4.2.2 Formulation of the Concept Plan

1) Development Potentials and Constraints

The Kg. Kuantan concept plan area encompasses the area between Batang Kali and Kg. Kuantan along Sg. Batang Kali and administratively belongs to Mukim Batang Kali, Ulu Selangor District. The area is located approximately 20 km. south of Kuala Kubu Bahru, the administrative center of Ulu Selangor. Kg. Kuantan is located approximately 4 km. east of Batang Kali township where the Federal Route No. 1 passes through.

Urban and industrial developments in Ulu Selangor have been insignificant compared to other regions, in spite of the fact that the district is located 20 to 70 km. north of Kuala Lumpur. However, with the completion of the North-South Link Expressway for Kuala Lumpur - Tanjung Malim - Bidor sections, various development projects and policy directions have been made available. Although the impact of these changes on the case study area has not been assessed nor reflected in any official development plans, it is considered that the development potentials and opportunities in the areas would not remain as they are but would increase considerably.

Aside from broadly defined policies, there are no specific plans and development policies for the case study area. Relevant policies which will affect the case study area indirectly are as follows:

- Traditional village regrouping program in Selangor;
- Rural Growth Center proposal for Kampung Kuantan;
- Second National Car Project at Bukit Beruntung;
- New Batang Kali Estate township in the south of Kg. Kuantan;
- Batang Kali - Genting Highland Road project; and
- North-South Expressway - Federal Route 1 access roads project.

Although the overall development opportunities in the region are expected to increase considerably, it should be noted that the case study area involves a number of peculiar factors related to development which shoould be duly taken into account. These include the distance from transport arteries, nature of traditional rural settlements, Malay reservation land, unstable river, among others. In particular, Sg. Batang Kali varies from time to time, naturally posing a serious threat to the community (refer to Figure 4.39).

Figure 4.39
Historical Change of Sg. Batang Kali

2) Development Directions

The development directions for the area are set forth in both regional and local development context as follows:

Regional Level

(a) Zoning of the Region for Effective Development: The areas between NSE and Federal Route No. 1 will be designated mainly for industrial development while the areas east of Route No. 1 will be mainly for residential, agricultural and recreational uses.

(b) Improvement of Accessibility: The accessibility between Batang Kali and the NSE is not favorable at this moment due to non existence of an interchange between Rawang and Tanjung Malim. A few more interchanges and service roads linking the Federal Route No. 1 are desirable. In addition, Genting Highland Highway is an important alternative road between Kuala Lumpur which is also expected to stimulate tourism development. The strengthening of the public transport system, with particular regard to the improvement of rail transit commuter services and associated interchange facilities, should also be considered.

(c) Provision of Planned Housing Area: The undertaking of various urban and industrial development projects in the region will require a constant supply of housing. With the proposed improvement of accessibility and the rich environment, there is an opportunity to provide new type of housing schemes in the area.

(d) Strengthening of Urban Centers: To match the proposed regional structure, urban centers need to be strengthened, especially the major local center (District Center) in Kuala Kubu Bharu, and the minor local center in Serendah, Batang Kali and Bernam.

Local Level

(a) Improvement of Basic Living Conditions: While residents of the housing schemes are satisfied with basic living conditions, those living in the traditional houses suffer from inadequate infrastructure and public services.

(b) Flood Control of Sg. Batang Kali: Sungai Batang Kali has frequently changed its river course and often caused disasters in the basins. One of the major reasons of the resettlement of Kampung Genting Malek was the frequent floods.

(c) Development of Rural Centers: The area lacks various facilities to support economic, social and cultural activities, including commercial and cultural facilities, play lots, sports facilities, etc. An adequate central function of the community is necessary to enhance the living environment and to integrate the community.

3) Concept Plan

In order to provide a more concrete basis for preparing the concept plan, a development structure for the region has been formulated, wherein the strengthening of regional road network and upgrading of the urban center, especially at Batang Kali, are proposed (refer to Figure 4.40).

The proposed concept plan intends to encourage adequate urbanization of the area and the modernization of village activities by strengthening accessibility between Batang Kali, providing better infrastructure along the new/improved roads, enforcing clearly defined zoning for more adequate landuse, introduction of new types of development such as housing scheme, homestead, etc., and improving industrial infrastructures. Sungai Batang Kali will function as an important environmental axis in the community while the calamitous threat to the residents will be minimized. Again, it should be noted that the concept plan proposes partial urbanization of the area after the deliberation of development potentials and constraints (refer to Figure 4.41). The development concepts are more specifically described below:

For Batang Kali Urban Area:
- town center development
- industrial estate development
- rural kampung/village improvement
- hill park development at Batang Kali
- prevention of river flood

For Agriculture and Forest Area:
- agricultural road development
- improvement of agricultural infrastructure and facilities to increase productivity
- forest reservation and watershed reservation

For Batang Kali - Kampung Kuantan Valley Area:
- new road development which strengthens the linkage between Batang Kali and Kampung Kuantan and induces desirable urbanization
- rural center development
- rural kampung improvement
- new housing scheme
- flood control of Sungai Batang Kali

4) Selection of Master Plan Area

Two hundred ninety-nine (299) hectares of the area have been selected for master plan formulation based on the consideration of the following factors (refer to Figure 4.41):

(a) An area where priority for infrastructure development needs are considered high on the basis of the concept plan and the results of the assessment of local needs;
(b) An area where the LR method is deemed necessary or applicable; and
(c) An area considered as an integrated community.

Figure 4.40
Proposed Regional Development Structure

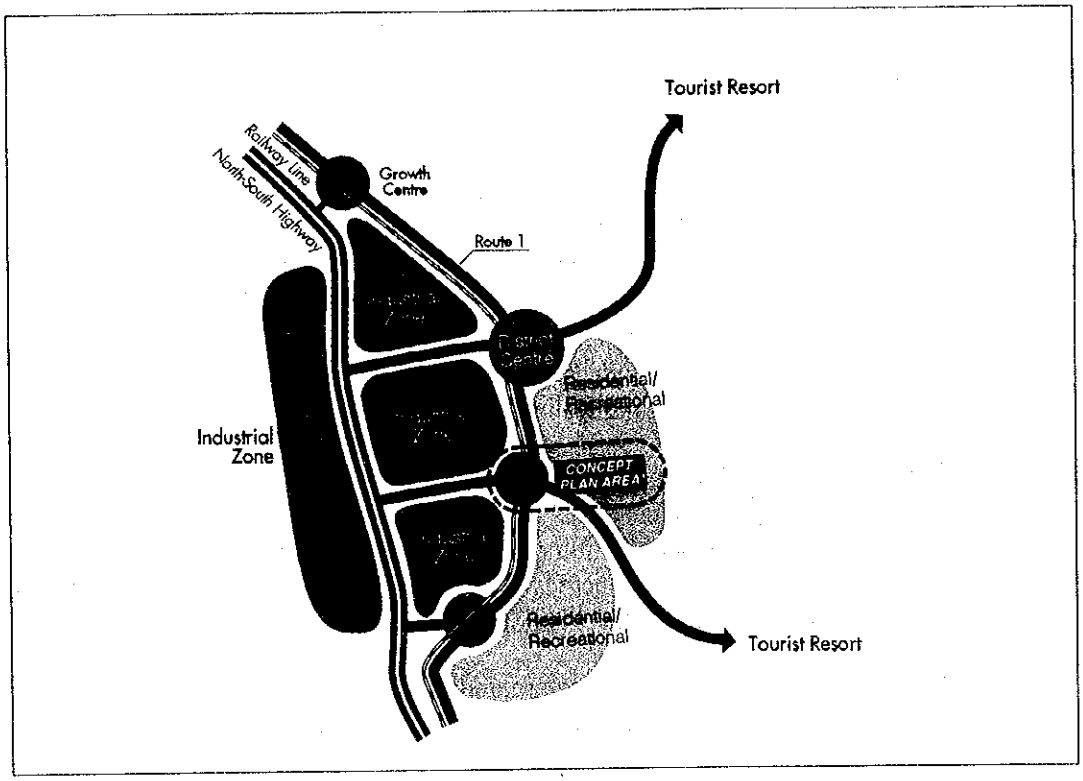
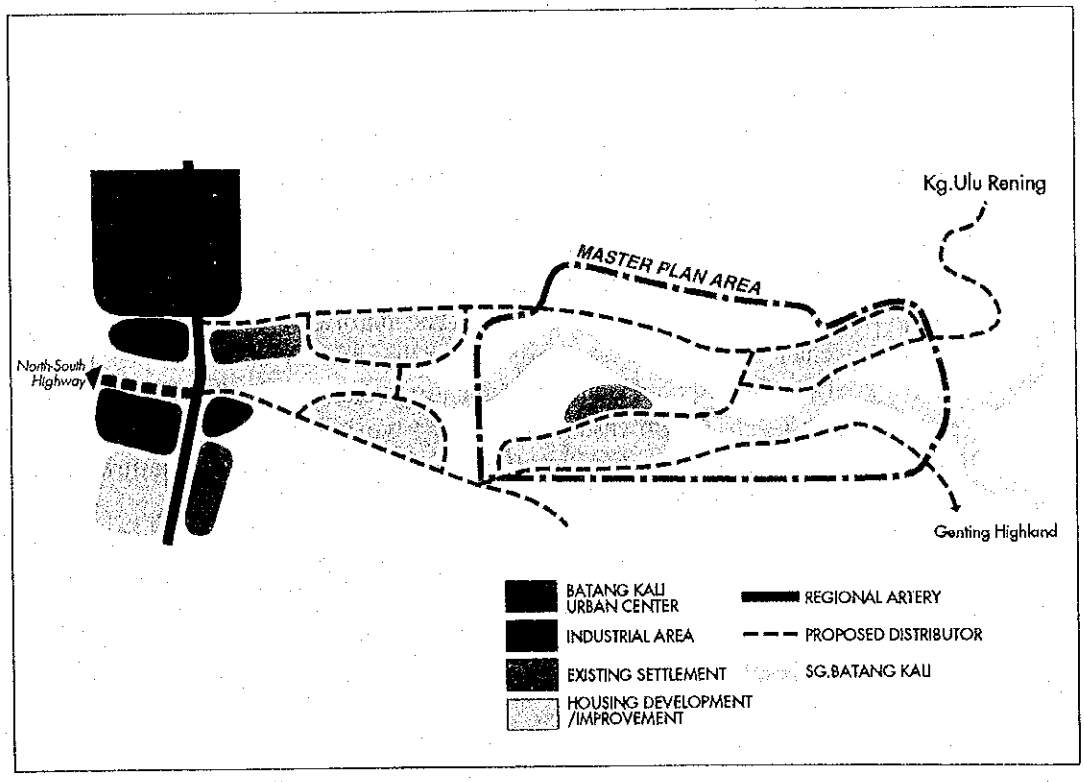


Figure 4.41
Development Structure of Concept Plan Area



4.2.3 Formulation of Master Plan

1) Existing Conditions in the Master Plan Area

A. Area Characteristics

Physical Characteristics and Overall Land Use: The master plan area of approximately 229 ha. is composed of Kampung Sungai Masin, Kampung Genting Malek and Kampung Kuantan (refer to Figure 4.42). The area is flat at a level of 40 to 50 meters along Sg. Batang Kali with the highest altitude of 105 meters on the summit of a northern hill, while the lowest is 37 meters at the outflow edge of Sg. Batang Kali. Existing land use is predominantly agricultural (about 75%) and residential (about 20%). The area is surrounded with vast Malay reservation land, private estates, forest reserve and the Batang Kali township.

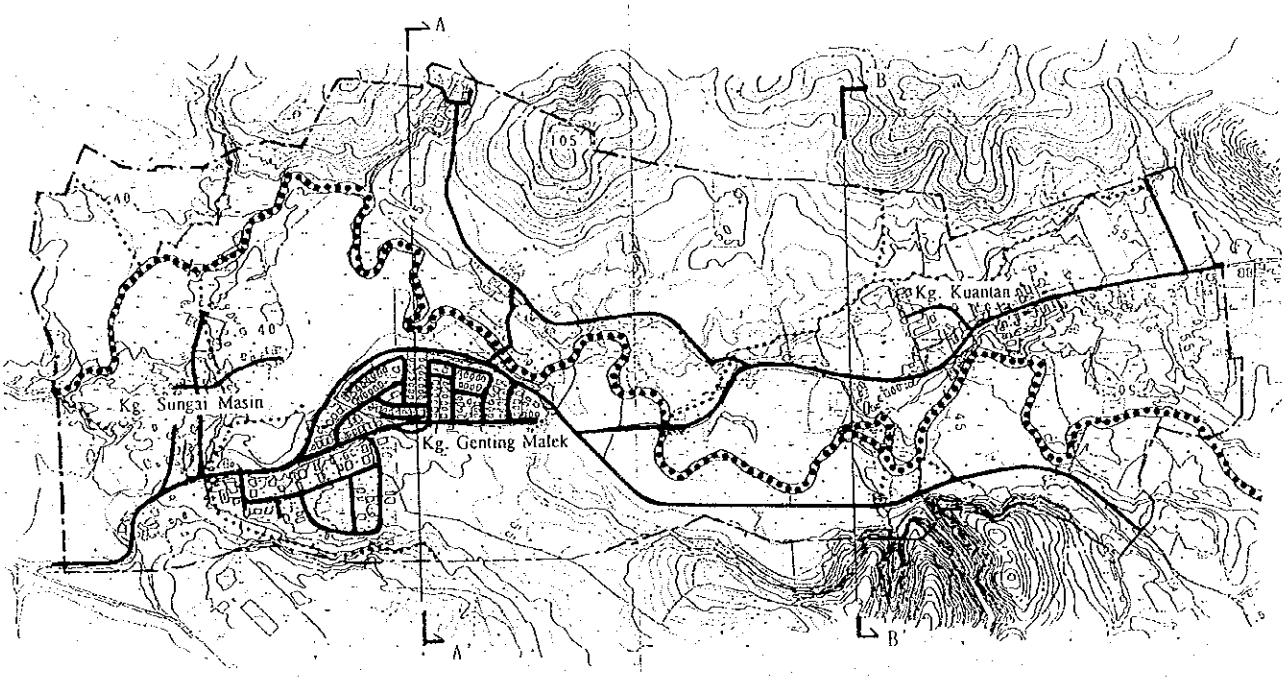
Roads and Public Transport: The road network in the area is not well developed. The roads linking with Batang Kali, Kampung Ulu Rening and Genting Highland are 8 to 12 meters wide, while the others are less than 6 meters. They are mostly paved but are not maintained well. There is a bus route between Batang Kali and Kampung Ulu Rening but the service level is not adequate.

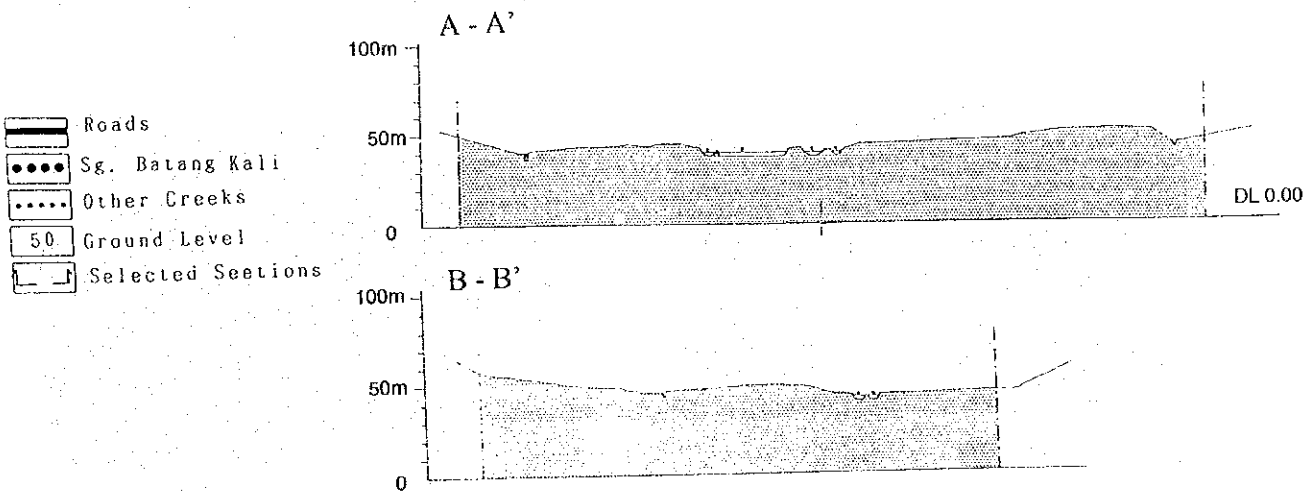
Open Space: Even though there are abundant agricultural and undeveloped land, open space, which is planned for preventing disaster and recreational purposes, is not provided.

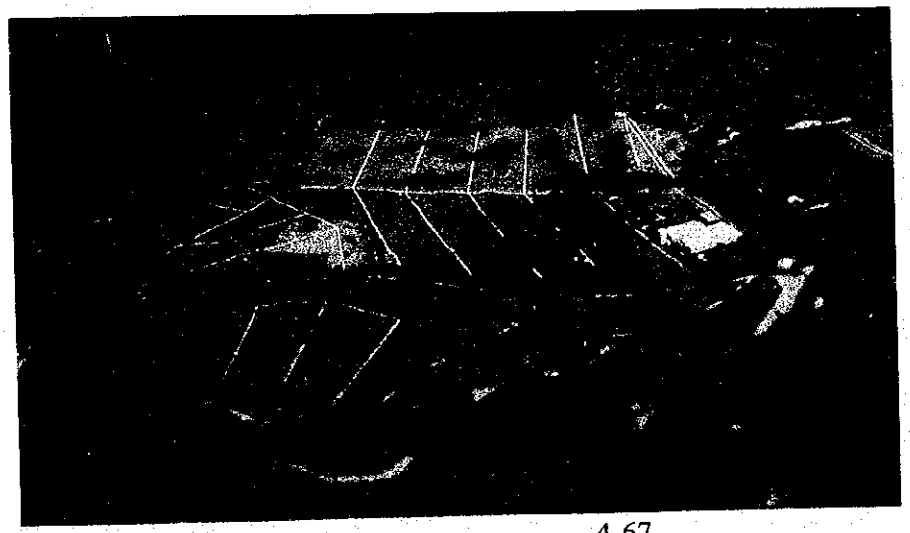
Utilities: Most of the houses are provided with piped water, though some use wells. For sewerage, flushing and filtration types are used and it is discharged to the septic tank provided in the perimeter. TNB serves electricity to most of the houses. The ownership of telephones is less than 30% of the households, while only three public phones are available.

Rivers: Sg. Batang Kali, with a width of 10 - 20 m, passes through the area with its tributaries of Sg. Tamu in the east and Sg. Kental to the north. Sg. Batang Kali flows further west to join Sg. Selangor and ultimately flows into the Malacca Sea. The catchment area is 113 sq.km. Floods have frequently occurred between October and March. Whenever the water level exceeds the warning level of 35.81 m at Dijaian Bridge in Batang Kali, the alarm will be automatically activated. In practice, this happens two or three times in a year. The natural river course in the area has frequently changed while the reserved land for the river has not been well maintained. Accordingly, some reserved lands are currently alienated from the actual river shape. From Batang Kali to the downstream, dredging work is being carried out every three years by the District DID. On the other hand, the upstream is a natural river.

Figure 4.42
Physical Conditions of Kg. Kuantan





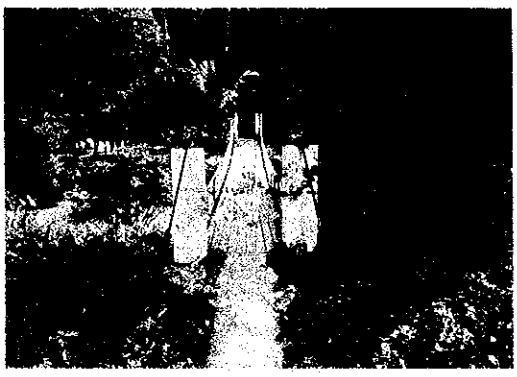


Batang Kali

Kg. Genting Malek

Sg. Batang Kali

State Road B114



Suspension Bridge

Kampung House

Kampung House

B. Social Characteristics and Needs

To identify the social characteristics of residents in the area and their area-wide improvement needs, an interview survey was conducted by the JICA Study Team between January and February 1994. The number of collected samples were 238 households. The survey results are outlined as follows :

(a) Profile of the Residents

Socio-economic Profile: The area's population (1,027 as of 1993) is dominantly Malay (99.4%). Population composition of the area shows that lower percentages for age group of 0-4, 20-24 and 45-49 are significant compared to the national average. Outflow of the population from rural to urban is also evident in the area, especially in Kg. Sungai Masin and Kg. Kuantan. On the other hand, Kg. Genting Malek's population increased due to the development of a housing scheme wherein not only the residents were resettled but also new residents were accommodated. Only 31% of the population are employed, about one third of which is self-employed. The main employment sector is manufacturing (37%), followed by government services (23%) and agriculture (20%). This clearly indicates that agriculture is no longer the economic basis of the area. Average household income is RM 930, gained by an average number of 1.3 workers per household.

