
7	Thirty years old TrunkSewer should replaced by new Trunk Sewer because design life of the system has been expired
8	Upgradation of Sewerage System in 18 Towns
9	Additional Sewage flow improvement works of STP-III & STP-IV

Non-Capital Measures:

- Formulate and implement a trade waste policy on the “user pays” principle. Generators of industrial wastewater should be required to pre-treat before introducing their waste into the municipal system. Construction of pre-treatment facilities should be organized where possible at the level of the industrial zone in order to take advantage of economies of scale and reduce costs per industrial unit and per unit volume of wastewater. For example a 30 MGD wastewater treatment plant could treat approximately 70% of industrial waste at SITE. SITE administration is already planning to construct one such effluent treatment plant incoming years.

- Make available treated wastewater for industry, car washing, watering lawns and public green areas, and recharging the aquifer.

- Introduce a sewerage tariff and add it to the water bill.

- Undertake maintenance and repair of the existing wastewater network to seal it off more tightly from (i) streets, public spaces and other inhabited areas, (ii) ground water, and (iii) the water supply network.

5.3.3 Solid Waste Management

The solid waste management phase of KMP 2020 has several aims:

- Rationalize the collection process and make transportation of waste more efficient.
- Increase the capacity of landfill sites.
- Reduce the volume of waste through compacting.

Projected Solid Waste Generation

Estimates of solid waste generation indicate Karachi will produce 16 - 18 thousand tons of solid waste each day in the year 2020.

170 million cubic meters (0.17 cubic kilometers) space will be necessary to store this waste in compacted form over the next 15 years (not including cover materials.)

Demand Management: Waste Separation at Source

The project is studying the feasibility of distributing different colored garbage receptacles to houses for storing recyclable waste in one, and all other materials in another. This approach has many advantages in terms of reducing the volume of waste and costs. However, it requires community acceptance and public education; and pilot projects are necessary before a Karachi-wide program is ready.

Proposed Collection and Transportation Improvements

KMP 2020 recommends an improved collection and removal system with more efficient storage, transportation and treatment.

Compacting trucks will service neighbourhoods and remove wastes to a dozen or more 5-acre (2 hectares) garbage transfer stations across Karachi. Compacting trucks have the ability to squeeze and press solid waste into a more compressed form at the time of collection. Vehicles can transport more compact waste in compressed form, and a landfill site can store compressed waste more efficiently.

Karachi will have nine to fourteen, possibly even more, 5-acre (2 hectares) garbage transfer stations by the year 2020. Compacting trucks will dump waste from nearby neighbourhoods in such stations. Large trucks will move the compacted waste from the garbage transfer station to existing and future landfill sites.

New Landfill Site, Capacity, and Processing:

The project has identified two potential sites near the northern-most extents of the Northern Bypass Road. Meanwhile, studies of the large Dhabeji site, east of Karachi's outskirts, continue. One of these sites will likely include a specialized 100-acre (40 hectare) site to treat industrial waste.

KMP 2020 proposes composting technologies to produce fertilizer. There is interest in a methane generation process to produce gas for power generation, but the investment may be too expensive. Special facilities for incinerating hospital waste need to be expanded to include more of the city's health institutions.

S. NO	Solid Waste Management
1	Development of Garbage Transfer Stations
2	One compacter for each 178 union council
3	30 Tons 40 long container vehicles.
4	Proposal of Railway means Transportation for Solid Waste Management
5	Development of Dhabeji landfill site.

The cost of landfill site clearance and preparation, bulldozers, and processing facilities for and composting will be determined once the exact sites are chosen. The costs is most likely more than 3 billion Rupees.

The above costs do not include the cost of collection vehicles, as private contractors will bear that expense. The investments in landfill sites may be born by CDKG, or the private sector, or both.

5.3.4 Electrical Power

To address the perennial shortfall of electrical power in Karachi and its negative impact on economic growth, it is proposed to undertake a two-phased power system development program as described below.

1. Immediate action plan (2006-2011)
2. Long-term plan (2011-2020)

Immediate Action Plan (2006-2011)

The objective is to close the 1628 MW gap between electrical power supply and demand with the following fast-track approach to generation expansion.

Generation Expansion

- 1000 MW direct power source from Hubco Power Plant. A 500 kV / 220 kV grid station was recently commissioned near Baldia for linking Hubco-Jamshoro 500 kV transmission lines to this completed grid station which will have a capacity of about 1000 MW as against present arrangement of 500 MW. Therefore import from WAPDA through Hubco-Jamshoro line, up to 1000 MW, can be expected, provided that WAPDA's own power requirement allows it.

- 80 MW, DHA Co-Generation Power Plant is under construction and is expected to be commissioned in 2007 and shall feed KESC network. A further extension of this plant by 80 MW is under consideration.

- 350 MW combined Cycle Power Plant by KESC is in planning stage for commissioning in 2007 and another 350 MW plant in 2008 further an additional (350 MW) plant is expected in 2011-12.

- 150 MW Western Electric Power Plant in North Karachi, in private sector, is under consideration / negotiation.

- 150 MW Fauji Foundation Power Plant, in private sector, is under consideration / negotiation.

- 240MW Abu-Dhabi Gas Turbine is expected in 2008.

- On conservation side, all hoardings / bill boards, should be powered by solar power. This conservation will save 20 MW of energy in Karachi.

  From the above it is clear that there would be shortage of power in years 2006 and 2007 if quantum of power as required by KESC is not made available by NTDC (WAPDA). Shortage of power may be aggravated in case construction of new power generation plants by KESC itself or by IPPs is not started immediately.

Transmission System Expansion

The on-going transmission system projects includes establishment of the following grid stations in the existing system which will enable KESC to meet the above demand successfully:

- 220 kV - Surjani Town, Gulshan, Landhi
- 220 / 132 kV – Mauripur
- 132 kV West Wharf, Old Town, Korangi South, Gulshan-e-Maymar near PRL, Memon Goth, Azizabad, Tipu Sultan Road, Jail Road, FTC and in DHA (2 Nos.)

Distribution System

In order to meet the load demand growth during 2006-2011, KESC will have to increase by about 350 to 400 the number of 11 kV primary distribution feeders and will have to establish about 4,000 11kV distribution substations.

A distribution system improvement and loss reduction program is already under implementation by KESC. With the implementation of system improvement plan, the existing system losses of 34% are expected to be reduced to 24%.

Long Term Plan (2011-2020)

The objective is to respond to the anticipated increase in power demand of 1,140 MW over the period 2011-2015 and 1425 MW over the period 2015-2020.

Power Generation

As per the national power sector development policy, additional capacity requirements in power generation would be made mainly from indigenous resources. Accelerated program has been undertaken to increase hydro power generation capacity from 6,460 MW to 7,720 MW by 2010, 15,290 MW by 2015, 19,990 MW by 2020 and to 32,660 MW by 2030 through construction of series of hydro power projects on all rivers, particularly on the Indus.

Although inter-regional power development policy is outside the scope of this master plan, future power development will have an important impact on Karachi's growth. If large sources of hydro-electric power become available, it will provide an alternative low cost energy source for future employment growth in Karachi. Alternatively, if the current reliance on thermal plants continues, Karachi's energy costs are likely to continue to increase making it a less favorable location for industries reliant on electrical energy.

Feasibility and detailed engineering work on major hydro power projects is already underway and their construction is scheduled to start soon. These projects are poised to make an important contribution to future supply of power. However, if further substantial hydro-electric power increases prove infeasible, then future power generation in Karachi will have to rely on lower cost nuclear generation. The alternative is to continue the current pattern of reliance on higher cost fossil fuels. The higher cost pattern may tend to discourage energy-intensive industries from locating in Karachi. It may also be a constraining factor in the growth of service sector activities.

The national power sector development policy envisages increasing nuclear power generation from the present 400 MW to 1,300 MW by 2015 and 2,800 MW by 2020. KANUPP (Karachi nuclear power plant) will be retiring during this period; therefore, PAEC must consider putting up 2 x 300 MW power plant in Karachi during 2010-2015. A second nuclear power plant may be established in Bin Qasim Town where a large industrial area will be developed. A parcel of land of about 3,000 Acres should therefore be reserved now in Bin Qasim Coastal Area for a 1600/2000 MW Nuclear Power Plant to meet the future load demand of Karachi and lower Sindh area.

The program of utilization of indigenous coal includes its use in generating 900 MW additional power by the year 2010, 3,000 MW by 2015 and 4,200 MW by 2020 and 6,250 by 2030 as per the National Power Development Policy. KESC electric network is interconnected with the national grid; therefore, power produced at Thar and Lakhra coal fields, if found economical compared to existing thermal plants, may become available for Karachi.

Large-scale development of new natural gas fields might also provide new energy supply for KESC for establishing combined-cycle gas turbine units. which are more efficient than conventional thermal plants.

The present KESC management has given high priority to consumer service. The new management has affirmed that there is a clear understanding and recognition on the part of the new management that without sustainable growth of industry of Karachi, for which un-interrupted power supply is a fundamental pre-requisite, the macro-economic targets set for national industrial growth can not be achieved.

It is assured by the new management of KESC that they would primarily focus on rehabilitation of the existing de-rated generation capacity and that the planning to establish new generating units of 1,000 to 1,300 MW would immediately be embarked upon to meet the ever-growing power demand of Karachi City. Large quantities of natural gas would be required for these plants.

GOP policy is to encourage the utilization of renewable energy (such as solar, wind and biomass) especially for remote areas.

Transmission System

The transmission system expansion plan beyond 2011 has yet to be prepared by KESC. It is estimated that to meet the growing power demand of Karachi towns, grid stations shall be required mostly in North East and East Karachi, where the population and industrial load will be growing at a faster rate compared to other areas and in South of Karachi due to conversion of residential buildings to commercial use.

The requirement of grid stations during 2011–2015 and 2015–2020 is estimated as follows:

2011–2015 (Load Growth 1,140 MW)

- 220/132 kV Karachi East, Tunisia Lines
- 132 kV Deh Taisar, Gadap, Hawksbay, Boat Basin, Kashmir Road, PECHS. Sindhi Muslim Housing Society, Malir East, KDA Scheme 33, NED.Karachi University, Karsaz or any location off Shahrah-e-Faisal Agha Khan Hospital

2015–2020 (Load Growth 1,425 MW)

- 220 / 132 kV Gulistan-e-Jauher-II, Near Quaid-e-Azam Mazar, Bahadurabad.
- 132 kV Shah Latif Town, Lawrence Road, Malir West, KDA Scheme-33, Karachi North East, Deh Khar Kharo, Hub-Dam, Deh Langheji, KHA

Distribution System

In order to meet the load demand growth during 2011-2020, KESC will have to increase about 700 to 800 number of 11 kV primary distribution feeders and will have to establish about 8000 numbers 11kV distribution substations during this period. The number of consumers is expected to increase by about 1 million during 2011-2020, on an average of about 100,000 consumers per year.

5.4 SOCIAL SERVICES COMPONENT

5.4.1 Health Services

Introduction

Analysis of the health care situation in Karachi showed that the majority of health related problems are basic in nature and that there is a clear need to support, bolster and maintain prevention programs against communicable disease. Millennium Development Goals for the health sector also focus on reducing child mortality, improving maternal health and combating HIV/AIDs, malaria and other communicable disease.

Given limited government resources, public-private partnerships provide an important opportunity for CDGK to undertake a broad range of health care initiatives in collaboration with the private sector. These initiatives can include: preventive health programs, health education, disease surveillance programs, sharing of information for a National HMIS, and propagation of programs for reproductive health. Financial partnerships can be used to stimulate private sector investment in health care infrastructure by providing land and/or tax holidays for the construction of much needed health facilities in newly developing areas.

Facility Provision

Responding to the city's future health service needs will require the construction of new facilities at all levels of the health care system. In particular, it will require a large number of new primary health care centers, the majority of which will be located in newly developing areas of the city. Based on future population projections, some 50 percent of these new facilities should be built in Gadap, 15 percent in Keamari, 15 percent in Bin Qasim and 20 percent in the already built-up, older towns. New teaching and tertiary level hospitals also will need to be built on the borders of these new towns in order to serve both older towns that do not have the necessary land for new, large-scale facilities and newly developing towns that have land available.

A low-cost solution to the establishment of primary health care centers would be to place these facilities in existing or ready-to-use buildings that require a minimum amount of modification and can be leased. Financial savings from this approach could then be used to provide subsidies to needy people for certain health care services.

Given limited public sector resources, there should be a proactive plan to involve the private sector in providing capital investment for the construction of new medical colleges, nursing schools and medical training institutes. Hospital restructuring is also needed in order to improve health services, make them more efficient and sustainable, and reduce, or at least better target, government subsidies. The private sector could be engaged to help manage public health centers for the CDGK. Contributions to improving health service delivery by the Sind Institute of Urology and Transplant, AO Clinic and Aga Khan University should be documented, distributed and incorporated into the future provision of services.

Staff Improvement

Preparing a large new health care staff for the future, while raising the performance of current workers will require a significant training effort at all levels of the system. While the repatriation of quality Pakistani professionals from abroad can be considered as a means of supporting this effort, the use of telemedicine and teleconferencing may prove more efficient in gaining the necessary expertise to help improve the quality of services. Telemedicine at the primary health care level may be an effective way to improve local services and reduce the burden on tertiary hospitals. Computer literacy in Pakistan is growing rapidly and it would be far easier to set up an excellent telecommunication infrastructure within the Karachi area than to attempt to place a large number of medical specialists throughout the city. A broader use of Lady Health Workers and home-based outreach centers run by women could be incorporated into a well-integrated approach. The telemedicine approach can be an excellent way to bring quality medical services to the patient, rather than transporting the patient to expensive and overburdened tertiary care centers. Teleconferencing can also be an effective way to provide state of the art training and knowledge from a wide range of sources to a large number of health care workers within the city.

Health providers at the primary level need to be reoriented towards a preventive approach. They should be able to provide support and guidance for malaria prevention, tuberculosis treatment, HIV prevention, hepatitis prevention and the immunization of children. Because nurses and paramedical staff are more in touch with people, they can educate and guide them well in terms of preventive health related issues. Primary level professionals should be trained in areas of preventive medicine and well versed with required preventive programs in order to make an impact on the health of local communities.

As a result, there should be a greater focus on preventive curriculum and attitude in the medical colleges and training courses for health care professionals. New training programs for health care administration are also needed that could be conducted, for example, in collaboration with the College of Physicians and Surgeons' diploma for health services administration and/or with specialized training centers in the existing and future teaching hospitals.

The budgets for general and preventive training in particular need to be drawn from both the public and private sectors. Training should be provided at regular intervals throughout the year and/or on-line in order to reach the maximum number of health care workers.

CDGK should undertake a number of institutional actions to improve its management control of the sector. These include:

- establishing Health Management Boards in all government hospital;
- creating an Accreditation Body that endorses licenses to open and run private health facilities
- working with the National Commission for Career Structure of Health Professionals to develop recommendations on suitable career structures, salary packages and incentives for different cadres of health care professionals; and
- developing a detailed plan of action with local governments to check the clinical practice by unqualified doctors in the private sector.

Access to Services

Access to and utilization of primary health care centers must be improved in order to reduce the flow of unnecessary patients to tertiary hospitals for the treatment of minor illnesses. Not only do primary health care centers need to be well located, staffed and equipped, they also require a well-functioning outreach network to support their disease prevention efforts, instill resident confidence in the overall health care system and help manage an effective process of referrals. The person-to-person approach of these outreach centers is particularly important for the growing number of low-income households throughout the city.

Innovative public private partnerships are needed to increase private sector investment in health care infrastructure. Government could also turn over the management of large tertiary care hospitals to the private sector for extended periods of time under a fixed budget agreed upon by both parties. This would improve the management of these facilities, lower costs and free up government funds for more needy activities.

The CDGK should create more opportunities for the private sector to invest in healthcare facilities and their operation, not only in terms of curative services, but also in undertaking preventive programs.

Primary health facilities must be able to provide proper guidance on the reproductive health of women and family planning. Outreach and primary health care centers must be able to guide people in their neighbourhood on how to become more aware of their own health related issues and where to go for treatment.

The government should establish a health related disaster preparedness program with an organized action plan and triage system that is adequately rehearsed with civil defense, policy and ambulatory services, and local government officials.

5.4.2 Education Facilities Proposals as per Densification Scenario

Existing and proposed educational facilities in Karachi are shown in table in attached**,** which depict that at present the educational facilities in Karachi are over and above National Standards of Educational Facilities.

These educational standards are as follow:
One primary school / 6000 persons
One secondary school / 25000 persons
One college for / 100000 persons

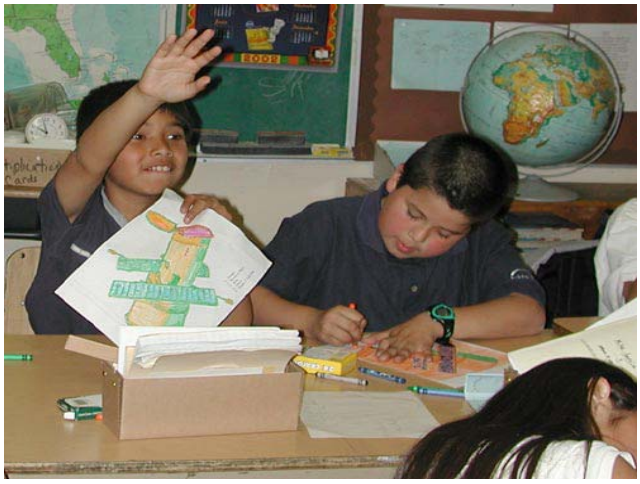
Although the educational facilities in Karachi at present are over and above the National Standards of Educational Facilities but for the new settlement / scheme in Gadap, Bin Qasim and Keamari Town additional educational facilities will be required as shown in Table No. 22

Table No. 22
Town wise Education Facilities Required as per Densification Scenario

Town	2005 Existing			2010 Requried			2015 Requried			2020 Requried		
	P.School	S.School	College	P.School	S.School	College	P.School	S.School	College	P.School	S.School	College
Keamari	119	84	16	36	N.R	N.R	61	N.R	N.R	57	N.R	N.R
S.I.T.E	107	159	10	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Baldia	141	287	32	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Orangi	269	261	6	N.R	N.R	5	N.R	N.R	N.R	N.R	N.R	1
Lyari *	198	169	8	N.R	N.R	1	N.R	N.R	N.R	N.R	N.R	N.R
Saddar	198	278	28	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Jamsheed	190	249	54	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Gulshan-e-Iqbal	231	285	56	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Shah Faisal	146	206	17	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Landhi	263	255	13	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Korangi	271	180	9	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
North Nazimabad *	101	417	9	27	N.R	N.R	2	N.R	N.R	2	N.R	N.R
New Karachi	252	228	11	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Gulberg	99	181	25	16	N.R	N.R	19	N.R	N.R	21	N.R	N.R
Liaquatabad	244	164	16	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Malir	206	156	7	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R	N.R
Bin Qasim	188	146	11	N.R	N.R	N.R	92	N.R	6	191	N.R	6
Gadap	227	188	31	333	N.R	3	487	63	29	489	117	29
Total	**3,450**	**3,893**	**359**	**412**	**N.R**	**9**	**661**	**63**	**35**	**760**	**117**	**36**

*Source: * Includes data provided by Government Agencies only*
Data provideded by UC's Nazim

Following are the major recommendations for Master Plan-2020



Educational facilities in Karachi Metropolitan area are in excess due to commercialization of education and active role of private sector. Private organizations NGOs, autonomous bodies have all taken part in providing sub standard educational facilities, so the measure should be taken to improve standard & quality of education.

