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Final Report



Territory Development Department
拓展署

in association with

The MVA Consultancy
Llewelyn-Davies Planning
Brian Clouston and Partners Hong Kong Limited
Cremer & Warner Limited

Executive Summary

September 1994

Green Island Reclamation Feasibility Study



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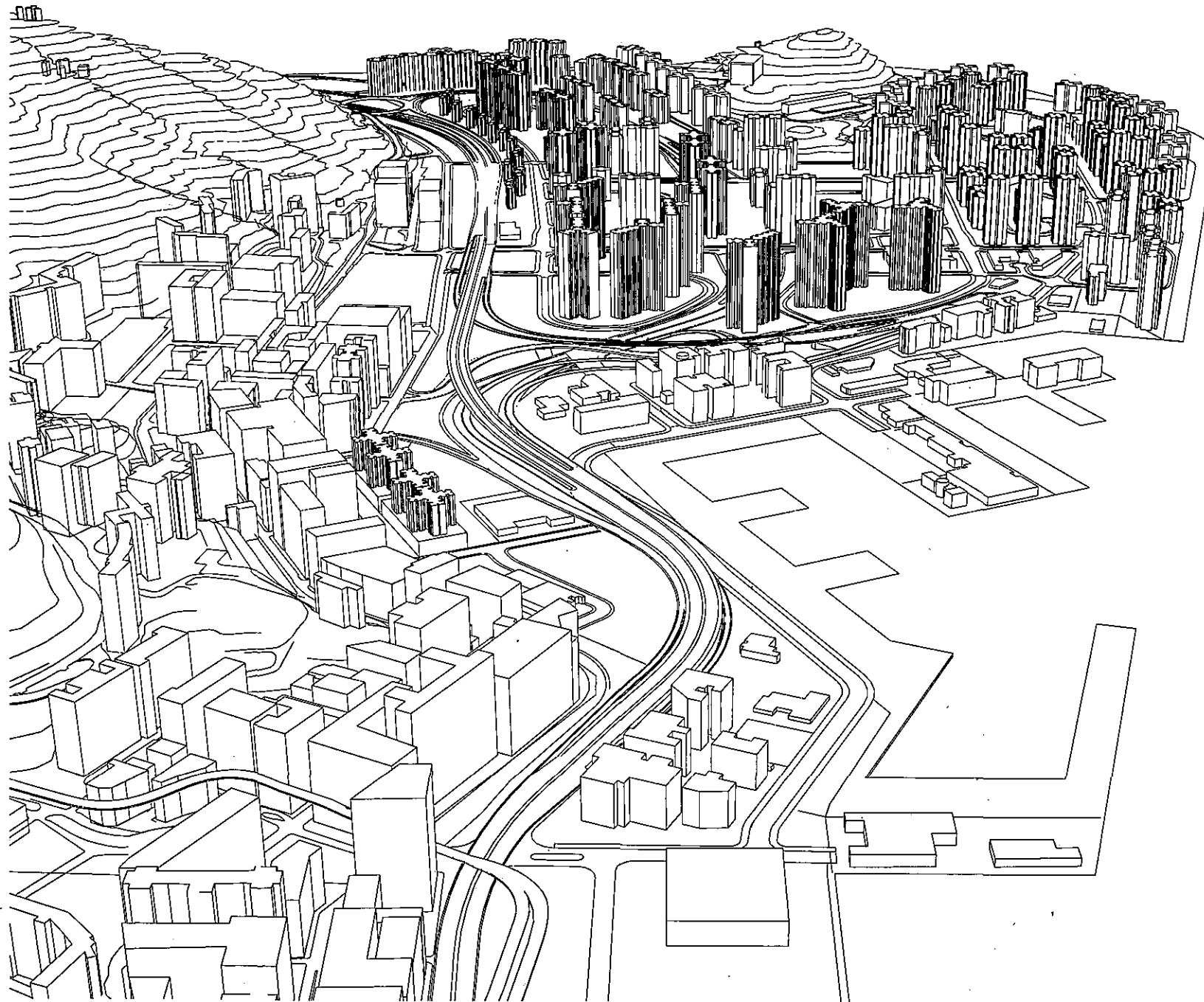
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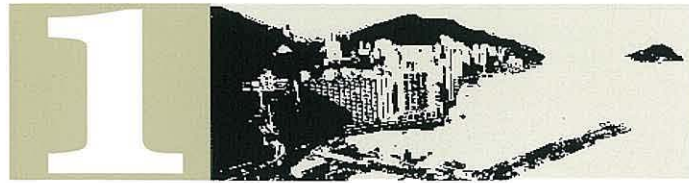
Preface

The Green Island Reclamation Feasibility Study started in 1988 and progressed until early 1989. At this point it was decided that decisions taken in the Port and Airport Development Strategy (PADS) and Metroplan Studies were needed for this study to have a firm basis from which to take its options forward with confidence.

This led to an extended period over which the study has been carried out. In the process of seeking final Government approval to the outcome of the study considerable comments were made which required a further review of and revision to the Recommended Outline Development Plan.

The Final Report, in three volumes, presents the findings of the Study, the process of the study and the technical issues examined during the study. This Executive Summary presents the key issues of Volume 1 - The Main Report.

The Executive Summary has kept the reference numbers which the figures and tables have in the Main Report and also has made reference, in italics, to those sections of the Main Report being summarised.



Introduction

The Green Island Reclamation Feasibility Study was commissioned in response to a 1985 report from the Urban Area Development Office advancing the view that if the land between Kennedy Town and Green Island were to be reclaimed from the sea, a development on it could accommodate a population of approximately 207,000. This Executive Summary presents an overview of the Study's results.

Figure 1.1 illustrates the areas covered by the detailed study, and by a transport modelling study of the probable effect over a wider area of additional traffic generated by development on the new reclamation. Transport modelling played a significant part in this research.

The Study Brief set out in detail the requirements of the Study at its commencement; an early decision was taken that the design years should be 2001 and 2011. This decision was taken in the interests of compatibility with a number of other studies proceeding in parallel, most notably the Port and Airport Development Strategy (PADS) and Metroplan.

The primary objectives of the Study were to confirm the feasibility of the proposals for the reclamation, and to produce a comprehensive scheme ensuring, as far as practicable, balanced urban development for the study area.

Achievement of this overall aim required a focus on the engineering, planning and environmental

considerations affecting a number of issues, including the reclamation process itself; infrastructural requirements; land and marine transport issues; environmental and social deficiencies in the surrounding areas; planning; and expenditure estimates and forecasts. The plan that evolved from the overall work of the study is presented in this report as the Recommended Outline Development Plan (RODP) illustrated in Figure 3.1.

Integrated with the Study's objectives were six specific goals for the plan which are given in Table 1.1. In the screening or evaluation of any option it was required that these goals be met.

Table 1.1 Goals of the Study

Goal A	Flexibility and Robustness
	Ensure that the plan and the completed development are capable of responding to changing demands and circumstances without comprising the integrity of the selected strategy.
Goal B	Strategic and Territorial Integration
	Ensure that the comprehensive development options are capable of fitting into the overall Territorial land use and transportation strategy that will result from the findings of PADS, CTS-2, TDS, West Kowloon and Central and Wanchai studies.
Goal C	Environmental Quality
	Maximise the extent to which the plan for both the existing areas and the new reclamation achieve high environmental standards.
Goal D	Maximise Plan Opportunities
	Maximise the contribution of the existing natural features and the strategic location of Green Island to an intergrated urban form and layout, and to create a recognisable identity.
Goal E	Staged Implementation
	Ensure that the infrastructure works and the development schemes are capable of being implemented in stages consistent with demands and resource availability.
Goal F	Project Feasibility
	Ensure that the complete project adopts the most appropriate practical engineering techniques and is cost effective.

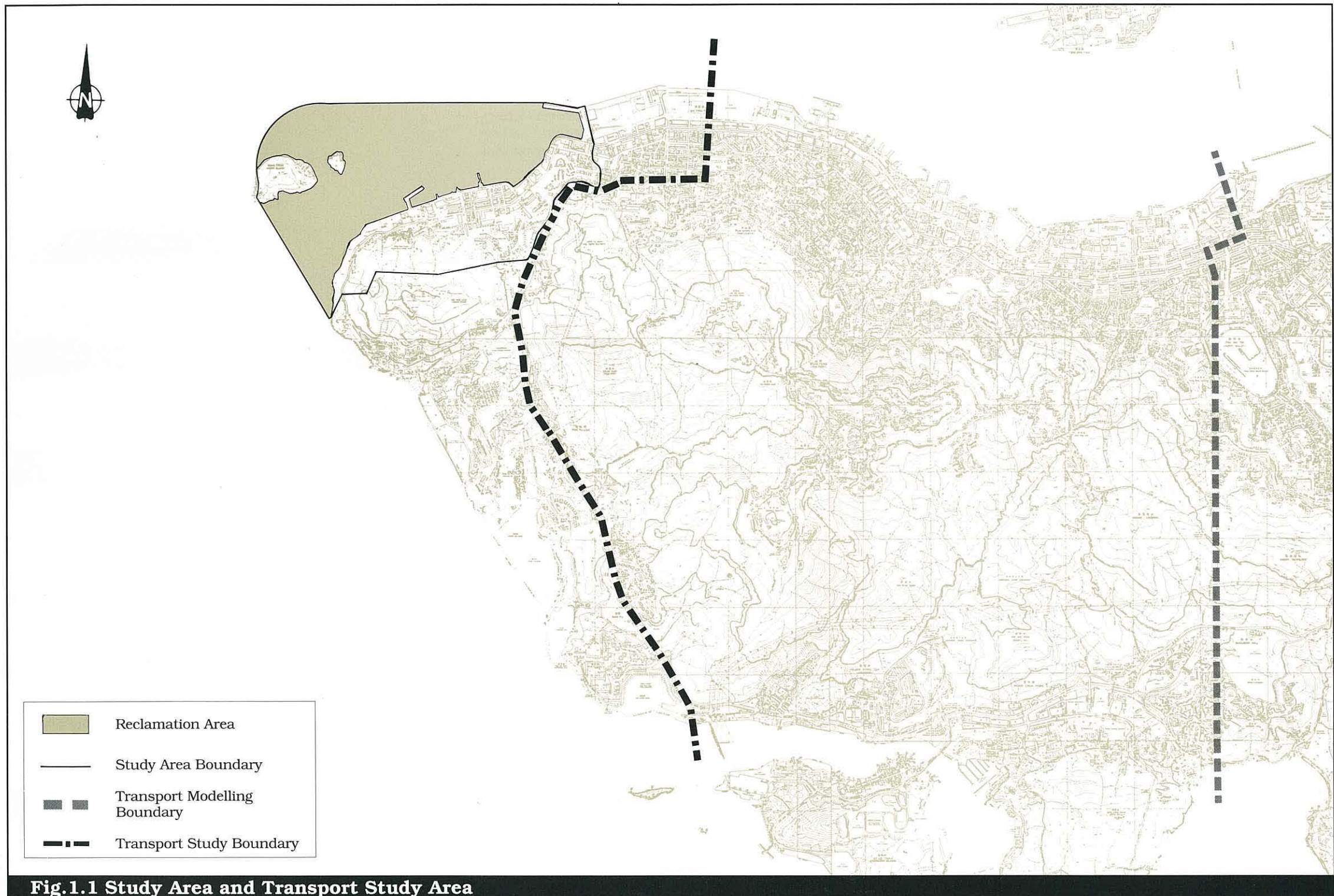
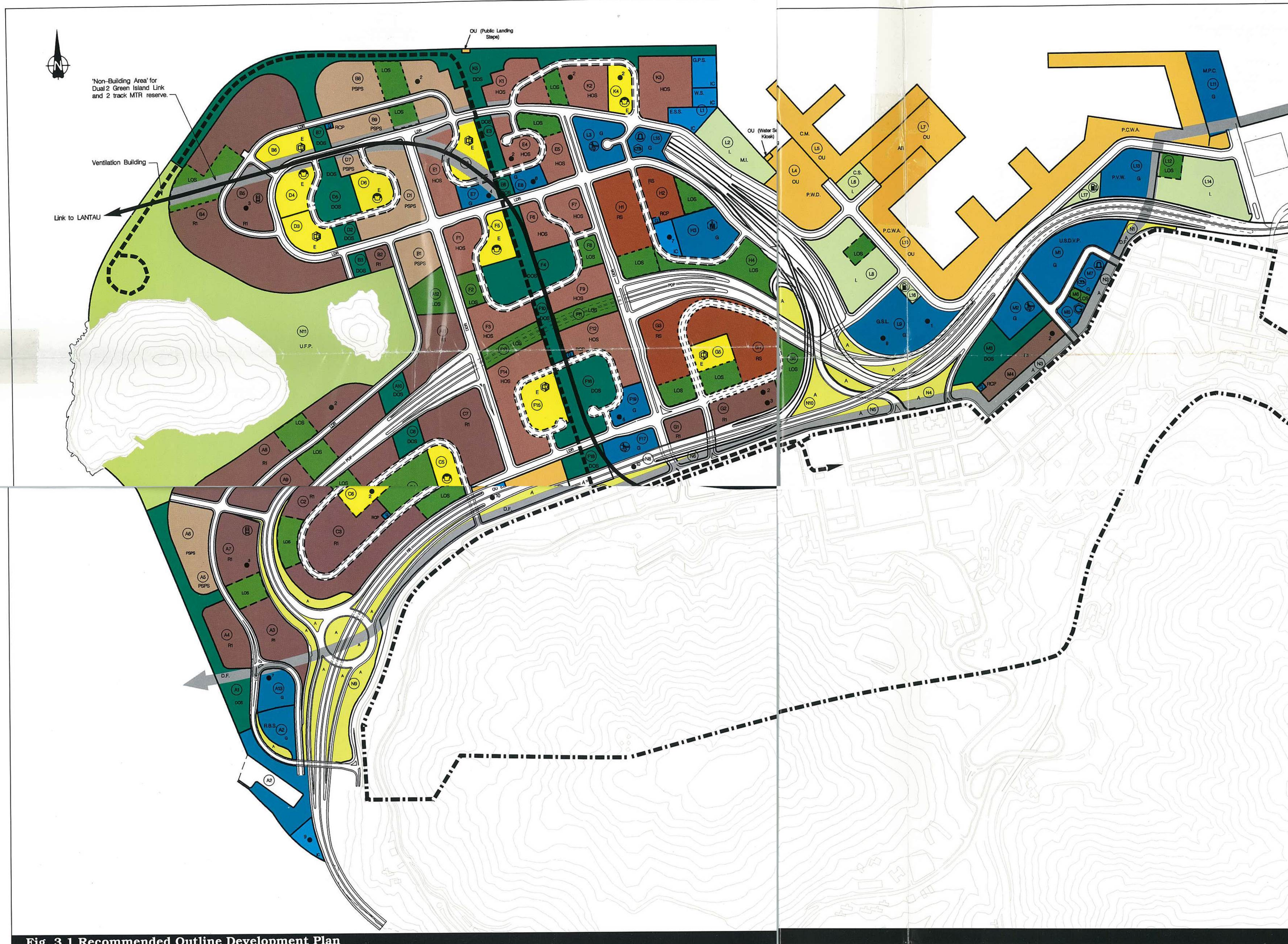