Utilities: Most of the houses are provided with piped water, though some use wells. For sewerage, flushing and filtration types are used and it is discharged to the septic tank provided in the perimeter. TNB serves electricity to most of the houses. The ownership of telephones is less than 30% of the households, while only three public phones are available.

Industrial/Commercial Activities: Other major public services provided in the area are a maternity clinic, three surau, a primary school, two kindergarten schools, two public halls, a playground and a cemetery. All high level facilities such as mosque, secondary school, hospital, government offices, etc., are located in Batang Kali and other towns.

Perception on Real Estate: The residents' land relationship is characterized by owner occupied with freehold on Malay reservation land (67.2%), followed by tenant (1.5%) and sub-tenant (32.3%). All the residents answered the question on the size of their lots but many occupy smaller lots than the registered ones due to the multiple ownership of lands. About 70% of the residents know the boundary of their lots. On the other hand, only a quarter of residents are interested in land price increase. They are mostly new settlers in Kg. Genting Malek.

Housing: The is primarily rural. Detached houses are dominant both in traditional and modern housing. However, they are not spacious; 80% of them only have one or two rooms and an average floor area of onlt 643 sq.ft. Traditional houses are characterized by a high floor structure made of timber or a mixture of brick and timber. They are generally old and poorly maintained, especially those in Kampung Sungai Masin.

Durable Goods Ownership: Ownership of TV set (91% of the total households), refrigerator (66%), bicycle (78%) and motorcycle (77%) is high, followed by automobile (20%) and video (18%), while airconditioner is unpopular. The bicycle and motorcycle are major private transportation means of the residents. Ownership of the goods among kampungs is different. Kampung Genting Malek has higher ownership of refrigerator, motorcycle and automobile, while Kampung Kuantan has the least percentage in automobile.

Activity Area Coverage of Residents: Activity areas of the residents extend considerably wide. For commuting, 54% complete their trips within the area while 22% to Batang Kali, 18% to Kuala Kubu Bahru/Rawang, and 6% to as far as Kuala Lumpur. Coverage of schooling is mainly within the area (59%) and Batang Kali (34%). Daily shopping is completed mostly in the area (89%), while occasional shopping in Batang Kali (74%), followed by Kuala Lumpur (14%), and Rawang (9%).

(b) Specification of Improvement Needs

A set of questions were asked of the residents about their assessment on current living environment and public services. The results are briefly described below (refer to Figure 4.43):

Infrastructure and Public Services: Satisfaction was expressed on water supply, primary education, postal service and electricity. Complaints are on garbage collection, higher education, park/playground, drainage and public transport, while roads, telephone, nursery/kindergarten, health care, and sewerage are also their concern. Park/ playground, road / bridge and garbage collection are the top three items which residents in Kampung Kuantan find unsatisfactory while in Kampung Genting Malek, dissatification was expressed on garbage collection and higher education, and those in Kampung Sungai Masin are garbage collection, higher education, park / playground, drainage, public transport and telephone.

Environment Conditions: This is highly appreciated in the area except for water pollution in Kampung Kuantan and security in Kampung Sungai Masin.

Other Services: Kampung Kuantan residents complain of the lack of banking service, amusement and sports/ recreational facilities, while Kampung Sungai Masin residents point out the lack of religious / cultural facilities and inconvenience of daily shopping.

Housing Lot: Most of the residents appreciate the existing conditions.

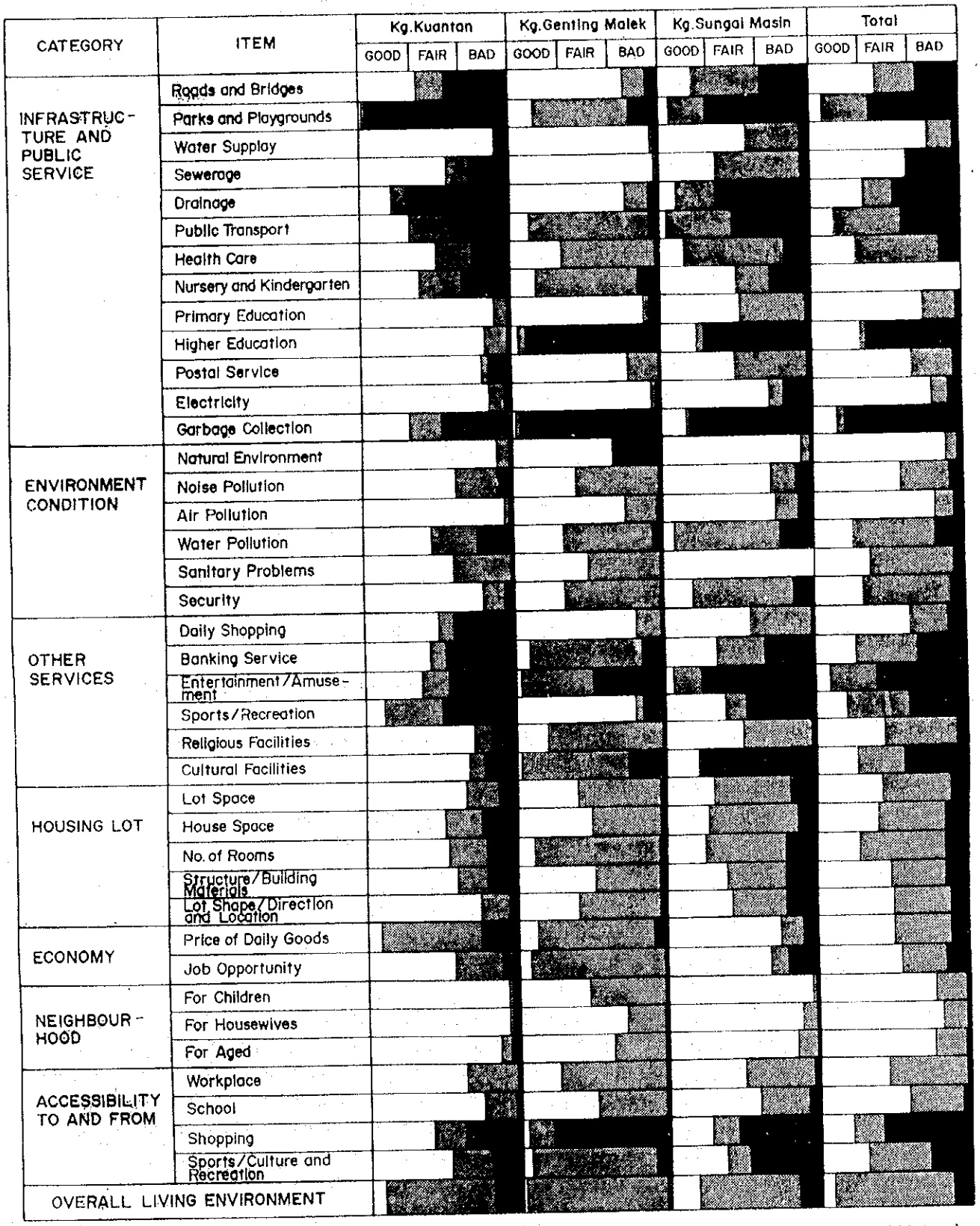
Economic Aspect: Most of the residents appreciate the existing conditions in terms of job opportunity and price of daily goods.

Neighbourhood: Residents are satisfied with the present neighborhood relationships.

Accessibility: Residents are dissatisfied with the present level of accessibility for shopping, recreational and cultural activities.

Overall Assessment: Most of the residents assess the overall condition of the area as "fair" (81%), while "bad" registers 10% and "good", 9% only.

Figure 4.43
Assessment by Residents of Infrastructure and Living Conditions



Source: Study Team, Household Interview Survey 1994

2) Planning Policy and Framework

Area Development Policy: The major landuse and functions which the master plan intends to incorporate are as follows:

(a) Creation of New Rural Center: To support the daily activities of the residents and to meet the higher level of community needs, a rural center will be created.

(b) Development of Planned Residential Area: To improve existing residential areas and to accommodate future population, new planned residential areas will be developed.

Infrastructure and Utility Improvement Policy: Upgrading of infrastructure and public services is critical to actualize the development potential of the area. Following are the planning directions for major sectors :

(a) Road
- to organize a hierarchical road network
- to strengthen the link with Batang Kali
- to improve walking condition and accessibility in the community

(b) Park and Open Space
- to provide a network of different parks and open space
- to preserve the environment

(c) Rivers and Drainage
- to provide flood control reservoirs but not to adversely affect the areas due to the development
- to improve small creeks, install gabionade, and reclaim the land in flood prone area
- to provide sufficient reserves or buffer zones along Sungai Batang Kali

(d) Other Facilities
- to expand piped water and sewerage systems
- to expand electricity and telecommunication lines

The area is planned to accommodate a population of approximately 3,000 and provide employment for 300.

3) Overall Land Use Plan

On the basis of the proposed development policies and framework, a land use plan has been prepared. The total land area of 229 ha has been allocated for private use (132 ha or 57.6%) and the rest for public use. The major uses of public use land are river enclosing detention pond and reserve (21.3%) and road (13.0%), while those of private use land are agriculture (45.3%) and residential (11.8%). Table 4.27 and Figure 4.44 present the land use distribution.

Table 4.27
Area Allocation in Land Use Plan

Land use		Area	
		ha	%
Public Use Land	- Open Space	9.43	4.1
	- Road	29.80	13.0
	- River & Detention Pond	48.72	21.3
	- Educational Facilities	2.90	1.3
	- Water Tank	0.10	0.1
	- Oxidation Pond	2.12	0.9
	- Water Treatment Plant	1.59	0.7
	- Community Halls	0.53	0.2
	- Religious Facilities	1.88	0.8
	Sub Total	97.11	42.4
Private Use Land	- Residential Area	26.96	11.8
	- Commercial Area	1.08	0.5
	- Agriculture	103.78	45.3
	Sub Total	131.82	57.6
	Total	228.93	100.0

Figure 4.44
Land Use Plan

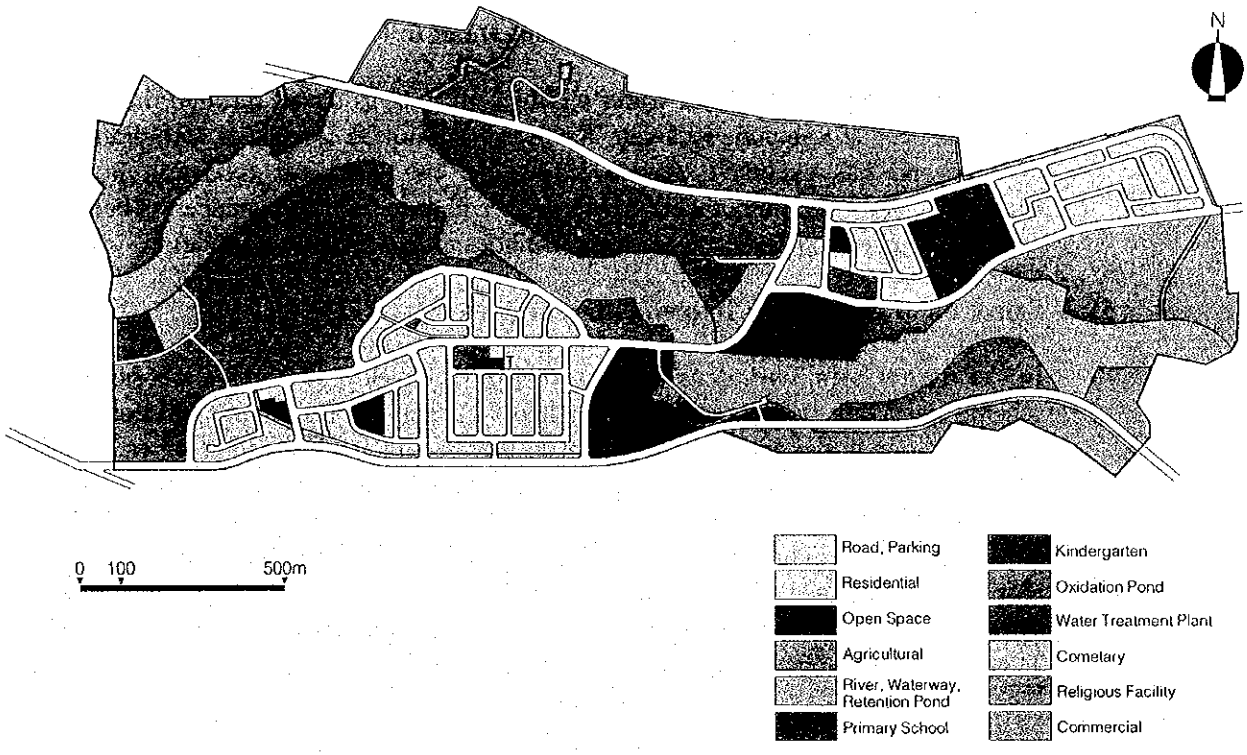


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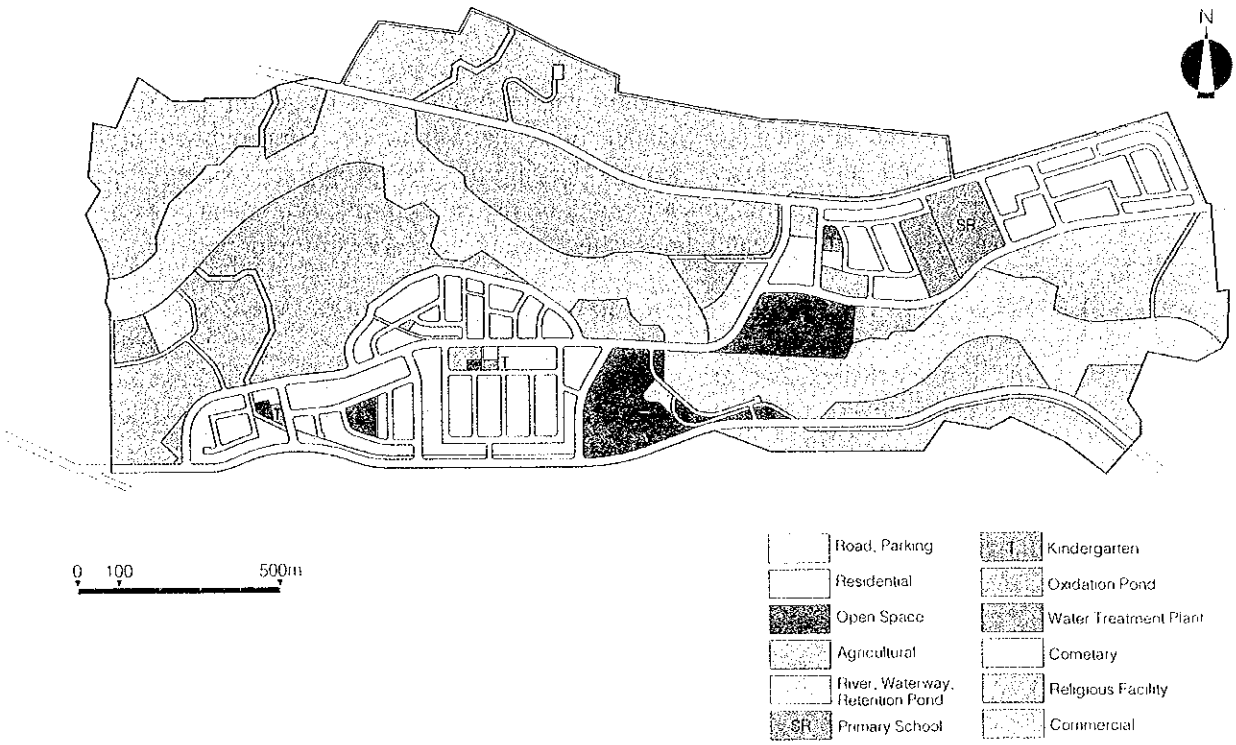
Figure 4.44
Land Use Plan



4) Sector Planning

Land Development: For effective development while preserving existing environmental conditions as much as possible, land development is concentrated along the existing and new roads such as the area adjoining the existing housing scheme in Kampung Genting Malek and the area in Kampung Kuantan.

Residential Area: A residential block is standardized at 100 to 200 meters frontage and 50 meters depth to accommodate a standard lot with 20 meters frontage and 25 - 30 meters depth.

Open Space Allocation: To satisfy the strong desire of the residents, sports ground (4.6 ha.), recreational park (4.5 ha.) and children's playlots at three locations are allocated and, networked with other open space and buffer zone to maintain the rich green environment along Sg. Batang Kali.

Road: The area's road network is composed of two collector roads (20 meters width), major local road (15 meters), minor local road (12 meters), service road (9 meters), agriculture road (6 meters) and foot path (6 meters). Two collector roads not only provide external access to the area but also serve through-traffic in the region.

River and Drainage: Although improvement of Sg. Batang Kali is a critical issue in the area, it is a task beyond the scope of this study because its catchment and influence area extends way beyond the study area. The basic planning philosophy in this exercise is, therefore, set forth to solve the area's flood problem within the area and not to adversely affect downstream areas due to the proposed development. Accordingly, three retention ponds are planned and sufficient buffer lands along Sg. Batang Kali are reserved to prevent flooding (refer to Figure 4.45).

Other Public Services: Piped water will be provided, as usual, through the water treatment plant at Kampung Kuantan. Sewerage will not be connected with drainage directly and has exclusive sewers leading to the proposed oxidation ponds. Electricity and telecommunication will be provided in the same manner as before. There is no need to expand the existing facilities to serve future population.

5) Selection of the Project Implementation Area

In the master plan, two areas were proposed for development. One is a housing scheme which directly adjoins the existing housing scheme in Kg. Genting Malek, and the other one is the existing settlement in Kg. Kuantan. Since the former site is located in an estate where subdivision development is considered as the most effective method, the latter area was chosen for LR application. In order to determine the boundary of the project area, the factors taken into account are the necessity of integrated development, alignment of major roads, Sg. Batang Kali and its reserved land shown on the cadastral map, other state lands, and replotting design. The selected area covering 45 ha is shown in Figure 4.46.

