

Putrajaya –Administrative Centre of Malaysia -Planning Concept and Implementation-

Ho Chin Siong – Universiti Teknologi Malaysia, 81310 Skudai, Johor Bahru. csho59@yahoo.com

Sustainable urban development and Governance conference at SungKyunKwan University
Seoul
on 16 Nov 2006- organised by SUDI , Seoul, Korea

Abstract

Putrajaya was designated as the new administration seat of the Malaysian Government following the Government's decision to relocate the federal administrative capital in June 1993 from Kuala Lumpur to the district of Sepang in Selangor. The relocation was part of the decentralisation efforts and also the Government's efforts to alleviate traffic congestion in Kuala Lumpur to ensure its continued development as Malaysia's premier business hub. Putrajaya is a model city planned with "great respect for the environment" The city is planned to embrace two (2) main themes -- city in a garden and an intelligent city. The construction of Putrajaya commenced in October 1996. By 2006, Putrajaya has a population of 60,000 and is supported with modern and smart public amenities and infrastructure. About 38% of the land is being developed into parkland. Putrajaya has the largest man-made wetland totaling about 200 ha, which is used for recreational activities, scientific and biological research. Putrajaya represents an administrative centre for the new millennium.

1.0 Introduction

Planning for a new Governmental administrative centre is not a new phenomenon. It can be observed for cities like Washington, D.C (1887), Ottawa (1880), Canberra (1912), Chandigarh (1952) and Abuja (1975). The presumption had always been that it was a lot easier and cost effective to have a new site or Greenfield development for such massive urban development. This trend of building new administrative centre can also be seen in the recent cases in Pinmana, Myanmar which is located about 320km north of Yangon and the proposed South Korea's new capital 150km south west of Seoul in Yeongi Gongju region.,

The idea for the establishment of Malaysian Government administrative centre away from Kuala Lumpur was mooted since 1993. One of the main rationales for moving the administrative centre away from Kuala Lumpur was to ensure a quality urban living and environment for the new administrative centre. The moving of the administrative functions of the Federal Government away from the already congested capital city of Kuala Lumpur not only helped to relieve the pressure on Kuala Lumpur's over-stretched infrastructure but also resolved the great shortage of Government land to cater for increased demand for office space. By establishing a new administrative centre at a new site, the opportunities to have a well-planned urban centre with modern facilities and technology to enhance Government efficiency and productivity was boundless.

Putrajaya is the largest integrated urban development project in Malaysia. It combines the development of Government institutions with accompanying amenities and infrastructure and commercial cum residential development. It is planned as the new federal Government administrative centre of Malaysia. The creation of Putrajaya marked a new chapter in the development history for the design team of Malaysia. It was a great challenge to Malaysian professionals to embark on a project which represented Malaysian's values and culture. The planning and development of Putrajaya is special because it involves mainly the Malaysian professional in the planning, design and construction team. It is the country's

largest urban development project on a Greenfield site set to be a model city of sustainable development.

Putrajaya is located about 25km from Kuala Lumpur and 20km from Kuala Lumpur International Airport Sepang in the south (Figure 1). Putrajaya is located within the Multimedia Super Corridor (MSC), which is the fastest growing region in Malaysia. MSC represents Malaysia's first technology region stretching from KLCC to KLIA covering a length of 50km and a width of 15km. This garden corridor development is supported by a high capacity, digital telecommunication infrastructure designed to meet international standards in all aspects relating to capacity, reliability and pricing. On the western side of Putrajaya, is Cyberjaya city, another technology township which functions as the nodus of MSC. The latter is equipped with a broad range of the latest technology and infrastructure.