- The schools and college especially private schools and colleges should be evenly & spatially spread all over the Metropolitan area. Townwise and U.Cs wise on neighbor hood planning principles.

- Concentration of private school and college in certain area should be discouraged by not allowing schools in private residential buildings.

- Tiers of education system should be minimized

- To provide specialized training to meet future manpower needs (craftsman, technicians etc.)

- To achieve specialized training through co-ordination between industry and technical training institutes.

5.4.3 Recreation

Proposals for recreational areas include the following:

- identify and protect any land available for active recreation within the different towns;
- locate and share sports facilities between towns whenever appropriate;
- engage the private sector to run major parks and collect a nominal entrance fee that will lead to higher level of maintenance, usage and security;
- establish a sports complex in Kemari Town;
- provide a sports complex and zoological garden in Bin Qasim Town out of land reserved for the forest; and
- generally double the number of town parks, community parks, town stadiums and community play grounds in each of the 18 towns by the year 2020.

In terms of coastal recreation, proposals include the following:

- divide the area from Cape Monze to Port Qasim into zones from A to G and maintain a 500 meter wide recreation belt along beachfront for the development of resorts, hotels and water sport activities;
- preserve the existing mangroves;
- develop Bundle Island, Buddo Island and Muchak Island for recreational, commercial and residential use;
- build a vehicular bridge to provide a ground link to Bundle and Buddo Islands and Kaprianwalla;
- provide public transport and facilities for low and middle income visitors;
- establish a system of parking fees to fund the maintenance of the beaches;
- redirect the dumping of waste water from the Malir and Lyari Rivers and set up controls to enforce a ban on future dumping;
- provide trained lifeguards; and
- develop plans for marinas and water sport facilities.

5.4.4 Conservation Sites of Natural Archeological Importance

Historic resources provide a link to the past, as well as give a feeling of continuity and a sense of history and place. These resources can consist of a single building, such as a government building, a house or a mosque; a group of buildings, such as a commercial block, or a neighborhood; a site, such as a burial ground or an archaeological site; or a natural feature, such as a river.

In recent years, there has been a growing interest in preserving historic buildings in Karachi. The passing of the 1994 Sindh Cultural Heritage Act law provided an avenue to legally protect buildings that are deemed. Since the adoption of the law, more than 600 buildings in Karachi have been identified for preservation due to their historic value. Karachi clearly includes numerous additional resources that could be qualified as historic. Some of important sites are as below.

Places	Year
Mohatta Palace	1933
Karachi Port Trust	1915
Mazaar Quaid-E-Azaim	1970
Merewether Memorial Tower	1892
Hindu Gymkhana	1925
Wazir Mansion	1860
New Sindh Assembly Buildings	1942
Clifton Promenade	1920
Flag staff House	1865
Maxdenso Hall	1886
Parsi Dare Mehar	1875
City Court (old Jail)	1868
KMC Head Office	1931
Victoria Museum	1987
Ghulam Husain Khlikdina hall	1906
Karachi Central Jail	1906
Empress Market	1889
St. Patrick,s Church	1845
Holy Trinity Church	1855
Frere Hall(Liaquat Hall)	1865
Dayaram Jethmal Science College	1887
Imperial Custom House	1917
Sindh Madressah-Tul-Islam	1885
Jaffar Faddoo Dispensary	1904
Khaliqdina Hall	1906
Dayaram Jethmal (D.J) Sindh College	1893
Lady Dufferin Hospital	1898
Civil Hospital Karachi	1898
Sindh Club	1883
Sindh-Madressah-Tul-Islam	1885

Proposals:

The CDGK should expand its historical buildings program to include other historic resources, as well as to pursue the following:

- Identify and designate historic resources in Karachi.
- Establish rehabilitation standards and preservation techniques that describe what types of changes are allowed on historic resources.
- Monitor any work done on historic properties through the building permit process.
- Review, and promote compatible new design adjacent to historic buildings and in historic neighborhoods.
- Set up a tax credit program to encourage private property owners to protect their historic properties.
- Enforce the Sindh Cultural Heritage Act.
- Increase public awareness regarding Karachi's history and historic assets.

6.0 INITIAL ENVIRONMENTAL EXAMINATION

This section provides an overall initial examination of the environmental impacts, both positive and negative, of the Karachi Master Plan 2020. The anticipated impacts are presented by Plan components: Land Use and Housing, Transport, and Infrastructure Services. At the time of subproject preparation, the need for a more detailed Environmental Impact Assessment should be considered.

6.1 LAND USE AND HOUSING

Karachi's environment will continue to experience increased stress as long as the city continues to urbanize beyond the carrying capacity of its infrastructure services and natural resources.

The Land Use and Housing proposals of the Karachi Master Plan 2020 will shift some of the congestion and inefficient growth in the CBD/port area to more managed new development areas at the urban periphery. The creation of such a polycentric settlements will have a positive environmental impact to the extent that it will reduce the growth of resource demand and pollution discharge on the CBD/port area and redirect activities to planned areas with infrastructure to mitigate these impacts. This will be far more positive than allowing the CBD/port area to continue to follow current growth patterns.

That said, there will be negative environmental impacts in the proposed new urban centers to the extent that they will experience increased resource demand and pollution. The construction of new roads and building will increase impervious surface area substantially, creating additional run-off that, if not channeled and treated properly, will increase erosion and non-point source pollutants. Impervious surfaces also reduce groundwater recharge and increase the likelihood of flash-floods. By developing the proposed infrastructure services for sewerage and sanitation these impacts can be substantially mitigated. Treated sewerage and wastewater discharge will significantly reduce fecal coliform bacteria and nutrient levels discharged into streams and waterways, benefiting both public health and stream ecology. Environmental impacts of storm water drainage can also be reduced by constructing retention and settlement chambers at the release of storm water end pipes.

Where future housing requirements are accommodated by densification of existing residential areas, there will be increased demand for natural resources and discharge of waste. The environmental impacts of this can only be mitigated by executing infrastructure system upgrades as proposed. Also, in areas where flooding is experienced, additional secondary storm water drainage investments may be necessary.

The proposed mix land uses in new development areas will reduce commute times and congestion on roads.

6.2 TRANSPORT

Roads – The main environmental impact of the proposed roads will be increased storm water run-off. On both new and existing paved roads, the impervious surface will displace storm water, causing erosion, accelerated discharge into waterways, and increased pollution run-off.

Some of these impacts can be mitigated by constructing roadside drains and catchments chambers at storm water end pipes to settle particulates and reduce water pressure before releasing into streams. It will be important to ensure that run-off is properly channeled from the roadside drains into secondary and primary drains and final discharge areas. Improved management will also be required to ensure that solid waste will not be dumped in drains resulting in blocked, non-functioning systems.

The proposed transportation network improvements will have a positive environmental impact to the extent that they will relieve congestion (or at least, slow the rate of congestion increase) on the metropolitan road network and reduce automobile emissions. Road upgrades, new expressways, radial and circumference roads, over/under passes, and improved traffic signals will all help improve traffic circulation and reduce idle time.

Negative environmental impacts of new roads will include the introduction of traffic and automobile emissions to new areas of the city. However, as long as these new roads are increasing traffic circulation and reducing idle times, overall emission levels should improve. The simultaneous development of public transit systems and improved traffic management will also improve overall air quality.

Bus Improvements – The environmental impact of the bus system improvements is expected to be positive to the extent that they will result in the replacement of private vehicle trips with public transit trips, since air pollution levels per trip are lower. However, the overall environmental impact may be negative if trip replacement does not occur, since bus services will simply add to current exhaust emissions.

6. 3 Infrastructure and Urban Services

Water Supply – To the extent that the proposed actions to manage water demand are successful, the environmental impact of these actions will be positive since they will reduce the overall burden on current water supplies and increase its carrying capacity.

The progressive introduction of water meters will encourage customers to conserve water use. Public education and marketing of water conservation fixtures will also decrease waste of water, particularly among domestic users. Utilizing non-potable water sources for fire protection, for example, will also reduce demand on fresh water supplies. Where the increased supply of piped water reduces the demand on ground wells and aquifers, there will be a positive environmental impact. This will reduce the tainting and permanent ruin of aquifers that occurs when wells are continually dug deeper to find dwindling freshwater, only to hit saltwater and arsenic that can seep in.

Management improvements undertaken by KW&SB to increase the technical, financial and administrative efficiency will also have a positive environmental impact.

Capital investments to increase bulk water supply and storage for new and existing urban areas will have little environmental impact themselves since they are simply transporting water. The environmental impacts of the introduction and increase of water supply to these areas however will depend on how it is discharged. This is addressed below in sewerage.

Sewerage – Capital investments proposed for new and existing treatment facilities will have a significant positive environment impact by reducing biological pollution of ground and surface water. The current degradation of water supplies and threats to public health caused by untreated sewerage are great as identified by the surveys and assessments. Any capital investments in building interceptors, new treated facilities or upgrading of existing facilities will help reduce degradation from wastewater. Non-capital improvements will also improve the overall wastewater management.

Solid waste – The construction of landfills will help contain solid waste and decrease pollution. Leaching and other run-off into ground and surface water supplies will also be reduced.

Electric power – The capital and non-capital investments proposed to increase power generation will not have significant environmental impacts themselves. Power sources and resulting pollution are of more concern. Proposed hydro-electric, natural gas and nuclear power sources produce significantly less emissions that fossil fuels and should be considered in reducing CO2 emission levels. Increasing residential access to grid power will also reduce pollution from domestic burning of cooking and heating fuels. This will help improve air quality in the city.

7.0 PLAN COST AND FINANCING

Karachi Master Plan 2020 lays out a plan to develop large areas of under-serviced land in the east, west and north of Karachi during the next 15 years. The challenge of delivering the infrastructure necessary to support this development is financial as much as it is technical.

The following pages discuss the large increase in capital investment proposed in this Karachi Master Plan 2020 and the funding required to carry out this investment. That leads to a discussion of proposals to improve the financial position of union councils, towns and above all the city district. The subsequent sections on affordability address household affordability and financial sustainability of infrastructure service providers.

Many different actors will invest in different aspects of the proposed development plan. City, Town and to a lesser extent union council governments will raise the capital for roads and traffic management as well as solid waste capital improvements. The government-owned KW&SB utility will guide the investment in water and wastewater treatment, distribution and transmission systems using its own revenue (while the city subsidizes some of its expenditures.) Autonomous private sector utilities such as KESC will be able to raise capital on the stock exchange to fund expanded electrical power generation, transmission and distribution systems. Smaller private operators will be able to finance much of the cost of buses, parking garages, vehicles needed to haul solid waste, and even, to a certain extent, the cost of preparing landfill sites. The real estate sector can provide much of the capital for developing new land if the legal, institutional and incentive framework are suitable. NGOs and charities can be expected to provide some basic public services in katchi abadis, although their ultimate reach is rarely extensive and any successes are to some extent a reflection of inadequacy of the government and utilities to deliver low-cost affordable services to low-income areas.

All of the public entities, private developers, and NGOs identified above are by nature financial intermediaries in the delivery of infrastructure services. Ultimately it is the Karachi residents, businesses and institutions – the users of the system – who pay for the services, at least in part. The long-run funding for local infrastructure depends upon end user payment of service charges and taxes. Their payment will cover the cost of capital over the long-term. End users' taxation depends upon the design of the taxation assessment, reasonable rates, and enforcement. The same end users' payments also depend upon the level of service and the appropriateness of design, and households' abilities to pay service charges.

The financial plan is largely a matter of who raises the capital to invest in infrastructure, and how they will recover their investment through taxes and user charges. The most likely impediment to immediate implementation of area development projects is the cost of infrastructure in relation to local government revenues.

7.1 CAPITAL DEVELOPMENT PLANS AND COSTS

Karachi Master Plan makes many recommendations to expand infrastructure and services to a rapidly growing population. There are no precise estimates of the costs at this point, but it is possible to describe the magnitude of these investments and the capacity of different service providers to raise capital.

Water Supply and Sewerage

Karachi's growth to the year 2020 will require the Karachi Water and Supply Board (KW&SB) to press forward with an ambitious capital development program as follows:

- New water transmission lines to double intake from the Indus river
- New water storage and filtration facilities
- Replace water pipes, pumps, chambers, valves, etc. to reduce technical losses
- Install large interceptor sewer pipes to link collection areas to treatment facilities
- Construct a series of small and medium wastewater treatment plants
- Rehabilitate existing treatment plants to improve operational efficiency
- Replace wastewater pipes, pumps, chambers, valves, etc. to reduce technical losses

The cost of this development program will be high. The 2005-2020 sewerage capital improvement program for Keamari, Gadap and Bin Qasim alone represent several billion rupees.

In addition, industrial park managers will be expected to construct new industrial waste pre-treatment facilities.

Alternative water and sewerage development approaches exist, but projects such as desalination plants represent even greater cost.

The projects described above would seem to provide the best returns to the public in terms of public health, quality of life, and employment prospects for the poor. The intention of the replacement and rehabilitation programs mentioned above are intended to reduce, if not eliminate, the KW&SB's 25% technical loss. More detailed analysis of each projects financial and economic rate of return must be determined before they can proceed, but the initial indications are favourable.

Solid Waste Management:

The cost of compactors and garbage transfer stations will be almost 7 billion Rupees. The cost of purchasing, clearing and preparing the landfill site, acquiring bulldozers and installing treatment facilities for some of the waste is difficult to estimate until the exact sites are selected, but will probably cost 3 or more billion Rupees.

As with water and sanitation, solid waste removal contributes greatly to public health by removing pests and unpleasant odors. The capital costs appear to be modest when compared to other sectors, and the feasibility appears sound. Private and public investors will perform an evaluation of the financial and economic rates of return once studies are complete and costs can be better quantified.

Roads:

The Karachi Master Plan 2020 envisions an ambitious program of road transportation improvements, including:

- elevated roads
- signal free expressways
- underpasses
- road upgrading and widening
- Interchanges
- By passes

This is in addition to the construction of by-pass roads and an array of ring road improvements, intersection improvements, arterial road upgrading, signals, and traffic management improvements. The private sector will make additional bus and parking improvements.

The transportation component of KMP 2020 is an ambitious. Grade-separated interchanges, flyovers and underpasses can be expensive. On the other hand, they will be placed at chief traffic bottlenecks in an effort to reduce congestion. This ensures many vehicles will benefit every day from faster travel times and lower vehicle operating costs, time saved, and higher productivity. A better quantified calculation of the benefits and costs of such projects will be a part of the evaluation of each specific project.

Public Transport:

The transit improvements envisioned in public transport are no less ambitious:

- Light rail mass transit system
- Bus terminals
- Multimodal Transportation Centre
- Bus bays
- KCR revitalization

The cost of the light rail system will be among Karachi's largest investments ever. Although a private operator has already expressed interest in a concession to run the service, large capital is nonetheless required for track and yard. The cost of rail, yard and rolling stock is likely to come to at least 30 billion rupees. If the city

chooses to build a tunnel beneath the CBD, the costs could rise into the hundreds of billions of Rupees, depending upon the technology employed. This project requires a major investment study.

Bus terminals represent quite substantial expense. Bus bays and other road improvements are important and can have costs to the greater public in terms of traffic disruption. All of these sorts of project would seem to have great benefits in terms of improved transfer, time saved, and safety, and indicate good rates of return.

The proposed KCR revitalization may cost as much as US$ 1 billion.

Electrical Power

Electrical power improvements can be divided into two phases. The first stage covers years 2006-11 and envisions the following improvements:

- 1,050 MW increased power generation capacity
- Transmission and stations to purchase another 1,000 MW power over the grid under a contract with WAPDA's Hubco Power Plant
- Transmission improvements
- A dozen stations ranging from 132 – 200 kV
- 4 thousand 11kV distribution substations

The second stage covers 2011-20 and will rely upon the larger grid to sell Karachi more power. Nonetheless, at least 350 MW capacity improvements are already planned for that period, in addition to perhaps purchasing more power from other producers on the larger grid.

7.2 FINANCING PLAN

This section will first review the own-revenue base supporting CDGK's finances today and then discuss ways to augment the local revenue base or raise part of the funds through public-private partnerships.

CDGK Improvement to Own Local Revenue Base

The challenge of providing infrastructure to existing urbanized and new expansion areas will be to raise the necessary capital surplus from operations. Transfers can provide much of the funds needed, but they are not reliable and often unsustainable. Provincial Governments cannot incur debt. The only real option is for local governments to raise their own revenues. Today CDGK only raises one-eighth of its revenues, relying on higher levels of government to provide seven-eighths through transfers. This is an untenable situation and a position of weakness from which to finance the growth of the city.

The following analysis focuses upon the ability of CDGK to increase its own revenue base – from taxes and fees – away from transfers so that the government can draw upon and leverage a larger and more reliable source of funds. In short, CDGK must expand its revenue base. The following table 23 is a legally mandated sources of revenue available to local governments.