Fig.1.1 Study Area and Transport Study Area



Legend for Fig. 3.1

- District Police Headquarters
- Government Offices
- Divisional Fire Station
- Ambulance Depot
- Indoor Recreation Centre
- G / IC Uses
- Primary School
- Secondary School
- Petrol Filling Station
- Bus Terminus

LOS Local Open Space
 DOS District Open Space
 U.F.P. Urban Fringe Park
 I. Industry
 R.B.S. Refuse Barging Station
 E.S.S. Electric Sub-Station
 G.P.S. Gas Piggling Station
 W.S. Fresh and Salt Water Pumping Station
 D.F. Drainage Fairway
 C.M. China Merchants
 P.C.W.A. Public Cargo Working Area
 C.S. Cold Storage
 A. Amenity Area
 AB. Abattoir
 M.I. Marine Industry
 P.W.D. Port Works Division
 G.S.L. Government Serviced Land
 M.P.C. Marine Police & Customs
 P.V.W. Police Vehicle Weighing Station
 U.S.D.V.P. USD Vehicle Depot
 R.C.P. Refuse Collection Point

Drainage Fairway
 Notional Road Access

G / IC Uses

1. WSD Maintenance Depot	6. Clinic
2. Kindergarten	7. Telephone Exchange
3. Post Office	8. Highway Maintenance Depot
4. District Community Centre	9. Drainage Station
5. Joint User Building *	

* to incorporate a market complex, R.C.P. other U.C. facilities, children's centre, youth centre and post office.

Schedule of Uses and Areas

Uses	Net Site Area (ha)
Residential Zone 1	26.83
Special Residential	6.92
Home Ownership Scheme	12.26
Private Sector Participation Scheme	7.40
Government	12.29
Institution and Community	2.75
Education	6.56
District Open Space	13.59
Local Open Space	5.19
Local Open Space Reserves	6.97 ⁽¹⁾
Other Specified Uses	23.40
Industry	4.90
Urban Fringe Park	26.61
Local Distributor Road	10.39
District Distributor Road	9.61
Primary Distributor Road (0.71 ha in tunnel)	5.14
Regional Road	12.76
Amenity Areas	7.53 ⁽²⁾
Total	186.60

(1) Included within gross Residential land areas
 (2) Included within gross area of OU.

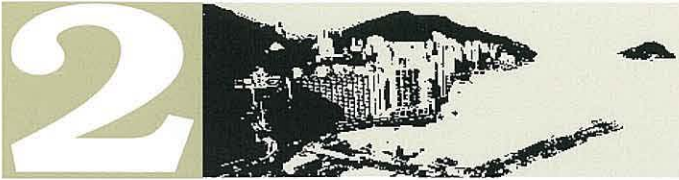
Fig. 3.1 Recommended Outline Development Plan

In line with Goal B the study was significantly influenced by various strategic highway links, comprising Route 7, the Western Harbour Crossing, and a possible fourth harbour crossing to either Lantau, Stonecutters Island or north-west Kowloon. This narrowed land use options down to either a residential/commercial emphasis or an industrial/port related development. (Section 1.2)

Sixteen options were put through the assessment and evaluation progress, and narrowed down to four. When the decision was taken to go ahead with the airport at Chek Lap Kok, plans for which included a road link between North Lantau and the Green Island Reclamation, now known as the Green Island Link, the option which incorporated the PADS strategic roads network was chosen, and the RODP prepared accordingly. (Section 1.4)

A review carried out in May 1990 recommended two layout options for the Green Island Link, one with a landfall to the north of Green Island and one joining it to the south. No final decision could be taken until completion of the Green Island Link Prefeasibility Study, but a clear preference emerged for the north option, which has been used to develop the RODP. A less detailed plan has been prepared incorporating the southern option, which can be used as the basis for another RODP should that alignment eventually be chosen. (Section 1.5)

The RODP is supplemented by an Outline Zoning Plan (OZP) illustrating the proposed zoning pattern in Kennedy Town. The requirement to relocate existing waterfront activities when reclamation began presented an opportunity to re-examine the planning deficiencies in Kennedy Town and to make recommendations for the upgrading and rejuvenation of the area. The RODP and the OZP are based on the design year of 2011. (Section 1.6)



Planning Context

The strategic context for the preparation of the RODP is dominated by Metroplan, which formulates a land use framework for the development of Hong Kong into the next century, and envisions Green Island as a primarily residential development.

Metroplan's population projection for the Green Island area by the year 2011 is 114,028. Under its guidelines for gradually phased building and development the majority of housing units required to accommodate that population would be in place by 2011, dispersed in line with Metroplan's objective of reducing residential densities throughout the urban areas.

Proposals for the area's port development are restricted to the reprovisioning of marine facilities from Kennedy Town to the new Green Island Reclamation and the expansion of the Shek Tong Tsui Public Cargo working Area.

No hotel or office development is envisioned for Green Island, although Metroplan does propose a three hectare gross commercial development over a possible MTR station in Kennedy Town. Industrial development will be limited to reprovisioning of equivalent areas of land to those occupied by facilities displaced by the reclamation. A central focus for retail activity is envisioned supported by local shopping facilities within the residential areas.

Other Metroplan land use proposals which the study confirms to be feasible include a 25 hectare Urban Fringe Park, an underground sewage treatment works located at Mount Davis, and an extension of MTR to serve Kennedy Town with a possible extension to the reclamation. *(Section 2.1)*

An open space deficiency has been identified in Kennedy Town and the urban renewal programme will include additional open areas to make good the projected shortfall, as well as an additional sports centre. *(Section 2.2)*

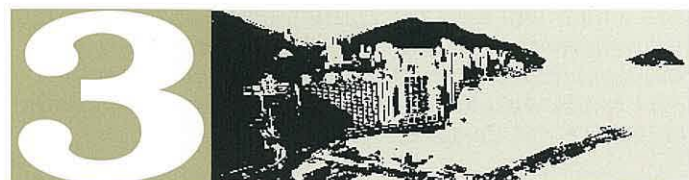
Road transport is a critical issue. The PADS study required provision to be made for a Green Island Link and the Western Harbour Crossing Feasibility Study recommended its southern landfall should be at Sai Ying Pun. There it would join Route 7, a dual three lane road to Kennedy Town and on to Aberdeen.

The local road networks will follow a 'spine' road principle with a single primary road through the middle of the reclamation with a network of branch roads leading off it. *(Section 2.3)*

Urban design principles build on the structural pattern of Kennedy Town and the natural features around it. Exploiting visual links between existing development and the reclamation area is an important urban design objective, with the water's edge and the land surrounding the islands providing the opportunity to create a settlement with a unique identity within the crowded urban environment of Hong Kong Island. The urban and landscape designs incorporate the principles of good microclimate control, and the natural dispersion capabilities of land and sea breezes have been maximised in the layouts. *(Section 2.4)*

A further important criterion for all proposals was that there should be no negative impacts in terms of air or water quality either during construction or on completion of the work, while the impact of noise on residential areas, schools, hospitals and other sensitive receivers should be minimised. *(Section 2.5)*

To sum up, priorities in developing the urban design and landscape input of the RODP and Master Landscape Plan (MLP) have been to retain existing landmark features; to protect the quality of the environment; to improve the quantity of open space and access to it; to provide recreational opportunities, and to ensure ease of circulation for both pedestrians and traffic.



The Recommended Outline Development Plan

3.1 Land Use

The RODP defines the land use zoning proposals for the reclamation area. These divide it into two distinct zones - the western and central areas dedicated to residential use and the eastern end of the reclamation given over to industry and port related functions. These areas are bisected by the Green Island Link and bounded at their southern edge by the Route 7 alignment. The plan is further subdivided into a number of smaller planning areas. The schedule of uses and areas are given in Table 3.1.

Residential densities based on Metroplan recommendations were used to develop the populations. In public housing areas a development ratio of 6 has been adopted due to the environmental setbacks required for development. The detailed requirements will be examined in the Hong Kong West Development Statement. Table 3.2 gives the populations by Housing Type.

Accommodation in the reclamation area will include public sector Housing for Rent (RS), Home Ownership Scheme (HOS) housing, Private Sector Participation Scheme (PSPS) housing and private sector housing for purchase (R1). The proportion of private housing to public housing will be about the same. (Section 3.1.1)

The Kennedy Town area is thought to be a suitable site for a major sub regional retail centre comprising approximately 50,000 sq. metres of retail floor

space, possibly with an office development above, although the area is not thought likely to be outstandingly attractive as a secondary office location.

The ability of the area to support commercial development depends to a large extent on the extension of the MTR to Kennedy Town and possi-

Table 3.1 RODP - Schedule of Uses and Areas

	Net Site Area (ha)
Residential Zone 1 (R1)	26.83
Special Residential (RS)	6.92
Home Ownership Scheme (HOS)	12.26
Private Sector Participation Scheme (PSPS)	7.40
Government (G)	12.29
Institution and Community (IC)	2.75
Education (E)	6.56
District Open Space (DOS)	13.59
Local Open Space (LOS)	5.19
Local Open Space Reserves	6.97 ⁽¹⁾
Other Specified Uses (OU)	23.40
Industry (I)	4.90
Urban Fringe Park (UFP)	26.61
Local Distributor Road (LDR)	10.39
District Distributor Road(DDR)	9.61
Primary Distributor Road (0.71 ha in tunnel) (PRD)	5.14
Regional Road (RR)	12.76
Amenity Areas (A)	7.53 ⁽²⁾
Total	186.60

(1) included in gross Residential land areas
 (2) included in gross area of Other Uses

Table 3.2 Comparison of Population by Housing Type for the RODP with Metroplan Housing Requirements by 2011

Housing type	Metroplan (1)				RODP (2)			
	No. unit	Occ. Rate	Popu.	%	No. unit	Occ. Rate	Popu.	%
RS	5,850	3.08	18,018	16	4,636	3.08	14,278	14
HOS	9,110	2.78	25,326	22	8,827	2.78	24,537	24
PSPS	4,980	2.78	13,844	12	4,440	2.78	12,343	12
Private	21,130	2.69	56,840	50	19,445	2.69	52,307	50
			114,028				103,465	

Source: (1) Metroplan April 1990
 (2) Consultants July 1993

bly to the reclamation. The viability of a major retail centre in the area as proposed in the RODP will be dependent on the provision of an MTR station, a transport interchange with facilities for buses, mini-buses and taxis, and a major car park.

An alternative MTR station site has been identified at the site of the wholesale market and abattoir both of which will be relocated in stage away from this area. (Section 3.1.2)

Government, Institution and Community (G/IC) facilities are outlined on the RODP by Planning Area and have been broadly divided into three categories: Community Uses to support the existing population, Government Service Land Uses, and Utility Services.

Community facilities planning has been required to meet three key objectives: facilities should be located near proposed centres of population, in close proximity to areas of open space and protected environments, and should not only meet the new requirements of the reclamation but also rectify the shortfall of existing facilities in Kennedy Town.

Five Primary Schools and six Secondary Schools are provided for in the RODP and kindergarten facilities will be supplied within residential schemes. A clinic will be provided on the reclamation while the Queen Mary Hospital will provide

health facilities at Regional District level. A combined Fire and Ambulance Station, a Police Station and a Marine Police Base and customs area have also been allocated sites.

Three Indoor Recreation Centres, a Multi Service Centre, a Day Care Centre for the Elderly, a Child Centre, a Youth Centre and an Elderly Centre are provided to meet the incoming population's need for recreation and social welfare facilities. (Section 3.1.3)

Industrial development on the reclamation under the RODP will be largely limited to the reprovisioning of marine and non marine sites lost to existing users as a result of the reclamation. In addition to providing a new Public Cargo Working Area to meet the Marine Department's projected requirements for the area the first phase of development will be required to provide approximately 3 hectares of land and 905 metres of waterfront for the use of the abattoir, the Salt Water Pump House and the China Merchants Company.