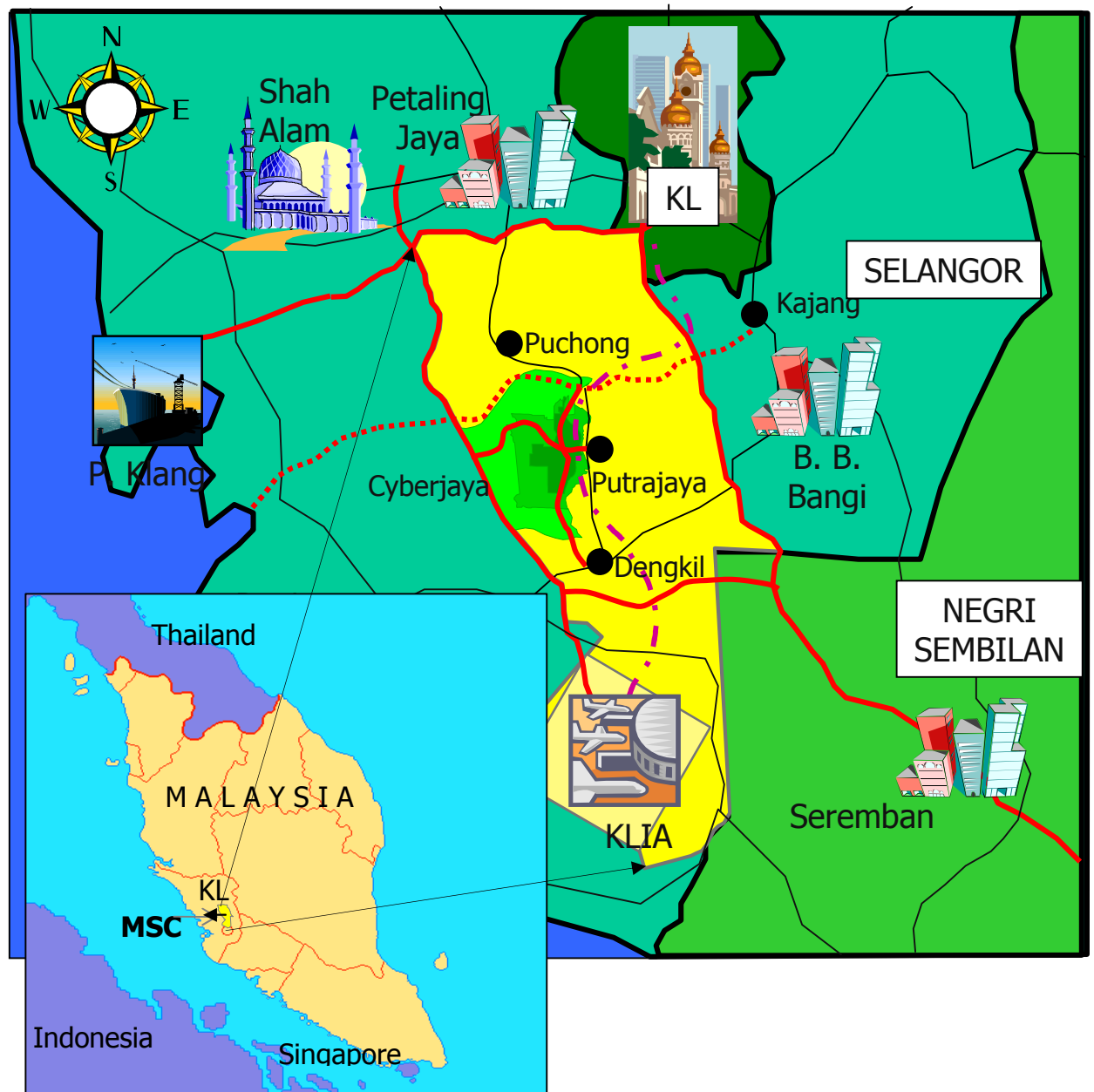


Figure 1: Location of Putrajaya

2.0 Planning of Putrajaya- Chronology

In the early 1990's, six (6) sites are considered for the locations for the new administrative centers. Among the 6 new sites are North West Rawang, Janda Baik/ Bukit Tinggi, North Port Dickson, Sepang Coast, Kenaboi Plains and Perang Besar. (Refer figure 2). The present Perang Besar site was selected based on the following factors:

- Land acquisition and infrastructure cost
- Strategic location within a growth corridor
- Good accessibility to major transportation network (rail, highways and ports)
- Presence of pristine natural vegetation and land form
- Potential for positive externalities to the neighboring regions
- Minimal negative impact to local communities

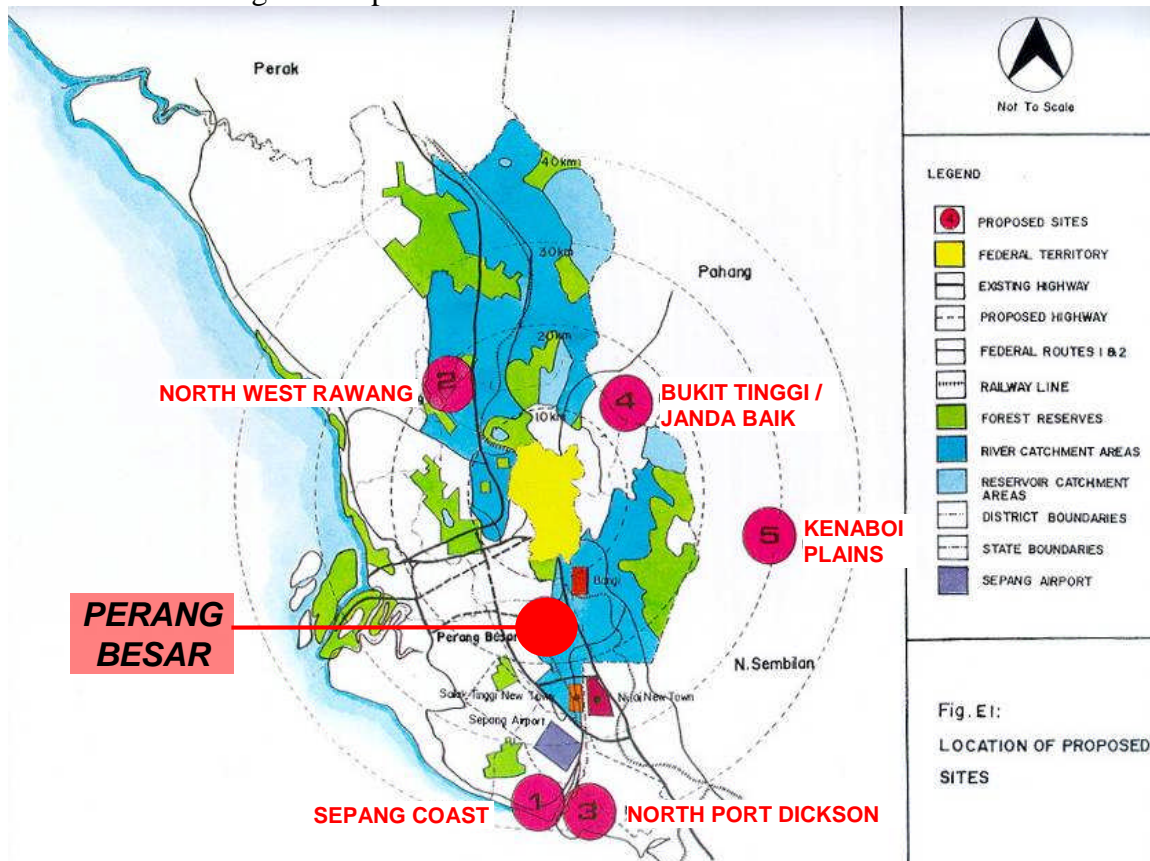


Figure 2 Site selections for new administrative centers.

By June 1993, the Perang Besar site was finally selected over the rest of the five (5) locations due to its strategic location between KLIA airport and Kuala Lumpur City, the lower development cost and its surrounding natural environment.

In February 1994, five alternative concepts with different themes i.e. Garden city, Linear city, Crescent concept, Suburb and Built with nature were presented to the Government. The Garden City Concept was short listed and finally selected by the Cabinet a year later in February 1995. The Vision for the Creation of a new Federal Government Administrative Centre chose a development theme entitled “*City in a Garden- Intelligent City*” (Putrajaya 1995). The development components included Institutional, Administrative, Education, Residential, Commercial, Tourism, Regional, Diplomat and Conventional centre. Six months later, in August 1995, the Putrajaya project was officially launched by the former Prime Minister of Malaysia, Dr Mahathir Mohammad.

The main functions of Town Planning are to provide good physical environment, for the promotion of a healthy and quality urban life. As such, in the urban planning of Putrajaya the following were the prime considerations (Putrajaya 2006):

- .Efficient Accessibility to facilities, services and place of work
- Integrated Neighborhood and community atmosphere
- Close to nature and Urban ecology
- Ample Amenities for recreation
- Dynamic, lively and economic vitality
- A city with identity and character
- Conducive Urban Environment for quality & healthy Life-style
- Creating the City Image & Character

In late October of 1995, it was formally decided that the city be designated as the Federal Government Administrative centre of Putrajaya, to be named after and in memory of the first Prime Minister of Malaysia, Almarhum Tunku Abdul Rahman Putra Al-Haj. As the planning of the city progressed on a fast track basis and as more information became available, changes to the original Masterplan became necessary. Since precise topographical information was available only after the original Masterplan was completed, it was considered imperative to review design pertaining to earthworks.

