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

Draft Final Report
Volume 1



Territory Development Department
拓展署
Urban Area Development Office
市區拓展處

Main Report

**Green Island
Reclamation
Feasibility Study**



RJA-0461/BC



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Route 7

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Glossary of Abbreviations

ANL Acceptable Noise Level

AQO Air Quality Objectives

CAPRO Cavern Project

CDA Comprehensive Development Area

CMC China Merchants Company

CNL Corrected Noise Level

CNP Construction Noise Permit

CRTN Calculation of Road Traffic Noise

CTS-2 Second Comprehensive Transport Study

dB(A) The A-weighted sound pressure level in decibels. An A-weighted network can be built into a sound level measuring instrument such that direct sound levels in dB(A) can be read from a meter. The weighting is based on the frequency response of the human ear and has been found to correlate well with human subjective responses to various sounds.

DOS District Open Space

GFA Gross Floor Area

GEO Geotechnical Engineering Office

HKPSG Hong Kong Planning Standards & Guidelines

HOS Home Ownership Scheme

kPa Kilo Pascals

L10 The noise level exceeded for 10% of the time

L90 The noise level exceeded for 90% of the time

LDC Land Development Corporation

Leq The notional steady noise level which would, over a given period of time, deliver the same sound energy as the actual fluctuating sound over the same period.

LOS Local Open Space

LTHS Long Term Housing Strategy

MLP Master Landscape Plan

mPD Metres above Principal Datum

MTR Mass Transit Railway

MTRC Mass Transit Railway Corporation

NOX Nitrous Oxide

NSR Noise Sensitive Receiver

OZP Outline Zoning Plan

PADS Port and Airport Development Strategy

pcu/hr Passenger Car Units Per Hour

PCWA Public Cargo Working Area

PSPS Private Sector Participation Scheme

R1 Private Sector Housing for Purchase

RODP Recommended Outline Development Plan

RS Housing for Rent

SHRUG Harbour Reclamation and Urban Growth Study

SPUN Study of the Potential Use of Underground Space

TDS Territory Development Strategy

TM Technical Memorandum on Noise from Construction Work Other than Percussive Piling

TP Technical Paper

TPDM Transport Planning and Design Manual

UFP Urban Fringe Park

vph Vehicles Per Hour

WAHMO Water Quality and Hydraulic Model Studies

WDTS Western District Traffic Study

WP Working Paper

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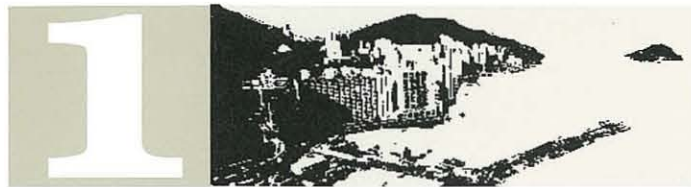
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Introduction

1.1 The Study Context

1.1.1 Background

The possibility of reclaiming an area of land between Green Island and Kennedy Town was put forward as a recommendation of the Harbour Reclamations and Urban Growth Study in 1983. The idea was taken further by the Territory Development Strategy, whose Initial Results, accepted by the Executive Council in June of 1984, identified major Harbour reclamations as a component of long term growth strategies.

An Outline Brief for Planning and Engineering Feasibility Studies for Strategic Development Projects was prepared by the Strategic Planning Unit in 1985 and a review of the harbour reclamations and development in Pok Fu Lam was carried out by the Urban Area Development Office. The Initial Report of that review set out the planning considerations for the Green Island Reclamation which envisaged accommodating a population of approximately 202,000.

A detailed study of the feasibility of the Green Island Reclamation was therefore commissioned. This report presents the outcome of that work.

1.1.2 The Study Area

The Study Area is illustrated in Figure 1.1. It includes the land and sea areas between Shek Tong Tsui in the east and Green Island in the west. The Study Area is bounded to the east by Hill Road and Pok Fu Lam Road and to the south by a line following approximately, the

200 metre contour on the northerly slopes of Mount Davis.

The Study Brief also required an assessment of the effect on the Transport Study Area of additional traffic generated from the developments on the new reclamation. This area is outlined in Figure 1.1 and is bounded by Eastern Street and Pok Fu Lam Road south to Wah Fu Estate, and west and north to the coastline. Transport modelling for this part of the study has been carried out over half of Hong Kong Island as indicated also in Figure 1.1.

1.1.3 The Study Objectives

The general objective of the study was to plan a comprehensive urban development scheme which will ensure, as far as is practicable, balanced development for the Study Area and to confirm the feasibility of the proposals.

Whilst achieving this overall aim there were also a number of specific objectives of the study which involved engineering, planning and environmental considerations of the following issues:

- engineering feasibility of reclamation
- staging of the reclamation
- environmental and social deficiencies in the adjacent urban areas
- reprovisioning of existing marine based activities
- Route 7 alignment through the Study Area
- land formation and road network plans
- linkages to external transportation infrastructure
- extension of the Mass Transit Railway from Sheung Wan to Kennedy Town
- provision of serviced land and infrastructure requirements
- liaison with other current strategic studies
- a Recommended Outline Development Plan (RODP)
- a Master Landscape Plan (MLP)

- programme for comprehensive development
- expenditure estimates and forecasts

The Study Brief - reproduced as Appendix B in Volume 2 of this report - set out the requirements in detail at the commencement of the study. As the study progressed these requirements were affected in part by works of parallel strategic studies.

At the first Joint Working Group Meeting, held in July 1988, it was agreed in principle to amend the Brief (item 3.2.3) for the design year of the transport and traffic studies from 1996 and 2001 to include the year 2011. A decision was then made to revise the design years to 2001 and 2011 to be compatible with other studies then underway. During the course of the study a further amendment to the specific objectives was endorsed by the second meeting of the Steering Group. In addition to the RODP it was agreed that another plan, developed to a lesser level of detail, be prepared to keep open an option for the landfall of the Green Island Link between North Lantau and the Green Island Reclamation area, the prefeasibility study of which commenced in April 1991.

1.1.4 The Study in Context

A number of studies were proceeding in parallel with the Green Island Reclamation Feasibility Study. Those with significant influence on the work of this study included:

- Second Comprehensive Transport Study - CTS-2
- Water Quality and Hydraulic Model Studies - WAHMO
- Ports and Airport Development Strategy - PADS
- Updating of the Territory Development Strategy - TDS
- Metroplan
- Western Harbour Crossing Feasibility Study - WHCFS

Those strategies for developing the Western Harbour and North Lantau areas were significant because of the location of the proposed reclamation at the northwestern end of Hong Kong island.

The location was also significant in strategic transportation terms and both PADS and Metroplan were influential in the direction of the study. It was decided that

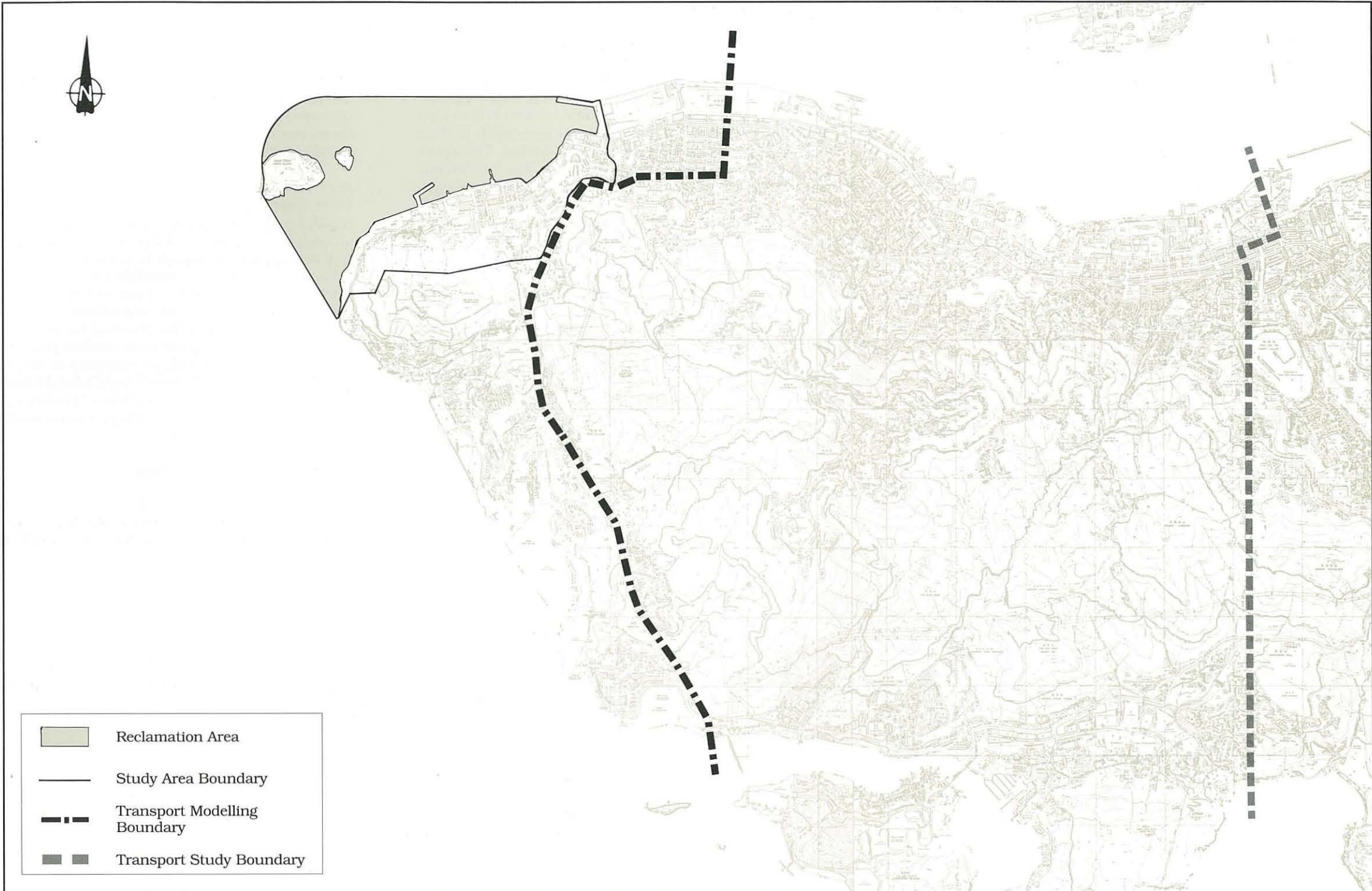


Fig.1.1 Study Area and Transport Study Area

options for the Green Island Reclamation should preserve the options of PADS and other studies, until such time as firm decisions on these were taken. Then Green Island options could be narrowed down and the preferred scheme identified for development, as specified by the Brief.

Work on this study was halted in 1989 until the decision on the relocation of the airport to Chek Lap Kok was announced by the Governor in October 1989. The final stages of the study were then progressed with a plan which contained the requirements of that port and airport strategy.

The plan that evolved from the overall work of the study is presented in this report as the Recommended Outline Development Plan: the Master Landscape Plan has been prepared as an integral part of the RODP.

1.2 Goals and Objectives

The first Working Paper set out the Goals and Objectives for the study. These were discussed at the Second Joint Working Group and the approved Goals of the Study are shown in Table 1.1.

These goals are broad statements which encompass the full range of the work of the study.

The objectives, as set out in Working Paper No.1, deal with specific issues of the Brief which were addressed during the progress of the Study. The objectives were used in the evaluation of options throughout the process of developing the final plans.

Certain of the objectives were regarded as requirements of the Study. In any option screening or evaluation it was intended that these objectives should be met.

Table 1.1 Goals

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.

1.3 The Study Process

The Brief for the study identified requirements for Engineering Feasibility and Planning Feasibility. Embodied in both of these workstreams was the need to carry out traffic, transportation and environmental assessments. The study process integrated the work of the various disciplines whilst allowing each to progress its specific tasks at the appropriate times.

Four stages of work were identified:

- Inception
- Assessment and Identification
- Evaluation and Selection
- Development

Work was undertaken within each stage by individual disciplines; their efforts were brought together in a multi-disciplinary report, or technical paper, summarising that stage and setting the scene for the next phase of work. The process is shown diagrammatically in Figure 1.2.

Technical Papers (TP) presented the findings of specific topics and set out, where necessary, recommendations which directed the study at the next stage. All Technical Papers were circulated for comment by Government Departments and responses to comments were made in writing. Two Working Groups - Traffic and Transport (TTWG) and Planning and Engineering (PEWG) - were set up to provide guidance to the study. The working groups met jointly on four occasions reflecting the multi discipline approach adopted by the study. In addition, there were two meetings of the Traffic and Transport Working Group and one meeting of the Planning and Engineering Working Group.

The Steering Group provided the study with overall guidance on policy matters and endorsement on the progress and direction of the work within the study.

The composition, terms of reference and schedule of meetings of the three groups is given in Appendix C of Volume 2 of this report.

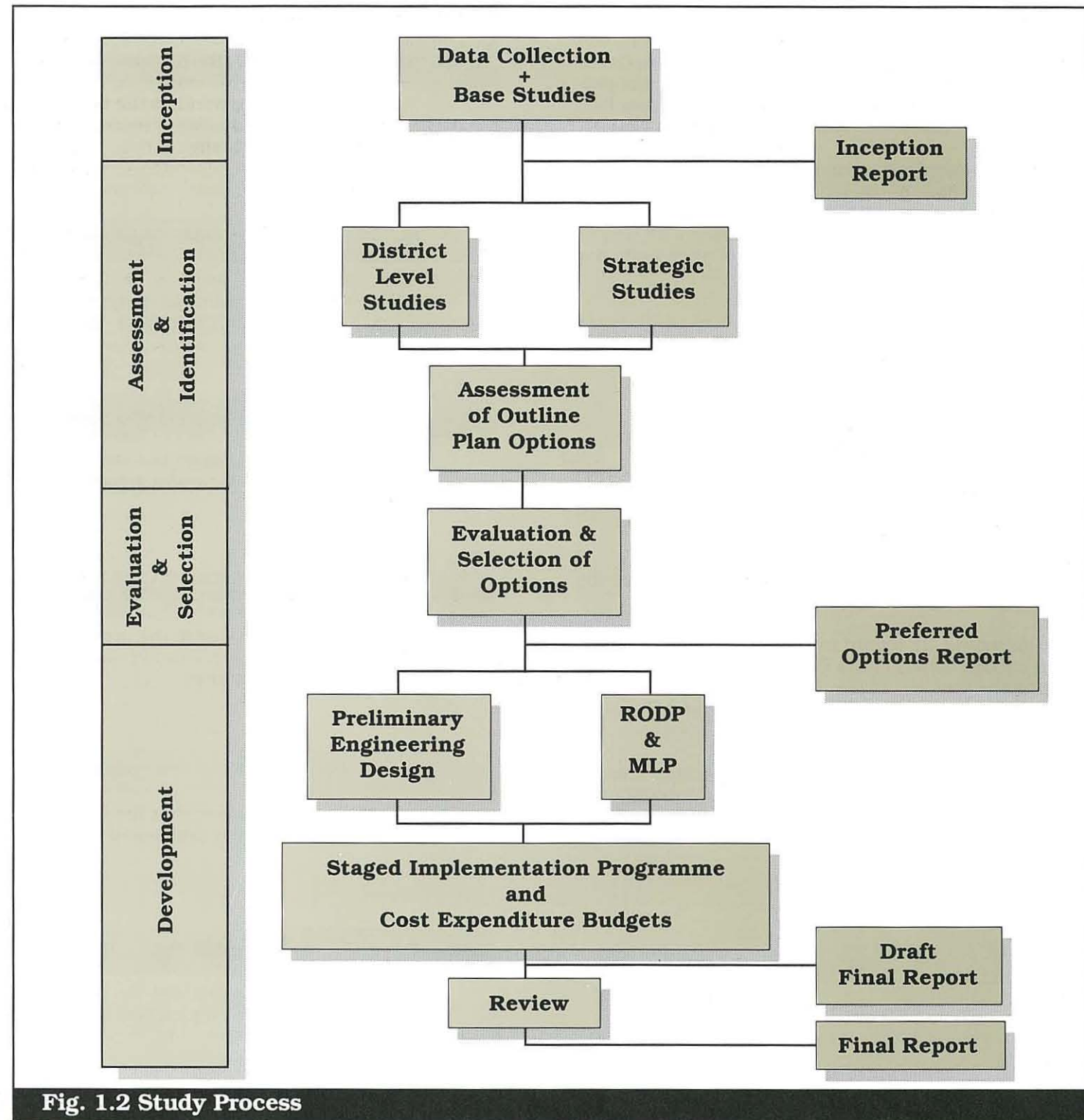


Fig. 1.2 Study Process

1.4 Options

Early in the second stage of the study it became apparent that the generation of options was significantly influenced by the various strategic highway links. These comprised Route 7, the Western Harbour Crossing and a possible fourth harbour crossing to either Lantau, Stonecutters Island or north-west Kowloon. Working Paper No.1 presented the strategic context for the study.