Table 23: Existing Sources of Revenue for Local Governments

Union Council	Town Administration	City District
• Fees for licensing of professions and vocations • Fees for birth, marriage and death certificates • Charges for specific Union Council services • Rate for remuneration of village and neighbourhood guards • Charges for execution and maintenance of public works. • Rents on land, buildings, equipment… • Collection charges on taxes assessed by other levels of government	• Education tax • Health tax • Fees related to educational and health facilities • Rents on land, buildings, equipment • Service fees • Tolls on roads, bridges, and ferries (other than national and provincial highways and roads) • Fees for fairs, exhibitions and other public events • Collection charges on taxes assessed by other levels of government • Any other tax authorized by the government	• Education tax • Health tax • Fees related to educational and health facilities • Rents on land, buildings, equipment • Service fees • Tolls on roads, bridges, and ferries (other than national and provincial highways and roads) • Fees on advertisements hoardings • Fees for approval of building plans and construction permits • Charges for execution and maintenance of public works. • Collection charges on taxes assessed by other levels of government • Any other tax authorized by the government

The town and the city district options are almost the same, with a few additions at the city district level. Some are less attractive and could generate public opposition. Service fees, tolls, assessments on public events, and charges for building and construction approval should all be easy enough to impose (as easy as those on advertisements), although the natural desire to keep the rates low normally prevents these sources from becoming significant contributions to the resource base.

The natural sources to explore further are those of property tax and motor vehicle tax. Various forms of tax evasion exist in these areas, but there are ways to simplify the tax while still being progressive. There are a rich number of options to select from:

- Contracting private sector valuation assessments would improve the property tax rolls enormously. The current process of official inspection of properties suffers from corruption and results in ludicrously low values on the most valuable property. Contracting a new valuation survey of land and housing values to a private-sector assessment team, given incentives to represent market values accurately, could increase CDGK's tax base enormously.

- The greatest potential probably lies in identifying commercial properties and assessing them properly. If a small or medium business can operate from a residential property, there is no disputing that the value of the home is greater than that of a katchi abadi. A commercial building has a market value of 2, 5, even 10 times that of a residential property in the same site. Karachi today looses much property tax revenue by charging a low rate to dentists, consultants, and other service business that establish operations in a residential home — an increasingly common phenomenon in Karachi today. Cooperation with the telephone company or electricity provider could help to quickly identify commercial properties. Both companies have well-maintained databases that could produce a list of commercial properties with minimal effort. This could immediately yield a large increase in the property tax receipts.

- The "Mutation Tax" – a tax on transfer of property through inheritance or gift – is largely unutilized. The process represents a large windfall to at least one party, yet the government only charges for a very low-priced stamp on these transactions. The modification from a stamp duty to a fee requires a change in the provincial laws.

- Automatic property revaluation: presently, many older properties carry a small value related to its original assessment when first constructed. CDGK should consider the Punjab precedent of raising the property tax each year.

- General rate increases could increase revenues considerably. This does not, however, address the problems of poor assessment and poor enforcement. Identifying properties that are undervalued is politically more acceptable.

The motor vehicle tax is a lucrative and progressive form of taxation that is easy to monitor as part of the mandatory vehicle registration process. The city discontinued the tax a few years ago under an agreement whereby the province would collect the tax and share it with the city; the dedicated transfer was later discontinued without explanation. The city therefore appears to have the right to revive its motor vehicle tax. It is common in many countries to dedicate taxes on vehicles and on fuel to road maintenance and improvements.

The motor vehicle tax could be the source of large and increasing value as Karachi's vehicle fleet grows rapidly. While having a smaller revenue-generating potential than the property tax, the motor vehicle tax is easier to implement.

Local Area Development through Public-Private Real Estate Service Provision:
Local government should pursue public-private development opportunities through partnerships that involve joint financing of infrastructure. This will require promotion of this type of investment and lengthy negotiations with developers during the development process of specific projects. It also involves fast-track permitting, assistance in resolving land disputes, and often times trading land in return for the necessary infrastructure investments.

Public private partnerships are also appropriate for the development of large subdivisions. This is where the government's gifting of greenfield land in exchange for real estate developers' investment in local infrastructure, and a share of trunk infrastructure, becomes useful. Large developers of residential communities with some local commercial activities should be able to make a financially viable project of serviced land and housing, in exchange for land and participation in the planning process. Tax waivers (especially if the larger taxation regime is well-enforced) or incentives may be useful. The economies of dense development reduce the cost of distribution infrastructure, lower service costs, and represent sound environmental planning. This is an investment method many countries have tested, achieved good results from, and applied extensively.

The public-private model is appropriate to zones within Karachi's existing built-up area today. The upgrading of transportation and transit infrastructure will make an area more accessible for employers and shoppers, and thus enhance the value of land and property within commercial centers. Retailers, and by extension landlords renting to them, gain from the accessibility that such improvements provide. It is only reasonable that they should pay for the increase in value those road and transit improvements provide. Likely commercial developments to contribute finance include KMP 2020's proposed mixed-use urban centers offering retail services, commercial employment, and perhaps entertainment and recreation as well.

A related notion popular in the United States is the establishment of business improvement districts. Merchants in a designated commercial area (again, a mixed use commercial and residential area such as KMP 2020 proposes, or older traditional commercial centers) agree to pay an extra "betterment tax" in exchange for superior services: parking, enhanced security, pedestrian amenities landscaping, diligent street cleaning, perhaps an information booth. Such services help to make such a location more appealing to customers, who patronize the commercial area more, thereby increasing merchants' revenues.

7.3 HOUSEHOLD AFFORDABILITY

The underlying premise for the pricing of urban infrastructure services should be "user pays." The person or organization consuming an infrastructure services whether water supply, wastewater collection, electrical power, solid waste collection, etc. should in principle pay the provider user fees that cover the cost of capital investment, operations and maintenance. In practice, however, many end users cannot afford to bear the full cost. And governments often bear some responsibility for providing some basic services such as water supply and garbage collection regardless of levels of affordability. In such cases, a number of strategies can be adopted:

- Reduce the cost of service provision, for example by reducing service levels

- Employ cross-subsidies in the tariff that allow richer, larger consumers of services to subsidize smaller, poorer consumers
- Lower the target for cost recovery to include only operations and maintenance, while mobilizing other resources to cover the cost of investment

Many Karachi households face serious affordability constraints when it comes to paying for urban services. First, on average 75% of the monthly household expenditure is for food.[1] Households participating in the KMP 2020 household survey also reported that they spend 19% of their monthly income on utilities and 2% on housing. This suggests that:

- Spending on basic needs is very high, leaving little financing available for other expenditures
- Existing level of expenditures on urban utilities is high, and there is little room for increasing charges

Analysis of electrical power charges as a percentage of household income supports the latter finding. Monthly power charges for low income and upper middle income households range from Rs 600-2,000, representing about 12% of average monthly household income for those two groups (see table below). As KESC seeks to fill the electrical power deficit in Karachi, it would be logical to look to customers to pay a greater share of generation, transmission and distribution costs. At least in the case of lower income domestic customers, however, it seems unlikely that a tariff increase will be feasible. The possible of introducing more cross-subsidies between users or between income groups in the form of steeper block tariffs can still be explored.

Table No. 24
Electrical Power Charges as Approximate Average % of Household Income

Socio-economic Group	Monthly Household Income (Rs)	Average Monthly Power Consumption (units)	Average Monthly Power Charges (Rs)	Charges as % Household Income
Lower income	5,000	150	600	12%
Upper middle income	15,000	500	2000	13%

Source: KESC

KW&SB faces similar challenges in the water supply and sewerage sectors. There is considerable additional revenue to be gained from improving collection on existing tariffs. While it is also desirable from a financial feasibility perspective that tariffs be increased to the point where user charges, the combined impact of water supply, (proposed) sewerage, solid waste and electrical power charges may be too burdensome on household budget to consider a rise in the near future.

Using the principles set out in this section, urban services tariffs should be the subject of a separate, detailed study in order to evaluate the feasibility of covering a larger share of infrastructure O&M costs through user charges.

[1] Household Survey, ECIL, 2005

7.4 FINANCIAL SUSTAINABILITY OF INFRASTRUCTURE SERVICE PROVISION

This section reviews the financial performance of different service providers including CDGK, but with special attention to utility and private sector providers.

Critique of CDGK Revenue Base

There is enormous room to increase local revenue generation. Although the transfers CDGK receives from the province are robust and the federal government transfers can be understood as replacement for local government's traditional Octroi revenues, the existing own local revenues – taxes and fees that CDGK collects today – should be more than one-eighth of the total funds available to any local government. Transfer formulas and general higher-level government policy on distribution of funds to lower government will inevitably change, and locally generated revenues must be strong if local governments are to avoid crises. Changes in the transfer programs often involve matching the transfer grant against locally generated resources.

The largest sources of locally generated revenue CDGK relies upon today are not the elements of a strong financial base. Local governments usually rely on property taxes for a large share of revenues: land and housing charges are reliable, progressive, and usually not difficult to collect. It is encouraging to see that the chief tax revenue is the property tax, but it should be higher than 3% of all revenues or 16% of own-source revenues, as it is today. This is very low by international standards. CDGK's total own revenues are also quite low. Advertisement and hoarding fees, and parking charges (which are classified as taxes) are attractive in that they are born by the commercial sector and upper-income individuals, but these are not normally a large source of revenue for a city. The fact that the chief fee income sources derive from the sale of scrap and surplus stores is simply not acceptable. Fees should be for services to the public, not the sale of its assets (however worthless they may be.)

Water and Sewerage Company

The Karachi Water and Sewerage Board is overburdened by rising demands, does not collect revenue on 40% of its water for technical and billing reasons, and suffers from a poorly designed tariff structure.

The city currently uses the revenues KW&SB collects to invest in capital. Operations and maintenance is subsidized by the city. This limits funding for maintenance, which results in equipment breakage and requires capital replacement earlier than would normally be the case.

The "Existing and Required Potable Water Supply for Karachi" study (see section 5.2) makes recommendations on raising the water tariff. These include progressive increases; charging a 10% higher rate in low-income areas, and 100% increase in affluent neighbourhoods, charging commercial users 15 to 500% more depending upon the volume they consume. The motivation is to both encourage conservation of the volume consumed, while achieving water conservation.

Conservation methods would represent a change in the cost structure. For example, supplying grey water to horticulture, agriculture, and private parks or raw water to construction and manufacturing industries will conserve the volume

of potable water and still provide revenue to KW&SB. Another example is metering of customers and internal operations.

The KW&SB clearly must reform its rate structure and use price signals to ration water to those with the ability to pay, reduce wastage, and improve collection. The current situation of relying upon the city government for subsidies is unsustainable.

Solid Waste Management:

Private operators manage most solid waste collection and disposal under CDGK contracts whereby the city pays operators for each load moved and dumped. This is a convenient arrangement at present because it reduces city and district capital investment requirements in collection vehicles.

Nonetheless, there is a need to acquire more land for garbage transfer stations and landfill sites, and to prepare those sites. The garbage transfer stations require basic structures and loading equipment. The landfill site requires vehicles to turn the waste. The towns and district governments will probably arrange most of the finance for these investments, although Jam Chakro provides a precedent for privatization of a large landfill site.

Ultimately, the city, towns and union councils must pay for solid waste removal and dumping charges as they occur; and will likely make the investments in garbage transfer stations and in large landfill sites. The best source of revenue for this purpose is generally thought to be property taxes, as these should be charged on each home, and thus be equitable.

Roads:

Roads are easily tolled, but the public normally uses roads for free. Today, the money to support Karachi's road building and maintenance program normally derives from the general fund, supported by the tax base. In many cities this would be property taxes, with perhaps a transfer from petrol taxes and other expenses. In Karachi's case, there is no dedicated fund. Instead, CDGK road expenditures are budgeted from its overall revenue base, relying largely on transfers from higher levels of government.

CDGK capital expenditures on roads and bridges are programmed for only 770 million Rupees in year 2006/07 for a portion of the construction of less ambitious improvements than those of KMP 2020. The operations and maintenance budget for "Works and Services." which is to a large extent transportation, is 1,250 million Rupees.

Karachi has an ambitious road program under KMP 2020, but the local own-source revenue base is quite small (see Section 2.7). The solution to financial backing for this ambitious plan most probably lies in expanding the tax base such as motor vehicle registration taxes and property taxes (see below), but could also in some financial innovations:

- A toll could be charged to people entering the CBD. This practice is borrowed from the Singapore and London experience, where it has been quite successful. A charge is placed on cars crossing lines delineating the downtown area at certain times of day. The system works best when vehicles are equipped with radio transponders, which allows them to cross the line into

the city without stopping; and then pay after receiving a monthly bill. This requires various technical and institutional arrangements that may not be appropriate to Karachi. Above all, such congestion tolling requires suitable transit alternatives allowing persons to travel into the CBD by other means with minimal inconvenience.

- Intra-city toll roads have been quite successful in Bangkok and other East Asian cities. The US has recently developed alternative allowing vehicles to travel on the same road but pay a fee to travel in an uncontested lane. The charge to travel in that lane depends upon the time of day and the number of vehicles on the road at the time.

Tolling within the city is a traffic management measure that has proven to be quite effective, and a good cash earner. Cities can raise funds to pay for the system and to cover larger road improvements in this way. Political opposition proves to be less than is anticipated at the planning stage.

Failing such tolling mechanisms, CDGK must draw down on its revenue base to fund its ambitious transportation program. A motor vehicle tax is the most logical.

Public Transportation:

The age and poor condition of the private-sector transportation fleet indicates there is little money for capital improvements on buses after operations are complete.

Improvements such as bus terminals represent a service to bus operators and to riders. It should be easy to charge buses a small fee at entry. The increase in fares riders pay should be minimal and yet greatly improve their mobility.

KMP 2020 envisions mass transit improvements. An investment in a system such as two light rail lines or the KCR will represent one of Karachi's largest investments ever and will require a special purpose transfer from the federal government, a large loan backed by the federal government, or some other financing mechanism. Either of these transit improvements will operate on a subsidized basis, but the subsidy should be limited.

Electrical Power:

The Karachi Electrical Supply Corporation is a power generation, transmission and distribution company and a publicly-traded private-sector corporation. No local government body is directly involved in this power company's operations or finance.

Although historically profitable, KESC suffered a 7.2 billion Rupee loss on Rs 41.6 billion revenue (a 17% loss) in the fiscal year ending June 2006. (The loss would have been almost twice as large, were it not for a subsidy from the government.) The simple reason for this is that the increase in the cost of fuel and power purchased from other energy producers was greater than the increase in revenue from customers. If the conditions persist, KESC will have to either raise more capital or cut back on its investment program. The capital might come from government, but that turns on the revenue base of CDGK and higher-level governments.

8.0 INSTITUTIONAL ARRANGEMENTS FOR PLAN IMPLEMENTATION

8.1 PLANNING AND DEVELOPMENT CONTROL

As shown by previous attempts to plan more orderly and efficient development in Karachi, the greatest challenges in plan implementation are:

- the concentration of sufficient planning and development control authority for the entire metropolitan area in one institution, and

- the achievement and maintenance of high standards of institutional performance in regulating, over time, the varied and complex set of real estate transactions that will collectively constitute the growth of Karachi.

Recent regulatory and institutional changes in Karachi have made great progress in the area of concentrating planning and development control. Prior to the passage of the local government law of 2001, development control responsibilities were fragmented into more than a dozen different agencies. Now the City District Government Karachi (CDGK) is charged with managing and guiding the growth of the entire city district. For the first time in the history of independent Karachi, a single institution is clearly mandated to take a lead role in planning and controlling the development of the city. The role of local government has been upgraded from land development (as previously under Karachi Development Authority) to overall management of the development process. The Karachi Building Control Authority and the Karachi Water and Sewerage Board have also come under the management of CDGK.

In some respects, however, CDGK still shares planning and development control authority with other entities. This takes place vertically and horizontally. CDGK vertically shares planning authority with other lower-level local governments (the 18 towns and 178 union councils), which are charged with preparing physical plans that regulate the growth and redevelopment of the areas within their jurisdiction. While the master plan, with its more macro-level land use and primary infrastructure proposals, will be binding, once approved, on the subordinate local government bodies, those entities can and should prepare local and area plans that articulate more detailed development proposals. These “town plans” and “local area plans” will specify such important physical development parameters as building heights, floor-to-area ratios, setbacks, and land use mixes on a block-to-block basis. For example, the master plan demarcates “Medium-Density Mixed Use” development areas (land use type MU2) in neighbourhoods such as North Nazimabad near the city centre. That land use type calls for the redevelopment of selected existing arterial streets into mixed use, mid-rise development corridors. But the master plan is silent on which streets should be redeveloped, to what height, and with what land use mix. The town plans and/or local area plans to be prepared in the future will provide the degree of detail needed to actually implement the development proposals. This “vertical” sharing of planning and growth management authority between CDGK and lower-level local governments is consistent with the planning process.

At the same time, CDGK shares planning and development control responsibility with higher-level government entities that own land or in some way participate in the regulation of development in the city district. To these seven institutions have been delegated, as well as to CDGK, the powers and duties associated with the Karachi Building and Town Planning Regulations of 2002 (as amended in 2005): Cantonment Boards of the Ministry of Defence, Karachi Port Trust, Pakistan Railways, Ministry of Works (GOP), Sindh Industrial Trading Estate (Karachi), Sindh Katchi Abadies Authority, and Sindh Board of Revenue.

There is at root a contradiction between shared responsibility for planning and development control among the eight institutions and the conception of CDGK as the agency with responsibility for guiding the development of Karachi. For the Karachi Master Plan 2020 to be successful, the implementing arrangements must grant CDGK this authority. To bring uniformity in zoning regulations i.e land use zoning, height zoning and Building Control Regulations all the cantonments and other land holding agencies like Karachi Port Trust, Port Qasim Authority, Pakistan Steel, Pakistan Railways, SITE, Defence Housing Authority, Malir Development Authority, Lyari Development Authority should come under the Municipal jurisdiction of City District Government Karachi. Only defence operational areas and operational areas of these land holding agencies should be with them. All Municipal services like water supply, sewerage, solid waste management should be under one umbrella of CDGK. Similarly all the municipal rights of revenue collections should rest with City District Government. This does not mean eliminating a role for the other seven entities in developing or redeveloping the operational areas which they control; rather, it means establishing CDGK as the *lead agency* with *primary responsibility* for development planning and control in the City District. This will require both regulatory changes to the development code and appropriate institutional arrangements for plan implementation.

8.2 DEVELOPMENT CODE

Changes to the development code will help to vest necessary development authority in CDGK and enable the types of mixed use, mid-rise and high-rise development foreseen in the Master Plan.

It is proposed that the Karachi Building and Town Planning Regulations of 2002 be revised to establish a two-tier development control process. First, special development authorities with specific geographical jurisdictions will review and provide preliminary approval of proposed development projects. Then the application will be submitted to CDGK for final approval. In this way, special authorities will participate in the regulating the development of their areas, while CDGK will be maintain its position as the final arbiter of development control decisions.