By April 1996, it was clearly evident that some aspects of the Masterplan required further in depth review. The final report on the review of the Masterplan was produced in March 1997. Many of the overall concepts and important features of the original Masterplan were retained and three (3) issues were raised for improvement. Among these issues were (Putrajaya 1997).

- a) Improvement for efficient and flexible transportation network
 - b) Minimisation of destabilisation of the land as well as to reduce cut and fill
 - c) Extended boulevard that would have further enhanced the identity of Putrajaya.
-
- a) Transportation network

Broadly, the highway network concept and hierarchy have been maintained including the policy assumptions and design standards adapted for the study. The review examined the compatibility of external road links with those inside the Putrajaya boundary, the need of consistency in road and junction layout, linkages between main highway network and local access roads and the requirements for phased development of the network. The review also proposed a number of privately funded highways schemes around Putrajaya, including South Klang Valley Expressway (SKVE), Damansara Puchong Highway (LDP), North South Central Expressway Link (NSCEL) and Dedicated Highway (DH). The preliminary alignment of the LRT system consisted of two (2) lines running west-north and east-south directions. Two (2) major interchanges were proposed at the Boulevards to permits transfer between lines. The review on transportation network aimed towards a congestion free, public transport city.

- b) Earthworks

The project site was highly undulating with levels ranging from as low as below 10m to as high as 145m. As such, earthworks using cut and fill methods were considered a necessary component of the development of Putrajaya. The original Masterplan involved a total of about 44.9 M m³ of fill as compared to 17.7M m³ of necessary cut, the difference of 27M m³ of excess fill was large and prohibitive. Hence, the revised Masterplan aims to reduce the difference having due consideration of the natural terrain, thereby minimizing overall costs to an acceptable level.

c) Boulevard

Based on the Original Masterplan, a 2.1 km Boulevard was proposed and covered the entire length of the mixed development precinct which was located at the southern end of the island part of the core area. Due to the short length and platform level of RL 25, only the view of the Boulevard was only visible from the Mixed development precinct only. To improve the vistas quality and minimize cut and fill, the revised Masterplan proposed a 4.2 km long boulevard which went right through the middle of the core area. This was achievable via creation of bridges extending north and south from the Boulevard to the Government and Recreational precincts respectively. The new Boulevard would then constitute the Central spine which linked the whole of Core Area together. By amending the boulevard design, it became an identifiable spatial element and landmark that could now clearly be viewed from the Prime Minister Office Complex and the earthworks required would also be reduced.

The chronology of events in Table 1 summarized the events over the three years from the inception of ideas until the commencement of the construction work on the Putrajaya project.

Table 1: Chronology of events – Putrajaya development

Year	Events
June 1993	Perang Besar site was chosen for the Administrative Centre
February 1994	Five alternative concepts with different themes i.e. Garden city, Linear city, Crescent concept, Suburb and Built with nature were proposed
February 1995	Putrajaya Master Plan approved by the Cabinet
August 1995	Official launch of the Putrajaya Project by the Prime Minister
April 1996	Review of Putrajaya Master Plan undertaken <ul style="list-style-type: none"> - Preservation of the natural topography - Minimization of earth cut and fill works
October 1996	First Construction Commenced

Source: Perbadanan Putrajaya 2006

3.0 Planning concept

The Structure plan for Putrajaya was prepared based on Part III of the provision of the Town and Country Planning Act 1976 (Act 172) The Structure Plan provided basic information and guidance on land use planning, infrastructure and socio-economic

development. In general, Putrajaya and Sepang Structure Plan (1995) provided basic framework in terms of efficient and comprehensive strategies to meet Government objectives for the new administrative centre. The Structure plan also provided the regional framework for Putrajaya city in the context of MSC and Klang Valley development which covered a total of 4,400 hectares as it was under the jurisdiction of Sepang District Council. The Sepang and Putrajaya Structure plan targeted a total of 570,000 persons for the whole area of Sepang District Council and Putrajaya city. Out of this total, 250,000 persons were designated for Putrajaya administrative centre and 320,000 persons for the Corporatization area and Malay reserve area of Sepang district council area.

Putrajaya Corporation also adopted the Masterplan to guide the implementation, land use and infrastructural development and all physical form for the entire designated area. The original Masterplan of Putrajaya was started with collaboration between a consortium of master planners and Government authorities, comprises mainly the Federal Town and Country Planning planners. It was planned with two (2) major themes i.e. “City in the garden” and “Intelligent City”.

The Garden city concept emphasized the physical aspects such as landform, vegetation, visual quality and water bodies. The Integration of metropolitan parks such as Taman wetlands and botanical garden with other urban and pocket parks will function as green lung for the city. The planning concept for Putrajaya was based on the Total Planning Doctrine i.e. 3 main principles of relationships (FTCPD, 2000)

- a) Relationship between Man and Creator
- b) Relationship between Man and Man
- c) Relationship between Man and Environment

Putrajaya is planned as an intelligent city with the telecommunication technology and information technology infrastructure to enhance the infrastructure, management activities and societal progress.

The Structure Plan’s population target of 250,000 persons was then reviewed to accommodate about 335,000 persons on 4,400 hectares of land. The original Masterplan, had provided for a total of five (5) precincts at the Core Area and 17 precincts with 16 neighborhoods. A 2.1 km stretch of boulevard forms part of the new Core Area design, A green network connecting on precinct to another is also being planned. Subsequently upon, review of the Masterplan, the population target was increased to 330,000 persons based on a total dwelling of 67,000 dwelling units. The Core area was projected to accommodate over 10,000 dwelling units while the Periphery will have 57,000 dwelling units. Figure 3 shows the key diagram of the Structure Plan approved in 1995 indicating Putrajaya and its surrounding Corporatised Zone and Malay Reserved areas .

