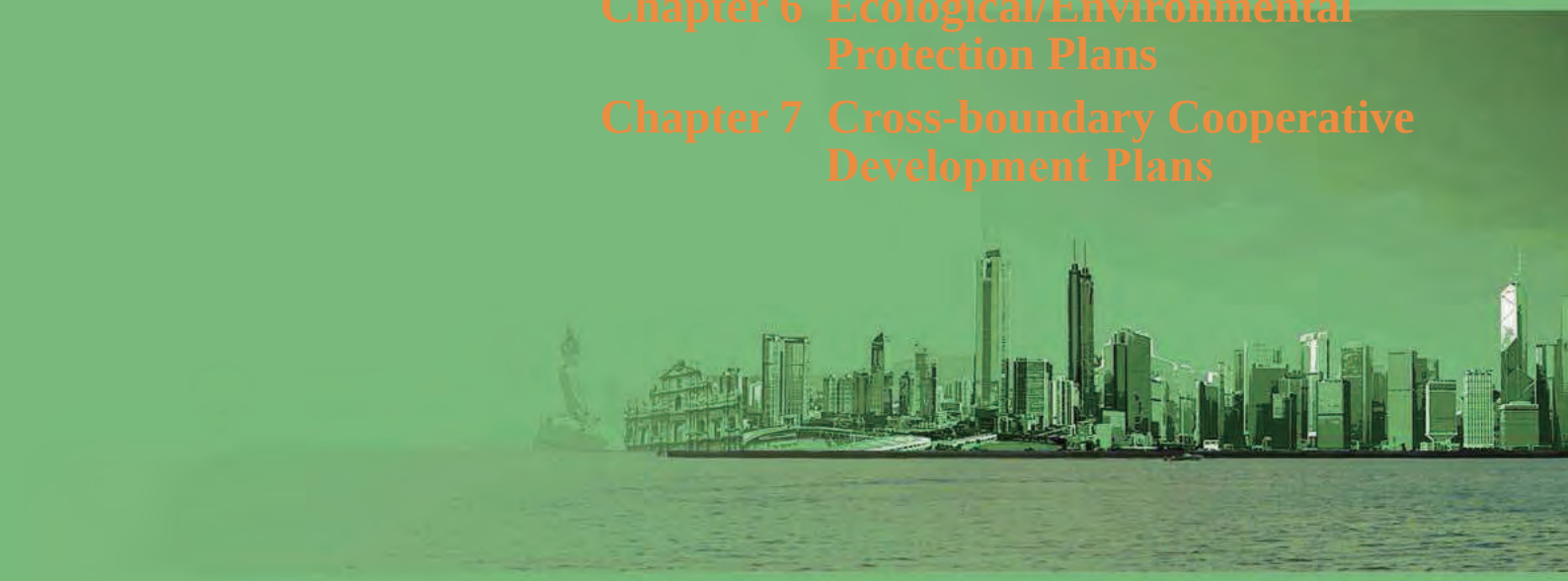
[Part II Spatial Plans]



Chapter 4
Master Spatial Coordination Plans

The "Master Spatial Coordination Plans" serve to elaborate and implement the "Strategy for Optimization of Spatial Structure", and provide guidance for the governments of Guangdong, Hong Kong and Macao in planning for actions on co-ordinated development. It includes the development of global city functions via the "Plans for Bay Area Development"; promotion of city conglomerations via the "Plans for Development of Metropolitan Areas"; establishment of a city-region framework via the "Plans for Axis Development"; expansion of the city-region's hinterland via the "Plans for Tier Development"; promotion of the integration of cities/towns/centres via the "Sub-regional Development Plans" and encouragement of specialized growth of individual cities/towns/centres via the "Poly-centric Development Plans".

4.1 Plans for Bay Area Development

The Plans for Bay Area Development aim to develop the Bay Area to serve the functions of an "Innovation Bay for early and pilot implementation", a "high-end industrial Co-operation Bay", a "Hub Bay" which is internally and externally accessible, an "Ecological Bay" with blue sky and clear water, a "Scenic Bay" with proper development intensity and a "Vibrant Bay" that is the pioneer of this era.

4.1.1 "Innovation Bay for early and pilot implementation"

—— A regional innovation system with Guangzhou-Shenzhen-Hong Kong as the main axis: based on the resources of Guangzhou, Shenzhen and Hong Kong in technology innovations and with the opportunity provided by such macro-policies as the "Shenzhen/Hong Kong Innovation Circle" and the "Construction of National Innovative Cities", this regional innovation system would serve to implement China's key projects in developing technology infrastructure, research institutions and innovation items. It should also serve as a base for cultural innovation, and research and development of technology.

—— An open system to accommodate innovations: the "Shenzhen/Hong Kong Innovation Circle" could serve as a model for the implementation of the "joint innovation zone" proposed in "the Outline" and the "early and pilot implementation" projects under CEPA. The experiences of Shenzhen/Hong Kong in innovation cooperation should be promoted as a basis for exploring the ways to integrate and enhance the resources for innovation among the wider areas of Guangzhou/Shenzhen/Hong Kong and Hong Kong/Zhuhai/Macao. Guangdong, Hong Kong and Macao should be encouraged to cooperate in technology innovations in the Bay Area, including the undertaking of joint projects, creation of platforms for innovation and cooperation in training, research and development, with a view to building an open innovation system in the Bay Area.

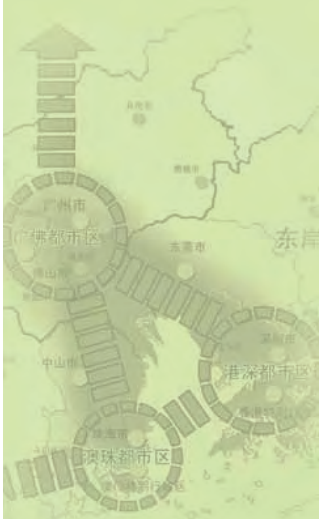
—— Innovative approaches of land development and management: with the opportunity provided by the projects such as the development of Lok Ma Chau Loop Area and the Zhuhai/Macao/Hengqin and Zhuhai/Macao Cross-boundary Cooperation Districts[1], innovative approaches of land development and management should be promoted in the Bay Area. The feasibility of developing new and high-end technology parks using Hong Kong/Macao's well developed approaches of land development and management and running business should be studied. Industrial restructuring should be promoted through the development of five national new and high-end industrial districts (in Guangzhou, Shenzhen, Zhongshan, Zhuhai and Foshan) and over 10 provincial new and high-end industrial districts to facilitate industrial upgrading with focus on innovation.

—— Adoption of common standards: actions should be taken to establish common standards of technology infrastructure development, professional recognition, common database and platforms for sharing technology facilities and resources, as well as an effective system of the protection of intellectual property rights within the Bay Area, so as to facilitate free flow of resources for innovation.

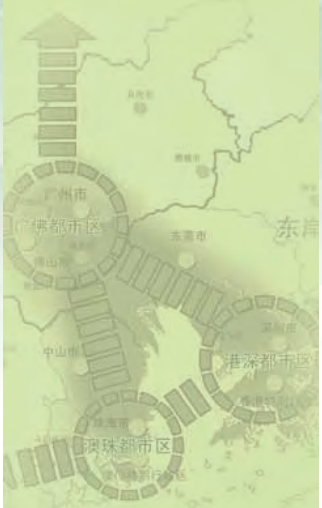
4.1.2 "Cooperation Bay" for High-end Industries

—— Optimization of industrial structure: actions should be taken to speed up the construction of a regional centre of modern service industries and an advanced manufacturing base in Guangzhou, and to create centres of modern service industries and central commercial areas in Guangzhou, Shenzhen and Hong Kong. Development of high-end electronic and information industries at the east bank of Pearl River Estuary should be accelerated to create a global electronic and information industrial base. The development of services including financing, convention and exhibition, logistics, technology services and cultural innovation should also be expedited. At the west bank of Pearl River Estuary, large scale advanced manufacturing industries should be developed, development of service industries should be expedited, and the leading industries should be strengthened with a view to creating internationally competitive industry clusters.

—— A world-class advanced manufacturing base: actions should be taken to speed up the development of the equipment manufacturing industries by actively implementing the projects such as the Shenzhen Baguang Fine Chemical Industrial Park, China State Shipbuilding Corporation's plant for the production of low speed marine diesel engine in Guangzhou, Zhuhai's aircraft and maritime engineering equipment manufacturing plants, and the relevant projects of Longxue Shipbuilding and Zhongshan Shipping. Production of automobiles using alternative energy sources should be encouraged through the guidance and impetus from the government. The use of electric cars in the key cities of the Bay Area should be promoted through the development of factories for the assembly and production of spare parts for electric cars. Vocational and technical education in the relevant aspects should be promoted by utilizing the well-developed, distinctive industrial areas as training bases



1 Zhuhai/Macao Cross-boundary Cooperation District was previously known as Zhuhai/Macao Cross-boundary Industrial District. In April 2009, Zhuhai/Macao Cooperation Task Force set up the Working Group on the Restructuring and Upgrading of Zhuhai Cross-boundary Industrial District. The District was then upgraded as Zhuhai/Macao Cross-boundary Cooperation District.



and the capital from government, big corporations and private enterprises to establish vocational and technical education institutions in the Bay Area.

—— A base of modern service industries: Hong Kong's advantages in financial sector should be enhanced and the cooperation with Shenzhen should be strengthened. Furthermore, actions should be taken to upgrade the logistics sector in the Bay Area to facilitate development of it into a major modern business region and a world-class logistics centre. Professional services, such as design, market planning, engineering consultation and intermediary services, should be supported to facilitate development of the Bay Area into a nationwide e-commerce centre, design capital, international exhibition centre, service outsourcing base. Headquarters economy should be actively promoted for the establishment of global marketing service and central commercial centres. Projects for the standardization and branding of service industries should be promoted to develop the Bay Area into a globally influential centre of finance, logistics, innovative design and headquarters economy.

4.1.3 "Internally and externally accessible Hub Bay"

Through further strengthening the connections of all transportation hubs in the PRD, Hong Kong and Macao for the fast circulation of key economic factors, the Bay Area should develop into a convenient international and domestic transportation hub. The specific measures for realizing the transportation hub in the Bay Area are detailed in Chapter 5 of this report, "Plans for Cooperative Development of Transportation".

4.1.4 "Ecological Bay with blue sky and clear water"

The Bay Area comprises a complex network of waterways and wetlands, of which the ecological functions are important and extremely sensitive. With further economic and infrastructure development, the contradiction between the protection of ecology and urbanization will become more acute. Therefore, efforts should be put on the management and control of ecology and environment. The specific measures for the protection of the ecology and environment of the Bay Area are detailed in Chapter 6 of this report, "Ecological/Environmental Protection Plans".

4.1.5 "Scenic Bay with proper development intensity"

—— "Smart growth" approach in land development: with the guidance of relevant policies, the Bay Area should change its current pattern of disorderly urban growth led by the industrialization of villages and small towns, and should strengthen the concept of "smart growth" to achieve effective control over urban sprawl. Based on the regional eco-security framework proposed by this study and the planning of green belt system for the PRD, effective ecological controls should be established through the identification and protection of the key ecological origins, corridors and nodes, integrated protection of the regional ecological and green leisure resources

and setting out clear boundaries and limits on urban growth. Emphasis should also be put on recyclable use of urban land, promotion of low-carbon economy and low-carbon city, establishment of land reserve system to ensure orderly development of land resources, conducting studies on innovative approaches of urban renewal, and changing the obsolete mindsets in land development.

—— Arrangement of cities/towns in clusters: the concept of "large cities agglomerate, small cities disperse" as raised in "the Outline" should be followed. Through various measures including the construction of Intercity Mass Rapid Transit, integration of spatial resources, and macro-economic control policies such as the relocation of industries into industrial parks, new development areas with integrated functions should be formed. Actions should also be taken to optimize the arrangement of cities/towns combing the concepts of "vertical city" and "urban carpet" (Column 4-1) to rectify the current extensive, monotonous urban setting and create cities/towns clusters that are highly accessible, fully serviced and with reasonable land use pattern, scenic landscape, and good living and working environment.

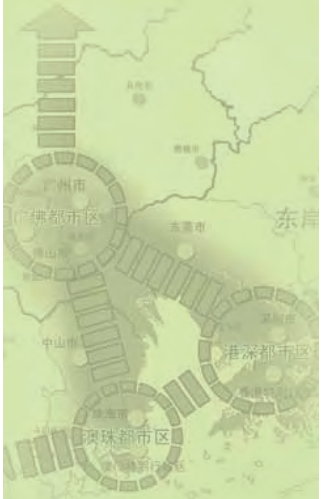
Column 4-1: "Vertical City" and "Urban Carpet"

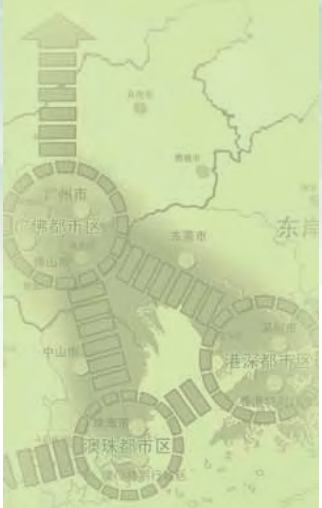
The concept of "Vertical City" started to be popular in Europe after the Second World War. It refers to the practice of putting various urban functions such as the residential, employment, leisure, medical, education uses into one place. This spatial form, characterized with large building scale, high plot ratio and high density of people, serves to achieve concentration of land uses and agglomeration of core functions of a city.

"Urban Carpet" is a concept in contrast with "Vertical City". It refers to the practice of creating extensive ecological green belts outside the highly concentrated urban core areas. Through the "carpet form" of greening and ecological conservation, this practice serves to link up the dense built-up areas of various cities in order to form an overall spatial structure comprising clusters of development areas.

—— "Sunshine Coast" for leisure: drawing on the experience of Singapore's "Sunshine Coast", the Bay Area should plan for a dynamic sunshine coast, with the production, daily living and ecological functions well coordinated. Uncontrolled development and disorderly expansion of small and medium-sized ports should be avoided and emphasis should be given to the protection of coastal landscape and enhancement of cultural and life-style developments. A national waterfront park should be built. An "Ecological Bay for leisure" that combines the functions of ecological conservation, protection of cultural heritage, eco-tourism, high-end service industry, scientific research and education should be promoted to turn the Bay Area into the top attraction of eco-tourism and cultural-tourism for residents of the Greater PRD as well as tourists.

—— Waterfront landscape with distinct characteristics: drawing on the experience of Hong Kong and Macao in the development of waterfront landscape, a comprehensive design for the waterfront landscape of the Bay Area should be formulated to rectify the current setting dominated by ports and related industrial and transportation developments. The waterborne transportation, urban services, residential and commercial functions should be integrated through comprehensive planning and development. The protection of the coastal environment would upgrade the city's appearance as a whole and create high quality waterfront landscape.





—— Harmonious colour schemes: the government should take the lead to set up comprehensive guidance and control mechanisms to achieve harmonious colour schemes for the Bay Area. Studies should be taken on the colour schemes of the major scenic areas and the central districts of each city, with emphasis on the compatibility of the colour between natural and man-made environment, preventing the abuse of excessively bright or dim colours, and creating a characteristic subtropical waterside landscape.

4.1.6 "A pioneer Vibrant Bay"

—— Multi-cultural integration: a "multi-cultural Bay Area" that encompasses the traditional Lingnan culture, the new urban migrants' culture, the metropolitan culture in Hong Kong and the European culture in Macao should be established to highlight the cultural charisma and image of the Bay Area. Actions should be taken to actively promote the relationship with the overseas. Making use of the strengths of Hong Kong and Macao in language, business and socio-cultural aspects, platforms for international cooperation and interflow and measures to attract the immigration of international talents should be implemented.

—— An area of creativity: Hong Kong and Macao should make full use of their "international vision" and share their experiences with the other cities in the Bay Area on the aspects such as the training of high-end creative talents, management and protection of intellectual property rights, assistance to investments, etc. The PRD should serve as a hinterland of resources including creative talents and markets for Hong Kong and Macao. Guangzhou, Shenzhen and Zhuhai should plan well for the promotion of creative industries such as animation, multi-media and internet services with a view to developing PRD into China's creative software and animation base.

4.2 Plans for Metropolitan Area Development

4.2.1 An integrated "Guangzhou-Foshan Metropolitan Area"

—— Planning for Guangzhou-Foshan integration: based on a series of policy frameworks and agreements and the principles of resources sharing, complementation of advantages and win-win cooperation, a plan for the integration of Guangzhou-Foshan should be formulated to set out the required arrangements, mechanisms, action areas and projects. The plan should provide guidance for the integration of government functions and resources, and serve as a model for the integration of economic systems in the Greater PRD.

—— Implementation of the agreed arrangements for the Guangzhou-Foshan integration: the "Framework Agreement on Guangzhou-Foshan Cooperation of Integration" and the four cooperation agreements on town planning, transportation infrastructure, environmental protection and industry cooperation should be implemented. Cooperation in the aspects of energy, education, culture, employment, social welfare and quality manpower should be promoted.

4.2.2 An international "Hong Kong-Shenzhen Metropolitan Area"

—— Implementation of the "Cooperation Agreement on Shenzhen/Hong Kong Innovation Circle": focusing on the cooperation in production and advancement of productivity, actions should be taken to enrich the projects such as the "Construction of Public Information Service Network in the Shenzhen-Hong Kong Innovation Circle", "Financial Assistance for Major Projects in the Shenzhen-Hong Kong Innovation Circle" and "Shenzhen-Hong Kong Production Base". Implementation of the 24 key projects under the "3-Year Action Plan of Shenzhen-Hong Kong Innovation Circle (2009-2011)" should be expedited. Cooperation of the industrial, academic and research institutions should be enforced to encourage "bottom-up" initiatives in research and development and expedite the adjustment and integration of the innovation and industrial systems. A strategy to build a "Shenzhen Silicon Valley" should be put forward by integrating innovation and spatial planning on the basis of the resources of the Shenzhen High-tech Industrial Park and University Town and through forming strategic alliance with the universities and research institutes in Hong Kong, with a view to establishing a significant strategic region of innovation serving the Metropolitan Area as well as China.

—— Cooperating to build an international metropolis: Hong Kong should continue to bring its status as an international centre of service industries into full play. At the same time, it should cooperate with Shenzhen in areas such as commercial transformation, connection of service chains and allocation of resources. Shenzhen and Hong Kong should join hands to build a global centre of finance, logistics, trading, innovation and creativity culture.

4.2.3 A distinctive "Macao - Zhuhai Metropolitan Area"

—— Encouraging collaboration between Macao and Zhuhai: concrete action plans should be worked out to implement the consensus on the connection of cross-boundary infrastructure, facilitation of CIQ clearance, industrial cooperation and provision of social services. Special attention should be paid on the connection of Macao-Zhuhai cross-boundary infrastructure and the construction of Hong Kong-Zhuhai-Macao Bridge and Guangzhou-Zhuhai Intercity Mass Rapid Transit (extending to Hengqin) so as to establish an integrated transportation hub at the west bank of Pearl River Estuary.

—— Reinforcing the complementation of advantages between Macao and Zhuhai: by taking full advantages of Macao's service industries and the land and tourism resources in Zhuhai, this Metropolitan Area should develop into a new pole of economic growth at the west bank of Pearl River. For mutual benefits and win-win development of Macao and Zhuhai, innovative mechanisms of land management and cooperation in land use should be implemented to resolve the problem of land shortage for urban development in Macao.

—— Forming new pole of economic growth: the old pattern of urbanization through urban sprawl and intensification of labour-intensive industries as happened at the east bank of Pearl River should be avoided, and a "smart growth" concept for economic growth should be explored. The proposals of establishing port-based production bases under "the Outline" should be realized by expediting the development of Gaolan Port Industrial Area, the ocean engineering and equipment manufacturing base, and the aviation industrial park. On the foundation of the tourism industry in Macao and Zhuhai, a regional platform for trading, convention and exhibition, and tourism should be established, with Hengqin as the core, in order to develop the area into a dynamic recreation, tourism and international service centre and drive the overall development of the west bank of Pearl River.

4.2.4 The three cores of coordinated development

Under the above development plans, the three Metropolitan Areas will become highly accessible through a regional transportation network and possess a good basis for cooperation through innovative policies and arrangements. The focus of cooperation will be in modern service and advanced manufacturing industries, including the establishment of a regional innovation system and concentration of modern services mainly along with the Guangzhou – Shenzhen – Hong Kong axis. The cooperation between the three Metropolitan Areas would have strategic implications of serving the whole country and even the world, and is an important spatial plan to attain the objective of developing the Greater PRD into world-class city-region.

4.3 Plans for Axis Development

4.3.1 Optimization of the Guangzhou – Shenzhen – Hong Kong Development Axis

—— Optimization of development quality: action plans should be formulated and implemented to optimize the development quality of the area along the axis. The focuses of development should include high-end production, liveable ecology and environment, pooling of resources and "seamless circulation" of economic factors.

Column 4-2: Guangzhou/ Shenzhen/Hong Kong Development Axis

The "Guangzhou/Shenzhen/Hong Kong Development Axis" (Guangzhou – Dongguan – Shenzhen – Hong Kong) covers the currently most developed economic areas in the Greater PRD City-region. It is also the key functional zone in the "Bay Area" development. The axis encompasses those vigorous centres in the City-region (i.e. Guangzhou, Dongguan (Humen – Chang'an), Shenzhen, Hong Kong), key transportation nodes in the City-region (i.e. Guangzhou Baiyun International Airport, Shenzhen Airport, Hong Kong International Airport, West Shenzhen Port, Kwai Chung Container Port in Hong Kong, etc.) and certain fast-growing zones that have good development potentials (including Guangzhou Huadu – Baiyun, Dongguan Humen – Chang'an, Shenzhen Shajing – Songgang, Qianhai – Shekou peninsula, and Hong Kong new airport – Disneyland).

—— "Smart growth" through planning: through comprehensive planning for urban-rural integration and urban renewal in PRD, the pattern of industrial development and land use in the region should be transformed from the previous low-quality, wide-sprawling approach to a more focused and "smart growth" approach. The new development approach will provide a structural basis for the building of the Guangzhou-Foshan and Hong Kong-Shenzhen Metropolitan Areas and a poly-centric urban system in the region.

—— "Seamless connections" of transport infrastructure: the "Guangzhou – Shenzhen – Hong Kong Axis" covers the area with the highest mobility and most convenient transport system in the Greater PRD City-region, and serves as the backbone of communication of the region, both internally and externally. To meet the increasing demand in accessibility between cities, it is necessary for the cities along the axis to co-ordinate the construction of transportation infrastructure. Intercity rapid rail system and cross-boundary transportation should be enhanced to achieve "seamless connections" and improve the accessibility along the axis.

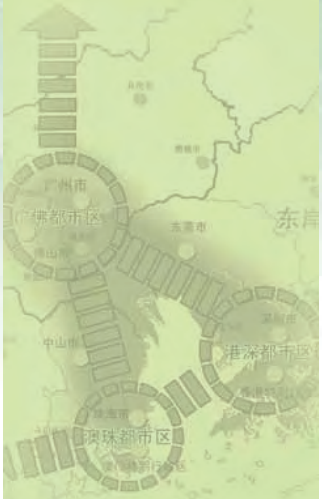
—— Industrial upgrading driven by cross-boundary cooperation: Hong Kong and the cities in Guangdong, especially Shenzhen, should strengthen cooperation in land development. While the Pearl River Delta should make full use of its advantages in low land and labour cost, Hong Kong should bring its management and business experiences into full play. The two places should work together for the development of a world-class base for advanced and high-tech industries. Specific recommendations of realising cross-boundary cooperation are detailed in Chapter 7.

4.3.2 Enhancement of the Guangzhou – Zhuhai – Macao Development Axis

—— Intensification of development: the construction of infrastructure such as the expressway along the west bank of Pearl River, the Intercity Mass Rapid Transit and Shenzhen-Zhongshan Bridge has provided

Column 4-3: Guangzhou/Zhuhai/Macao Development Axis

The "Guangzhou/Zhuhai/Macao Development Axis" (Guangzhou – Foshan – Zhongshan – Zhuhai – Macao) covers the area which is the cradle of Lingnan culture. It is also an area with the most developed specialized towns and richest tourism resources in the Greater PRD. The axis encompasses the most developed specialized towns in the Greater PRD (i.e. Gu Town, Xiaolan Town, Shiwan Town, Chencun Town, Lunjiao Town, Lecong Town, etc), world-renowned recreation resorts (Macao, Zhuhai, Guangzhou Panyu, Nanhai Mount Xiqiao, etc.), regional transportation nodes (Macao Airport, Zhuhai Airport, Nansha Port, Zhongshan Port, Zhuhai Gaolan Port, etc.) and those fast-growing functional centres (i.e. Guangzhou Panyu, Nansha, Foshan development zone, Shunde development zone, Zhongshan Huoju development zone, Zhuhai west district, Tang Jia Wan, etc.). Against the backdrop of an increasing mature Guangzhou/Shenzhen/Hong Kong Axis on the east bank of Pearl River, many development plans in the area have commenced over the years. However, being separated from Hong Kong by the Pearl River, the area does not come under sufficient positive influence from Hong Kong and thus does not enjoy the same level of economic growth as the east bank. It is expected that new infrastructure developments like expressways along the west bank of the Pearl River, Intercity Mass Rapid Transit, Hong Kong-Zhuhai-Macao Bridge, and Shenzhen-Zhongshan Bridge will greatly improve the development of the area.



a good opportunity to boost the development level along this axis and narrow the development gap between the east and west bank of Pearl River. It will also facilitate specialized and diversified development along the axis.