The existing five categories in the Karachi Building and Town Planning Regulations are not sufficiently articulated to enable the types of development foreseen by KMP 2020.

- First, land uses need to be regulated on a zone-by-zone basis. This is not to say that zones should include only one land use; rather, most zones should be mixed use, and in many cases the predominant use should be identified. These land uses need to be defined in text and represented on the land use map of the city.

- Height regulations need to be more specific, providing minimum and maximum values in feet and/or number of stories in order to facilitate mid-rise development in high-density areas and along major arterial and some secondary roads.

- High-rise development needs to be undertaken only in a few selected locations in the city district. High-rise development will be prohibited in other areas.

The following table 25 presents a preliminary descriptions of the proposed land use types for Karachi City District. The land use areas are shown on the Proposed Land Use 2020 map. It is recommended that these land use types are defined in a detailed manner and included as an amendment to the Karachi Building and Town Planning Regulations.

Table 25: Proposed Land Use Types

Code	Land Use Type	Description	Example Zones
MU1	High-Density Mixed Use	• Commercial, institutional, and/or residential development • Predominantly party-wall, zero lot line construction • Buildings heights typically less than or equal to 0.75 times width of street right-of-way • In selected zones, high-rise permitted. • Heights and setbacks specified in local plans • Parking provided in separate multi-story structures, preferably located in middle of block • Sidewalks and pedestrian amenities provided	• CBD • New urban center at intersection Northern Bypass and RCD Highway
MU2	Medium-Density Mixed Use	• Commercial, institutional, and/or residential development • Mid-rise (G+4 or G+6) along development corridors with improved public transport services and traffic management. Predominant use of corridors (residential, retail, office) to be specified in local plans • Buildings heights along development corridors less than or equal to 0.75 times width of street right-of-way • Parking in development corridors provided separate multi-story structures, preferably located in middle of block • Sidewalks and pedestrian amenities provided along development corridors • Detached or semi-detached housing on local streets	• Zone adjacent to CBD: Gulberg, Liaquatabad, North Nazimabad, SW corner of Gulshan-E-Iqbal • New urban center in western Keamari
RE1	Medium-Density Residential	• Predominantly residential, with commercial and institutional also permitted • Plot sizes 80-240 square yards • G+2, with G+4 on selected main roads to be specified in local plans	New development areas along Northern Bypass
RE2	Medium-Density Residential Plus	• Predominantly residential, with commercial, institutional and cottage industrial also permitted • G+2, with G+4 on selected main roads to be specified in local plans	New development areas adjacent to Gulberg/Taisar Town industrial area New development areas adjacent to new Textile City
RE3	Low-Density Residential	• Predominantly residential, with commercial and institutional also permitted • Plot sizes 240-800 square yards • G+1 height limit	New development areas in Keamari
CO1	Retail	Predominantly retail	Along selected development corridors
CO2	Office	Predominantly offices	Along selected development corridors
CO3	Neighbourhood Commercial	Retail, office, institutional and other uses in commercial centers located in residential neighbourhoods	At center of residential neighbourhoods
CO4	Wholesaling	Wholesaling and transport permitted	At new decentralized warehousing/transport centers

The other land use types that should be included in the revised development code are as follows:

IN1	Government
IN2	Educational
IN3	Healthcare
IS1	Heavy Industrial
IS2	Light Industrial
IS3	Warehousing
T1	Transport
OS1	Regional Park
OS2	City Park

OS3	Local Park
OS4	Plaza
OS5	Sports Facility
OS6	Cemetery
OS7	River Buffer Zone
OS8	Green Reserve
AG1	Agricultural
GR1	Grazing
VI1	Village

8.3 IMPLEMENTING ARRANGEMENTS FOR KMP 2020

It is proposed that the CDGK take the lead role in implementing the Karachi Master Plan 2020.

To facilitate detailed physical planning, CDGK will, under the Mega City initiative, provide technical assistance as required to towns and union councils for the preparation of town plans and local area plans.

CDGK will be the final arbiter of development control decisions. Special development agencies operating in the City District will review and approve development projects within their jurisdiction prior to submission to CDGK. For approval of large-scale development projects, CDGK will secure the participation of other key national, provincial and local stakeholders in approval decisions.

A two-tiered structure composed of a Steering Committee and Development Control Committee and with representation of all development major actors in Karachi City District will carry out oversight, coordination and selected implementation functions related to the Master Plan.

Mega City Steering Committee — This Committee will operate at the provincial government level and be headed by the Governor or the Chief Minister of Sindh. With representation of key stakeholders, this body will ensure that all decisions pertaining to development, land grants, allocation of land for industries, tourism, roads, infrastructure, etc, of the Provincial Government and its various organizations, are made in consonance with the Master Plan. Coordination with Federal Government and its agencies sponsoring and executing schemes in Karachi will be made through the Steering Committee.

Karachi Planning and Development Control Committee — Chaired by the City Nazim, this committee will review and provide final approval of large-scale development projects, for example, greater than 50 acres in land area or greater than 1 million square feet of built area. Key national, provincial, and local stakeholders in the development of Karachi, such as the Cantonment Boards, Malir Development Authority, Sindh Katchi Abadies Authority, Pakistan Railways, etc., will sit on the committee to ensure their participation in approval of large development projects. Projects presented for consideration will have received preliminary approval from the development control department of CDGK. The committee will also review and approve towns plans and local area plans prepared by local governments or other public or private entities for specific geographic sub-areas of the City District.

8.4 PERFORMANCE MONITORING

One measure of the success of KMP 2020 will be the extent to which it achieves its mission: "transforming Karachi into a world class city as an attractive economic centre with a decent life for Karachites". Within this mission lie a number of objectives and target attributes:

- A "world class city" will tend to be large and cosmopolitan; influential in terms of culture, religion or politics; and/or well-connected with other financial or business capitals.
- An "attractive economic centre" should exert a strong pull on labor and capital to locate in the city and engage in economic activity. The qualities that contribute to this contraction are a good governance environment for business (including respect for the rule of law, functional legal system, respect for contracts, adequate labor rights, etc.), reliable infrastructure services, good transport connections, and access to inputs and markets.
- A "decent life for Karachiites" would include economic opportunities, good education and health services, a healthy and attractive urban environment, and opportunities for recreation. Improvements in these areas are particularly critical for low-income residents.

These qualities are translated in the table below to specific indicators.

Indicator	Unit	Baseline 2006	Target 2010	Target 2015	Target 2020
Job formation rate	% change	5,675,146	3%	3%	3%
Unemployment rate	%	18.44	14%	11%	8%
% drinking water treated	MGD	530	947	1156	1377
Hours of water service per day	hour	1	6	24	24
% population connected to sewerage system	%	57	75	100	100
% wastewater treated	%	22	50	75	100
% population receiving solid waste collection services	%	56	70	100	100
Days with electrical power blackouts per year	day	30	15	5	0
Ratio of beds in healthcare facilities to population	ratio	1:1700	1:1400	1:1000	1:500
Primary school teachers per 1,000 students	teacher	48	100	200	300
Acres of parkland per 1,000 population	acre	0.34	0.5	0.75	1

The planning department of CDGK will be responsible for monitoring the performance of KMP 2020. The department will collect for and calculate the indicators once a year. Findings will be presented to the Steering Committee for review; in the case that findings are not being met, the Steering Committee will make recommendations for changes to the implementation plan.

ANNEXURE-I

Table 5.2.3: Traffic System Management Projects List

S. No.	Projects
1	Establish Drivers Training Institute.
2	Initiate Car Pool / Van Pool Programs (starting with some Model Schools).
3	High occupancy Vehicles Lanes on selected Arterials
4	Implementation of Transportation Control Measures as recommended by TCP.
5	Designate and notify Truck Routes on City arterials.
6	Revision, update and modernization of Motor Vehicle Ordinance and concurrent rules.
7	Initiate Saddar to Tower shuttle Bus
8	Undertake feasibility for Downtown people mover system such as a mono-Rail or Aero-Movel linking east and west Bus Terminals.
9	Establish a 3C Planning process for Urban Transportation on a continuing, comprehensive and cooperative basis.
10	Implement centralized Urban Traffic Control system phase-II (cost Rs.600 million).
11	Initiate institutionalized system of regulating Motor Training Schools in Karachi.
12	Initiate Traffic Operations programs to increase capacity and safety studies for 18 Towns of Karachi.
13	Establish Accident Reporting and Management System on a continuing basis.
14	Establish Traffic Management Team to develop Karachi Mobility Plan on a continuation basis. The Team will also establish an emergency relief and accident management system for each Town.
15	Develop a GIS Based Karachi Streets Inventory and Management System (KSIMS) to produce a Capital Improvement Programming Tool for each year.
16	Implement Central Business District Circulation Action Plan
17	Implementation of Corrective Measures at all high accident locations in Karachi on continuing and regular basis.
18	Undertake Intersection Improvement and Rehabilitation of intersections on a continuing and regular basis after the construction of grade separated facilities.
19	Development of computerized Regional Transport Authority record and reporting system.
20	Establishment of at least 2 Motor Vehicle Inspection and Testing Stations in the Private Sector.
21	Institutional up-gradation and strengthening of Transport and Communication Department of the City district Government Karachi.
22	Undertake an area wide signing and Pavement Marking Program in the City of Karachi.
23	Continue construction of Bus Shelters at 500 locations on BOT basis. The City to fund locations not acceptable to Private Sector on financial grounds.
24	Review and take corrective measures to strengthen Urban Transport Scheme of Karachi for large buses.
25	Develop a dynamic Traffic Incident Management Program to deal with Emergencies.
26	Introduce an emergency medical service system with fast and responsive medical care.
27	Construct and providing stairs on both sides of Liaquatabad Flyover
28	Improvement of 27 major roads in Saddar Town, costing Rs. 3 crores
29	Institute traffic regulation and enforcement plan to reduce the traffic congestion at Liaquatabad Flyover and other flyovers in the city.
30	Improvement of main link road and internal streets in Malir Town, costing Rs. 23.30 millions
31	Installation of traffic signals in Korangi Town.
32	Construction and rehabilitation of internal road in Korangi Town.
33	Construction and rehabilitation of internal road in Gadap Town.
34	Under take improvement of Rd. 3000, Rd. 9000, Rd. 12000, Rd. 5000 in North Karachi Town
35	Construction of pedestrian bridges at proposed locations
36	Removal of encroachments from major roads.
37	Reconstruction, rehabilitation and resurfacing of roads along Public Transport Routes throughout the city.
38	Roadway restoration, resurfacing, reconstruction and rehabilitation of area wide roadways (4R Program) in all 18 towns.
39	Re-alignment of Sharae Faisal at Sharae Faisal and Rashid Minhas Intersection.

Table 5.2.1: Proposed Long Range Project List

S.No.	Area Wide Projects
1	Development and construction of Parking Plazas at various locations through the city with concentration in the CBD Zone.
2	Undertake construction of Coastal highway and its linkage with National highway
3	Upgrade Karsaz, Estate Avenue, Sir Shah Mohammad Suleman Road, H.I.R. Road, Shahrah-e-Faisal, Moulvi Tamizuddin Khan Road and Mauripur as a major principal arterial with access control to form central ring road.
4	Provide connection of Lyari Expressway with Jail road at Tin Hatti and upgrade Jail Road, Shaheed-e-Millat Road and Expressway, Korangi Road, Khayaban-e-Roomi, Mai Kolachi Bypass, connecting with central ring road at M.T. Khan Road to form inner ring road. Alternately Nishter road can be upgrade and included instead of Lyari Expressway.
5	Construction of Interchanges or grade separated facilities on proposed ring roads. (Proposed locations are shown in **Figure 5.2.1)**
6	Bridges over Railway lines and Nallahs on proposed ring roads (proposed locations are shown in **Figure 5.2.1**

North-East Quadrant:

S.No.	Long Range Projects
1	Extension of Lyari Expressway in North direction, with one interchange at Northern By-pass and next at RCD Highway.
2	East end of Northern bypass to be extended southwards along Jinnah Avenue and intersecting with National Highway, terminating at proposed Malir River Expressway.
3	Linking 200' wide Road in New Karachi with Super Highway, costing Rs. 700 million
4	Up-gradation of entire Super Highway to Expressway standards.
5	Road connecting Malir Halt with Murad Memon Ghot extension following right bank of Malir River to education city.
6	Construction of grade Separated Facilities at the proposed locations
	• Gulshan Chowrangi
	• Intersection opposite Drive-in-Cinema
	• Johar More Intersection
	• Fazal Mill
7	Construction of Underpasses at proposed locations
	• Construct Underpass at Super Highway & Abul Hassan Isphahani Rd.
	• Saba Cinema Intersection (New Karachi Town)
	• Power House Chowrangi (New Karachi Town)
	• Godhra Chowrangi (New Karachi Town)

North-West Quadrant:

S.No.	Long Range Projects
1	Additional ramps on Lyari Expressway at Shaheed-e-Millat Road, Sarwar Shaheed Road and Chakiwara Road.
2	Re-route Northern Bypass westwards across RCD Highway then southwards terminating at Southern Bypass/ Coastal highway in Keemari Town.
3	Reconstruction of S.M. Taufeeq Road
4	Upgrade and connect road between Gulberg town and North Nazimabad town from Saifi Poly Technic R/A to Shahrah-e-Pakistan.
5	Construction of grade Separated Facilities at the proposed locations
	• Nagan Chowrangi
	• Daak Khana Roundabout
	• Altaf Hussain Barelvi Road & Nawab Siddiq Ali Khan Road.
	• Banaras Chowk
	• Teen Hatti Intersection
	• Ayesha Manzil Intersection
	• Water Pump Intersection
	• Bara Board Manghopir Road
	• Habib Bank, SITE

South-East Quadrant:

S.No.	Long Range Projects
1	Expressway at right bank along Malir River to connect Mehran Highway and Shaheed-e-Millat Expressway.
2	East end of Northern bypass to be extended southwards along Jinnah Avenue and intersecting with National Highway, terminating at proposed Malir River Expressway
3	Extend link road between Super highway & National highway southwards to connect the Coastal highway immediately east of Steel Mill/ PQA.
4	Construction of Elevated Expressway from Quaidabad to Jinnah Bridge subject to the finalization of feasibility by Malaysians.
5	Up-gradation / widening of National highway to Expressway standards
6	Connection of Mehran Highway with National highway around Korangi.
7	Continuation of Mehran Highway up to N-S Road at Pakistan Steel/PQA
8	Upgrade Rd 13000 to connect Shah Faisal Colony with Korangi Road via bridge under construction
9	Reconstruct abandoned bridge across Malir River to connect Mehran Highway at Shaheed-e-Millat Extension.
10	Construction of grade Separated Facilities at the proposed locations
	• Shahrah-e-Faisal & Jinnah Avenue
	• Malir City Railway Crossing, Shahrah-e-Faisal
	• Dawood Chowrangi Road Quaidabad Road
	• Malir Kala Board, Shahrah-e-Faisal
	• Future Colony at 8000 Road

South-West Quadrant:

S.No.	Long Range Projects
1	Additional ramps on Lyari Expressway at Shaheed-e-Millat Road, Sarwar Shaheed Road and Chakiwara Road.
2	Extension of Lyari Expressway westward to connect Hawksbay road.
3	Re-route Northern Bypass westwards across RCD Highway then southwards terminating at Southern Bypass/ Coastal highway in Keemari Town.
4	Construction of Elevated Expressway from Quaidabad to Jinnah Bridge subject to the finalization of feasibility by Malaysians.
5	Construct elevated road 45ft. wide, dual carriage way from I.I Chundrigar Road up to Lea market
6	Extension of Jamshed road through Jail linking Nishtar road
7	Extension of Jamshed Road directly at Newtown Police Station connecting S.S.S. Pir Pagara Road
8	Up-gradation, widening and improvement of existing Shaheed-e-Millat Expressway
9	Widening of Rafeequi Shaheed road from Sh-e-Faisal to Kalapul (3 lanes in each direction).
10	Improvement of alternate access through Aisha Bawany and at Kalapul into Jinnah Hospital
11	Connection between Moulvi Tamizuddin road and I.I Chundrigar road through KPT land and up-gradation of Altaf Hussain Road to improve access to Lyari Town.
12	Complete Preedy Street ext. by removing encroachments
13	Connection from Preedy street extension with Shahrah-e-Faisal through Lines area.
14	Reconstruct Wallace Road Bridge to improve connection of M.T. Khan Road and I.I. Chundrigar Road.
15	Construction of grade Separated Facilities at the proposed locations
	• Gurumandir
	• Mehmoodabad, Shahrah-e-Faisal
	• Mehran Hotel
	• Metropole Hotel
	• Intersection in front of KMC Head Office M.A. Jinnah Road.
	• Zaibunnissa Street & Preedy Street
	• Nishter Road & Business Recorder Road
	• Aga Khan III Road & M.A. Jinnah Road
	• Sea Breeze Plaza Near Capri Cinema
	• I.I. Chundrigar Road & Dr. Ziauddin Road Intersection
	• Boltan Market M.A. Jinnah Road
	• Lee Market Chowk
	• New Town Police Station
	• Intersection opposite Ankelsarria Hospital
16	Construction of Underpasses at proposed locations
	• Dr. Dawood Pota and M.A. Jinnah Rd Intersection
	• Zaib-un-Nissa Street and M.A. Jinnah Rd. Intersection
	• Muhammad Bin Qasim Road and M.A Jinnah Road Intersection

Table 5.2.2: Proposed Public Transport Capital Improvement Projects

S.No.	Public Transport Projects
1	Establishment of Bus Terminals at Proposed Locations as per attached map. **Figure 5.2.2**
2	Construct Model Bus-way on one Principal Artery of Karachi in accordance with Karachi Mass Transit Plan (proposal on Nawab Siddique Ali Khan Rd from Nagan to Mazar-e-Quaid)
3	Undertake construction of Priority – I Corridor Light Rail Line in accordance with the Karachi Mass Transit Plan
4	Introduction and Operation of CNG based Bus System in Stages in accordance with the approved plan.
5	Undertake construction and development of Priority – II Corridor Light Rail Line in accordance with Karachi Mass Transit Plan.
6	Introduce Bus Priority Scheme on a selected Arterial (Korangi Road)
7	Institute the Park & Ride philosophy in one of the Sub-Urban Areas of Karachi.
8	Operation of Express Park 'n' Ride Bus Service from Sohrab Ghot to Tower via Lyari Expressway.
9	Construction of dedicated transit way for buses along University Road from Safoora Ghot to Gurumandir.
10	Revitalization of Karachi Circular Railway.
11	Feasibility of Trams Service in Shah Faisal Town