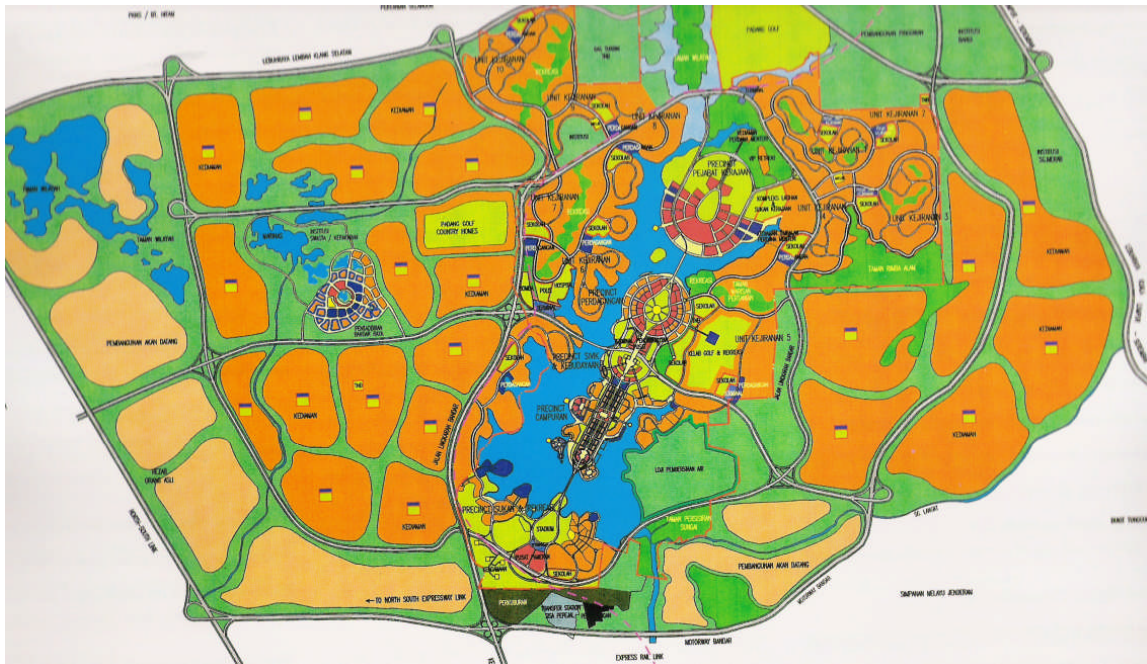


Figure 2 : Structure Plan of Sepang and Putrajaya (1995)

In terms of development framework, Precinct block is used. Precinct blocks are like planning zones which can be parceled into several neighborhood units. The entire area is divided into 20 distinct Precincts and each precinct is demarcated by roadways or green spaces. Broadly, the Core Area consists of the 5 precincts (Precinct 1 to precinct 5) and the remaining 15 precincts are located at the Periphery Area. Each precinct has a neighborhood commercial site, public facilities include public school and complex site. The clear demarcation assists to reinforce the identity of each precinct and also facilitate implementation of the project. All precincts have residential area with the exception of Precinct 1 (Government Precinct) and Precinct 13 (Wetland and Utility)

4.0 Land use distribution

In line with the garden city concept, more than a third of the total area (37.6%) is reserved as open space. It was important to introduce nature into the city. It had a total area of 4,254 acres for open space which included large Metropolitan park, Urban park (Dataran) and City parks, wetlands, buffer areas and water bodies. Table 2 shows the three (3) main metropolitan parks which not only supported the urban ecology but also provided attraction to local and foreign tourists. The water bodies consisted of primarily lake and wetlands. Wetland functioned as a natural filtration system for the lake. The lake was designed to cater for multi functional uses including recreation, fishing, water sports, water transportation and provided opportunities for educational and research activities. The Wetland is about 200 hectares in size and is the largest man-made wetlands in the tropics. Planted with more than 70 species of wetland plants totaling 12 million altogether, the

Lake covered an area of 400 hectares, creating 38 kilometers of shoreline. Figure 3 show the overall Masterplan with land use distribution and wetland planning.

Table 2: Metropolitan parks in Putrajaya

Metropolitan park	Characteristics
Taman Botani Putrajaya -A Shared Natural Heritage	-Contains 700 species from over 90 countries - 230 acres (93 ha) of land - Explorer's Trail, Palm Hill, Floral Gardens and Sun Gardens Lakeside
Taman Warisan Pertanian -Showcases Malaysia's commercial agricultural crops Agricultural crops – rubber, coffee, lowland tea, oil palm, cocoa, black pepper - Seasonal fruits and non-seasonal fruits	Attractions: <ul style="list-style-type: none"> • Visitor's Complex (fruit stalls, exhibition gallery, café) • weekly pasar tani (market) • viewing deck • rubber processing demonstration cooking demonstrations
Taman Rimba Alam - A forest park in an urban setting	Main attraction: a collection of lowland dipterocarp forest species (685), including bamboo, rattan and palms
Taman Selatan - Integrated cemetery area for Muslims, Buddhists, Hindus and Christians in a garden setting	Among the facilities provided: administration building and crematorium complex

Source : Putrajaya Corporation 2006

In Putrajaya, Residential land use constituted the second largest land use category with 25.5% of the total area, covering a total of 2,888.8 acres which is capable of supplying about 67,000 dwelling units. This residential land is divided into 14 exclusive precincts in the Periphery (2,713 acres with 57,033 units) with some parcels within the Core area (175.8acres with 10,119 units). A total of 52% of the total housing units will be allocated for Government servants and the remaining 48% or 32,000 units for private sector. Due to premier location of the Core area, the housing density permitted in these areas is all high density housing i.e. Plot Ratio of 3.2 or more than 40 units per acre. The gross housing density within the periphery areas ranged from low density (Plot ratio to 1.0 or density of 1 to 8 unit per acres), low medium density (Plot ratio to 1.5 or density of 9 to 13 unit per acres), medium density (Plot ratio up to 2.1 or density of 14 to 20 unit per acres), medium- high density (Plot ratio up to 2.5 or density of 21 to 41 unit per acres) and Plot ratio of 3.2 or more than 40 units per acre.