The land use planning options for the new reclamation area were narrowed down to either a residential/commercial emphasis or an industrial/port related option.

The existing waterfront uses would require to be relocated when reclamation commenced. This presented an opportunity to re-examine the planning deficiencies in Kennedy Town and where practicable, to make recommendations for the rejuvenation and up-grading of the Kennedy Town area. The various planning options for the new reclamation area suggested a number of different approaches to the Kennedy Town issues, thereby generating more sub-options.

The Options Report (Working Paper No.2) described 16 preferred options which were all assessed and evaluated against the study requirements, goals and objectives. Four options were identified as performing best against these criteria, but it was considered necessary

to keep open the various alternative strategic highway links until such time as decisions on the location of the new airport were taken.

The plans for the new airport at Chek Lap Kok included considerable port development on North Lantau and identified a road link between this and the Green Island Reclamation, via Kau Yi Chau, now known as the Green Island Link (GIL).

The final stage of the study took the selected option which incorporated the PADS strategic road networks and prepared the Recommended Outline Development Plan (RODP) and Master Landscape Plan (MLP) for the area of reclamation. In conjunction with these plans, amendments have been recommended to the Kennedy Town and Mount Davis Outline Zoning Plan. These are presented in this Report.

Preliminary engineering design work has been carried out on the section of Route 7 from Belcher Bay through to the south western limit of the reclamation. The alignment of Route 7 south to Aberdeen presented in the Report 1983 has been reviewed to assess the impact of new developments, traffic demands and more recent construction activities along its route.

Methods of reclamation and type and construction of seawalls have been considered to a preliminary engineering design level. The provision of utilities and the staged implementation of the reclamation have been studied and feasible plans are presented in this Report.

The output of this part of the study is presented in Volume 3 of this Report. Costs associated with the implementation programmes are presented together with expenditure budgets for implementation of the plans.

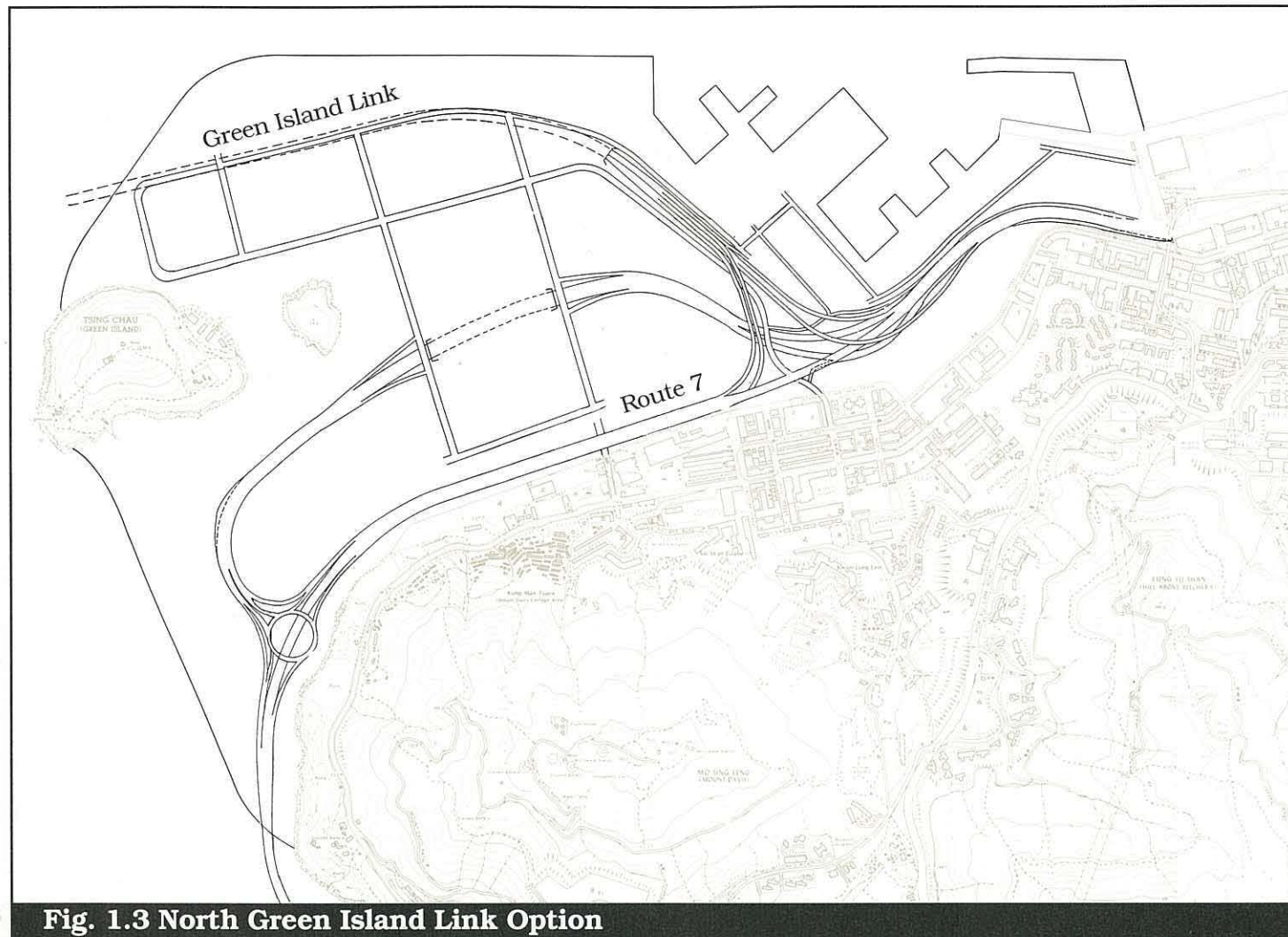


Fig. 1.3 North Green Island Link Option

1.5 North and South Green Island Link Options

A review was carried out in May 1990 which recommended two layout options for the alignment of the strategic road linking Green Island to the Port and Airport Development areas on Lantau;

- North Option : with the landfall of the link to the north of Green Island.
- South Option : with the landfall of the link to the south of Green Island.

These are illustrated in Figure 1.3 and Figure 1.4. The final alignment of the road link will not be determined until the completion of the Green Island Link Prefeasibility Study.

It was necessary to identify one of these options to be used in the Recommended Outline Development Plan, and an assessment was carried out to select the most suitable option from the objectives for the Green Island Reclamation. Appraisal of the two options considered land use planning, transportation and environmental implications of the alternative alignments.

A clear preference for the North Option was based on:

- smaller land take for the interchange
- less overall severance of the reclamation area from Kennedy Town
- better standards of highway design
- better location of tunnel portal and ventilation building
- less impact of strategic roads on residential areas
- provision of a buffer zone between port/industrial and residential land use areas
- less traffic noise impact on the proposed development.

The North Option has been used to develop the Recommended Outline Development Plan while the South Option has been used to develop a plan with less detail. Should the Green Island Link Prefeasibility Study conclude the southern landfall alignment is preferred then the basis of a plan exists, from which future work can produce an RODP.

1.6 Recommended Outline Development Plan and Outline Zoning Plans

The RODP for the Green Island Reclamation Area has been drawn to illustrate the land use zoning proposals. The RODP is based on the northern alignment for the Green Island Link.

Two Outline Zoning Plans (OZP's) have been prepared for the reclamation area for each of the North and South Green Island Link options; the former complements the RODP and the latter illustrates the impact upon the proposed land use mix, of the southern road landfall option. These are enclosed as Appendix A.

The RODP is supplemented by OZP's illustrating the proposed zoning pattern in Kennedy Town. Two scenarios are presented for this OZP - the first proposes short term revisions; the second sets out amendments for the long term scenario in 2011. The RODP and OZP for the reclamation area are based on the design year of 2011.

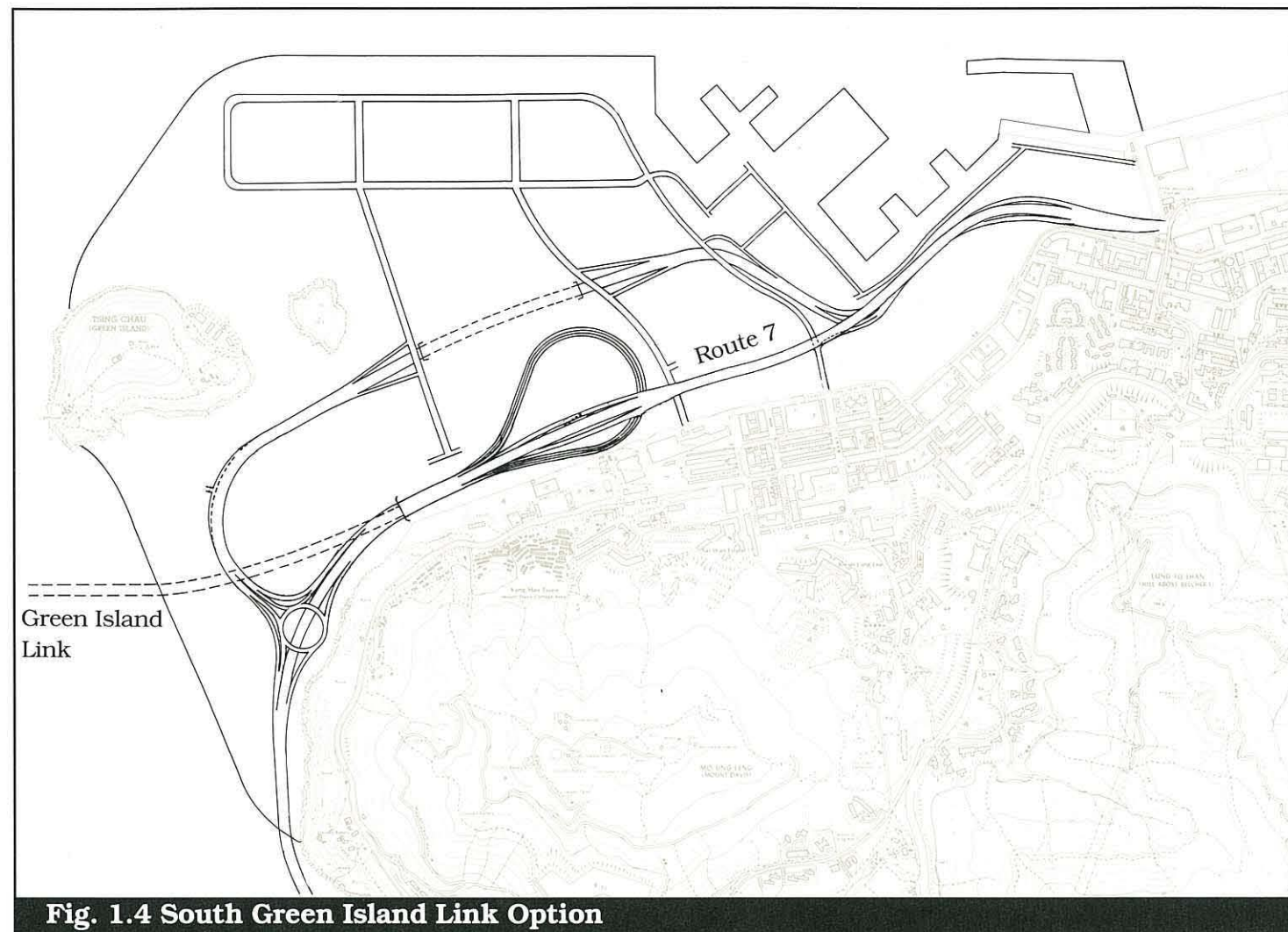
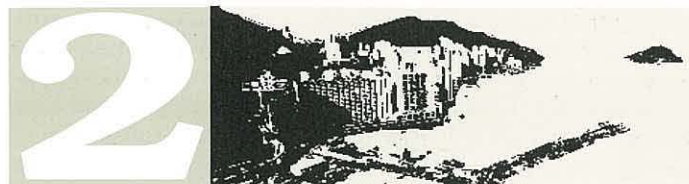


Fig. 1.4 South Green Island Link Option



Planning Context

This chapter reviews the strategic and local planning context for both the reclamation and Kennedy Town areas. It will present the background against which the RODP has been prepared and sets the parameters for the planning, highways and transportation, urban design, landscape and environmental issues to be addressed by the Plan.

2.1 LAND USE

2.1.1 Strategic Planning Context

'Metroplan: The Selected Strategy' produced by the Planning Department in October 1991, formulates a land use framework for the future development of Hong Kong into the next century. It identifies areas of existing and committed development and it targets areas for improvement. The following information is embodied in the Metroplan strategy and provides the planning context for the preparation of the RODP.

Residential Development

New housing demand figures for the whole Metropolitan Area prepared by Metroplan in conjunction with the Housing Authority have been identified. Housing requirements for 2011 for the Green Island area have been projected and are shown in Table 2.1.

The Metroplan population projection of 111,348 has therefore been adopted as a guide for the reclamation area.

Table 2.1 Housing Requirements by 2011

Housing Type	No of Units	Occupancy Rate	Population
RS	4,980	3.08	15,338
HOS	9,110	2.78	25,326
PSPS	4,980	2.78	13,844
Private	21,130	2.69	56,840
Total			111,348

(Source: Metroplan April 1990)

Metroplan has also produced guidelines for the phasing of residential development upon the Green Island Reclamation; the emphasis is placed upon a gradual build-up of development and a programme which will have the majority of housing units in place by 2006, (see Table 2.2).

As part of the Metroplan objective of reducing residential densities throughout the urban areas, guidelines have been prepared for new residential development. These are expressed in terms of the proximity of the site to a new/proposed Mass Transit Railway (MTR) station, as indicated in Table 2.3.

Table 2.3 Housing Densities in MTR Catchment Area

Housing Type	MTR Catchment (No of flats per hectare)		
	200m	200-400m	400m+
RS	----	600	----
HOS	600	500	400
PSPS	700	600	500
Private	830	720	450

(Source: Metroplan October 1990)

Table 2.2 Completion for Types of Housing

Housing Type	Completion Date
RS	2006 (100%)
HOS	2006 (40%) 2011(100%)
PSPS	2011(100%)
Private	2006 (30%) 2011(100%)

(Source: Metroplan October 1990)

Port Development

Marine uses will be re-provisioned from Kennedy Town and these have been included in the Metroplan proposals for Green Island. The Shek Tong Tsui Public Cargo Working Area (PCWA) for Western District is to be expanded to increase its capacity. No other port development has been proposed for the Green Island Area.

Office Development

A three hectare (gross) commercial development scheme located above a possible MTR station in Kennedy Town is proposed by Metroplan. There is a presumption in the Metroplan Strategy against office development on the Green Island Reclamation in favour of other, more central, locations.

Retail Development

Metroplan envisages a self-supporting retail component for the reclamation development. This could take the form of a development similar to Tai Koo Shing, as the focus for retail activity together with local shopping facilitates within the residential areas.

Hotel Development

No hotel development on Green Island is assumed by Metroplan.