Private industrial lots, located on both marine and non marine sites and representing the equivalent amount of land lost to Kennedy Town under the reclamation and urban renewal measures, have been provided with the RODP. This provision recognises the importance of allowing existing local industrial operations to bid for new sites as well as providing additional sites for the expansion of companies located on the reclamation. (Section 3.1.4)

Utility services required include a Gas Piggling Station, two Telephone Exchanges and Electric Zone Stations, a Salt Water Pumping Station and a Drainage Station. Utility company land requirements total 1.75 hectares and include the provision of 100 metres of waterfront.

Essential Government Land Service demands require a total area of 9.2 hectares comprised of 3.9 hectares of non marine lots and 5.3 hectares of marine lots with 400 metres of waterfront. (Section 3.1.5)

Other land requirements have been made for petrol filling stations, refuse collection points, a lorry park, bus depot and drainage fairway. (Section 3.1.6)

The RODP's calculations for the provision of Open Space is based on the HKSPG requirements of 20 hectares of total open space per 100,000 persons. The 26 hectare Urban Fringe Park has the potential to attract users from the rest of Hong Kong Island as well as the reclamation area. The open space system is shown in Fig 3.4.

The land allocated to District Open Space on the reclamation comprises the Green Island District Park, linear parks and waterfront promenades. The open space system occupies a central location with Green Island and Little Green Island as a back-drop.

Local Open Space is distributed throughout the site, together with District Open Space creating a network providing essential links in the landscape structure as well as passive and active recreation opportunities for local residents. Open space in the industrial areas is mainly intended to provide recreational facilities for workers at lunch times.

The footpath and cycle-track systems create important links between open spaces and there are areas of planting and ground modelling serving screening and noise buffer purposes. None of these form part of the aggregate open space formula which includes only District Open Space and Local Open Space. (Section 3.1.7)

3.2 The Road Network

The RODP illustrates the road network on the Green Island Reclamation which has been designed to meet the requirements of Route 7 linking Sai Ying Pun to Kennedy Town, the Belcher Bay Link, Route 7 to Aberdeen, and the Green Island Link. The recommended strategic highway network within the study area consists of Route 7 and the Green Island Link. The road network is shown on Fig 3.5.

The development on the reclamation will also require access to the strategic highway network and two junctions with Route 7 have been planned at Belcher Bay and at the south-western corner of the reclamation.

The local road network comprises the central primary distributor linked to Route 7, district distribu-

tors which will feed the traffic north/south through the reclamation to link with the primary distributor, local distributors which will link the district level roads with local access roads, and local roads which are not designed as through routes.

Junction performance for all major road junctions has been assessed, and capacity for morning and evening peak hour conditions analysed. Local junctions in Kennedy Town adjacent to the reclamation have also been checked to ensure adequate capacity to cope with additional traffic from the reclamation. (Section 3.2.1)

3.3 Public Transport

In the year 2011 the reclamation and Kennedy Town are jointly forecast to generate an estimated 242,000 daily public transport trips of which approximately 29,000 will be at peak hours with 23,000 people travelling in the peak direction, reflecting the housing led nature of the development. Public transport systems to cater for this demand examined were the MTR, tram, franchised buses and green mini-buses.

Three options open to the MTR were examined, these being to extend the Island Line to the Green Island Reclamation via Kennedy Town, to extend only as far as Kennedy Town, and not to extend at all. It was decided for long term planning purposes that the reserve from Sheung Wan to Kennedy Town should be retained, as should a reserve across the reclamation to allow for a long term extension to Lantau Island.

Tram options were to some extent defined by MTR options. It was considered that a tram extension from Kennedy town to the reclamation would complement an MTR extension. Should the extension not be pursued a tram feeder to Sheung Wan was thought to be a possibility, and the option of incorporating an upgraded tram, running on a revised alignment through Kennedy Town, was examined. A tram reserve has been provided in the RODP and a more comprehensive study will be required at the detailed design stage. Provision of buses was also considered in a context of MTR feeder services as well as linking the reclamation to four major destination areas; Cross Harbour, Central and Eastern, Pokfulam and Southern, and Western District. Terminus facilities at Green

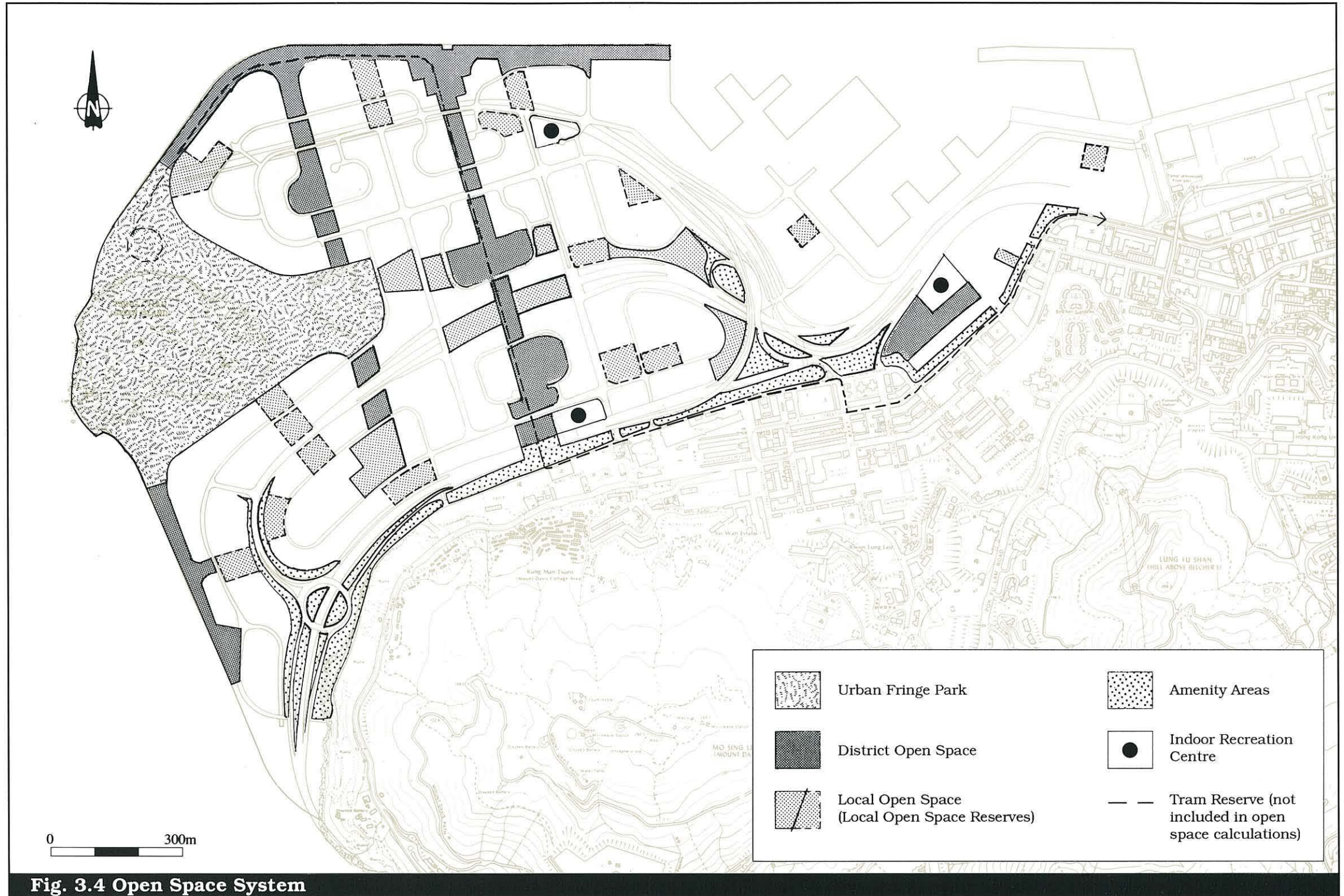


Fig. 3.4 Open Space System

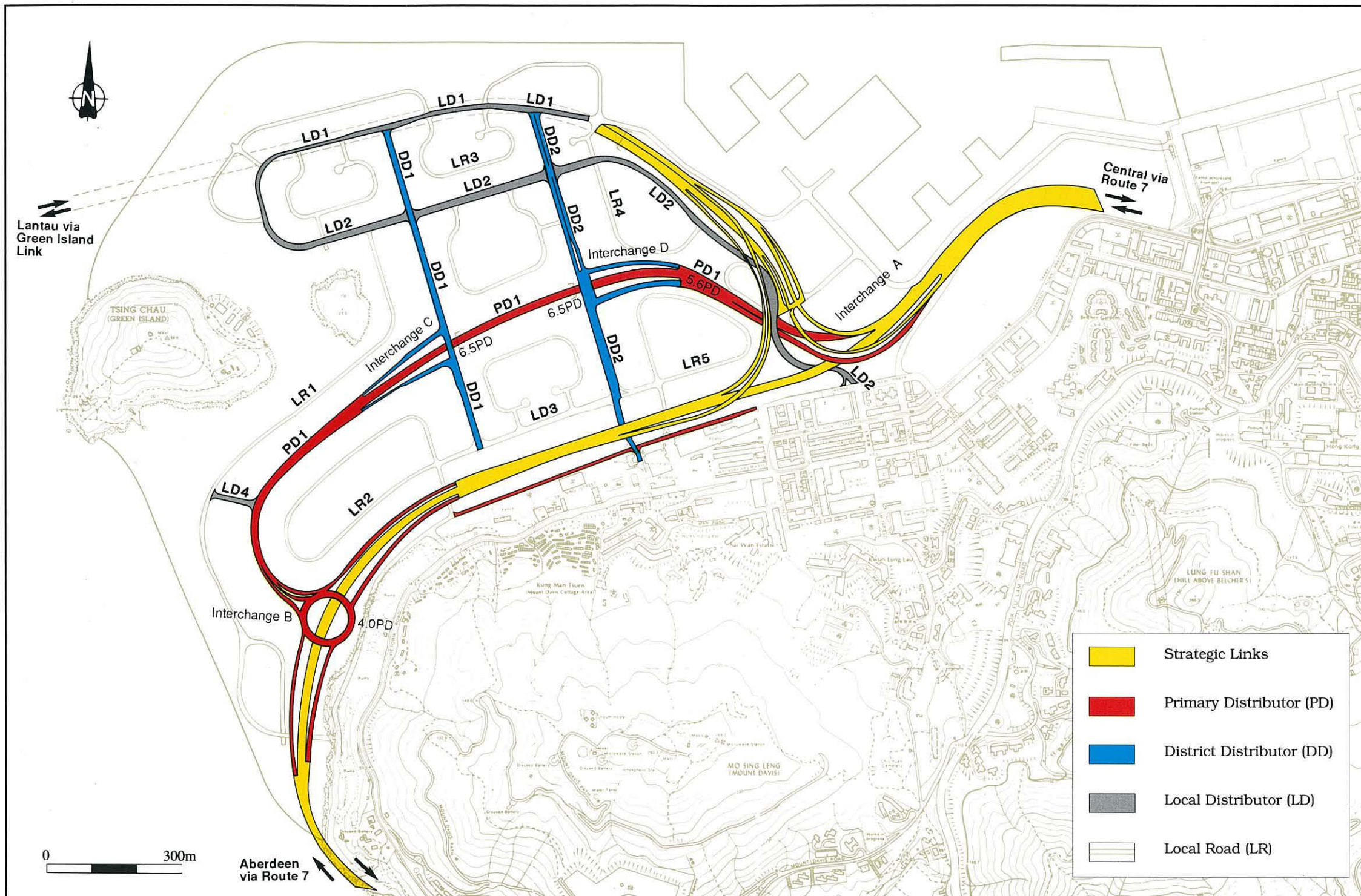


Fig. 3.5 Road Network Plan

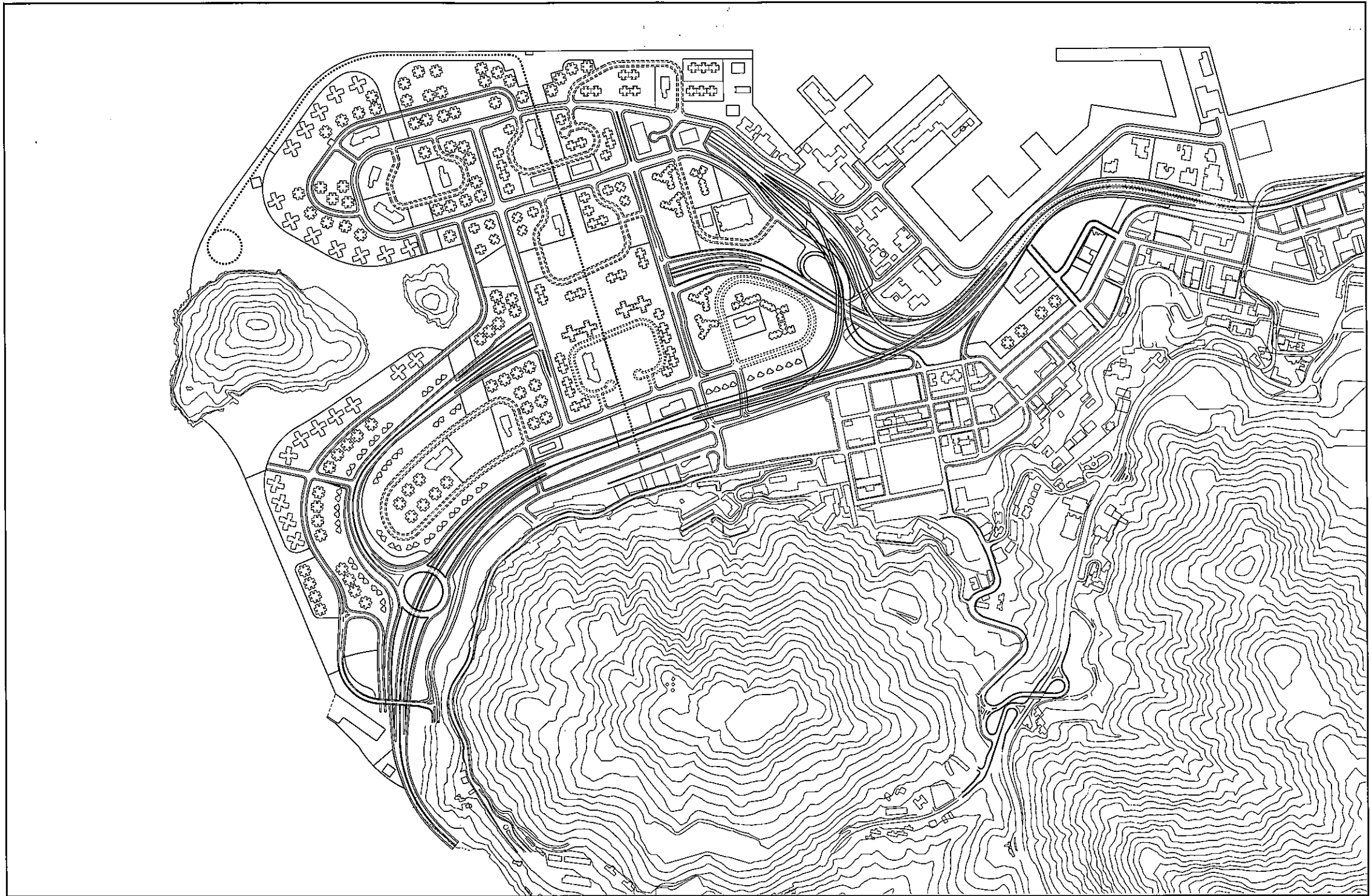


Fig. 3.29 Urban Design - Building Block Layout Plan

Island are accommodated in the RODP, but destination facilities present a problem which should be addressed at the detailed design stage of the reclamation public transport provision.