Figure 4.45
Location and Catchment Area of Retention Pond

Zoning	Area 1	Area 2	Area 3
RETENTION VOLUME			
rc (mm/h)	5.5	3.5	5.5
t (min)	352	352	352
Vmax (m^3)	19,500	18,500	4,800
RETENTION POND			
Designed Depth (m)	2.4	1.9	1.4
Necessary Area (ha)	1.09	1.32	0.58

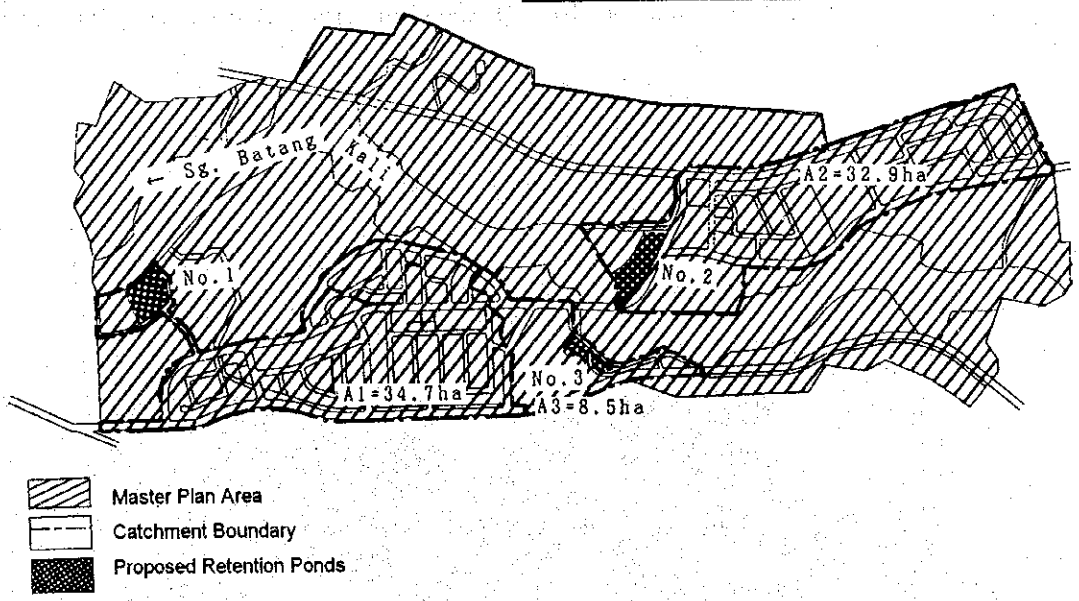
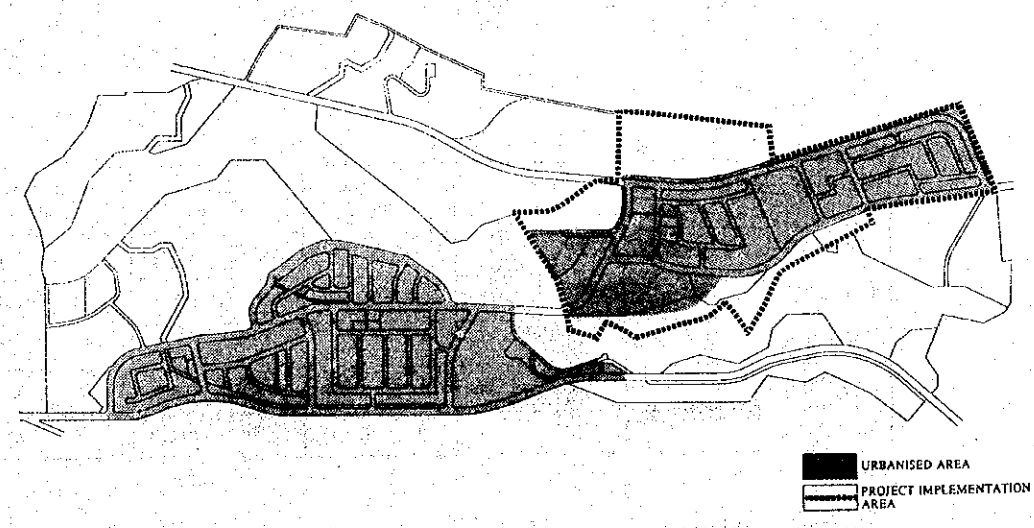


Figure 4.46
Selected Project Implementation Area



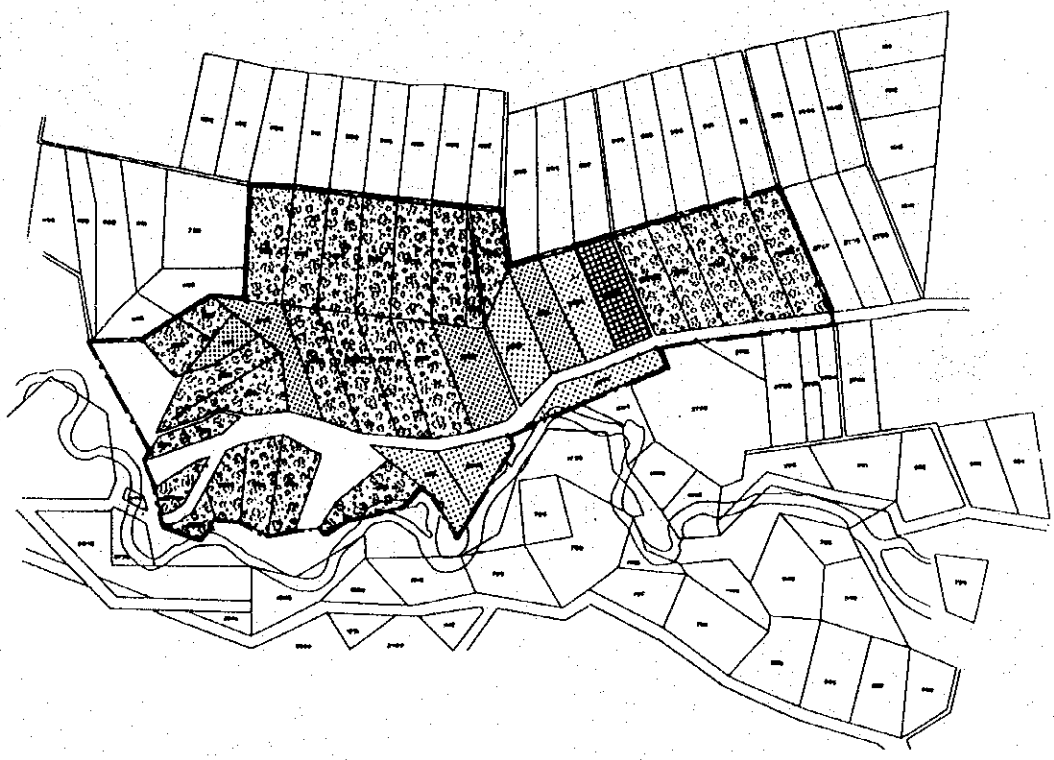
4.2.4 Formulation of Layout Plan for the Project Area

1) Profile of the Project Area

(a) Existing Land Use

At present, the 45-ha. project area which is inhabited by 294 residents and provides 30 jobs in agriculture and 10 for others, is predominantly of the rural nature of a typical Malay village. The existing land use is primarily devoted to agriculture/undeveloped use (73.8% of the total area), followed by residential use (12.2%), public facilities use (10.8%), and commercial use (3.1%). (Refer to Figure 4.47).

Figure 4.47
Existing Land Use



Land Use Category	Legend	No. of Lots (%)	Area m² (%)	Average Lot Size (m²)
Agricultural/ Undeveloped		30 (7.5)	288,733 (73.8)	9,624
Residential		5 (12.5)	47,553 (12.2)	9,511
Commercial		1 (2.5)	12,306 (3.1)	12,306
Public Facilities		4 (10.0)	42,392 (10.8)	10,598
Total		40 (100.0)	390,984 (100.0)	9,775

Source: Study Team

(b) Existing Conditions of Lands

Characteristics of the area are as follows:

- The project area includes state land, reserved land and alienated land. The state land consisting of roads and rivers shares 13.4% of the total area, while alienated land of 34 lots with agriculture purpose shares 67.6% of the total area. Reserved land sharing 19% for specific purposes cover school, water treatment plant, cemetery, community hall, etc. (Refer to Table 4.28 and Figure 4.48).
- All alienated land is with freehold status and final titles, except one lot. No difference in the area is observed between registry and topo-map produced by the Study Team.
- There are three lots (2.5 ha) under "caveat".
- The entire area is designated as Malay Reservation Land. The lots are alienated only to Malays and selling, leasing and charging to non-Malays are prohibited.
- In the 1960s, 3.8 ha. of land were compulsorily acquired (12 lots were affected), presumably for road improvement.

(c) Building

Characteristics are as follows (refer to Table 4.29 and Figure 4.49):

- There are 135 buildings in the project area, including 94 housing and 21 public facilities.
- As to residential type, detached houses (38 units) and kampung houses (48 units) are the most popular.
- The buildings are located mostly along the major road.

Table 4.28
Classification of Lands

Classification		Area		No of Lots
		sqm	(%)	
State Land	Road	36,887	(8.1)	-
	River	23,836	(5.3)	-
	Sub-total	60,723	(13.4)	-
Reserved Land	School	11,129	(2.5)	1
	Water Treatment Plant	15,335	(3.4)	
	Cemetery	15,927	(3.5)	2
	Community Hall	12,307	(2.7)	1
	Unknown	31,060	(6.9)	2
	Sub-total	85,758	(19.0)	6
Alienated Land	Agriculture	305,226	(67.6)	34
Grand Total		451,707	(100.0)	-

Source : Study Team Land Title Survey 1994

Table 4.29
Existing Buildings

Use	No	Floor Area (sq.m)	
		Total	Average
Public Facility	21	6,028	287
Housing	94	10,309	110
Retail Shops	3	246	82
Restaurant/Canteen	2	213	106
Office	2	807	403
Animal Shed	3	227	109
Garage	10	285	29
Total	135	18,115	134

Source : Study Team Building Survey 1994

Figure 4.48
Land Classification by Lot

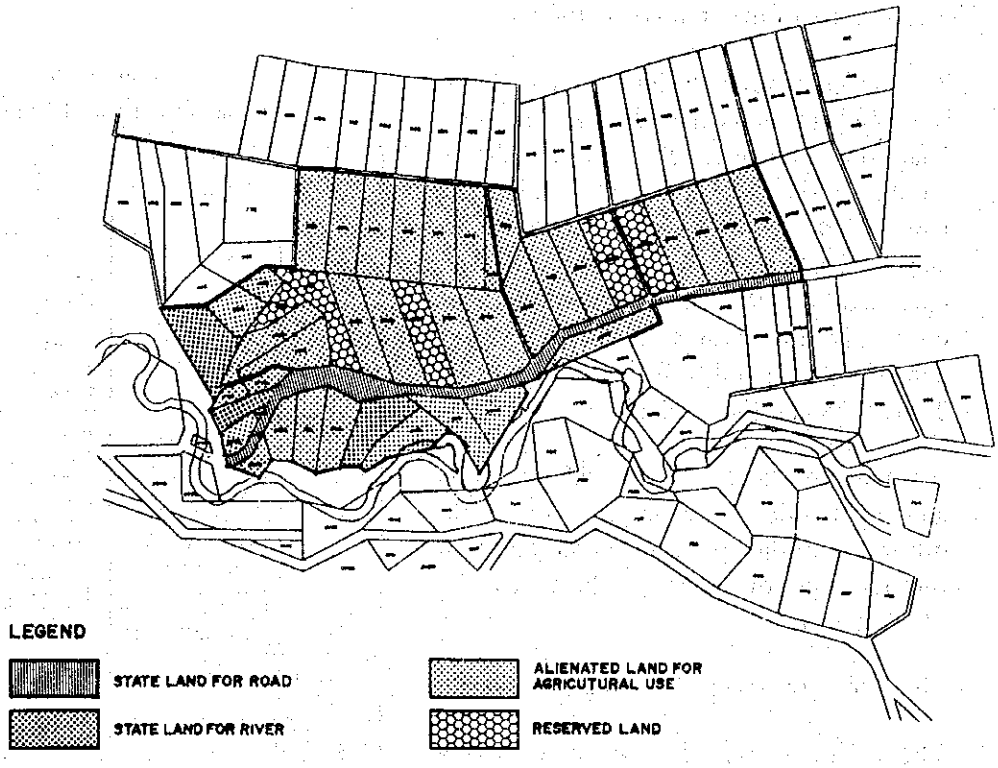


Figure 4.49
Distribution of Buildings by Type

Source : Study Team Land Title and Building Survey 1994

2) Planning Considerations

In preparing various physical plans for the project area, the following points have been duly considered and incorporated:

(a) Upgrading the existing road: As existing houses are located along the road, the improvement will directly enhance their accessibility.

(b) Protection from the flood of Sg. Batang Kali: To minimize the adverse impact of Sg. Batang Kali, which causes periodic floods and changes river courses, the affected area will be improved and the necessary buffer be alotted.

(c) Enhancement of socio-economic activities of the area: With the improvement of infrastructure and public facilities, it is expected that the present night-time population and employment will increase from 294 to 1,000 and 60 to 160, respectively.

3) Proposed Layout Plan

Overall Land Use Plan: The overall land use plan and physical structure of the project area are shown in Figure 4.50 and Table 4.30 which describe the following characteristics:

- The area is broadly composed of two landuses: the area where public facilities concentrate and the remaining residential areas.
- Public use lands share 54.3% of the total land, covering road, river/retention pond, playground, school, cemetery, etc. On the other hand, private use land, sharing 45.7% of the total is mainly for residential and agriculture uses.
- Open space is 11.6% of the project area. Playground occupies 2.9 ha. of the total 5.3 ha. of open space.

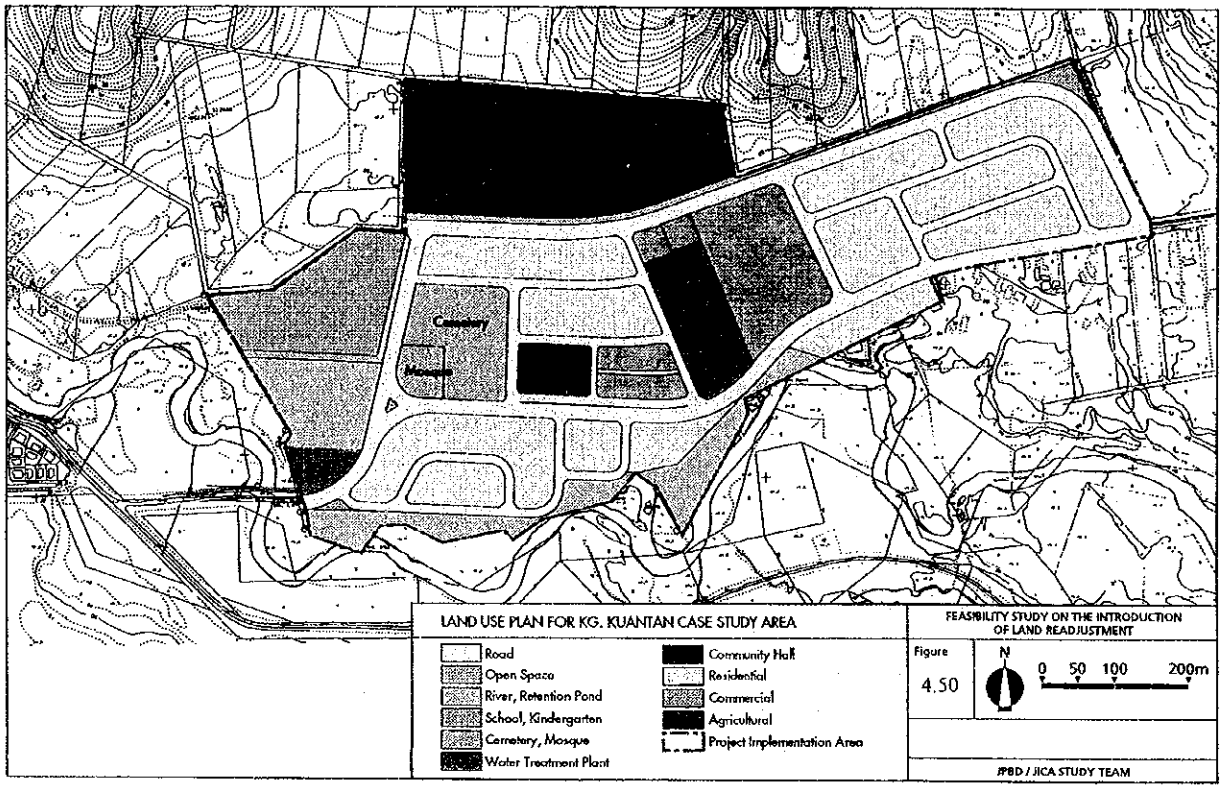
Table 4.30
Land Use Plan

Land Use		Area	
		ha	(%)
Public Land Use	Road	9.4	(20.8)
	Playground	2.9	(6.4)
	River, Reserve, Retention Pond	4.9	(11.0)
	School, Kindergarten	2.7	(5.9)
	Water Treatment Plant	1.6	(3.6)
	Oxidation Pond	0.4	(0.9)
	Cemetery	1.6	(3.5)
	Mosque	0.5	(1.1)
	Community Hall, Clinic	0.5	(1.1)
	Sub-total	24.5	(54.3)
PrivateLand Use	Residential	13.4	(29.6)
	Commercial	0.5	(1.2)
	Agriculture	6.7	(14.9)
	Sub-total	20.7	(45.7)
TOTAL		45.2	(100.0)

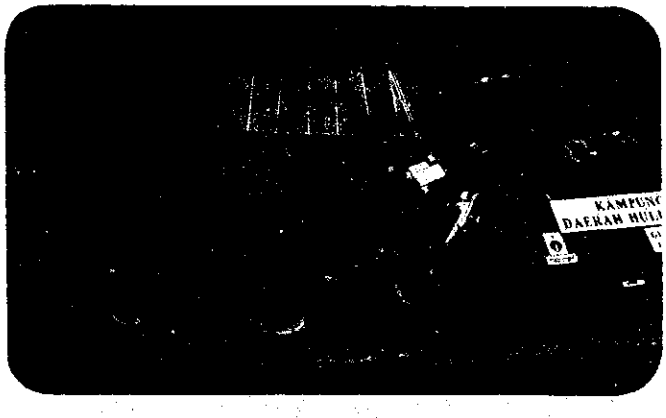
Source: Study Team

Residential Area: Residential lot size and shape in this project will be standardized to 60' by 80' - 100' (20m by 24 - 30m), which is the practice in the existing housing scheme in Kg. Genting Malek.

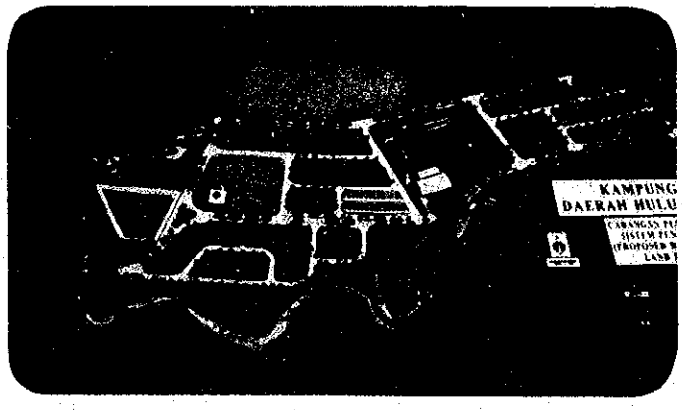
Figure 4.50
Land Use Plan for Kg. Kuantan Case Study Area



Before LR Project



After LR Project



Agriculture Land: Existing agriculture areas will remain as they are, except the area required for road and waterway construction.

Commercial Site: A commercial site will be provided at the proposed rural center. The site can accommodate two shop buildings or market space.

River Reserve: The existing river reserve of Sg. Batang Kali shown in cadastral map, does not jibe with the actual river course. The planned river reserve was moved accordingly.

Educational Facilities: The existing primary school will be expanded in compliance with the planning standard. The existing kindergarten built on a narrow site is now obsolete. It will be transferred to a site with enough space and good environment.

Other Public Facilities: Other public facilities to be provided include park, community hall, clinic, cemetery, mosque, retention pond, and oxidation pond (refer to Table 4.31).

Table 4.31
Other Public Facilities

Type	No	Ha
1) Park		
- Sports ground	1 (new)	2.5 ha
- Play lot	2 (new)	0.2 ha each
2) Community Hall	1 (new)	0.3 ha to replace existing one
3) Clinic	1 (new)	0.2 ha
4) Cemetery	1	1.6 ha
5) Mosque	1 (new)	0.5 ha
6) Retention Pond	1 (new)	1.6 ha
7) Oxidation Pond	1 (new)	0.4 ha

4) LR Design of Infrastructure and Public Facilities

(a) Road Network

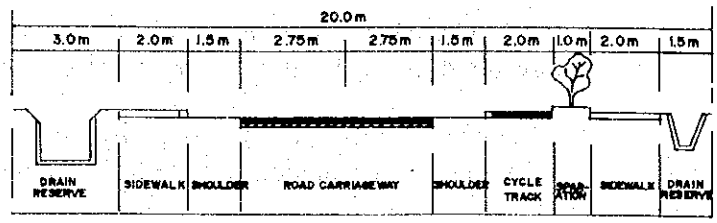
The project area will be provided with five types of roads and outlined as follows (refer to Figure 4.51):

- Inner Collector Road: U2, 20-meter width with 2 lanes and a total length of 1,295 meters;
- Outer Collector Road: U2, 20 meters, 2 lanes, 1,403 meters;
- Major Local Road: U1, 15 meters, 2 lanes, 414 meters;
- Minor Local Road: U1, 12 meters, 2 lanes, 2,558 meters; and
- Backlane: 6-meter width, 106 meters.

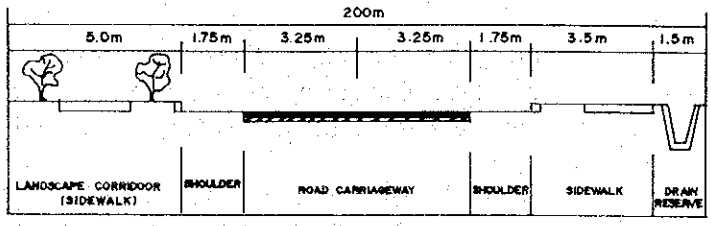
The Inner Collector Road provides an external link with Batang Kali, while the Outer Collector Road can do so in the future.