—— Upgrading of the manufacturing industry through planning: through macro-economic control measures such as the integration of administrative functions, integration of urban and rural areas and policies for guiding industrial development, the specialized towns and industrial parks along the axis should be integrated, optimized and upgraded. On one hand, innovation and industrial upgrading should be encouraged. On the other hand, different production activities and resources should be consolidated to strengthen the economy of specialized towns and foster the development of specialized centres with sustained competitiveness.

—— Development of tourism through planning and building transportation infrastructure: with the improvement of transportation infrastructure at the west bank of Pearl River, the accessibility of the major development nodes along the Guangzhou – Zhuhai – Macao Axis will be significantly enhanced. There will be more opportunities to realize the potential of the abundant tourism resources in the area. To make full use of the resources, efforts should be put on enhancing the tourism projects and transportation infrastructure along the Guangzhou – Zhuhai – Macao Axis. On one hand, a tourism development plan should be formulated through a review of tourism resources, forecast of customer trend, planning of tourism products and integration of tourism developments. On the other hand, the accessibility of the tourism attractions should be improved through enhancing the linkages between the scenic spots and transportation hubs, and developing nodes of tourism attractions along the intercity rapid transportation routes.

—— Upgrading of services through cross-boundary cooperation: with the improvement in transportation infrastructure, the west bank of Pearl River will see significant economic development and rapidly growing demand for service industries. Being the development core on the west bank, the areas along Guangzhou – Zhuhai – Macao Axis should put efforts in the development of service industries. In this regard, more cooperation between Macao and the cities at west bank of the Pearl River (especially Zhuhai) should be undertaken to tap on Macao's experience. Specific recommendations to realise cross-boundary cooperation are detailed in Chapter 7 of this report.

4.3.3 Establishment of Coastal Development Axis

—— Promotion of the development axis: the establishment of the "Coastal Development Axis" would rely on the implementation of the major regional infrastructure including the Hong Kong-Zhuhai-Macao Bridge and Shenzhen-Zhongshan Bridge. As these projects are not yet completed, an action plan should be dervied to achieve highly efficient and sustainable development along this axis.

Column 4-4: Coastal Development Axis

The "Coastal Development Axis" (Shenzhen and Hong Kong on the east bank, and Zhongshan, Zhuhai and Macao on the west bank to be linked by the Hong Kong-Zhuhai-Macao Bridge, Shenzhen-Zhongshan Bridge and Cross-Pearl River Railway Bridge) is an important axis to connect the eastern and western development axes. It covers the area connecting Pearl River Delta with Hong Kong/Macao and also the area with the richest resources, including tourism resources, in the Bay Area. Once this axis is formed, the separation between the east and west bank will no longer exist. The function of the Bay Area will be fulfilled. The axis will also be connected to the national expressways and rapid rail systems, linking the Greater PRD City-region to the central region of China. To the east, the axis will be connected to the city-region at the west coast of Taiwan Strait and can directly reach the active economic zones in China. To the west, the axis will connect to the Great Southwest of China as well as the ASEAN countries.

—— Formation of development axis through transportation infrastructure: cross-river passages such as the Hong Kong-Zhuhai-Macao Bridge and Shenzhen-Zhongshan Bridge are essential in creating the Coastal Development Axis. The two projects should be expedited, tapping on the opportunity that the State has increased its investment in infrastructure to deal with the financial crisis.

—— Innovative, efficient and intensive land uses and urban/rural structure through planning: the east bank of PRD has been growing rapidly, as benefited from Hong Kong. However, the rapid economic growth has also caused problems like wastage of resources, uncontrolled land uses and serious environmental pollution. The west bank of PRD should avoid such problems. Cities on the west bank, like Zhuhai, Jiangmen and Zhongshan, should prepare as early as possible to optimize the opportunities arising from improved linkage with the east bank. The cities should devise suitable development approaches and conduct environmental assessments before undertaking major development projects, and should ensure high standards of development and efficient use of resources through good planning.

4.4 Plans for Tier Development

The four-tier development space refers to the Bay Area (core tier), the outer Greater PRD ("consolidation – expansion" tier), the "Circum-PRD" (direct hinterland) and the "Pan-PRD" (hinterland). These tiers may be further connected with other regions in China, such as Yangtze River Delta and the Beijing-Tianjin-Hebei region as well as the international markets. The Bay Area Development Plans have been detailed in section 4.1. This section will discuss the other three tiers and the connection with the markets in China and the overseas.

4.4.1 Making full use of the "consolidation – expansion" function of the outer Greater PRD

—— Proactive actions should be taken to develop different forms of transportation facilities including railways and expressways to extend the influence of the development of the Bay Area towards the whole Greater PRD region as well as a wider area beyond the region.

—— Each city, metropolitan area and sub-region should actively find its ways to help extend the influence of the development of the Bay Area.

—— The prefecture-level cities (Huizhou, Zhaoqing and Jiangmen) should be developed into sub-regional integrated centres.

—— The functions and resources of different administrative units should be integrated. On the condition of not damaging the ecology and farm land, more sub-regional specialized centres should be developed.

4.4.2 Increasing the influences towards the "Circum-PRD Region"

—— The governments of Guangdong, Hong Kong and Macao should work together to establish a regional cooperation and coordination mechanism to enforce the implementation of "double shifting" of industries and labour force, improvement to the environment and development of quality living area in Greater PRD.

—— Actions should be taken to speed up the construction of key transport corridors such as Boluo-Shenzhen Expressway, Guangzhou-Huizhou Expressway Eastern Extension, Guangzhou-Hezhou Expressway, Guangzhou-Heyuan Expressway and Guangzhou-Shaoguan-Lechang Expressway; promote the construction of Guangzhou-Qingyuan Intercity Mass Rapid Transit; and launch preliminary study on the extension of the Intercity Mass Rapid Transit towards the peripheral cities.

—— The relocation of industries to industrial parks should be promoted through the reinforcement of the relevant planning and policies.

—— Through regional coordination, the function of the mountains in the north of the Greater PRD in the protection of the ecology of the region should be reinforced. With emphasis on protecting the sources of drinking water, the protection of ecology and environment should be strengthened.

4.4.3 Developing the "Pan-PRD" as economic hinterland

—— Based on the national strategy of "transmitting power from the west to the east", cooperation with all provinces in the "Pan-PRD" in power generation and the production and sale of energy resources such as coal, natural gas, etc. should be promoted.

—— Actions should be taken to strengthen the connections of land transportation systems (railway, expressway, national expressway and provincial highway networks) of the Greater PRD City-region with the "Pan-PRD"; build key rapid rail networks such as the Eastern Coastal Railway, Wuhan-Guangzhou Passenger Line, Nanjing-Guangzhou Railway and Guizhou-Guangzhou Railway; plan for the Western Coastal Railway; and strengthen the connections between Hong Kong, Macao and "Pan-PRD" through building Guangzhou-Shenzhen-Hong Kong Passenger Railway, Pearl

River Delta Intercity Mass Rapid Transit (with efficient connections with Hong Kong and Macao) and Hong Kong-Zhuhai-Macao Bridge.

—— Actions should be taken to actively promote regional tourism cooperation.

—— Actions should be taken to establish a stable system of procurement of food and other agricultural products and open up a regional "green corridor" for the transportation of agricultural products.

—— Actions should be taken to establish an effective information platform and coordination mechanism for orderly circulation of labour force.

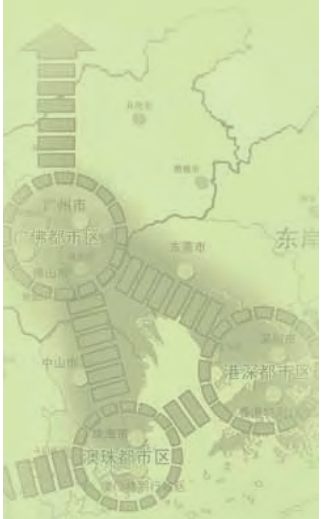
—— Actions should be taken to improve the quality of labour force by improving vocational training and professional recognition system.

—— Actions should be taken to promote cooperation between research and high-tech industrial institutions to jointly build a regional innovation system.

—— Actions should be taken to reinforce regional cooperation in ecological protection and the safeguard of clean drinking water and air quality.

4.4.4 Connecting with other regions in China and the overseas

—— **Enhancing the market connections with the other two major city-regions in China with a view to forming a giant development axis in east China for raising the overall strength of China to participate in international cooperation and competition:** making use of Guangzhou's status as the "integrated transport hub"[1] within China and through coordination in cross-boundary transportation, the connection between Greater PRD City-region and the other two developed city-regions in China (i.e. Yangtze River Delta and the Beijing-Tianjin-Hebei region) should be strengthened. Through building up a "multi-airport system", the aviation network between the Greater PRD City-region and other developed cities in China should be strengthened. Through the construction of rapid rail networks (including the new Beijing-Guangzhou Passenger Railway, Eastern Coastal Railway and Guangzhou-Shenzhen-Hong Kong Passenger Railway) and the enhancement of Beijing-Kowloon Railway and Beijing-Guangzhou Railway, the land transportation connections of the City-region with the developed areas in China should be reinforced. Through the use of advanced technology and innovative management in boundary-crossing facilities and streamlined CIQ clearance procedure, the time required for traveling across the boundaries between the Mainland and Hong Kong/Macao should be reduced. Attempts should also be made to set out the importance of reinforcing the connections among the three major city-regions in the "Twelve Five-Year Plan" with a view to forming a "D-shape" development axis with three mutually interactive centres in the north, east and south of China.



1 The Medium and Long Term Development Plan for Comprehensive Transportation Network endorsed by the Standing Committee of the State Council in October 2007.

—— Developing overseas markets and becoming the most important spatial entity of China to participate in global economic cooperation and competition: an international transportation hub with Hong Kong as the core should be established by developing a "multi-airport" and an "integrated port" system (see Chapter 5). The cooperation with the Portuguese-speaking countries should be strengthened through enhancing the functions of Macao. Land routes reaching South Asia, Middle East, Europe, North Africa and Southeast Asia via the Nanning-Guangzhou Railway, Nanning-Kunming Railway, Trans-Asian Railway and the third bridge linking Europe and Asia should be established. The City-region's capacity of external communication should be improved by streamlining the CIQ clearance procedure, as well as building Intercity Mass Rapid Transit for rapid connections between the key transportation and urban functional nodes. The status and influence of the region in the international economy and trade system should be lifted by reinforcing the cooperation with the Southeast Asian countries under the "10+1" free trade framework, solidifying the traditional markets in the US and Japan and developing new markets in Africa and Latin America.

4.5 Sub-regional Development Plans

The roles of the sub-regions are to build closer relations amongst the cities in the Greater PRD City-region, bring out the cohesive force and influences of the regional/sub-regional centres, integrate the sub-regional functions, and therefore effectively rectify the current discrepancy of development levels and imbalanced influence among the cities in the City-region. With emphasis on government actions, such as the planning for sub-regional integration, the Sub-Regional Development Plans proposed in this study aim to achieve coordinated development in the City-region through strengthening the radiating function of the regional/sub-regional centres, integrating the developments of various cities for more efficient utilization of resources, improving the connectivity of transportation infrastructure and promoting the protection of resource and environment.

4.5.1 Innovating the Eastern Sub-region

—— Through comprehensive cooperation between Hong Kong, Shenzhen, Dongguan and Huizhou in urban planning, industrial development, innovation, transportation and environmental protection, the functional spatial layout of the Eastern Sub-region can be further enhanced for further economic growth.

—— Based on the cooperation framework of the "Shenzhen/Hong Kong Innovation Circle" and through the building of infrastructure, such as the Liantang/Heung Yuen Wai BCP, the relationship among Hong Kong, Shenzhen and Huizhou should be strengthened so that Hong Kong's influence could be extended eastwards to a greater area. The Eastern Sub-region will promote the development of eastern Guangdong and will further influence the Taiwan Strait West Coast Economic Zone to allow industrial growth in a wider area.

—— Under the framework of the agreement on strengthening further cooperation among Shenzhen, Dongguan and Huizhou, emphasis should be put on promoting cooperation in the development of high technology industries in Shenzhen, Dongguan and Hong Kong, in particular establishing an Eastern Sub-region High Technology Industry Corridor on the foundations of the Shenzhen High Technology Industry Zone and Dongguan Songshan Lake High Technology Industrial Park.

—— Coordination among Shenzhen, Dongguan and Huizhou in land use should be promoted and the distribution of key production factors should be optimized.

—— The city centre of Huizhou should be strengthened as a local integrated service centre. Daya Bay should be strengthened as a specialized centre. A polycentric development pattern should be established in the Sub-region.

—— A "Dongguan-Shenzhen-Huizhou" eco-corridor with connection to Heyuan should be established as part of the sub-regional eco-security system. The Hong Kong, Shenzhen and Huizhou governments should strengthen cooperation to protect the fragile ecological regions, such as Mirs Bay and Daya Bay.

—— Under the guidance of the "smart growth" concept in land development in the Bay Area and on the premise of effectively protecting the ecology, environment and agricultural land, actions should be taken to adjust the land use pattern, e.g. through urban renewal, to achieve a more intensive land use and economic growth.

4.5.2 Integrating the Central Sub-region

On the basis of the integration of Guangzhou and Foshan, a Guangzhou/Foshan/Zhaoqing economic zone should be established to fully utilize the manufacturing foundation of Guangzhou and Foshan and the abundant resources for eco-tourism in Zhaoqing with a view to creating an advanced manufacturing industry base and liveable cities.

—— On the basis of the integration of Guangzhou and Foshan, both cities should strengthen the cooperation and linkage in the development of industries and infrastructure with Zhaoqing. Through the expansion of transportation infrastructure westwards up to Yunfu and Guangxi, a greater radiating influence of the Greater PRD City-region towards the west of Guangdong and the broader hinterland beyond would be achieved.

—— The city centre of Zhaoqing should be developed as a sub-regional integrated centre. Through the upgrading of industries and integration of resources of specialized towns, such as Shunde and Nanhai, competitive industrial clusters should be developed and new sub-regional specialized centres should be formed.

—— Guangzhou, Foshan and Zhaoqing should cooperate to explore the ways to utilize Zhaoqing's ecological and tourism resources. A landscape belt with ecological rehabilitation and enhancement functions should be established. With the upgrading of Guangzhou and Foshan manufacturing industries, the environmental pollution faced by the Central Sub-region should be resolved. The roles of Guangzhou and Foshan in the Bay Area development should be utilized to promote the development of tourism in Zhaoqing.

—— Guangzhou, Foshan and Zhaoqing should take the lead in strengthening the management of Xi Jiang and Bei Jiang.

4.5.3 Upgrading the Western Sub-region

With the construction of transportation infrastructure across Pearl River, such as the Hong Kong-Zhuhai-Macao Bridge and Shenzhen-Zhongshan Bridge, the natural barriers between the eastern and western bank of PRD would be largely removed and the Western Sub-region would have the biggest scope for further development among the three sub-regions. In the coming 10 to 20 years, the Western Sub-region, with Zhuhai and Macao as the centres, will possibly attain the development level similar to that of the Eastern and Central Sub-regions. The Western Sub-region should prepare for it in advance.

—— The transportation infrastructure across Pearl River and its connection with the transport facilities within the Sub-region should be actively promoted. Access from Hengqin to Jiangmen and western Guangdong should be formed to provide the infrastructure for further development in the Sub-region.

—— Zhuhai and Macao should be promoted as centres of service and high technology industries. The city centres of Jiangmen and Zhongshan should be promoted as Sub-regional integrated centres. For the specialized towns, such as those in Zhongshan, industries should be upgraded and industrial agglomeration should be promoted. Actions should be taken to create competitive advanced manufacturing zones in Jiangmen. High quality economic growth pattern should be promoted. Uncontrolled uses of resources including land, as occurred in early development of the east bank of PRD, should be avoided.

—— Resources should be allocated with balanced emphasis on protection and development. This could be achieved through proper planning for the integration of ecological and cultural tourism resources, by means of a regional tourism development plan. Emphasis should also be put on the protection of water quality to minimize the impact of economic development.

4.6 Poly-centric Development Plans

4.6.1 Promoting the functions of the regional centres

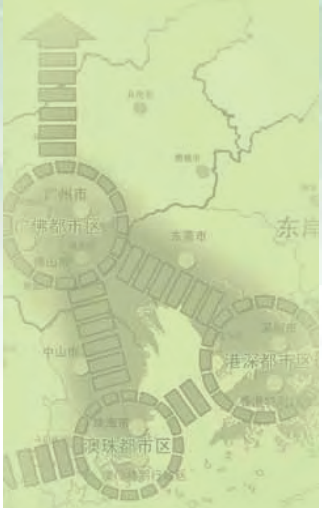
The relevant national development strategies, such as the "Eleventh Five-Year Plan", and regional development strategies, such as the "the Outline", have all endowed Hong Kong, Macao, Guangzhou and Shenzhen with the functions of regional centres at both national and international dimensions, and assigned Zhuhai and Foshan as regional centres at the regional dimension. These six cities form the centres of the "Bay Area and three Metropolitan Areas" to carry out global city functions. They should be further upgraded, with proper division of functions, in order to undertake different functions of a global city-region.

—— **Hong Kong** should be dovetailed with the economy of the Mainland as soon as possible, overcome the barriers of social and economic activities brought about by the differences in systems with the Mainland, and maintain its status as an international financial centre. The manufacturing industries of the peripheral areas of the Eastern Sub-region should be used to maintain a stable market for Hong Kong's service industries in order to offset its drawback of insufficient anti-risk capability caused by a narrow-based industrial structure. In view of the shortage of development space, cooperation with the areas in the City-region should be promoted to explore more development opportunities.

—— **Guangzhou** should bring into full play its advantage as the provincial capital to strengthen the agglomeration of high-end industries, technology innovation, cultural leadership and integrated service functions. Priority should be given to the development of high-end service industries and advanced manufacturing industries and the enhancement of innovation capacity in order to establish a modern industrial system. Guangzhou should also strengthen its cultural soft power, improve its competitiveness, enhance its status as a national key city, integrated gateway city and regional cultural centre, and increase its radiating influence. Integration of Guangzhou and Foshan should be strengthened to provide guidance for coordinated development of the Greater PRD City-region to achieve rational spatial layout, comprehensive functions and close relationship. Among other cities, Guangzhou should build itself as the top of Guangdong's "liveable city", and an international metropolis oriented to the world and serving the whole country.

—— **Macao** should overcome the shortage of development space through cooperation with Zhuhai and strengthening its connection with Hong Kong and the west coast of the PRD. With the construction of the Hong Kong-Zhuhai-Macao Bridge, there would be more opportunities for cooperation in industrial development and land use. This factor should be adequately considered in regional development, especially in tourism and convention/ exhibition development.

—— **Shenzhen** should continue to act as the gateway, pilot base and exemplary area as a special economic zone. It should also strengthen technology research and development and high-end services to reinforce its status as China's economic centre, innovative city as well as an international



city. Shenzhen and Hong Kong should together build a global financial, logistics, trading, innovation and international innovative cultural centre.

—— **Zhuhai** should bring into full play its advantages as a special economic zone and its locational advantages. It should hasten the construction of transport infrastructure to form a transportation hub at the west bank of PRD. It should also strengthen its function in agglomerating high-end industries and innovation capability. The advantages of neighbouring Macao should be fully utilized by having more cooperation with Macao to increase its international influence and develop into a modern regional centre, an environmental-friendly area and an exemplary city on scientific development.

—— **Foshan** should improve its quality of service industries and ecology in order to realize division of functions with the other five regional centres in the City-region, and to promote the agglomeration of advanced manufacturing industries. Emphasis should be put on improving the competitiveness of the local enterprises in the aspects of international advanced manufacturing and modern service industries, flat panel display industry and ceramic industry.

4.6.2 Upgrading the integrated service functions of the sub-regional centres

Actions should be taken to improve the integrated service functions of the five sub-regional centres including Dongguan, Zhongshan, Jiangmen, Zhaoqing and Huizhou, which do not fall within the three major Metropolitan Areas.

—— Actions should be taken to strengthen the administrative functions of the concerned cities, especially the integrated services for both production and daily living, and tackle the shortage of urban services caused by rapid industrialization.

—— Actions should be taken to expedite the construction of intercity rapid transit network to ensure more convenient accessibility within the City-region. The transportation network within individual integrated service centres should be efficiently connected with the intercity rapid transit network.

—— Specific developments which reflect individual city's characteristics and allow higher-level functions in broader areas should be encouraged. For instances, **Dongguan** should be developed into an international manufacturing base led by electronics, information, light textiles and port industries. **Huizhou** should be built into a world-class petrochemical base, a national electronics and information industrial base, a pilot base for comprehensive reform of urban/rural development, a leisure base in the Guangdong/Hong Kong/Macao region, and a clean energy base of Guangdong (collectively known as the "Five Major Bases"). **Zhongshan** should rely on high technology to hasten the restructuring of traditional industries, such as clothing, home appliances, metal products and fine chemicals. Emphasis should be put on strengthening the innovation capability. **Zhaoqing** should be developed as a tourism centre of the Central Sub-region, the whole Greater

PRD or even a wider area. **Jiangmen** should be built into a model city which is environmental-friendly and liveable, a base of power sources and advanced manufacturing, and a renowned cultural city.

—— Actions should be taken to introduce the idea of "smart growth", allowing social and economic development through economical and cost-effective utilization of resources in order to provide a quality liveable environment as the basis of improving the integrated service functions.

4.6.3 Development of specialized centres in the sub-regions

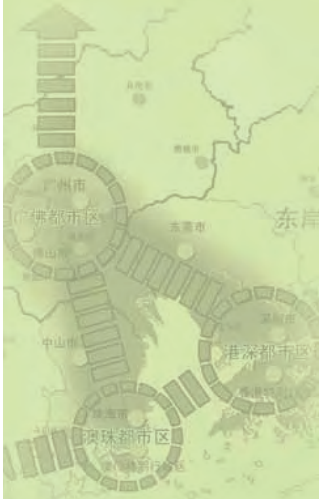
Apart from the integrated service centres formed by the administrative centres of the concerned cities, there is a group of specialized centres which also exert great influence on regional development, such as the clothing processing base in Humen and Chang'an, the petrochemical base in Daya Bay, and the advanced manufacturing industrial base led by port development in Nansha. Actions should be taken to consolidate the scattered resources and strengthen the advantages of specialization of certain districts or groups of districts through macro-economic control measures by government, such as regional integration and concessions for industrial parks, to help build specialized centres with regional influence.

4.6.4 The upgrading and optimization of specialized towns

—— Using planning and regulating tools, the leading industries with distinctive characteristics should be promoted for developing into specialized towns. Support to specialized towns on the aspects of spatial arrangement and social protection should be provided.

—— By means of product promotions, trade negotiations, and business and capital agglomerations, actions should be taken to promote and upgrade the brand names of specialized towns.

—— Through staff training and the integration of production, academic and research institutions, actions should be taken to promote innovations in the specialized towns, identify opportunities of developing correlated industries, promote industrial agglomeration and realize industrial upgrading.



Chapter 5
Plans for Cooperative Development of Transportation

To implement the "Strategy for High Accessibility", this study has taken into account the major transportation plans at national, provincial and city levels relating to the Greater PRD City-region (refer to Column 5-1 for details), and the cross-boundary transportation infrastructure agreed by Guangdong, Hong Kong and Macao. On this basis, the aspects that need further actions are identified, including the proposals that have not been considered before, the proposals that have been considered but need to be coordinated and integrated, as well as the approved projects for which the implementation should be expedited. Three types of cooperative development plans on transportation are recommended, namely, the regional transportation hub plan, inter-city transportation plan and cross-boundary transportation plan.

5.1 Regional Transportation Hub Plan

5.1.1 "Multi-airport System"

—— To implement the "Action Agenda for Implementation of "the Outline" by the Five Airports in the Greater PRD Region" (the "Action Agenda"): based on the consensus under the Action Agenda, the concerned cities should continue to foster cooperation and jointly ask the central government to open up the airspace. Intercity railways and expressways connecting the airports and ports in the Greater PRD City-region should be built (Table 5-1). Studies should be carried out on the five major airports (Figure 5-1) with regard to their routes, flights, passengers, hardware, timing and arrangements for separating international and domestic as well as passenger and cargo flights in order to identify their roles in the economic integration in the City-region. Efforts should be made for the sharing of resources among the five major airports through routine communication platforms and by specific agreements. These could include joint purchases of products and services for the purpose of enhancing the overall bargaining power; establishing common training base; exchanging ideas and joining forces in developing e-business

Column 5-1 Major Transportation Plans Adopted as References in This Study

This study has made references to major transportation plans including the National Medium and Long Term Railway Network Planning of China, 11th Five-year Plan of National Railway and Highway Network Plan, National Inland Waterways and Port Master Plan, Medium and Long Term Development Plan for Comprehensive Transportation Network, National Highway Transportation Hub Master Plan, National Civil Airport Master Plan, National Sea Port Master Plan, Planning for Highway and Waterway Infrastructure in the Pan-PRD on Regional Cooperation, 11th Five-year Plan on Developing Guangdong Provincial Comprehensive Transportation System, Guangdong Provincial Expressway Network Plan (2004-2030), Guangdong Provincial Sea Port Master Plan, Shenzhen Municipal Route Network Plan, etc. This study has also made reference to "Hong Kong 2030 Study", "Plan for the Coordinated Development of PRD Townships", "Shenzhen Comprehensive Plan" and "the Outline", and fully adopted the consensuses reached amongst Guangdong, Hong Kong and Macao at all levels of cooperation meetings.

and other IT projects; promoting environmental management programs; coordinating infrastructure projects to avoid duplication of work or waste of resources; and establishing neutral agencies to serve the five airports, etc (Column 5-2).