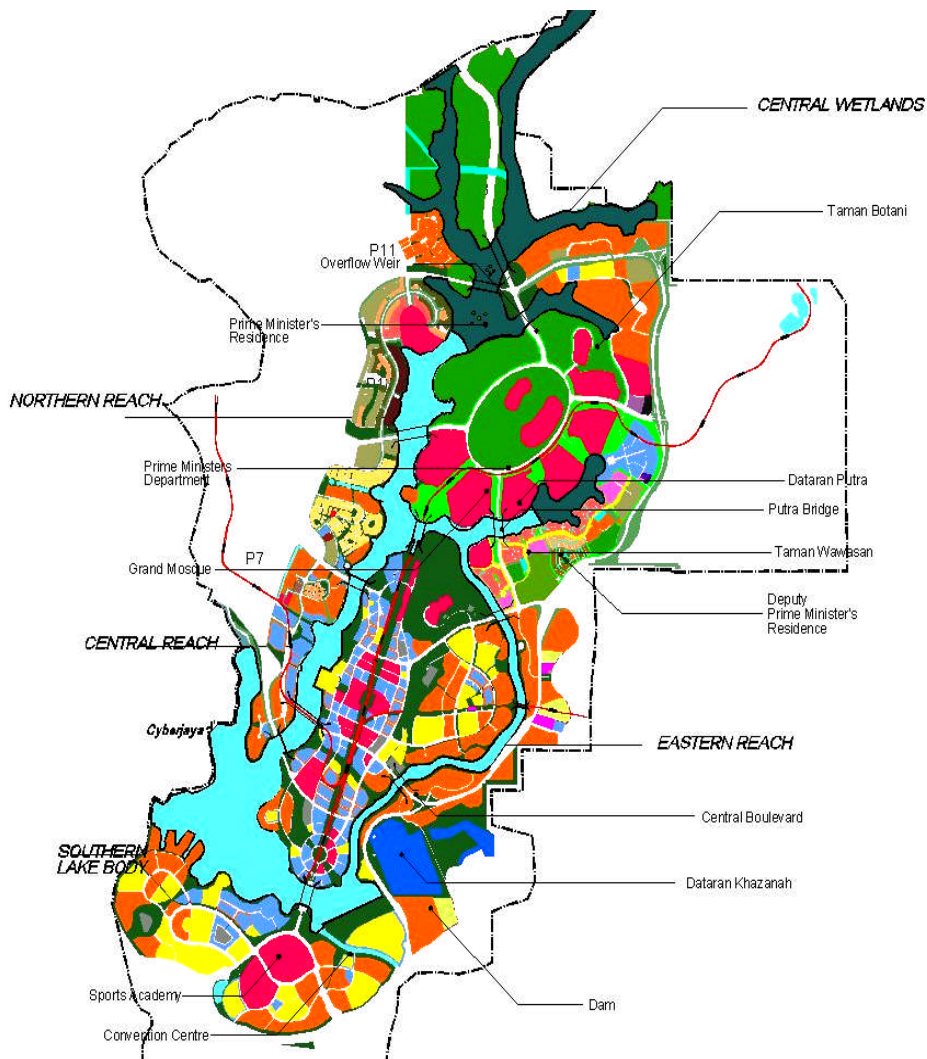


Figure 3 : Overall Putrajaya Masterplan and wetland system

The Road and utility reserves covered a total area of 2,132 acres or 18.8% of the total area. Effective and efficient transportation system is a key element in the planning of Putrajaya. Great emphasis had been given to public transport and the promotion of park and ride concept (modal split of 30:70 split of private and public transport). Hence the transportation system was developed around the integrated bus and LRT public transportation complemented with highway network. There were 8 utilities services planned for Putrajaya development. Among the 8 utilities are; water supply, drainage, wastewater, solid waste; electricity; telecommunication; gas and chilled water (gas district cooling)

The range of Government land use included areas designated for Government offices, institutional use, VIP retreat, training centre and official residence. All the Government uses were located in the Core Area. This comprised 597.7 acres or 5.3% of the total land area. Out of this total, 334.1 acres of Government offices or 70.7% of the total Government land and the balance of 263.6 acres were reserved for other uses such as VIP hotel, Istana Hinggap, Sport and Training Centre and exhibition centre in the Sport and Recreational Precinct.

Community facilities were also an important element of garden city in community building. These amenities were anticipated to function as a node to integrate residents of the city when they meet and use the facilities daily or weekly. Public facilities constituted about 1103 acres or 9.7% of the total land area. Public facilities comprises of areas designated for education, religious, health, civic, postal facilities, library, public market, community halls, information centre, cemetery land, sport and recreational (including a golf course) and cultural uses. These facilities were all planned within easy access of the region's ring road system and within walking distance of sub neighborhood.

The Commercial land area in Putrajaya is about 327.8 acres or 2.9% of the total land area. The Main commercial land use comprising 282.9 acres is located in Putrajaya. Out of this total, 224.8 acres were located in the Core area and 58.1 acres located in Precinct 7 and 8. A total of 44.9 acres were allocated for neighborhood commercial area. A local neighborhood centre has an area of about 3.5 acres to accommodate different type of shops like convenience stores, laundry shops, small cinemas and petrol kiosks. These areas consist of all commercial area in the core area as well as the neighborhood commercial area.

Table 3 summarized the overall land use distribution in Putrajaya city.

Table 3: Land use distribution of Putrajaya

Land use	Total area (acres)	%
Government	597.7	5.3
Commercial	327.8	2.9
Residential	2888.8	25.5
Civic and cultural	25.1	0.2
Public facilities	1103.1	9.7
Infrastructure	519.2	14.2
Utilities	1604	4.6
Open spaces	4254.1	37.6
Total	11319.8 or 4581.1ha*	100%

Note : Discrepancy of total area of the site PJC presentation shows 4931 ha and masterplan (1997) is 4581ha . The later figure is used to ensure consistency in land use analysis.

It is also important to examine the distribution of the land use in detail by precinct to understand the distribution of the urban activities. In order to achieve a balance and coherent urban structure, the Core area (Precinct 1 to Precinct 5) were predominantly planned with higher density as compared with the precincts located in the Periphery area. Table 4 shows Land use distribution by Precinct and category.

Table 4 Land use distribution by Precinct and category

Land use	Govt	Com	Hsg	Civic	Infra & Utility	Open space	Total	%
PPj1- Government Pcnt	342.3	40.8	na	na	127.4	664.2	1174.7	10.4
PPj2-Mixed development	38.9	30.7	21.1	2.2	66.7	223.8	383.4	3.4
PPj3-Civic & Cultural Pct	34.9	Na	25.5	12.0	104.7	157.1	334.2	3.0
PPj4-Commercial Pcnt	15.5	104.4	46.4	2.9	105.5	252.3	527.0	4.7
PPj5-Sports & Recreation	40.7	48.9	82.8	8.0	374.8	258.0	813.2	7.2
Total Core area	472.3	224.8	175.8	25.1	779.1	1555.4	3232.5	28.56
PPj6	na	4.3	156	na	104.5	98.0	362.8	3.2
PPj7	na	16.0	47.9	na	150.2	73.1	287.2	2.5
PPj8	na	45.6	228.2	na	121.3	179.8	574.9	5.1
PPj9	na	3.0	236.3	na	139.9	87.2	466.4	4.1
PPj10	40.2	na	185.7	na	72	72.8	370.7	3.3
PPj11	53.7	3.0	461.6	na	299.6	231.2	1049.0	9.3
PPj12	na	4.3	187	na	195	18.1	404.4	3.6
PPj13	na	na	na	na	47.8	736.2	784.0	6.9
PPj14	na	4.0	385.9	na	200.1	199.0	789.0	7.0
PPj15	na	3.0	199.3	na	128.1	377.2	707.6	6.3
PPj16	31.5	3.9	153.5	na	90.9	104.3	384.1	3.4
PPj17	na	3.0	95	na	108.3	31.1	237.8	2.1
PPj18	na	3.9	107.5	na	113.1	114.9	339.4	3.0
PPj19	na	4.0	221.6	na	301.3	206.0	732.9	6.5
PPj20	na	5.0	47.5	na	374.7	169.8	597.0	5.3
Total periphery PPj1- 20	125.4	103	2713.0	0	2447.2	2698.7	8087.3	71.44
Grand Total	597.7	327.8	2888.8	25.1	3226.3	4254.1	11319.8	100%
% of the total	5.3	2.9	25.5	0.2	28.5	37.6	100%	