Figure 4.51
ad Network Plan in Kuantan Area

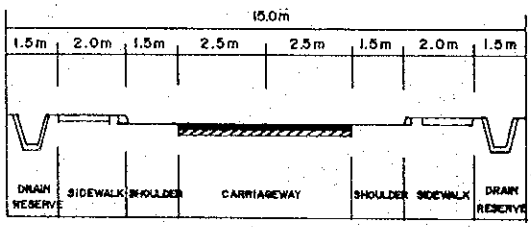
INNER COLLECTOR ROAD



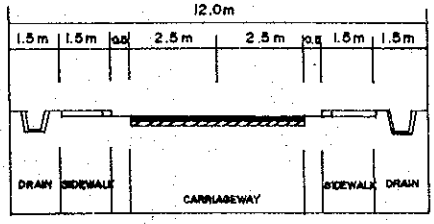
OUTER COLLECTOR ROAD

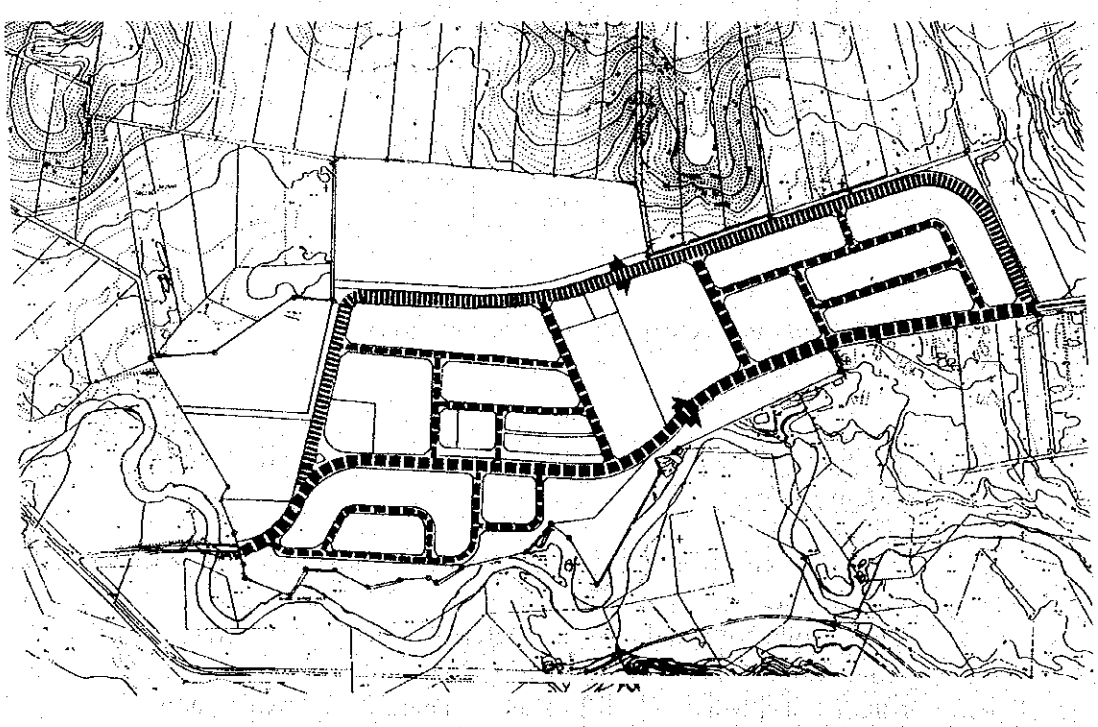


MAJOR LOCAL ROAD



MINOR LOCAL ROAD





LEGEND

- INNER COLLECTOR ROAD (W : 20m)
- OUTER COLLECTOR ROAD (W : 20m)
- MAJOR LOCAL ROAD (W : 15m)
- MINOR LOCAL ROAD (W : 12m)
- DIRECTION OF CROSS-SECTION DESIGN

(b) River and Drainage Plan

The project area does not include Sg. Batang Kali but part of the river reserve. There is a natural creek which joins Sg. Batang Kali. A key to flood control is to provide an adequate retention pond to regulate the outflow of additional storm water due to the development (refer to Figure 4.52). The estimated size of the retention pond is 1.4 ha., which can store a volume of 18,500 m^3. The drainage system is composed of block drain, U-drain, sub-drainage and man-made waterway (refer to Figure 4.53).

(c) Water Supply and Disposal System

There is a water intake station and a water treatment plant both managed by JBA at Kg. Kuantan. Water is conveyed to the water distribution reservoir at Bukit Chendang Kechil, Batang Kali through an aqueduct 18 inches in diameter. The reservoir accommodates half a million gallons or 2,273 m^3 and supplies water to Rawang, Ulu Yam, Batang Kali and the project area (refer to Figure 4.54). Future water demand in the project area is estimated to be 398 m^3. The existing water supply system can work in the future only if new water supply pipes connecting to consumers are installed (refer to Figure 4.55).

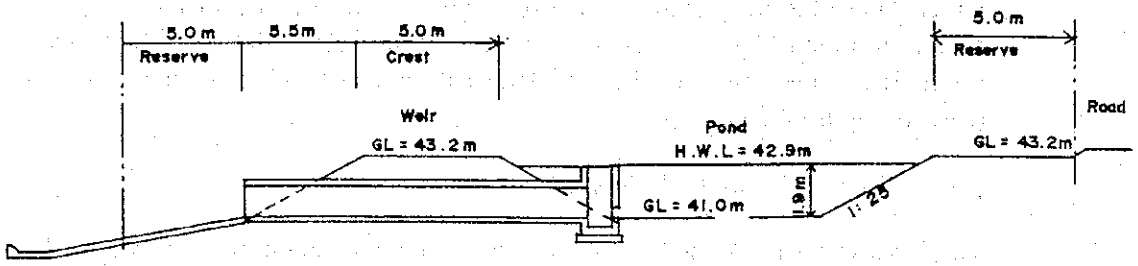
(d) Sewage Disposal System

Sewage generated in the area will not be discharged into the roadside drains, or artificial waterway or Sg. Batang Kali directly. Sewers will be installed. The effluent will be conveyed to an oxidation pond and retained for a sufficient period of time until micro-organisms break up into a more stable end product. An oxidation pond is an economical form of liquid waste treatment but it needs a relatively large land compared with a mechanical treatment plant. Since there is ample idle land, particularly along Sg. Batang Kali at low land price, and the population will not be large even after completion of the project, an oxidation pond system is recommendable. According to the JPBD planning, the required site is 0.4 ha. including pond and embankment (refer to Figure 4.56).

(e) Electricity and Telecommunication

To meet the demand by the increased population, an electric substation will be installed in the proposed rural center with a capacity of 1MVA which can cater to about 400 households. A 4.6 m by 7.7 m (35 m^2) lot is required. To meet the increase in the telephone demand, a distribution point will be installed on the road reserve.

Figure 4.52
Retention Pond Sectional Design



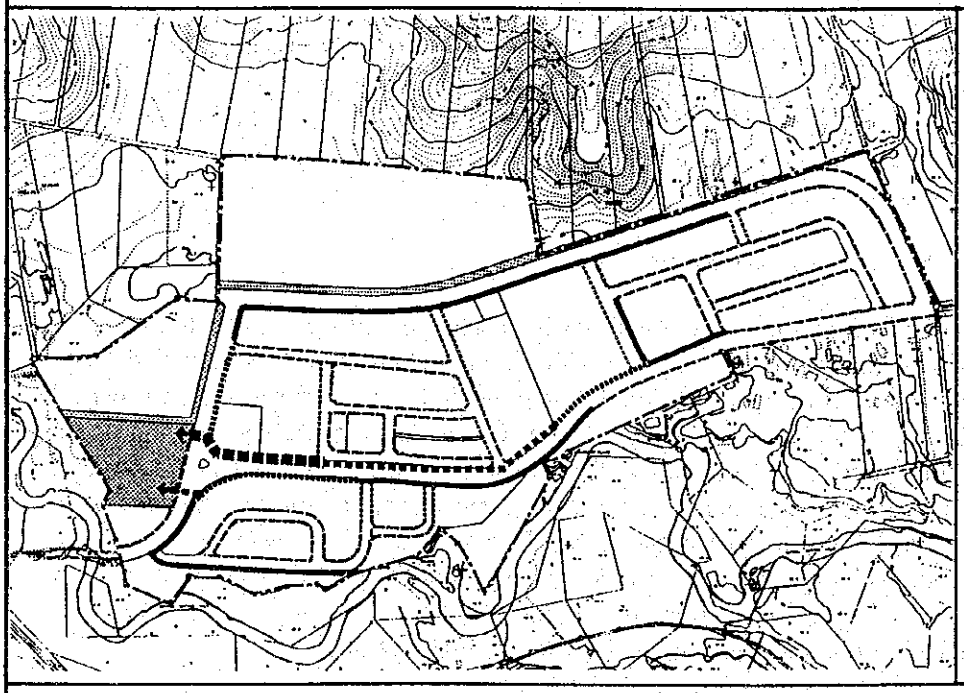
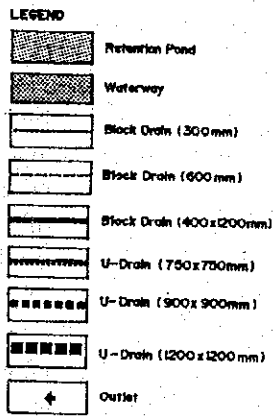


Figure 4.53
River and Drainage System Plan



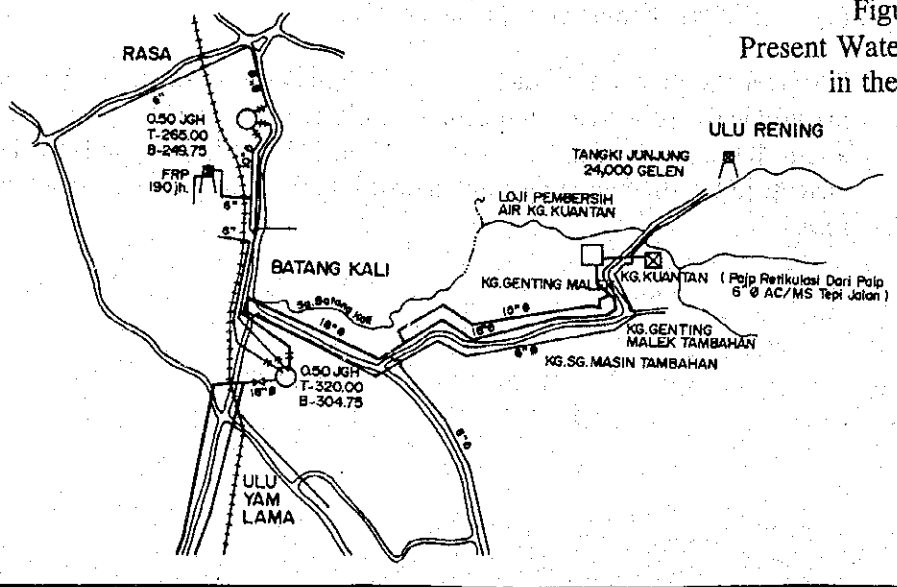


Figure 4.54
Present Water Supply System in the Region

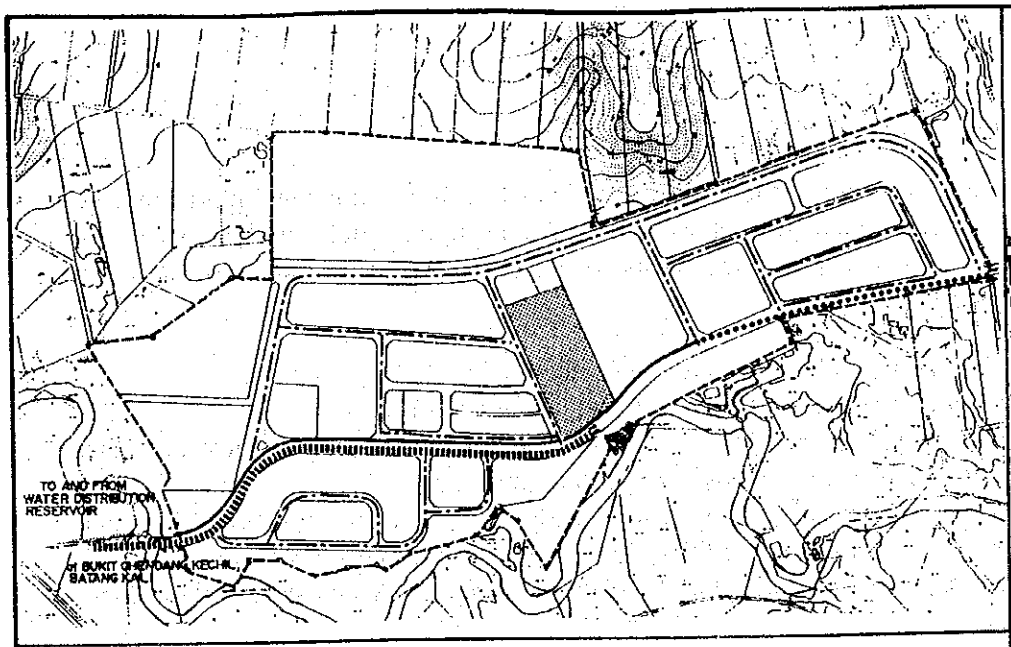


Figure 4.55
Water Supply
System Plan

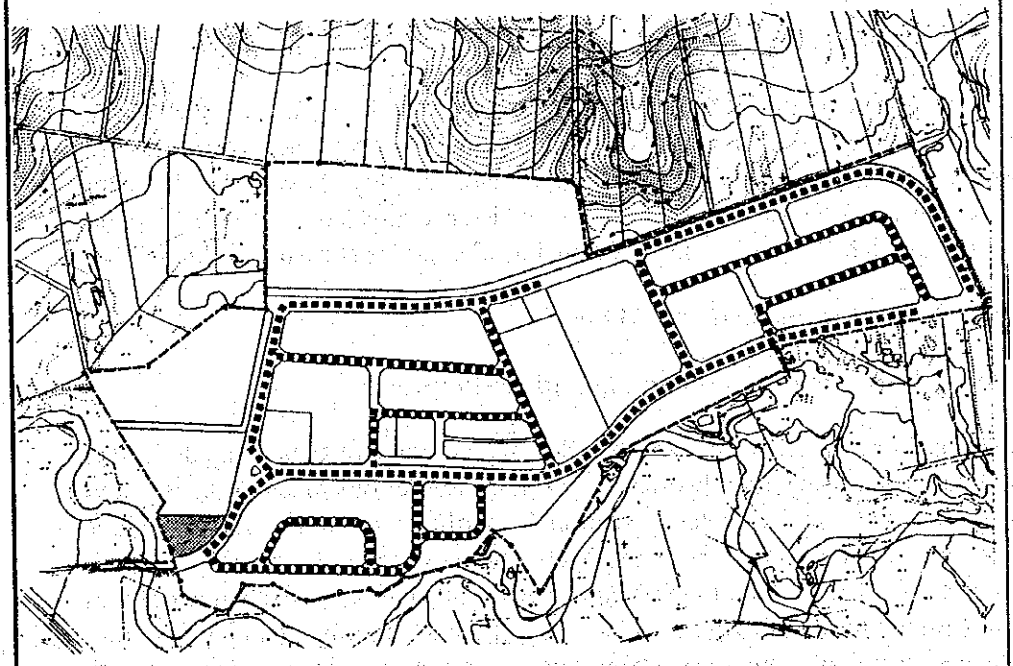


Figure 4.56
Sewerage System
Plan

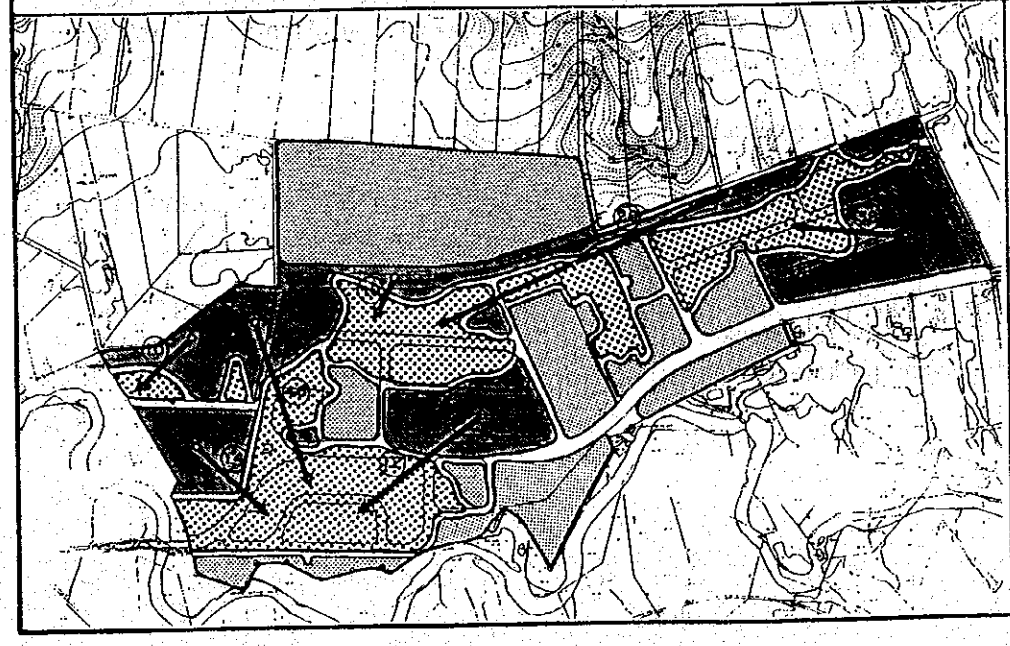


Figure 4.57
Land Development
Plan

(f) Land Development

The project area lies at the foot of gentle north to west slope with approximately 1.2% gradient, while a tiny natural creek runs north to south through the area. To minimize the adverse environmental impact due to the earthwork, the following were considered:

- The creek will be moved to the northern edge of the project area;
- Existing houses and public facilities will not be disturbed;
- The ground level of the Project Area will be higher than the designed high water level of the proposed retention pond;
- Filling and cutting will be balanced within the area (refer to Figure 4.57); and
- Adequate drainage facilities, fences, gabion will be constructed to avoid possible disasters during the construction work such as land slide, soil outflow, etc.

5) Estimate of Construction Costs

The construction costs of the Project were estimated based on the available data on similar construction works undertaken in the region as well as the experiences and knowledge of an experienced local consulting engineer employed by the Study Team. The total construction cost is RM14.3 million, which is equivalent to RM317,503/ha, RM32/sq.m. or RM2.9/sq.ft. The breakdown of the cost is shown in Table 4.32.

4.2.5 Formulation of Project Implementation Plan

1) LR Project Implementation Planning and Assumptions

A similar exercise made for the Kg. Seri Subang study area has been made for the Kg. Kuantan, Ulu Selangor study area. The same assumptions made in the Kg. Seri Subang project were applied (refer to Section 4.1.5 of this report). An issue unique to this project area is the effect of the Malay reservation land which can only be owned, used and transacted among Malays. With this nature, an exchange of lands with or without money involved will be constrained. Replot planning becomes complicated and constrained especially when a project area is composed of both Malay reservation lands and other lands. The financial land planning will also be affected because they can only be sold to Malays.

2) Land Transformation Plan

The existing land use will be changed significantly due to the project as shown in Table 4.33 and Figure 4.58. Its characteristics are as follows :

- Lands for basic infrastructure increase substantially from the existing 6.1 ha. (13.4% of the total area) to 17.3 ha. (38.2%). The increase is contributed by roads and parks/open space, river/waterway and retention pond.