S. No.	Water supply proposal
1	Water storage and filtration plant in all 18 towns.
2	Construction of new pumping station
3	Installation of injection well
4	Improve recharging measured
5	Leakage and loss reduction program
6	Development of new big reservoir in Gadap near Kirthar National Park
7	Double line Water supply system is recommended for industrial and residential effluent
8	Zoning meters for Union Council and Towns
9	Up gradation of Water Supply System in 18 Towns
10	Development of K-IV
11	Direct line from Haleji and Hadero lake
12	Revamping of Hadero Lake

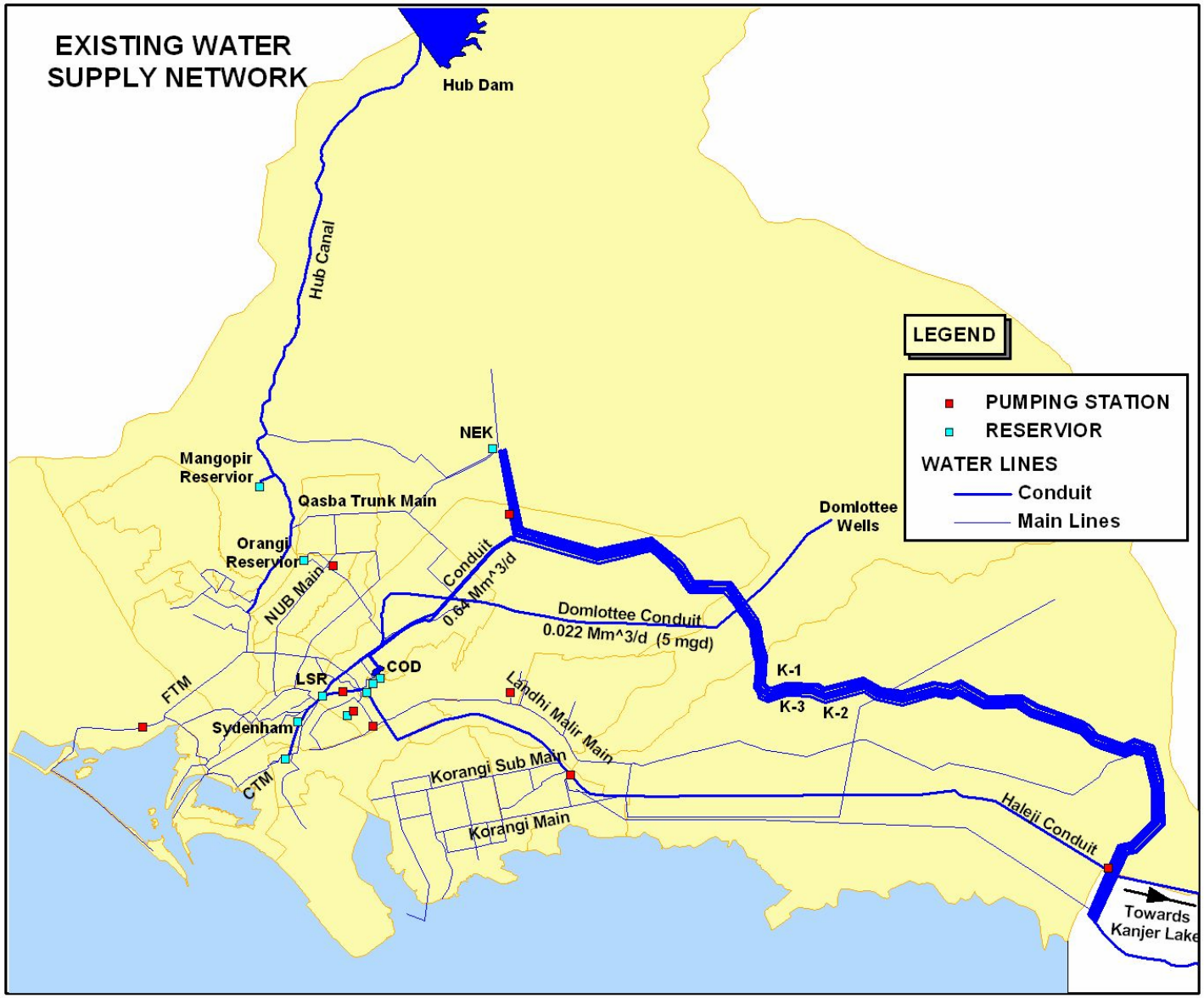
S. No.	Sewerage system proposal
1	Development of new sewerage treatment plants
2	Deep sea industrial Waste disposal scheme
3	Development of interceptor drain to main Arterial Lyari and Malir at each town
4	Bitumen coated R.C.C pipe replacement in sewerage network
5	Pre cast manholes in new sewerage network
6	Improvement of sewerage Treatment Plant for its efficient functioning Dislodging Sludge digestion and dry sludge bed improvemnet.
7	Thirty years old Trunk Sewer should replaced by new Trunk Sewer
8	Up gradation of Sewerage System in 18 Towns
9	Additional Sewage flow improvement works of STP-III & STP-IV

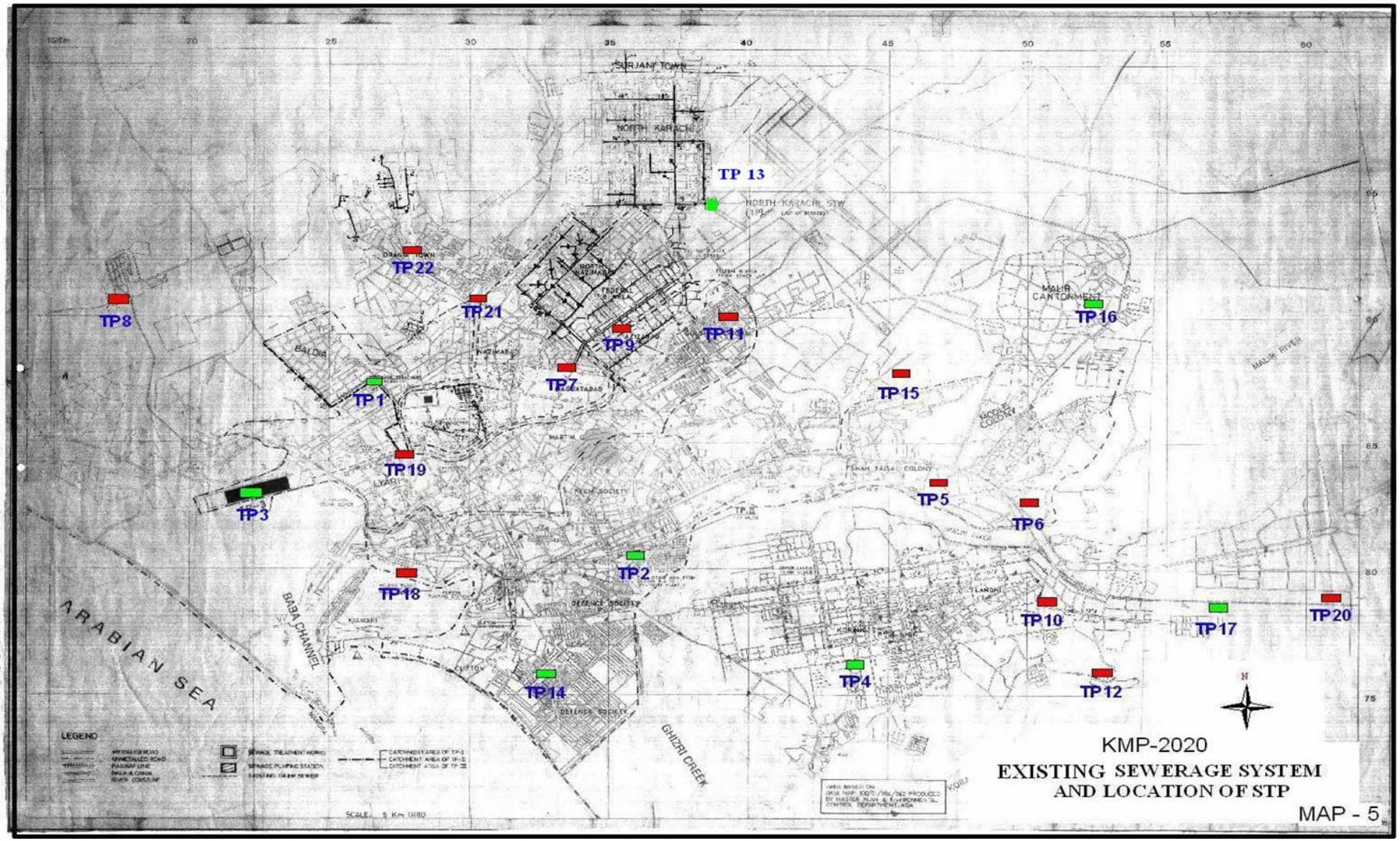
S. No.	Solid Waste Management
1	Development of Garbage Transfer Stations.
2	5 Tons compacter for each 178 union council
3	30 Tons 40 long container vehicles.
4	Railway means of Transportation for Solid Waste Management
5	Development of Dhabeji landfill site.

S. No.	Drainage System proposal
1	Creation of Weirs in Lyari and Malir River for recharging ground water
2	improvement of Drainage system
3	linking of Nallah to Malir interceptor 1& 2
4	linking of Nallah to Lyari interceptor up to north Karachi
5	linking of Frere and Railway Nallah to Nehe-e-Khayyam
6	Improvement of Kalri,Pitcher,Railway and Nehr-e-Khayyam Nallah

ANNEXURE-II

ECIL PADCO | AECOM


EXISTING WATER SUPPLY NETWORK
Hub Dam
Hub Canal
NEK
Mangopir Reservior
Qasba Trunk Main
Orangi Reservior
NUB Main
Conduit 0.64 Mm^3/d
Domlottee Wells
Domlottee Conduit 0.022 Mm^3/d (5 mgd)
K-1
K-3
K-2
COD
LSR
FTM
Sydenham
CTM
Landhi Malir Main
Korangi Sub Main
Korangi Main
Haleji Conduit
Towards Kanjer Lake
LEGEND
PUMPING STATION
RESERVIOR
WATER LINES
Conduit
Main Lines



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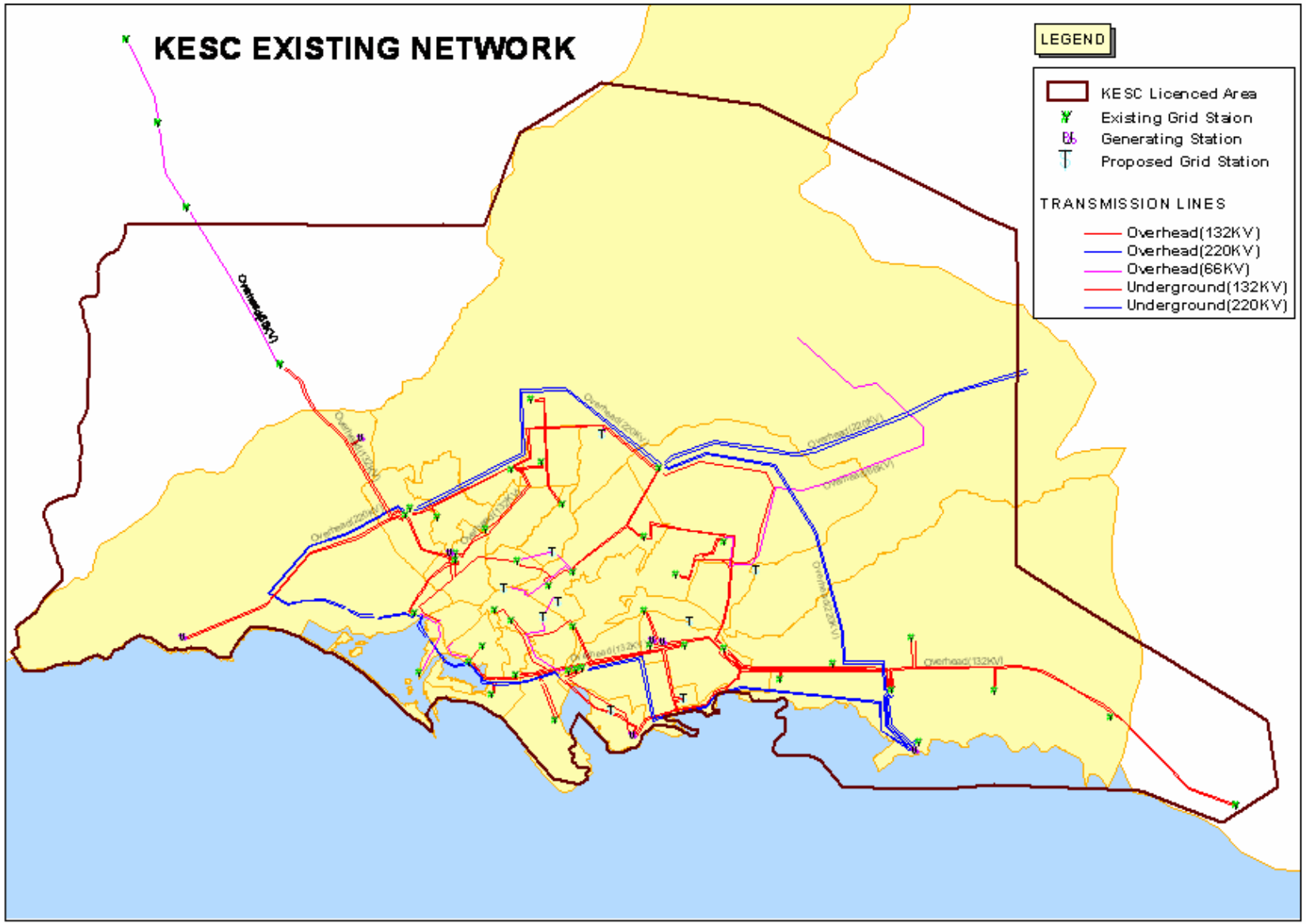

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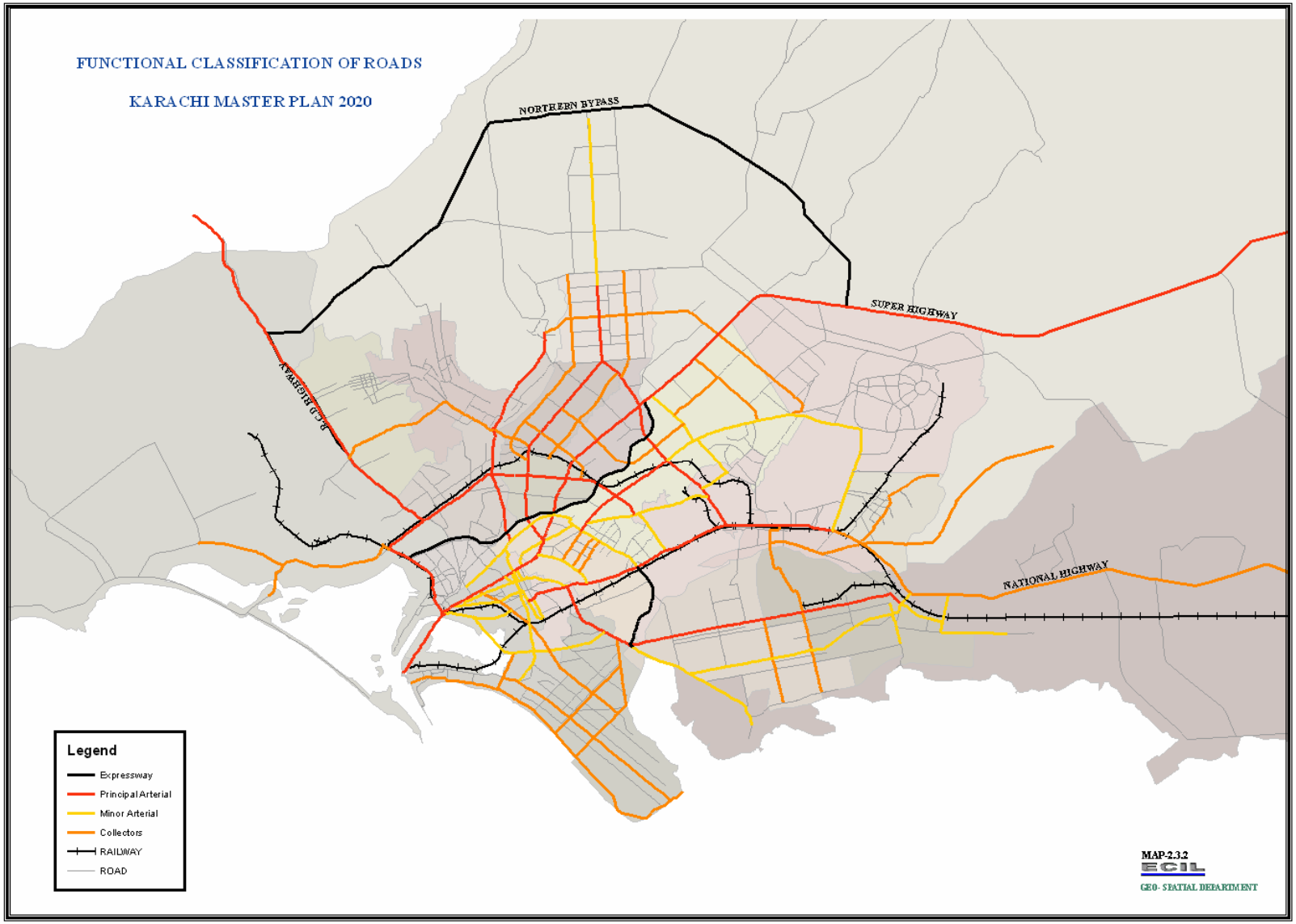