Industrial Development

Metroplan has rejected an emphasis on industrial development at Green Island. However sites should be provided for local industry which acknowledge the requirement to re-provision land uses displaced by the new reclamation. Within its overall strategy, Metroplan has projected preliminary employment data for 2001, 2006 and 2011 for the Green Island Reclamation Area as follows:

Year	2001	2006	2011
Job Places	27,000	31,000	22,500

The majority of this employment is classified as 'non-manufacturing', with a high proportion (72%) of construction and service sector jobs estimated for 2001 and 2006.

Urban Fringe Park

A 25 hectare Urban Fringe Park, which was a common feature of all the land use options shown in the Options Report - WP2 - has been adopted by Metroplan. Predominantly passive 'higher order' recreational uses are envisaged and Metroplan are currently assessing which facilities are appropriate to serve a larger catchment population outside the reclamation area.

Sewage Treatment Works

The recommendations of the Sewage Strategy Study include an underground sewage treatment works at Mount Davis. The treatment works will also serve the population from North Point to Western and also will treat flows from Pokfulam. A long oceanic outfall in deep tunnel is also planned.

A Government study which looked at the potential for utilising space underground (SPUN) has examined the proposal for an underground Sewage Treatment Works at Mount Davis. It was found to be practicable and cost effective in overall terms particularly when taking into account the potential land values which would be generated for alternative above ground uses.

The benefits of this will be the release of more land for development and the removal of an environmentally undesirable activity from an otherwise attractive location on the proposed reclamation.

Mass Transit Railway

Metroplan within their Selected Strategy have included an MTR extension to Kennedy Town, together with a possible 'spur' onto the reclamation to serve residential development sites. The feasibility of a MTR extension to serve Kennedy Town and the reclamation area has been considered. This is discussed in Section 3.2.3.

Heliport

The opportunity of providing a licensed heliport for international helicopter operations at Green Island has been considered, with particular assessment made of the noise problems associated with such a facility. After detailed assessment of the strategic planning, transportation and environmental issues, a heliport location at Green Island is considered to be incompatible with the residential emphasis for the reclamation. The requirement for a heliport has therefore not been incorporated in the RODP.

2.1.2 Local Planning Context

Reprovisioning

The Options Report - WP2 - identified a schedule of land uses that Government requires to re-provision upon the reclamation area. Three marine lots are required in the early stages of development:

- the China Merchants
- the Salt Water Pump House
- the Abattoir

Government also need to provide a new Public Cargo Working Area (PCWA) to meet the Marine Department's

projected requirements for this area. This would incorporate the existing Western District PCWA at Shek Tong Tsui which will be resited during the reclamation programme. The Green Island Cement Company will lose their marine access when the reclamation takes place. The District Lands Office/HKW has indicated that there is no essential need to retain the existing operations of either the Green Island Cement Company or Pioneer Concrete within Kennedy Town.

G/IC. and Open Space Requirements

An open space deficiency has been identified in Kennedy Town. The urban renewal programme in Kennedy Town will include additional areas of local open space to meet the projected shortfall. The Belcher Bay area will be used to meet some of the district open space requirements and the remaining shortfall will be provided elsewhere upon the reclamation. Belcher Bay Reclamation will also provide the location for an additional sports centre to serve Kennedy Town.

Essential Government Service Land Demands

Marine and non-marine lots for Essential Government Service Land and Utility Company demands have been identified and incorporated into the land use proposals.

Private Industrial Lots

Industrial land areas have been classified into marine and non-marine lots. The private non-marine lots represent the equivalent amount of industrial land that is projected to be lost in the existing Kennedy Town Urban Area.

The fixed industrial land component recognises the importance of providing suitable sites that will give existing industrial operations in Kennedy Town the opportunity to bid for sites on the reclamation. Private industrial lots will also provide additional sites for the expansion of companies located on the reclamation.

Kennedy Town Studies

Working Paper No. 3 outlined the proposed amendments to the Kennedy Town Outline Zoning Plan. This plan has been refined to incorporate Government comments and the additional technical work that has been undertaken. The proposals for Kennedy Town are outlined in Chapter 4.

2.2 Highways and Transportation

2.2.1 Strategic Road Network

The PADS study required the provision to be made for a Green Island Link. The Western Harbour Crossing Feasibility Study recommended that a southern landfall for this crossing be located at Sai Ying Pun. These two decisions set the strategic highway requirements for the study. Other work on Route 7 - Sai Ying Pun to Kennedy Town and Kennedy Town to Aberdeen was considered in the development of the strategic road network for the RODP. The following highway parameters were adopted:-

- 2011 will be the design year for traffic purposes.
- The Western Harbour Crossing will land at Sai Ying Pun.
- Route 7 will be a dual three lane road aligned along Connaught Road West.
- Belcher Bay Link will initially be a dual two lane road which can be upgraded to a dual three lane road to suit development of the reclamation area.
- Route 7 from Kennedy Town to Aberdeen will be a dual 2 lane road with an "all movements" interchange with the Green Island Link.
- Green Island Link will be a dual two lane tunnel across the East Lamma Channel. Its landfall could be either north or south of Green Island.
- Green Island Link toll plaza should not be accommodated on Green Island reclamation.
- Green Island Link design speed will be 70 kph; Route 7 design agreed will be 85 kph.

The 'Options Report' - WP2- assessed the possible corridor for Route 7 through the reclamation area. It was decided that an elevated alignment close to the existing shore line gave the benefits of ground level road and pedestrian links between Kennedy Town and the reclamation.

The north landfall for the Green Island Link suggested the location of the main interchange with Route 7 should be towards the eastern end of the reclamation. This provided the opportunity to keep the GIL in tunnel

along the northern edge of the reclamation area, giving noise and severance benefits to that high value area of the development. As the GIL climbs and curves southward the approach ramps and junction layout with Route 7 provide a separation zone between the port and industrial area to the east and the residential area to the west.

2.2.2 Local Road Networks

The population of 111,348 planned for the reclamation allows the local road network to follow the "spine road" principle. A single primary distributor through the middle of the reclamation area has been planned with a dendritic network of district and local distributors. The eastern end of the primary distributor joins The Belcher Bay Link within the area occupied by the Route 7 / Green Island Link interchange. It joins access to route 7 eastbound via the ramps from Belcher Bay. At the western end a roundabout junction with Route 7 provides a east effective interchange from with the capacity to receive future connections from the proposed underground developments in Mount Davis. The layout will be the use of Route 7 whilst local road area requirements.

2.3 Urban Design and Landscape

Urban design principles build on the structural pattern of Kennedy Town and the natural features around it. These include the dominant background slopes and ridges of Mount Davis and Victoria Peak, and Green Island and Little Green Island. Exploiting visual links between existing development and the reclamation area is an important urban design objective in both quantitative and qualitative terms. The water's edge and the land surrounding the islands provide opportunities for creating a settlement with a unique identity within the crowded urban environment of Hong Kong Island.

The urban design and landscape concepts are advocated in 'Development Parameters' -TP12. These provide the context for the development of the urban design and landscape input for the RODP and MLP.

A reiterative process of reviewing the various objectives and assessing these against the detailed layouts for the RODP has continued throughout the land allocation exercise. The factors which have been taken into consideration in this process are:-

Existing Landscape

- retain the natural ridgeline visibility and develop building massing principles to reflect this
- retain landmark features

Environment

- maximise opportunities for screening incompatible land uses
- improve microclimate by introducing ventilation corridors
- limit visual impact of development

Open Space and Recreation

- meet open space requirements including Kennedy Town deficits
- provide linkages to adjacent open space networks
- develop a network of linked open spaces with a defined hierarchy
- include the Urban Fringe Park as defined by Metroplan
- provide recreation opportunities
- provide a variety for waterfront edge treatments

Circulation

- increase visual corridors by aligning major roads with boulevard type planting in the north-south direction
- ensure pedestrian comfort and ease of walking around the reclamation
- provide pedestrian connections to Kennedy Town

2.4 Environmental Context

The potential for environmental impact on air and water quality and noise climate has been assessed throughout the study.

Environmental reviews have been performed at various stages of option development. Recommendations concerning the layout and zoning of the proposals, compatible land uses and the need for buffer zones have been incorporated into the Recommended Outline Development Plan throughout its development.

The existing environmental quality of the Kennedy Town area and its environs was studied. An Environmental assessment was undertaken of the likely impacts during the reclamation and construction of the development. Recommendations have been made for further work, monitoring, control measures and other amelioration.

2.4.1 Air Quality

Air quality considerations have examined vehicle and industry emissions. Assessments of the existing and proposed situations have been undertaken, and have included vehicle generated pollutant dispersion modelling.

The study has paid particular attention to the future of the Kennedy Town Incinerator, the Abattoir and the Green Island Cement Company plant.

The urban and landscape designs incorporate the principles of good microclimate control. The natural dispersion capabilities of the land/sea breezes have been maximised in the design of layouts.

2.4.2 Water Quality

There are no streams or other bodies of surface water in the Study Area and water quality requirements have been centred on the harbour waters. It was deemed a necessary study objective that no detrimental effects should be caused by the proposals - either during the construction or after completion of the project.

Two areas of main concern were the PCWA activities and the discharge of foul sewers and stormwater along the existing waterfront into the harbour. Recommendations have been made for improvement to existing practices which will bring benefits to the water quality of the Victoria Harbour through control of discharges.

2.4.3 Noise Impact

Minimisation of the impact of noise on sensitive receivers including residential areas, school and hospital facilities has been an important study objective. Locational controls have been incorporated into layout plans to help achieve this requirement. The urban design principles embody noise reduction guidelines and housing layouts feature measures to reduce noise exposure.

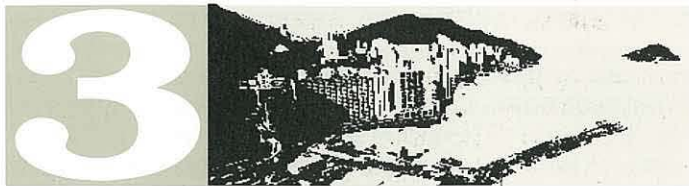
2.4.4 Landscape/Visual Impact

The visual impact of the development has been assessed together with the other environmental criteria throughout the study. The objectives relating to the visual impact have been incorporated at all assessment stages. The main objective against which the final plan is tested is:

"Ensure high visual standards for development, optimising the use of existing landform to guide built form."

This objective could be achieved through overall massing, appropriate land use distribution, strategic location of features and landmarks, and height restrictions.

The landscape structure and the open space network will have a significant effect on the visual impact of the development. Objectives for the open space network, to maximise its microclimate effect, and to remedy the open space deficiencies in the existing urban area at Kennedy Town by both environmental upgrading and reprovisioning on the reclamation, have been achieved within the RODP and MLP.



The Recommended Outline Development Plan

The reclamation around Green Island will provide the opportunity for a large scale development accommodating a target population of 111,348 on an area of 187.44 hectares. The plan for this development has evolved from consideration of the wider objectives of Metroplan, the need to provide strategic highway links and the requirement to relocate some of the existing waterfront uses onto the new reclamation.

Certain provision has been made for port and industrial activities and these are located adjacent to each other in the eastern part of the plan. The remainder of the area comprises residential development and open space provision.

This chapter describes the land use, transportation, urban design and landscape components of the RODP together with the infrastructure and utility provisions. An environmental assessment of the plan is then described in Section 3.6.

3.1 Land Use

The RODP defines the land use zoning proposals for the reclamation area. The plan is characterised by 2 distinct areas of zoning; residential land uses on the western and central areas of the reclamation, industrial/port related uses at the eastern end of the reclamation. These uses are bisected by the Green Island Link and are also bounded at their southern edge by the Route 7 alignment, which is situated between the Urban area of Kennedy Town and the proposed land uses on the reclamation.

114,131 on Table 3.1
138.65

The RODP is divided into 13 'planning areas' which characterise particular elements of the Plan. These planning areas are illustrated in Figure 3.2 and summarised in Table 3.1.

Table 3.1 illustrates the balance that has been achieved between the provision of residential development units and associated G/IC and open space facilities. A total population figure of 114,531 is planned for the reclamation area in 2011. This figure is broadly in line with the Metroplan projection. A more detailed breakdown of uses by planning area is given in Appendix B.

3.1.1 Residential Development

The requirement for public and private housing development at Green Island has been assessed at two levels;

- the district specific requirements
- the contribution the reclamation area can make towards the Territory-wide requirements.

The Long Term Housing Strategy (LTHS) provides the main policy background for the methodology adopted by Metroplan. The LTHS proposes:

- to continue producing public rental housing at the present rate but to gradually substitute HOS/PSPS as that demand increases after 1990;
- to introduce a Home Purchase Scheme which will be adjusted to ensure that there is sufficient demand to keep private sector production at its optimum level.

The Land Development Policy Committee has endorsed the Metroplan proposal that the population of the sub-region of Hong Kong Island should not exceed the 1987 figure of about 4.2 million people. This figure has been adopted by Metroplan as a control total for its population projections.

Does it tie in with S.M.P.?

Table 3.1 Recommended Outline Zoning Planning Areas

Area No.	Land Use	Area (ha)	Population
A	Residential (R1)	10.36	19,907
	G/IC	3.69	----
	Open Space	2.21	----
	Industry	----	----
		<i>16.26</i>	
B	Residential (R1)	11.75	24,641
	G/IC	1.15	----
	Open Space	0.38	----
	Industry	----	----
		<i>13.28</i>	
C	Residential (PSPS)	8.09	13,345
	G/IC	1.09	----
	Open Space	1.41	----
	Industry	----	----
		<i>10.59</i>	
D	Residential (R1)	1.56	3981
	G/IC	1.68	----
	Open Space	1.13	----
	Industry	----	----
		<i>4.37</i>	
E	Residential (R1)	2.93	6563
	G/IC	0.74	----
	Open Space	0.52	----
	Industry	----	----
		<i>4.19</i>	
F	Residential (HOS)	7.41	19016
	G/IC	2.17	----
	Open Space	5.27	----
	Industry	----	----
		<i>14.85</i>	
G	Residential (R1)	4.13	10349
	G/IC	0.52	----
	Open Space	0.52	----
	Industry	----	----
		<i>5.17</i>	
H	Residential (RS)	3.17	7546
	G/IC	0.93	----
	Open Space	0.80	----
	Industry	----	----
		<i>4.9</i>	
K	Residential (R1,HOS)	3.36	7515
	G/IC	0.50	----
	Open Space	4.16	----
	Industry	----	----
		<i>8.02</i>	
L	Residential	----	----
	G/IC	7.23	----
	Open Space	----	----
	Industry	4.85	----
	Other Specified Uses	13.14	----
		<i>25.22</i>	
M	Residential (HOS)	0.80	1668
	G/IC	3.09	----
	Open Space	1.30	----
	Industry	----	----
		<i>5.19</i>	
N	Residential	----	----
	G/IC	----	----
	Open Space	----	----
	Industry	----	----
O	Urban Fringe Park	26.61	----
Total		<i>138.65</i>	114,531

111,000 in S.M.P. Central

The Metroplan proposal of 111,348 for residential development at Green Island has been outlined in Table 2.1.

The reclamation area will include public sector Housing for Rent (RS), Home Ownership Scheme (HOS), Private Sector Participation Scheme (PSPS) housing and private sector housing for purchase (R1). Land for lower density R2, R3 and R4 housing has not been included in the RODP as it is considered that low density housing should be minimised in 'new town type' development areas with high capacity infrastructure.

The proportion of private housing development to public housing development is provided at 53% to 47% respectively. Private housing provision is restricted to R1 development which is located primarily on waterfront sites on the northern and western edges of the reclamation.

Within the public housing category 5,810 units will be constructed. HOS and PSPS housing will contribute 14,440 residential units to the scheme. RS, HOS and PSPS housing will occupy the central areas of the reclamation.

Residential density guidelines produced by Metroplan for the reclamation area are outlined in Table 2.3. The figures are derived from an assessment of the proximity of housing sites to the proposed MTR alignment, which terminates in Kennedy Town.