Note : Infra – include all public facilities, utilities and infrastructure land uses.

The planning of Putrajaya as the new administration seat of the Malaysian Government following the Government's decision to relocate the federal administrative capital in June 1993 from Kuala Lumpur to the district of Sepang in Selangor is taking place as scheduled. The city is planned to embrace two (2) main themes -- city in a garden and an intelligent city. In summary, the main land use features of Putrajaya include the following:

- Large proportion of the city area is designated as green open space
- Water body (man-made lake and wetlands) created within the city
- 38km of waterfront area created by the lake
- City is divided into twenty precincts; core employment and commercial precincts located on Core Island
- 'Peripheral precincts (residential precincts) planned based on the neighborhood planning concept
- A 4.2km long Boulevard forms the central spine of the city
- Daytime population 500,000 persons
- Night time population of 330,000 persons

5.0 Implementation Mechanism

Malaysia Incorporated model is adopted as implementation by the Malaysian Government. The main objective of Malaysia Incorporated is that the private and the Government should work closely together in a manner where both of these sectors will gain benefits from this cooperation. Public sector as an active partner under Malaysia Incorporated will continue to play its roles as a facilitator and pacesetter revising and simplifying from time to time the procedures and functions of administration in the development process and maintaining a close and congenial relationship with the private sector spurring it on as the main engine of the country's growth.. There are four main parties in the implementation of the Putrajaya projects. Table 5 shows the main parties in the implementation of Putrajaya project. Two (2) main bodies were created i.e. Putrajaya Corporation and Putrajaya Holdings Company and they functioned as local authority and developers respectively.

Table 5: Main parties for the implementation of Putrajaya

Parties	Roles and functions
Putrajaya Corporation	<ul style="list-style-type: none"> • Develop, Manage and Administer • Local Authority • Local Planning Authority • Land Administrator
Putrajaya Holdings Sdn Bhd	Main Developer Construction of Government offices, commercial areas, residential premises and the main infrastructure
Utility companies	<ul style="list-style-type: none"> • Telekom, TNB, Gas Malaysia, GDC
KLCCPB	<ul style="list-style-type: none"> • Project Manager

Source: Perbadanan Putrajaya 2006

In terms of typical project consultant arrangement, it involved the following team members in implementing the project.

- a) Principal Consultant
 - Principal Project Consultant
- b) Sub Consultants Teams
 - Town Planner
 - Traffic Planner
 - Land Surveyor
 - Architect
 - Environmental Consultant
 - Civil and Structural Engineer
 - Mechanical and Electrical Engineer
 - Landscape Architect
 - Interior Design

The Preliminary work of the land surveyor is very important to ensure site data are collected and also simple land use budget can be carries out. Among the common data required by the land surveyor include Topographic Survey, Aerial Photogrametry Survey,

Topographic survey, Geological survey, Engineering survey, Land survey, Pre-Comp Plan and Land Title

The team will finally produce a Masterplan for the implementation of Putrajaya city. In addition, there are other planning documents to complement the development control and monitoring of development. The planning guidelines are based on comprehensive policies and guidelines in documents namely; Structure Plan, Local Plans, Landscape Master Plan, Lake use and Navigation Master Plan, Utilities Master Plan, Transportation Master Plan, Irrigation Master Plan, Lighting Master Plan, Urban Design Guidelines, Fencing Design Guidelines, Signage and Advertisement Design Guidelines

Besides the planning guidelines, urban design guidelines were also being prepared by the local planning authority by respecting the Urban Context. Among the planning and urban design considerations were concepts like Form of the City, Scale of the City, Scale of the Waterfront, Local Culture & Tradition, Mixed Uses, Street Level Activities, Entry Points/Gateways and Buildings form Outside 'Rooms'

The most common building construction system in Malaysia is the conventional construction system. It deals with existing systems which are standardized, tested, commonly practiced and understood by the general building industry. However, in Putrajaya, new building construction methods and technologies that can improve, maintain high performance and environmental sustainability were always encouraged. The Industrialized Building System (IBS) for example was widely used in Putrajaya as it ensured quality construction, reduced costs, created safer and cleaner working environment and reduced the dependency on foreign workers.

The Industrialized Building System (IBS) Open systems permitted flexibility in façade treatment, design variation and interchangeability. As for value proposition, it allowed faster completion, higher quality & safety standards, was environmental friendly and less labor / highly skilled labour intensive, whilst permitting design variations & flexibility, cost optimization and cheaper maintenance.

There are two (2) gas district cooling (GDC) in Putrajaya i.e. at Government Parcels Precinct 1 and Core Island Precinct 2. These included a centralized energy plant that enabled several buildings within a certain district to be air-conditioned by chilled water, produced from a single, shared source plant. In order to enhance the GDC operation, *Co-generation* system is introduced. The technology involves the production of electricity and heat energy from a fuel source, i.e. natural gas. The heat energy is captured and recycled for producing chilled water to cool the buildings. This system has the benefits of *higher energy* efficiency of up to 70% and Savings in capital costs can be achieved because developers no longer have to incur costs on installation of chillers, cooling towers. In addition, the size of the electrical system can be reduced. Beside lower operational costs, it has reliable, uninterrupted supply, was aesthetically pleasing and environmentally friendly as it minimized both Nox and Sox emissions.