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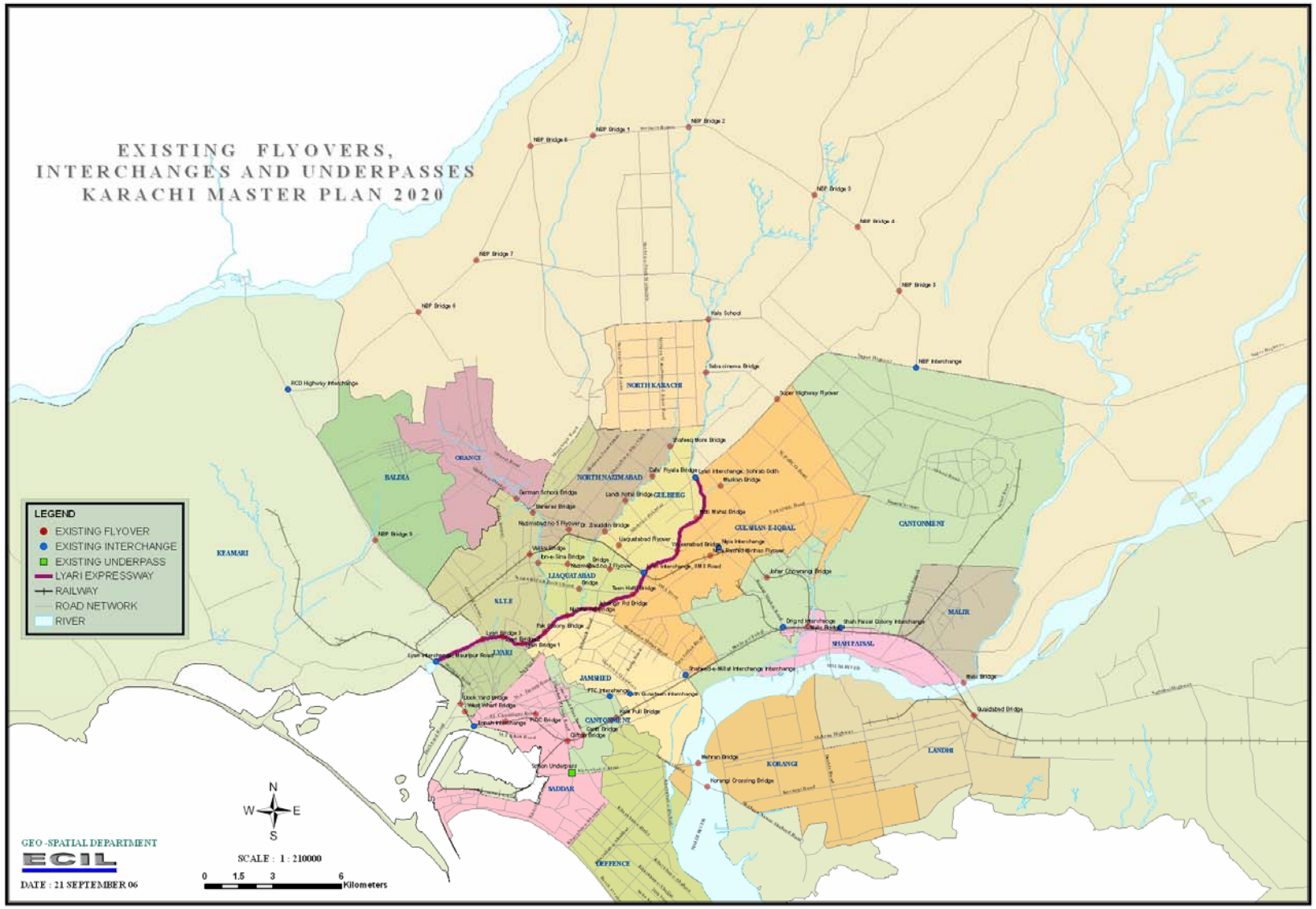

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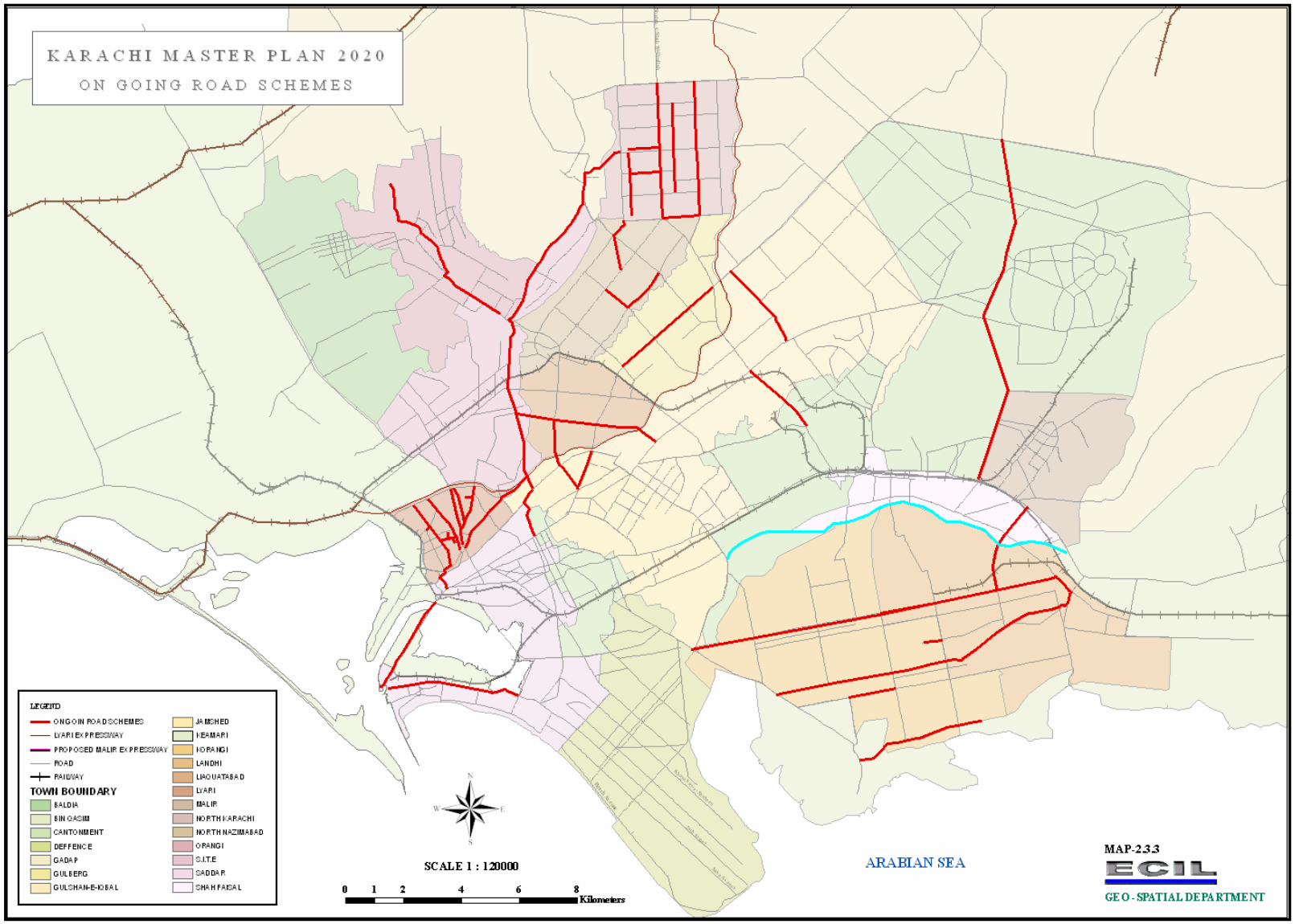

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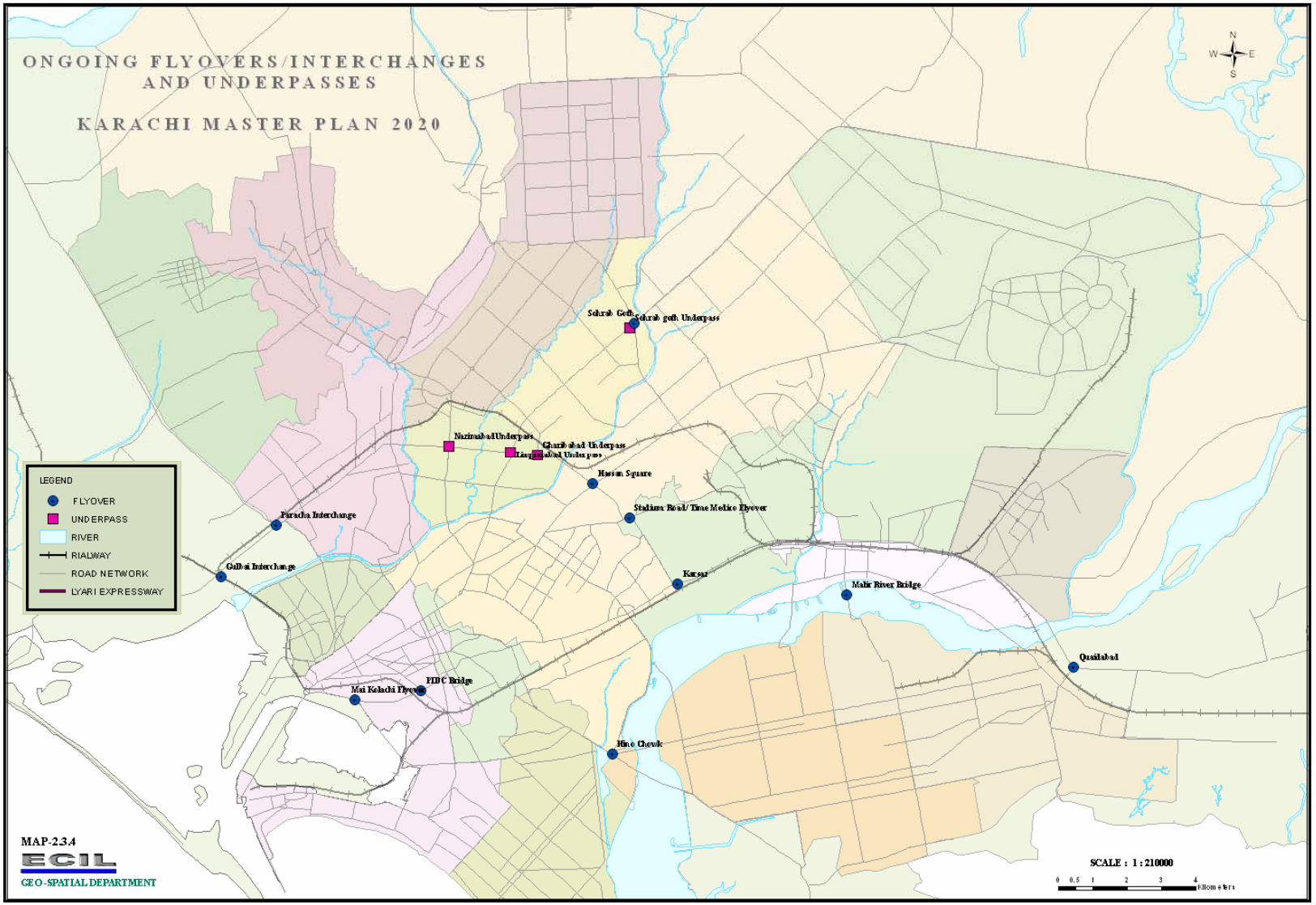

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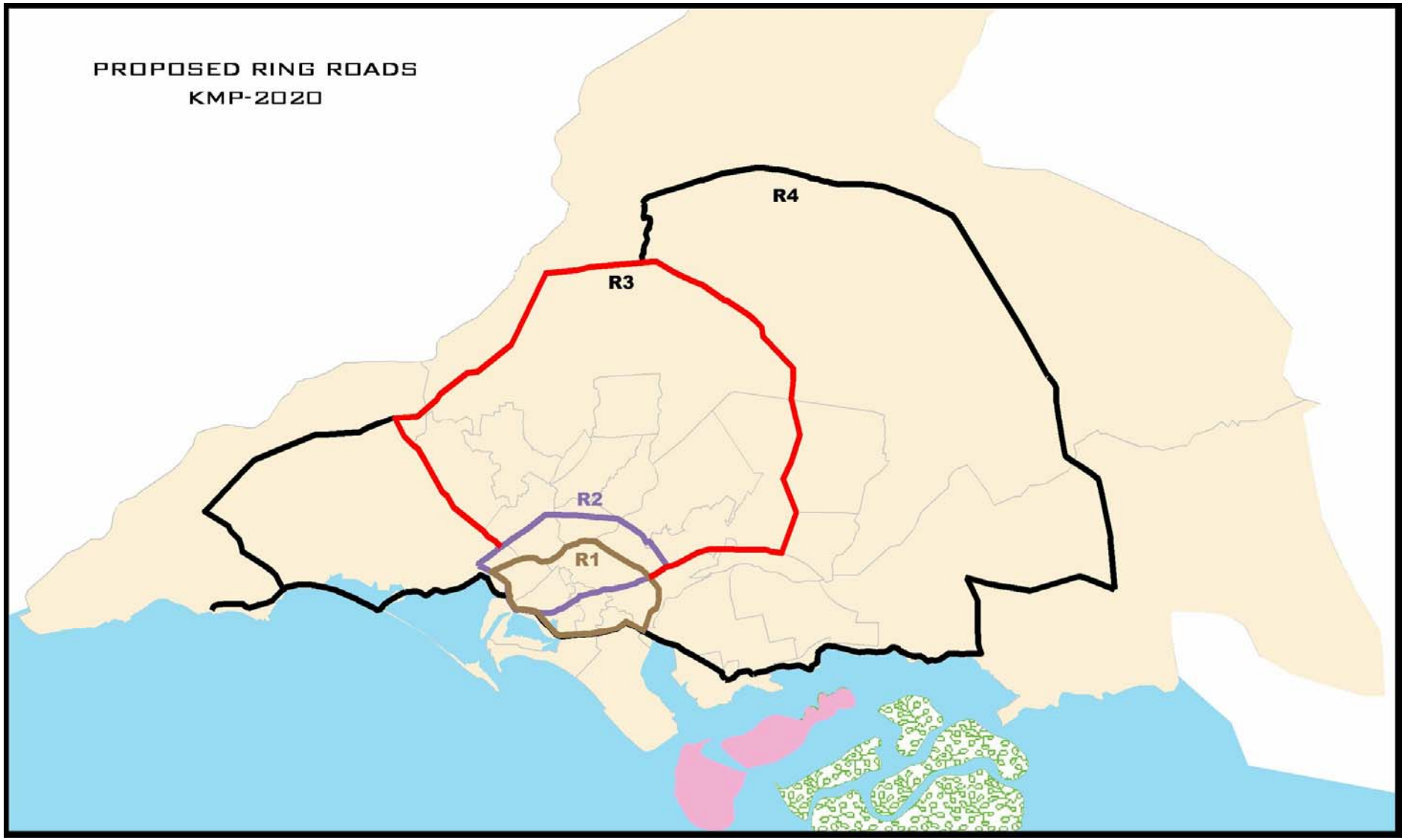

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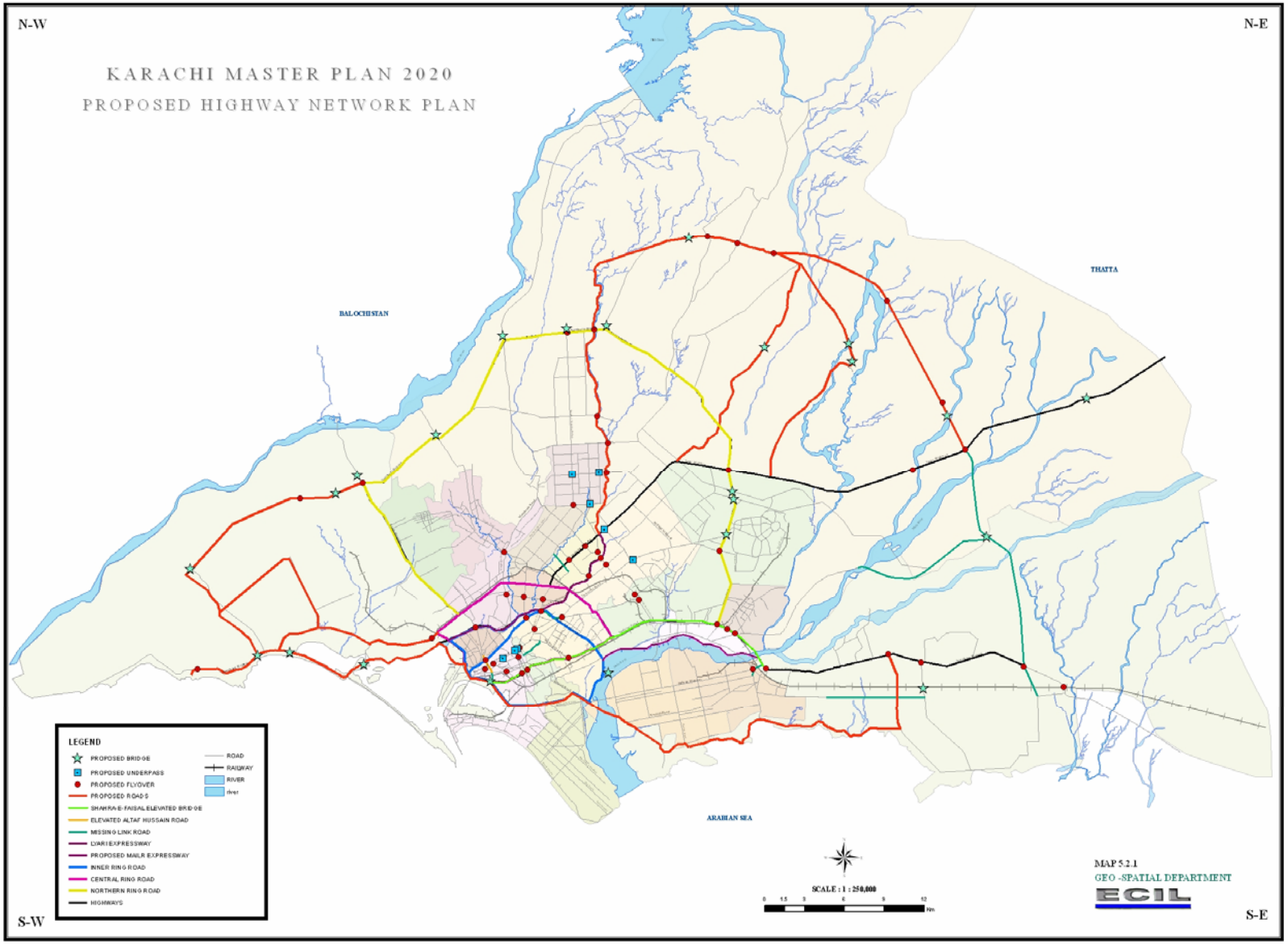