—— To promote specialized development of subsidiary airports: while fostering the cooperation between the five major airports, efforts should be made to resume the operation of the Shadi Airport in Foshan and the Pingtan Airport in Huizhou. Studies and pilot schemes should be carried out to explore specialized development of these airports to complement the major airports for overall benefits of the "multi-airport system" in the City-region.

—— To study the development of helicopter transportation: while applying to the State for the opening-up of the low-altitude airspace, studies on the development of helicopter transportation system in the City-region (especially the inner Bay Area) should be undertaken. Through developing helicopter transportation, the major functional nodes in the Bay Area would be more easily accessible, and the overall competitiveness of the service sector of the City-region would be enhanced.

—— To plan for the development of "multi-airport system": this study is focused on spatial planning and does not cover the details of airport cooperation. For implementation of the "multi-airport system", Guangdong, Hong Kong and Macao should conduct further studies and devise the required plans.

5.1.2 "Integrated port system"

Actions should be taken to establish an "integrated port system" with clear division of functions among the ports in the City-region to facilitate development of the region into an international freight centre in the Asia-Pacific region. Deep water ports like those in Kwai Chung of Hong Kong, Nansha of Guangzhou, Yantian of Shenzhen, the western part of Shenzhen, Gaolan of Zhuhai and Daya Bay of Huizhou should be the key areas of development (Figure 5-2).

Table 5-1 Connecting Routes between Major Airports in the Greater PRD City-region

Airport	Connecting Routes
Hong Kong Airport - Shenzhen Airport - Guangzhou Airport	Guangzhou-Dongguan-Shenzhen Inter-city Transit -- Hong Kong - Shenzhen Western Express Line; Guangzhou-Shenzhen Expressway; Coastal Expressway -- Guangzhou Airport Expressway
Guangzhou Airport - Zhuhai Airport - Macao Airport	Guangzhou-Zhuhai Inter-city Transit
Shenzhen Airport - Zhuhai Airport	Shenzhen-Zhongshan Line + the extension of Beijing-Hong Kong-Macao Expressway with Guangzhou-Macao Parallel Line (Beijing-Zhuhai Expressway) + Jinhai Expressway
Hong Kong Airport - Zhuhai Airport - Macao Airport	Hong Kong-Zhuhai-Macao Bridge + the extension of Beijing-Hong Kong-Macao Expressway and Guangzhou-Macao Parallel Line (Beijing-Zhuhai Expressway) + Jinhai Expressway; Guangzhou Airport Expressway -- Guangzhou - Zhuhai Western Express Line -- Western Coastal Expressway -- Zhuhai Airport Expressway -- Jinhai Expressway

Figure 5-1 Distribution of Airports in the Greater PRD City-region

Column 5-2 The Division of Functions within the Airport Cluster of the Greater PRD

Based on Mainland's master plan and development strategy of civil airports, the "Action Agenda for Implementation of "the Outline" by the Five Airports in the Greater PRD" recommends to define the functions and positioning of the five major airports in the Greater PRD as follows: Hong Kong Airport to maintain as an international freight centre and be reinforced as an international aviation hub; Guangzhou Baiyun International Airport to develop as a gateway and a hub and be reinforced as a key airport with upgraded global competitiveness by improving its service standards and accelerating the construction of hardware and software; Shenzhen Airport to develop as a major airport; Macao International Airport to act as a model multi-functional small/medium-sized international airport; Zhuhai Airport to continue to be south China's aviation industry base which strives for the economic and social prosperity of the Greater PRD.

—— As for the coordinated functions of the ports, the transportation structure of the "integrated port system" should be clearly defined through market negotiations and improvement of operations. The supporting functions of small and medium-sized ports to the major ports, like those in Hong Kong, Shenzhen and Guangzhou, should be ascertained in order to reduce duplication of low-level infrastructure and vicious competitions. The Gaolan port of Zhuhai and the Daya Bay port of Huizhou should seize the good opportunities brought by the enhanced land transportation network in the region to promote port and related economic development for realizing integrated development with the concerned cities. The coordination between ports should be enhanced for the relieving of water pollution, reduction of transportation costs and spreading of advanced technology and managerial expertise in the region. The relevant plans of the State for rational distribution of energy source transfer terminals, which are of various types and size, should be implemented.

Figure 5-2 Distribution of Ports in the Greater PRD City-region

—— As for the construction of transportation linkages for the ports, emphasis should be put on large-capacity, energy saving and environmental-friendly transportation means like waterways and railways. Good use should be made of the dense waterways of the Greater PRD. An inland navigation network based on Xi Jiang and supported by Bei Jiang and Dong Jiang should be developed. The land-based transportation network should also be reinforced. Major ports should be supported with

Table 5-2 The Transportation Routes of Major Ports in the Greater PRD City-region

Port	Transportation Routes	Function
Guangzhou Nansha	Nansha Port Railway Line Nansha Port Expressway The Beijing-Hong Kong-Macao Expressway with Guangzhou-Macao Parallel Line	large volume of cargo flow
	Beijiang + Pearl River Dongjiang + Pearl River	small volume and low-value cargo flow
Zhuhai Gaolan	Guangzhou-Zhuhai Railway Gaolan Harbor Expressway + Jinhai Expressway	large volume of cargo flow
	Tanjiang + Yamen Channel Xijiang + Modaomen Channel (Jitimen Channel)	small volume and low-value cargo flow
Huizhou Daya Bay	Huizhou-Macao Railway Huida Port Expressway + Huizhou-Shenzhen Coastal Expressway	large volume of cargo flow
Western Shenzhen	Pingnan Railway Guangzhou-Shenzhen Coastal Expressway + Airport Expressway + Nanping Expressway	large volume of cargo flow
	Xijiang + Hengmen Channel Beijiang + Hengmen Channel Dongjiang + Pearl River + Humen Channel	small volume and low-value cargo flow
Shenzhen Yantian	Pingyan Railway Yanpai Expressway + Yanba Expressway + Huizhou-Shenzhen Coastal Expressway	large volume of cargo flow

railway/highway interchange hubs to achieve an integrated multi-modal transportation system in the region and improve connections with the hinterland (Tables 5-2 and 5-3). Besides, the implications of the development of China's regional railway network on the future development of ocean shipping in the Greater PRD should be studied. The feasibility of connecting the passenger/freight rail lines in Hong Kong, Macao and the Mainland should be studied as well.

—— On cargo transportation, supporting container ports should be built in the inland river areas to improve the operation efficiency of the major ports in the region. While arranging central handling of containers by specific berths in the major ports, supporting container ports in the inland river area should be built. Transshipment of containers by waterways, highways and railways should be promoted to reduce cargo packing/depacking at the ports and container terminals. To facilitate cargo transshipment between Guangdong, Hong Kong and Macao, multi-modal transportation and one-stop customs clearance should be established to accelerate cargo circulation.

—— As regards the strengthening of the region's overall competitiveness, attention should be paid to the development of waterway transportation in the peripheral area of the City-region and its influence over the Greater PRD's shipping and port system.

—— A plan for the coordination and development of the "integrated port system" should be formulated. The coordination of port operation is a highly specialized topic. This study can only provide a cooperation framework from the spatial planning perspective without covering the detailed coordination measures. Guangdong, Hong Kong and Macao should jointly study these issues further.

5.1.3 "South China Railway Hubs"

The Greater PRD should increase its external railway linkages to make up for its disadvantage of being located at the peripheral position of the national railway network. A system of "South China Railway Hubs" for connecting with the main markets and hinterland in China should be established. Railway linkages between Hong Kong, Macao and the Mainland should be strengthened. The distribution of railway hubs should be optimized in a polycentric pattern (Figure 5-3).

Table 5-3 The "3 Vertical, 3 Horizontal and 3 Linear" High-grade Waterways Network

Network	Channels covered
3 Vertical	The seaward channel of Xijiang's downstream, Baini Waterway-Chencun Waterway-Hongqili Waterway, seaward channel of Guangzhou port
3 Horizontal	Dongping Waterway, Tanjiang-Laolonghu Waterway-Liansharong Waterway-northern main channel of Dongjiang, Xiaolan Waterway-seaward channel of Hengmen
3 Linear	Yamen Waterway-seaward channel of Yamen, Hutiaomen Waterway, Shunde Waterway

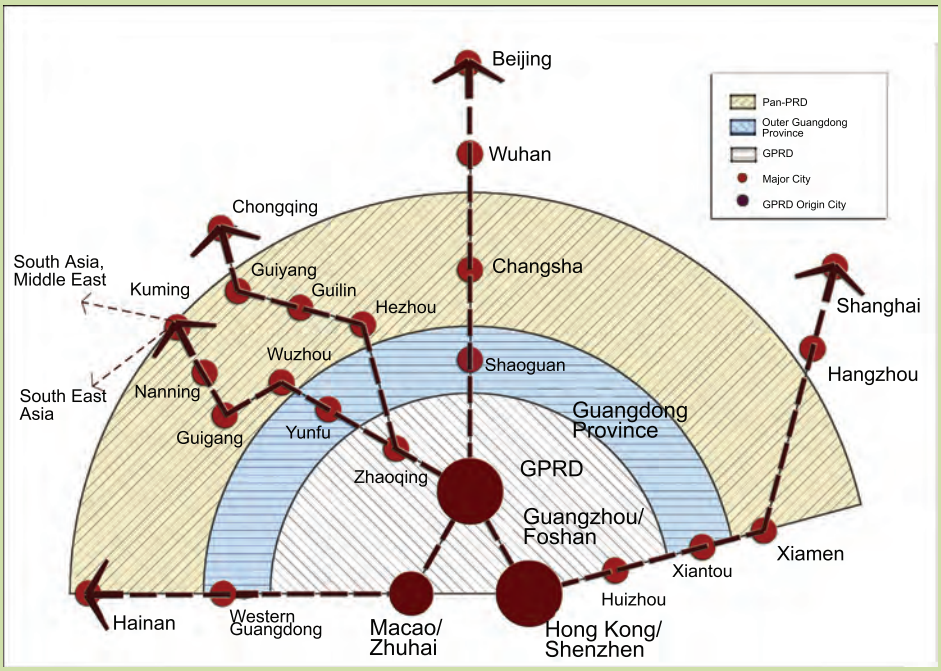


Figure 5-3 Outbound High-speed Railways of the Greater PRD City-region

—— Great efforts should be paid to promote the construction of railways linking the Greater PRD City-region with the outside areas, such as the Wuhan-Guangzhou, Guangzhou-Shenzhen-Hong Kong, Guizhou-Guangzhou, Nanning-Guangzhou and Southeast Coastal Railways, with a view to forming passenger and cargo transportation corridors connecting the Bay Area to the other major city-regions and densely populated areas in China (Table 5-4).

—— Actions should be taken to enhance the coordination and cooperation between the Ministry of Railway and Guangdong Provincial Government. The connection of the express railway network in the Greater PRD City-region to the State's high-speed railway network should be

Table 5-4 The Inbound/outbound Railways of the Greater PRD City-region

Name	Railway lines
Beijing–Guangzhou – Shenzhen (Hong Kong) Passenger Railway	Beijing - Shijiazhuang – Zhengzhou - Wuhan - Changsha - Hengyang - Guangzhou - Shenzhen - Hong Kong
Southeastern Coastal Railway	Hangzhou - Xiamen - Chaozhou - Shantou - Jieyang - Shanwei - Huizhou - Shenzhen
Nanning-Guangzhou Railway	Nanning - Guigang - Wuzhou - Yunfu - Zhaoqing - Foshan - Guangzhou
Guiyang-Guangzhou Railway	Guiyang - Guilin - Hezhou - Zhaoqing - Foshan - Guangzhou
Guangzhou-Shanwei Railway	Guangzhou - Huizhou - Shanwei
Western Coastal Railway	No specific plan has been confirmed yet. Relevant studies should be expedited so as to strengthen the connection of the Pearl River Delta with the western part of Guangdong.

enhanced. More long-distance trains should be operated to reduce the need of transfer between railways to maximize the efficiency and convenience of the external rail links.

—— Actions should be taken to expedite the construction of Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Passenger Line, Hong Kong-Shenzhen Western Express Line, and the connection between Guangzhou-Zhuhai Intercity Rail and Macao Light Rail, etc. in order to foster the linkages of the railways in Hong Kong and Macao with those in the PRD and the Mainland.

—— The feasibility of building a coastal express railway across Pearl River Estuary should be studied.

—— Actions should be taken for coordinated development of the key stations of the express railway system. Guangzhou and Hong Kong should be made the centres of the railway system in the Greater PRD and Shenzhen and Zhuhai as the sub-centres (Figure 5-4).

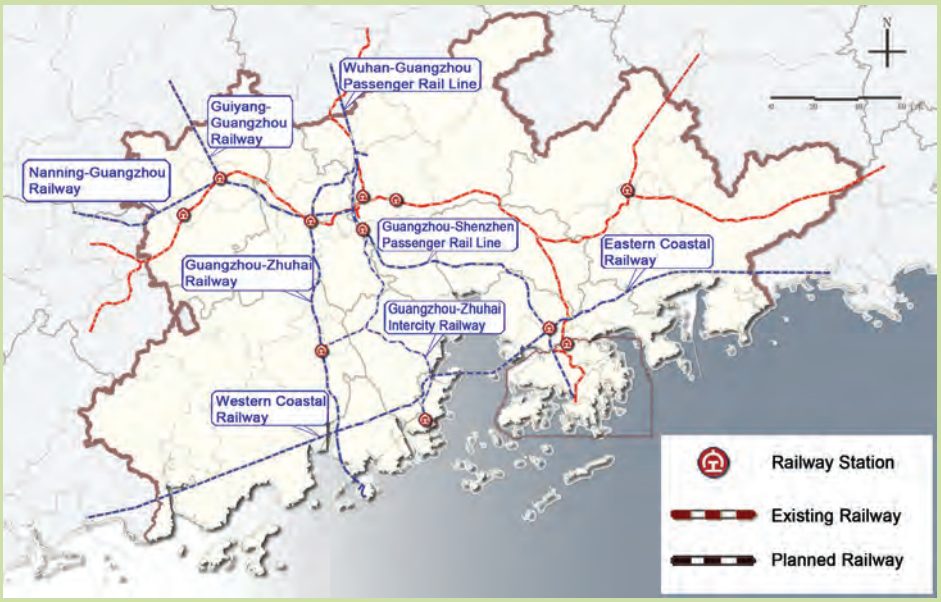


Figure 5-4 The Layout of Railways in the Greater PRD City-region

—— The Hong Kong/Shenzhen Metropolitan Area should be allowed more autonomy in making innovative arrangement on railway operation and related matters to meet the transportation needs arising from the large volume of movements.

—— Actions should be taken to promote the construction of railway stations in cities such as Foshan, Huizhou and Dongguan so as to enhance their supporting function to the key stations.

—— The development of the Mainland railway network and its full integration with those of Hong Kong and Macao will achieve multi-modal transportation between the Mainland railway network and the international ports

and airports in Hong Kong and Macao. This will in turn greatly improve the overall effectiveness of the transportation system in Greater PRD City-region. Studies should be carried out on the implications of the development of the Mainland railway network on ocean shipping of the Greater PRD region.

5.1.4 Outbound expressways

The connection between the road network in Greater PRD and the national expressway system should be fostered by constructing more outbound expressways in Guangdong. Guangdong Province should expedite the projects as planned, including the Zhanjiang-Xuwen Expressway, the Guangdong section of Baotou-Maoming Expressway, the Shuangfeng-Tanbin section of Yunfu-Cenxi Expressway, the Hekou-Pingtai section of Guangzhou-Wuzhou Expressway, the Lianzhou Sanshui-Huaicheng section and Huaiji-Gangping Sub-line of Erlianhaote-Guangzhou Expressway, the upgrading of the Lianzhou-Fengbu section of Qingyuan-Lianzhou Expressway, the Boluo-Rucheng section of Guangdong-Hunan Expressway, the Shaoguan-Ganzhou (provincial boundary) Expressway, the Guangdong section of Daqing-Guangzhou National Expressway, the Pingyuan-Xingning section of Jinan-Guangzhou Expressway, the Mei County-Dapu Expressway and the Chaozhou-Zhangzhou Expressway.

5.1.5 Water-based transportation system

Column 5-3 Current layout of the expressway network in the Greater PRD City-region

At present, there are five major highway exits in the Greater PRD City-region connecting to other parts of Guangdong Province and adjacent provinces. The inbound/outbound highway network, with expressways as its backbone, has been largely formed (Table 5-5). Under the "Plan of the Guangdong Provincial Expressway Network (2004-2030)", there would be 31 expressways directly related to the Greater PRD City-region (Table 5-6). According to the framework of "7 radiation lines from the Capital, 9 north-south vertical lines and 18 east-west horizontal lines" defined in the "Planning of the National Expressway" promulgated in January 2005, there would be 8 lines closely related to the Greater PRD City-region. On this basis, 2 main roads, namely the Guangzhou-Fuzhou Line and Yueyang-Shenzhen Line were added under the "Planning for the Highway and Waterway Infrastructure on the Pan-PRD Regional Cooperation" completed in December 2005. That plan would also integrate the existing network to form the "Guangzhou-Chengdu" Line, and create an intercity highway system with Guangzhou as the centre, the Guangzhou-Shenzhen (Hong Kong) Line and the Guangzhou-Zhuhai (Macao) Line as main axes, a number of ring roads and radiation lines as framework, and vertical and horizontal links as supplements. This network would connect the Greater PRD City-region including Hong Kong and Macao to the external areas, as well as among the cities within the region (Table 5-7).

On the above basis, it is stated under the "11th Five-year Plan on Guangdong Provincial Comprehensive Transportation System" that up to 2010, there will be 10 outbound corridors in the province, including 2 to Guangxi, 2 to Hunan, 2 to Jiangxi, 2 to Fujian, 1 to Hong Kong and 1 to Macao. These would intensify the expressway connection of the province to adjacent provinces and regions, improve the capability of the expressways leading to the Pan-PRD region, and further upgrade the expressway network. These lines are mainly located in the Guangdong Province but outside the Greater PRD City-region. They would facilitate closer connection of the region's expressway system with the national expressway network.

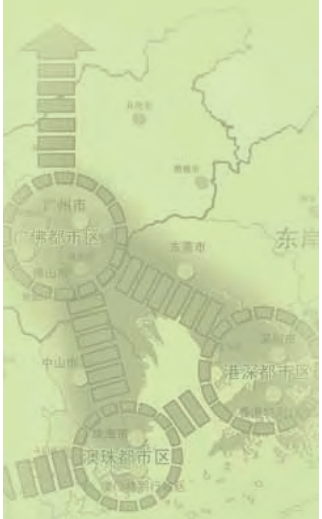


Table 5-5 The Major Existing External Links of the Greater PRD City-region

Corridor	Routes	Provinces connected
Eastern Corridor	Shenzhen-Shantou Expressway +National Highway 324	Eastern part of Guangdong Province and Fujian Province
North-eastern Corridor	Shenzhen-Huizhou Expressway +National Highway 205	North to the Huihe Expressway, and directly linking to Jiangxi Province
Northern Corridor	Beijing-Zhuhai Expressway +National Highways 107,105,106	Hunan, Hubei and other provinces
Western Corridor	Guangdong-Zhaoqing Expressway + National Highways 321,324	West to Guangzhou-Wuzhou Expressway; reaching Guangxi via Zhaoqing and Yunfu
South-western Corridor	Western Coastal Expressway + theGuangzhou-Zhanjiang section of theShenyang-Haikou Expressway +National Highway 325	linking major cities in the coastal areas of western Guangdong, connecting to the Chongqing-Zhanjiang Expressway and leading to Guangxi and Hainan

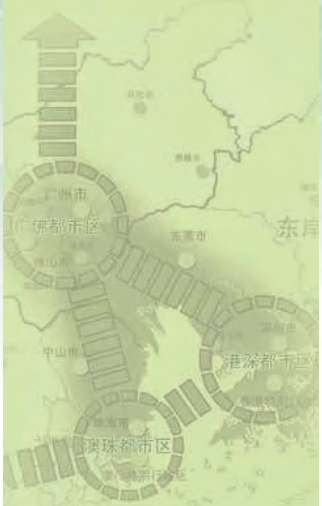
Table 5-6 The Major Planned Expressways Leading to the Greater PRD City-region

Routes covered in the "Planning of National Expressway Network" (January 2005)	Routes covered in the "Planning for Highways, Waterways and Infrastructure on the Pan-Pearl River Delta Regional Cooperation" (December 2005)
Shenyang - Haikou	Guangzhou - Shenzhen - Shanwei - Shantou - Xiamen - Quanzhou - Fuzhou - Ningde
Changchun - Shenzhen	Shenzhen - Huizhou -Heyuan - Meizhou - Longyan -Sanming - Nanping
Jinan - Guangzhou	Guangzhou - Heyuan -Ruijin - Nancheng - Yingtan - Jingdezhen
Daqing - Guangzhou	Guangzhou - Lianping - Longnan - Ganzhou - Ji'an
Beijing - Hong Kong and Macao	Hong Kong - Shenzhen - Guangzhou - Shaoguan - Binzhou - Hengyang - Zhuzhou - Changsha - Yueyang
Beijing - Hong Kong and Macao	Macao - Zhuhai - Zhongshan -Guangzhou - Lianzhou - Yongzhou - Shaoyang - Loudi - Changde
Guangzhou - Kunming	Guangzhou - Zhaoqing - Yunfu - Yulin - Nanning - Baise - Funing - Kaiyuan - Shilin - Kunming
Shenyang - Haikou - Sanya	Guangzhou - Foshan - Kaiping - Yangjiang - Maoming - Zhanjiang - Haikou - Sanya
— —	Newly added: Guangzhou - Huizhou - Jieyang - Zhangzhou - Fuzhou
— —	Newly added: Yueyang - Zhuzhou - Rucheng - Shaoguan - Huizhou - Shenzhen
Integration of a number of major lines: Guangzhou - Hezhou - Guilin - Majiang - Guiyang - Bijie - Luzhou - Longchang - Neijiang - Chengdu	

Table 5-7 The Planned Provincial Expressway Network in Guangdong leading to the Greater PRD City-region

Name of Line (section)	Major control points
Shenzhen-Ganzhou, Jiangxi (province boundary)	Shenzhen, Huizhou, Heyuan, Heping
Shenzhen-Rucheng, Hunan (province boundary)	Yantian port, Dongguan, Boluo, Longmen, Xinfeng, Wengyuan, Shixing, Renhua
Guangdong section of Beijing-Zhuhai Expressway	Zhuhai, Zhongshan, Guangzhou, Conghua, Fogang, Yingde, Wengyuan, Shaoguan, Ruyuan, Pingshi
Zhuhai to Lianzhou	Zhuhai, Zhongshan, Shunde, Guangzhou, Qingyuan, Yangshan, Lianzhou
Zhuhai-Yongzhou, Hunan (province boundary)	Zhuhai to Yongzhou, Hunan (province boundary)
Jieyang to Maoming	Jieyang, Jiexi, Zijin, Heyuan, Longmen, Fogang, Qingyuan, Zhaoqing, Xinxing, Yangchun, Maoming
Huizhou-Wuzhou, Guangxi (province boundary)	Huidong, Huizhou, Zengcheng, Guangzhou, Nanhai, Gaoyao, Yunfu, Luoding, Yunan
Zhangzhou, Fujian (province boundary)-Yulin, Guangxi (province boundary)	Chaozhou, Jieyang, Jiexi, Luhe, Huidong, Dongguan, Zhongshan, Jiangmen, Xinxing, Luoding, Cenxi
Guangdong section of Tongsan Expressway and its connecting roads	Raoping, Chaozhou, Shantou, Shanwei, Huizhou, Shenzhen, Dongguan, Guangzhou, Foshan, Jiangmen, Zhuhai, Yangjiang, Maoming, Zhanjiang, Xuwen, Lianjiang
Pearl River Delta Ring Expressway	Panyu, Sanshui, Nanhai, Shunde
Pearl River Delta Outer Ring Expressway	Shenzhen, Dongguan, Zengcheng, Huadu, Zhaoqing, Gaoming, Jiangmen, Zhongshan, Zhuhai
Guangzhou Ring Road	Baiyun District, Tianhe District, Haizhu District and Fangcun District of Guangzhou, Nanhai District of Foshan
Guangzhou Dongxin Expressway	Dongsha in Haizhu District to Xinlian in Panyu District of Guangzhou
Guangzhou to Ganzhou (province boundary)	Guangzhou new airport, Conghua, Xinfeng, Lianping
Guangzhou to Sihui	Guangzhou, Nanhai, Sanshui, Sihui
Guangzhou-Shenzhen (Hong Kong) Coastal Highway	Guangzhou, Dongguan, Shenzhen
Shenzhen Northern Ring Expressway	Yinhu, Nantou
Shenzhen Outer (half) Ring Expressway	Shajing, Guangming, Fenggang, Pingdi
Shenzhen-Huizhou Coastal Highway	Yantian, Aotou, Renshan
Shenzhen Longda Expressway	Longhua, Shenzhen, Shiyan, Guangming Nong Chang, Songgang, Luotian Lin Chang, Dalingshan, Dongguan
Shenzhen Shuiguan Expressway	Buji, Henggang, Pinghu, Longgang
Dongguan Longlin Expressway	Tangxia Longbeiling to Lincun
Xinhui to Taishan	Xinhui (Siqian), Taishan
Huizhou Port to Huizhou	Huizhou Port, Huiyang, Huizhou
Shenzhen-Zhongshan cross Pearl River Estuary project	Jihe Expressway, Zhongjiang Expressway
Dongguan Southern Ring	Houjie and Liaobu, Dongguan
Panyu to Dongguan (Lianhuashan Bridge)	Dongchong, Panyu and Houjie, Dongguan
Guangzhou-Gaoming Expressway	Panyu, Foshan, Gaoming (connected to Jiangmen-Yunfu Expressway)
Pingzhou, Nanhai - Nansha, Guangzhou Expressway	Pingzhou, Nanhai; Dashi, Nancun, Hualong, Shilou, Dongchong, Huangge, Panyu
Guangzhou-Heyuan Expressway	Guangzhou, Zengcheng, Longmen, Heyuan
Zengcheng-Conghua, Guangzhou Expressway	Zengcheng, Conghua

Remarks: This table is summarized from the “Plan on Guangdong Provincial Expressway Network (2004-2030)”



The capacity of water-based transportation in the City-region, which focuses on tourism, ferry services between Hong Kong and Macao, and passenger transportation in inland rivers, should be enhanced to become an important part of the integrated transportation system.