Table 4.32
Estimated Construction Costs

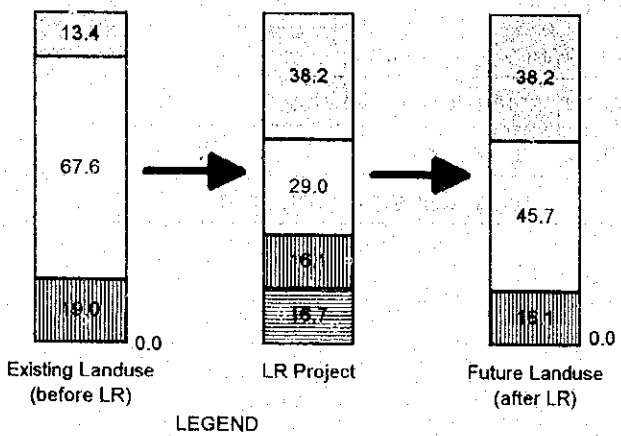
Work Item	Unit	Quantity	Unit Price (RM)	Amount (RM)
1. CIVIL INFRASTRUCTURE				10,046,036
1.1 General Site Clearance	ha	23	7,122	163,806
1.2 Earthwork				1,270,740
1) Cutting and Filling	m^3	238,000	3.83	911,540
2) Slope Protection	m^2	306,000	1.17	359,200
1.3 Stormwater Drainage				3,178,660
1) Waterway Replacement	Lump Sum			1,045,420
2) Retention Pond	Lump Sum			460,890
3) Open Drain	m	9,064	173.16	1,569,560
4) Sump	pcs	52	1,976.7	102,790
1.4 Roads and Bridges				3,459,570
1) Roads				3,251,570
Inner Collector Road W=20m	m	1,290	630	812,700
Outer Collector Road W=20m	m	1,403	640	897,920
Major Local Road W=15m	m	414	550	227,700
Minor Local Road W=12m	m	2,575	510	1,313,250
2) Bridges	m^2	260	800	208,000
1.5 Water Supply Reticulation	m	5,701	139.05	792,750
1.6 Sewage Disposal				983,150
1) Sewer	m	4,823	99	477,480
2) Manhole	pcs	440	922.0	405,670
3) Oxidation Pond	Lump Sum			100,000
1.7 Landscaping and Turfing	Lump Sum			197,360
2. MECHANICAL AND ELECTRICAL INFRASTRUCTURE				2,462,807
2.1 Electricity Supply				1,089,890
1) Electrical Cable	m	6,965	112	780,080
2) Distribution Sub Station	pcs	1	309,810	309,810
2.2 Telephone Cable Installation	m	6,956	167.90	1,167,917
2.3 Street Light Installation				205,000
1) Street Light 150W	pcs	70	1,540	107,800
2) Cabling and Trenching	m	2,700	26	97,200
3. DETAILED DESIGN WORKS (1. + 2.) x 0.10				1,250,884
4. MANAGEMENT AND SUPERVISION (1. + 2.) x 0.02				250,177
5. CONTINGENCY (1. + 2. + 3. + 4.) x 0.05				700,495
TOTAL CONSTRUCTION COST				14,710,399

Source: Study Team

Table 4.33
Land Use Transformation

Item	Land Use Before LR		Land Use in LR Scheme		Final Planned Land Use	
	Area (sqm)	(%)	Area (sqm)	(%)	Area (sqm)	(%)
Public Facility						
Basic Infrastructure						
Road	30,311	6.7	93,994	20.8	93,994	20.8
River & Waterway	23,836	5.3	33,993	7.5	33,993	7.5
Retention Pond	0	0.0	15,450	3.4	15,450	3.4
Park & Open Space	0	0.0	29,090	6.4	29,090	6.4
Reserved Land	6,576	1.5	0	0.0	0	0.0
Basic Infrastructure Total	60,723	13.4	172,527	38.2	172,527	38.2
Community Service Facilities						
Kindergarten	0	0.0	1,500	0.3	1,500	0.3
Primary School	11,129	2.5	25,000	5.5	25,000	5.5
Clinic	0	0.0	1,500	0.3	1,500	0.3
Water Facility	15,335	3.4	16,250	3.6	16,250	3.6
Cemetery	15,927	3.5	16,000	3.5	16,000	3.5
Religious Facility	0	0.0	5,000	1.1	5,000	1.1
Community Hall	12,307	2.7	3,360	0.7	3,360	0.7
Others	31,060	6.9	0	0.0	0	0.0
Sewage Disporsal	0	0.0	4,000	0.9	4,000	0.9
Community Service Facility Total	85,758	19.0	72,610	16.1	72,610	16.1
Public Facility Land Total	146,481	32.4	245,137	54.3	245,137	54.3
Alienated Land						
Private Use						
Agriculture	305,226	67.6	67,400	14.9	67,400	14.9
Building : Commercial	0	0.0	0	0.0	5,800	1.3
Building : Residential	0	0.0	63,695	14.1	133,370	29.5
Private Use Total	305,226	67.6	131,095	29.0	206,570	45.7
Alienated Land Total	305,226	67.6	131,095	29.0	206,750	45.7
Public Facility & Alienated Land Total	451,707	10.0	376,232	83.3	451,707	100.0
Financial Land	0		75,475	16.7	0	0.0
Area Difference (Actual - Registered)	0	0.0	0	0.0	0	0.0
Total	451,707	100.0	451,707	100.0	451,707	100.0

Figure 4.58
Diagram of Land Use Transformation



- Lands for community services will slightly decrease from 8.6 ha. (19.0% of the total area) to 7.3 ha (16%). Currently unutilized land (3.1%) will be converted to sites for basic infrastructure.

- On the other hand, lands for private use will decrease from 30.5 ha. (67.6% of the total area) to 20.7 ha. (45.7%). However, land use which was largely under agriculture, will be transformed to residential (13.3 ha.), commercial (0.6 ha.), and agriculture (6.7 ha.).

3) Land Valuation

Lands before and after the LR project were evaluated by land use type. The value "before" the project was determined in consultation with the Valuation Department, while those "after" the project were estimated by comparing the quality of the project with similar developments, situated under similar conditions. The average land value of RM17/m^2 "before" the project is expected to increase to RM72/m^2 "after" the project. Thus, the total land value increased from RM5.3 million to RM14.8 million (refer to Table 4.34). Site utility ratio, defined as the ratio calculated by dividing the average land values "after" the project by that "before" the project is 4.2 (refer to Table 4.35).

4) Financial Land Estimate

The financial lands planned in the area are mostly for commercial and residential uses, taking into account the marketability and expected land values. A total of 75,475 sq.m. to generate RM 7.7 million are necessary to sustain the project (refer to Table 4.36). The maximum area which can be allocated for financial land is 133,426 sq.m., while the actual allotment is 75,475 sq.m., which accounts for 56.6% of the maximum allowable area (refer to Table 4.37).

5) Financial Plan

(a) Project Cost

The cost for the project implementation includes not only the construction cost of the area but also various compensations, project management, necessary premiums and interest repayment. The implementing body will have to employ a large number of designers, supervisors and management personnel in order to carry out the project. Contractors and surveyors have to be employed and supervised as well. The costs of the project are as follows:

Construction cost: This covers the construction cost of all necessary infrastructure and public facilities needed in the project (refer to Table 4.32 for details).

Compensation Cost: Due to varied reasons such as change in landuse replotting plan, land development plan, construction of public facilities, etc., a total of 70 buildings with 13,138 thousand sq.m. of floor area need to be relocated or demolished and rebuilt. The affected buildings were identified and 80% of the new construction costs

Table 4.34
Estimate of Land Values

Land Use : Alienated Land	Before LR			After LR		
	Unit Price (RM/sqm)	Area (sqm)	Amount (RM000)	Unit Price (RM/sqm)	Area (sqm)	Amount (RM000)
Private Use						
Agriculture	17.20	305,226	5,250	30.00	67,400	2,022
Building : Commercial	-	0	0	368.00	5,800	2,134
Building : Medical, Welfare	-	0	0	-	0	0
Building : Residential	25.00	0	0	80.00	133,370	10,670
Industry : Medium Scale	-	0	0	-	0	0
Industry : Service	-	0	0	-	0	0
Private Use Total	17.20	305,226	5,250	71.77	206,570	14,826
Other Community Service						
Other Community Service Total	-	0	0	-	0	0
Alienated Land Total	17.20	305,226	5,250	71.77	206,570	14,826
Area Difference (Actual - Registered)		0	0			
Total / Average	17.20	305,226	5,250	71.77	206,570	14,826

Table 4.35
Estimate of Land (Replot) Value and Site Utility Increase Ratio

Item	Before LR	After LR
Registered Area : sq.m.	305,226	-
Actual Area : sq.m.	305,226	206,570
Average Unit Value : RM/sq.m.	17.20	71.77
Total Value : RM000	5,250 (A)	14,826 (B)
Site Utility Increase Ratio : (B)/(A)		4.17

Table 4.36
Planned Financial Lands and Estimated Value

Use	No of Lots	Area (sq.m.)	Average price (RM/sq.m.)	Amount (RM000)
Commercial	20	5,800	368	2,134
Residential	140	69,675	80	5,574
Total	160	75,475	-	7,708

Table 4.37
Estimate of Maximum Contribution for Financial Land

Item	Amount	Remarks
Total value of private use lands before LR : RM000	5,250	Refer to Table 4.34
Total value of private use lands after LR : RM000	14,826	"
Total increased value or private use Lands : RM000 (A)	9,576	"
Unit Value of private use lands after LR : RM/sq.m. (B)	71.77	"
The Maximum Area for Financial Land Contribution : sq.m. (C)	133,426	(A) / (B)
Actually planned Financial Land : sq.m. (D)	75,475	Refer to Table 4.36
Actually planned Financial Land : % to maximum	56.6	(C)/(D)

were allocated in the project cost for different building types (residential, commercial) and material types (reinforced concrete, timber, brick and timber). Compensation will also cover temporary suspension of business activities, loss of agricultural production and other losses **(refer to Appendix 4.9)**.

Survey Cost: The LR project requires extensive surveys throughout the process. During the preparatory stage, various survey maps are necessary for project planning, and a boundary survey is also needed to delimit the project area precisely. During the implementation stage, a block confirmation survey, which determines the location of the planned roads on the existing lands, needs to be carried out. Together with a road centerline survey, the location and area of the block will be determined. However, when the construction work is completed, differences are normally observed between the results of the block confirmation survey and the actually developed blocks. For this, a confirmation/ alteration survey will be carried out to confirm the location, shape and area of blocks and lots prior to preparation of the replotting plan. A lot confirmation survey is conducted to survey the final area of the replots (refer to Appendix 4.10).

Project Management Cost: Management of the LR project requires preparation of detailed design, supervision of the construction work, undertaking compensation negotiation and work implementation, supervision of various survey work, and preparation of replotting design. For this purpose, an effective LR organization needs to be established which is composed of a large number of personnel with adequate levels of expertise (refer to Appendix 4.11).

Land Conversion and Alienation Premium: In the Malaysian land registration system, a LR project will also be subject to conversion premium and (further) alienation premium. The former is imposed when land purpose is altered, while the latter when financial land is created (refer to Appendices 4.12 and 4.13).

Total Project Cost: The estimated total project cost is approximately RM21.8 million of which the construction cost shares the largest portion (57.5%), followed by compensation cost (19.9%), project management cost (17.3%), etc. Land conversion premium shares an insignificant portion of the cost (refer to Table 4.38).

Table 4.38
Estimated Project Cost

Item	RM000	(%)
Construction Cost	12,513	(57.5)
Compensation Cost	4,316	(19.9)
Survey Cost	219	(1.0)
Project Management Cost	3,764	(17.3)
Land Conversion Premium	374	(1.7)
Interest	568	(2.6)
Total Project Cost	21,754	(100.0)

(b) Project Revenues

The revenue sources of the project include the shared costs of the Federal Government, State Government, Local Authority and relevant agencies, and disposition of financial land.

Defrayals: Shared costs of relevant bodies were worked out on the basis of discussions held with the counterpart team officials to assume cost-sharing for relevant public facilities (refer to Appendix 4.14).

Financial Land: A total of 7.5 ha. has been allocated for commercial (0.58 ha.) and residential (6.97 ha.) uses (refer to Table 4.36).

Total Project Revenue: The total revenue of the project is expected to be RM21.8 million, of which disposition of financial land contributes 35.4% of the total, federal share, 46.4%; state and local authority share 3.9% and various agencies, 14.3% (refer to Table 4.39).

Table 4.39
Estimated Project Revenue

Revenue	RM000	(%)
Federal Share	10,100	(46.4)
State & Local Authority Share	840	(3.9)
Agency Share	3,106	(14.3)
Disposition of Financial Land	7,708	(35.4)
Total Revenue	21,754	(100.0)

(c) Financial Plan

Disbursement of the project costs and generation of the revenues are more or less made over seven years between 1997 and 2003, as shown in Table 4.40. The cost and revenues will be balanced by year 2001, though the exercise at this stage of the study involves a lot of uncertainties such as project period, the sale of financial land, etc.

(d) Contribution Rate

Estimated contribution rates are 32.3% for public facility and 24.7% for financial land. Therefore, the aggregate contribution rate for landowners becomes as high as 57.1%, as shown in Table 4.41.

Table 4.40
Cost Disbursement and Revenue Generating Schedule[1)]

Item		Total RM000	Yearly Disbursement (RM000)						
			1997	1998	1999	2000	2001	2002	2003
COST	Construction Cost	12,512	0	626	1,877	3,128	3,754	1,877	1,251
	Compensation Cost	4,316	0	432	1,079	1,295	863	432	215
	Survey Cost	219	55	44	11	33	11	33	32
	Project Management	3,764	301	452	565	866	678	489	413
	Conversion Premium	374	0	0	0	112	150	75	37
	Alienation Premium	0	0	0	0	0	0	0	0
	Sub-Total	21,186	356	1,554	3,532	5,434	5,456	2,906	1,948
	Interest [2)]	568 [2)]		36	195	294	43	0	0
	Total	21,754	356	1,590	3,727	5,728	5,499	2,906	1,948
REVENUE	Federal Share	10,100	0	0	2,525	3,030	3,030	1,515	0
	State & Local Authority Share	840	0	0	210	252	252	126	0
	Agency Share	3,106	0	0	0	0	1,242	1,242	622
	Disposition of Financial Land	7,708	0	0	0	3,854	2,505	23	1,326
	Total	21,754	0	0	2,735	7,136	7,029	2,906	1,948

1) Yearly allocation of costs and revenues are made based on the assumption shown in **Appendix 4.15**.
2) 10% per year is assumed as interest rate

Table 4.41
Contribution Rate Calculation

Item			Amount	Remarks
Registered Area before LR (sq.m.)		: (A)	305,226	
Revised Area before LR (sq.m.)		: (B)	305,226	
Development & Financial Land After LR (sq.m)		: (C)	206,570	
Contribution Area (sq.m.)	Basic Infrastructure	: (D)	98,656	
	Financial Land	: (E)	75,475	
	Aggregated Area	: (F)	174,131	(F)=(D) + (E)
Contribution Rate (%)	Basic Infrastructure	: (G)	32.3	(G)=(D)/(B)*100
	Financial Land	: (H)	24.7	(H)=(E)/(B)*100
	Aggregated Area	: (I)	57.0	(I)=(G) + (H)

4.2.6 Formulation of Replotting Design Plan

1) Assumptions

The assumptions in this exercise are similar to those made in Kg. Seri Subang. Without any statutory plan, it is assumed that the area is declared under the rural growth center project of the government. The lands in Kg. Kuantan are provided with final title.

2) Land Valuation

(a) Calculation of Street Value

Street values were calculated using the same method applied for the Kg. Seri Subang project, where only the factors relevant to Kg. Kuantan project have been considered (refer to Table 4.42). The calculated street value index before the project ranges from 650 to 1,000, and from 3,120 to 3,350 after the project, as shown in Figures 4.59 and 4.60, respectively.

Table 4.42
Adjustment Factors in Street Value Method

Adjustment Factors	Range of Adjustment (Coefficient Value)	
	Before the Project	After the Project
• Condition of Street (hierarchy, connection)	- 10% ~ 0%	0% ~ + 15%
• Amenity (utilization of private land)	- 5% ~ 0%	+ 150%
• Width of Street	- 10% ~ 0%	0% ~ + 10%
• Pavement Type	- 10% ~ 0%	0%
• Sewerage / Drainage	0%	+ 30%
• Water Supply	- 5% ~ 0%	0%

(b) Valuation of Individual Lot / Block

The adjustment factors and their coefficient values considered for individual lots are shown in Table 4.43. All the existing lands were valued at the same index of 697 since they are all designated as agricultural land and connected with only one road. On the other hand, the future lands were grouped into three landuses - commercial, residential and agricultural - and they were valued at different indices. For residential purpose, the lands were valued within the narrow range between 3,245 and 3,485. The land valuation results are indicated in Table 4.44 and illustrated in Figure 4.61 and Figure 4.62. Almost the same increase rate for residential land, and more moderate rates for agriculture and commercial lands, were estimated.

Figure 4.59
Street Value Index Before the Project

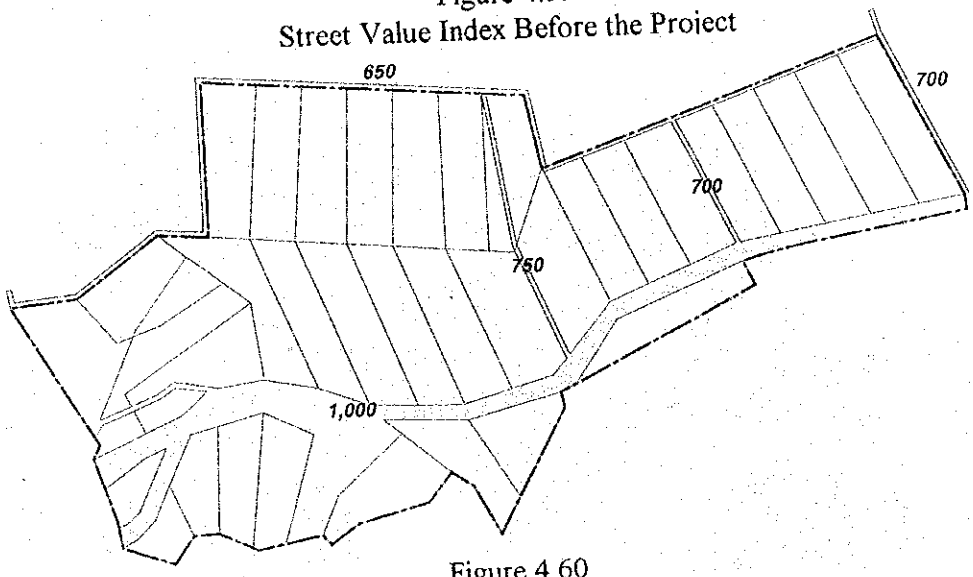


Figure 4.60
Street Value Index After the Project

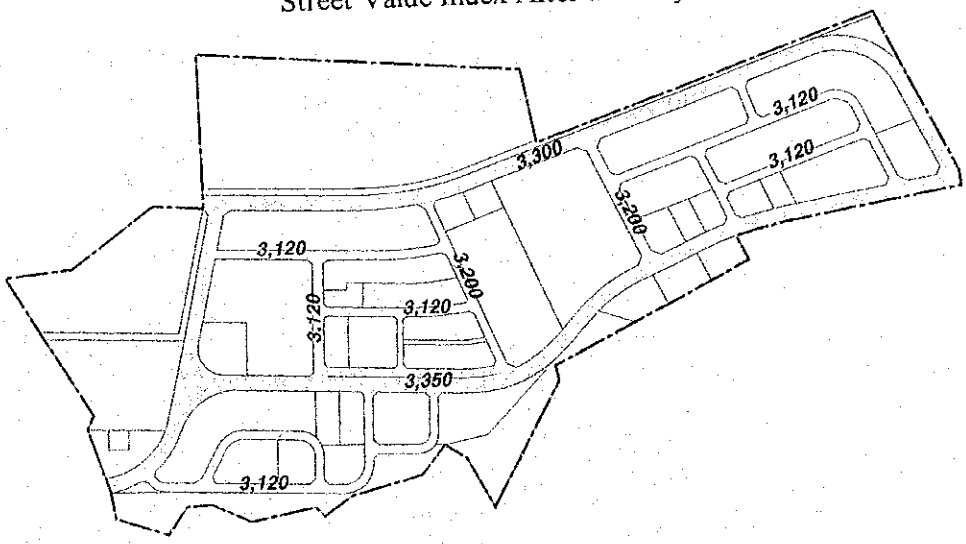


Table 4.43
Factors and Coefficient Values for Land Valuation in Kg. Kuantan Project Area

Factor	Condition	Coefficient Value	Note
Category of Land Use	Commerce Residence Agriculture	+ 200% 0% - 10%	
Size	A < 20,000 m² A ≧ 20,000 m²	0% - 5%	
Terrain	Gradient ≦ 5% Gradient > 5%	0% - 5%	
Nuisance Facilities	Adjoining Land	- 5%	
Height Difference Between Road and Lot	H > 1m - 1m ≦ H ≦ 1m H < - 1m	- 3% 0% - 5%	only applied to the block valuation after project
Corner Lot	Commerce Residence	+ 10% + 2%	
Land Adjoining Front and Back Road	Commerce Residence	+ 10% + 2%	
Land not Adjoining Any Road		- 5%	

Figure 4.61
Individual Lot Valuation Before the Project

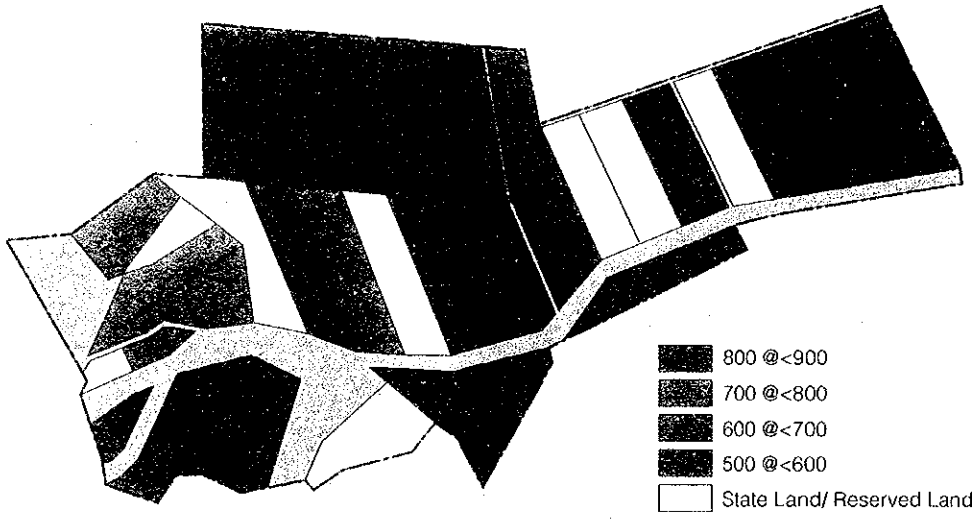


Figure 4.62
Block Valuation After the Project

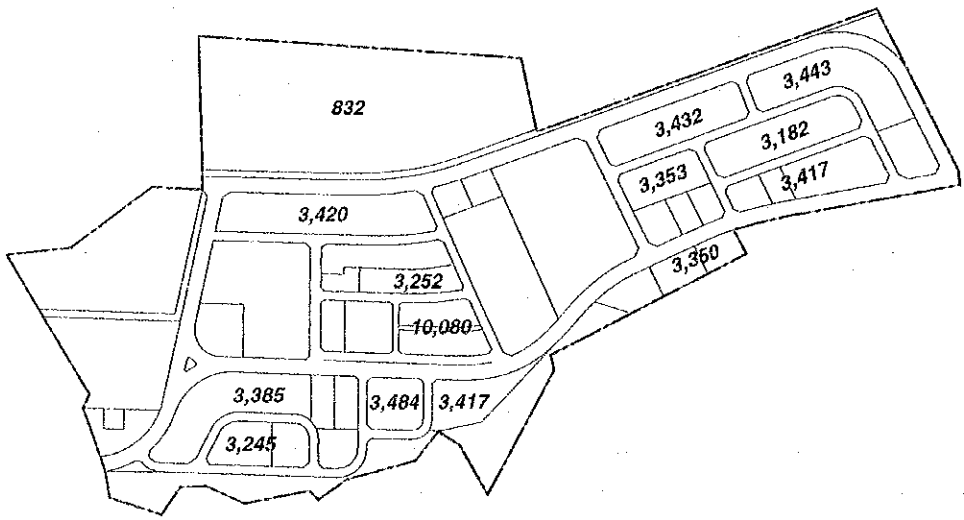


Table 4.44
Land Valuation Results Before and After the Project

Before the Project Valuation Index	After the Project			Increase Rate in Project Implementation Plan
	Land use	Average Valuation Index	Increase Rate (%)	
Agriculture 697	Agriculture	832	119.4%	174.4%
	Residential	3,371	483.6%	465.1%
	Commercial	10,080	1446.2%	2139.5%
	Total	2,731	391.8%	417.3%

3) Replotting Design

(a) Replotting Principle

The proportional valuation replotting calculation method is employed as a key formula to determine the replotted area. The proportional rate in the project area is calculated at 1.278 on the average.