Only routes within the reclamation area will be serviced with Green mini-buses which will cater for 12,000 trips daily or 2,200 two way trips in the peak hours. (Section 3.2.2)

3.4 Urban Design

The urban design process resolves the complex interaction of the competing requirements of a planned urban environment in a way which creates a balanced solution. In the context of this study the balance is essentially between quantitative requirements, satisfying specific mechanical demands, and qualitative concerns, which form the basis of improved lifestyles.

Kennedy Town and its environs formed the basis from which urban design principles for the reclamation were developed. These principles concentrate on pedestrian connections and links with existing and open spaces in Kennedy Town and on the Mount Davis backdrop, natural ventilation corridors, visual links and the massing of buildings.

In quantitative terms highly specific standards and performance criteria, largely imposed by Metroplan, required equally specific technical solutions. Qualitative aspects required further examination. Contributory elements in this area included diversity, identity, legibility and an overall feeling of comfort which inhabitants and visitors will experience.

The reclamation area is a predominantly residential township with full support services. The basic land use distribution pattern has resulted from Metroplan and the industrial and waterfront reprovisioning requirements. The residential land use reflects a neighbourhood pattern, with private housing occupying the prime waterfront areas while public housing is placed close to the main open space system.

The tallest buildings are grouped within the shadow of Mount Davis so as not to break through the ridgeline. This grouping defines a strong

central core containing major open spaces around which less dominant buildings are sited to create a more human scale. Beyond the central core and progressing towards the limits of the reclamation shorter buildings provide a softer edge to the development. As part of the feasibility testing process a building block layout plan (see Fig 3.29) was produced, leading to a proposal that balances qualitative and quantitative considerations. (Section 3.3)



Master Landscape Plan

The Master Landscape Plan (MLP), which includes the reclamation area, Kennedy Town and Belcher Bay is a close adjacent to the RODP.

The MLP is a reactive design to the findings of the environmental and visual impact studies, and combines the landscape design with the urban design guidelines. It also provides the conceptual layout for the open space distribution together with the recreation network. The Illustrative Master Landscape Plan is shown in Fig 3.30

The Urban Fringe Park is significant in acting as a territory - wide recreational attraction as well as serving the needs of the reclamation. The opportunity was taken to retain Green Island and Little Green Island, and also conserve as much of the natural coastline as possible.

One determining factor in the District and Local open space provision for the MLP is the requirement for a comprehensive recreation facilities network offering indoor and outdoor options. Facilities deployed as neighbourhood focal points under the MLP include an athletics complex, three indoor recreation centres, and sports pitches in the district parks. Areas for passive recreation such as walking, exercising and sitting out are proposed throughout the reclamation. Advantage has been taken of the magnificent waterfront location with its views across the Harbour and Lamma Channel.

The MLP also governs the dispersal of amenity areas, which either act as environmental buffer zones or are devoted to roadside planting. It also identifies areas, including slopes, which can be improved by treatment, including planting, which is intended to contribute on a number of levels to a pleasant and healthy environment.



















Wherever possible existing vegetation will be preserved. Woodland planting will be used in areas sufficiently extensive to accommodate it, and will also be employed to stabilise and reinstate slopes.

Specific landscape guidelines have been prepared for the various types of open space included on the MLP, and future ease of maintenance and management is a stated priority. (Section 3.4)



Fig. 3.30 Illustrative Master Landscape Plan

Legend for Fig. 3.30

-  Entrance to Green Island Link
-  Route 7
-  Non-residential building
-  Residential Plot with Local Open Space
-  Water Feature
-  Feature Pavillions
-  Theme Museum
-  Athletic Complex
-  Landmark / Focal Print
-  Tramway
-  Active Recreation Grounds
-  Piazza / Plaza
-  Pedestrian Link
-  Amenity Planting
-  Grassed Area
-  Roadside Planting with Amenity Strip
-  Roadside Planting without Amenity Strip
-  Woodland Planting



Infrastructure

Infrastructural requirements include systems to handle foul sewerage, storm water drainage, flushing water, cooling water and utilities supplying power and communications capabilities.

The foul sewerage system shown in Fig 3.38 is designed to serve the reclamation and to divert some of the flow from Kennedy Town. A collector sewer will run east-west along the approximate alignment of the existing sea wall to receive the flow from each location.

The general direction of flow in the system on the reclamation will be from north to south to drain directly into the collector sewer without pumping. Sewage treatment will be provided within Mount Davis thus avoiding environmental nuisance.

A major stormwater collector system shown in Fig 3.39 will be constructed along the alignment of the existing seawall to pick up the 16 existing stormwater discharges from Kennedy Town. Drainage from the reclamation is generally radial from the central higher ground level. No discharge is planned into any confined water area. The collector system will be divided into separate catchments draining eastwards and westwards.

For potable water requirements both Kennedy Town and the reclamation may require a new cross harbour delivery main, and a new reservoir occupying an area of some 10,000 square metres will be needed to service the development. The distribution network, which has been designed to suit the

phasing of development on the reclamation, will generally follow the road or open spaces network.

Following the route of the potable water distribution system will be the flushing salt water system. A new pumping station will replace the present Kennedy Town facility and will supply both Kennedy Town and the reclamation. The new station will require a reservoir of approximately 2,500 sq metres, and it is anticipated that the water may require some form of disinfection.

The requirement for cooling water supplies will be assessed when the nature of specific industries within the development is established.

Electrical power will be supplied by the Hong Kong Electricity Company's existing Mount Davis Sheung Wan circuit. Two sub-stations will be required on the development.

Gas will be supplied either by the North Point Depot of the Hong Kong and China Gas Company, in which case a new intermediate pressure main will be required, or from Tsuen Wan in which case a new cross-harbour main and a pigging station on landfall will be required. Provision for this has been made in the development plan.

The reclamation will probably be served by two telephone exchanges, and at the detailed design stage it will be appropriate to consider whether provision should be made for cable television conduits. (Section 3.5)