—— The opportunities arising from improvement to watercourses in Guangdong Province should be seized to explore the potential of water-based transportation. High-speed, safe and high-performance vessels should be used.

—— Full use should be made of the water-based passenger transportation during special occasions like the Spring Festival and the tourism golden week, as supplement to mainstream transportation by highways, railways and aviation.

—— The scenery along Pearl River and the environment of the terminals should be improved. Tourism projects and items to make Pearl River a "golden route for tourists" should be launched.

—— Both the hardware and software, and the service quality of CIQ clearance should be improved to fully exert the important functions of ferries in passenger and cargo transportation between PRD, Hong Kong and Macao.

5.1.6 Integrated transportation hubs

—— In the future, the Bay Area of Pearl River Estuary will become the focus of passenger and cargo flow. To realize "seamless connections" between various transportation means, efforts have to be made to enhance the transferring capacity, create a more efficient, comfortable and economical transfer environment and develop an integrated hub system which is highly effective and safe.

——The capacity of major railway hubs and civil airports such as the Hong Kong International Airport, the new passenger station in Guangzhou, the Guangzhou Baiyun Airport, the new passenger station in Shenzhen and the Shenzhen Airport should be enhanced through improved technology and management. The transportation linkages and cooperation between Guangzhou-Foshan, Hong Kong-Shenzhen and Macao-Zhuhai should be reinforced to establish an integrated transportation hub and achieve mutual benefits through mutual complementation. The transportation capacity and hub function of the cities such as Zhaoqing, Jiangmen, Dongguan, etc. should be enhanced.

—— The essence of forming integrated transportation hubs in the Bay Area is to facilitate coordination in regional planning and development, as well as close connection of the passenger and cargo transportation hubs within the Greater PRD City-region, in particular between Hong Kong, Guangzhou, Shenzhen and Zhuhai. An intercity railway system should be developed to foster the links between these hubs, enhance the efficiency of transfer and improve the conditions of transfer in public transport so that tourists can enjoy convenient transfers between different transportation means, different cities and different traffic routes within a city (Figure 5-5).

Figure 5-5 The Layout of Intercity Rail Links in the Greater PRD City-region

5.2 Intercity Transportation Plan

5.2.1 One-hour commuting circle within the Bay Area

—— Three new routes should be developed between Guangzhou-Foshan Metropolitan Area and Hong Kong-Shenzhen Metropolitan Area, i.e. the Guangzhou-Shenzhen-Hong Kong Passenger Line, the Guangzhou-Dongguan-Shenzhen Intercity Rail—Shenzhen-Hong Kong Western Express Rail, and the Guangzhou-Shenzhen Coastal Expressway— Shenzhen-Hong Kong Western Corridor.

—— The Guangzhou-Zhuhai Intercity Rail and the Guangzhou-Zhuhai Western Expressway should be developed between Guangzhou-Foshan Metropolitan Area and Macao-Zhuhai Metropolitan Area, which should be connected to Macao's light rail and road network via the Hengqin BCP.

—— Cross-river links between Zhuhai-Macao Metropolitan Area and Hong Kong-Shenzhen Metropolitan Area should be developed by building Hong Kong-Zhuhai-Macao Bridge and Shenzhen-Zhongshan Bridge. A study should be undertaken on building cross-Pearl River Estuary intercity rail.

—— The development of hubs of the intercity rail system should be strengthened. The connection of the rail system to the airports of Hong Kong, Macao, Guangzhou, Shenzhen and Zhuhai, the major railway stations such as the new Guangzhou Station, Shenzhen Station, the new Foshan Station and Shenzhen Futian Station, as well as the major long-distance bus stations such as the Guangzhou Tianhe Passenger Station, Shenzhen Bus Station and Zhuhai Gongbei Bus Station should be enhanced (Table 5-8).

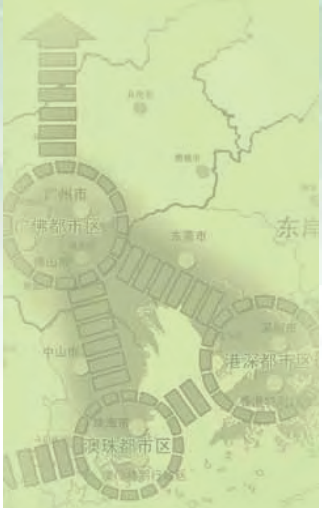


Table 5-8 Improvement Schemes under the "One-hour Commuting Circle within the Bay Area"

Development Axis	Status	Routes and Major connecting nodes
Guangzhou-Shenzhen-Hong Kong Development Axis	Built	Guangzhou-Shenzhen Expressway; the Zengcheng/Dongguan-Dongguan/Shenzhen-Meiguan Expressway; Guangzhou- Shenzhen Railway
	Planned (including those under construction)	Guangzhou-Shenzhen-Hong Kong Passenger Line: New Guangzhou Station-Dongchong-Humen (connecting to Huizhou)- Guangming-New Shenzhen station (Longhua)- Shenzhen North Station (Futian)-West Kowloon of Hong Kong
		Foshan-Dongguan Inter-city Transit; Guangzhou-Dongguan-Shenzhen Inter-city Transit-Hong Kong-Shenzhen Western Express Line; Line 5 of the Guangzhou Metro-Guangzhou Development District–Mayong–Humen–Songgang-Shajing- Shenzhen Airport-Qianhai-Shekou-Hong Kong Airport (possible extension: Hong Shui Kiu, Yuen Long)
		Guangzhou-Shenzhen Coastal Expressway-Hong Kong- Shenzhen Western Corridor: Guangzhou Economic Development District-Dongguan Humen Port-Western Shenzhen industrial clusters-Shenzhen Airport-Shenzhen Dachanwan Port-Shenzhen Shekou-Yuen Long, Hong Kong
Guangzhou-Zhuhai-Macao Development Axis	Built	Eastern Guangzhou-Zhuhai Expressway
	Planned (including those under construction)	Guangzhou-Zhuhai Inter-city Transit: New Guangzhou Station-Shunde-Rongqi-Nantou-Xiaolan-Dongsheng-Zhongshan-Nanlang-Cuiheng-Dinghu-Jintang-Mingzhu-Qianshan-Zhuhai-Hengqin (connecting to the light rail of Macao)-Zhuhai Airport
		Guangzhou-Zhuhai Railway: Jiangcun-Datian-Guanyao-Beijiang-Xiqiao-Heshan-Jiangmennan-Gujing-Doumen-west Zhuhai- Gaolan Port Western Guangzhou-Zhuhai Expressway: Guangzhou-Foshan-Zhongshan- Hengqin, Zhuhai -Lianhua Control Point-Macao
Coastal Development Axis	Built	——
	Planned (including those under construction)	Hong Kong-Zhuhai-Macao Bridge, Shenzhen-Zhongshan Bridge, Cross-river Inter-city Transit Rail Bridge

5.2.2 One-hour commuting circle within Sub-regions

The intercity rail and expressway network in Greater PRD should be optimized (Figure 5-6). The Bay Area should be connected to the major cities within the region. In particular, the connectivity between the three major Metropolitan Areas and other cities in the respective sub-regions should be strengthened. Transportation hubs should be established at the major stations of the Intercity Rail Link like Huizhou, Zhaoqing and Jiangmen. The connection between the Intercity Rail Link and the transportation system within individual cities should also be strengthened. A "one-hour commuting circle" in each of the three Sub-regions should be realized (Table 5-9).

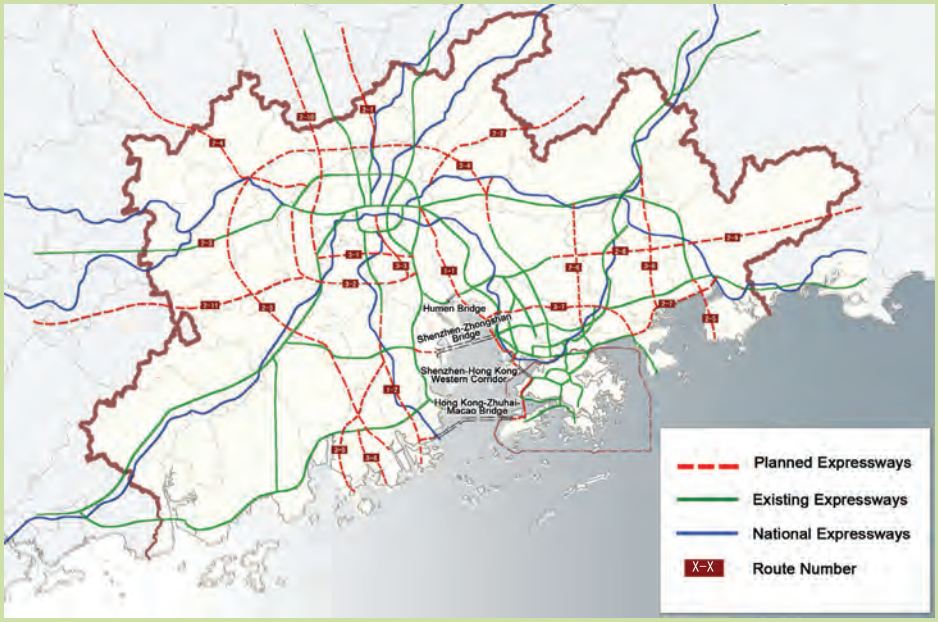


Figure 5-6 The Layout of Highways in the Greater PRD City-region

Table 5-9 Improvement Schemes under the "One-hour Commuting Circle within Sub-regions"

Sub-region	Roads
East Bank Sub-region	Dongguan-Huizhou Inter-city Transit, Huizhou section of the Huizhou-Shenzhen Coastal Expressway, Dongguan-Huizhou Expressway, Boluo-Shenzhen Expressway, eastern extension of Guangzhou-Huizhou Expressway, Huizhou-Macao Expressway
West Bank Sub-region	Sanshui-Huaiji section of Guangzhou-Hezhou Expressway, Jiangmen-Zhaoqing Expressway, Guangzhou-Zhaoqing Expressway Phase II, Tai'ao Expressway (Western Guangzhou-Zhuhai Expressway)
Central Sub-region	Foshan-Zhaoqing Inter-city Transit, Guangzhou-Heyuan Expressway, Guangzhou-Lechang, Shaoguan Expressway, Foqing Expressway

5.2.3 One-hour commuting circle within Metropolitan Areas

One-hour commuting circle within each of the three Metropolitan Areas should be established by means of improving specific roads and enhancing internal accessibility of each Metropolitan Area (Table 5-10).

5.3 Cross-boundary Transportation Plan

5.3.1 Connection of Cross-boundary traffic routes

—— **For railways between Hong Kong and Shenzhen:** actions should be taken to integrate the railways into the national railway network; accelerate the construction of the Guangzhou-Shenzhen-Hong Kong Passenger Line, the intercity rail in Greater PRD and the connection between Guangzhou-Dongguan-Shenzhen intercity railway and Hong Kong-Shenzhen Western

Table 5-10 Improvement Schemes under
the "One-hour Commuting Circle within Metropolitan Areas"

Metropolitan Area	Expressways
Hong Kong-Shenzhen Metropolitan Area	Shenzhen Outer Ring Expressway, Huida Port Expressway, Central Shenzhen Boundary-crossing Channel, Huizhou-Shenzhen Coastal Expressway
Guangzhou-Foshan Metropolitan Area	Guangzhou-Foshan Inter-city Transit Ring, Guangzhou- Foshan-Zhuhai Inter-city Transit, southern section of the Guangzhou Loop of National Highways, Pingnan Expressway, West Guangzhou-Zhuhai Expressway, Guangzhou-Gaoming Expressway, extension of Guangzhou-Foshan and Foshan-Kaiping Expressways, Guangzhou Dongsha-Xinlian Expressway, extension of Guangzhou-Sanshui Expressway, Zengcheng-Jiekou (Conghua) Expressway in Guangzhou, Nanfan Road in Foshan and Link to New Guangzhou Station
Zhuhai-Macao Metropolitan Area	Gaolan Port Expressway, Zhuhai Airport Expressway, Jinhai Expressway, Guangzhou-Zhuhai Inter-city Transit, extension of Guangzhou-Zhuhai Inter-city Transit, Beijing-Zhuhai Expressway, Western Guangzhou-Zhuhai Expressway (including extension of Hengqin), Zhuhai Road, Jingang Road

Express Link; and promote the construction of railway hubs in Shenzhen and Hong Kong so that the cross-boundary rail can be merged with the two cities' internal transportation systems. Cross-boundary cargo railway should be developed between Hong Kong and Shenzhen to strengthen the linkage among the ports in case the cargo flow to Hong Kong by rail increases (Table 5-11).

—— For highways between Hong Kong and Shenzhen: the future focus of the cross-boundary highways linking Shenzhen and Hong Kong should be put on the Eastern Corridor via the Liantang/Heung Yuen Wai BCP. This can strengthen the accessibility between Hong Kong and the eastern parts of Greater PRD as well as Guangdong Province. Furthermore, there should be clearer separation of passenger and cargo transportation. The Guangzhou-Shenzhen Coastal Expressway should serve the cross-boundary cargo transportation between Shenzhen and Hong Kong, and the Guangzhou-Shenzhen Expressway should serve mainly the purpose of cross-boundary passenger transportation. As such, the cross-boundary traffic, port-related cargo traffic and internal city traffic can be separated (Table 5-12 and Figures 5-7 and 5-8).

Figure 5-11 Cross-boundary Railway Development between Hong Kong and Shenzhen

Level	Railways	Measures	Functions
National Railway	Guangzhou-Shenzhen-Hong Kong Passenger Line – Hong Kong section of the Guangzhou–Shenzhen–Hong Kong Express Rail Link	Guangzhou-Shenzhen-Hong Kong Passenger Line will be connected to Guangzhou-Shenzhen-Hong Kong express railway (Hong Kong section) and directly reach West Kowloon Station, Hong Kong. It will connect to National Passenger Lines (such as Beijing-Hong Kong Passenger Line and Hangzhou-Fuzhou-Shenzhen Passenger Line).	To enhance connections of long-hauled passenger trips between Hong Kong and the Mainland and to strengthen the function as a transportation hub of both areas.
Inter-city Transit	Hong Kong-Shenzhen Western Express Line	To plan for the construction of a inter-airport rail between Shenzhen and Hong Kong, and to study the construction of a cross-boundary railway which connects the western part of Shenzhen to Hong Kong	To strengthen the linkages between eastern bank of the Pearl River and Hong Kong; to faciltiate communications between Integrated Hub at Shenzhen Qianhai, Shenzhen Airport and Hong Kong Airport; and to reinforce the eastern bank development axis of the Pearl River.
	Guangzhou-Shenzhen-Hong Kong Passenger Line – Hong Kong section of the Guangzhou–Shenzhen–Hong Kong Express Rail Link	To connect with the PRD Inter-city Transit via intermediate stations	This will greatly strengthen the links between Hong Kong and the PRD region.
Urban Transit	Shenzhen Metro	It is planned to relocate part of the long-hauled passenger trip services to Zhuzilin hub.	To reduce the traffic pressure at the Lo Wu Control Point and to further improve the standard of long-hauled cross-boundary passenger trip services.

Figure 5-7 The Cross-boundary Transportation Facilities of Shenzhen

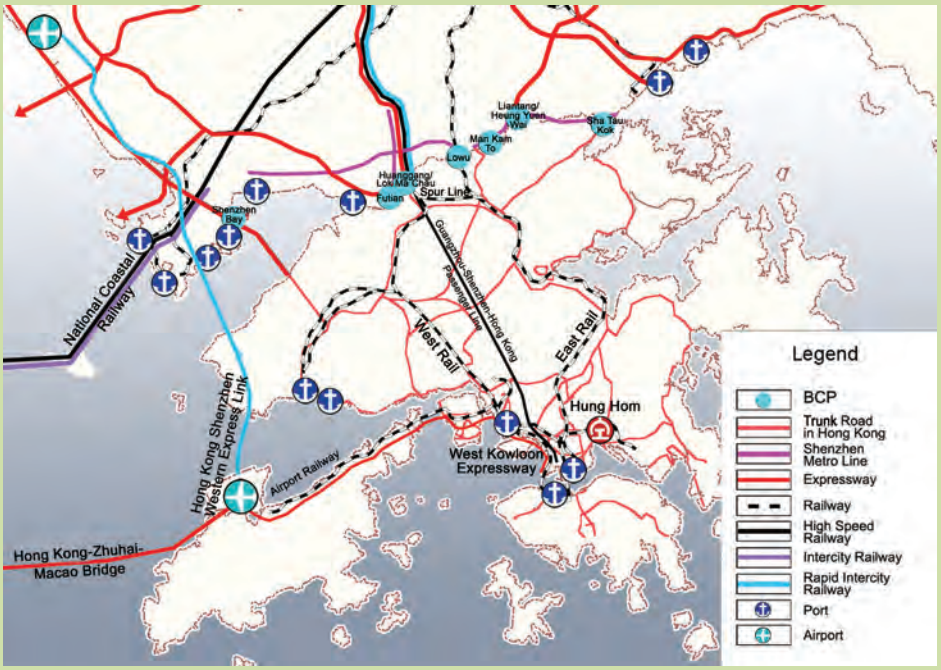


Figure 5-8 The Cross-boundary Transportation Facilities of Hong Kong

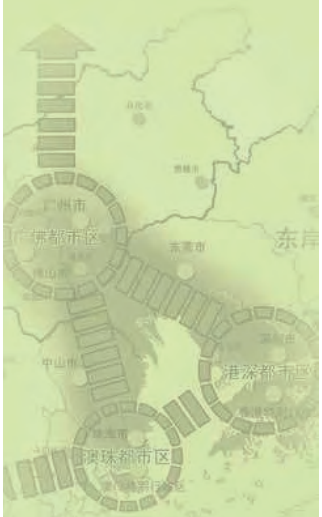
—— For the railway between Macao and Zhuhai: the linkages between Guangzhou-Zhuhai Intercity Rail and Macao's light rail should be promoted.

—— For the highways between Macao and Zhuhai: the Guangzhou-Macao Parallel Line of Beijing-Hong Kong-Macao Expressway should be extended and linked to Lianhua Bridge via Hengqin Bridge and the round-the-island highway of Hengqin. This would strengthen the tie between the western part of Guangdong and Macao. As part of China's Western Coastal Expressway, the Zhuhai sub-line should be extended into Hengqin Island through the Hengqin Bridge II. To strengthen the tie between Macao and the western coast of Pearl River Estuary and Zhuhai Airport, an expressway should be built from Lianhua BCP westwards across Modaomen Channel and linked to Zhuhai Airport. To strengthen the communication between Guangdong Province and Macao, the feasibility of establishing three or more road junctions on Hengqin Island for the purpose of linking to Macao through different phases (short/medium/long term) should be studied (Figures 5-9 and 5-10).

—— For the transportation hubs in Macao and Zhuhai: consideration should be given to developing a road-base BCP specifically for cargo transportation on Hengqin Island with a view to separating passenger and cargo flows and allowing direct transportation of cross-boundary cargo to Macao from the outskirts of Zhuhai. An integrated transportation hub station on the eastern side of Hengqin Island should be set up to achieve "seamless transfer", in conjunction with the infrastructure including the Zhuhai Extension Line of Guangzhou-Zhuhai Intercity Rail, the connection between Macao's light rail and Hengqin BCP, the long-distance bus terminals, the internal public transportation systems, the Guangzhou-Macao Parallel Line of Beijing-Hong Kong-Macao Expressway and the Zhuhai Sub-line of Western Coastal Expressway.

Table 5-12 Highways and Expressways directly related to the Major Land-based Boundary Crossing Points between Hong Kong and Shenzhen in the "Shenzhen Municipal Road Network Plan"

Road	Planned time for operation	Brief
Nanping Expressway (Phase II)	To be determined	The western end of the road is Qianhai overpass of the Coastal Highway, and it goes eastward along the southern section of the boundary between districts of Nanshan and Bao'an, passing through the Bao'an Road, Guangzhou-Shenzhen Highway and Shanhe West Road, and connects to the Nanping District Phase I via Longzhu Road. The road will be 15.42-kilometre long with dual 8 lanes. The construction started in February 2007, and planned to be operated in the first half of 2009. With the completion of Nanping District (Phase II), Shenzhen's second layer east-west rapid cargo transportation corridor is to be built, and to realize the separation of cross-boundary traffic, port cargo traffic and urban traffic.
Guangzhou-Shenzhen Coastal Expressway	Before 2012	With a total length of 97 kilometres, the expressway originates at Huangpu, Guangzhou and ends at Shekou, Shenzhen, and to be connected to the Hong Kong-Shenzhen Western Corridor. The Shenzhen section is 30-kilometre long with dual 8 lanes. The preliminary design has been completed and construction is planned to commence by the end of 2009 and to be operated in 2012. Upon its completion, trips between Guangzhou and Hong Kong will be shortened to an hour. Besides, Hong Kong cross-boundary lorries can directly reach the port without passing through the urban area of Shenzhen. This will greatly ease the traffic pressure of Guangzhou-Shenzhen Expressway and National Highway 107.
Eastern Corridor (Mainline)	Before 2011	Originated from the Pengxing Road on the southern side of the Liantang water plant, the mainline of Eastern Corridor goes through Yanpai Expressway and Huiyan Highway, and eastwards to its end point at the intersection of Shenzhen-Huizhou Expressway and Shenzhen-Shantou Expressway. The total length is 25.63 kilometres, being ranked as an Expressway with dual 6 lanes. This corridor is planned to be operated in 2011.
Connecting road linking Man Kam To BCP to Eastern Corridor	Before 2011	Its main function is to divert part of the cross-boundary cargo traffic at the Man Kam To BCP to the mainline of Eastern Corridor before the completion of the Liantang BCP. It is planned to make use of the existing Eastern Ring Expressway and to construct an overpass at Aiguo Road Viaduct. As such, Danping Expressway, Eastern Ring Expressway, Buxin section of Northern Ring Expressway will be linked to the mainline of the Eastern Corridor. A flyover will be built in the Donghu Park to connect to the mainline of Eastern Corridor. The total length is 2.2 kilometres with dual 6 lanes. This connecting road is to be ready for operation before 2011 concurrently with the mainline of Eastern Corridor.
Connecting Road linking Liantang/ Heung Yuen Wai BCP to Eastern Corridor	2018	Originated from its southern end at the Liantang BCP, the connecting road connects northward the mainline of the Eastern Corridor. The total length is 0.85 kilometres with dual 6 lanes. It is scheduled to be operational in 2018 concurrently with the completion of Liantang BCP.