Since the replotting design is to be formulated based on the project implementation plan, commercial area is first fixed as financial land and then followed with the replotting of the private land in compliance with the following policies:

- Basically, lots are to be replotted to original places or to nearby locations;
- To ensure lot utilization after the project, replotted lots should have enough frontage with rectangular shape; and
- No financial land is allocated to agricultural land.

(b) Results

The replotting design modified original lots are shown in Figure 4.63 and the allocated new lots and financial land are illustrated in Figure 4.64. All original lots were replotted to new lots under some calculated contribution rates. These rates are summarized in Table 4.45. The rate of residential land is as high as 70.6%.

Table 4.45
Contribution Rates

Private Land Before the Project	Private Land After the Project		Note
	Landuse	Average Contribution Rate	
Agriculture	Agriculture Residential Commercial Total	23.6% 70.6% - 57.1%	Financial Land

Figure 4.63
Change in Lot Shape Through Replotting

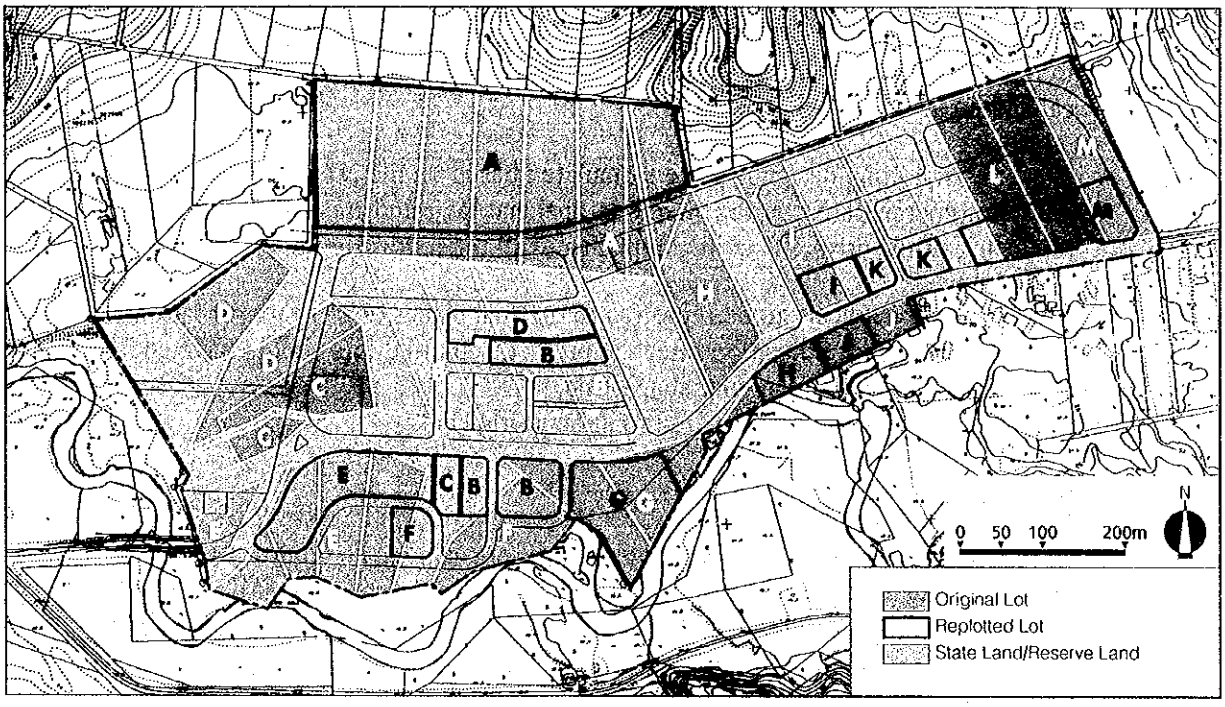


Figure 4.64
Replotting Design in Kg. Kuantan Project Area

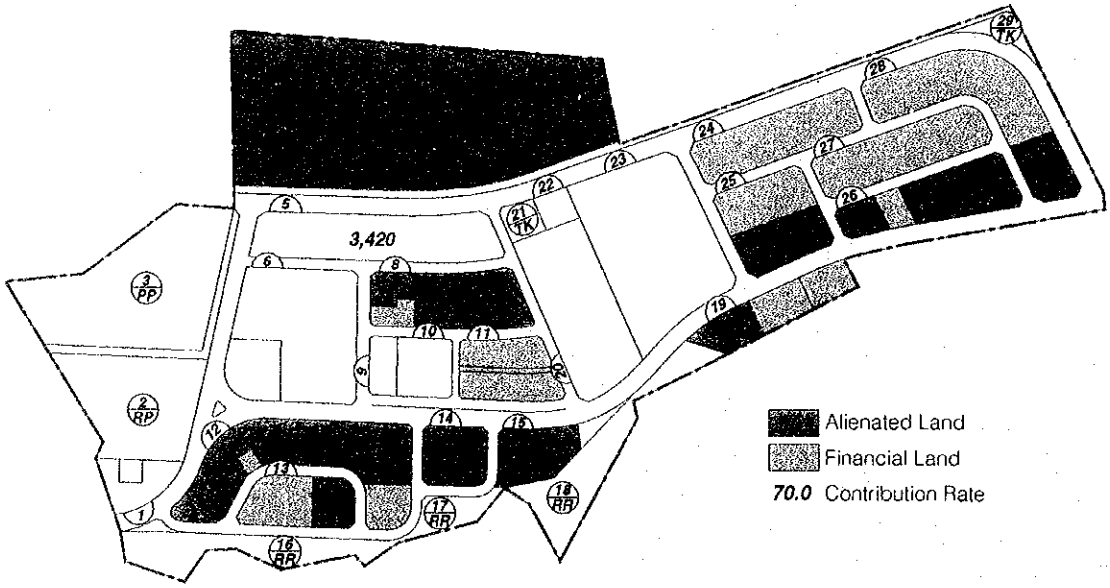


Figure 4.63
Change in Lot Shape Through Replotting

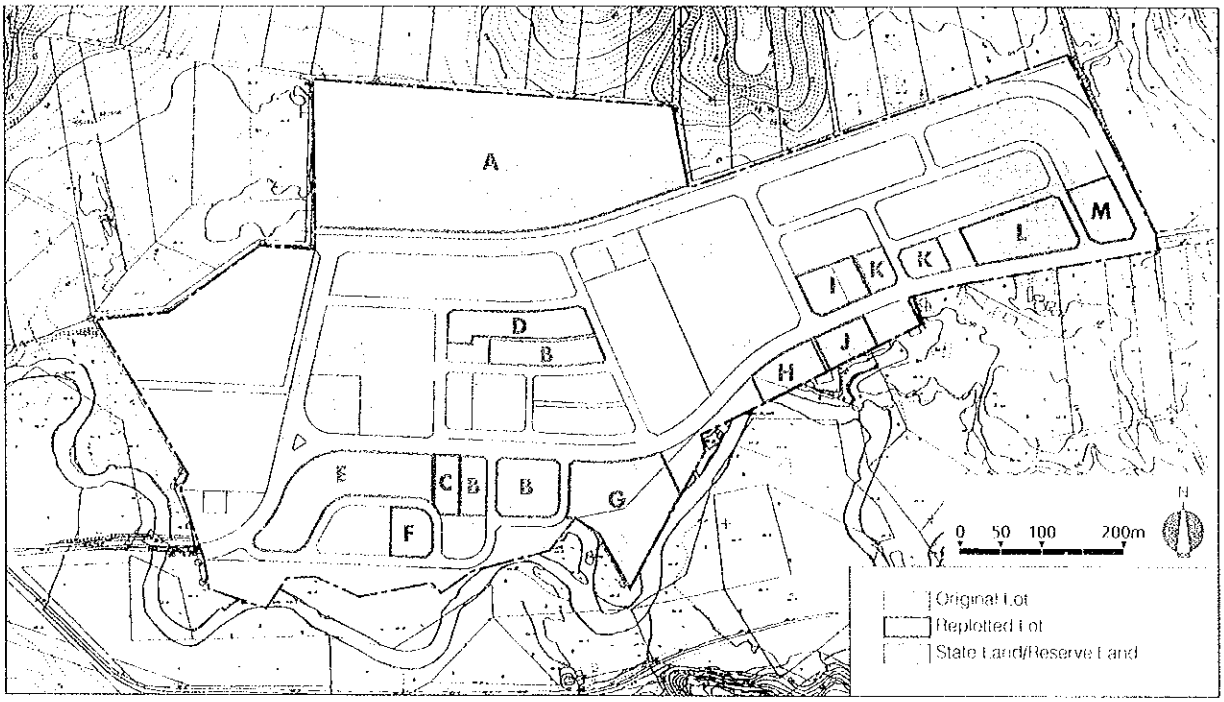
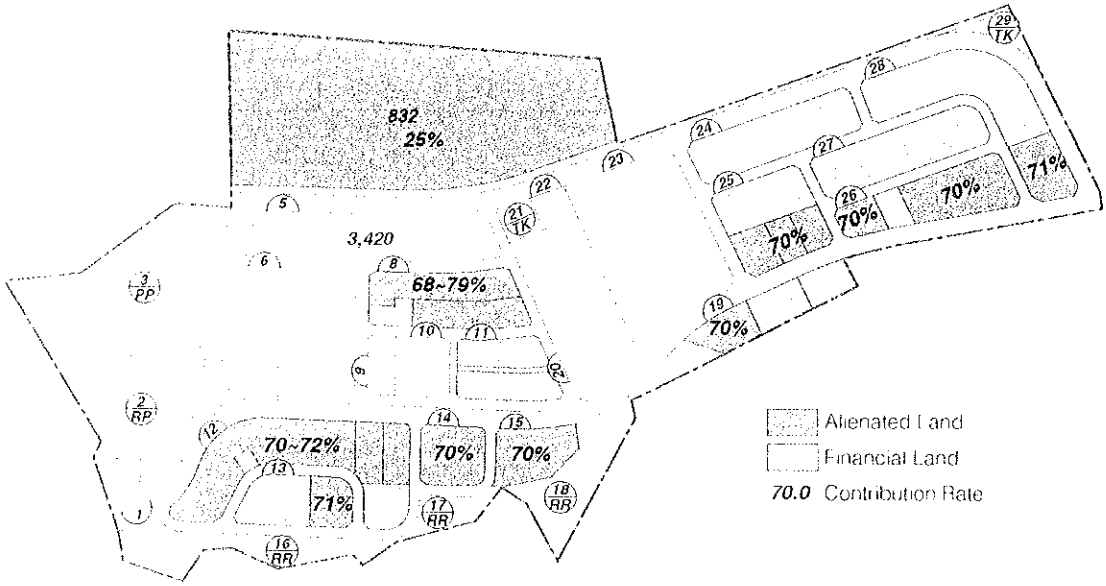


Figure 4.64
Replotting Design in Kg. Kuantan Project Area



4.3 Assessment of the Case Study Projects

4.3.1 Economic Aspect

1) General

The economic assessment of the LR projects has to be discussed from two different viewpoints:

(a) Economic assessment of the LR projects as an urban development undertaking; and

(b) Economic assessment of the LR method in comparison with other urban development methods.

In order to develop or improve an area, LR is not the only method but other methods could also achieve similar effects. Therefore, the economic effects due to the former should not simply be attributed to the latter, though it is difficult to segregate them clearly.

It is expected that the project would bring about different economic benefits for different bodies over different periods of time. Aside from the short-term benefits, which are mainly due to the implementation of construction work, the expected benefits from the project would be extensive, as shown in Table 4.46. Although these benefits overlap and cannot be explicitly defined and quantified, they are normally considered much larger than the costs especially when the project conforms with the statutory plan or master plan, which have been prepared properly. This is particularly true in the case of Kg. Seri Subang where urbanization has been rapidly taking place and effective use of lands is desired locally and at the regional level.

Table 4.46
Type of Benefits and Beneficiaries

Type of Benefit	Beneficiaries		
	Landowners	Community	Government
• Effective Use of Lands	A	-	AA
• Creation of New Urban Centers	A	A	AA
• Increase in Employment Opportunities	A	A	A
• Improved Circulation	AA	A	AA
• Improved Site Utility	AA	-	-
• Improved Accessibility to Services	AA	A	A
• Improved Safety/Living Environment	AA	-	AA
• Regulation of Rights on Lands	AA	-	AA

Note : AA : Significantly concerned
A : Concerned
- : Neutral

The differences of economic impact between the LR method and other methods, say the buying up of land, compulsory purchase or gradual adjustment to a new plan, are mainly evident in the distribution of the benefits and maximization process of the benefits. The former is probably the most significant aspect of the LR project which will concurrently contribute to the maximization of the project benefits. Buying up of large inhabited lands is practically impossible, and gradual adjustment to the plan would require a very long time as well as a strong enforcement machinery. And most likely, the plan would not be realized effectively. A realistic alternative approach to LR is to acquire the necessary lands for infrastructure/public facilities and construct them. However, with this conventional method, it is easily foreseen that the following drawbacks are created:

- Unfair distribution of the benefits: Those who own lands adjoining the improved infrastructure would be greatly benefitted while those being located remotely from them, and those whose lands are acquired, would not be benefitted equally.

- Ineffective use of lands remain: Since the land ownership structure is not reorganized, lands with irregular shapes remain, therefore, effective use of lands cannot be expected.

A significant aspect of LR projects is that secondary economic activities, such as constructing or reconstructing houses/buildings, would also be much more encouraged compared to other development methods. This is because all lands are reorganized and equally improved with readily available necessary infrastructure and utilities.

2) Economic Impact of the Projects

One simplified and practical way to judge the level of economic viability of the projects is to estimate and compare the land value on "with" and "without" project basis. Since the land valuation method applied in this Study incorporated similar factors. As summarized in Table 4.47, the increase in land value is significant for both project areas (RM 227 million to RM 777 million in Kg. Seri Subang and RM 5.3 million to RM 14.8 million in Kg. Kuantan, Ulu Selangor) mainly due to effective land use, improved infrastructure and resultant enhancement of accessibility, environment, and utilities. With the projects, population as well as employment is expected to increase in an organized manner under much improved living and activity environments.

Project cost (RM 262 million) for Kg. Seri Subang is well below the increase in land value (RM 551 million), while the former for Kg. Kuantan (RM 22 million) is lower than the latter (RM 10 million). This implies that the economic viability of the project for Kg. Seri Subang is significant, while that for Kg. Kuantan is much less. This exercise clearly indicates that the area where land value is relatively high owing largely to high urban development pressure is the area that is the most suitable and has potentials for LR undertaking.

The economic impacts were further assessed by varied benefits component. The benefits with regard to town planning aspect and community environment are great, while that on regional economy is also expected to a considerable extent..

Table 4.47
Economic Impact of LR Projects

Item			Kg. Seri Subang	Kg. Kuantan Ulu Selangan
Demography	Population	Without LR	2,300 < [2]	290 < [2]
		With LR	10,700	1000
Land Value and Project Cost (RM000)	Employment	Without LR	3,000 < [2]	60 < [2]
		With LR	9,500	160
	Entire Area	Without LR	226,584	5,250
		With LR	777,216	14,826
	Landamness	Without LR	231,478	5,250
		With LR	662,585	7,118
	Project Cost		261,994	21,754
Town Planning Aspect	1) Creation of new urban centres		4	2
	2) Effective use of land		4	3
	3) Improved circulation		4	2
Regional Economy	1) Increase in employment oppotunities		4	3
	2) Stimulating neighbouring local economy		2	1
Community Environment and Interest	1) Imploved site utility		4	3
	2) Improved salety/living environment		4	2
	3) Regulation of rights on lands		0-4 [1]	0

Note : Assessment is made on the following scale: 4 : very significant, 3 : significant, 2 : moderate, 1 : insignificant, 0 : no impact, N : negative impact

Legend:
1) Needs policy decision on regulating existing land ownership conditions which is outside the LR Project.
2) There might be uncontrolled increase with disregard for infrastructure improvement.

4.3.2 Financial Aspect

1) General

The financial aspect of the LR method is also very significant as compared to other methods. Both the landowners and the administration side benefit from the LR method. In conventional development, buyers purchase the developed lands from the developers who shoulder the development costs and administration, and obtain lands and various public facilities free of cost. When and where cheap virgin lands are available and demands on properties are large, this type of development method is feasible.

However, for the areas subject to LR application such as a previously developed area or areas with complicated landownership, a different cost-sharing method is formulated because the higher project cost cannot be transferred to the residents. Similarly, the residents cannot expect all the development costs of the infrastructure to be shouldered entirely by the administration.

A basic principle in LR project financing is that all participants of the project share the cost equitably in accordance with the benefits they receive from the project. While the project cost can be easily quantified, the project benefits are not equally quantifiable. However, this does not prevent the establishment of a rule or guideline on how to split the costs among the participants. As analyzed in project implementation plan formulation worked out on the basis of discussions with concerned agencies, a cost-sharing formula was able to be prepared.

2) Financial Assessment from Landowners

As was clearly explained in the previous sections and also seen from Table 4.47, the landowners in Kg. Seri Subang and Kg. Kuantan, Ulu Selangor can expect an increase in land valuesof their lands due to the projects. However, the increase in the former area is larg (2.9 times), while that in the latter area is relatively small (1.4 times).

3) Cost to Government

In general, LR method is more effective than the acquisition method in many cases of infrastructure development and, especially, in area development. An exercise was carried out in Kg. Seri Subang in order to compare the project costs under the two methods mentioned, as shown in Table 4.48 The assumed situations for the comparison are as follows:

(A-1): Acquisition Method: Only infrastructure/public facilities will be constructed, while the remaining areas remain as they are. This is the most popular conventional development method.

(A-2): Acquisition Method: The entire area will be first acquired including the relocation of all buildings/facilities, then the area be developed according to the layout plan.

(B) : Land Readjustment Method: No land will be acquired nor existing buildings/facilities be relocated outside the project area. The entire area will be developed according to the layout plan.

The project costs are roughly estimated in Table 4.48. The LR method does not require any land acquisition cost, but rather, higher compensation due to replotting and higher project management costs caused by intensive planning and coordination. Although the project costs of the two methods are quite similar, the cost-sharing is very different. Government has to shoulder RM 221 million or RM 381 million under the acquisition method but only RM 109 million under the LR method. Although landowners share RM 159 million, their lands will be so well-organized that land

values increase and overall environment become much improved. On the other hand, under the acquisition method, landowners do not probably have to shoulder any project cost except land premiums, but lands and buildings which were not affected by construction remain as they were. Overall, environment would not be enhanced much. Only some landowners would be benefited significantly due to the construction of public facilities while many landowners would not.