**Green Island Link
Northern Approach**

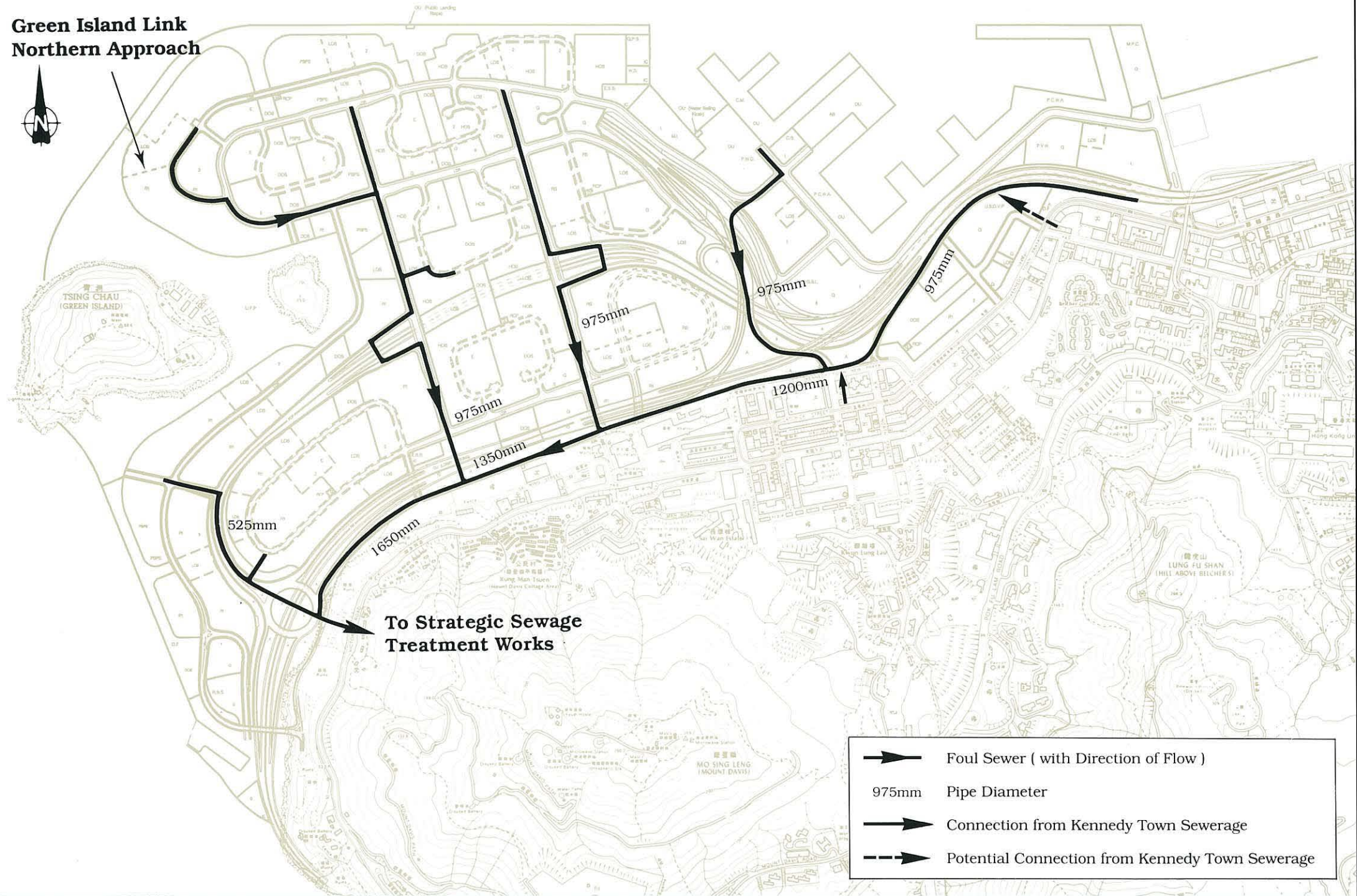


Fig. 3.38 Sewerage System

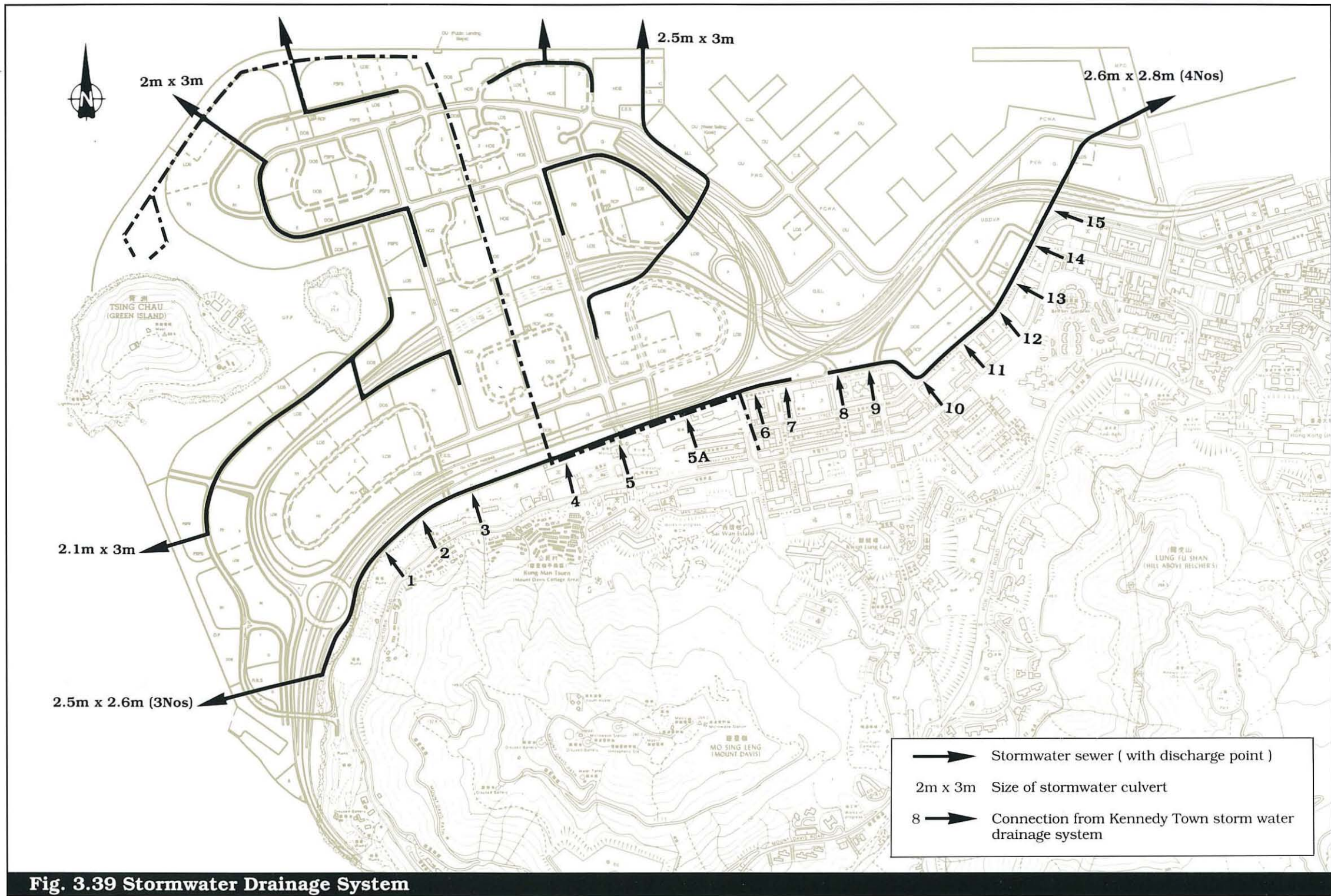
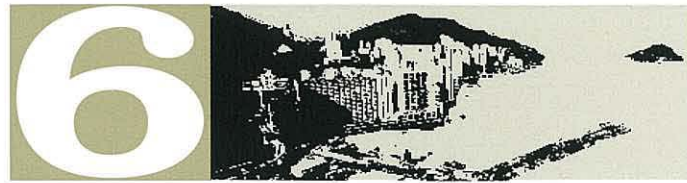


Fig. 3.39 Stormwater Drainage System



Environmental Assessment of the Plan

The Development Plan has been subjected to rigorous assessment of its environmental consequences in terms of noise and visual impacts as well as for its effects on air and water quality. It will however be necessary to continue the process of environmental assessment during the implementation of the development.

Air Quality Objectives are defined by the Hong Kong Planning Standards and Guidelines (HKPSG). The principle air quality impacts are emissions from road vehicles and from industry. Kennedy Town already suffers from high traffic pollution emission rates, and predictions of vehicle emitted pollutants indicated the potential for conditions stated to be unacceptable to be generated at three new locations: the Green Island Link Approach Roads, the Primary Distributor PDI Tunnel Portals, and Route 7 across Belcher Bay.

These predictions however are based on worst case estimates, and improvements to vehicle emissions are already underway through the impositions of new standards and the availability of catalytic converters and unleaded petrol. Overall predictions based on AM and PM peak hour traffic flows for the year 2011 show that Air Quality Objectives for carbon monoxide and lead will be maintained.

Industrial emissions will improve. There are currently several sources of industrial air pollution in the study area, the principle ones being the Kennedy Town incinerator, the abattoir and the Green Island Cement plant. Neither the incinera-

tor nor the cement plant will be reprovisioned in the study area, and up to date process design and pollution abatement equipment will reduce emissions from the abattoir. A buffer zone of 300m provided for in the RODP will further reduce the impact of the installation.

Industrial emissions should be confined to the port areas and new ventures on the reclamation must be geared to reducing these to an acceptable level, in line with the Air Quality Objectives defined by the HKPSG.

It is considered that the development's impact on the quality of water in the area, which although reasonable is deteriorating, will be beneficial. Sewerage systems will be improved and the Mount Davis Sewage Treatment Works will discharge only surface water to the harbour. To minimise water pollution and improve water quality further it is recommended that detailed guidelines for the control of port and Public Cargo Working Area operations be drawn up and enforced.

The HKPSG recommends maximum allowable noise levels outside dwellings of 70db(A), outside schools of 65db(A), and outside hospitals of 55db(A). Experience has shown that these limits are difficult to achieve, and that noise mitigation measures are necessary. Many of these have been built into the RODP.

Land use planning helps to control noise by ensuring compatibility of land uses, employing non sensitive buildings as noise screens, and ensuring that there is a barrier of distance between roads and residential areas. Traffic noise can be ameliorated by reducing traffic speed, and noise reduction features can be built into the design of both roads and buildings. Fig 3.41 shows recommendations for noise mitigation.

The reclamation will be subject to high levels of traffic noise and this has greatly influenced the planning. Whilst several noise mitigation measures have been proposed, noise needs to be carefully considered during the design of all buildings on the reclamation.

Visual impact can best be assessed in the way existing landmarks and landscape character have been retained, and in the way the overall plan

optimises urban design opportunities. High visual standards are being adopted for the development using existing landform to guide built form.

A clear set of urban design guidelines has been accepted for the development. Its implementation according to those guidelines and the MLP will be crucial to meeting the visual objectives. (Section 3.6)

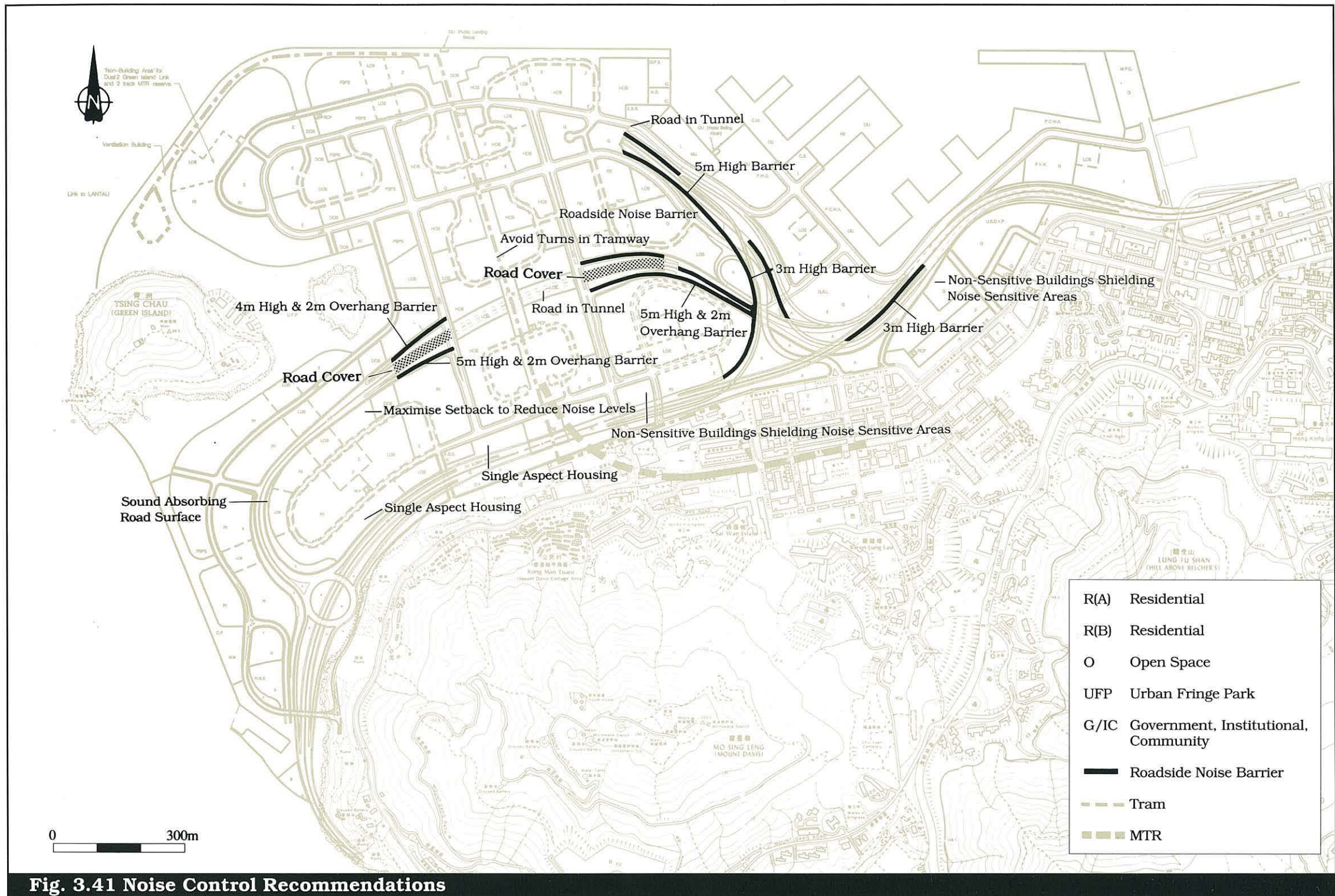
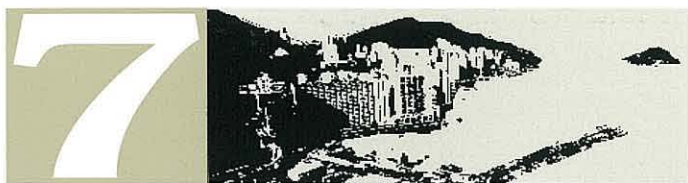


Fig. 3.41 Noise Control Recommendations



Kennedy Town

The Study Brief calls for proposed amendments to the draft Kennedy Town and Mount Davis Outline Zoning Plan. This raises several key planning issues, namely the maximisation of urban renewal opportunities in the area, upgrading the environment, rectification of current and projected deficiencies in terms of provision of G/IC and Open Space facilities, amelioration of adverse impacts on existing waterfront activities in Kennedy Town, establishing effective linkages between Kennedy Town and the reclamation area, creating an interface between existing development in Kennedy Town and the proposed alignment of Route 7, realising the potential for improved accessibility to and from Kennedy Town by MTR and strategic road links, and grasping the opportunity to upgrade the local road system in Kennedy Town by improved traffic management measures. (Section 4.1)

Research and survey data collected during the early stages of the project has formed the basis for determining the urban renewal potential of Kennedy Town. A significant limiting factor is the multiple ownership within many of the blocks. Lack of knowledge of the intentions of individual owners makes redevelopment predictions essentially speculative.

The potential for urban renewal is further limited by the presence of anticipated and recently completed developments dispersed throughout most street blocks. In proposing modifications to the OZP, therefore, it is important to identify large packages of urban renewal which can be managed

by major private sector developers within an overall planning framework seeking to improve physical and environmental conditions in Kennedy Town.

Key elements in the urban renewal programme will be the proposed extension of the MTR to serve the area, the influence exercised by the development of the Green Island Reclamation, and the contribution made by the Belcher Bay reclamation in terms of making up the shortfall in G/IC and open space provision in the area, and in providing new residential space for the existing population to occupy during the renewal programme.

Several key waterfront sites will be released by re-provisioning measures, providing an immediate environmental improvement, particularly in the case of the Green Island Cement Company which is a source of environmental nuisance and can be relocated. An abattoir will reduce its environmental impact, and its by-products plant and crematorium can also be located outside the study area. The various markets are now being relocated to the permanent wholesale market complex in Kennedy Town.

Five areas provide the focus of the plan which aims to upgrade the environment in terms of microclimate, pedestrian movement patterns, recreational use of Mount Davis through improved slope treatment, urban street quality, and improved quantity and quality of open space.

Ventilation corridors will improve the microclimate. Pedestrian movement patterns will be improved through a system of linkages based on a detailed study which has identified the most serious of the present blockages. Pedestrian links will also improve access to Mount Davis which Metroplan proposes as an Urban Fringe Park.

If Mount Davis is to be a successful recreational facility many slopes which currently have rigid protective treatment, with a consequently negative visual impact will need new treatment. Where feasible vegetation should be the primary protection for engineered slopes in soils and weathered rock.