—— Between Hong Kong, Zhuhai and Macao: the opportunities arising from the construction of Hong Kong-Zhuhai-Macao Bridge should be utilized to foster closer linkages between Hong Kong, Macao and the major cities at the west bank of PRD. Focus should be put on connecting Hong Kong-Zhuhai-Macao Bridge to the central part of Hong Kong. In view of the increasing demand for passenger transportation between Hong Kong and the west bank of PRD, study of building a railway bridge across Pearl River Estuary should be undertaken. Such bridge, if built, would also change the

Figure 5-9 The Cross-boundary Transportation Facilities of Zhuhai

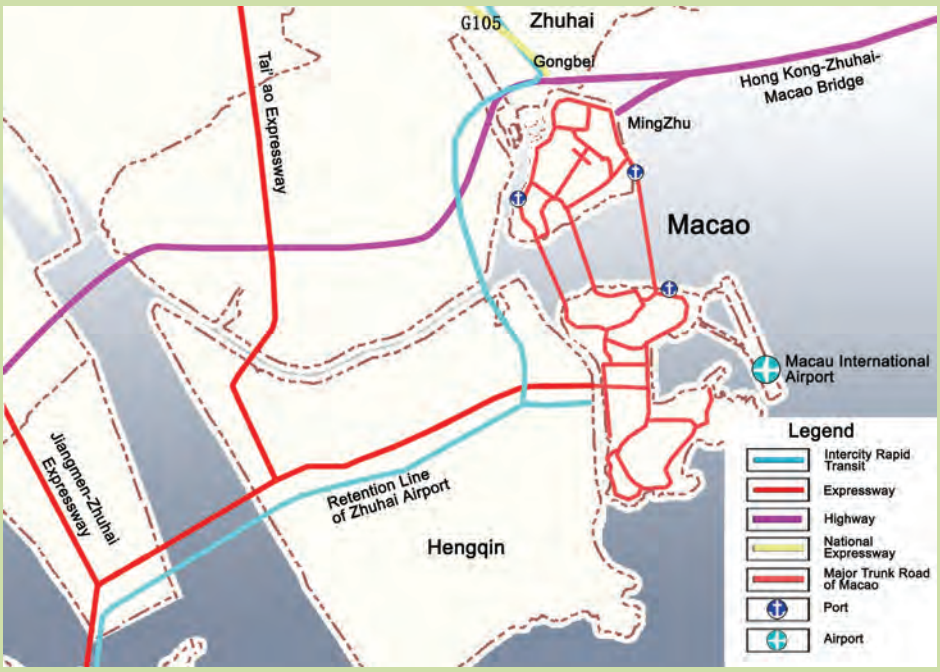


Figure 5-10 The Cross-boundary Transportation Facilities of Macao

peripheral position of Hong Kong in the national railway system (Table 5-13 and Figure 5-11).

Table 5-13 Key Cross-boundary Links under Coordination among Cities

City	Transportation Link	
	Railway	Highway
Hong Kong	Hong Kong section of the Guangzhou–Shenzhen–Hong Kong Express Rail Link, Hong Kong-Shenzhen Western Express Line	Eastern Corridor and Hong Kong-Zhuhai- Macao Bridge
Shenzhen	Guangzhou-Shenzhen-Hong Kong Passenger Line, Hong Kong-Shenzhen Western Express Line and Shenzhen Metro	Nanping Expressway Phase II, Guangzhou-Shenzhen Coastal Expressway, the mainline of Eastern Corridor, connecting road linking Man Kam To BCP to Eastern Corridor and connecting Road linking Liantang/ Heung Yuen Wai BCP to Eastern Corridor
Macao	Macao Light Rapid Transit	Hong Kong-Zhuhai-Macao Bridge
Zhuhai	Guangzhou-Zhuhai Inter-city Transit	Jinghai Bridge and Guangzhou-Zhuhai Western Highway

Figure 5-11 The Layout of Cross-boundary Transportation Facilities in the Greater PRD City-region[1]

1 Mainly based on the Overall Transportation Planning of Shenzhen (May 2008), Master Plan of Zhuhai (2001-2020), Master Plan of Zhongshan (2004-2020), the Plan for the Coordinated Development of the PRD City-region, Hong Kong 2030: Planning Vision and Strategy, the Optimization Scheme of the Rail Transit System in Macao, as well as latest planning information in various cities. These include the built and planned transportation facilities crossing the boundaries of Hong Kong/Macao and PRD.

5.3.2 Development of Boundary-crossing facilities

(1) Boundary-crossing facilities between the "adjoining areas"

To meet the drastic increase in the demand for cross-boundary passenger and cargo flow, measures including building new boundary crossing facilities between Hong Kong and Shenzhen, and Macao and Zhuhai, enhancing the capacity of boundary crossing facilities, separating passenger and cargo flow, strengthening connection of boundary crossing facilities with public transport should be undertaken (Table 5-14):

—— The BCPs between the "adjoining areas" should be expanded in conjunction with co-ordinated development with the surrounding land uses.

—— Actions should be taken for coordinated planning of BCPs, separation of passenger and cargo flows, and enhancement of the handling efficiency of the BCPs.

—— Linkages between the BCPs and public transport should be enhanced. For the heavily used BCPs which are not served with adequate public transport, such as Man Kam To, Lo Wu, Huanggang/Lok Ma Chau, Gongbei and Hengqin, public transport hubs should be built in the nearby areas, including Shenzhen Bay, Futian and Sha Tau Kok BCPs.

Table 5-14 Improvement of the Key Boundary Control Points

Category	Between Hong Kong and Shenzhen	Between Zhuhai and Macao
New control points and expansion of existing control points	To implement the Hong Kong-Shenzhen Eastern Liantang BCP; to improve passenger CIQ facilities of Sha Tau Kok BCP and Man Kam To BCP and the efficiency of the facilities; to expedite the planning and implementation of the BCP for the Hong Kong-Zhuhai-Macao Bridge.	To expand the capacity of Hengqin BCP (since Gongbei BCP is located in the built-up area and its size is restricted) and to reserve land for vehicles turning around and related facilities; to facilitate CIQ clearance between Guangdong and Macao by cross-referencing and mutual recognition of CIQ inspection between the two places; to expand Gongbei BCP in tandem with the expansion of Macao Barrier Gate (Portas do Cerco), thereby achieving the goal of having the Macao and Zhuhai BCP buildings completed concurrently; to provide 24-hour CIQ clearance with sufficient staffing and facilities; to expedite the planning and implementation of the BCP for the Hong Kong-Zhuhai-Macao Bridge.
Separation of passenger and cargo transportation	Western Corridor BCP will mainly serve cargo transportation; Liantang BCP will mainly serve cargo and long-haul passenger trips; Sha Tau Kok and Man Kam To BCPs will mainly serve passenger trips; Huang- gang/Lok Ma Chau BCP will serve both passenger and cargo transportation.	Making use of Gongbei BCP at the northern part of Macao to meet the demand of cross-boundary passenger trips and making use of Hengqin BCP at the southwestern part of Macao to meet the demands of cross-boundary cargo transportation; and to enhance the capacity of Wanzai BCP for passenger trips.
Strengthening connection with public transport	To build public transport interchanges at the Western Corridor BCP, Huanggang BCP and Sha Tak Kok BCP; and to implement specific transportation measures at the heavily congested BCPs like Huanggang.	To strengthen the connection of Hengqin BCP with public transport; to build new passenger handling zone at Hongwan of Zhuhai to serve passengers from Hong Kong, Macao and those from city core of Zhuhai to the western districts of Zhuhai, areas along Guangzhou-Zhuhai Railway and the western part of Guangdong Province.

——"Park and cross-boundary ride" facilities should be constructed in the BCPs to cope with the continuous increase of cross-boundary cars and relieve their impact upon the roads of Hong Kong and Macao. Study on providing "park and cross-boundary ride" facilities near the BCPs between Hong Kong and Shenzhen and between Zhuhai and Macao should be undertaken.

(2) Construction of BCP between the "non-adjoining areas"

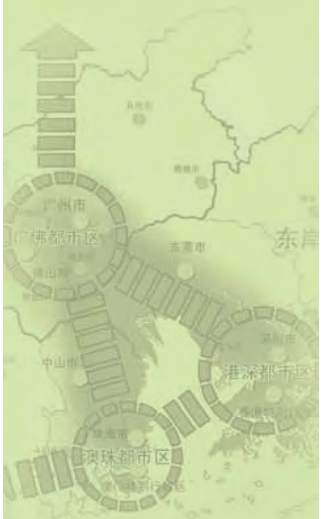
—— Construction of "inland straight-through" BCP via railway[1]**:** in light of the increasing traffic between the less developed areas in Guangdong Province, the "Pan-PRD" region and Hong Kong/Macao, studies on more effective and convenient linkages between Hong Kong/Macao and the Mainland should be undertaken. The proposed "inland straight-through" BCP via railway could expand the coverage of the railway network in Hong Kong and Macao by means of (1) actively promoting the operation of passenger through-trains between PRD and Hong Kong/Macao; (2) actively promoting the operation of passenger through-trains between Hong Kong/Macao and other major cities in the Mainland, in particular those in Yangtze River Delta and the Chengdu-Chongqing and Changsha-Zhuzhou-Xiangtan regions in the "Pan-PRD" region; (3) actively promoting the operations of straight-through cargo trains between the Mainland and Hong Kong/Macao, such as organizing the Chang Ping-Hong Kong Line for the transportation of agricultural by-products and implementing through-trains between Hong Kong/Macao and the production bases of major resources and raw materials in the "Pan-PRD" region.

—— Increasing the number of BCPs serving the "non-adjoining areas": actions should be taken to change the approach of focusing on BCPs serving the "adjoining areas" to emphasizing both "adjoining" and "non-adjoining" areas through (1) increasing the number of BCPs serving the "non-adjoining" areas; (2) developing different types of BCPs, such as helicopter terminals and ports; and (3) increasing the number of BCPs in the outer Greater PRD.

—— Active promotion of cross-boundary "straight-through" services between the main transportation hubs in Hong Kong, Macao and PRD, with the aim of achieving convenient and efficient "multi-modal transportation": possible measures include linking up the airports and ports with expressways, linking up the major water-based BCPs and the Hong Kong International Airport, and providing cross-boundary "through-train" services between the major cities in PRD and the airports of Hong Kong and Macao.

5.3.3 Coordinated management of cross-boundary transportation

—— Convenient and efficient CIQ clearance: actions should be taken to adopt new technology at BCPs, reduce the fares of transportation facilities, promote the "co-location of immigration and CIQ facilities"; relax the entry restrictions on people from the Mainland to Hong Kong and Macao



1 "Inland straight-through" BCP allows one-stop CIQ clearance at the place of origins so that the through-train can enter Hong Kong/Macao direct without further clearance. The same practice applies to the train from Hong Kong/Macao to the Mainland. It will greatly reduce the clearance cost and improve the accessibility.

to facilitate business and sightseeing trips. Timetables for implementation of the above measures should be worked out.

—— Innovative approaches of cross-boundary transportation: expert teams should be formed to study the feasibility of relaxing the restrictions on cross-boundary vehicles between Guangdong and Hong Kong, of which a pilot scheme should be launched at the Shenzhen Bay BCP as soon as possible. Besides, the use of "regional autopay card" applicable to the public transport and transit railway systems in all cities in Greater PRD should be promoted. The governments of Guangdong, Hong Kong and Macao should continue to study the legal as well as transportation and traffic management means to enhance the cross-boundary traffic flows.

Chapter 6
Ecological/Environmental Protection Plans

In this Chapter, a number of joint actions are recommended for the implementation of the "Strategy for Quality Environment" in five aspects, namely, optimization of the regional eco-security system, prevention and control of regional environmental pollution, designation of environmental protection duties, protection of the ecology/environment of the Bay Area and joint studies on ecology/environment.

6.1 Optimization of the Eco-Security System

6.1.1 Establishment of Eco-Corridors

The Pearl River water system which comprises mainly Xi Jiang, Bei Jiang and Dong Jiang should serve as river-based eco-corridors. The stretching natural mountain ranges (including hills and reservoirs) should serve as mountain-based eco-corridors. The traffic route system should serve as traffic eco-corridors.

—— The "Three Rivers" as River-based Eco-corridors: the Pearl River water system, which comprises mainly Xi Jiang, Bei Jiang and Dong Jiang (the "Three Rivers"), forms the backbone of the river-based eco-corridors of the region. These rivers, coupled with Tan Jiang and Yamen Channel in Jiangmen, Modaomen Channel in Zhongshan, Liuxi River and Zeng Jiang in the north, form a "mesh-like" framework of river-based eco-corridors in the Greater PRD City-region. While the rivers form the main part of the river-based eco-corridors, the river shores should also be reserved as green belts of reasonable width (Figure 6-1).

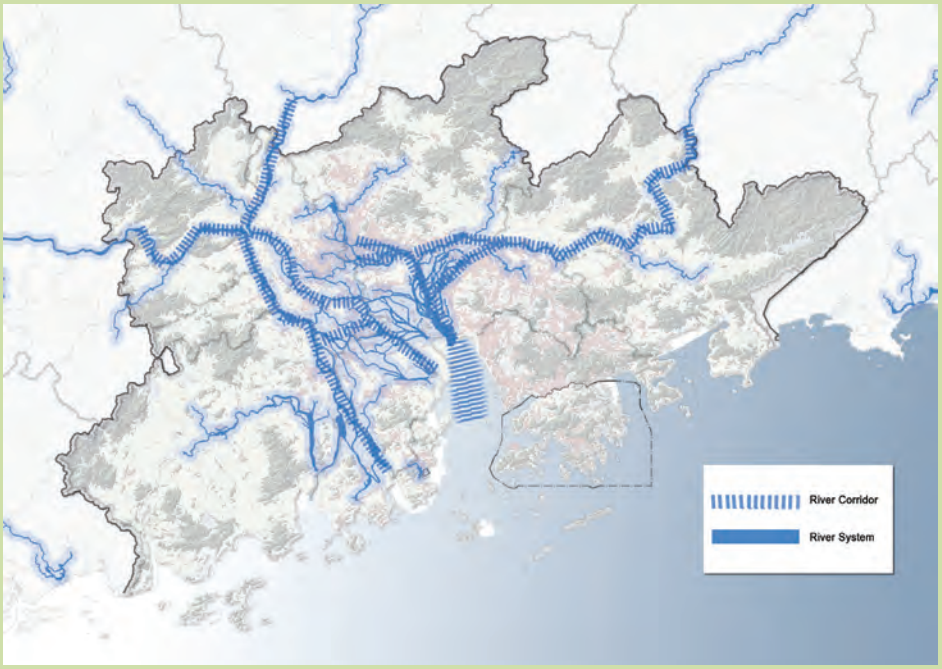
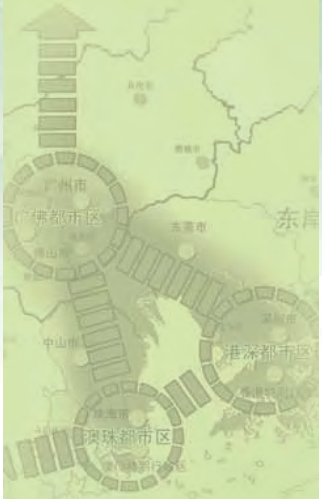


Figure 6-1 The River-based Eco-corridors in the Greater PRD City-region



—— "The Seven Mountains" as Mountain-based Eco-corridors: the mountain ranges in the Greater PRD City-region (including hills and reservoirs) also form major eco-corridors (Figure 6-2). Among them, the mountains stretching from Lianhua Mountain, via the eastern part of Huizhou and Maluan and Wutong Mountains in Shenzhen, up to the hilly area of Pat Sin Leng–Tai Lam Country Park in northern Hong Kong form an important eco-corridor in the eastern part of the region. The mountains running along Baipenzhu Reservoir (in northern Huizhou), Taigu Nature Reserve, Xiangtou Mountain, Luofu Mountain and Liuxihe Reservoir in Chonghua form an important eco-corridor in the northern part of the region. The mountains running along the hilly area of Dinghu in Zhaoqing, Liantang, Genghe, Zhaiwu and the western hilly area in Enping form an important eco-corridor in the western part of the region. The mountains running along Liangmo Mountain (in Gudao), Hengqin (in Zhuhai), Fenghuang Mountain and Wugui Mountain (in Zhongshan) form a major eco-corridor in the central area of the region. Development at the key areas along these eco-corridors should be restricted, and a certain amount of high quality eco-areas like woodlands should be preserved or established to strengthen the structure and functions of the corridors.

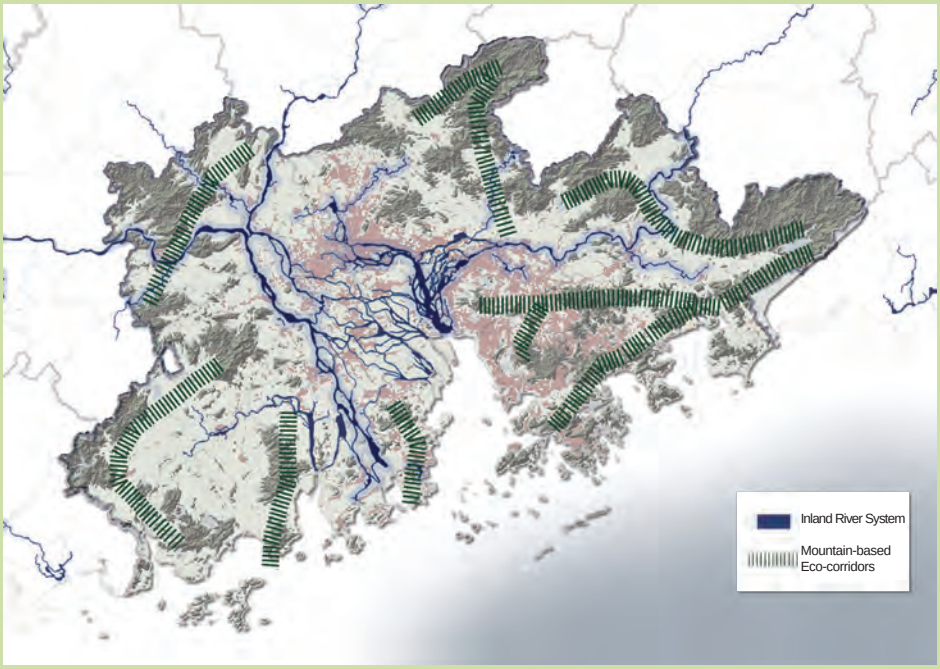


Figure 6-2 The Mountain-based Eco-corridors in the Greater PRD City-region

— The "Three Vertical and Three Horizontal Trunk Routes" as Traffic Eco-corridors: the "Three Vertical Trunk Routes" refer to the routes along Beijing-Kowloon Railway, National Expressway 205, Huizhou-Heyuan Expressway and Huizhou-Yantian Expressway; Beijing-Guangzhou Railway, Beijing-Zhuhai Expressway, National Expressways 105 & 106, and Guangzhou-Shenzhen, Guangzhou-Qingyuan and South China Expressways; and Xinhui-Taishan Expressway, Foshan-Kaiping Expressways and National Expressway 325. The "Three Horizontal Trunk Routes" refer to the northern route which runs along National Expressway 321 & 324, Guangzhou-

Zhaoqing, Guangzhou-Shanshui and Guangzhou-Huizhou Expressways, and Guangzhou-Zhaoqing/Dongguan Railway; the central route that links up Huizhou-Jiangmen, Jihe and Shenzhen-Huizhou Expressways; and the coastal route that runs along the West Coastal Expressway, Yantian-Bagang Expressway and Shenzhen-Shantou Expressway (Figure 6-3). Along these traffic eco-corridors, more green belts should be established and effective ecological protection measures should be undertaken to safeguard the linkage functions of the corridors.

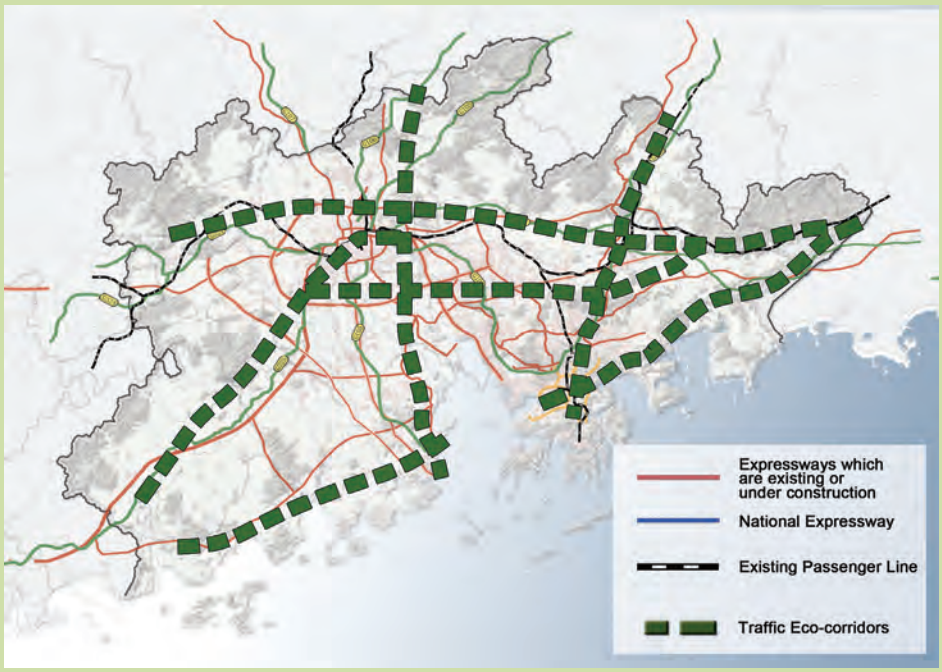


Figure 6-3 The Traffic Eco-corridors in the Greater PRD City-region

6.1.2 Protection of the Eco-Functional Zones

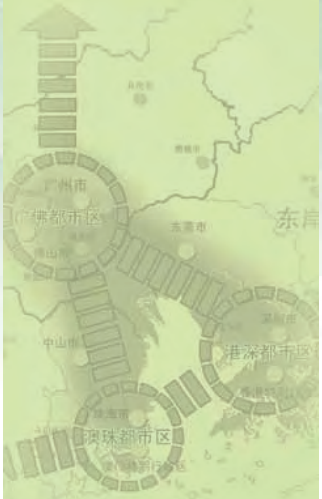
Priority should be given to protecting the nine eco-functional zones (see Column 6-1), the seventeen eco-functional origins as well as the seven eco-nodes as identified according to the uniqueness of each nature reserve (Table 6-1).

6.1.3 Protection of the Ecologically Sensitive Areas

Concerted efforts should be made to protect the ecologically sensitive areas which are of great significance to the region as a whole.

Examples of these ecologically sensitive areas include Wugui Mountain–Fenghuang Mountain–Hengqin Island, Baiyun Mountain–Maofeng Mountain, Yangtai Mountain–Daling Mountain–Baiyunzhang, the northern mountain areas in "Circum PRD", Wanshan Islands–Futian Mangrove Nature Reserve, Wutong Mountain Forest Park–Hong Kong Tai Lam Country Park and the Pearl River water system.

Seven key eco-areas are identified for conservation taking into consideration the relevant regional plans, local situations as well as the future need of conservation (see Column 6-2).



Column 6-1: The Nine Major Eco-functional Zones

(1) The functional zone of Wugui Mountain in Zhongshan/Fenghuang Mountain in Zhuhai/Hengqin, including three eco-functional origins: Wugui Mountain, Fenghuang Mountain and Hengqin;

(2) The functional zone of Beifeng Mountain in Jiangmen/Huangyang Mountain in Zhuhai, including two eco-functional origins: Beifeng Mountain and Huangyang Mountain alongside the Yamen Waterway;

(3) The Mount Pujiding (in western Jiangmen)/Qixingkeng functional zone, including two eco-functional origins: Mount Pujiding to the northern shore of Tan Jiang and Qixingkeng Nature Reserve in western Enping;

(4) The functional zone centering around Dinghu Mountain in northern Zhaoqing, referred to as the eco-functional origin of Dinghu Mountain;

(5) The functional zone in the periphery of Liuxihe Reservoir in Conghua/ Luofu Mountain in Huizhou, including two eco-functional origins: the surrounding areas of Liuxihe Reservoir in northern Conghua and Luofu Mountain in western Huizhou;

(6) The functional zone around Lianghua Mountain and its range in eastern Huizhou, referring to as the eco-functional origin from Lianghua Mountain Range in eastern Huizhou to Maluan Mountain and Wutong Mountain in Shenzhen and Pat Sin Leng and Tai Tam Country Park in northern Hong Kong;

(7) The functional zone along Baipenzhu Reservoir/Gutian/Xiangtou Mountain in Huizhou, including three eco-functional origins: the mountainous areas surrounding Baipenzhu Reservoir, Gutian and Xiangtou Mountain Nature Reserve in northern Huizhou;

(8) The urban green-core functional zone of Daling Mountain – Baiyunzhang amidst Shenzhen, Dongguang and Huizhou, including two eco-functional origins: Daling Mountain in Dongguan and Baiyunzhang in Huizhou;

(9) The country-park functional zone in the New Territories of Hong Kong, including a number of country parks in the New Territories of Hong Kong.

Table 6-1 Key Eco-functional Origins and Eco-nodes in Greater PRD

17 Eco-Functional Origins	7 Eco-nodes
Wugui Mountain in Zhongshan, Fenghuang Mountain and Hengqin in Zhuhai	Guifeng Mountain in Jiangmen
Beifeng Mountain and Huangyang Mountain alongside the Yamen Waterway Mount Pujiding to the northern shore of Tan Jiang and Qixingkeng Nature Reserve in western Enping	Wanshan Islands in Zhuhai
Dinghu Mountainous area in northern Zhaoqing	Sanshui Forest Park in Foshan
Surrounding mountainous areas of Liuxihe Reservoir in northern Conghua, Luofu Mountain in western Huizhou	Baiyun Mountain National-level Scenic and Historic Interest Area in Guangzhou
Lianghua Mountain Range in eastern Huizhou and the major hilly areas in Shenzhen and Hong Kong	Hong Kong and Shenzhen mangrove areas at Shenzhen River Estuary
Mountainous areas surrounding Baipenzhu Reservoir, Gutian and Xiangtou Mountain Nature Reserve in northern Huizhou	Shenzhen Wutong Mountain Forest Park
Daling Mountain in Dongguan and Baiyunzhang in Huizhou as well as country parks in the New Territories of Hong Kong	Hong Kong Sai Kung East Country Park/ Hong Kong Sai Kung West Country Park

6.2 Prevention and Control of Regional Environmental Pollution

6.2.1 Prevention and Control of Air Pollution in the Region

Column 6-3 shows the major pollution sources and their distribution in the region. On this basis, the air pollution prevention and control plans should

Column 6-2: The Key Eco-areas for Conservation

(1) Wugui Mountain/Fenghuang Mountain/Hengqin: it is an important eco-functional origin at the west bank of Pearl River Estuary, with significant bearing on the ecological quality of Zhongshan, Zhuhai and Macao. Macao, Zhuhai and Zhongshan should strengthen cooperation on the establishment and conservation of this eco-area to jointly promote good ecology of the cities at the west bank.