Residential occupancy rates are derived from the Metroplan projections for 'persons per occupied flat' by housing sector for Hong Kong Island. These figures are based upon projections for the design year of 2011.

Discussions with the Planning Department, Urban Area Development Office, and the Housing Department have indicated that in addition to a reduction in the residential occupancy rate, there is likely to be corresponding increase in the residential floorspace allocation per person for both public and private sector housing developments.

3.1.2 Commercial Development

The ability of the area to support commercial development depends to a large extent on the possible extension of the Mass Transit Railway to Kennedy Town, and even onto the new reclamation.

An MTR reserve to Kennedy Town and a station location at Forbes Street have been identified since 1986 on the Kennedy Town and Mount Davis OZP.

Two options have been investigated for an MTR extension:

- two MTR stations - one in Kennedy Town and one on the reclamation
 - one MTR terminus station in Kennedy Town
- In both options the provision of office and retail floorspace was kept constant.

A study carried out as part of the 'Review of MTR Extensions to Green Island' - TP6 - reported that the perception of the market for commercial development opportunities does not consider the Kennedy Town/Green Island Reclamation area a suitable secondary office location from an investment perspective.

The market currently considers the Kennedy Town area to be a suitable site for a major sub-regional retail centre, comprising approximately 50,000 sq. metres of retail floorspace possibly with office development above. This is in line with Metroplan which envisages a self supporting retail component for the reclamation area. Provisional floorspace estimates for the two MTR station sites are shown in Table 3.2.

An alternative MTR station location, with potential for significant commercial development was identified at the site of the Wholesale Market and abattoir. The Wholesale Market will be relocated to new premises on the Western Reclamation in stages between 1991 and 1994. The abattoir will be reprovisioned on the new reclamation to preserve water access.

The 50,000 sq. metres retail development is anticipated to be of a scale and quality that will attract custom from a wide catchment which will include the western corridor of Hong Kong Island. Currently, there are no major shopping centres west of Central; the main shopping areas on Hong Kong Island are located at Central/Admiralty, Causeway Bay and Tai Koo Shing.

The viability and success of a major retail centre in Kennedy Town to support the proposals outlined in the RODP are dependent upon the provision of an MTR station, a transportation interchange including bus, mini-bus and taxi stands and a major carpark.

Table 3.2 Provisional Floorspace for Commercial Development

MTR Station	Floorspace (sq. m.)	
	Office	Retail
Kennedy Town	200,000	40,000
Reclamation	50,000	10,000
Total	250,000	50,000

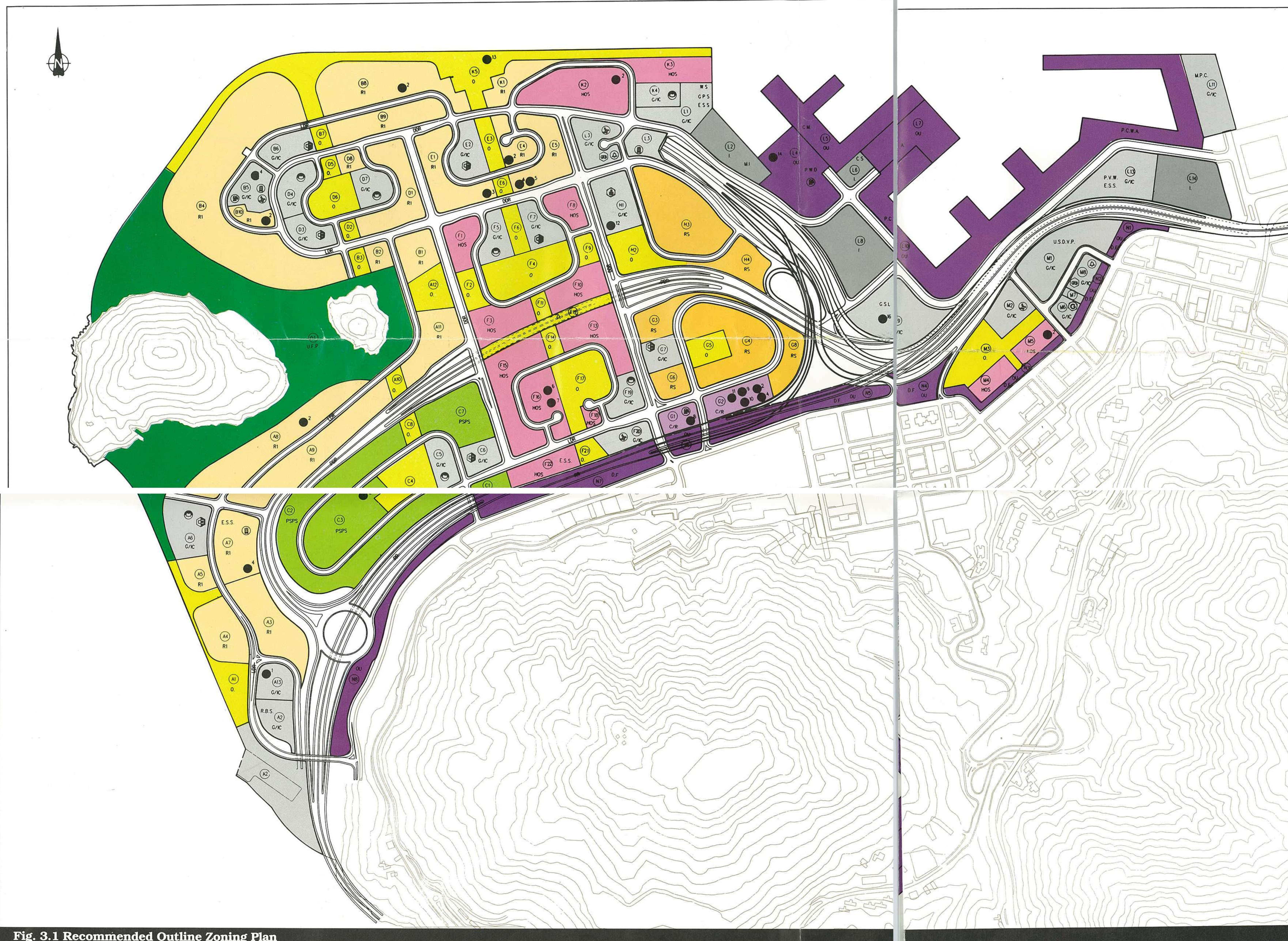


Fig. 3.1 Recommended Outline Zoning Plan

Legend for Fig. 3.1

- District Police Headquarters
- Government Offices
- Divisional Fire Station
- Ambulance Depot
- Indoor Stadium
- Bus Terminus
- Incorporated G/IC Uses
(eg. Kindergarten, Elderly Care Centre)
- Primary School
- Secondary School
- Petrol Filling Station

- O 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 Piging 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 Abattoir
- MI Marine Industry
- P.W.D. Port Works Division
- G.S.L. Government Serviced Land

**● Incorporated G/IC Uses
(eg. Kindergarten, Elderly Care Centre)**

- | | |
|--|-------------------------------|
| 1. WSD/ASD Maintenance & Contractors Depot | 9. Elderly Centre |
| 2. Kindergarten | 10. Market |
| 3. Youth Centre | 11. Clinic |
| 4. Post Office | 12. Telephone Exchange |
| 5. Child Centre | 13. Public Landing Steps |
| 6. Multi Service Centre | 14. Water Selling Kiosk |
| 7. Day Care Centre | 15. Lorry Park |
| 8. District Community Centre | 16. Highway Maintenance Depot |

● Schedule of Uses and Areas

Uses	Net Site Area (ha)
Commercial/Residential	1.16
Residential Zone 1	27.28
Special Residential	7.30
Home Ownership Scheme	10.89
Private Sector Participation Scheme	8.09
Government/Institution & Community	22.81
Open Space	17.77
Other Specified Uses	20.22
Industry	4.85
Urban Fringe Park	26.61
Local Distributor Road	9.95
District Distributor Road	9.61
Primary Distributor Road	6.14
Regional Road	14.76
	<hr/> Total 187.44



Fig. 3.2 Planning Areas

3.1.3 Industry and Re provisioning

The impact has been assessed of the proposed reclamation upon the existing waterfront users in the adjacent urban area. The analysis - summarised in Table 3.3 - indicated the extent to which waterfront related activities would be adversely affected by the reclamation works. Figure 3.3 identifies those affected.

The Kennedy Town waterfront has traditionally provided marine access for the loading and unloading of goods. It has been a key element in both the development of the entrepot trade with China and the related godown and trading activities in Western District.

These activities are classified into 5 sectors:-

- The Western District Public Cargo Working Area
- The Kennedy Town Praya 'uncontrolled seafront'
- The Kennedy Town New Praya 'permitted seafront'
- Government Uses (Abattoir, Incinerator, Wholesale Market)
- China Merchants Godown, Wharf and Transportation Company pier and private seafront.

The action that is required by Government which can be broadly classified under 4 headings:-

- the re provision of land uses (either on the reclamation or elsewhere)
- the re provision of waterfront access for loading/unloading activities.
- the termination of tenancy and/or licence agreements.
- notification to existing waterfront users that reclamation is taking place.

From this analysis, a schedule of land uses that Government is required to re provision has been formulated. These uses should be sited upon the reclamation area. Three marine lots are required in the first phase of development for:-

- the China Merchants Company,
- the Salt Water Pump House,
- the abattoir.

These uses will require approximately 3 hectares of land and a total of 905 metres of waterfront. In addition, Government will need to provide a new Public Cargo Working Area (PCWA) to meet the Marine Department's projected requirements for this area. This would incorporate the existing Western District PCWA at Shek Tong Tsui which will be resited during the reclamation programme.

Private industrial lots, located on both marine and non-marine sites, have been provided within the RODP. These land areas represent the equivalent amount of industrial land that will be lost in the existing Kennedy Town urban area as a result of reclamation activity and urban renewal measures.

A private marine lot of 1 hectare has been provided for either manufacturing or warehousing developments which require direct waterfrontage. Non-marine lots totalling 3.4 hectares have also been provided.

Provision of the fixed industrial land component recognises the importance for existing industrial operations in Kennedy Town to bid for sites on the reclamation. Private industrial lots will also provide additional sites for the expansion of companies located on the reclamation.

3.1.4 G/IC Facilities

Government, Institution and Community (G/IC) facilities are outlined on the RODP by Planning Area. The schedule which is attached in Appendix B includes a variety of uses which can broadly be divided into the following categories :

- Community Uses to support the existing population
- Government Service Land Uses
- Utility Services

Community Uses to support the existing population

These uses include education, medical and health, community centres, social welfare facilities and emergency services. These facilities have been planned in accordance with the HKPSG.

Three key objectives have been adopted for the provision of community uses upon the reclamation :

- to locate facilities near proposed centres of population to provide a balanced provision of land uses within each residential neighbourhood;
- to locate facilities in close proximity to areas of open space and protected environments, for the comfort and convenience of residents;
- to ensure that the provision of facilities meets the requirements of the proposed population and also rectifies the shortfall of existing G/IC facilities in Kennedy Town.

The community facilities are provided under the following categories :

Education Facilities

A total of 6 Primary Schools and 6 Secondary Schools is provided upon the reclamation to serve the projected population of primary and secondary school age. Kindergarten facilities have also been identified and will be provided within residential schemes.

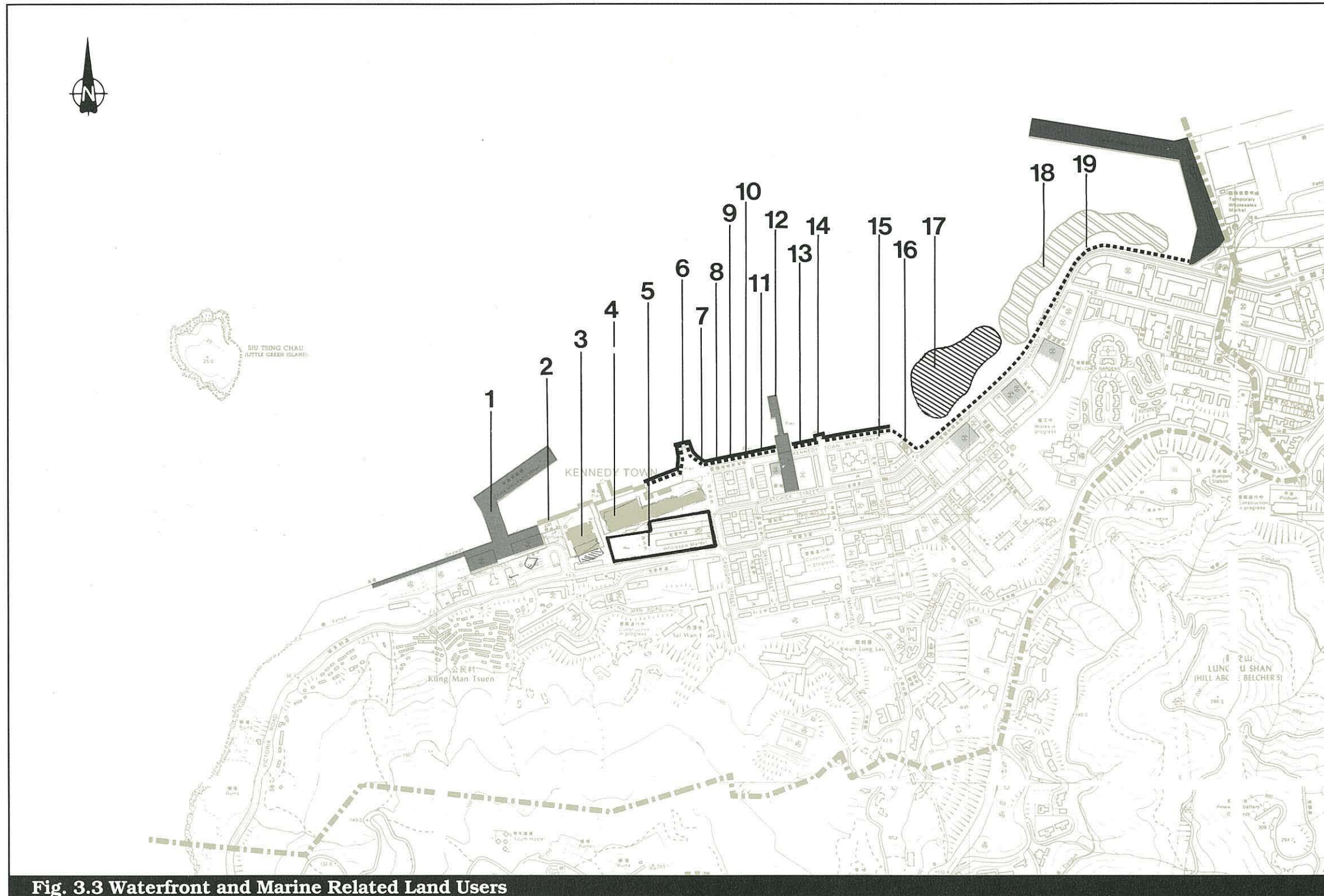


Fig. 3.3 Waterfront and Marine Related Land Users

Legend for Fig. 3.3

1. China Merchant's Pier and Godowns
2. Salt Water Pump House
3. Incinerator
4. Abattoir
5. Wholesale Market and ancillary carpark
6. Two dumb lighters used as crane barges by Ng Luen Transport
- 7,11. Licensed landing pontoon of Fruit and Vegetable Guild
8. Licensed landing pontoon of 'fish laan'
9. Licensed landing pontoon
10. Pier (possibly disused)
12. Green Island Cement Plant and Pier
13. Dumb lighter used as landing pontoon by Chu Kong Shipping
14. Pier of Choy Luen Hong
15. Two ex Kowloon Wharf dumb lighters used as landing pontoons
16. Refuse collection point
17. Dah Chong Hong 'Floating Godowns'
18. Barges berthing along Kennedy Town Praya
19. Licensed landing pontoon of Yick Fung Motor Ship Company

WATERFRONT








-  Western PCWA
-  Uncontrolled Seafront
-  Waterfront Connected with Wholesale Market
-  Government
-  Private Seafront
-  Private Godowns
-  Study Area Boundary

Table 3.3 Kennedy Town Existing Waterfront Uses; Measures Required by Government to Enable Reclamation to Proceed.