Urban street quality can be improved through enforcement of legal constraints regarding shopfront infringement of pavements, sensitive

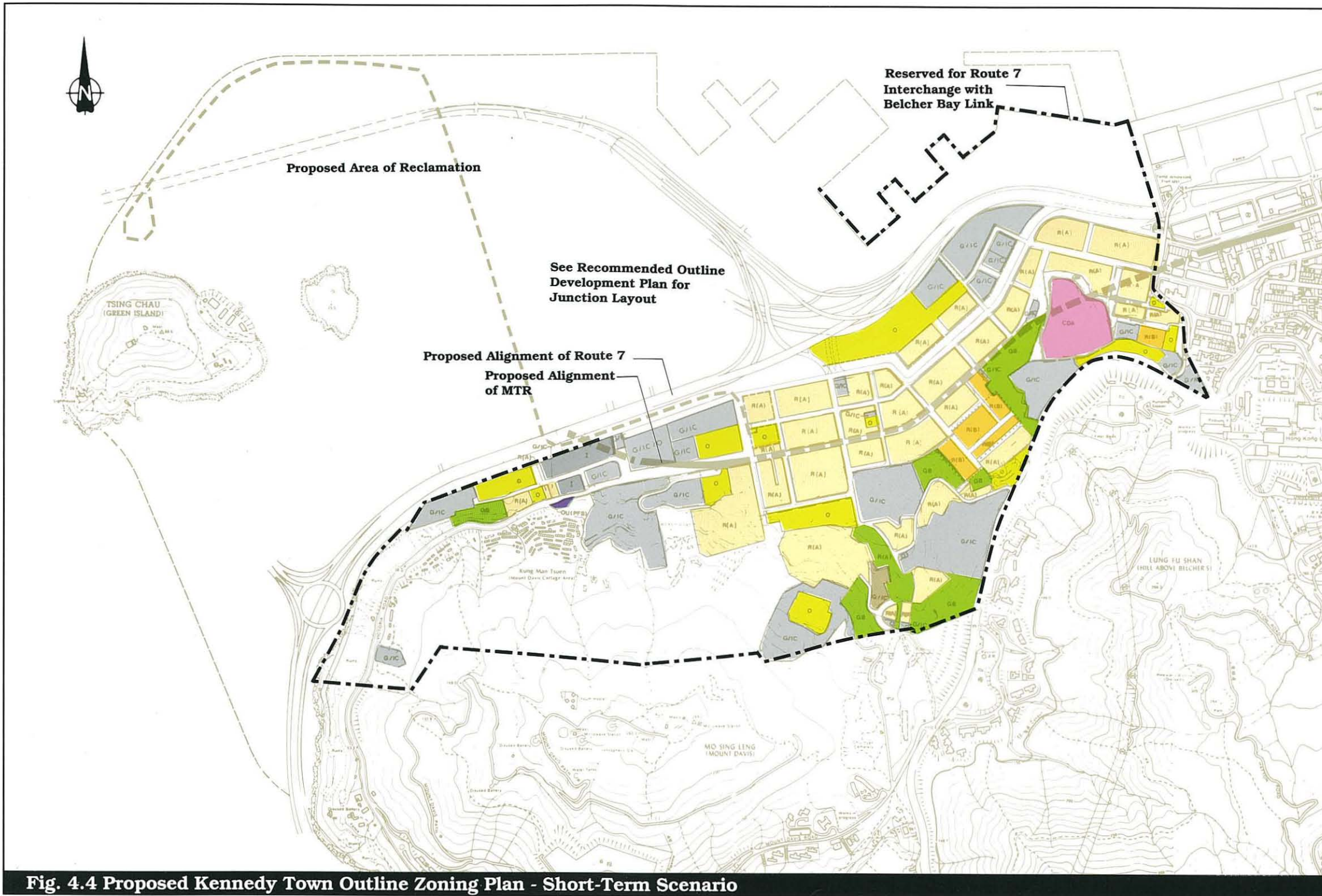
redevelopment to retain character, and development of new view corridors wherever possible. The deficiency in open space provision can only be rectified to HKSPG standards by making full use of the open space opportunities identified on the Green Island and Belcher Bay reclamations. It would be impossible to fulfil HKSPG requirements within the present street pattern. (Section 4.2)

Two statutory Outline Zoning Plans have been prepared for Kennedy Town which complement the RODP. The first illustrates short term amendments which can be incorporated within the existing OZP to enhance the statutory planning framework and also facilitate the future integration of Kennedy Town with the new development area. The second illustrates long term amendments for restructuring of the existing urban area which can be encouraged through a modified OZP.

The two plans are necessary to provide the flexibility in the adoption of the OZP required for the implementation of the MTR extension, the re-provisioning of existing waterfront activities, and the implementation of various Comprehensive Development Areas. Figure 4.4 illustrates a revised OZP which incorporates the proposed amendments of the short term land use scenario. Figure 4.6 illustrates the revised OZP incorporating the proposed amendments for long term land use.

The short term amendments will facilitate the future integration of Kennedy Town with the proposed reclamation area without undermining public confidence. The long term planning intention is to restructure the existing urban area through an OZP which recognises the land use planning changes necessary to integrate Kennedy Town with a new urban community. (Section 4.3)

Priority areas for urban renewal have been identified for both short term and long term horizons and have been incorporated into the appropriate draft OZP for Kennedy Town. An extension of the MTR is seen as an important factor in encouraging urban renewal to take place, and implementation agencies such as the Land Development Corporation, the Hong Kong Housing Society, the Hong Kong Housing Department, the Mass Transit Railway Corporation and the private sector will be instrumental in the process of renewal. (Section 4.4)



Legend for Fig. 4.4

1. Zones

- R(A) Residential (Group A)
- R(B) Residential (Group B)
- CDA Comprehensive Development Area
- I Industrial
- G/IC Government/Institution & Community
- O Open Space
- OS Other Specified Uses
- GB Green Belt
- CA Conservation Area
- E.I Environmental Improvement

2. Communications

- Proposed Mass Transit Railway Station and Alignment
- Major Roads and Junctions
- Elevated Roads
- Proposed Road Extensions
- Tram Extension

3. Miscellaneous

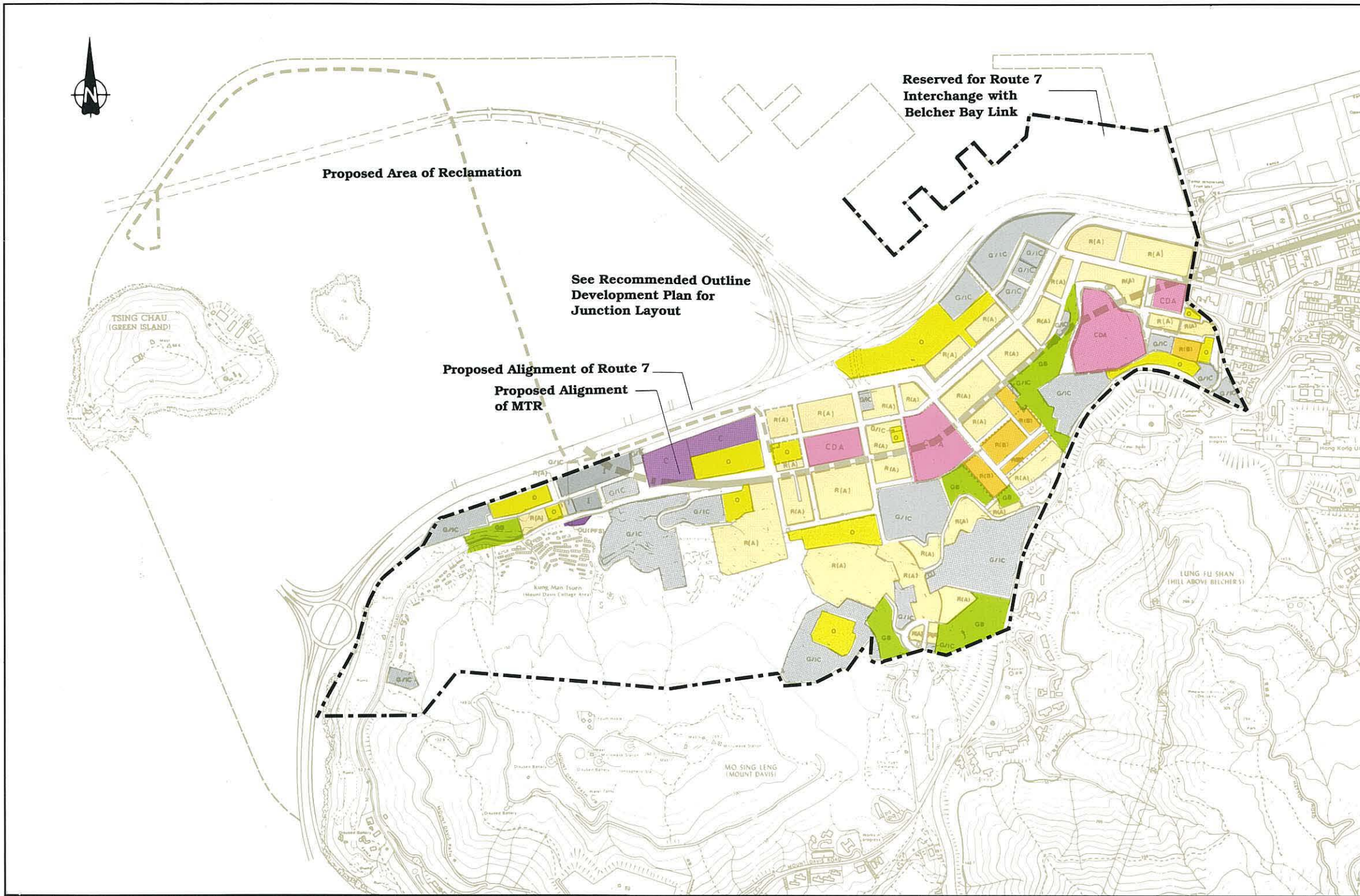
- Boundary of Study Area
- P.F.S Petrol Filling Station

Short - Term Schedule of Uses and Areas

Uses	Hectares
Residential (Group A)	21.56
Residential (Group B)	1.88
Comprehensive Development Area (C.D.A.)	(2.68)*
Industrial	0.81
Government/Institutional & Community	23.18
Open Space	8.37
Other Specified Uses	1.80
Major Roads etc.	-
Total Development Area	-
Green Belt	34.66
Total Area of Planning Scheme	

* Land area included within the residential, commercial and open space categories in the schedule.

Fig. 4.4 Proposed Kennedy Town Outline Zoning Plan - Short-Term Scenario



Legend for Fig. 4.6

1. Zones

- R(A) Residential (Group A)
- R(B) Residential (Group B)
- C Commercial
- CDA Comprehensive Development Area
- I Industrial
- G/IC Government/Institution & Community
- O Open Space
- OU Other Specified Uses
- GB Green Belt
- Conservation Area
- Environmental Improvement

2. Communications

- Proposed Mass Transit Railway Station and Alignment
- Major Roads and Junctions
- Elevated Roads
- Proposed Road Extensions
- Tram Extension

3. Miscellaneous

- Boundary of Study Area
- P.F.S Petrol Filling Station

Long - Term Schedule of Uses and Areas

Uses	Hectares
Residential (Group A)	28.38
Residential (Group B)	1.88
Comprehensive Development Area (C.D.A.)	(2.21)*
Government/Institutional & Community	16.79
Open Space	9.66
Commercial	2.09
Major Roads etc.	-
Total Development Area	-
Green Belt	34.65
Total Area of Planning Scheme	

* Land area included within the residential, commercial and open space categories in the schedule.

Fig. 4.6 Proposed Kennedy Town Outline Zoning Plan - Long-Term Scenario

8



Implementation

Reclamation of the area - about 181 hectares - around Green Island is feasible and can be carried out in phases.

Soft and very soft silty clays up to 30 m thick exist in the area. Solutions for reclamation are presented and quantities of fill vary between 30 and 50 million cubic metres depending on how much marine deposits are removed. Marine sand is recommended as the fill material as it is won and transported in a more environmentally acceptable way. Construction of the reclamation will be more difficult than most reclamations in HK because of the exceptionally thick marine deposits, strong tidal currents and the deep water of the Sulphur Channel.

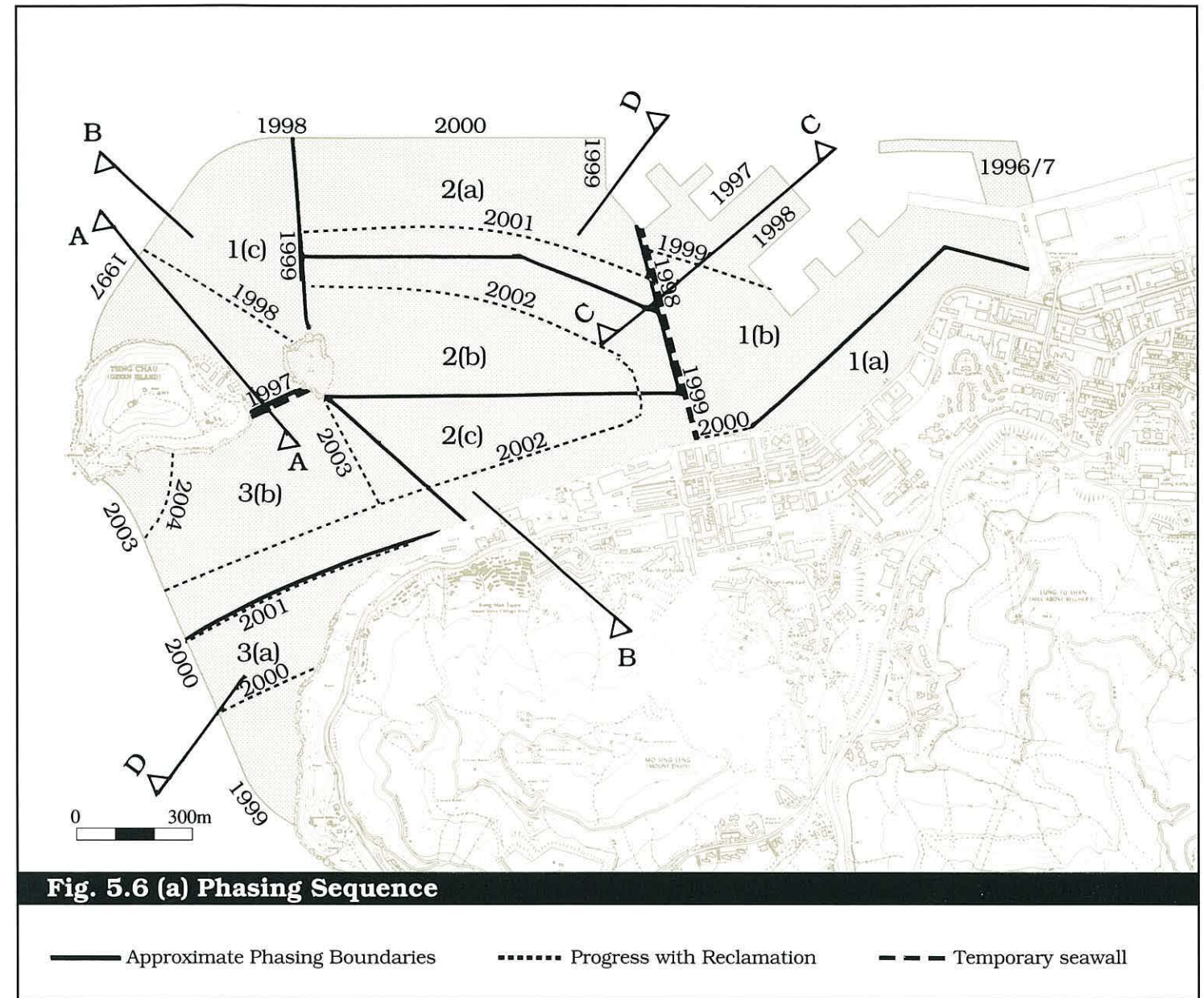
Seawalls within the port area and along the northern limits of the reclamation should be of a standard vertical form to accommodate berthing and to avoid infringement of the inshore marine traffic zone. The western seawalls can be revetment or sloping armoured type walls. The phasing sequence has been developed from consideration of the need to relocate existing mooring buoys and realignment of the marine fairways, the need to maintain marine access to existing waterfront users until their relocation and the constraints imposed by the Green Island Link programme and new housing demands for the area proposed by Metroplan.