(2) Baiyun Mountain/Maofeng Mountain: it is a major urban green core in the Guangzhou-Foshan Metropolitan Area. It is also an important ecological node with influence extending even to Dongguan. It is proposed that Guangzhou, Foshan and Dongguan should join forces to establish and conserve this eco-area so as to improve the ecological quality of the northern part of the city-region.

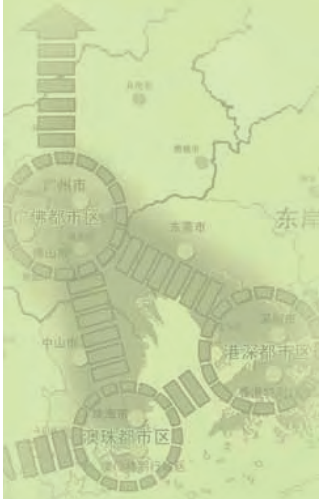
(3) Yangtai Mountain/Daling Mountain/Baiyunzhang: it is a major urban green core at the eastern bank of the Pearl River Estuary, as well as an important ecological node connecting to the northern ecological buffer. Shenzhen, Dongguan and Huizhou should further cooperate to conserve this area by transforming it into a forest park and to optimize its ecological functions in tandem with the implementation of urban greening initiatives.

(4) Northern Mountainous Area of Circum-Pearl River Delta: from the middle and western part of Jiangmen, this area runs along northern Zhaoqing and northern Guangzhou, through the northern mountainous area of Huizhou, to the Lianghua Mountain Range in the east, and extends to Hong Kong. It serves as an ecological buffer for the GPRD region. Cities in the region should cooperate for the conservation of this area.

(5) Wanshan Islands/Futian Mangrove Nature Reserve: it connects the key ecological nodes alongside Pearl River Estuary and is significant for maintaining the ecological linkage between the east and west banks as well as the stability of ecology in the region. A mechanism for joint conservation should be set up among Zhuhai, Shenzhen, Macao and Hong Kong.

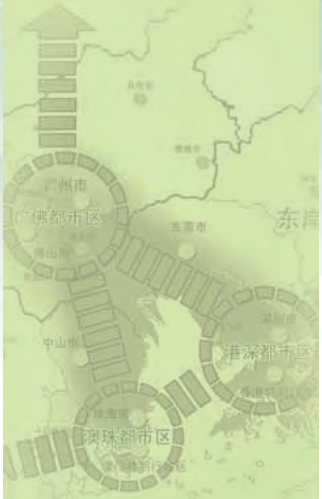
(6) Wutong Mountain Forest Park/Hong Kong Tai Lam Country Park: it is located between Shenzhen and Hong Kong and above the residual range of Lianghua Mountain. It serves as an important ecological node linking Hong Kong to the Mainland, and has great significance on terrestrial species migration. Efforts in protection should be stepped up to conserve the forest resources and the wildlife. On the other hand, cooperation and communication between Shenzhen and Hong Kong should be enhanced to facilitate creation of a better ecological corridor for terrestrial species migration.

(7) Pearl River Estuary: the Pearl River water system and its tributaries are not only the key sources of drinking water in the GPRD region, but are also the natural ecological corridors linking up the region. It therefore plays a defining role in the ecological conservation of the region. Cities should strengthen cooperation to carry out comprehensive water quality control and greening initiatives along the river. It is suggested that Hong Kong should be consulted in the management of Dong Jiang water system, while Macao should cooperate with Jiangmen, Zhuhai, Zhongshan and other relevant cities in the management of Xi Jiang and its tributaries, Tan Jiang as well as major seaward waterways.



cover measures against acid rain and sulphur dioxide, nitrogen oxides, tiny particles and volatile organic compounds (VOCs) pollution.

—— **Acid Rain and Sulphur Dioxide:** regarding pollutant emissions, it is proposed to gradually phase out small power generators that are high energy-consuming and highly polluting. Actions should be taken to enhance the efficiency of energy utilization in thermal power plants and install desulphurization devices for the existing thermal power plants. A power plant to be built, rebuilt or expanded should be equipped with desulphurization devices and adopt low-NOx combustion technology. As regards pollutant monitoring, it is necessary to enhance the monitoring of major emission sources of sulphur



Column 6-3 Major Pollution Sources and their Distribution in the GPRD City-region:

Acid rain and sulphur dioxide: the GPRD city-region suffer from serious acid rain and sulphur dioxide pollution, which poses the biggest ambient air challenge to the region. The vast majority of sulphur dioxide emission comes from coal consumption, for which the thermal power plants take the heaviest share. Therefore, the thrust of controlling sulphur dioxide emission is to control the emission from coal-fired power plants.

Nitrogen oxides: nitrogen oxides is mainly generated from mobile sources, namely motor vehicles, followed by electricity generation like power plant boilers, industrial boilers and restaurant boiling water furnace etc. Within the GPRD city-region, Guangzhou, Dongguan, Shenzhen, Foshan and Hong Kong should be the key areas for regulating nitrogen oxide emission by controlling mobile sources and reducing power plant boilers.

Respirable Suspended Particles: respirable suspended particles emission in the PRD region is mainly generated from the non-metallic mineral product processing industries, such as cement, ceramics and brick manufacturing, followed by mobile sources, dust and large point sources. Therefore, the non-metallic mineral product processing industries should be the top priority for emission control. These sectors are mainly distributed in areas such as Jiangmen, Zhaoqing, Foshan and Dongguan, etc.

Volatile Organic Compounds (VOC): mainly generated from vehicle emission, paint, craft production process like printing and paper making, etc. VOC emission of the PRD is concentrated mainly in Guangzhou city centre, Dongguan and Shenzhen.

dioxide. For this purpose, a declaration system for sulphur dioxide emission should be developed by the environmental protection authorities. An acid rain and sulphur dioxide pollution database and a dynamic information management system should be established to improve the monitoring of acid rain. In each city of Guangdong Province, in particular those areas with serious acid rain pollution, routine monitoring stations should be established and the latest information about acid rain should be timely provided to the government and the public through a regional information platform. In terms of energy sources, urban citizens should be encouraged to use eco-friendly fuel. In PRD, utilization of liquefied natural gas should be promoted to replace coal and oil as the fuel for the power plants and industrial boilers. Use of quality energy sources such as natural gas, light diesel oil, liquefied petroleum gas, as well as nuclear energy or solar energy should be encouraged so as to reduce the use of coal and oil, thus minimizing pollutant discharge.

—— **Nitrogen Oxides:** it is proposed to tighten the control over exhaust emissions, enhance vehicle management system, and strictly carry out voluntary and mandatory old vehicle scrappage programs. Traffic network of the region should be improved through proper planning. Use of public transport should be encouraged. Pollutant discharge fee, congestion charge, and fuel tax should be introduced as means to reduce the number of vehicles. Fees may be reduced or exempted for vehicles with purification devices. The discharge of nitrogen oxides from power plants should be controlled, and low-NOx combustion technology should be adopted. Ways to promote clean combustion technology and flue gas de-nitrification technology should be explored.

—— **Inhalable Particles:** it is proposed to step up the pollution control measures over cement plants, and shut down or relocate small or technically outdated cement companies. In principle, new construction

or expansion of cement plants should no longer be allowed in PRD. Dust pollution should be reduced by controlling secondary dust (dust generated in construction, demolition, public works and roads traffic) by worksite enclosure, road paving, extension of greenbelts and timely clearing. Granule discharge from vehicles, power plant and boilers should also be controlled. Old buses and taxis should be replaced, and motorcycles should be forbidden to run in downtowns. Besides, all power plants and boilers should be equipped with fume purifying devices like electrical precipitators and bag filters. Oil smoke discharge from the catering industry should be controlled by installing oil smoke purifiers. Unorganized discharge of oil smoke from the catering industry should be strictly prohibited.

—— **VOCs:** it is proposed to enhance the relevant policy guidance; standardize industrial discharge; eliminate oil paints or coating products that are rich in VOCs; encourage production and sales of insect aerosols, detergents, adhesives and hair gels which are low in VOCs; require all companies engaged in automobile manufacturing and repair, petrochemical processing, furniture making and processing, shoemaking, printing, electronic products, and dry cleaning to manage and control unorganized VOCs emissions in accordance with relevant technical specifications; facilitate researches on VOCs; promote researches on ozone and VOCs to study the characteristics and development mechanism of photochemical smog in the region; and expand the scope of the Air Pollution Control (Volatile Organic Compounds) Regulation to limit VOCs content of binders, sealants, car touch-up paints and vessel paints.

6.2.2 Prevention and Control of Water Pollution in the Region

—— **Strengthening Cooperation in Protecting the Aquatic Environment in the Pearl River Basin**: to safeguard clean water supply in the region, the 11th Five-Year Plan on Prevention and Control of Water Pollution in the Pearl River Basin should be implemented. At the same time, comprehensive prevention and control measures to safeguard water quality in the basin should be carried out through furthering coordination and collaboration of all parties. To safeguard clean water from Dong Jiang and Xi Jiang, detailed and feasible plans should be drawn up for the protection of water sources and control of water supply, intake and drainage. Based on the Study on Planning of Water Pollution Prevention and Control in the PRD, we should define and demarcate water supply areas in the region, and develop specific water supply and drainage systems to ensure the supply of clean water. River improvement works should be carried out for the rivers that fail to meet the water quality standards even after adopting up-to-standard pollution control and sewage treatment, as well as the heavily polluted rivers that cannot restore their ecological functions by natural means.

—— **Control and Treatment of Urban Sewage:** taking advantages of the financial markets of Hong Kong and Macao to raise funds, construction projects of sewage treatment infrastructure in the region should be accelerated to alleviate water pollution at the inland sections and the estuary of Pearl

River. Construction of urban rainwater and sewage division systems should be promoted and the projects for the cleaning of harbour areas should be continued.

6.2.3 Control of Major Pollution Sources

—— Control of Point-based Pollution due to Industrial Activities: the Outline of Environmental Protection Plan for Pearl River Delta should be strictly implemented. Great efforts should be made to promote clean production, especially among the electricity, building materials, metallurgy, chemical and petrochemical industries. Pollutants discharge should be strictly controlled, and those heavily polluting enterprises should be kept away from

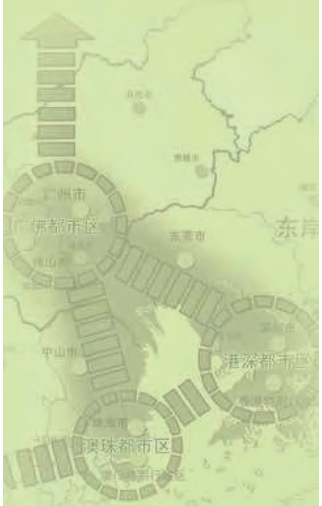
Table 6-2 River Regulation Projects for the Region (By 2010)

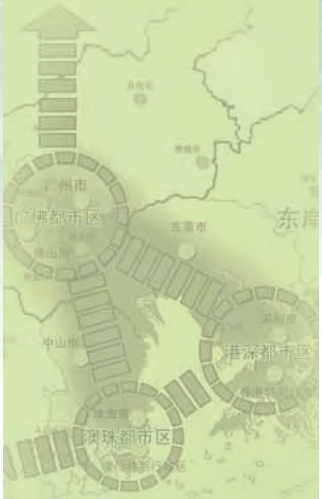
	Project Location and Description	Removal of Pollution Load (ton BOD/year)	Investment (RMB 100 million)	Operating Cost (RMB10,000/year)
Regional Main Project	Concerted Regulation over Water Systems and Reservoirs	-	3	1000
	Shabei Controlling Gate	-	3	500
	Sub-total	-	6	1500
Guangzhou	Liuxi River tributaries	4300	3.9	2300
	Streams in the Laoba Districts	17000	11.5	7600
	Zeng Jiang tributaries	4300	4.1	2300
	Streams in Shiqiao Waterway etc	12800	11.5	5300
	Streams in Huadu District	12800	10.5	5300
	Sub-total	51200	41.5	22800
Shenzhen	Shenzhen River	17000	12.0	7600
	Pingshan River	17000	11.5	7600
	Shawan River	4300	3.8	2100
	Maozhou River	12850	8.7	5700
	Other individual river systems	12800	10.7	5350
	Sub-total	63950	46.7	28350
Foshan	Foshan Waterway river system	25500	17.2	11500
	Southwest stream system	12800	9.6	5500
	Nanhai District steam system	11490	8.9	5000
	Shunde District stream system	8500	8.2	4200
	Gaoming River and its tributaries	4300	4.1	2200
	Sanshui District stream system	9580	7.4	4100
	Other stream systems	9580	7.5	4100
Jiangmen	Sub-total	81750	62.7	36600
	Streams in built-up areas of Jiangmen	21200	14.7	9500
	Heshan stream system	4250	3.8	2100
	Hetang and other streams	3190	3.0	1360
	Jiangxin and other streams	6200	7.6	4300
	Tan Jiang tributaries	6370	6.1	3200
	Sub-total	41210	35.2	20460

	Project Location and Description	Removal of Pollution Load (ton BOD/year)	Investment (RMB 100 million)	Operating Cost (RMB10,000/year)
Zhaoqing	Sui Jiang tributaries and its estuary	6100	5.1	800
	Streams in Zhaoqing urban areas	2100	1.9	1100
	Small tributaries of the Bei Jiang	2100	1.8	1100
	Small tributaries of the Xi Jiang	2000	1.8	1100
	Sub-total	12300	10.6	6100
Huizhou	Dong Jiang tributaries within Boluo District	4200	4.0	2200
	Danshui River system	9600	7.7	4100
	West Zhi Jiang tributaries (except Danshui River)	4100	3.7	2100
	Ditches in Huizhou urban areas Dong Jiang tributaries within	6400	5.1	2800
	Huicheng District	6300	5.7	3100
	Sub-total	30600	26.2	14300
Zhongshan	Qi Jiang River system	21290	14.3	9500
	Fuzhou Waterway System	18000	14.5	8100
	Zhong-Zhu and other streams	4500	3.7	2100
	Zhongshan and other streams	6700	7.4	5500
	Sub-total	50490	39.8	25200
Dongguan	Shimahe River system	11900	9.1	5600
	Dongguan Canal water system	26000	16.9	11000
	Streams in Hewangpian area	12700	9.7	5350
	Sub-total	50600	35.7	21950
Zhuhai	Qianshan River system	6100	4.8	2700
	Jiang-Zhu and other streams	6300	5.9	3100
	Streams along the River	2200	2.2	1100
	Sub-total	14600	12.9	6900
	Total	289420	469.3	186660

Notes: 1) Data Source: the Outline of the Environmental Protection Plan for the Pearl River Delta
2) The river flows of those under the Regional Main Projects are not counted in the Total. "Stream System in Jiangmen Built-up Area" means Jiangmen Waterway, Tianhe River, Tiansha River, Duyuan River and the streams in the built-up areas of Jiangmen. "Stream System in Huicheng Built-up Area" refers to Xinhui River, Lile River and streams around the Bird Paradise. "Jiangxin and other streams" mainly refers to those contaminated streams in Jiangmen New District and Yinzhou Lake Harbourfront Industrial District.

water sources, residences and other sensitive areas. Incentive mechanisms with fair rewards and punishments should be established to encourage enterprises to meet environmental standards. The industrial structure should be optimized by imposing more stringent criteria for the projects which have implications on the environmental quality to get approval and enter the market. Applications for new and expansion projects should be subject to stringent environmental impact assessment, under which applications from inefficient and highly polluting enterprises should by no means be approved. Study on the trading of emission rights, eco-compensation and circular economy should be intensified. Cooperation between Guangdong and Hong Kong in trading emission rights should be actively and yet prudently promoted with relevant experiences taken into account.



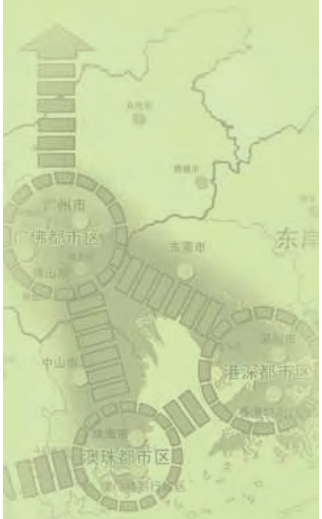


—— Control of Area-based Pollution due to Agricultural Activites: efforts should be stepped up to control the use of pesticides and monitor pesticide residues; ban the production, distribution and application of highly toxic pesticides; develop highly effective chemical and biological pesticides with lower toxicity and fewer residues; put fertilizer pollution under control; promote the use of formula fertilizers; control the use of nitrogen fertilizers, balance the proportions of nitrogen, phosphorus and potassium to enhance fertilizer effectiveness; control chemical fertilizer pollution; and promote the use of organic manure and recycled rice straw. To prevent and control pollution from livestock and poultry breeding, actions should be taken to strictly limit the scale of livestock and poultry breeding in the catchment area of Pearl River; cease to approve the establishment or expansion of large-sized livestock and poultry breeding enterprises; promote the relocation of animal breeding industry to the mountain areas with relatively sufficient land for eco-breeding; reduce drainage of livestock and poultry wastewater directly into ambient water bodies; and legislate, regulate and regularize the control of pollution arising from livestock and poultry breeding through environmental planning, environmental impact assessment, pollutant discharge reporting and registration, introducing pollutant discharge fee and permit, and imposing time limit for rectifying pollution.

6.3 Designation of Environmental Protection Duties

6.3.1 Demarcation of the Duties of Establishment and Protection of Eco-areas (Figure 6-4)

Figure 6-4 The Demarcation of Responsibities in the Establishment and Protection of Eco-areas in the Greater PRD City-region



(1) West Bank Ecological Zone

—— Macao: to actively complement and cooperate with Jiangmen, Zhongshan and Zhuhai in the establishment and protection of eco-areas on the west bank by making good use of its unique locational advantages.

—— Zhuhai: to focus on the establishment and protection of urban ecology, with Fenghuang Mountain, Huangyang Mountain, Hengqin Island, etc as the key protection targets, so as to give a full play to its influences to Macao.

—— Jiangmen: to establish important ecological buffers such as nature reserves and forest parks, so as to protect the existing woodland resources and give a full play to its importance in providing regional ecological buffers.

—— Zhongshan: to establish eco-agriculture zones with the focus on developing eco-areas that are aimed at protecting farmlands and green corridors, in order to give a full play to its role as an ecological transition zone.

(2) Central Ecological Zone

—— Guangzhou: to establish an ecological system with ecological buffer at the north and eco-transitional zone and eco-areas at the central. The establishment of green belts in the Pearl River water system (the Pearl River and its tributaries such as Liuxi River and Zeng Jiang, etc.) should be the key actions. The protection over the eco-areas in Baiyun Mountain–Maofeng Mountain should be enhanced.

—— Foshan: to build a comprehensive eco-corridor system along the northwest which mainly comprises woodlands serving as shelter of farmland and green belts along rivers and roads, and strengthen the cooperation with Zhaoqing and Conghua, so as to jointly establish an ecological buffer zone which exerts great influence upon Foshan.

—— Zhaoqing: to establish a northwestern mountain–based ecological buffer zone; strengthen the protection of native vegetation and ecosystem; actively establish nature reserves; and seek financial supports from Foshan, Guangzhou and other places to bring into play its role as a regional ecological buffer.

(3) East Bank Ecological Zone

—— Hong Kong: to focus on the establishment and conservation of forest resources mainly in the country parks; strengthen the establishment of terrestrial biological corridors with Shenzhen and cooperate with other PRD cities, such as Huizhou, to expand the scope of cooperation in ecological/ environmental protection.

—— Shenzhen: to focus on establishing the mountain-based corridors in the eastern areas and re-establishing terrestrial biological corridors with Hong Kong (such as Wutong Mountain); strengthen the establishment and conservation of forest parks; and support the eco-area establishment projects in Huizhou and other places.

—— Dongguan: to focus on establishing urban green core which mainly comprises forest parks such as Daling Mountain Park and Yinping Mountain Park; emphasize the connectivity of eco-areas and foster ties with other cities to support the eco-area establishment projects in Huizhou and other places.

—— Huizhou: to focus on the establishment and conservation of forest resources in the northern area of the region; ensure the continuity of the eastern mountain-based corridor; bring into play the location advantages to solicit support from Shenzhen, Dongguan and Hong Kong's investment for relevant eco-area establishment projects.

6.3.2 Regional Environmental Control Objectives

(1) Control of Air Pollutant Emission

—— Actions should be taken to control emission of air pollutants including sulphur dioxide (SO_2), nitrogen oxides (NO_X) and respirable suspended particles (PM10) etc. in accordance with the Air Pollutant Emission Indicators formulated in policy documents such as "the Outline of the Environmental Protection Plan for the PRD (2004-2020)" and "the PRD Regional Air Quality Management Plan". The total emission control targets of SO_2, NO_X and PM10 for the PRD by 2010 should be 398 000 tonnes/year, 418 000 tonnes/year and 284 000 tonnes/year respectively, and the targets by 2020 should be 358 000 tonnes/year, 395 000 tonnes/year and 270 000 tonnes/year respectively. The targets for Hong Kong should be 30 200 tonnes/year, 92 800 tonnes/year and 4 700 tonnes/year respectively, and the targets for Macao should be 11 400 tonnes/year, 30 800 tonnes/year and 900 tonnes/year respectively. To further improve the air quality of the PRD after 2010, this study recommends that the governments of Guangdong, Hong Kong and Macao should further discuss on imposing more stringent emission targets for 2020.

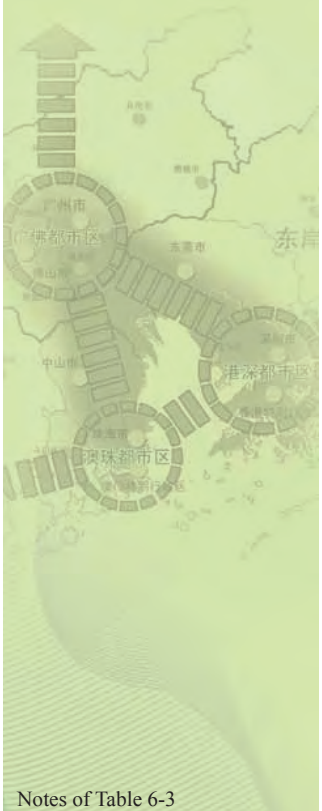
—— Projects which would cause huge emission of air pollutants should no longer be allowed at the centre and sub-urban areas of the major cities, including Guangzhou, Foshan and Dongguan. The air pollution sources in Huadu, Sanshui, Gaoming, Heshan, Xinhui, Doumen, Zhuhai, Panyu, the city centres of Guangzhou, Dongguan and Shenzhen have significant impacts on the air quality in the region. It is necessary to strengthen the control in these areas by upgrading the industrial technologies and strictly controlling the projects which would cause significant emission of air pollutants.

—— Pollutants from three major development districts, namely Daya Bay of Huizhou, Lingang Industrial District of Zhuhai and Nansha of Guangzhou have significant implication on ozone level. Stringent control measures on emission of nitrogen oxides and VOCs should be implemented. Further analysis of the significance of the pollutants in the formation of photochemical smog should be undertaken.

(2) Targets for the Control of Aquatic Environment (please refer to Table 6-3)

Table 6-3 Targets for the Control of Aquatic Environment in PRD

Item Category	Current Value (2002)	2010		2020	
		Conventional Development	Non-conventional Development	Conventional Development	Non-conventional Development
Industrial wastewater discharge (100 million ton)	16.85	28	42	38	50
Total COD discharge (10,000 ton)	126	120	130	100	90
Industrial COD discharge intensity (kg/RMB10,000 GDP)	13	5	4	3	2
Environmental protection investment as a share of GDP for the period (%)	-	1.3	1.85	0.49	0.48
Quality compliance rate of centralised drinking water source (%)	83.3	95		100	
Water consumption per unit GDP (m^3/RMB10,000)	70.7	43.8		27.4	
Quality compliance rate for urban water functional area (%)	48.3	90		100	
Quality compliance rate for cross-boundary water bodies (%)	<50	80		100	
Industrial water recycling rate (%)	18.4	50		70	
Inshore waters quality compliance rate (%)	80	90		100	
Centralised urban sewage treatment rate (%)	30	70	80	80	100
Domestic sewage treatment rate (%)	-	80	85	90	100
Ratio of Sewage treatment capacity to centralised water supply (%)	15	55	65	65	80
Oxygen-demanding organic matter (with BOD) removal efficiency (%) (ratio of removal to generation)	-	67	74	74	85
Sewage COD removal efficiency (%)	-	60	69	69	81
Sewage TP removal efficiency (%)	-	64	72	71	83
Sewage TN removal efficiency (%)	-	76	83	83	90
Urban sewage collection rate	30	70	80	80	100



Notes of Table 6-3
1 To tie in with the relevant plans of the PRD, data provided in the Third Topical Report on the Environmental Protection Plan in the PRD – Study Report on Water Pollution Prevention and Control Plan in the PRD and the Outline of the Planning for Environmental Protection in PRD has been adopted as the targets for the protection of water environment in the PRD.
2 Industrial wastewater discharge is estimated based on the current values and comparison with the overseas countries regarding the share of the industrial output in the GDP in different stages of development, and taking into account factors such as technology advancement.
3 COD discharge is calculated by multiplying the amount of discharge from both industrial and domestic sources by their respective discharge coefficient.
4 COD discharge intensity is calculated by multiplying the total discharge from industrial and domestic sources by their discharge coefficients, where those from domestic sources will be adjusted by the treatment coefficient.
5 The symbol "-" indicates missing data.