In order to achieve a sustainable city management, concepts, Common Utility Trench, Intelligent Transportation system, Facilities Management Systems (FMS) and Public Information and Emergency Systems are also integrated in the planning. Table 6 showed some of features of the city management system. In order for Putrajaya to function as an

Intelligent City, it is being equipped with high bandwidth fiber-optic backbone infrastructure. The City Control Room is also used for implementing the Integrated City Management System.

Table 6: Sustainable City management system

Advanced system	Components
Common Utility Trench (Central Business District).	<ul style="list-style-type: none"> - Electrical power cable, water pipe, chilled water pipes, natural gas pipes, multimedia cables, telecommunication cables, fiber-optic cables and irrigation pipes - securing the utilities inside the tunnel allows a year-round access for the purposes of inspection and maintenance work
Intelligent Transportation System(ITS)	<ul style="list-style-type: none"> - Traffic Management System, - Travel Demand Management, - Commercial Vehicle Operation, - Emergency Management - Advance Vehicle Control
Facilities Management Systems(FMS)	<ul style="list-style-type: none"> -Transportation Infrastructure Monitoring - Utilities Infrastructure Monitoring - Building and Ground Monitoring, - Maintenance System Monitoring
Public Information And Emergency Systems	<ul style="list-style-type: none"> - Emergency Management System - Public Information System - Close-Circuit TV Surveillance System - Hotline Services

6.0 Putrajaya: Current Status of Development

The construction of Putrajaya commenced in October 1996. Almost ten years later, by 2005, Putrajaya now has an estimated population of about 60,000 persons enjoying with modern and smart public amenities and infrastructure. Putrajaya is well equipped with good inter- and intra-city transport system (including monorail and water taxis), broad band width global multi-media communication platform (2.5 to 10 gigabyte fiber-optic digital network), Common Utility Tunnel (CUT) for services, smart hospitals and schools. About 38% of the land is being developed into parkland. Putrajaya has the largest man-made wetland with a total area of about 200 ha, which is used for recreational activities as well as scientific and biological research. .

The city is to be developed in two (2) phases over a period of 15 years. Phase 1 was carried out from years 1996-2000 (completed) and Phase 2 which commenced in the year 2000 is scheduled for completion in the year 2010. Putrajaya Holdings Sdn Bhd which was incorporated in 1995 is the developer of the township while Perbadanan Putrajaya (incorporated in 1996) serves as the body to administer and manage Putrajaya.

Table 7 shows the current development position of Putrajaya - an existing population of about 60,000 persons with about 10,000 housing units. Population growth will depend

greatly on the speed of construction of the Government buildings, which is the trigger and the multiplier for employment in the city's initial stage of development. By year 2005, more than 2.0 million sq metres or half of the Government building is completed/under-construction. About 20,000 houses are under-construction to cater to the demand of the population in Putrajaya, the majority being public officers' family residents. Alamanda Shopping Centre was opened in 2004 with Retail, Food and Beverage, Cinema, Bowling Alley, Hypermarket, Departmental Store and Leisure activity. Other major commercial development included the Putrajaya Shangri-La Hotel, a 5-star hotel with 118 rooms operational since 2003.

Table 7: Existing Population and Status of Completion

Planning Information	Particulars
Resident Population	60,000
Government Office worker	30,000
Government Offices	1,000,000 sq. m. (completed)
	1,,000,000 sq. m. (under construction)
Commercial spaces	100,000sq. m. (completed)
	260,000 sq. m. (under construction)
Housing Units	10,000units (completed)
	20,000 units (construction)
Roadwork's	60.73km (completed)
	34.14km (construction)
Facilities	Mosque 1 (capacity of 20,000 persons) Surau – 4 units Health clinic – 1 District Police station – 1 Marine Police station – 1 Fire and Rescue Bus terminals District hospital -1 Boat/lake club

Source: Putrajaya Holding 2005

Even as the city is being developed, an early completed development is the Putrajaya Lake and Wetlands, which is at the heart of the city and a critical component of the project. Built to demonstrate the benefits of incorporating the wetlands ecosystem into the urban area, Putrajaya Wetlands will be used as a best practice case in sustainability. The key environmentally friendly solution of constructing the wetlands is to treat catchment water before it enters the Putrajaya Lake, thus ensuring that the quality of water in Putrajaya Lake remains clean and unpolluted. The 197 hectares of Putrajaya Wetlands is one of the largest freshwater wetlands in the tropics (Perbadanan Putrajaya and Putrajaya Holdings Sdn Bhd, 1999). It is Malaysia's first such project and represents a milestone in its urban development.

7.0 Neighborhood Planning and Caring city concept to achieve Quality Urban Living

In neighborhood planning concept, each neighborhood has a center and an edge or distinctive boundary. The center as place for congregation consists of public square, public facilities, meeting places or even shops. Planners can influence the scale, density, form and structure of development to create neighborhood units. This neighborhood unit is used extensively in Putrajaya in planning the residential areas in all the periphery residential precincts. In addition, it also provides a platform for a broad mix of housing types for all sections of society to encourage social integration. These housing types ranging from affordable homes and apartments to condominiums and bungalows are planned to foster this integration.

Quality and modern public amenities are also planned on a neighborhood unit concept, granting residents easy access within the neighborhood via non motorized transport – walking or cycling.

The other important features found in the city are the importance of human scale streets design and the fostering a sense of community and belonging through design. Putrajaya represents the first city in Malaysia to provide Fencing Design Guideline – “permeability”. The latter encourages interaction and community policing. Permeable fencing is preferred with generous use of landscape treatments: hedges, shrubs, trees instead of solid fencing. Permeability translates into the absence of a front fence and this is not at the expense of privacy and security because hedges and shrubs are used as fences instead.

In order to foster a sense of community and belonging, provision of adequate facilities and organization of programs and activities in the neighborhood are equally important. As for the caring society objective, barrier free design to cater for the disabled are also incorporated in the design of all public buildings. Code of Practice on ‘Access for Disabled People to Public Buildings’ Malaysian Standard 1184: 1991 and Code of Practice on ‘Access for Disabled People Outside Buildings’ Malaysian Standard 1331: 1993 are also being used as design guide for all buildings in Putrajaya.