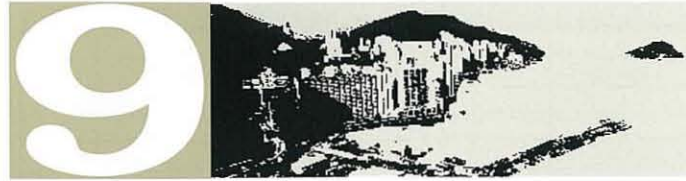
Phasing is recommended in three phases generally working from Belcher Bay westwards as shown in Fig 5.6. The environmental effects during reclamation have been assessed and proper monitoring programmes should be implemented to ensure control measures are efficiently applied.

Whilst no hydraulic modelling was needed to demonstrate the feasibility of the reclamation it is

recommended that it be considered at detailed design stage to examine specific solutions for construction. (Section 5.1)

Infrastructure and utilities can be constructed in phases in line with the reclamation process so that serviced land is available for development. (Section 5.2)





A Programme for Development

The key factors upon which the programme for the Green Island Reclamation was developed are the need for the Green Island Link to be opened by 2004, for a proportion of housing to be completed by 2006, and for all housing development to be completed by 2011.

The Green Island Link Preliminary Feasibility Study has determined, by considering various options for road and tunnel construction, the dates by which the relevant parts of the reclamation need to be in place for Green Island Link.

The reclamation north of Green Island (Phase 1c) must be in place by 1999 or 2000, depending on the type of tunnel constructed selected. The reclamation area for reprovisioning (Phase 1b) and the middle section behind the north facing seawall (Phase 2a) should be complete by mid 2002.

The Green Island Link Study has determined that the latest date for commencement of Phase 1c in order to have the road open by 2004 should be mid 1997. A start date of 1996, following on from completion of the Belcher Bay reclamation, is recommended for Phase 1b. The programme is shown in Fig 5.8 while Fig 5.9 and Fig 5.10 illustrate the contract packages.

Before construction can commence a number of preliminary activities must be carried out, for which a lead time of 24 months should be allowed, beginning with a decision on the part of Government to proceed with the Green Island Reclamation Project.

The Recommended Outline Development Plan and Outline Zoning Plans will be presented once the landfall for the Green Island Link has been decided. Submissions and presentations to Government will be required to gain LDPC approval. The implementing office will be identified and will seek the allocation of funds for project implementation.

Further design work will be required to develop the plans to a greater level of detail in order that gazetting can be carried out under the Foreshores and Seabeds Ordinance. The Outline Zoning Plans will be gazetted under the Town Planning Ordinance. Design, tender and contract procedures will then lead to the implementation of contract activities. It is recommended that consultants be appointed early in this process to allow the development of plans for gazetting. (Section 5.4)

Activity	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
1 Constraints																							
1.1 GIL Opening																							
1.2 China Merchant's Re provisioning																							
1.3 Barge Point Re provisioning (Interim RTS)																							
1.4 Mount Davis Sewage Treatment Plant																							
2 Reclamation Phases																							
2.1 Belcher Bay Reclamation (Phase 1a)																							
2.2 Dredging Southern Fairway - Contract A																							
2.3 Phase 1b - Contract A																							
2.4 Phase 1c - Contract B																							
2.5 Phase 2a - Contract B																							
2.6 Phase 2b - Contract C2																							
2.7 Phase 2c - Contract C2																							
2.8 Phase 3a - Contract C1																							
2.9 Phase 3b - Contract C2																							

Fig. 5.8 Programme

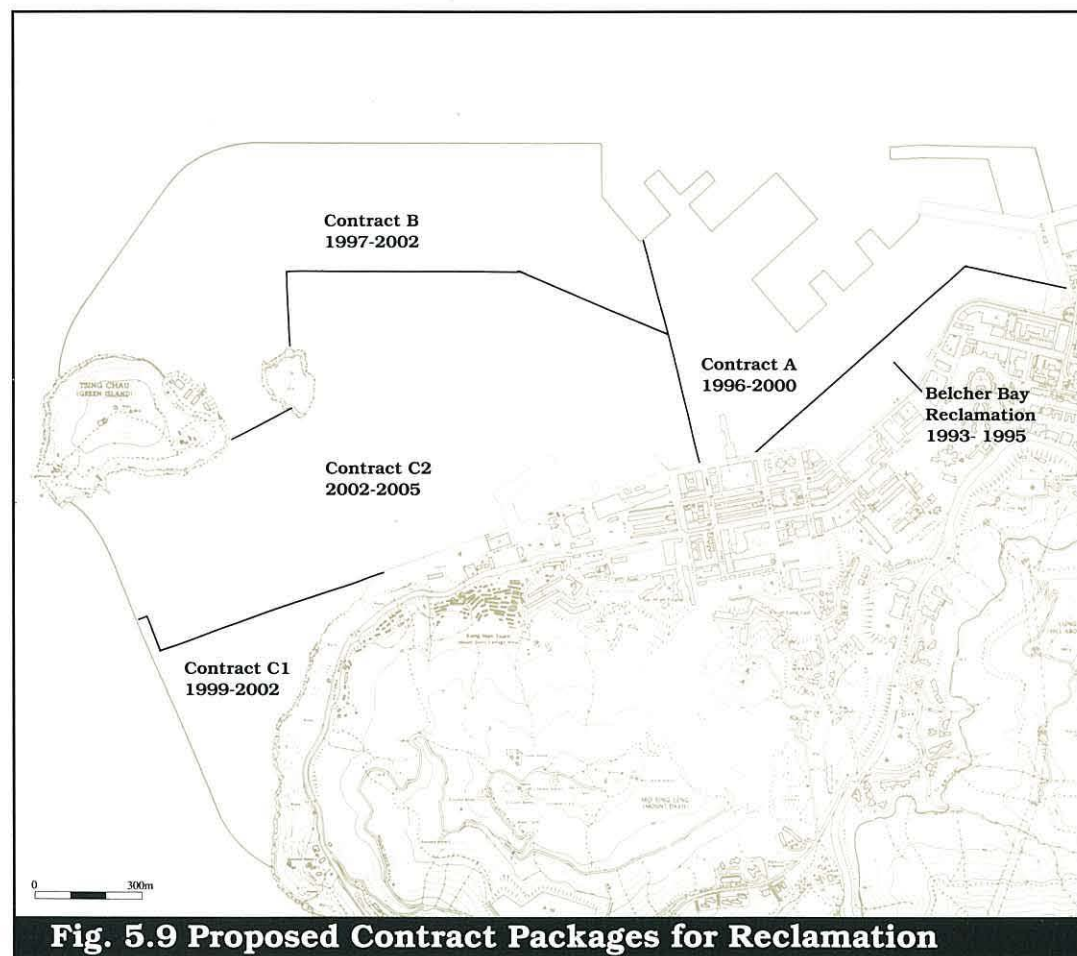


Fig. 5.9 Proposed Contract Packages for Reclamation

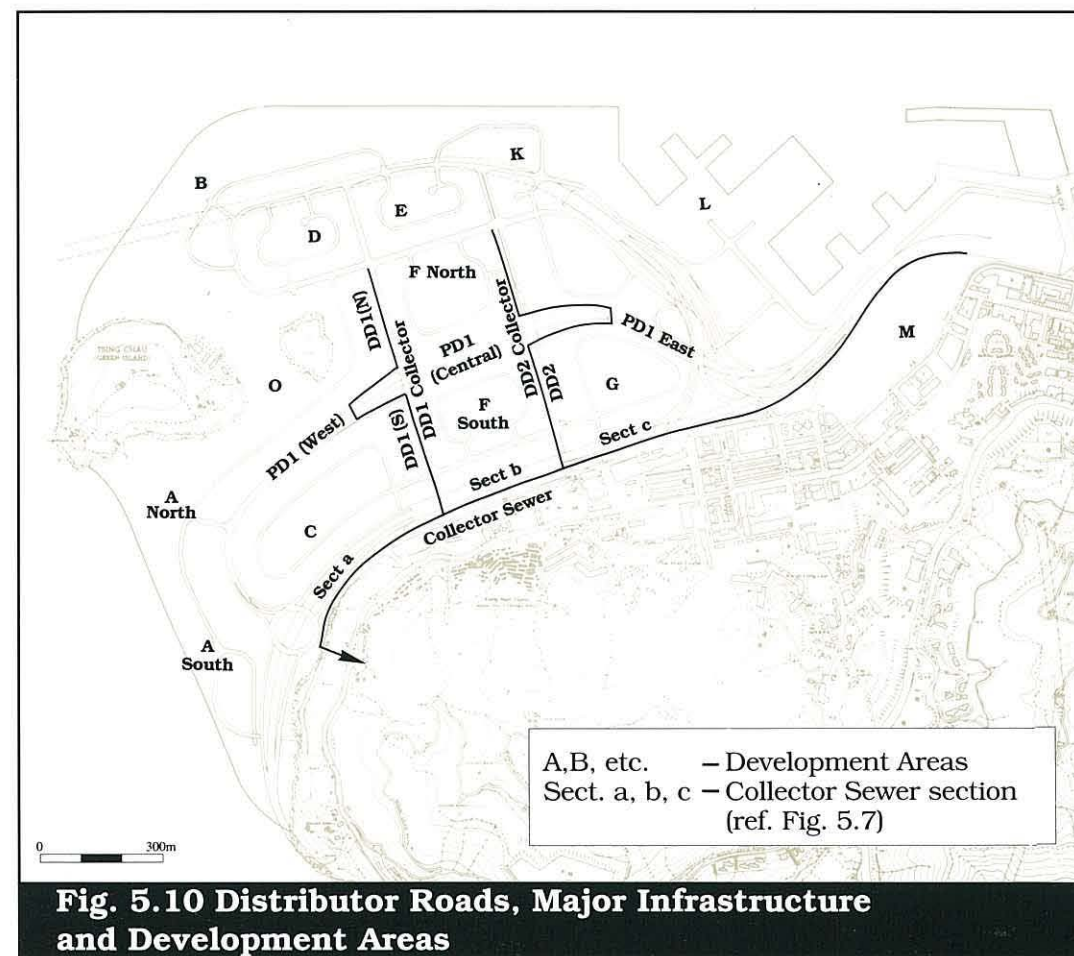


Fig. 5.10 Distributor Roads, Major Infrastructure and Development Areas

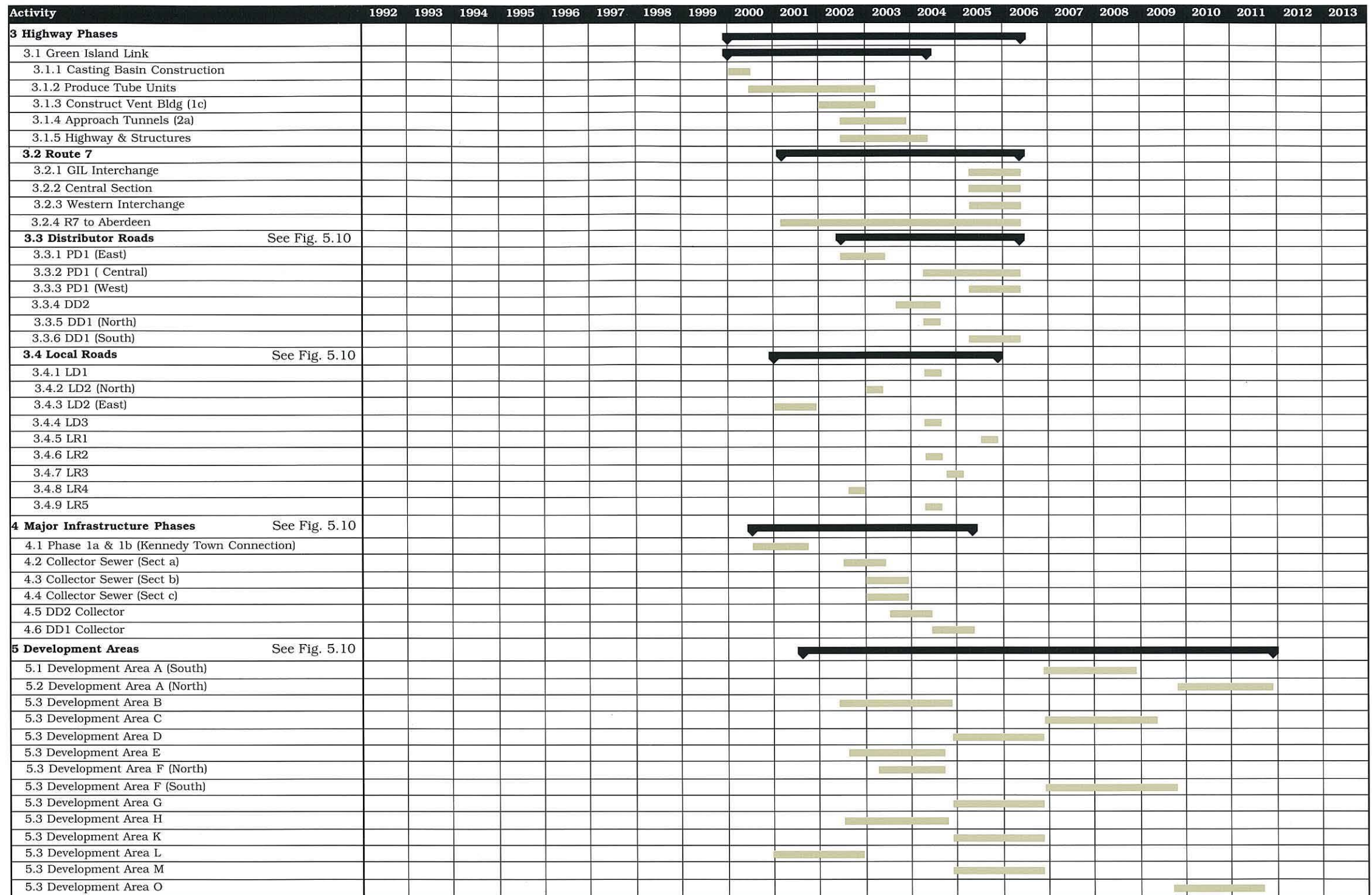


Fig. 5.8 Programme (Continued)

10



Expenditure Estimates and Forecasts

Estimates of the capital cost of seawalls, reclamation, infrastructure, roads and landscaping have been prepared during the course of the study, and are given as at the fourth quarter of 1991.