6.3.3 Major Projects and Measures

The major environmental technology problems of Greater PRD which require prompt action focus on the aspects of atmospheric and aquatic environment. Priority should be given to promoting clean production technology (Table 6-4) in these two aspects. In addition, priority should be given to promoting the following technologies in the near future:

Table 6-4 Priority Clean Production Technology to be Promoted in the GPRD City-region

	Technology Initiatives
Air Pollution Technology	1. Eliminate small power generation units that are high energy-consuming and highly polluting and improve the energy efficiency of thermal power plants.
	2. Install flue gas desulphurisation device for existing thermal power plants.
	3. All newly established, reconstructed and extended power plants must be equipped with flue gas desulphurization device and adopt low-nitrogen combustion technology.
	4. Tighten the control over motor vehicle exhaust emission; fully implement the national phase III standards regarding the discharge of air pollutants from motor vehicles; and implement EURO III standards in Guangzhou, Shenzhen, Dongguan and Foshan.
	5. As regards the control over nitrogen oxides emission from power plants, to adopt the low-nitrogen combustion technology; explore and promote clean combustion technology and flue gas desulphurization technology, such as the use of natural gas and advanced re-burning technology, or adopt selective or non-selective catalytic reduction technology.
	6. Equip the existing cement plants with bag filters to reduce emission of all pollution sources to less than 50mg/Nm^3.
	7. Power plants and industrial boilers are required to install smoke and dust purifying devices such as electrostatic precipitator and bag filter.
Water Pollution Technology	1. Prevent and control agricultural non-point source pollution; control pesticide pollution by means of further enhancing the supervision and management over the use of pesticides; strengthen the monitoring of pesticide residues; ban the production, sale and use of highly toxic pesticides; and explore effective chemical pesticides with lower toxicity and fewer residues and biological pesticides.
	2. Step up the efforts in promoting clean craft design throughout the industrial production process.
	3. Step up the efforts in developing sewage treatment technology. Specific techniques include the use of biological nutrient removal process to remove nitrogen, phosphorus and other inorganic nutrients; using the anaerobic-aerobic biological treatment technologies which have good effect on the refractory organic pollutants; treating refractory organic pollutants through microbial cultivation and genetic engineering methods; combining biological treatment technology and chemical/physical-chemical treatment processes to meet the requirements of sewage re-utilisation; using biofilm treatment processes such as various kinds of fillers or ceramists to treat micro-polluted water.

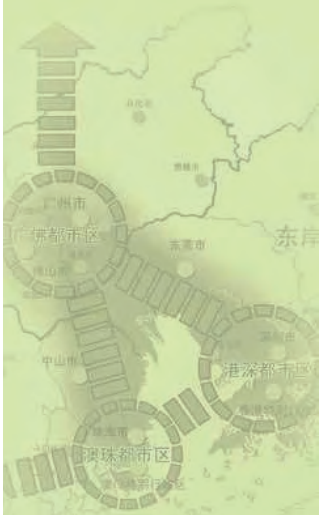
—— Establishment of Regional Eco-Security Buffer: based on the eco-function zoning for PRD in the "Outline of the Environmental Protection Plan for the Pearl River Delta", actions should be taken to build a regional eco-security buffer through initiatives such as conserving natural forests and establishing ecological forests in the mountain areas, transforming the commercial forests and low-quality natural forests, establishment of nature reserves, undertaking soil and water maintenance works, and conservation of coastal mangroves.

—— Construction of Urban Garbage and Sewage Disposal System in the Region: actions should be taken to rectify the current approach of urban garbage and sewage disposal (which relies mainly on filling) by a system driven by high-technology which promotes the conversion of garbage into resources.

6.4 Strengthening the Ecological/Environmental Protection of the Bay Area

6.4.1 Planning Ahead

Prior to kicking off large-scale construction projects in the Bay



Area, actions should be taken to set out proper zoning of functions through effective planning; screen out the existing and potential critical ecological/ environmental problems; implement all necessary remedial measures and formulate reasonable contingency plans for ecological/environmental protection, so as to ensure that no severely negative environmental effects would result and the socio-economic development objectives of the Bay Area could be materialized smoothly.

6.4.2 Raising Threshold for Industry Access and Implementing Necessary Environmental Protection Measures

As regards the future industrial development of the Bay Area, the access threshold should be raised to avoid the industries which are potentially hazardous to the ecology/environment from entering into business. In addition, during the planning stage of infrastructure or industrial projects, the environmental impact assessment requirements should be strictly complied with and effective mitigation measures should be undertaken to relieve all possible adverse ecological/environmental impacts to an acceptable level.

6.4.3 Giving Priority to the Construction of Environmental Infrastructure

Projects for environmental infrastructure and control over major ecological/environmental problems in the urban area should be implemented in strict compliance with the planned schedule. In addition, all necessary environmental infrastructure projects to address the future ecological/ environmental protection needs must be carried out first, before any large-scale development and construction projects commence.

6.4.4 Exercising Stringent Ecological Monitoring System

In addition to the above tasks, upon commencement of large-scale construction projects in the Bay Area, close monitoring of the ecology/ environment is required. The important environmental elements (such as the aquatic and atmospheric environment) and the ecological protection targets (such as wetlands) should be closely monitored so that any ecological/ environmental problems could be timely detected and resolved.

6.5 Joint Ecological/Environmental Studies

The governments of Guangdong, Hong Kong and Macao still need to press ahead with researches on ecological/environmental protection for further improvement of the regional ecology/environment. Though researches on environmental protection undertaken jointly by the governments of Guangdong, Hong Kong and Macao have already reached international standards, studies on multi-source atmospheric pollution, persistent organic pollutants (POPs) control and other topics that are closely related to the

regional ecology/environment still need to be intensified. Besides, studies on trading emission rights, circular economy, low-carbon cities, etc. should be further strengthened, and studies on eco-compensation mechanisms should be carried out in the long term, so as to enhance comprehensive protection of the ecology/environment in the Greater PRD City-region.

Chapter 7
Cross-boundary Cooperative Development Plans

The main purpose of the "cross-boundary cooperative development plans" detailed in this chapter is to support the "master spatial coordination plans", "transportation cooperative development plans" and "ecological/ environmental protection plans" in the land use and development aspects. In this study, "cross-boundary areas" cover the "adjoining areas" which are located along the boundaries among Guangdong, Hong Kong and Macao as well as the "non-adjoining areas" which do not adjoin the boundaries but have the potential for cooperative development or management by Guangdong, Hong Kong and Macao. This chapter comprises two parts, namely the "cooperation plans for the adjoining areas" and the "cooperation plans for the non-adjoining areas".

7.1 Cooperation Plans for the Adjoining Areas

The "adjoining areas" are unique spatial units in the coordinated development of the Greater PRD City-region, by being the key areas for undertaking system innovations. The "cooperation plans for the adjoining areas" serve to explore the innovative modes of land use and development at the "adjoining areas" and provide reference for the government of Guangdong, Hong Kong and Macao in reaching consensus on cooperative development.

7.1.1 Selection and Zoning of Cooperation Areas

Taking into consideration the idea of "innovative cooperation zone" under "the Outline", the scope of joint innovation under the cooperation agreement on "Shenzhen–Hong Kong Innovation Circle" and the established visions and conditions for cooperation among the "adjoining areas", this Study has identified a number of major cooperation areas (Column 7-1). Based on the respective functions, these areas are divided into five zones, i.e. the "joint innovation zone", "pilot logistics zone", "education cooperation zone", "tourism cooperation zone" and "boundary control cooperation zone" (Figure 7-1 and Table 7-1).

—— **Joint Innovation Zone:** including the Lok Ma Chau Loop Area, Shenzhen Qianhai and Houhai areas, Zhuhai Hengqin New District, Zhuhai–Macao Cross-boundary Industrial Zone, and Guangzhou Nansha District (Column 7-2) which are identified as "comprehensive joint innovation zones" under "the Outline". These areas are major spatial units for implementing joint research and development projects by the closely related industries in Guangdong, Hong Kong and Macao, in particular high-tech industries, with a view to enhancing the overall innovation capability of the three places.

—— **Pilot Logistics Zone:** including Shenzhen Qianhai–Bao'an District and Zhuhai Hengqin New District. In May 2008, United Parcel Service (UPS), one of the world's largest distribution companies, moved

Column 7-1: Cooperation Areas in the "Adjoining areas" of Shenzhen-Hong Kong and Zhuhai-Macao

1. "Adjoining areas" of Shenzhen/Hong Kong

Lok Ma Chau Loop Area: it is located in the frontier closed area of Hong Kong adjoining Shenzhen and has been earmarked for "joint development" by Hong Kong and Shenzhen.

Qianhai and Houhai Areas: they are located along the Guangzhou-Shenzhen-Hong Kong Development Axis and served by Shenzhen Bay BCP. They are designated as new urban centres under the comprehensive urban planning of Shenzhen, and are assigned the task of stepping up cooperation with Hong Kong and Macao in service industries and high-tech industries under "the Outline".

Liantang: Liantang/Heung Yuen Wai BCP is to be set up for goods delivery and logistics functions.

2. "Adjoining areas" of Zhuhai/Macao

Gongbei: bordering with Macao, it is served by the largest BCP in PRD and considerable provision of commercial, catering, residential and transport interchange facilities.

Wanchai: it is separated from Macao by a river and is served by a BCP. It could help relieve the shortage of residential space in Macao.

Nanping: it is separated from Macao by a river. It could help relieve the shortage of residential space in Macao.

Hengqin: it is separated from Macao by a river and is served by a BCP. It is the place where all key transportation facilities will pass through and thereby has a great potential for development.

Table 7-1 The Zoning of Cooperation Areas

Function Zone	Cooperation Areas
Joint Innovation Zone	Lok Ma Chau Loop Area, Qianhai and Houhai areas in Shenzhen, Hengqin New District in Zhuhai, Zhuhai-Macao Cross-boundary Cooperation Zone, Nansha District in Guangzhou
Pilot Logistics Zone	Qianhai-Bao'on District in Shenzhen, Hengqin District in Zhuhai
Education Cooperation Zone	Lok Ma Chau Loop Area in Hong Kong, Hengqin District in Zhuhai
Tourism Cooperation Zone	Shenzhen Bay, northeastern New Territories, areas along Mirs Bay, Hong Kong Disneyland, Wanshan Islands, Macao, Gongbei and Hengqin Districts in Zhuhai
Boundary-control Cooperation Zone	Liantang/Heung Yuen Wai BCP, Man Kam To BCP, Sha Tau Kok BCP, Huanggang/ Lok Ma Chau BCP, Shenzhen Bay BCP, Gongbei/Boundary Gate BCP, Hengqin/ Lianhua BCP

their Asian air transfer centre from Philippines to the Shenzhen airport, and decided to build its "Pan-PRD" logistics headquarters in Hengqin. All these have provided a good opportunity for the development of the logistics industry in the "adjoining areas" of Hong Kong/Shenzhen and Macao/Zhuhai. The designation of Qianhai–Bao'an District and the Zhuhai–Hengqin New District as pilot logistics zones has also been included in "the Outline" as an arrangement to promote innovative cooperations in the PRD region. Through innovative systems, the administrative barriers such as CIQ clearance can be relieved. It would facilitate "early and pilot implementation" of the policies concerning the logistics service industry under CEPA.

Figure 7-1 Zoning of Cooperation Areas

Column 7-2: Joint Innovation Zone

The latest progress of the joint development of the Lok Ma Chau Loop Area is that the land will be used mainly for developing higher education, which would be complemented with high-tech R&D facilities and creative industries.

Shenzhen Qianhai and Houhai areas are adjacent to the Shenzhen Bay BCP and the "Western Silicon Valley" intended to be developed by the Shenzhen Municipal Government. According to the Comprehensive Planning of Shenzhen, they would form the new urban centre, R&D and creative industry centre and headquarters base.

The latest progress of the Zhuhai-Macao cooperation in the development of Hengqin is the decision to relocate the University of Macao there. This will provide opportunities for cooperation in the development of innovation industries and training of human resources.

Under the framework of the "Zhuhai-Macao Innovation Circle", the Working Group on Cross-boundary Industrial Zone Transformation and Upgrading under the Expert Group on Zhuhai-Macao Cooperation has initially agreed to jointly push forward the transformation and upgrading of the Zhuhai-Macao Cross-boundary Industrial Zone, making it a cooperation platform for the service industries and high-tech industries of Guangdong, Hong Kong and Macao.

Though Nansha District of Guangzhou is not right next to Hong Kong, its waters adjoin Hong Kong. Besides, most of the land thereon is held by Hong Kong businessmen, which provides a basis for spatial cooperation. Positioned as a new city centre of Guangzhou, Nansha requires innovative technologies to support industrial development. It is therefore suggested that, based on the existing Nansha Information Technology Park, including the four research centres of the HKUST Fok Ying Tung Academy therein, further innovation resources should be pooled to develop Nansha into a Joint Innovation Zone.

—— **Education Cooperation Zone:** including Lok Ma Chau Loop Area in Hong Kong and Hengqin in Zhuhai. Hong Kong and Shenzhen should cooperate in establishing an education cooperation zone in the Loop Area and, using the university city to be built in the Loop Area as a basis, pursuing a "Hong Kong and Shenzhen Education Zone" for joint development of higher education and research and development of new and advanced technologies. For Hengqin, international educational resources (such as the Macao

University) should be utilized to establish an "education zone" which would focus on high-end professional training, technical training and general higher education.

—— Tourism Cooperation Zone: including Shenzhen Bay, the northeastern New Territories of Hong Kong, areas along Mirs Bay, the Disneyland, Wanshan Islands, Macao, and the Gongbei and Hengqin areas of Zhuhai.

The Tourism Cooperation Zone covers the major tourism resources in the "adjoining areas" of Hong Kong/Shenzhen and Macao/Zhuhai. Hong Kong and Shenzhen should cooperate in creating an eastern cross-boundary eco-tourism zone. In Hong Kong's tourism planning for the northeastern New Territories and Shenzhen's revision of its overall tourism plan, both cities should foster coordination to avoid duplication of developments. This can be done by integrating the local tourism resources, such as wetlands, parks and islands in Hong Kong and the Dameisha and Xiaomeisha beaches and Mirs Bay in Shenzhen, into comprehensive planning. The immediate focus should be put on coordination between the geology park planned to be established in the northeastern New Territories and the geology heritage park in Dapeng Peninsula. Besides, efforts should be made to create cross-boundary tourist routes through stepping up cooperation on major projects such as the reconstruction of Chung Ying Street, development of scenic tourism sections of Shenzhen River as well as the expansion of Hong Kong Disneyland. Harbour-based BCPs should be set up to facilitate movement of travelers by water-based transport. It could enhance the regional influences and attractiveness of the tourism resources in the east coast of Shenzhen and northeastern New Territories. Attention should also be paid to the coordination among tourism development and the operation of Yantian Port.

For Macao and Zhuhai, efforts should be made by both cities for joint development of tourism industry in Hengqin. These could include the expansion of Macao's tourism industry and conferences/trade shows business into Hengqin. Macao should capitalize on its advantages in tourism industry and consolidate its tourism resources and products with those of Zhuhai to promote leisure and creativity industries. Zhuhai and Macao should also cooperate to develop the Wanshan Islands, and expedite the development of recreational tourism projects (such as angling) through institutional arrangements.

—— Boundary Control Cooperation Zone: including the BCPs at Liantang/Heung Yuen Wai, Man Kam To, Sha Tau Kok, Huanggang/Lok Ma Chau, Gongbei/Boundary Gate and Hengqin/Lianhua. The linkages between the BCPs and the new development areas in Hong Kong, Macao, Shenzhen and Zhuhai should be fostered so that the BCPs could stimulate the surrounding land development. The construction and reconstruction of BCPs should be promoted, and actions should be taken to optimize the CIQ clearance facilities, enhance "passenger/cargo streaming", further study the implementation of "co-location of immigration and CIQ facilities", extend

the service hours, and enhance the passenger handling capacity to meet the increasing demand for CIQ clearance.

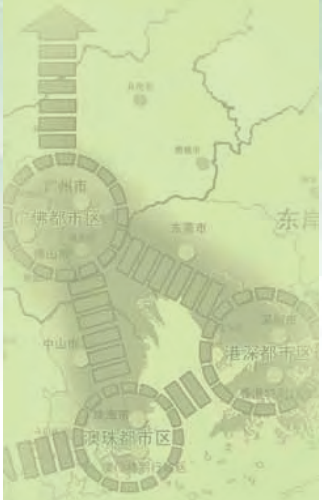
7.1.2 Zoning of the Adjoining Areas on the basis of cooperation approaches

On the basis of the "cooperation plans" as outlined above, this study recommended four categories of "cooperation approach zones" namely the Consultative Enhancement Zone, Cooperative Development Zone, Collaborative Development Zone and Joint Protection Zone as guidance for cooperative development or protection of the "adjoining areas" (Table 7-2, Figure 7-2).

Table 7-2 Zoning of the Adjoining Areas on Basis of Cooperation Approaches

Zoning	Cooperation Areas
Consultative Enhancement Zone	Futian BCP, Lo Wu BCP, Sha Tau Kok BCP, Gongbei/Portas do Cerco (Boundary Gate) BCP, Shenzhen Bay BCP
Cooperative Development Zone	Lok Ma Chau Loop Area, Liantang/Heung Yuen Wai BCP, Zhuhai–Macao Cross-Boundary Cooperation District, Hengqin Island
Collaborative Development Zone	Qianhai and Houhai areas in Shenzhen, northwestern New Territories, Nansha in Guangzhou, Nanwan in Zhuhai
Joint Protection Zone	Shenzhen Bay, the northeastern New Territories, Mirs Bay, Modaomen Waterway, Shizimen Waterway, Macao–Zhuhai inshore areas, Lingdingyang, Wanshan Islands, Pearl River Estuary

Figure 7-2 Zoning of the Adjoining Areas on Basis of Cooperation Approaches



(1) Consultative Enhancement Zone

Coverage: the well-established "adjoining areas" with well-defined functions in the PRD region, Hong Kong and Macao, including the major land-based BCPs and adjoining urban areas.

Principles: on the basis of maintaining the existing functions, continuous efforts should be made to step up cooperation by means of facilitating CIQ clearance, renovating and expanding the existing CIQ clearance facilities, with a view to enhancing the functions of these "adjoining areas" in regional cooperation.

Measures: coordination among the BCPs should be further intensified to enhance their capacity and create a more user-friendly CIQ clearance environment, through the measures such as improvement of hardware, implementation of electronic CIQ clearance and cooperation in management. A planning consultation system should be set up to facilitate cross-boundary consultation on the matters such as the distribution of pollution sources and development of major projects at the planning stage in order to promote the overall development of the region.

(2) Cooperative Development Zone

Coverage: the areas which are under development studies or under initial stage of development, and require cooperation in development due to respective spatial uniqueness.

Principles: a sustainable and effective coordination mechanism should be established to strengthen the cooperation between different authorities and promote cooperative development of the concerned areas.

Measures: based on the existing coordination mechanisms (the corresponding Expert Groups), the concerned authorities should formulate the principles and common agenda for cooperative development and ensure the continuity of the coordinating mechanisms. They should jointly explore innovative modes of cooperative development to enhance the competitiveness and institutional advantages of the concerned areas.

(3) Collaborative Development Zone

Coverage: the areas that are mainly developed by the government of the local area but allow the participation of the cross-boundary counterparts.

Principles: although these areas are under the sole jurisdiction of one government, their development requires the support of the cross-boundary counterparts (e.g. Shenzhen Qianhai and Houhai areas, Nanwan of Zhuhai and the northeastern New Territories of Hong Kong). Hence, collaboration is necessary.

Measures: the government of the local area should launch thorough consultation with the cross-boundary counterparts during the planning stage on the issues concerning planning and institutional arrangements. An institutionalized platform involving the governments, public and business community into discussion on the development strategy for the area should be set up. The platform should be able to represent the interests of all concerned bodies and enhance the overall competitiveness of the Greater PRD City-region.

(4) Joint Protection Zone

Coverage: the areas in need of joint protection by the PRD and Hong Kong/Macao.

Principles: since these areas cover mainly the water areas and several nature reserves with regional significance such as the Mai Po–Futian Wetland and the Chinese White Dolphin Sanctuary, they have significant ecological/ environmental implications on the region and should be jointly protected by Guangdong, Hong Kong and Macao.

Measures: the coverage of this zone should be determined jointly by the concerned governments in order to establish consensuses on joint protection. Division of powers and responsibilities for cross-boundary protection should be ascertained to facilitate implementation of the protection measures by each concerned body.

7.1.3 Major Cooperation Projects under Planning in the Adjoining Areas

(1) Lok Ma Chau Loop Area: as early as in 1996, the "Shenzhen Special Economic Zone Foundation for the Promotion of Economic Development in Shenzhen and Hong Kong" has initiated the idea of establishing a "Shenzhen River Economic Cooperation Zone" at the Loop Area. Similar proposals have been raised by the Shenzhen municipal government twice thereafter. The Hong Kong 2030 Study also put forward a proposal of "China/International Trade Exposition". However, no consensus on these proposals has been reached between Hong Kong and Shenzhen. In June and July 2008, the governments of the two cities were called upon by the Hong Kong–Shenzhen Joint Task Force on Boundary District Development to concurrently launch public consultations on the possible future land uses of the Loop Area. According to the consultation, the public of both cities considered that the Loop Area should be used for higher education, research and development of new and advanced technologies, creative and cultural industries. On this basis, comprehensive studies on the planning, environmental, transportation and engineering feasibility should be undertaken.

(2) Hengqin Island: in accordance with "the Outline", Hengqin should fully capitalize on its advantages under the "One Country, Two Systems" arrangement and serve as an area for "early and pilot implementation" of open-door policies and development of new technologies and systems under the

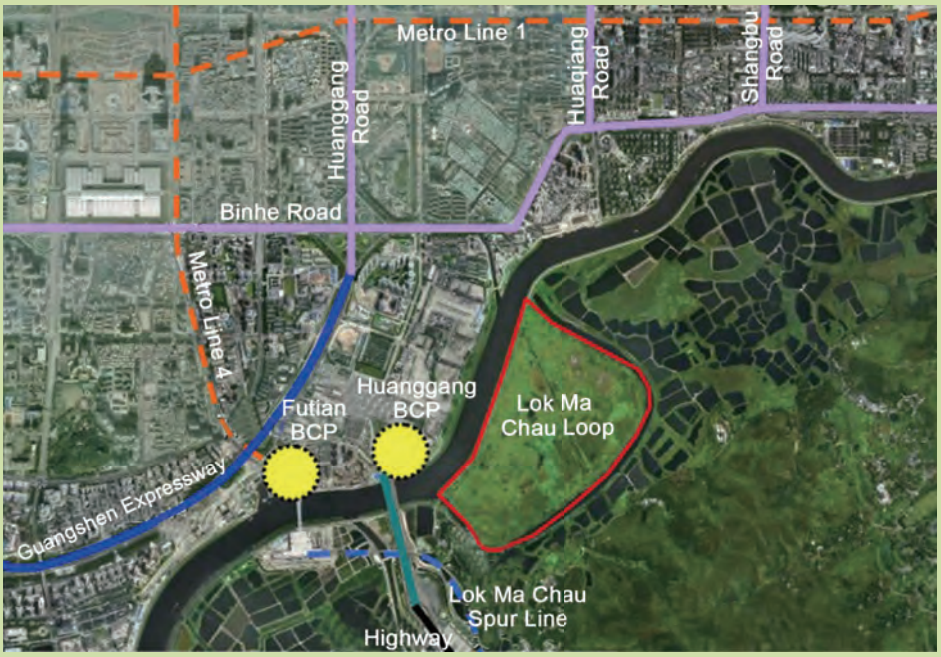


Figure 7-3 Location of the Lok Ma Chau Loop Area

Source: Final Report of the Public Engagement Exercise to Collect Community Views and Aspirations on Possible Future Land Uses for the Lok Ma Chau Loop (2008), Shenzhen Municipal Planning Bureau, Hong Kong Planning Department.

themes of cooperation, innovation and servicing. It should be developed into an innovative cooperation zone between Guangdong, Hong Kong and Macao, play a leading role in PRD to serve Hong Kong and Macao, and act as a model for the whole China. According to the Comprehensive Development Plan of Hengqin approved by the Standing Committee of the State Council in June 2009, Hengqin Island should be developed for leisure and holiday resorts, high-tech industries, research and development of new technologies, cultural and creative industries as well as higher education. On this basis, further studies should be launched on the mode of cooperation in land development and administration, industrial development, environmental impact assessment, transport linkages and so on.