Table 4.48
Comparison of Estimated Cost to Government
Between Acquisition Method and LR Method

Cost Category	Acquisition Method		(B): LR Method
	(A-1): Infra/Public Facilities Only	(A-2): Entire Area Development	
1) Land Acquisition	64.0	226.6	-
2) Construction	117.0	117.0	117.0
3) Compensation	5.0	17.7	57.0
4) Project Management	20.0	30.0	49.0
5) Land Premiums	45.0	45.0	45.0
Total Project Cost	251.0	426.3	268.0
Cost to Government	221.0	381.3	109.0

4.3.3 Social Aspect

1) General

The social significance of the LR project, in comparison with other development methods, has been discussed in general in other parts of this report. They are summarized as follows:

(a) LR requires landowners and lessees to participate in the project where they are not only consulted but also participate in certain decision making.

(b) LR is a joint undertaking between the landowners themselves and the government to maximize the benefits which accrue from the development, both for individual landowners and the community as a whole, at equitably shared costs.

(c) LR allows landowners and lessees to stay in the project area and continue their existing socio-economic activities unless they wish otherwise. Whenever they are affected adversely by the project, they are adequately compensated.

(d) LR will protect the legal rights of lands of landowners throughout the project period. No land will be compulsorily acquired.

The above key social elements are basically built into the LR procedure through legal and administrative arrangements. Therefore, it is worthwhile to assess the case study projects in the light of these LR principles. However, since any urban area development project is a sort of public undertaking, it has to be looked into also from the following standpoints:

- Community as a whole;
- Landowners; and
- Tenants, sub-tenants, squatters.

2) Public Interests vs. Landowners Interests

An ideal situation is that both interests meet. Although in this case study, the landowners have not been consulted in the process of formulating a series of plans, it is considered appropriate that the master plan will be formulated more from the community level and they are consulted through public hearings. Once the master plan or local plan takes effect, the plan is considered the common development objective of the community and the landowners. Then on the basis of the local plan, the LR layout/landuse plan will be worked out wherein conflicts between the public/community interest and the landowners' interest usually arise. The following are some major issues anticipated:

Kg. Seri Subang Project

(a) It is reasonable that agriculture lands shall be converted to more effective urban use. However, those who have been residing on such lands and are involved in legal activities cannot continue with their activities. For some, this will be a timely opportunity to change their lifestyle but for those who want to maintain their lives, the plan does not address this. A possible countermeasure is to provide alternative agricultural land outside the project area the development of which can also be integrated with the project.

(b) Many factories illegally operating on agricultural lands are provided with residence in the same lots. When the landuse is legalized, the factory and the residence have to be physically separated according to the existing zoning ordinance. By splitting the lands in addition to reducing them, is it feasible to continue their activities after the project? There is no common solution for those affected. However, they can redesign the existing factories when they are relocated to make them fit into the new replot, and with compensation money, obtain separate smaller residential lots.

(c) Nearly half of the lands (529 lots) are occupied by non-landowners including tenants (43 lots or 8.1%), sub-tenants (30 lots or 5.7%), TOL holders (150 lots or 28.4%), and illegal occupants (31 or 5.9%). The formal LR process does not provide any guarantee for their activities but leaves the arrangements between their landowners and themselves. However, it is considered possible to provide them opportunities to participate in the project by purchasing financial lands or land from landowners which can be planned based on their needs. Provision of social housing planned beforehand might be an effective countermeasure as well.

Kg. Kuantan Project

(a) Without any statutory plan covering the project area, the LR planning process becomes difficult and long. Although the residents feel that certain improvements are needed and they show positive response to developments, they are basically contented with existing environments. If a rural growth center is needed from the regional viewpoint, the public interest should be adequately balanced with the community interest and those of individual landowners. Since the study also suggests that the sale of financial land might not be so easy and contribution rates of the landowners are considerably high, it is not fair to develop the area using the LR unless the financial commitment of the Government is more significant.

3) Response to Key LR Concepts

In order to assess the perception on key LR concepts and the response to the proposed project, an opinoin survey was conducted for community leaders of Kg. Seri Subang (10 Chinese) and Kg. Melayu Subang (10 Malays). The survey was conducted according to the following program:

(i) Introduction of the meeting by the district officer and project coordinator of JPBD
(ii) Presentation of a video showing an experience of LR project in Japan
(iii) Presentation of the case study on Kg. Seri Subang and LR concepts by JICa Study Team
(iv) Question and Answer
(v) Discussion of quuestionnare (Refer to Appendix 5.1)
(vi) Discussions

The results of the opinion survey are as follows:

(a) General Perception of LR Concepts: 70% of the leaders find the LR concept good and interesting, while 30%, not so good.

(b) Acceptance of LR Concept in Malaysia: 45% of the leaders consider the LR concept would be accepted very well in Malaysia, while 45% do with difficulties, and 10% no.

(c) Perception of the Proposed Project: 45% of the leaders perceive the proposed project is good; 35% good but improvements are needed, while 20% find it not so good.

(d) Understanding LR Concept: Leaders find the LR concept can be well understood. (Refer to Table 4.49)

(e) Agree to Contribution: 45% answered yes, and 30% yes but too high, while 25% answered no. 80% of Malay leaders said yes, while on the other hand, 40% of the Chinese leaders said no.

(f) Financial Land: 75% found the concept of financial land a good one, while 25% considered it not to be. Malay leaders are more supportive to the concept.

Table 4.49
Understanding LR Concept

	Understand Well	Fairly Well	Difficult to Understand
Overall Concept	50 %	50%	0 %
Contribution	35	55	10
Replotting	40	50	20
Financial Land	30	60	10
Others	35	55	10

(g) Location of Replot: 75% want the same location, while 25% do not mind the location.

(h) Factors to be Considered for Replot: Land value, environment, and convenience are the major factors to be considered in replotting. (Refer to Table 4.50)

Table 4.50
Factors to be Considered for Replot

	Chinese	Malay	Total
Convenience	10 %	30 %	20 %
Environment	20	30	30
Land Value	60	20	40
Land Size	0	20	10
Land Shape	0	0	0
Land Status	0	0	0

(i) Participation in the Proposed Project: 50% want to participate in the proposed Kg. Seri Subang project and 35% do but with conditions, while 15% do not want to. Response was quite different between Malay and Chinese leaders. (Refer to Table 4.51)

Table 4.51
Participation in the Proposed Project

	Chinese	Malay	Total
Yes	20 %	80 %	50 %
Yes, with conditions	60	10	35
No	20	10	15

4.3.4 Environmental Aspect

1) General

The LR projects for Kg. Seri Subang area and Kg. Kuantan, Ulu Selangor area have been assessed on their environmental aspects. The assessment was made following the EIA guideline of the Department of Environment. After a pre-scoping was conducted, the following set of main issues for the project areas were gathered:

Kg. Seri Subang Area

- hydrology;
- soil erosion and sedimentation;
- water, air and noise quality; and
- traffic.

Kg. Kuantan Area

- soil erosion and sedimentation;
- loss of flora and fauna;
- water, air and noise quality; and
- socio-economic environment.

2) Kg. Seri Subang Project Area

(a) Hydrology

The implementation of the project can exert significant impact on the hydrology of the project area. There will be an overall reduction in filtration rate during the construction and post-construction period, which in turn will increase the volume, velocity and peak rate of runoff and decrease the catchment time lag. This will subsequently affect the flood characteristics of the project area. In order to mitigate the adverse impact of the project on the hydrology downstream of the project site, two retention ponds have been proposed to control the outflow of additional storm runoff from the project site. Within the project site itself, it is anticipated that there will be no localized floods due to the efficiency of the designed drainage system to convey storm runoff.

(b) Soil Erosion and Sedimentation

The estimated average annual soil erosion during the land clearing/construction period, under the worst case scenario, is within acceptable limit, that is, 355 tons/ha./yr. With the recommended mitigating measures, soil erosion in the project site is expected to be minimized. (Refer to Table 4.52 and Figure 4.65)

Following are the mitigation measures recommended to minimize the impact of soil erosion during the construction period:

(i) clearing of land should be carried out in stages to ensure that the exposed land is worked on and "covered up" within the shortest practical duration; this requires clearing and grading to be carried out in segments and only when necessary;

(ii) regulation of construction phases, i.e, major construction activities should be scheduled for periods with lower rainfall, that is from the months of June to October;

(iii) utilization of diversions and silt traps and construction of an appropriate drainage system to control the channelling of water and sediments;

(iv) revegetation or turfing of exposed land; and

(v) maintenance of buffer strips of vegetated land to trap sediments.

(c) Water Quality

Sewage flow from the project has been estimated to be 4.7 million liters per day and the sewage treatment systems to be installed would be the oxidation ditch system. The effluent will be treated to Standard A, as required by Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979, before being discharged into Sg. Pelumut and Sg. Air Kuning. In view of this, negative impacts on the river water quality caused by the discharge are expected to be minimal provided that the wastewater treatment plant is operational and properly maintained.

At present, the water quality of Sg. Pelumut and Sg. Air Kuning was observed to be poor, with high levels of suspended solids, coliform and E. Coli. The drains were also badly maintained. (Refer to Table 4.53 and Figure 4.66) With the planned drainage system, water quality in the project site is expected to improve significantly.

The mitigation measures recommended to minimize the impact on water quality are as follows:

(i) regular maintenance of the sewage treatment plant;

(ii) regular monitoring of the sewage treatment plant by the authorities; and

(iii) implementation of water quality monitoring program every three months during the operational stage.

(d) Air and Noise Quality

Some deterioration of the air quality may occur during the construction phase, mainly due to the movement of construction vehicles. This would be in the form of increased concentration of dust particulates in the air. At present, there is no serious air pollution observed in the area. (Refer to Table 4.54)

Construction activities, such as earthworks and piling, will also generate noise. These activities would produce noise in intermittent spurts of differing magnitude and duration. Typically, the levels of noise produced can be expected to range from 70 to 90 dB(A). During the operational phase, noise levels are expected to be lower than that generated during construction. The main sources of noise will be from human activities and from vehicles passing to and from the industrial and commercial centers. It is expected that typical noise levels will range between 50 to 70 dB(A)

Figure 4.65
Identified High Risk Erosion Areas

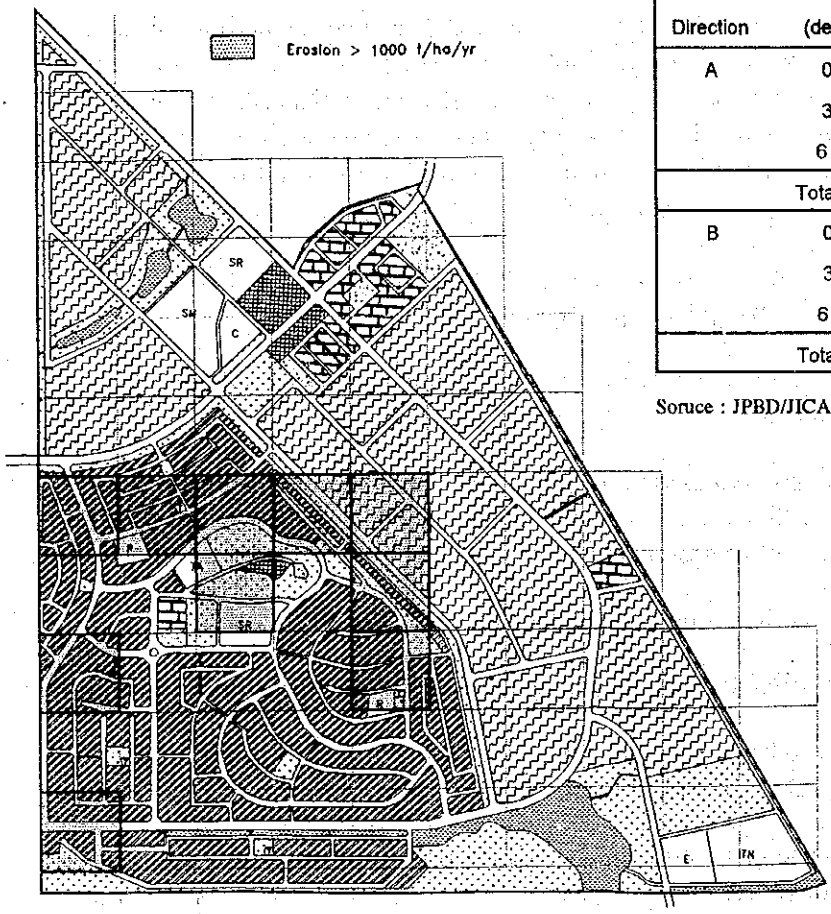


Table 4.52
Estimated Erosion for Project Site
Under the Worst Case Scenario

Slope Direction	Slope Angle (degree)	Area Involved (acreage)	Area Involved (%)	Erosion Range (Tonnes/ha/yr)
A	0 - 2	612.7	78	69.43 - 452.10
	3 - 5	87.8	11	566.27 - 832.84
	6 - 10	87.8	11	1094.45 - 2690.65
	Total Area	788.3	Mean	378.07
B	0 - 2	662.9	84	69.43 - 488.75
	3 - 7	62.7	8	566.27 - 882.27
	6 - 10	62.7	8	1268.02 - 2873.46
	Total Area	788.3	Mean	331.82

Soruce : JPBD/JICA, Plan No : JP/93/SEL/4173/SUB/B1, Scale 1 :2500

Figure 4.66
Water Sampling Locations

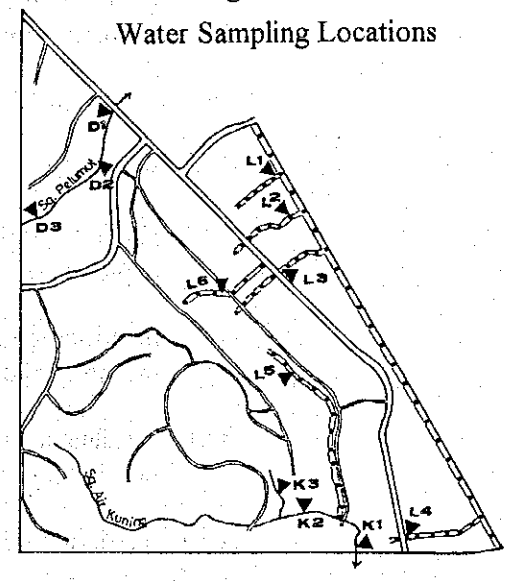


Table 4.53
Water Quality Analysis of Stream Samples

PARAMETERS	STD. A	D1	D2	D3	K1	K2	K3	L1	L2	L3	L4	L5	L6
pH	-	6.2	6.2	6.0	6.2	6.1	5.9	4.7	6.5	6.2	6.3	6.4	7.1
Temperature, deg. Celcius	-	28.6	29.8	30.9	30.6	29.8	30.3	30.5	29.6	30.5	30.4	30.4	30.4
Dissolved Oxygen	-	4.4	0.5	<0.1	7.3	6.5	5.3	7.8	1.0	<0.1	7.5	1.7	6.0
Chemical Oxygen Demand	50	32	83	112	336	205	278	48	144	176	141	406	45
Biochemical Oxygen Demand	20	8	20	25	82	69	64	11	34	41	33	92	10
Suspended Solids	50	48	56	27	372	128	112	13	37	76	140	79	1160
Mercury	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (Cr6+)	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cyanide	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead	0.1	0.07	0.07	0.04	<0.02	0.10	0.08	0.05	0.04	0.13	0.14	0.07	0.05
Chromium (Cr3+)	0.2	<0.02	0.36	<0.02	0.02	0.26	0.14	<0.02	<0.02	0.03	0.03	<0.02	<0.02
Copper	0.2	<0.02	0.03	0.02	0.25	0.27	0.21	<0.02	<0.02	<0.02	0.02	0.05	<0.02
Manganese	0.2	0.07	0.17	0.46	0.22	0.21	0.21	0.15	0.10	0.08	0.12	0.11	0.05
Nickel	0.2	0.02	1.23	<0.02	1.36	1.31	1.34	<0.02	<0.02	0.02	<0.02	0.04	<0.02
Tin	1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc	1.0	0.27	0.07	0.19	0.51	0.44	0.43	0.07	0.10	0.15	0.18	0.21	0.07
Boron	1.0	<0.02	0.07	0.15	0.31	0.26	0.26	<0.02	0.13	0.37	0.26	0.37	<0.02
Iron	1.0	2.44	3.03	7.94	0.96	1.15	1.13	2.18	1.58	4.08	1.84	1.36	0.17
Phenol	0.001	0.57	0.14	0.06	0.16	0.06	0.16	0.02	0.64	0.02	0.02	0.06	0.06
Free Chlorine	1.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sulphide	0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Oil & Grease	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND
E. Coli, org/100 mL	-	54000	92000	160000	160000	92000	35000	35000	92000	54000	16000	54000	4.5
Coliform, org/100 mL	-	92000	160000	240000	160000	240000	54000	54000	92000	92000	240000	54000	7.8
Ammoniacal Nitrogen	-	1.7	3.1	4.3	9.8	8.7	8.7	6.7	24.8	<0.1	10.8	25.2	1.8

Water samples chemical analysis were carried out by Spectrum Laboratories Sdn. Bhd.
All results in milligrams per litter unless otherwise stated
ND = not detected
D1 to D3 = Sg. Petumu
K1 to K3 = Sg. Air Kuning
L1 to L6 = Drains

The existing airport operations contribute to noise pollution. In this respect, the 70 dB(A) contour forming the critical noise cone from the airport cuts across the site to its east. (Refer to Figure 4.67) Areas within the east of the line would be subjected to levels exceeding 70 dB(A). (Refer to Table 4.55) The planning for the new Kg. Seri Subang has taken this into consideration and only non residential area is proposed for the affected area. Areas earmarked for residential development are confined to the western portion of the project site. As such, adverse impacts as a result of noise from the airport operations would not be serious.

To mitigate air and noise pollution arising from construction activities, it is recommended that the following be implemented:

(i) revegetating or constructing hard surface to reduce loose topsoil as soon as earthworks commence;

(ii) storing raw materials such as sand, cement and landscaping soil in buildings or covering them with plastic liners and placed away from urban areas and properly disposed off to designated areas;

(iii) tarring of all roads should be carried out as soon as possible;

(iv) wetting of the exposed dry soil surface with water should be carried out daily;

(v) restricting the speed limit to 5 km/hr on all vehicles entering the project site to avoid loose topsoil or dust turbulence;

(vi) positioning of noise generating machineries at least 80 meters away from the existing residential area;

(vii) installing acoustic shields to deflect and absorb noise from the machineries or providing exhaust mufflers on all moving machineries;

(viii) restricting construction activities and vehicle movement to daytime;

(ix) supplying hearing protective devices to workers especially those that are involved in drilling and piling operations;

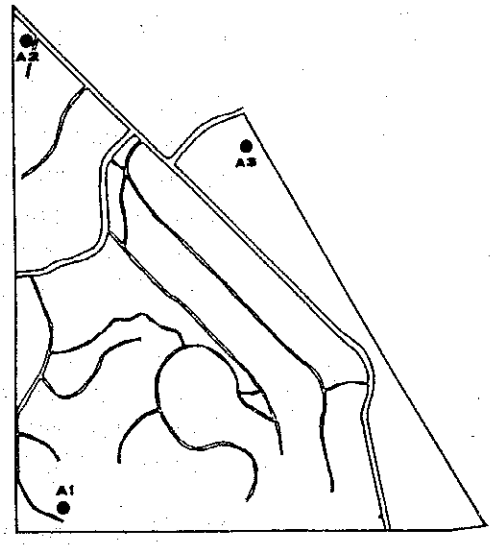
(x) installing warning signs to indicate high noise areas;

(xi) planning of vegetation along roadsides and at the borders to reduce noise; and

(xii) establishing barriers between the project site and the residential areas, say, in the form of earth mounds of solid walls.