The capital cost estimates have been linked to the implementation programme as shown in Table 5.3 which indicates Government expenditure involvement for Green Island Reclamation from 1996 through to 2011. No allowance has been made for escalation up to or over the period of construction.

Contract preliminaries and contingencies have been allowed as follows: Seawalls and Reclamation, 15.5%; Roadworks, 32.25%; Infrastructure, 30% and Landscaping 26.5%. No allowance has been made for consultants' fees and charges.

The breakdown of reclamation and seawall costs into the contract packages is shown in Table 5.4. A cumulative cash expenditure curve for Reclamation, Roadworks, Infrastructure and Landscaping is shown as Figure 5.11. (Section 5.5)

Table 5.4 Cost breakdown for Phases of Reclamation Construction

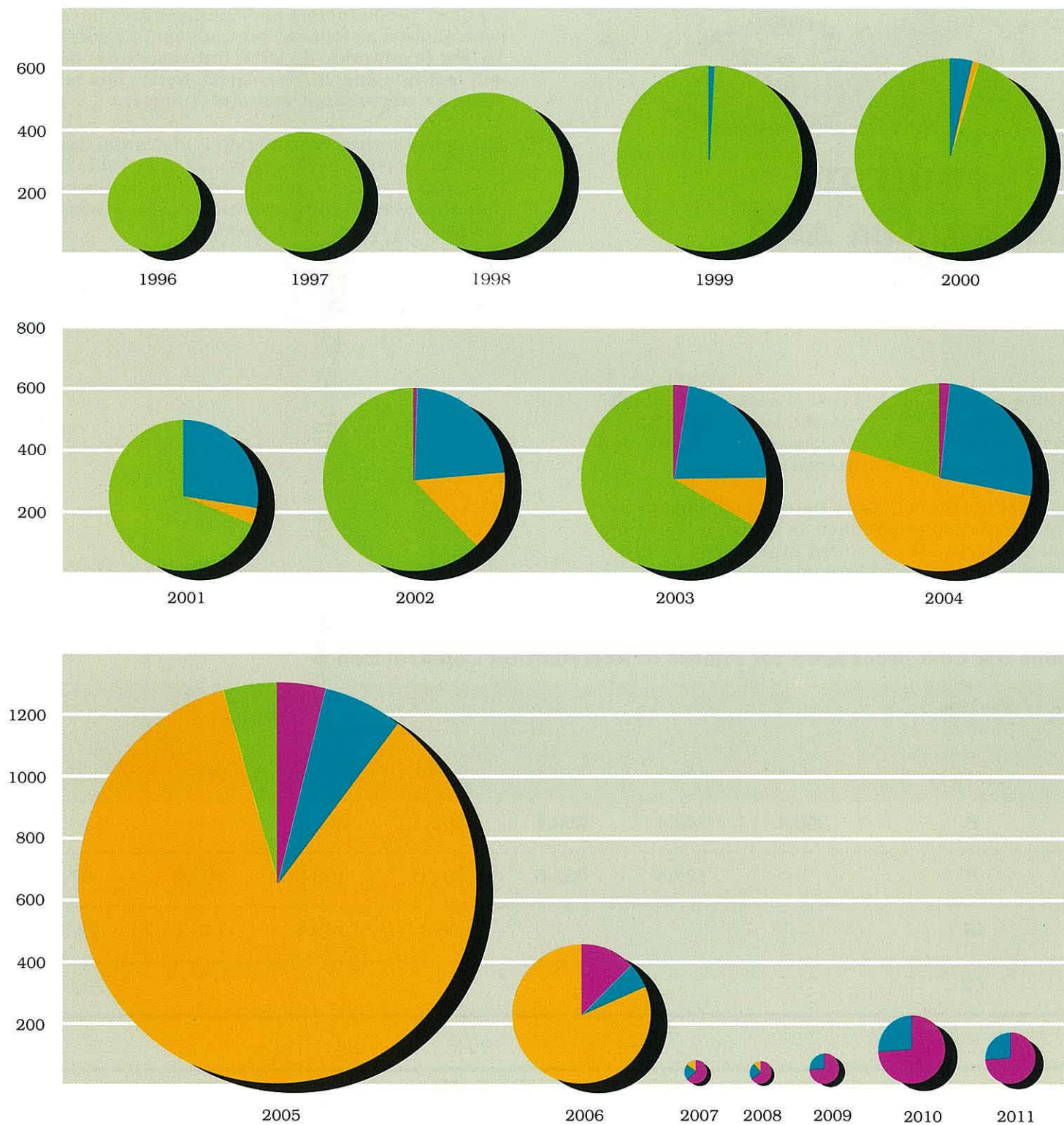
Reclamation and Seawall Construction Contract	Cost (HK\$ Million) per Year										Total
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
A	306.4	262.4	262.4	262.4	262.4	-	-	-	-	-	1356
B	-	127.8	255.6	304.0	193.8	193.8	97	-	-	-	1172
C1	-	-	-	36.3	145.1	145.1	72.5	-	-	-	399
C2	-	-	-	-	-	-	202.3	404.7	124	62	793
Total Reclamation Cost											3720

**Table 5.3 Construction Costs
(HK \$ Million)**

Year	Reclamation	Infrastructure	Landscaping	Roads	Total
1996	306.4	----	----	----	306.4
1997	390.2	----	----	----	390.2
1998	518	----	----	----	518
1999	602.7	5.62	----	----	608.3
2000	601.3	24.2	----	5.74	631.2
2001	338.9	136.1	----	17.2	492.2
2002	371.8	137.3	4.825	84.1	598
2003	404.7	136.6	15.4	51.4	608.1
2004	124	161.2	11.78	317.2	614.2
2005	124	88.9	57.5	1190	1398.4
2006	62	26.7	57.5	369.7	453.9
2007	----	16.4	46.87	11.1	74.4
2008	----	16.4	46.867	8.4	71.6
2009	----	25.2	72.27	----	97.5
2010	----	57.2	164	----	221.2
2011	----	42.9	123	----	165.9
Total	3720	874.6	600	2055	7249.6



HK\$ in millions



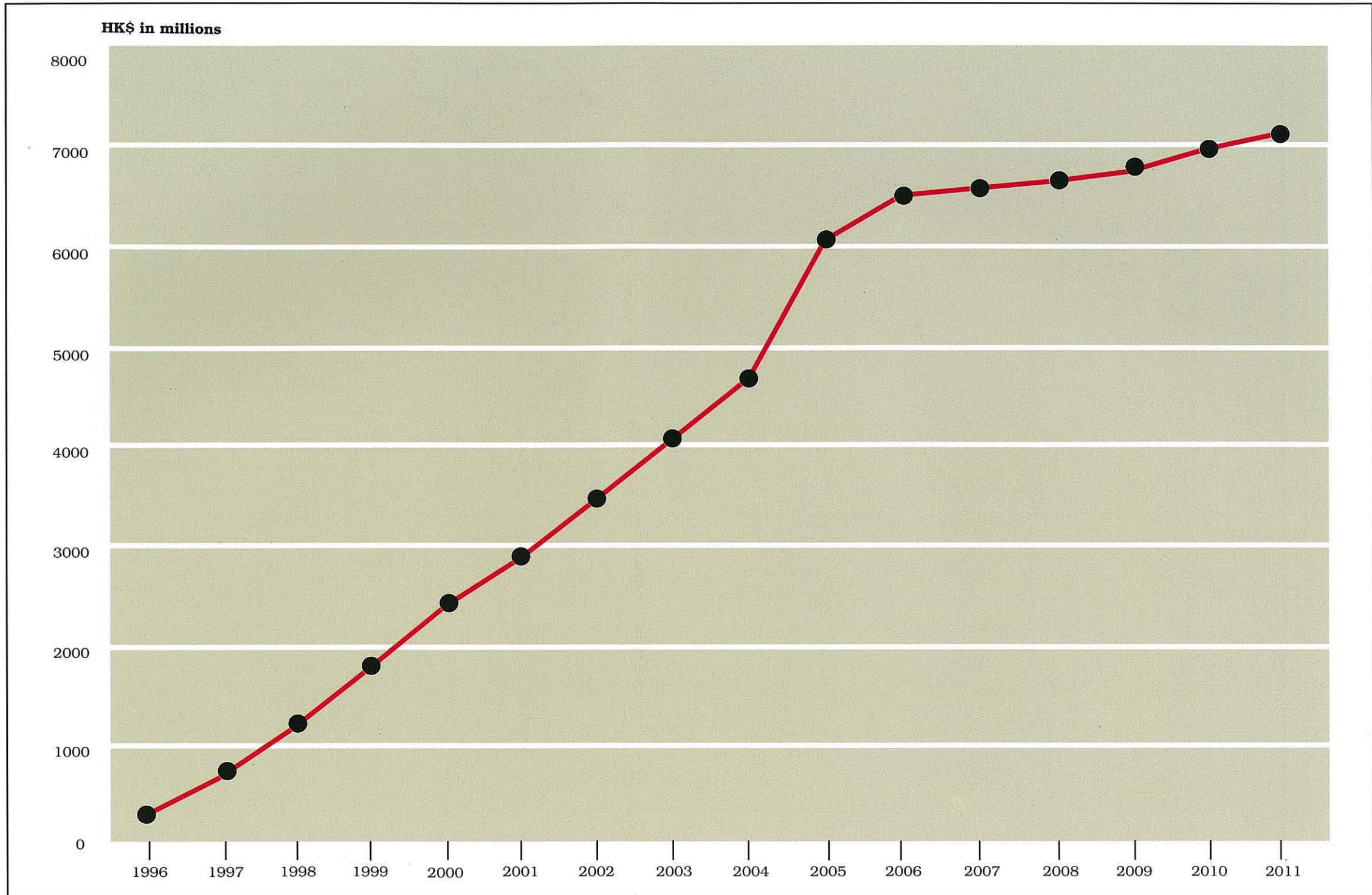


Fig. 5.11 Cumulative Expenditure Curve



Conclusions & Recommendations

Conclusion

The Green Island Reclamation Feasibility Study has demonstrated that the potential exists, within the context of Metroplan and PADS, for a development in the study area which will benefit not only the residents and businesses on the reclamation and in Kennedy Town but the territory as a whole. A population of 103,465 can be accommodated on the reclamation area of some 181 hectares. The study has also demonstrated the technical feasibility of realising that potential, produced the basis of a budget for the development, and drawn up a timetable for its implementation.

Recommendations for Preliminary Design Stage

1. Review RODP following the Hong Kong Island West Development Statement.
2. Consider alternative land use for the site allocated to the Abattoir in the port area.
3. Consider revision to the MTR reserve for the Kennedy Town Station if benefits arise from the use of the Wholesale Market site instead of Forbes Road.
4. Review and identify a source of potable water for the development.
5. Establish the requirement for cooling water supplies within the development area.
6. Establish noise mitigation constraints which should be incorporated as land sale conditions or planning briefs.
7. Re-examine the number and relocation of mooring buoys as recent harbour activities have affected the scheme proposed in this study.
8. The phasing of reclamation should be reviewed in light of the implementation of the Public Dump project initiated after this study was finished.
9. A qualitative study of water quality for the various phasing stages of the reclamation should be carried out to check whether there are any insurmountable problems. The study should be carried out in accordance with Environmental Protection Department requirements and recommendations.

Recommendations for Detailed Design Stage

1. Access Roads serving development sites should be reviewed to consider alignment based on development requirements. Access points should be retained wherever possible.
2. Detailed study should be made of pollutants and emissions from the GIL ventilation stack.
3. Develop noise control measures to be implemented to comply with noise standards.
4. Take account of individual operators requirements for berthing in the port area.
5. Mathematical hydraulic modelling of the reclamation phasing should be considered to examine specific aspects of construction.

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