(3) Zhuhai–Macao Cross-boundary Industrial Zone: established with the approval of the State Council and commenced operations in 2006, this area is located between Maoshengwei in Gongbei of Zhuhai and Cheongju of Macao. It was assigned as an experimental zone for in-depth economic cooperation between Guangdong and Macao, a model zone for new industrialization, an exhibition and marketing zone for modern logistics, and a pilot free trade zone. In response to the industrial upgrading in the Greater PRD region, in April 2009, the Zhuhai–Macao Specialized Cooperation Task Force under the Guangdong–Macao Cooperation Joint Conference set up a working group for the transformation and upgrading of the Zhuhai–Macao Cross-boundary Industrial Zone. The working group has agreed to adjust the industrial mix in the zone and boost the development of logistics, entrepot trade, product exhibition and marketing along with the manufacturing industries, with a view to developing the zone into an innovation zone for industrial cooperation between Zhuhai and Macao (renamed Zhuhai-Macao

Figure 7-4 Functional Layout Plan of Hengqin

Source: The Comprehensive Development Plan of Hengqin as approved at an executive meeting of the State Council

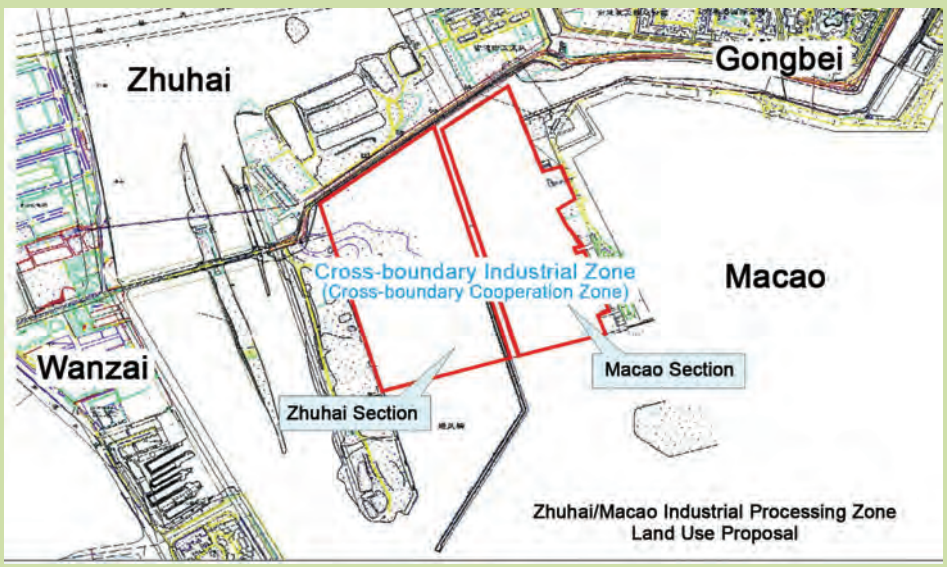


Figure 7-5 Location of the Zhuhai–Macao Cross-boundary Cooperation Zone

Cross-boundary Cooperation Zone) and promoting sustainable development. The change of the land uses should be expedited to facilitate industrial transformation, and studies should be undertaken to promote innovation in the cooperation of land development and administration.

7.2 Cooperation Plans for the Non-adjoining Areas

The "Cooperation Plans for the Non-adjoining Areas" proposed in this study outline the cooperation among Guangdong, Hong Kong and Macao in innovation, tourism and social services, with a focus on the spatial distribution of cooperation areas and mechanisms of cooperation.

7.2.1 Cooperation in Innovation

—— From the overall spatial perspective, the major actions of cooperation should be to facilitate development of the "Shenzhen/ Hong Kong Innovation Circle" and strengthen the cooperation between Guangzhou and Hong Kong in the industrial, academic and research aspects. The objectives of cooperation are to support China in the development of "innovative cities" and promote the establishment of a regional innovation system with Guangzhou–Shenzhen–Hong Kong as the major axis. A development strategy should be formulated for the Bay Area and an action plan should be prepared to develop the Bay Area into a global manufacturing, servicing and innovation centre, an international "innovation bay" and "liveable bay", and a pilot area for cooperation in high-tech industries, financial services and logistics industries (Table 7-3, Figure 7-6).

—— Joint Innovation Zone: to serve mainly the high-tech industries. It would facilitate cooperation of the closely related industries in

Table 7-3 Distribution of the Areas for Cooperation in Innovation

Type of function	Cooperation Areas		Justifications
Joint Innovation Zone	Key Areas of Cooperation	Guangzhou Science City, Shenzhen High-tech Industrial Park and Zhuhai National Hi-tech Industrial Development Zone	The Outline of the Plan for the Reform and Development of the PRD
	Potential Areas of Cooperation	Guangzhou University City, Shenzhen University City, Zhuhai University Park, Dongguan Songshan Lake Science and Technology Industrial Park, Huizhou Chung–Kai Hi-tech Industrial Development Zone, Huiyang Economic and Technology Development Zone, Zhongshan Torch Hi-tech Industrial Development Zone and Foshan National Hi-tech Industries Development Zone.	Topical Study II of the GPRD Study
Pilot Financial Reform and Innovation Zone	Key Areas of Cooperation	City centres of Guangzhou and Shenzhen, Foshan Qiandeng Lake District	The Outline of the Plan for the Reform and Development of the PRD
	Potential Areas of Cooperation	New development areas of Guangzhou, Pinghu Area and Qianhai of Shenzhen, city centres of Zhuhai, Foshan and Dongguan	Topical Study II of the GPRD Study
Pilot Logistics Innovation Zone	Key Areas of Cooperation	Baiyun District and Nansha of Guangzhou, Qianhai Area of Shenzhen and Hengqin of Zhuhai	The Outline of the Plan for the Reform and Development of the PRD
	Potential Areas of Cooperation	Shenzhen Shajing–Songgang, Longgang, Longhua–Guanlan, Gangming–Gongming, Dongguan Chashan, Humen–Changan, Chang Ping–Hengli, city centre of Huizhou, Daya Bay, eastern Huizhou, city centre of Guangzhou, eastern Guangzhou, city centres of Foshan, Zhaoqing, Zhongshan and Zhuhai, eastern Zhongshan, Xiaolan–Guzhen, western Zhuhai, Jiangmen Guanghai Bay	Topical Study II of the GPRD Study

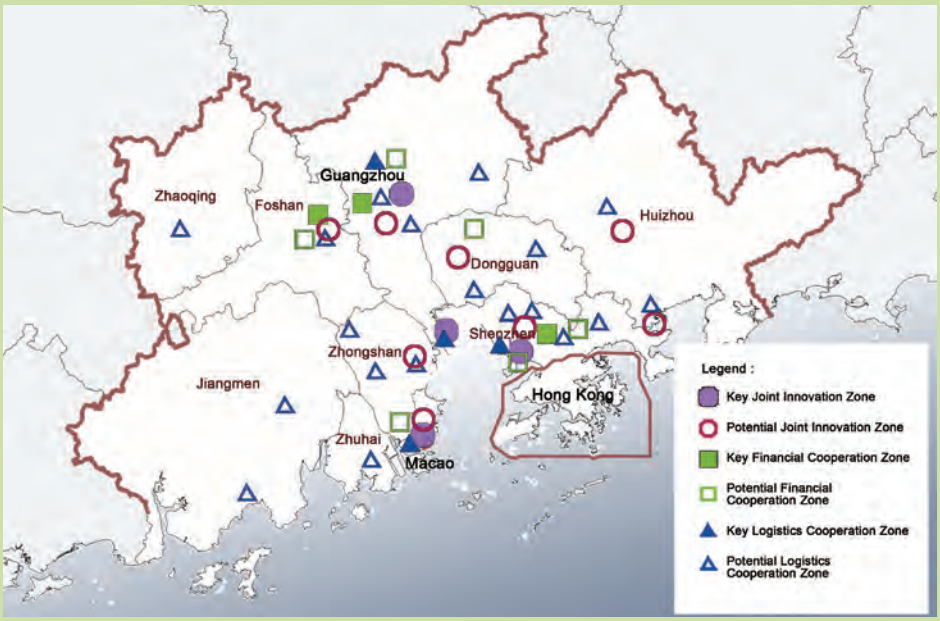


Figure 7-6 Distribution of Areas of Cooperaton in Innovation

Guangdong, Hong Kong and Macao in researches with a view to enhancing the overall innovation capability. Cooperations could be carried out on the basis of the existing university cities, science parks, hi-tech industrial parks and major innovation platforms in the Greater PRD City-region. Based on "the Outline", Guangzhou Science City, Shenzhen High-tech Industrial Park and Zhuhai National High-tech Industrial Park are chosen to be the primary implementation areas, while Shenzhen University City, Zhuhai University Park, Guangzhou University City, Huizhou Chung Kai High-tech Development Zone, Huiyang Economic and Technology Development Zone, Dongguan Songshan Lake Science and Technology Industrial Park, Zhongshan Torch High-tech Industrial Development Zone, Foshan Natural High-tech Innovational Park, etc. should serve as the potential implementation areas[1].

—— Pilot Financial Reform and Innovation Zone: Guangdong, Hong Kong and Macao should cooperate for early and pilot implementation of financial reform and innovations by means of developing relevant pilot zones, which could include the city centres of Guangzhou and Shenzhen, with the Foshan Qiandeng Lake serving as the financial service area (back office). Subject to further studies, the new development areas of Guangzhou, Pinghu & Qianhai Areas of Shenzhen, and the city centres of Zhuhai, Foshan and Dongguan are the potential areas for cooperation in financial innovation[2] .

—— Pilot Logistics Innovation Zone: to facilitate "early and pilot implementation" of the arrangements under CEPA regarding logistics service industries through easing administrative barriers (such as CIQ clearance). The areas near to the major airports, ports and land traffic hubs should be taken as the major areas of cooperation (Table 7-4). Guangzhou and Shenzhen should be developed as the primary logistics hubs, with the bonded ports and integrated bonded zones in Baiyun & Nansha of Guangzhou and Qianhai Bay of Shenzhen developed into harbour-front logistics parks in accordance with "the Outline". Hengqin of Zhuhai should be developed as the secondary logistics hubs, with streamlined CIQ clearance procedure and development of an exhibition/convention and logistics park[3]. The Shajing–Songgang,

1 Based on the finding of Topical Study II of the GPRD Study-Cross-boundary Regional Study.

2 Based on the findings of Topical Report II of the GPRD Study.

3 Zhang Wenxian : Study Report on the Competitiveness of the Guangdong Logistics Industry (2008.1).

Longgang, Longhua–Guanlan and Gangming–Gongming areas of Shenzhen, Chashan, Humen–Changan and Chang Ping–Hengli areas of Dongguan, the city centre and Daya Bay of Huizhou, Guangzhou (city centre and the eastern part), city centres of Foshan and Zhaoqing, Zhongshan (city centre, the eastern part and Xiaolan–Guzhen), Zhuhai(city centre and the western part) and Guanghai Bay of Jiangmen are identified as the potential areas for cooperation in logistics.

—— Development of a Cooperation System for Innovation in the Region: to safeguard joint innovation; promote early and pilot implementation of the opening-up policy to allow the extension of the service industries of Hong Kong and Macao into Guangdong; and integrate and coordinate in the operation of logistics parks in the Greater PRD City-region (Column 7-3).

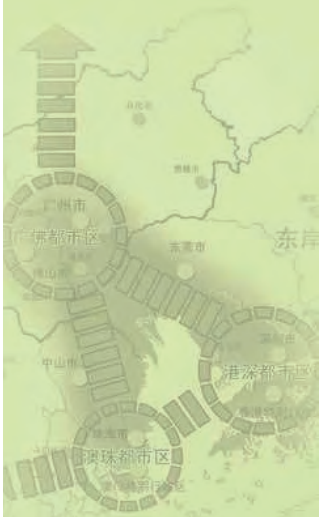
Table 7-4 Major Logistics Parks in the GPRD City-region

Name	Major Logistics Park
"Three large and five small" logistics parks in Guangzhou	"Three large logistics parks": Nansha Logistics Park, Huangpu Logistics Park and the International Airport Logistics Park "Five small logistics parks": Fangcun, Baiyun, Zengcheng, Huadu and Panyu integrated logistics parks
Six major logistics parks in Shenzhen	Yantian Port Logistics Park, Airport Aviation Logistics Park, Pinghu Logistics Park, Longhua Logistics Park, Qianhai Bay Logistics Park, Sungang–Qingshuihe Logistics Park
Hong Kong	Lantau Logistics Park (under study)
Macao	Under consideration by the government

Source: Existing and Policy Planning of the Three Major Logistics Economic Zones in the Mainland (10.1.2006), http://www.istis.sh.cn/list/list.asp?id=2518

7.2.2 Cooperation in Tourism

—— Establishment of Tourism "Gold Coast": the "Plan for the Development of the PRD Townships" proposed comprehensive protection and rational use of the natural coastline resources of PRD to create eco-friendly coastlines featuring distinctive views and a tourism brand of "Sunshine Coast". This study proposes a "Gold Coast" concept by incorporating the tourism resources of Hong Kong and Macao into the notion of "Sunshine Coast". The eco-friendly coastlines in Guangdong would be integrated with the distinctive cultural charms of Hong Kong and Macao to form a package of upgraded tourism assets of the region which would enhance tourism development and competitiveness of the region. The proposed "Gold Coast" would comprise mainly the areas along Nianping Peninsula–Xunliao Bay–Daya Bay, Mirs Bay–Dapeng Peninsula, Hong Kong and its outlying islands, Macao, Hengqin Island, Yamen–Gudou, Chuanshan Islands, Wanshan Islands–Outer Lingding Yang–Guishan Island (Figures 7-7). The major tourism resources that call forth cooperation in development include the geology parks in Shenzhen, Mirs Bay and northeast New Territories of Hong Kong, the mangroves



Column 7-3: Proposed Actions of Cooperation in Innovation

(1) **Implementing mechanisms to safeguard joint innovation:** to study the idea of the "Guangdong-Hong Kong-Macao Innovation Circle"; improve the current schemes for sponsoring technology cooperation, and consider expansion of the scope of the schemes; establish platform for industrial innovation jointly by Guangdong and Hong Kong, and continue to organize leading R & D institutions in Hong Kong to visit specialized towns and industrial bases in Guangdong, in a bid to promote application of the advanced technologies and achievements of Hong Kong by Guangdong; further enhance the cooperation within the "Shenzhen-Hong Kong Innovation Circle", through enhanced planning and development of relevant facilities and strengthening the cooperation amongst industrial, academic and research institutions; support the development of innovative cities in China; establish a regional innovation system with Guangzhou-Shenzhen-Hong Kong as the major axis; and facilitate scientific researches and upgrading and transformation of enterprises in the PRD region.

(2) Promoting early and pilot implementation of the opening-up policy to allow the extension of Hong Kong and Macao service industries into Guangdong: under the framework of CEPA, Guangdong should further open up and lower thresholds for the access of the small and medium enterprises from Hong Kong and Macao into its market by establishing a CEPA "green passage". Efforts should be made for the mutual recognition of professional qualifications between Guangdong and Hong Kong in various industries, including banking, securities trading, insurance, company appraisal, accounting, legal, education, health care and construction. Guangdong should establish policies to facilitate expansion of services of the banks from Hong Kong and Macao in the PRD region. Hong Kong and Macao banks should be allowed to hold equity shares in joint-stock commercial banks, urban commercial banks and rural credit cooperatives in Guangdong. Hong Kong and Macao financial institutions, enterprises and residents should be allowed to participate in the establishment of village or township banks and small loan banks in Guangdong. Policies should be formulated to provide guidelines for cooperation among Guangdong, Hong Kong and Macao in the financial sector. The system for cross-boundary settlement of RMB and foreign currency should be enhanced to facilitate economic and trade dealings among Guangdong, Hong Kong and Macao. Eligible enterprises in Guangdong should be encouraged to raise funds in Hong Kong through IPO activities, thereby laying the foundation for establishing a common financial market among Guangdong, Hong Kong and Macao.

(3) Integration of and coordination among the logistics parks in the Greater PRD City-region: the relevant governments of the PRD should communicate with the logistics industry sector in Guangdong, Hong Kong and Macao to jointly draw up the plans for the integration of and coordination among the logistics parks.

In addition to the above tasks, concerted efforts should be made to publicize the quality business environment in the Greater PRD City-region and formulate favourable human resources policies to encourage cross-boundary cooperation among Guangdong, Hong Kong and Macao.

nature reserve in Shenzhen Bay, the theme parks in Shenzhen, the exhibition/ convention, leisure facilities and theme parks of Macao, and Wanshan Islands (Figure 7-8)

—— Development of a Cooperation System for Tourism: a tourism development plan of the coastal areas of the Greater PRD City-region should be drawn up to consolidate and coordinate the land use of the coastlines. The existing planning of urban development in the coastal areas should be reviewed and the development of key areas should be closely monitored. Mechanisms and proposals of protecting the coastal tourism resources, including the cross-boundary resources, should be established.

Figure 7-7 The Tourism "Gold Coast" of the Greater PRD City-region

Figure 7-8 The Distribution of Tourism Cooperation Areas in the Greater PRD City-region

The overall tourism image of Greater PRD City-region should be improved through comprehensive marketing and strengthening the training of tourism professionals. The transport, servicing and policy barriers for the share of resources, information, markets and infrastructures should be removed through cooperation.

7.2.3 Cooperation in Social Services

Supplement IV and V to CEPA signed between Guangdong and

Hong Kong and between Guangdong and Macao in June 2007 and July 2008 respectively have expanded Guangdong–Hong Kong and Guangdong–Macao cooperation in production and services trading to the aspects of social services including medical services, education and elderly services. This is a response to the increasingly closer links among Guangdong, Hong Kong and Macao and the trend that more and more Hong Kong and Macao people live in Guangdong, which has given rise to the pressing needs for social services. The initiative of "building high-quality living area" by Guangdong, Hong Kong and Macao also calls for promoting the cooperation in social services among the three places (Table 7-5 and Figure 7-9).

—— Cooperation in Education: the proposal raised in the 2008 Guangdong–Macao Cooperation Joint Conference with regard to the establishment of schools in Guangdong for Macao children should be

Table 7-5 Distribution of Cooperation Areas on Social Livelihood

Type of Function	Area for Cooperation	Justifications
Education	Key areas for cooperation: Shenzhen (setting up classes for Hong Kong children), Zhuhai, Zhongshan (setting up primary schools for Macao children)	Guangdong/Hong Kong, Guangdong/Macao Cooperation Joint Conferences;
	Potential areas for cooperation: all cities (renowned universities of Hong Kong to organize independent schools or research institutes), Foshan, Zhaoqing, Dongguan for joint establishment of vocational schools	consensus between the governments of Guangdong/ Hong Kong, Guangdong/ Macao, Shenzhen/ Hong Kong, and Zhuhai/Macao
Elderly services	Key areas for cooperation: Shenzhen, Dongguan (Guangdong/Hong Kong), Zhuhai, Zhongshan (Guangdong/Macao)	Topical Study II
	Potential areas for cooperation: Zhaoqing, Jiangmen	Topical Study II
Medical services	Key areas for cooperation: Guangzhou, Shenzhen, Zhuhai, Dongguan, Foshan	Topical Study II
	Potential areas for cooperation: Zhongshan, Zhaoqing, Jiangmen	Topical Study II
Culture	Key areas for cooperation: Macao, Kaiping, Guangzhou, Foshan, Zhaoqing, Hong Kong	Topical Study II
	Potential Areas for Cooperation: Shenzhen, Zhuhai, Zhongshan, Huizhou	Topical Study II

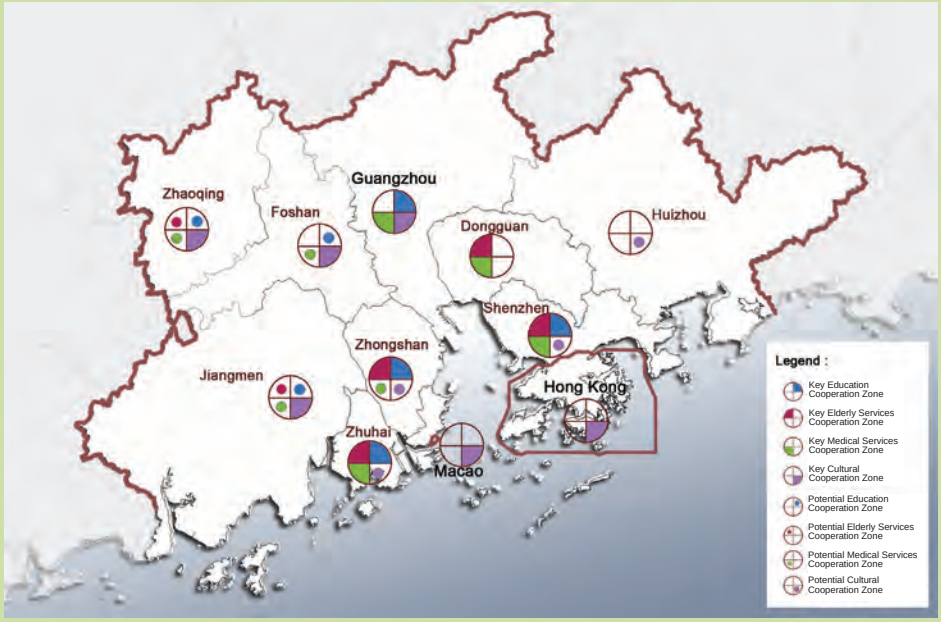


Figure 7-9 Distribution of Cooperation Areas in Social Services

implemented, and the relevant feasibility studies and site selection in Zhuhai and Zhongshan should be expedited. Study should also be taken to explore the ways to set up classes for Hong Kong children in Shenzhen. Making use of the internationalized education resources of Hong Kong and Macao for higher education and vocational education, the universities in Hong Kong and Macao should consider setting up education programs or joint scientific and research institutes in Mainland in order to train up more quality manpower to serve various sectors. Foshan, Zhaoqing and Dongguan should take the vocational training system of Hong Kong as reference to set up new vocational and technical schools.

——Cooperation in Elderly Services: Guangdong and Macao have jointly initiated researches on elderly care systems, and identified Zhuhai and Zhongshan as the major cooperation areas[1]. Elderly nursing homes and elderly communities should be located in areas with good environment, adequate public services (such as health care) and high accessibility. At present, the elderly nursing homes serving Hong Kong elderly and the properties purchased by Hong Kong people for retirement are primarily in Shenzhen, Dongguan and Zhuhai, in particular the city centre of Qianhai–Bao'an and Longgang of Shenzhen, Changping–Hengli and Zhangmutou–Tangxia of Dongguan, and the city centre of Zhuhai[2]. These areas will remain as the key areas of cooperation in elderly care in the future. With the establishment of "quality living area in Greater PRD City-region" and the improvement of accessibility in the region, the city centres of Zhaoqing and Jiangmen will be the potential areas of cooperation.

—— Cooperation in Medical Services: cooperation in medical services should be complemented with cooperation in education and housing development. The city centres of Guangzhou, Shenzhen, Zhuhai and Foshan, as well as Changping–Hengli and Zhangmutou–Tangxia of Dongguan, Qianhai–Bao'an and Longgang of Shenzhen, where many Hong Kong and Macao residents live, are the key areas of cooperation. The city centres of Zhongshan, Zhaoqing and Jiangmen are the potential areas of cooperation.

—— Cooperation in Culture: cultural interflow should be promoted through the establishment of the required platforms and integration of cultural resources by means of performances, exhibitions, publications, museums and cultural parks as well as information platforms. Priority should be given to the protection of the world's historic and cultural heritage such as the Historic Centre of Macao and Kaiping Watchtowers, the national level historic and cultural cities such as Guangzhou, Foshan and Zhaoqing, and a number of historic and cultural towns and villages. Efforts should also be given to make the "Nan Yue Heritage Site" a United Nations World Heritage Site, and the "Guangdong Opera" a UNESCO's "Masterpieces of Oral and Intangible Heritage of Humanity", and support the preservation of archaeological sites in Hong Kong and the launch of conservation initiatives including the Revitalizing Historic Buildings Through Partnership Scheme.

1 Han Deping. The Establishment of Diversified Retirement Security Systems-A Comparative Study of the Retirement Security Systems in Guangdong and Macao. Guangdong Province Research Centre, 2006.

2 Based on the findings of Topical Study II of this Study.

—— Development of a Cooperation System for Social Services: actions should be taken to set up a public administration policy framework regarding the provision of social services in Guangdong, Hong Kong and Macao. The focus should be put on addressing the needs for social services arising from the great number of Hong Kong and Macao citizens working and living in Guangdong and enhancing the entry into and exit from Hong Kong and Macao by Guangdong citizens, as well as the non-Guangdong citizens who always reside in Guangdong. The education resources in Greater PRD should be integrated by using Hong Kong and Macao as a platform. Formulation of details for medical cooperation should be expedited, and studies should be carried out on how Guangdong–Hong Kong and Guangdong–Macao could address the issues arising from the opening up of medical services, such as the mutual recognition of qualifications of medical practitioners, medical insurance arrangements, patient referrals and import of drugs. Actions should be taken to foster communication among the concerned sectors and draw up the detailed implementation plans and the related administrative measures.