Land Use / Activity	Existing Provisions		Reprovisioning Measures		Remarks
	Land Area (ha)	Waterfront (m)	Land Area (ha)	Waterfront (m)	
Shek Tong Tsui Public Cargo Area (PCWA)	2.0	782	7.7	1,750	The new PCWA at Shek Tong Tsui will incorporate the existing PCWA which will be resited during the reclamation programme.
Barges using the Kennedy Town Praya "Uncontrolled seafront"	-----	750 (Quayside under-utilised)	Incorporated within new PCWA		
Refuse Collection Point	0.04	40	Incorporated within new port uses		
Dah Chong Hong Company "Floating Godowns"	-----	Access to K.T. only	Existing loading/unloading activities will be provided for within the new PCWA.		Dah Chong Hong could bid for a private industrial lot on the reclamation for their land based activities.
Green Island Cement Co Plant and Pier	Pier 0.2 Footbridge 0.04 Site 0.15	225	None		As a result of reclamation works, Green Island Cement will lose their marine access; there is no requirement for Government to re-provision their activities and it is not recommended to resite the cement works upon the reclamation. Notification will be given and existing bridge/pier license /short term tenancy agreements terminated.
Western Wholesale Market	1.2	0	To be re-provisioned on Western Reclamation by 1994.		
Licensed Landing pontoons and Piers using the Kennedy Town New Praya "Permitted seafront"	-----	450 (Quayside under-utilised)	Activities associated with Wholesale Market will be given marine access adjacent to new Wholesale Market site on Western Reclamation. Remaining activities (linked with Kennedy Town) to be incorporated in new PCWA.		Activities associated with Wholesale Market unlikely to be affected by reclamation programme. Remaining activities will be given opportunity to use new PCWA prior to notification and subsequent termination of their existing licence agreements.
Abattoir and Animal Landing Pier	1.2	100	1.47	50	Reprovisioning measures are based upon Urban Services Department requirements. Animal landing pier may be provided on the reclamation waterfront as a temporary measure if existing waterfront is lost prior to re-provisioning.
Incinerator	0.6	50	Not required.		Refuse Transfer Station will be established in Western District. This will render the incinerator obsolete and as a result the site will be cleared by 1991.
Salt Water Pump House	0.013	25	0.15	50	Reprovisioning measures based upon Water Supply Department requirements.
China Merchants Godown Wharf and Transportation Company Pier and Private Seafront	Pier 0.70 Godown 0.62 ----- 1.32	Pier/Wharf For Vessel - 310 For Lighter - 305 Other seafront For Lighter - 140 ----- 755	2.1	755	A small increase in land area is included in the re-provisioning measures as a lower plot ratio of 5 will be applied to the development of the new site. Length of seawall to be re-provisioned reflects current use. The distinction between wharf for vessels and wharf for lighters has been acknowledged in new waterfront design.

Medical and Health Facilities

A clinic will be provided upon the reclamation, to provide the medical and health care services for the incoming population.

The Queen Mary Hospital will provide the reclamation area with health facilities at the Regional/District level.

Emergency Services

A combined Fire and Ambulance Station will be located upon the reclamation area, together with a Police Station, to meet the requirements for emergency services provision. A Marine Police Base and customs area have also been allocated a site following the survey of Government Service Land requirements.

Recreational Facilities

Land has been allocated on the RODP for one Type A Indoor Recreation Centre, one Type B Indoor Recreation Centre and two Type C Indoor Recreation Centres, which together will meet the requirements for recreational facilities generated by the population on the reclamation.

Social Welfare Facilities

A Multi Service Centre and a Day Care Centre for the Elderly have been indicated on the RODP. A Child Centre, a Youth Centre and an Elderly Centre, are also provided to meet the requirement for social welfare facilities by the incoming population.

Government Service Land Uses

Government Departments have identified required land uses upon the reclamation area. Section 3.1.6 describes these uses in more detail.

Utility Services

Utility services are required upon the reclamation. These include a Gas Piggling Station, a Telephone Exchange provision and Electric Zone Stations. These are described in more detail in Section 3.5.4 and their land demands are set out in Table 3.5.

3.1.5 Open Space

District Open Space (DOS) and Local Open Space (LOS) for the reclamation area and Kennedy Town have been calculated in accordance with the HKPSG recommendation of 20 hectares of total open space per 100,000 persons - see Table 3.4(a). In addition, as designated by Metroplan, the Green Island Urban Fringe Park has been included in the open space provision. The distribution of these main components of open space is shown in Figure 3.4(b). Other elements included in the open space network comprise amenity areas alongside roads; the environmental buffer zone for Route 7 and the industrial open space - see Table 3.4(c).

The DOS and LOS distribution is not a straight forward provisioning of the requirements for each area. The present shortfall of provision in Kennedy Town cannot be accommodated in that specific area and is therefore made up by an extra provision on Belcher Bay Reclamation and Green Island Reclamation. This is demonstrated in Table 3.4(b).

HKPSG recommends that land allocated for open space should be split half to DOS and half to LOS. The RODP identifies only DOS and the Urban Fringe Park. Other types of Open Space would be provided within the residential areas and the industrial areas. All Open Space types are itemised in Table 3.4(c).

Table 3.4a Open Space Requirements

	Hectares	Population
For Kennedy Town	13.71	68,534
For Belcher Bay Reclamation	0.33	1,668*
For Green Island Reclamation	22.57	112,863**
Total	36.61	183,065

* Area No. M in Table 3.1

** Total population less Area M population

The total open space provision on the Green Island reclamation is higher than that required by the formula recommended in the HKPSG for a number of reasons. Firstly, as mentioned earlier, the Urban Fringe Park, a territory-wide attraction - and more than 26 hectares - is included as additional to the HKPSG requirements. Secondly, in the overall open space, around 5 hectares of land is also included and allocated as 'Amenity' for road-side planting, buffer zones etc.

Open space for the industrial area has been treated separately as the provision required by HKPSG is allocated to the industrial area. Its distribution is not identified on the RODP, as this would be the subject of more detailed layout arrangements for the industrial area, but it is shown on the MLP. The total requirement is 0.5 hectares based on the HKPSG recommendation of 5 hectares of open space for every 100,000 workers.

Urban Fringe Park

Green Island and to a lesser degree, Little Green Island are natural landmarks of the area. In spite of the height and backdrop function performed by Mount Davis, Green Island stands as a focal point when viewed from most angles. Metroplan proposes Green Island, Little Green Island, the area between and the immediate surroundings as a 26 hectare Urban Fringe Park. There is potential for the area to attract users from the rest of the Western District and Hong Kong Island as well as the Green Island Reclamation area.

The Urban Fringe Park has a wide catchment area. Its land uses and attractions are therefore designed to service recreation requirements other than those of the population living in the immediate vicinity. This is in line with the definition of Urban Fringe Park as described in "Metroplan : The Landscape Strategy".

District Open Space

The land allocated to District Open Space on the Green Island Reclamation comprises the Green Island District Park, linear parks and waterfront promenades. District Open Space provides the active and passive recreation facilities which meet HKPSG requirements for the district level hierarchy. The layout of the DOS on the reclamation illustrated on Figure 3.4 shows the District Park as the focal urban open space feature, occupying a central location, with Green Island and Little Green Island as a backdrop. The waterfront promenades make use of the harbour location; the linear parks act

as linkages and provide a distribution of district recreation facilities across the reclamation. Together with the Local Open Space, the distribution of the District Open Space is designed to provide a comprehensive landscape structure throughout the reclamation area.

Local Open Space

Local Open Space (LOS) also provides both passive and active recreation for local residents. It is distributed throughout the site creating a network together with the DOS and provides essential links in the landscape structure. The principles governing the distribution of LOS have taken into account the objective of achieving an overall regular distribution of open space which is related to adjacent land uses, view corridors, breezeways and pedestrian access. The distribution of some of the LOS as outlined in the RODP is shown in Figure 3.4.

Industrial Open Space

The areas of open space in the industrial area are mainly to provide active and passive recreational facilities for workers at lunch times.

Amenity and Circulation Networks

Non-building land uses are provided in other areas and include:-

- Amenity - this mainly comprises planted areas forming roadside planting or serving a screening purpose. Planting areas are also included in the vicinity of interchanges and on road embankments.
- Buffer Zones - larger areas of ground modelling and planting are required in some areas which separate roads from noise sensitive uses. These areas would probably also be designated as Amenity for management purposes but might in some instances include some open space provision.
- Pedestrian and Cycle Links - the footpath and cycle-track systems are an integral part of the open space networks. They may pass through designated Open Space but in other areas they create important links between the open spaces.

None of these form part of the aggregate open space formula which only includes DOS and LOS.

Table 3.4b Open Space Distribution

	Hectares			
	Total	in Kennedy Town	on Belcher Bay Reclamation	on Green Island Reclamation
For Kennedy Town	13.71	7.61	1.04	5.06
For Belcher Bay Reclamation	0.33	----	0.33	----
For Green Island Reclamation	22.57	----	----	22.57
Total	36.61	7.61	1.37*	27.63

* Area No. M3 and M7 in Table B.1 in Appendix B

Table 3.4c Open Space Provision

DOS and LOS	Hectares			
	Total	in Kennedy Town	on Belcher Bay Reclamation	on Green Island Reclamation
Total District Open Space	18.30	0.27	1.30	16.73
Structural Local Open Space (as shown on the MLP)	13.18	7.34	0.07	5.77
Other Local Open Space*	5.13	0	0	5.13
Total	36.61	7.61	1.37	27.63
Other Open Spaces (Outwith HKSPG formula)	Total			
Urban Fringe Park	26.61**			
Amenity & Buffer Zones	5.60			
Industrial Open Space	0.50			
Total	32.71			

* Not shown on the RODP

** Area No.01 in Table B1 in Appendix B

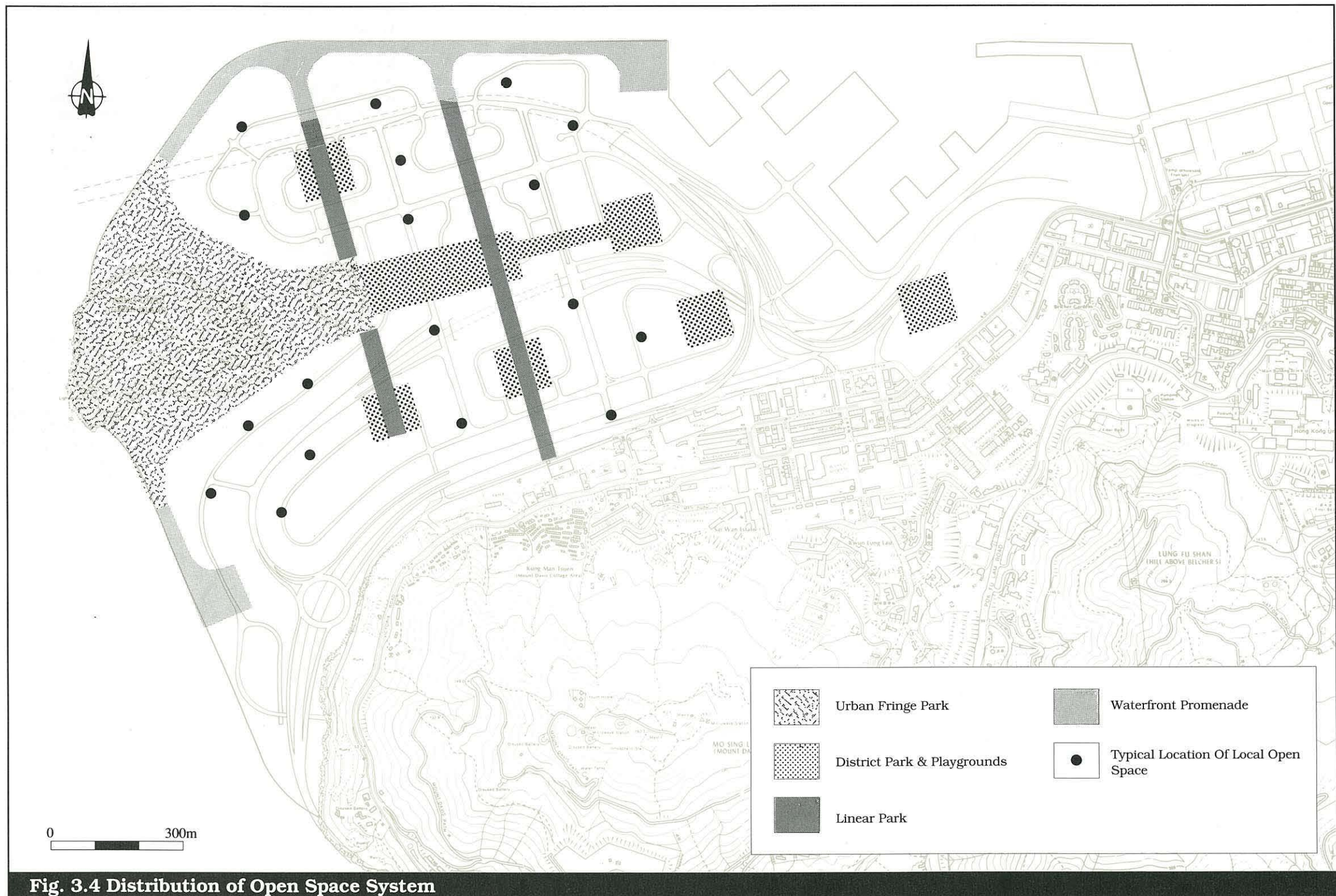


Fig. 3.4 Distribution of Open Space System

Table 3.5 Marine and Non-Marine Lots for Essential Government Service Land and Utility Company Land Demands

Government Departments Essential Service Land		Area (ha)	Waterfront (m)
(i) Marine Lots	Marine Police Base	1.08	100.00
	Public Landing Steps	-----	30.00
	Oil Pollution Equipment Store	0.02	30.00
	Refuse Transfer Station	2.00	100.00
	Water Selling Kiosk	0.01	30.00
	2 Pumping Stations	0.40	100.00
	Customs Building & Pier	0.40	80.00
	Works Division Barge Loading & Stockpiling	2.00	80.00
	Sub-Total	5.91	550.00
(ii) Non-Marine Lots	Police Weigh Station	1.40	
	USD Vehicle Depot	1.50	
	Highways Dept. Maintenance Depot	0.30	
	Fresh Water Pumping Station	0.20	
	2 Petrol Filling Stations	0.20	
	Sub-Total	3.60	
Government Service Land Total :		9.51	
Utility Company Land Requirement	Gas Piggig Station	0.08	30.00
	Telephone Exchange	0.20	
	Electric Zone Station	0.40	
Utility Company Total :		0.68	30.00
Total		10.19	580.00

3.1.6 Essential Government Service Land Demands

Marine and non-marine lots for essential Government Service Land demands have been incorporated into the RODP. Table 3.5 identifies the land uses and the required lengths of waterfront. They comprise a total land area of 9.5 hectares, divided into 5.9 hectares for marine lots and 3.6 hectares for non-marine lots. A waterfrontage of 550 metres would be required. Utility company land requirements total less than one hectare and include the provision of a waterfrontage of 30 metres.

3.1.7 Other Land Requirements

During the course of the study requests for specific uses within the industrial area have been made. In particular, requests were made to include a site for a cold storage facility, a vehicle weighbridge and parking for service vehicles. The first two have been accommodated within the industrial area. Lorry parking can be provided within the drainage reserve beneath the elevated portion of Route 7. Site areas allocated in the RODP for these additional uses are 0.35ha for cold storage, 1.5ha for the weighbridge (including police and electrical sub-station uses), and 2.3ha for the lorry parking.