The planning of circulation system was done with highest regard for pedestrians via proper planning of network of pedestrian walkways and cycle ways. Specific footpath standards are being used throughout Putrajaya to ensure a comprehensive footway and bicycle route system is carried out by the developers. In addition, supportive urban design and landscape treatments provide shade, comfort, convenience and safety for the users. Road hierarchy is planned to discourage cross traffic but ease of access. Public transportation system i.e. bus, taxi and rail supported by ‘Park-and-ride’ facilities – complement the pedestrian network in creating a sustainable transportation system

8.0 Planning and Urban Design - City Image and Character

Urban design and landscape architecture are part of town planning process. Urban design helps to organize and structure the urban realm; strengthen the legibility and image of the city as well as to create visual unity out of a diversity of urban elements. Putrajaya adopted the traditional spatial qualities in order to achieve the objectives of efficient, coherent and human Scale. The Detailed Urban Design Guideline (DUD) of Putrajaya focuses on the following guiding principles based on urban structure, urban form and urban character. The design brief is prepared on a Precinct basis and outlines character and ambience of each development plot.

Design parameters that are used as control includes land use detail, building height, skyline, urban rooms, visual axis and termination, street façade, building massing, building typology, pedestrian linkages, open space coverage and streetscape

The planning of the Boulevard in Putrajaya is inspired by the Champ Elysees, Paris. It is 100 meter wide and 4.2 kilometer long. The furniture along the Boulevard is predominantly developed from the traditional ‘tempayan’, the large ceramic water pot that has an elegant narrow base and a flaring full form that tapers to a narrow opening at the top. Signages with local craft motif are used. There is also a hierarchy of identification Signages

In terms of night lighting, lighting character is expected to be achieved through a consistent and regimented hierarchy of lighting quality. This is carefully done in the Core Island Roads, Streets and Buildings. In Putrajaya, Building Categorization for Lighting Purposes is as follows:

- Group Buildings, group of buildings, structures or other elements that form vista termination, landmarks when viewed from major distances, nodal points, or are categorized as landmark buildings in DUD documents. The majority of group A buildings will be located on the Core Island and within Precinct 1
- Group B Buildings that form the ‘street wall’ between group A buildings on Central Boulevard, buildings of particular architectural note, structures, landmarks, key buildings in regional centre and other elements
- Group C All remaining buildings, structures and elements that justified lighting for civic, architectural or commercial reasons

The control on the level of illumination on the building façade facilitated the fostering of the city’s image and character via lighting strategies. Night time ambience is deliberately influenced through the various implementations of the architectural lighting criteria. Outdoor space which in the daytime is unpleasantly hot is being transformed into to be vibrant and fun activity areas to be enjoyed by residents and visitors alike.

Complementing the architecture and landscaping in Putrajaya are eight (8) distinctive signature bridges. They only provide communication but also exude aesthetic appeal and enhance the character of the city. Table 8 summarised the characteristics of the eight (8) bridges in Putrajaya.

Table 8: Bridges in Putrajaya

Bridges In Putrajaya	Characteristics
Putra Bridge	Inspired by Khaju Bridge, Isfahan with 435 m span provide access to pedestrian, vehicles and monorail whilst the 4 minaret-type piers double up as observation decks overlooking the lake.
Seri Gemilang	Inspired by Port Alexandre III, Paris with 372m span-steel bridge that welcome you to the Island
Seri Saujana	Single span cable stayed arch bridge with 300m span
Seri Wawasan	Combination of cable backstays and structural tie back.
Seri Bakti	Using Moorish and Islamic architecture as inspiration-different vistas of Putrajaya Lake
Seri Perdana	Using Moorish and Islamic architecture as inspiration-different vistas of Putrajaya Lake
Seri Setia	Provide ease of communication to vehicles and track to cyclists
Seri Bestari	Provide ease of communication to vehicles and track to cyclists

The creation of Putrajaya lake set the platform for the development of waterfront city. Major features and opportunities of a waterfront city are the 38 km of Waterfront Promenade and the existence of green corridors, parks, and wildlife at the door step of urban dwellers. In addition, it provides a varied range of water recreation and sports opportunities. Putrajaya lake is a centre for water sports, recreation and tourism. Apart from passive activities such as fishing, bird watching, walking and jogging, active sports such as sailing and canoeing are commonly seen in the lake. Formula One Powerboat and High performance water sports competitions have been held there before.

9 Concluding Remarks

Putrajaya city is a massive Government initiative due to its investment and scale. The 5,000 hectares (about one third the size of Kuala Lumpur) is large enough to house a critical mass population of about 350,000 (and daytime population of half a million. Since it is Greenfield site, the natural ecology of the site can be used as large tract of greenery to ensure the implementation of the garden city concept where landscaping and water bodies are prominent components of the city. The Government vision is to for a City that reflects the natural and cultural heritage of the country and with the technological capacity incorporating the latest amenities to meet the challenges of the next millennium.

The planning of the Multi Media Super Corridor provided opportunities for the incorporation of the latest technology including of the concept of an intelligent city. The infrastructure and utility planning also showcased the state of art technology such as the use of Intelligent Transport system, Gas district cooling system, Common Utility Trench and the innovation of creation of largest manmade wetland as filtration for the Putrajaya Lake.

Putrajaya is planned with urban quality of life in mind. The use of neighborhood planning concept and caring society idea will help to promote community integration and solidarity in a multi-ethnic Malaysian community. A total of 67,000 landed homes, apartments and condominiums are planned, with 3.8 million sq m of Government and 3.4 million sq m of commercial land uses in eight (8) precincts provide shorter journey to work as Workplaces and Homes are located within the vicinity. With comprehensive planning of recreational and open spaces, its residents can look forward to enjoy a diverse range of entertainment, sports, and leisure and recreation activities, both indoor and outdoor

It is also a city with a clear identity and character rooted in local culture and tradition as evidenced by its local architecture and design. It shows how the ideas of garden city and intelligent city are translated on ground. Putrajaya is an excellent showcase for a city for administrative centre for the new millennium.

References

Brian H Roberts(edit) (2006) Urbanization and Sustainability in Asia – Best practice Chapter 9 Case study Malaysia by Belinda Yuen, Supian Ahmad and Ho Chin Siong, ADB.

Federal Town and Country Planning Department (2000) (Second edition), Total Planning Doctrine, Kuala Lumpur.

Konsortium Perang Besar(1995), Perancangan Pembangunan Pusat Pentadbiran Persekutuan Putrajaya, Kuala Lumpur.

Perbadanan Putrajaya and Putrajaya Holding (1999) Putrajaya Wetlands, Petaling Jaya.

Perbadanan Putrajaya (2003) Putrajaya , D'Synergy Sdn Bhd.

Putrajaya Corporation (undated) Putrajaya Booklet on Putrajaya attraction and Getting there.

Perbadanan Putrajaya (1997) Putrajaya- Review of the Masterplan.

* Perbadanan Putrajaya (2006) (Power point presentation and project briefing) by their officers on a study visit on August 2006.