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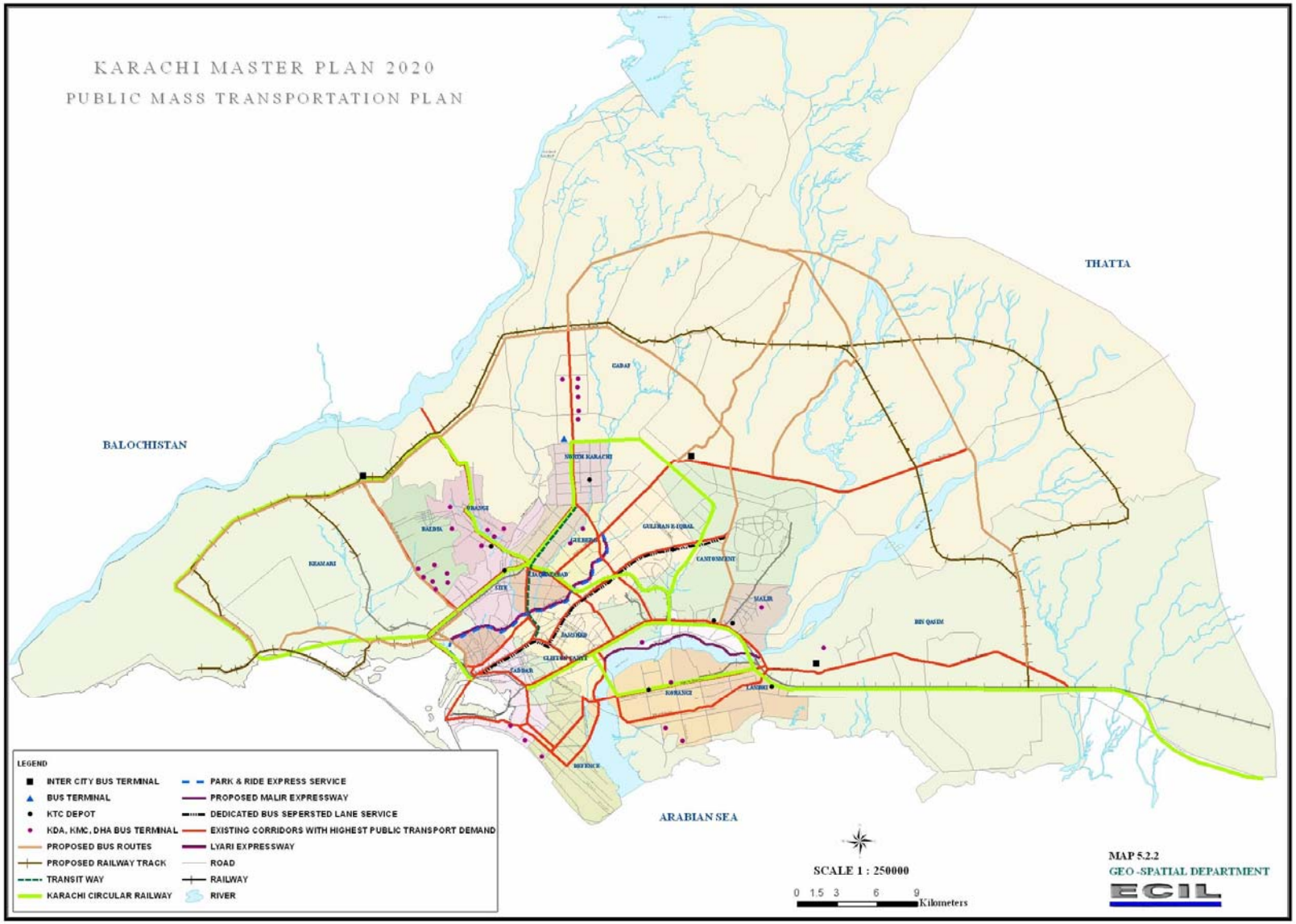

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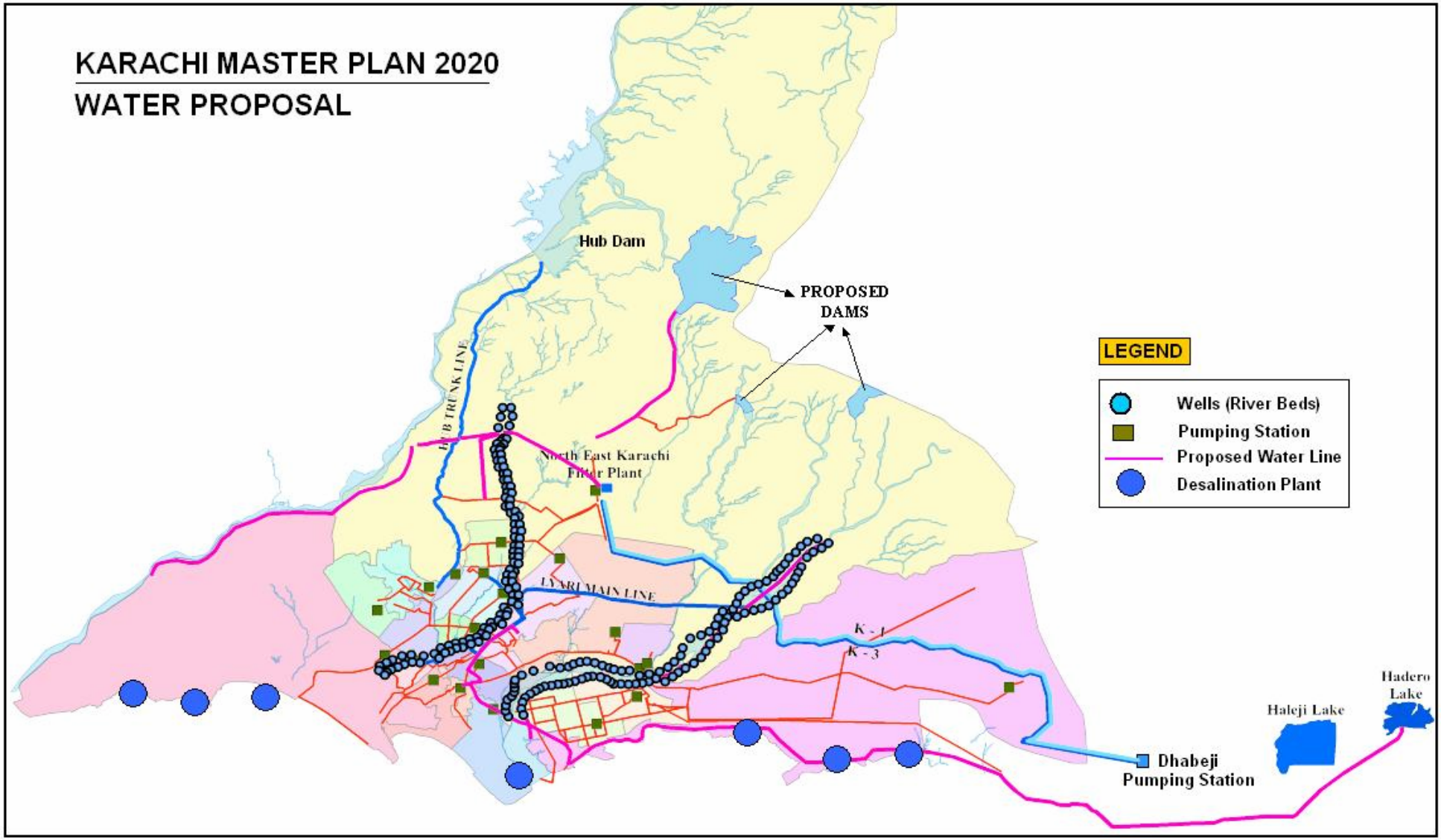

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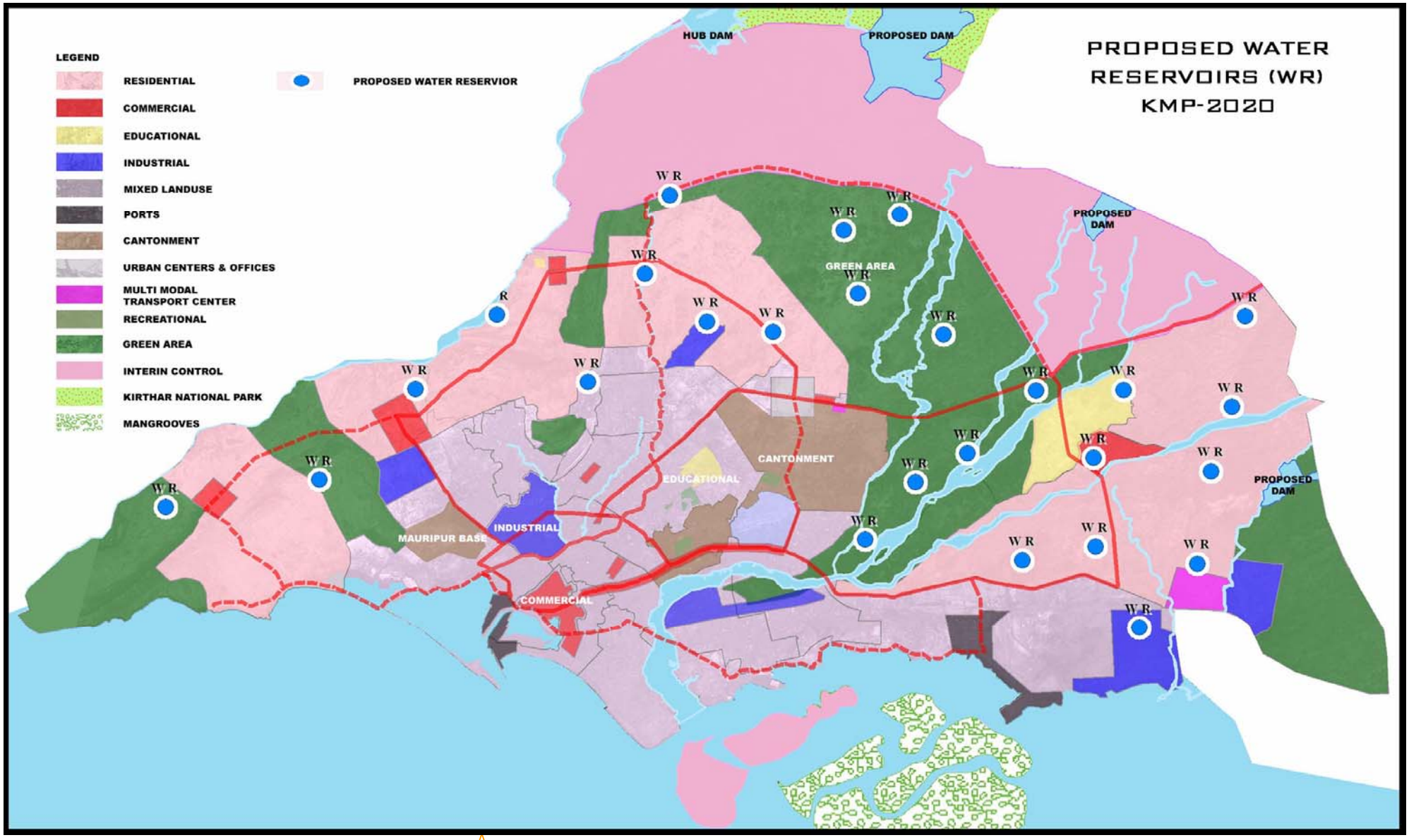

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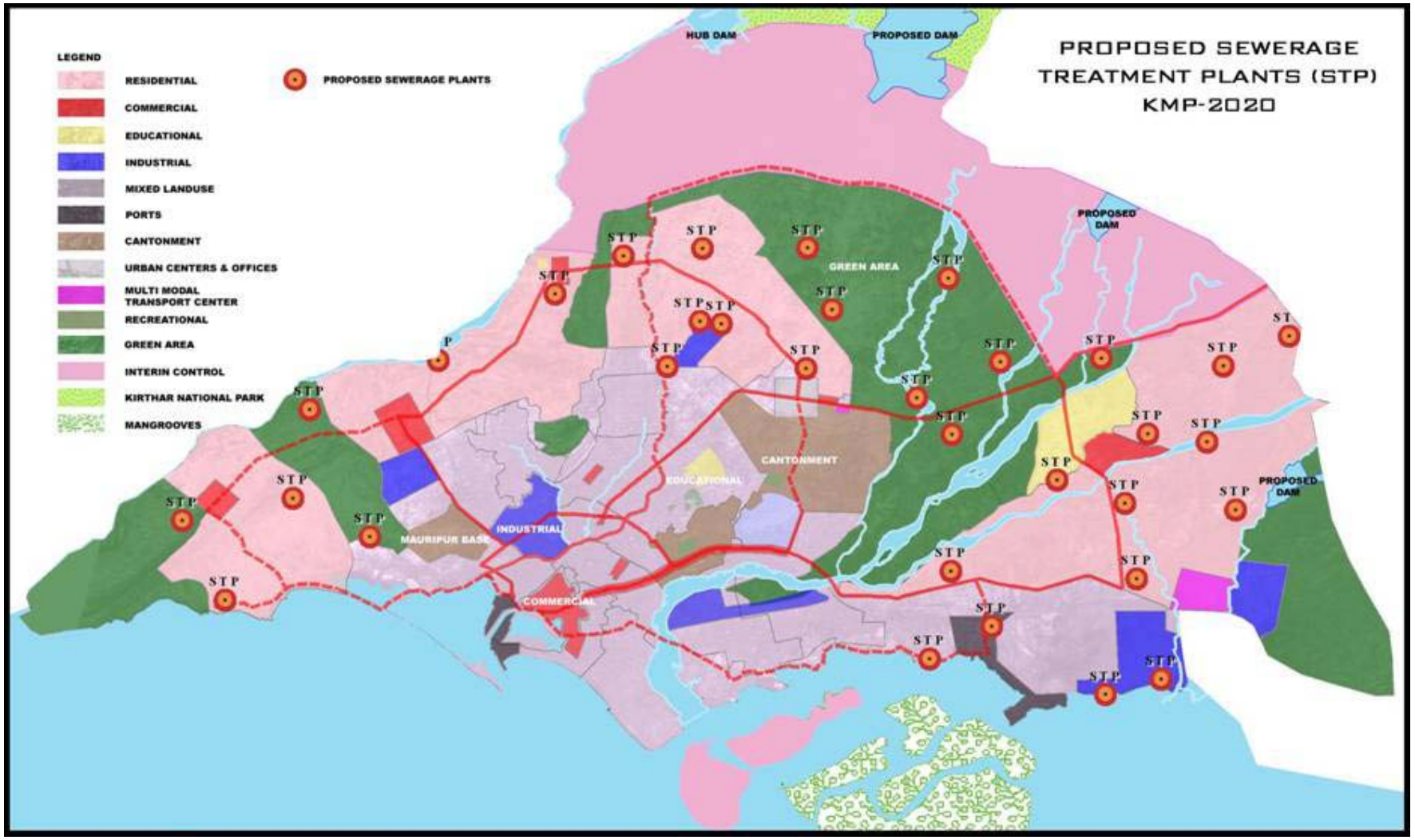

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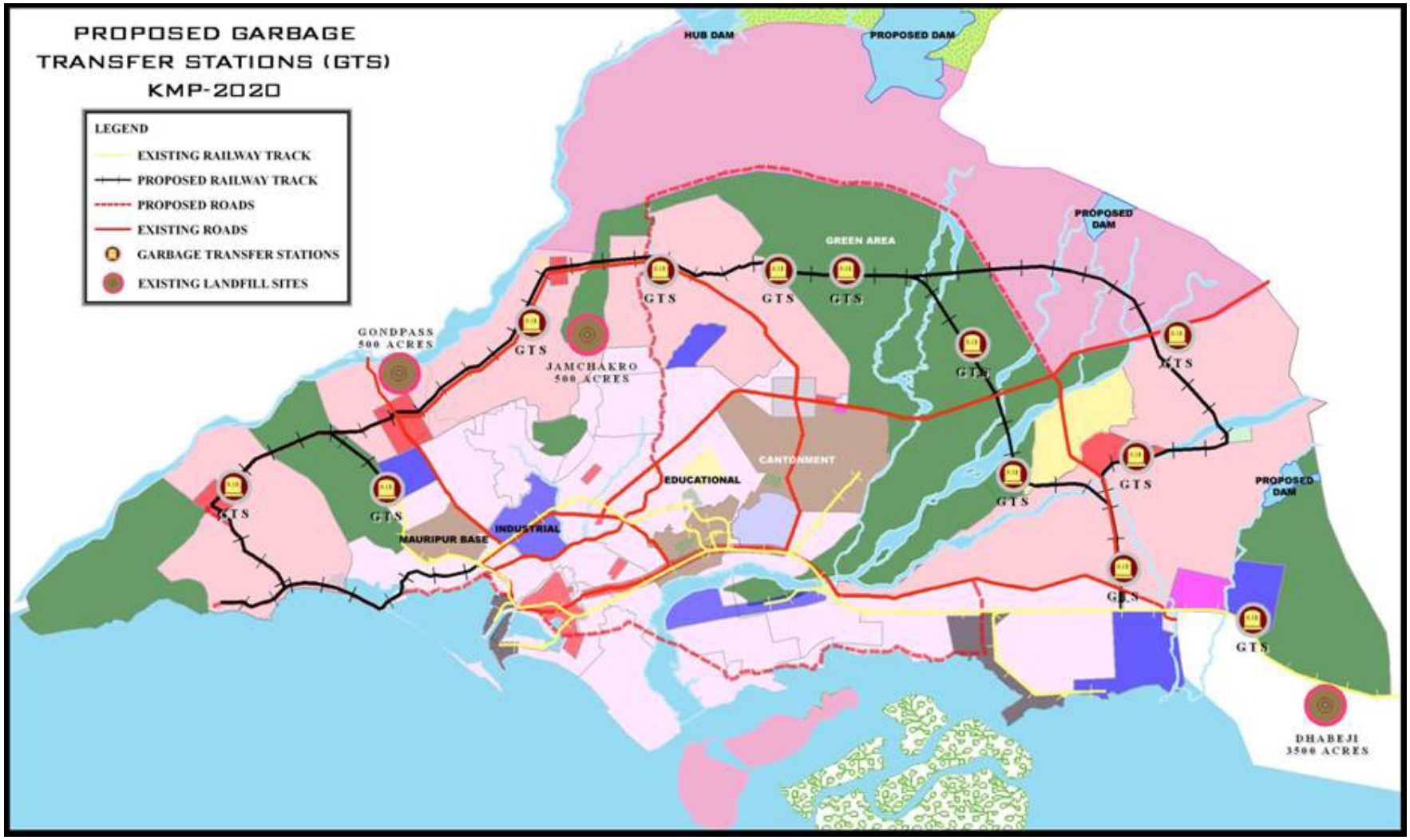