3.2 Transportation

3.2.1 Strategic Links

Background

The RODP illustrates the road network on the Green Island Reclamation which has been dictated by the requirements of the following:-

- Route 7 - Sai Ying Pun to Kennedy Town
- Belcher Bay Link
- Route 7 to Aberdeen
- Green Island Link

The latest planned information available concerning these road links has been taken into account when considering the road layout on the Green Island Reclamation.

Route 7 - Sai Ying Pun to Kennedy Town

The Transport Department traffic model for 2006 indicates that a dual three lane alignment is required. This is still the requirement from the figures for 2011. The detailed design of this road is now approaching completion.

The Route 7 - Sai Ying Pun to Kennedy Town - Preliminary Report showed a design intended for subsequent development into a full interchange layout on Belcher Bay Reclamation. Further study since then has shown that the traffic figures do not warrant such an interchange and it has been simplified by deletion of the eastbound ramp to Route 7 and the westbound ramp from Route 7. The preliminary report showed the layout which was developed along with this study's requirements, assuring compatibility with the present proposals. That report also concluded that the Hill Road Flyover constraint is such that an elevated Route 7 could not be larger than dual three lanes. This has been taken as the limiting factor for the Green Island Reclamation network. Similarly, it was also concluded that the Hill Road junction, located immediately to the west of Hill Road Flyover, could a dual three lane ground level road running beneath the elevated Route 7 westbound onto the reclamation. The road will be a Trunk Road with a design speed of 70kph.

Table 3.6 Strategic Highway Network

Highway	Comments	Completion
Design Year 2001		
Belcher Bay Link	Dual two lane road (Dual three lane, if necessary)	1995
Smithfield Link	Single carriageway road	1995
Western Harbour Crossing	Either dual two or dual three tunnel, landfall at Sai Ying Pun	1996
Route 7 Sai Ying Pun to Kennedy Town	Dual three lane road either along Connaught Road West or along the Spine Road	1996
Design Year 2001 (Additional Links)		
Route 7 - Kennedy Town to Aberdeen	Dual two lane road south of Green Island Reclamation.	Pre-2006
Green Island Link	Dual two /three lane tunnel with dual three lane configuration at portal. Alignment to be determined.	2004
Sham Tseng Crossing	Dual three lane	2008

Belcher Bay Link

The Belcher Bay Link has been designed as a dual two lane road partly on a temporary alignments. The design allows for upgrading to dual three lanes on the final alignment without affecting the main Route 7 structure, and is compatible with a dual three lane Route 7 aligned along Connaught Road West. The two ramps to Route 7 will have to be replaced when the Belcher Bay Link is constructed on its final alignment. The design of Route 7 will accommodate this whilst maintaining traffic flows.

Route 7 to Aberdeen

The Western Harbour Crossing traffic model for both 2006 and 2011 indicates that Route 7 to the south of the Green Island Reclamation will need to be a dual two lane road. The alignment will need to provide for all turning movements onto Route 7 eastbound and onto the Green Island Link, whilst accesses to the south of the reductions will be as previously proposed in the KMA study. The road is designated an expressway with a design speed of 85 kph.

Western Harbour Crossing

The landfall of the Western Harbour Crossing is to be at Sai Ying Pun and the crossing is to be a dual three lane tunnel. The effect of this on Green Island Reclamation is minimal necessitating only a dual three lane elevated road (Route 7) above a dual three lane ground level road (Belcher Bay Link) entering the new reclamation from beneath Hill Road Flyover.

Green Island Link

The Western Harbour Crossing traffic figures for 2006 and 2011 indicate that a dual two lane tunnel will be adequate. The alignment on Green Island Reclamation is influenced mainly by the location of the landfall of the GIL, either north or south of Green Island. Both options remain valid.

The strategic highway network for Green Island Reclamation in the design years 2001 and 2011, is summarised in Table 3.6.

Summary

The recommended strategic highway network within the study area consists of Route 7 and the Green Island Link. A grade separated interchange for all movements has been provided although the major movements are east/west along Route 7, and between the Green Island Link and Route 7 from the east.

The proposed development on the reclamation will also require access to the strategic road network. Two junctions with Route 7 have been planned as follows:

- at Belcher Bay a pair of on-and off-slip roads, via the Belcher Bay Link;
- at the south-western corner of the reclamation an all movements grade separated roundabout;

The local road network will gain direct access to the Green Island Link with a pair of on/off ramps.

The desirable minimum spacings between junctions, as specified in TPDM Volume 2 sections 4.2.11 and 6.3.6, are reproduced in Table 3.7. These junctions spacing cannot be achieved anywhere along the route. Route 7 does not meet these design standards for an expressway.

3.2.2 Local Road Network

Background

The scale and type of the local road network is dependent on the population of 114,531 and the pattern and mix of development. The problem of linking areas either side of the strategic roads has also been a major consideration in deriving the local road network. The following factors have been taken into consideration:

- integration of the reclamation with Kennedy Town
- east-west movement linking with Connaught Road West
- north-south movement via Victoria Road, Pok Fu Lam Road and Route 7
- internal circulation within the reclamation
- minimum total road area.

The local and strategic road networks require to be connected at two locations. The adoption of Expressway standards for Route 7 dictates that these junctions be kept as far apart as possible - see Table 3.7. One junction will be located at the east of the reclamation and the other at the west. The connection to Route 7 in the east will be made via the proposed on the Belcher Bay Reclamation.

The second connection will be as far west on the reclamation as practicable. A grade separated roundabout will reduce land take and provide the necessary capacity and allow for future connections for roads serving facilities under Mount Davis.

Table 3.7 Desirable Minimum Spacing Between Junctions

Road Type	Distance Between Junctions
Expressway	Desirable minimum -5km
	Absolute minimum -2km
Trunk Roads	Desirable minimum -1km
	Absolute minimum-dictated by length of slip roads

The Island West Refuse Transfer Station and a sewage treatment plant have been proposed for construction under Mount Davies. Connections to the local road network have been examined and a link to the roundabout is considered the best option.

The primary distributor has been aligned through the middle of the new reclamation area.

A number of advantages can be gained by this alignment:

- separation of Route 7 and the primary distributor allows reduction in severance
- junctions with Route 7 are simple while maintaining capacity
- a dendritic network of local roads feeding a central spine road reduces the total road area required.

The resulting road network on the reclamation has been further developed taking into account the following:

- the breezeways and visual corridor between Green Island/Little Green Island and the new port area - this is a major factor in orientating the road network on the reclamation.
- location of a local distributor over the top of the Green Island Link tunnel, making use of an otherwise constrained area.
- sizes of the development blocks.
- half-diamond grade separated interchanges between primary and district distributors.
- interchanges at-grade between district and local distributors.
- location of the Urban Fringe Park.

Design Considerations

The permissible peak hour traffic flow used for design purposes for each type of carriageway is specified in the Transport Planning and Design Manual, Volume 2, Chapter 2, Section 2.4. In some cases, the additional allowances specified in para 2.4.12 have been incorporated to produce a balanced network design.

Road Types

The details of the different road types adopted and their characteristics are shown in Table 3.8.

Road Hierarchy

The following hierarchy has been identified for the reclamation, as shown in Figure 3.5.

- Primary distributor - this will form the interface between Route 7 and the local road network.
- District distributors - these will feed the traffic north/south through the reclamation to link with the primary distributor.
- Local distributors - these roads will link the district level road with the local access roads.
- Local roads - roads within development areas or connecting adjacent areas but not designed as through routes.

Whenever possible, the junction spacing for the local road networks complies with the standards set out in TPDM Volume 2 section 2 para 2.4.11 and reproduced in Table 3.9.

In some cases, where tram or pedestrian crossing points are provided between junctions, these spacings are reduced.

Table 3.8 Road Types and Characteristics

Green Island Identification (See Fig 3.6)	Description	TPDM standards	Peak Hour Design Flow (2 way)
S2	2 lane-single carriageway	7.3m	800vph
WS2	Wide 2 lane-single carriageway	10.3m	1200vph
S4	Urban 4 lane-single carriageway	13.5m	4800vph
D2	2 lane-dual carriageway	6.75m x 2	5600vph
D3	3 lane-dual carriageway	10.0m x 2	8400vph

Note: Carriageway widths do not include verges, bus laybys etc.

Recommended Local Road Network Design

• Road Network

The choices of carriageway types for the major routes were based on the forecast traffic flows. The traffic flows were the combination of the estimated private and goods flows and road based public transport demands. The proposed road network with the carriageway types is illustrated in Figure 3.6.

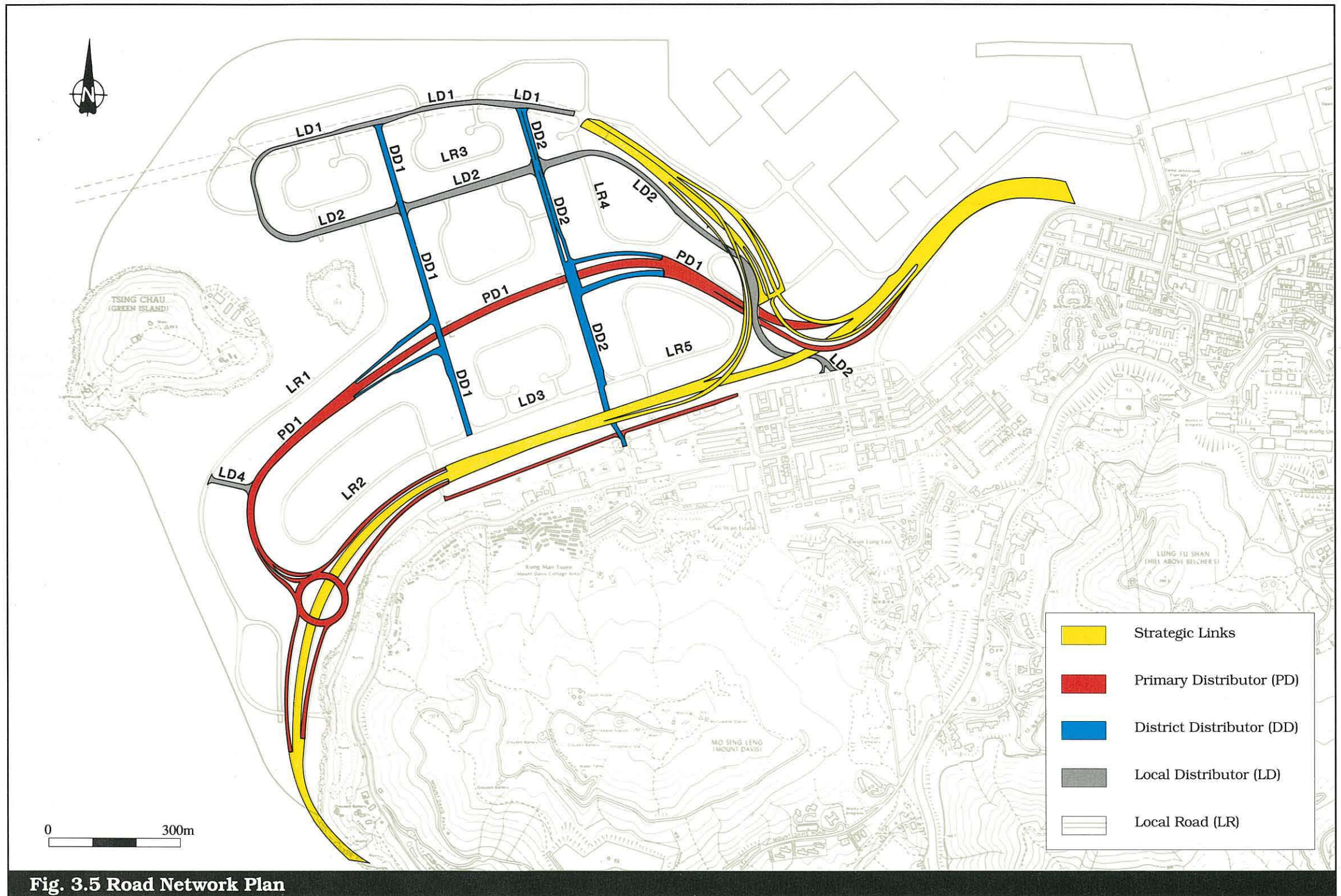
Road PD1, a Primary Distributor serving the reclamation, is a D2 type carriageway - as defined in Table 3.8 - except at the section east of Interchange C2 where it becomes D3. The junctions with Road PD1 have been minimised and grade-separated to provide a high grade, free-flowing route. The section of PD1 between DD1 and DD2 will be in tunnel to maximise environmental benefits and land values.

There are two District Distributors. Road DD1 is an S4 type carriageway whilst DD2 is a D4 type carriageway. Road DD1 acts as a north-south connection within the reclamation and Road DD2 links the reclamation to Victoria Road in Kennedy Town, at Sai Ning Street.

Four Local Distributors are proposed. Road LD2 serves the north and east side of reclamation and eastern Kennedy Town. Road LD2 intersects Kennedy Town New Praya at Smithfield to form a cross road. Forecast traffic demands along Road LD2 only warranted a WS2 type carriageway, but the relatively high flows in and out of the area immediately north of the primary distributor and the area between the two district distributors makes it necessary to upgrade the status of the section between Road DD1 and Road DD2 to S4.

Local Distributor LD4 links the local roads in the south west of the reclamation directly onto PD1. This junction is restricted to left in/left out movements only. To accommodate right turns would require grade separation for which there is insufficient space. In order to turn right from LD4 westwards on PD1 a U-turn at Intersection C1 is required and to turn right from PD1 into PD4 a U-turn at Interchange B is required.

The car and coach park for the Urban Fringe Park is located to the south of the park with easy access to Road LD4. The above arrangement has the added advantage that the traffic to the Park does not need to use the reclamation local road network. To access the park from the rest of Hong Kong, Route 7, Roundabout B and PD1 are used and departure from the park will be onto PD1 and then up to Route 7 at Belcher Bay.



**Table 3.9 Minimum Junction Spacings
-Local Roads**

Road Type	Distance
Primary Distributor (Urban Trunk Road)	300m
District Distributor	200m
Local Distributor	100m

Table 3.10 Inventory of Major Interchanges

Interchange	Description	Remark
A	Route 7/ Green Island Link	Grade separated
B	Route 7/ Road PD1	Roundabout
C1	Road PD1/ Road DD1	Signalised
C2	Road PD1/ Road DD2	Signalised

**Table 3.11 Ratio of Flow to Capacity at Major
Priority Junctions**

Junction	Ratio of Flow to Capacity
Road LR1/Road LD2	0.606
Road LR2/Road LD3	0.589
Road LR3/Road LD1	1.090
Road LD1/Road DD1	0.950
Road LD1/Road DD2	1.233
Road LD2/Road LR4	0.379
Road LD3/Road DD1	0.755

Preliminary layouts for the local roads are shown in Figure 3.5. During the detailed design of the development packages, the alignment of the local roads could change to conform to the development requirements. However, the proposed access points should be retained wherever possible.

Local roads on the southern part of the Belcher Bay Reclamation would be accessed directly from Kennedy Town Praya. There would be no direct connections to the Belcher Bay Link or Route 7.

Table 3.10 lists an inventory of major interchanges, which are all grade-separated to ensure unimpeded flow along the main routes.

Spacing of junctions along the District Distributors has been designed to a minimum, as set out in the TPDM, see Table 3.9, with the exception of local roads to development areas. Access to the area immediately north of the Primary Distributor and between the two district distributors from Road DD2 has been restricted to left-in/left-out movements only. Any right turns would seriously hamper the adjoining junction operations.

• Junction Capacity Assessment - Methodology and Analysis

Junction performance for all major road junctions has been assessed. Capacity analysis was carried out for the morning and evening peak hour traffic conditions.

In general, three arm junctions were less critical, and only contributed a minor part of the analysis. The computer program PICADY2 was used to evaluate the need for signalisation at the major intersections. Only the most critical peak was assessed and the results are shown in Table 3.11.

From the priority analysis, it was decided that traffic signals were required at the junctions of Road LD1/Road DD1, Road LD1/Road DD2 and Road LR3/Road LD1.