Table 4.54
Air Quality Results

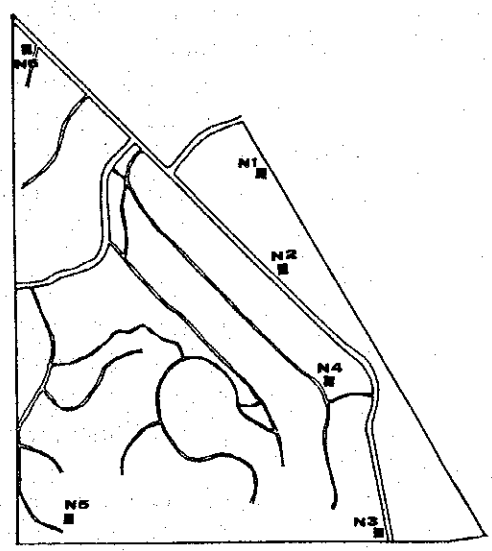
Test	Unit	Concentration			Specification	
		A1	A2	A3	Averaging Time	Malaysian Guideline*
T.S.P	ug/m³	75	206	139	24 hours	260
PM10	ug/m³	34	96	61	24 hours	150
NO2	ppm	<0.005>	<0.005>	<0.005>	24 hours	0.06
SO2	ppm	<0.005>	<0.005>	<0.005>	24 hours	0.04
LEAD	ug/m³	<0.01>	0.01	0.01	24 hours	1.5
CO	ppm	<2	<2	<2	8 hours	9
HYDROCARBON	ppm	<2	<2	<2	NA	NA



* - Malaysian Recommended Environmental Air Quality Guideline
NA - Not Available
A1 - Near TNB Power Cable (Vegetable farm)
A2 - Near Ladang Shah Alam, by the main road
A3 - at Pekan Subang (near Airport runway)

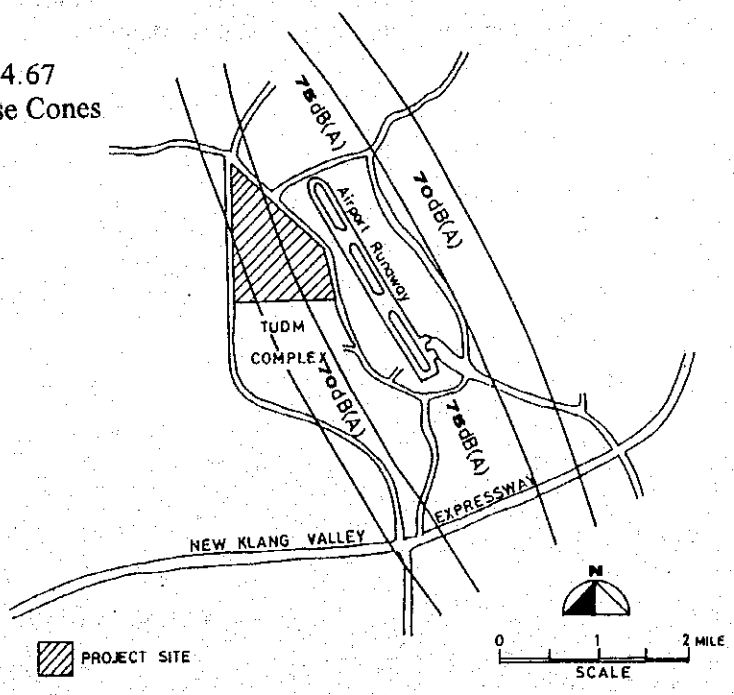
Table 4.55
Average Noise Level at the Sampling Sites

8 HOURS AVERAGE NOISE LEVEL, dB(A)					
N1	N2	N3	N4	N5	N6
62.78	66.98	68.48	63.68	58.15	61.18



Note : N1 - adjoining airport runway
N2 - at a junction by the main road
N3 - infront of the TUDM Complex
N4 - infront of a car workshop
N5 - agriculture area (vegetable garden/fruit orchard)
N6 - Near Ladang Shah Alam, by the main road

Figure 4.67
Airport Noise Cones



(e) Road Traffic

Traffic demand will increase and traffic flow pattern will change due to the LR project. The existing traffic volume along Jalan Subang-Jalan 3D of approximately 8,000 to 15,000 vehicles a day would increase to 10,000 to 40,000 pcu a day. Although some major roads in the project area would accommodate relatively heavy traffic volume of 5,000 to 10,000 pcu a day, they are well below the capacity of the planned 4-lane roads.

The most critical point is the intersection near Pekan Subang where Jalan Subang/Jalan 3D and circumferential road intersect. A detailed analysis has been made by estimating generation, distribution and assigned traffic volume. (Refer to Figure 4.68, Table 4.56 and Figure 4.69)

The total traffic volume to be loaded on the intersection will be doubled to approximately 44,000 pcu a day. Turning movement during the peak hour varies from 100 to 970. The heaviest volume is left-turn movement from Jalan Subang to the circumferential road and vice versa, each of which has 970 pcu an hour, followed by 700 pcu for each direction along Jalan Subang/Jalan 3D. (Refer to Figure 4.69)
To meet this level of traffic demand, at-grade intersection with adequate traffic engineering design and management will be sufficient. (Refer to Figure 4.70)

(f) Overall Assessment

In the overall environmental assessment of this project, it can be concluded that the positive consequences due to the implementation of this project will outweigh the negative consequences, which at most will be transient and have no residual effect, provided that the mitigation measures proposed are strictly adhered to.

On the other hand, the development of the project will improve the physical and socio-economic environment of the project site. The project area will be provided with all the basic infrastructure and community service facilities which will enhance the well-being and quality of living of the local residents.

Figure 4.68
Steps for Traffic Demand Forecasting

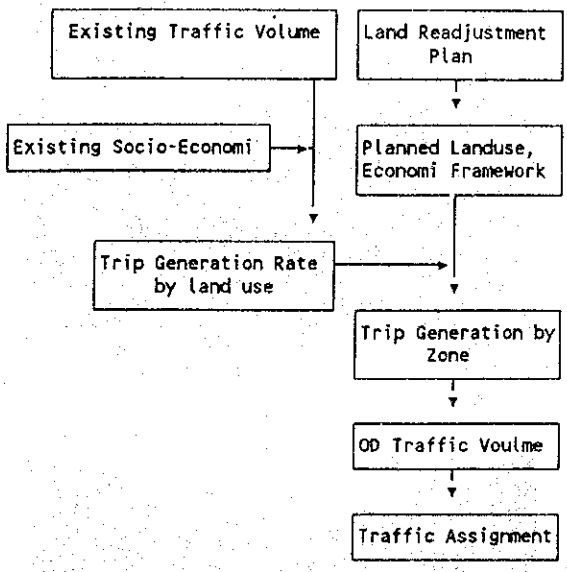


Table 4.56
Trip Generation Rate by Land Use Type

Land Use	P. Car	Lorry/Van	M/C
Middle-Industry	45	40	45
Service-Industry	230	200	230
Commercial	300	120	300
Detached House	40	-	30
Semi-D House	100	-	90
Terrace House	190	-	270

Figure 4.69
Future Traffic Demand on the Major Network and Major Intersection

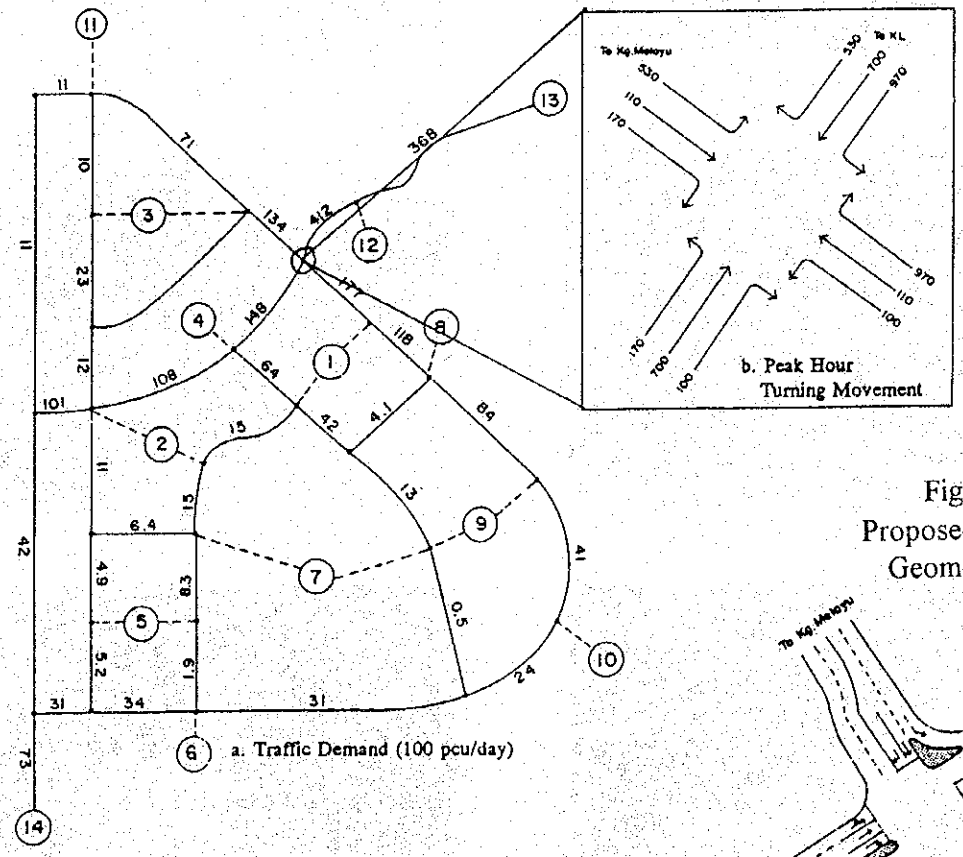
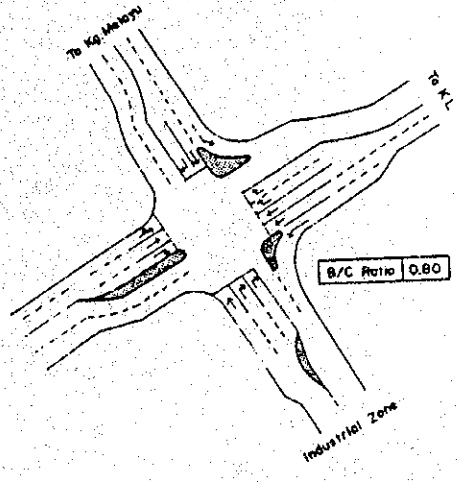


Figure 4.70
Proposed Intersection Geometric Design

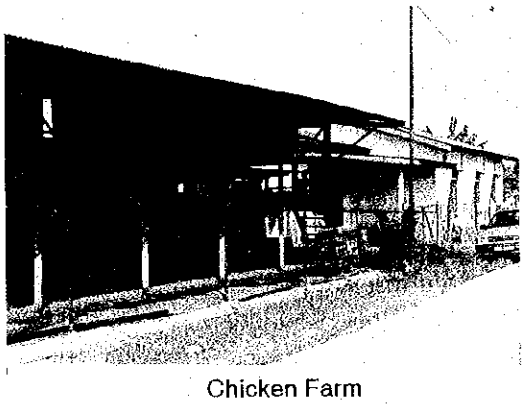


Scenes of Environmental Assessment Survey at Kg. Seri Subang

Land Clearing Activity

Agricultural Land

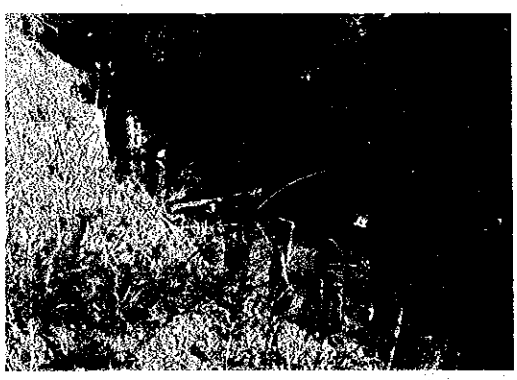
Air Monitoring Point



Chicken Farm

Water Sampling Point 1

Major Road



Water Sampling Point 2

Minor Road

3) Kg. Kuantan Project Area

(a) Soil Erosion and Sedimentation

The mean estimated soil erosion for the project site, under the worst case scenario is 160.22 tons/ha./year. (Refer to Table 4.57 and Figure 4.71) With the proposed mitigation measures, soil erosion of the project site is not expected to be a problem.

The mitigation measures against soil erosion and sedimentation problems arising from the construction activities are listed below:

(i) Clearing and grading of the land must be carried out in phases and only when necessary; this is to minimize soil erosion and to ensure that any exposed land is worked on and "covered up" within the shortest time possible;

(ii) The implementation of the construction phase should be properly planned and carried out only during periods with lower rainfall; this is to minimize soil erosion from surface runoff during heavy downpour;

(iii) Utilization of channels, diversions and various soil-trapping structures such as silt-traps and settling basins to control the channelling of water and sediments;

(iv) Revegetation of bare, exposed land should be done as soon as possible; and

(v) Construction of retaining walls or terracing at steep cut and fill slopes to prevent slope failure and possible landslides.

(b) Loss of Flora and Fauna

The biological resources of the project site mainly consist of species commonly found in a rubber estate. The flora and fauna found here are neither endemic nor indigenous. Thus, the loss of these species presents no threat to the biodiversity of the area.

(c) Water Quality

Judging from the results of the water sampling survey, the existing water quality of Sg. Batang Kali is clean, as its organic and inorganic constituents are well beneath the values stated in Standard A of the EQA 1974. (Refer to Table 4.58)

The sewerage system will be engineered to channel all effluent generated to the oxidation pond for treatment. Since land is available and the population density is low, an oxidation pond system is proposed to represent an economical method of treatment. By treating the sewer discharge, adverse impacts on the water quality of the various waterways in the project area are expected to be minimal provided the oxidation pond system is operational and properly maintained.

(d) Air and Noise Quality

Some degradation of the air quality may happen during the construction phase due mainly to movement of heavy vehicles. Also, numerous generators will be used to

generate electricity. Therefore, there would be an increased concentration of dust particles, hydrocarbon gases and smoke in the affected area.

It is anticipated that the major sources of noise pollution will be produced by the construction activities such as earthworks and piling. These activities would produce noise in intermittent spurts of differing magnitudes and duration. Typically, the levels of noise generated can be expected to range from 70 to 90 dB(A). The highest noise level of between 100 to 120 dB(A) will be produced by piling activities.

In the case of air and noise pollution arising from construction activities, the same mitigation measures in Kg. Seri Subang project area are recommended.

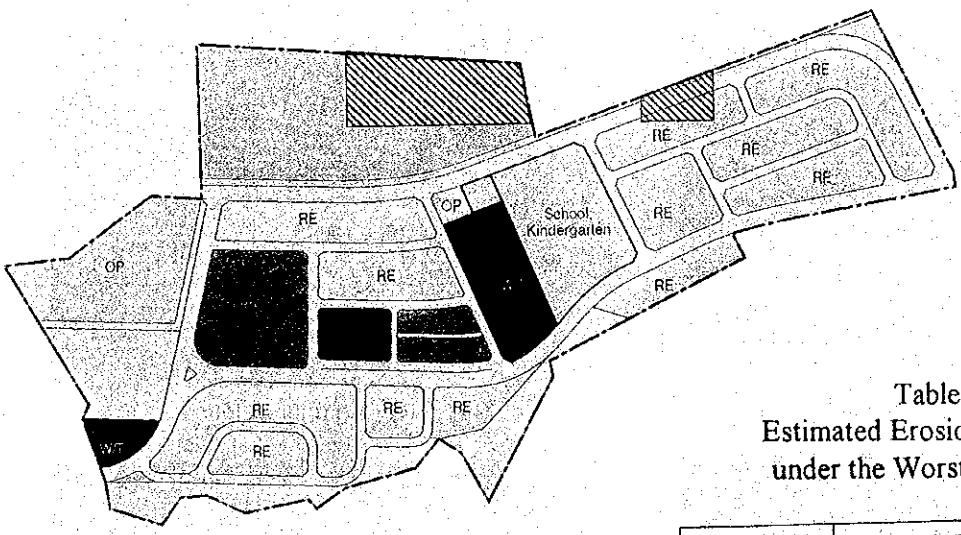
(e) Socio-Economic Environment

The implementation of the proposed project will improve the living standards of the local residents living near the project site through generation of more employment and commercial opportunities as well as through the provision of more homes in the area. The quality of life will be enhanced through the modernization of various infrastructure made available to the population living in the project site.

(f) Overall Assessment

In the overall environment assessment of this project, it can be included that the beneficial effects brought by the implementation of the proposed development will outweigh the detrimental consequence which at most will be transient and have least residual effects. The proposed development will also support the State Selangor Government's plan to direct developmental projects away from the polluted and congested Klang Valley.

Figure 4.71
Identified High Risk Erosion Areas



>500 tons/ ha/ year

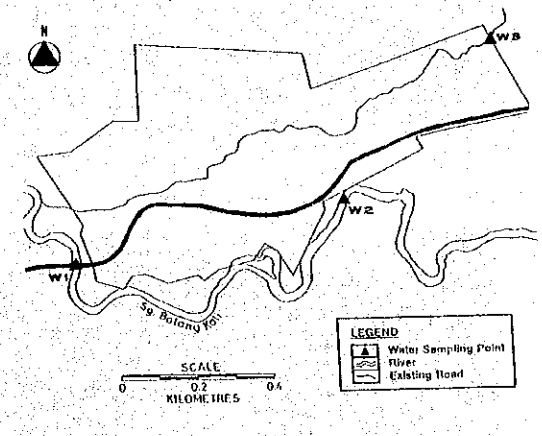
Table 4.57
Estimated Erosion for Project Site under the Worst Case Scenario

Slope Direction	Slope Angle (°)	Area Involved (ha)	Area Involved (%)	Erosion Range (Tonnes/ha/yr)
Slope A (northeast–southwest)	0–5	21.2	46.9	51 – 96
	6–26	23.7	52.4	102 – 405
	>26	0.3	0.7	2167
	TOTAL AREA	45.2	MEAN	169
Slope B (northwest–southeast)	0–5	25.1	55.5	46 – 96
	6–26	18.3	40.5	108 – 417
	>26	1.8	4.0	791 – 971
	TOTAL AREA	45.2	MEAN	151

Table 4.58
Water Quality Analysis of Stream Samples

Parameter	Unit	W1 +	W2 +	W3 +	Std.A*
pH		6.5	5.8	6.4	6.0-9.0
BOD	mg/L	4.0	6.0	5.0	20
COD	mg/L	18	24	18	50
S. Solids	mg/L	21	20	8	50
Oil and Grease	mg/L	ND	ND	ND	ND
Coliform Count	MPN/100ml	1600	2410	2400	-
E. Coli	MPN/100ml	540	1600	410	-
Free Chlorine	mg/L	ND	ND	ND	1.0
Arsenic	mg/L	ND	ND	ND	0.05
Boron	mg/L	ND	ND	ND	1.0
Cyanide	mg/L	ND	ND	ND	0.05
Cadmium	mg/L	ND	ND	ND	0.01
Mercury	mg/L	ND	ND	ND	0.005
Lead	mg/L	ND	ND	ND	0.10
Chromium^{3+}	mg/L	0.03	0.04	0.03	0.20
Chromium^{6+}	mg/L	ND	ND	ND	0.05
Copper	mg/L	0.02	0.03	0.02	0.20
Manganese	mg/L	0.02	0.02	0.08	0.20
Nickel	mg/L	ND	ND	0.02	0.20
Zinc	mg/L	0.23	0.18	0.23	1.0
Tin	mg/L	ND	ND	ND	0.20
Iron	mg/L	0.28	0.21	0.46	1.0
Phenol	mg/L	0.07	ND	0.12	0.001
Sulphide	mg/L	ND	ND	ND	0.50

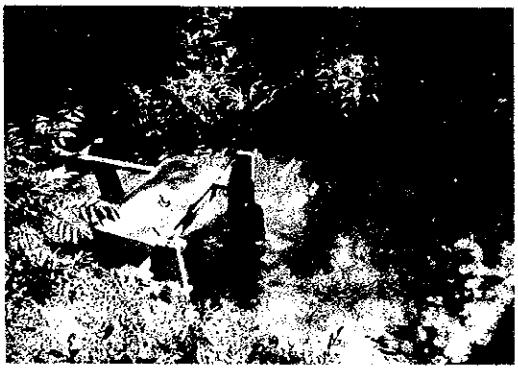
* Standard A, Environmental Quality Act, 1974 (1991)
\+ Results of water quality analyses by Spectrum Laboratories Sdn. Bhd
• ND - Not Detectable



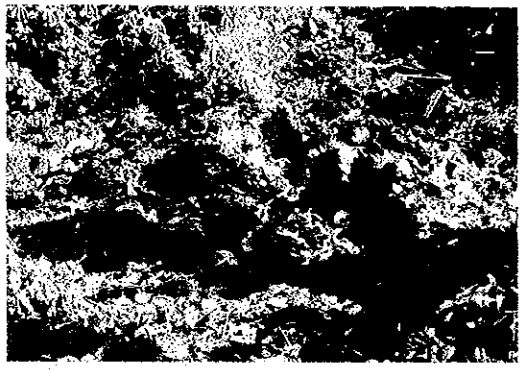
Scenes of Environmental Impact Assessment at Kg. Kuantan

Water Sampling Point 1

Kampung House



Water Sampling Point 2



Indiscriminate Dumping Site

Rubber Plantation

Major Road

Cleared Vegetation

Minor Road