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ANNEXURE-III

LIST OF PARTICIPANTS

CDGK	Mr. Mustafa Kamal, City Nazim Mr. Roshan Ali Shaikh, EDO Finance. Mr.Saleh Ahmad Faruqui EDO Revenue Mr.Haider Ali Navien EDO Education Mr.Zaheer ul Islam DG KMTC Syed Abid Ali Shah EDO Enterprise and Investment Syed Ather Ali EDO Transport and Communication Brig.Iftikhar Haider M.D. KW&SB Mr. Shahid Saleem DMD KW&SB Mrs. Rehana Shiekh EDO Community Development Mr. Sarfaraz Khan E.D.O Works and Service Mr. Mumtaz-ur-Rehman Khan Chief Controller KBCA Dr. A.D.Sajnani EDO Health
MDA	Mr. Ameer Zada Kohati Director General MDA Mr. Hafiz Majid Director Town Planning
LDA	Mr. Mohammad Sarfaraz Khan Director General LDA
MPGO	Mr. Iftekhar Kaimkhani, EDO Mr. Hafiz Muhammad Javeed, DO, Project Manager (MP)
Counterpart Staff from MPGO	Mr. S.M.Shah DO (planning) Mrs. Zareen F.Hussain Adl.DO (Urban Design) Barrister Abdul Rehman (legal & Institutional) Mr. Shahid Saleem (Water & Sewerage) DMD KW&SB Mr. Khalid Malik DO (SWM) Dr.Saif ur Rehman DO (Revenue) Mr. Khalid Iqbal Divisional Director Engg.KESC Syed Haider Ali DO (TCD) Mr. Irfan Ansari DO(Finance & Planning) Mr. Akhtar Ali DDO (land Use) Mr. Naved Zafar Ex. EDO (Environment) DO Health DO Education

ECIL	Mr. Zaheer Mirza, Chairman, ECIL
	Mr. Akhlaq Ahmed, C.E, ECIL
	Mr. Naved Zaheer ,Project Director/Team Leader
	Mr. Khalid Mirza, Transportation Specialist.
	Mr. Afzal Ahmed Khan, Coordinator / Town Planner
	Mr. Ashraf Sulimany, Civil Engineer
	Mr. Jawed Shah, Infrastructure Specialist
	Mr. Bux Ali Abro, Transportation Specialist
	Mr. Babar Sani, Land Use / Modeling
	Col. Siddiq, Coastal Development
	Dr. Syed Ahmed, Socio Economic Specialist.
	Dr. Shama, Socio Economic Specialist.
	Dr. Uzair Ghani, Health Policies.
	Mr. Fazal Noor, Housing & Urban Renewal Specialist
	Mr. Fasihuddin Pasha, Oceanographer
	Mr. Tanveer Ahmed, Marine Specialist
	Mr. N.H. Burni, Power Engineer
	Ad. Saadat Yar Khan, Legal / Legislative Specialist
	Ms. Anjla Naved, Architect.
	Mr. Ali Asghar, Sewerage Disposal Expert
	Mr. Abdur Rahim, Solid Waste Management Expert
	Dr. Shimail Daud Public Health Specialist
	Mr. Zafar Ismail, Economist, ECIL
	Mr. Abdul Wahid Sethi, Financial Analyst, AASR.
	Mr. T.A. Jafri , Town Planner
	Mr. Safiullah, Urban Designer
	Ms. Saima Shaikh, Junior Town Planner
	Ms. Qamar-un-Nisa, Junior Town Planner
	Mr. Muhammad Iqbal, RS / GIS Specialist
	Mr. Jamil Sabri, Statistician

Selected ECIL Support	Mr. M. Javed Mehmood, GIS
	Mr. Sharjeel Ahmed Khan, GIS
	Mr. Sohaib bin Farhan, GIS
	Mr. Sheeraz Ahmed, GIS
	Mr. Rizwan Ghori, GIS
	Mr. Ameer Azam, GIS
	Mr. Kamran Khan,GIS
	Ms. Ruqia Rehman, GIS
	Ms. Nimra Mujeeb, GIS
	Ms. Adeela Muneer, GIS
	Mr. Jameel Nizamani, Software Engineer
	Mr. Jawad Ahmed, Transport Engineer
	Mr. Ejaz Khokhar, Solid Waste Engineer
	Mr. Rehan Iqbal, IT Specialist
	Mr. Kashif Amjadi, Logistics
	Mr. Tariq Ahmed Siddiqi, Type Setting
PADCO	Mr John Bachmann, Director Planning,
	Urban Development Specialist.
	Mr. Jerry Erbach, Social Specialist.
	Mr. Douglas Lucius, Transport Economist.
	Mr. Vitorio Pareto, Infrastructure Specialist.
	Mr. Brain English, Town Planner.
	Mr. Amit Prothi, Housing Specialist.
CDGK follow-up	Brig. Iftikhar Haider, Managing Director KW&SB
Committee	C.E.O, KESC
	Director General Operation (South) PTCL Karachi
	G.M Planning & Development SSGC
	Mr. Sarfaraz Khan, E.D.O (W&S) CDGK
	Mr. Haider Ali Navien, E.D.O (Education) CDGK
	Dr. A.D. Sajnani, E.D.O (Health) CDGK
	Mr. Zaheer-ul-Islam, D.G KMTC, CDGK
	Mrs. Rehana Shaikh, E.D.O
	(Community & Development) CDGK
	Mr. Mohammed Ather Ali, E.D.O
	(Transport & Communication)

ACKNOWLEDGEMENT

Dr. Ishrat-ul-Ibad	**Governor of Sindh**
Engr.Dr.M.Akram Shiekh	**Deputy Chairman Planning Commission Of Pakistan**
Syed Mustafa Kamal	**City Nazim Karachi**
Mr. Fazal ur Rehman	**D.C.O, CDGK**

Coordination Committee on Development & Management of Large Cities GOP

1.	Deputy Chairman Planning Commission	-	Chairman
2.	Secretary, Planning & Development Division	-	Member
3.	Secretary, Economic Affairs Division	-	Member
4.	Chief Secretaries of the Provinces	-	Members
5.	Chief Economist, Planning Commission	-	Member
6.	Member (Infrastructure) Planning Commission	-	Member
7.	Advisor (Infrastructure) Planning Commission	-	Member
8.	Registrar Pakistan Engineering Council	-	Member
9.	Representative of the Pakistan Town Planner Association (to be notified)	-	Member
10.	Representative of Major Donor involved in development programmes (to be notified)	-	Members
11.	Chief (PP&H) Planning & Development Division	-	Member

Co-Ordination Committee for the Development of Mega City Affairs GOS

1.	Governor Sindh	Chairman
2.	Chief Secretary Sindh	Member
3.	Additional Chief Secretary (Dev)	Member/Secretary
4.	Additional Chief Secretary Local Government, Government of Sindh	Member
5.	City Nazim, Karachi	Member
6.	Secretary Finance, Government of Sindh	Member
7.	Secretary Law, Government of Sindh	Member
8.	Member (LU) Board of Revenue, Government Of Sindh	Member
9.	Provincial Police Officer, Government of Sindh	Member
10.	Chairman KPT	Member
11.	Chairman Port Qasim Authority	Member
12.	Chairperson, EPZA	Member
13.	Chairman EPB	Member
14.	Chairman Pakistan Steel	Member
15.	MD, KESC.	Member
16.	MD, SSGC.	Member
17.	Director General PTCL	Member
18.	Administrator, DHA	Member
19.	Director General MLC	Member
20.	Representative of HQ 5 Corps	Member
21.	Divisional Superintendent Railways	Member
22.	DCO, CDGK	Member

Technical Committees for the Formulation of KMP 2020

A- Committee of Health:

1.	Dr. Masood Hameed Khan Vice Chancellor, Dow Medical University	Chairman
2.	Sher Shah Syed Secretary General PM	Member
3.	Dr. A. D. Sajnani Executive District Officer (Health), CDGK	Member/Secretary
4.	Dr. Samad Shera	Member
5.	Dr. F.U. Baqai Chancellor Baqai Medical University	Member
6.	Prof. Mashkoor Alam Rep. J.P.M.C	Member
7.	Mr. Javaid Sultan Addl. D.O, MPGO, CDGK	Coordinator
8.	Dr. Irshad Waheed Registrar College of Physicans & Surgeon	Member
9.	Representative of Aga Khan University	Member

B- Committee of Housing:

1.	Prof. Dr. Noman Ahmed, Department of Architecture & Planning NED Univeristy.	Chairman
2.	Mr. Mumtaz Haider, D.O (Housing), MPGO	Member/Secretary
3.	Secretary / Representative of Excise & Taxation Department, Govt. of Sindh	Member
4.	Mr. Ali Ahmed Lund D.G Sindh Katchi Abadis Authority	Member
5.	Mr. Zaigham M. Rizvi Chairman of HBFC	Member
6.	Representative of NGO, SAIBAN	Member

7.	Mr. Raees Ahmed Chairman Association of Builders & Developers (ABAD)	Member
8.	Arch. Arshad Abdullah	Member
9.	Ms. Nusrat Ahmed D.D.O, MPGO	Coordinator

C- <u>Committee on Water Supply & Sanitation:</u>

1.	Brig. Iftikhar Haider MD KW&SB	Chairman
2.	Mr. Shahid Saleem Dy. Managing Director (Planning) KW&SB	Member
3.	Mr. Malik Mohammed Fiaz Town Nazim, Lyari	Member
4.	Mr. F.H. Mughal D.O (MPGO)	Member/Secretary
5.	Chief Engineer (W) KW&SB	Member
6.	Chief Engineer (S) KW&SB	Member
7.	Mr. Mohammed Bux Soomro Chief Engineer, SITE	Member
8.	Ms. Parveen Rehman (Sanitation Expert-OPP, Karachi)	Member
9.	Dr. Fazal Haider Usmani PCSIR	Member
10.	Mr. Yousuf Siddiqui Ex-Chief Engineer, World Bank Project (Defunct KDA)	Member
11.	Mr. Mohammed Aqib Representative of World Conservation Union (IUCN)	Member
12.	NGO (Working on desalination) Names to be included later	Member
13.	Representative of Association of Korangi Trade & Industry	Member

D- Committee on Solid Waste:

1.	Mr. Mohammed Aqib Representative of IUCN	Chairman
2.	District Officer Solid Waste Management (W&S), CDGK	Member/Secretary
3.	Mr. Fazal Haider D.G EPA	Member
4.	Mr. F.H. Mughal, DO, MPGO	Member
5.	Mr. Javaid Sultan, Addl.D.O, MPGO	Coordinator

E- <u>Committee on Environment:</u>

1.	Mr. Fazal Haider D.G Environment Protection Agency	Chairman
2.	Dr. Ashfaq Ex-Pro Vice Chancellor, Karachi University	Member
3.	Mr. F.H Mughal Ex.D.D.O MPGODr. Ashfaq	Member/Secretary
4.	Prof. Saudullah Chairman Department of Environment Studies NED University	Member
5.	Dr. Badar Ghauri (SUPARCO)	Member
6.	Dr. Mirza Arshad Ali Baig (Ex-D.G. PCSIR)	Member
7.	Mr. Mohammed Aqib IUCN	Member
8.	Dr. Ahsanullah, Ex-Principal, S.M. College	Member
9.	Mr. Naveed Zafar Ex-Addl. District Officer, MPGO	Member

F- Committee on Utilities:

1.	Sameer A. Hoodbhoy	Chairman
2.	Mr. Iftikhar Ali Kaim Khani Executive District Officer, MPGO	Member
3.	Managing Director, KESC	Member
4.	Managing Director, Sui Southern Gas	Member
5.	Mr. Nafees Ahmed Siddiqi Director General, PTCL	Member
6.	Khawaja M. Iqbal General Manager (Electricity) Pak. Steel Mill	Member
7.	Representative of Department of Alternate Energy, Government of Sindh	Member
8.	Mr. Mohammed Bux Soomro C.E. of SITE	Member
9.	Representative of HUBCO	Member
10.	Mr. Gulzar Alvi, DDO, MPGO	Coordinator
11.	Representative of Mobilink	Member
12.	Representative of Multinet	Member

G. Committee on Recreation & Community Facilities:

1.	Mrs. Rehana Sheikh Executive District Officer (Community Development), CDGK	Chairperson
2.	Mr. Mohammed Mansoor Qazi D.O, Parks & Horticulture, CDGK	Member/Secretary
3.	Mr. Zaigham S. Jaffery D. O, Design Bureau, MPGO	Member
4.	Mr. Akhtar Ahsan, Ex-Director, MP&EC	Member
5.	Mrs. Hurrah Javed, DDO, MPGO	Coordinator
6.	Curator, Zoological Garden	Member
7.	Representative of M/s Alladin Park	Member

H. Committee on Coastal Recreation:

1.	Managing Director Sindh Tourism Development Corporation	Chairman
2.	Dr. Tariq Masood National Institute of Oceanography	Member/Secretary
3.	Mr. Sarfaraz Khan E.D.O (W&S), CDGK	Member
4.	Mr. Mohammed Sarfraz Khan Director (Planning), Lyari Development Authority	Member
5.	Director General (Planning & Development) Port Qasim Authority	Member
6.	Mr. Atta-ul-Islam Manager Estates, Karachi Port Trust	Member
7.	Conservator Wild life, Department of Forest & Wild life Govt. of Sindh	Member
8.	Mr. Mohammed Aqib Representative of IUCN	Member
9.	Secretary, Korangi Fish Harbour Authority	Member
10.	Syed Abu Hamid Naqvi Ex-Addl. Director, MP&EC	Member
11.	Mrs. Zareen Fawad, DDo, MPGO	Coordinator

I- Committee on Institutional Framework:

1.	Syed Mustaffa Kamal City Nazim Karachi City District Government Karachi	Chairman
2.	Ms. Nasreen Jalil City Naib Nazim City District Government Karachi	Member
3.	Joint Secretary, Ministry of Housing & Works, Govt. of Pakistan	Member
4.	District Coordination Officer, CDGK	Member
5.	Chairman, Pakistan Steel	Member
6.	Chairman, Karachi Port Trust	Member

7.	Chairman, Port Qasim Authority	Member
8.	Chairman, National Highway Authority	Member
9.	Mr. Z.A Nizami Chancellor, Sir Syed University of Engineering & Technology	Member
10.	Member, Land Revenue, BOR Sindh	Member
11.	Divisional Superintendent, Pakistan Railway	Member
12.	Conservator, Wild life, Govt. of Sindh	Member
13.	Chairman, Pakistan Council of Architects And Town Planners	Member
14.	Mr. Iftikhiar Ali Kaim Khani E.D.O, MPGO	Member
15.	Hafiz Muhammad Javed, DO, MPGO	Member/Secretary
16.	Mr. Rizwan Ahmed Hashmi, DDO, MPGO	Coordinator

J- <u>Proposed Technical Committee on Legal Framework:</u>

1.	Justice (R) Rasheed A. Rizvi	Chairman
2.	Executive District Officer (Law), CDGK	Member/Secretary
3.	Mr. Rahimuddin Ex-Deputy Director (PLA) MP&EC, Department KDA (Defunct)	Member
4.	Ms. Nighat Jabeen, DDO, MPGO, CDGK	Member
5.	Mr. Rizwan Hashmi, DDO, MPGO, CDGK	Coordinator
6.	Mr. Latif Chaudhry Head, Corporate Law Statelife Insurance Corporation (Rtd).	Member

K- Committee on Education Facilities:

1.	Mr. Peer Zada Qasim Vice Chancellor or Pro Vice Chancellor, University of Karachi	Chairman
2.	Mr. Sameer A. Hoodbhoy	Member
3.	E.D.O. Higher Education	Member/Secretary
4.	Mr. Haider Ali Naveen E.D.O. Education	Member
5.	Registrar University of Karachi	Member
6.	Ms. Anita Ghulam Ali	Member
7.	Dr. Ehsanullah Ex-Principal, S.M. College	Member
8.	Mir Mohammad Ali, Ex-Chairman Board of Technical Education Karachi	Member
9.	Syed Khalid Shah President, Private Schools Owner Association, Karachi	Member
10.	Mrs. Yasmin Aqeel Regional Director Beacon House School Systems	Member
11.	Mr. Siddique Shiekh Chairman, FPCCI Education Committee	Member
12.	Mr. Shahab Afroz Alvi Add. D.O. MPGO	Member

L- Technical Committee on Transport

1.	Malik Zaheer-ul-Islam D.G KMPT	Chairman
2.	Mr. Iftikhar Ali Qaim Khani	Member
3.	Syed Ather Ali E.D.O Transport & Communication	Member
4.	Arch. Aarif Hassan	Member
5.	Divisional Superintendant Pak. Railway	Member
6.	Captain Falak Khursheed D.I.G Traffic	Member
7.	Mr. Hafiz Mohammed Javed D.O MPGO	Member
8.	Mr. Anwar Baig D.Director KMPTS CDGK	Member/Secretary
9.	President Karachi Bus Owner Association	Member

KARACHI TOWN NAZIM'S

1.	Mr. Hamayun Khan	Nazim Kemari Town
2.	Syed Badshah	Nazim Site Town
3.	Mr. Kamran Akhter	Nazim Baldia Town
4.	Mr. Abdul Haq	Nazim Orangi Town
5.	Mr. Malik Mohammed Fayaz	Nazim Lyari Town
6.	Mr. Mohammed Dilawar	Nazim Saddar Town
7.	Mr. Arif Aajakia	Nazim Jamshed Town
8.	Mr. Mohammed Wasay Jalil	Nazim Gulshan-e-Iqbal Town
9.	Mr. Mohammed Imran	Nazim Shah Faisal Town
10.	Mr. Mohammed Ismail Qureshi	Nazim Landhi Town
11.	Mr. Arif Khan Advocate	Nazim Korangi Town
12.	Mr. Mumtaz Hameed	Nazim N. Nazimabad Town
13.	Mr. Mohammed Hanif Surti	Nazim New Karachi Town
14.	Syed Maud Ahmed Hayat	Nazim Gulberg Town
15.	Mr. Usama Qadri	Nazim Liaqatabad Town
16.	Mr. Ansar Ahmed Shiekh	Nazim Bin Qasim Town
17.	Mr. Umer Jat	Nazim Gadap Town
18.	Mr. Ghulam Murtaza Baluch	Nazim Malir Town