A conservative method of reserve capacity calculation was adopted for the analysis of signalised intersections. The design for the junctions was intended to fulfil the requirement of a minimum reserve capacity of +25%. Each junction was assessed on the basis of a fixed cycle time of 60 seconds whenever possible.

A saturation flow of 1800 pcu/hr was taken for a straight on exit lane while a value of 1400 pcu/hr was adopted for each exclusive turning lane.

Signalised junctions in the vicinity of the reclamation, i.e. in Kennedy Town, were also examined to assess the impact on the existing road network.

The full set of traffic signal reserve capacity calculation results is shown in Table 3.12.

Interchange B

The performance of the roundabout at Interchange B was investigated with the computer program ARCADY2. The layout requirements are summarised in Table 3.13. With a 90m inscribed circle diameter for the roundabout adequate capacities were obtained at all peaks, as shown in Table 3.12.

A roundabout is the most appropriate design at this location because of the need to allow the U-turn movement from the primary distributor and it is efficient with land take. This arrangement has an added advantage in allowing a subsequent link from the proposed underground caverns in Mount Davis.

Interchanges C1 and C2

Due to the complexity of the half 'diamond' arrangements at Interchanges C1 and C2, it was necessary to examine each interchange as two separate signalised junctions. Particular care on signal timing linking was taken on such closely spaced junctions to avoid blockages caused by queueing back.

Interchange C1 has a 'half-diamond' arrangement and has sufficient reserve capacity with a four-lane bridge was to be constructed over Road PD1. A free-flow slip road has been provided for the left turn movement towards Road PD1 from Road DD1 northbound.

Two options were investigated for Interchange C2. The first considered 2 pairs of ramps creating a 'full diamond' arrangement, permitting all movements at the grade-separated junction. The second examined 1 pair of ramps only located eastwards of the junction to form a 'half-diamond' configuration with restricted access, as illustrated in Figure 3.6.

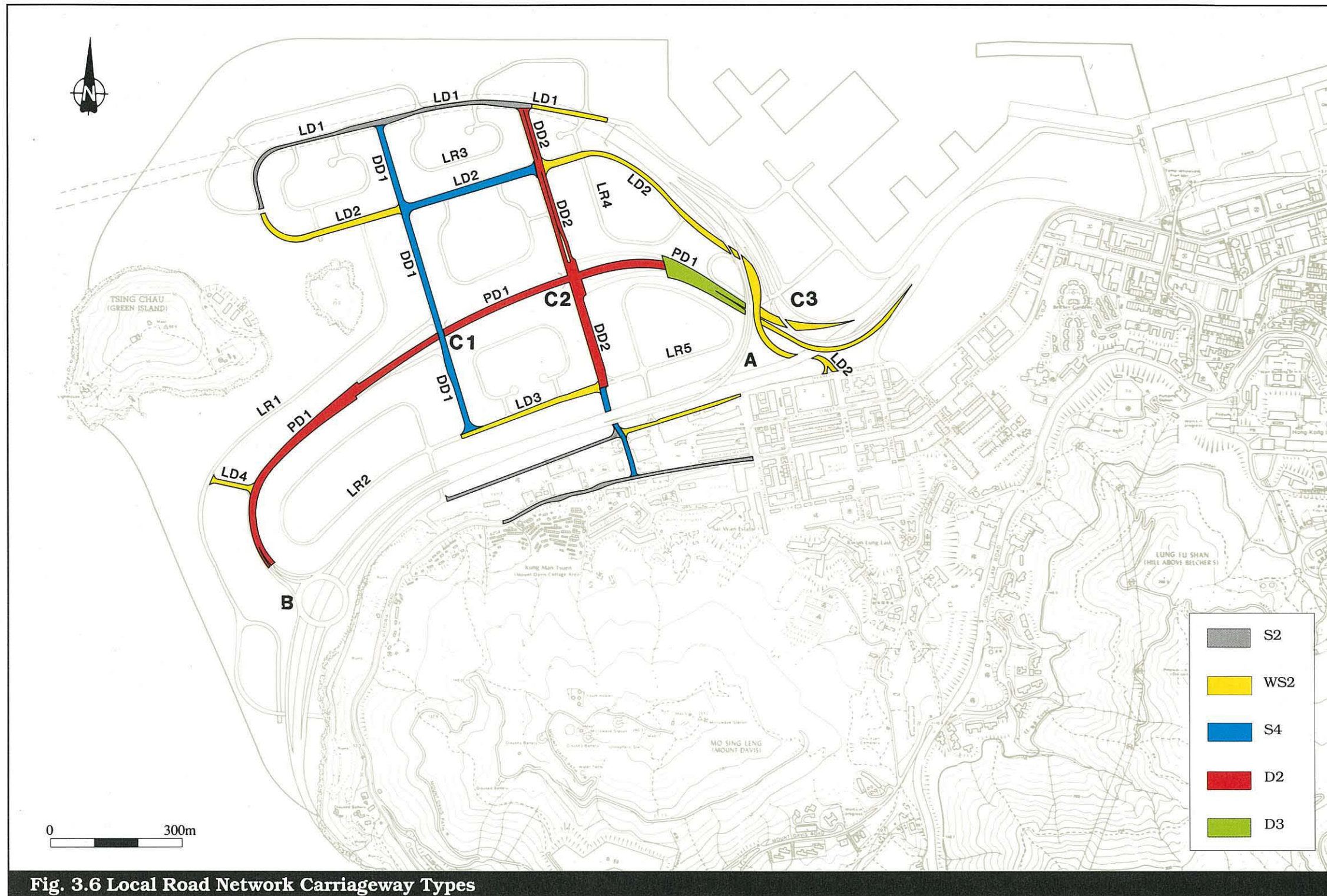


Fig. 3.6 Local Road Network Carriageway Types

Following a detailed assessment the second option was preferred as it reduced land take, increased the spacing between junctions along PDI and allowed the central section of PDI to be placed in a tunnel. The ramps at Interchanges C1 and C2 require 1 and 2 lanes respectively. The lane discipline is shown in Figure 3.7.

Junction Catchick Street./Sands Street.

Two straight ahead lanes are provided for the Catchick Street eastbound movement. Such a scheme would require the relocation of a prospective eastbound tram stop as 30m to the east proposed in the Western District Traffic Study (WDTS).

Junction Road DD2/Road LD3

The connection of Road DD2 to Road LD3 was found to be heavily trafficked. Although the provision of an overpass in the north-south direction gave respectable reserve capacities, the land take associated with such a structure has necessitated the seeking of an alternative solution.

In view of the high proportion of turning vehicles at the intersection, the implementation of a right turn ban and provision of left turn slip roads would be a possible approach to solving the problem.

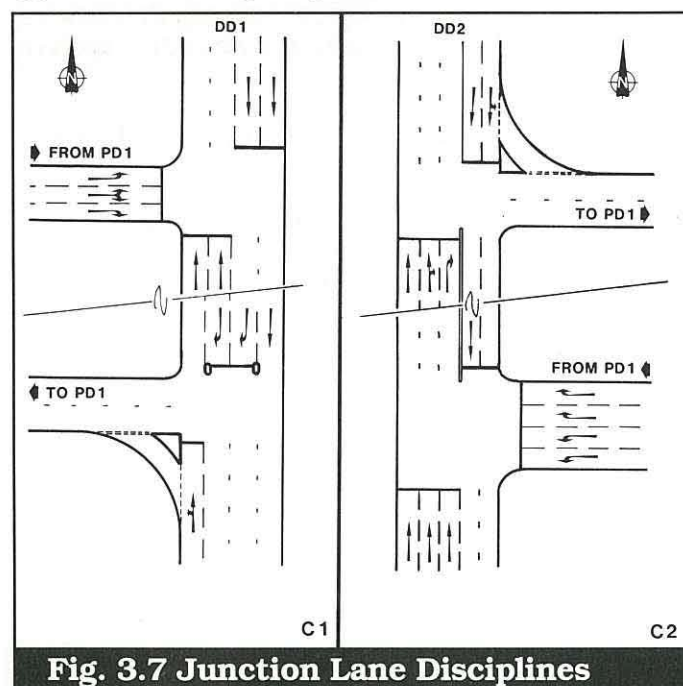


Fig. 3.7 Junction Lane Disciplines

Table 3.12 Junction Reserve Capacities

Junction	Reserve Capacity					
	MTR to Sheung Wan		MTR to Kennedy Town		MTR to Reclamation	
	AM	PM	AM	PM	AM	PM
C1 (North)	50%	55%	50%	60%	45%	30%
(South)	70%	160%	70%	165%	55%	115%
C2 (North)	25%	80%	30%	90%	70%	145%
(South)	20%	30%	25%	35%	35%	45%
Road DD2/Road LD2	40%	100%	45%	105%	25%	65%
Road DD2/Road LD1	100%	110%	105%	110%	40%	35%
Road DD1/Road LD1	45%	95%	50%	105%	30%	45%
Road DD1/Road LD2	30%	45%	30%	45%	25%	35%
Road DD2/Road LD3(Signals)	25%	40%	30%	45%	40%	75%
(Roundabout) (2)	0.80	0.78	0.77	0.76	0.56	0.56
Road LD1/Road LR3	125%	130%	130%	135%	45%	30%
Kennedy Town New Praya/Road DD2	30%	75%	30%	80%	50%	185%
Victoria Road/Road DD2	40%	70%	40%	75%	30%	70%
Belcher's St/Cadogan St/Davis St	25%	30%	25%	30%	25%	35%
Kennedy Town New Praya/Smithfield	30%	25%	30%	25%	30%	25%
Smithfield/Catchick St	120%	110%	120%	110%	150%	140%
Smithfield/Belcher's St/North St	85%	100%	85%	100%	85%	90%
Smithfield/Forbes St	55%	70%	55%	70%	45%	60%
Catchick St/North St	195%	250%	200%	255%	210%	255%
Catchick St/Sands St	25%	25%	25%	25%	25%	25%
Belcher's St/Sands St	75%	80%	75%	80%	75%	80%
Road PD1/Road LD2	50%	75%	50%	75%	40%	75%
Interchange B (2)	0.80	0.68	0.80	0.68	0.82	0.76

Note :(1) Figures show % reserve capacity to nearest 5%

(2) For Roundabout figures show ratio of flow to capacity

Two right turns can be banned where reasonable alternative routes are available i.e. Road LD3 eastbound and DD2 northbound. The former has the problem of re-routing a significant number of buses and other vehicles through a local road, making this an unsuitable alternative. The latter would make access to LR5 from Kennedy Town impossible.

A third option of a roundabout with a 45m inscribed circle diameter was also examined. This was found to yield favourable performances at all peak periods if two approach lanes were provided at each arm.

The introduction of a gyratory system incorporating LR5 and Kennedy Town New Praya in which vehicles travelled in a clockwise direction, as shown in Figure 3.8 was then investigated. The employment of a clockwise rather than anti-clockwise scheme depended mainly on safety considerations. It has a lower number of conflict points.

As each side of the gyratory system block is only approximately 300m in length, and taking the traffic distribution into account, the vehicle detours associated would be acceptable with the scheme. One minor drawback is the need for signal control at two junctions which previously were priority interchanges.

Acceptable reserve capacities, as shown in Table 3.14, were obtained for the four junctions involved in the scheme. This was adopted as it gave maximum overall capacity with minimum detour distance.

Table 3.13 Layout Requirements for Roundabout at Interchange B

From	Number of Approach Lanes Required	Remarks
Road PD1	2	Requires one exclusive lane to Route 7 eastbound
Route 7 Eastbound	2	Requires 2 approach lanes
Route 7 Westbound	2	2 approach lanes flare to 3 at the roundabout

Table 3.14 Gyratory System Junction Reserve Capacities

Junction	Reserve Capacity					
	MTR to Sheung Wan		MTR to Kennedy Town		MTR to Reclamation	
	AM	PM	AM	PM	AM	PM
GA	25%	30%	30%	35%	45%	70%
GB	25%	30%	25%	35%	65%	150%
GC	80%	45%	80%	45%	85%	150%
GD	35%	35%	35%	35%	40%	70%

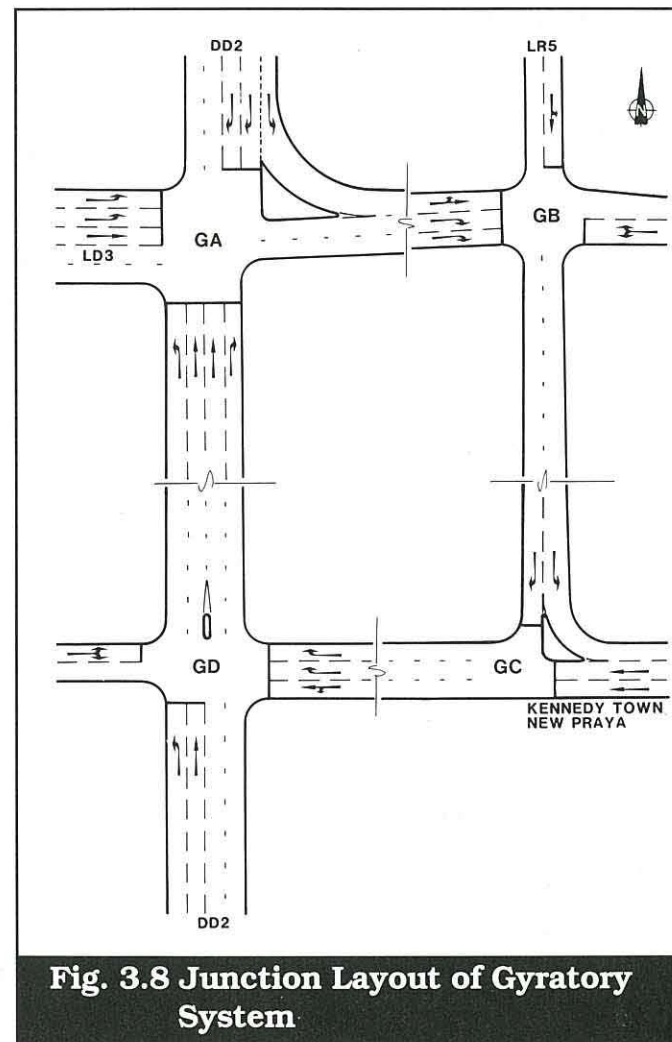


Fig. 3.8 Junction Layout of Gyratory System

Others

Local junctions in Kennedy Town adjacent to the reclamation have also been checked to ensure adequate capacity as a result of the additional traffic from the reclamation.

All other junctions have sufficient traffic capacities in all peaks.

Layout of Junctions

Figures 3.9 to 3.12 show the recommended lane arrangements for the approaches to each of the signalised junctions.

Local widening is shown at a number of the junctions to obtain adequate capacity.

The general layout of the junctions in Kennedy Town have been based as far as possible on previous designs taken from the Stage 3 drawings of the WDTS.

3.2.3 Public Transport

Public Transport Demands

In the year 2011 the Reclamation and Kennedy Town is forecast to generate an estimated 242,000 daily public transport trips. Daily trip rates per head of population/employment in 2011 are anticipated to be 36% higher than those existing in 1986. This assumption regarding trip rates has a significant effect on the demands for public transport throughout Hong Kong Island, not only on the proposed reclamation area.

Of these 242,000 daily trip ends, 29,000 will be during the peak hour and 23,000 will be in the peak direction, i.e. from the reclamation towards the East and Central in the a.m. peak and from the east to Green Island in the p.m. peak. This reflects the housing-led nature of the development, as very little employment is provided. It is anticipated that 20% of these trips will be internal Green Island and Kennedy Town trips with another 25% to and from the Sheung Wan, Central and Wan Chai areas. Trips to and from the east will comprise just over 10%, with less than 10% to and from Pok Fu Lam and the south. The remaining 35% of the trips will be between Green Island and Kowloon and the New Territories.

The public transport systems which were examined to cater for these trips were:

- MTR
- Tram
- Franchised buses
- Green Mini-buses

No red Public Light Bus (PLB) routes were considered in line with the PLB policy guidelines. TPDM volume 9 Chapter 3 states that "Public light bus operations will be restricted to areas of activity within established patterns, by preventing extensions to new areas such as new towns and limited access roads. Green minibuses should be introduced in new towns where appropriate."

MTR Extension

Three possible MTR scenarios were examined:

- extension of the Island Line to Green Island Reclamation. (via Kennedy Town)
- extension of the Island Line only as far as Kennedy Town.
- no extension of the Island Line past Sheung Wan.

A full analysis of these three options, the expected revenue and costs were reported in "Review of MTR Extensions to Green Island" - TP6.

For each option the boarding and alighting at each of the stations and an estimate of the likely increase in the system revenue were predicted. Many of the existing residents of Sai Ying Pun and Kennedy Town already use feeder services to the MTR and so it is the marginal changes in system boardings and revenues that are important.

The marginal revenues of an extension to Kennedy Town or onto the reclamation would cover the operating costs. However, the surplus revenue (after deduction of the operating costs) would be insufficient to finance the construction.

It was decided that the reserve from Sheung Wan to Kennedy Town should be retained for long term planning purposes. In addition, a reserve would be retained across the reclamation to allow for a long term extension to Lantau Island. However, no station reserve would be identified on the reclamation, as an extension across to Lantau would require a very deep track alignment across the reclamation. See Figure 3.13.

Land use considerations discussed in Section 3.1.2 pointed to benefits for commercial and retail development if the MTR extension should proceed. These opportunities can be maximised by moving the station in Kennedy Town from Forbes Street to the site vacated by relocation of the Wholesale Market and the abattoir. The MTR reserve will require to be amended in the existing Outline Zoning Plan for Kennedy Town and Mount Davis to preserve this opportunity.

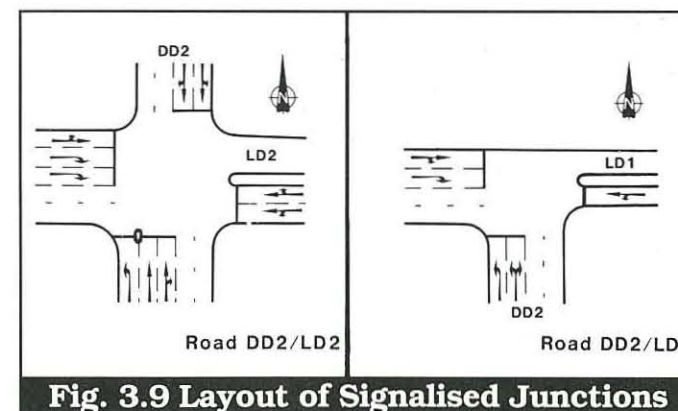


Fig. 3.9 Layout of Signalised Junctions

Tram Options

Various tram options were examined in conjunction with the 3 MTR scenarios:

- extending the existing tram onto the reclamation. This would compliment any MTR extension.
- in the event that a MTR extension was not pursued, a tram feeder to Sheung Wan has been examined. The option of incorporating an upgraded tram, running on a revised alignment through Kennedy Town was examined.

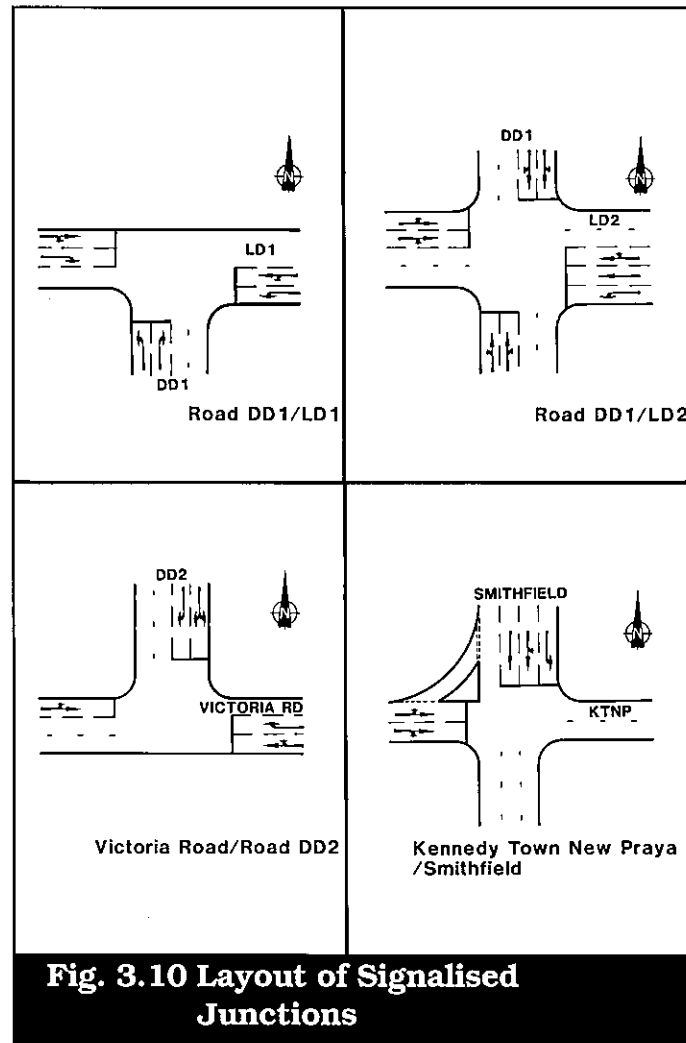
Transport Department queried the assumption of retaining the tram in its existing form as the base option. The design year is 2011, and it is arguable that there may be improvements to the tram system which will enhance the overall operating characteristics. However, as the tram already operates to Kennedy Town, any extension must logically be operated by Hong Kong Tramways. The reclamation development is too small to justify its own separate rail based system.

Alignment

The alignment of the traditional or upgraded tram was assumed to be the same across the reclamation. The alignment from Kennedy Town goes westward adjacent to Route 7 as far as the existing China Merchant's Wharf where it turns north. The alignment then follows the open space corridor passing over the primary distributor, 3 local distributors and 3 local access roads until it reaches the waterfront. It is then routed along the coast to the Urban Fringe Park. See Figure 3.14.

The proposed tram extension will replace the existing turnaround at Catchick Street by extending the tram alignment from Catchick Street north along Cadogan Street to Kennedy New Town Praya and then to the west adjacent to the Route 7 alignment. A turnaround facility will then be placed under Route 7 in the vicinity of the existing Abattoir. The new site of the tram turnaround has the advantage of reducing the conflict between the trams and the other traffic on the road.

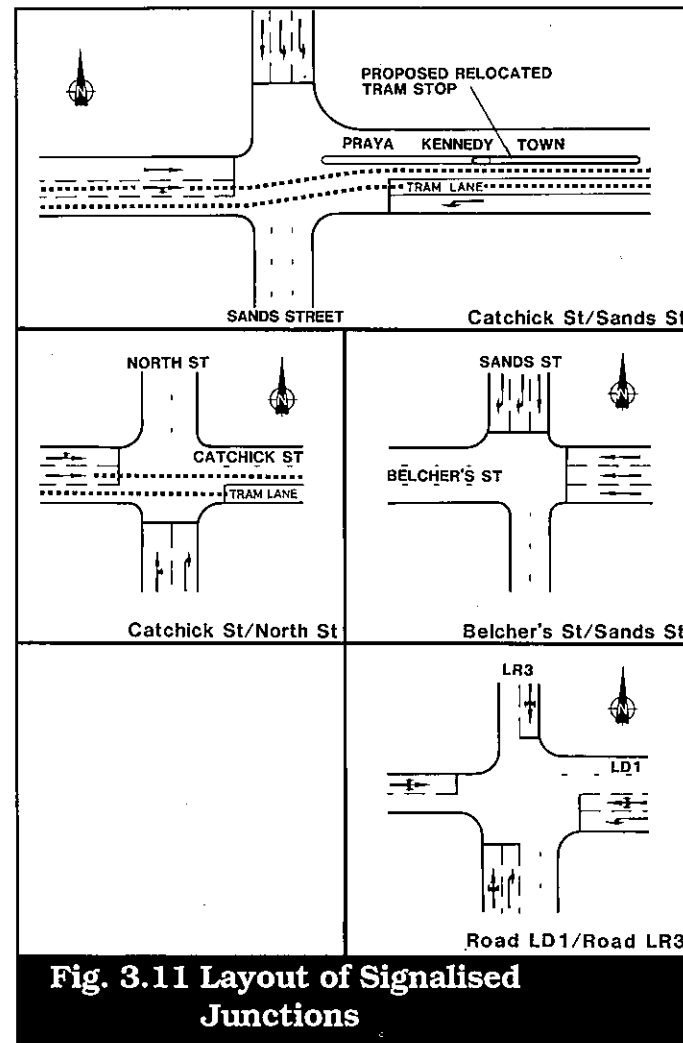
The operation of the tram through the open space corridor will provide maximum accessibility. Along the waterfront the tram will possibly be segregated from pedestrians. Tram stops have been assumed every 250 metres, although the exact spacings will depend on the future detailed development layouts.



It has been estimated that 10 extra trams will be required for the extension with a 4 minute headway service. The existing depots belonging to Hong Kong Tramways will be able to cater for these extra trams.

The above figures do not include any passengers attracted by the Urban Fringe Park or the associated retail/tourist activities along the seafront.

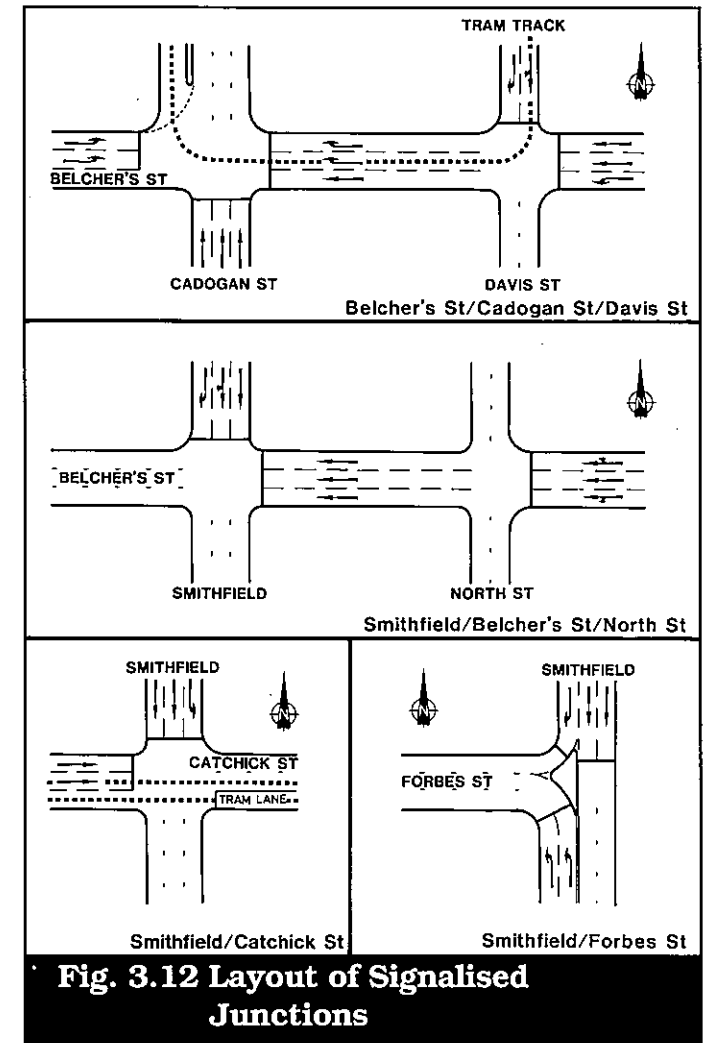
The tram extension may well be viable and a more comprehensive study will be required during the detailed design stage. A tram reserve has been provided in the Recommended Outline Development Plan.



Upgraded Tram

An upgraded tram option was investigated. A more modern tram design could be based around two bogies providing a superior ride to that on the present trams. Modern control equipment will allow for smooth acceleration and braking and maximum speeds will increase. The longer vehicle would have more entrance doors, more standing space downstairs and maximum seating upstairs.

Along the open space corridor, and along the waterfront the tram would run on a fenced right of way, and stops would be approximately 400 metres apart. Increasing the frequency of stops would add to the capital cost, and decrease system performance.



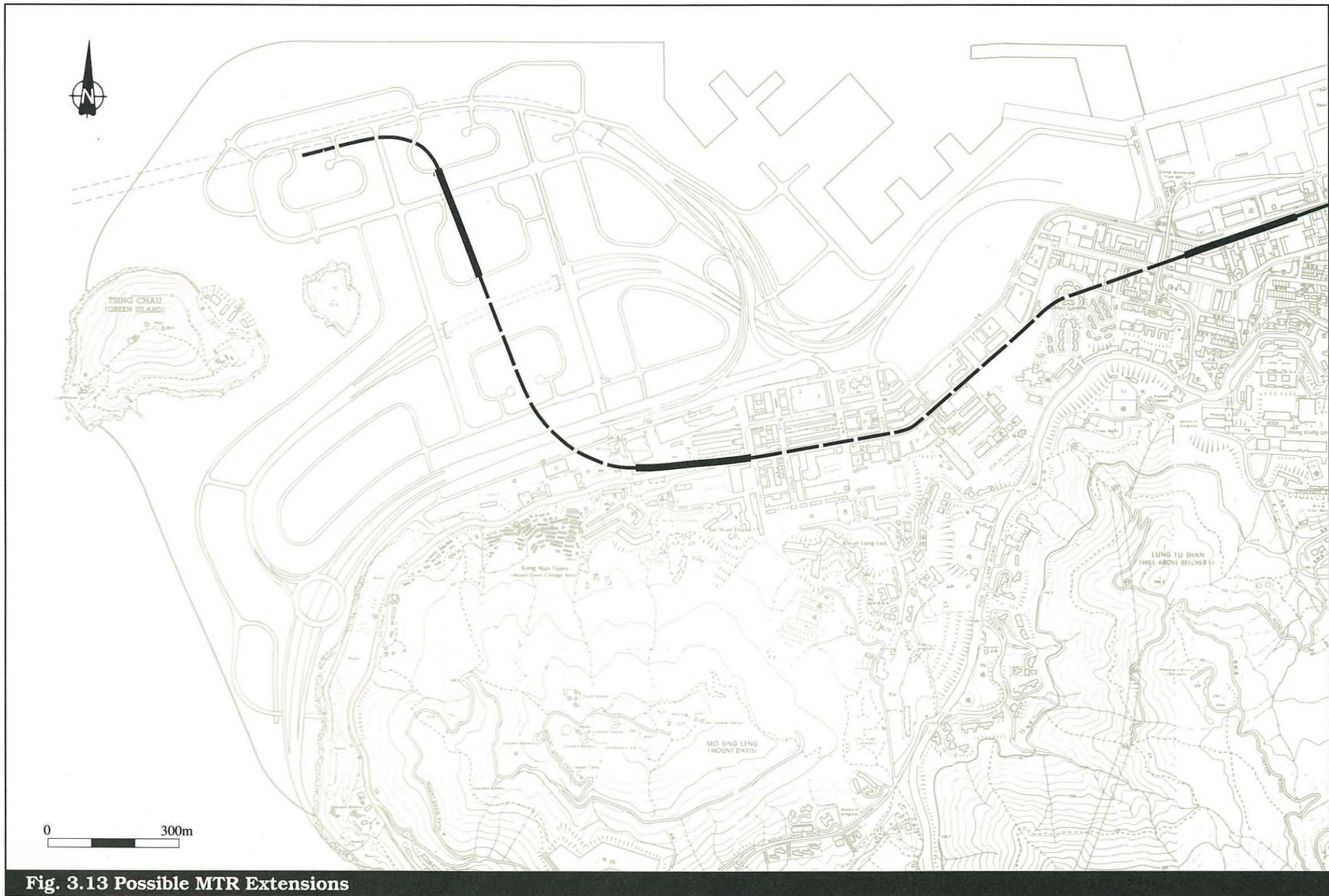


Fig. 3.13 Possible MTR Extensions

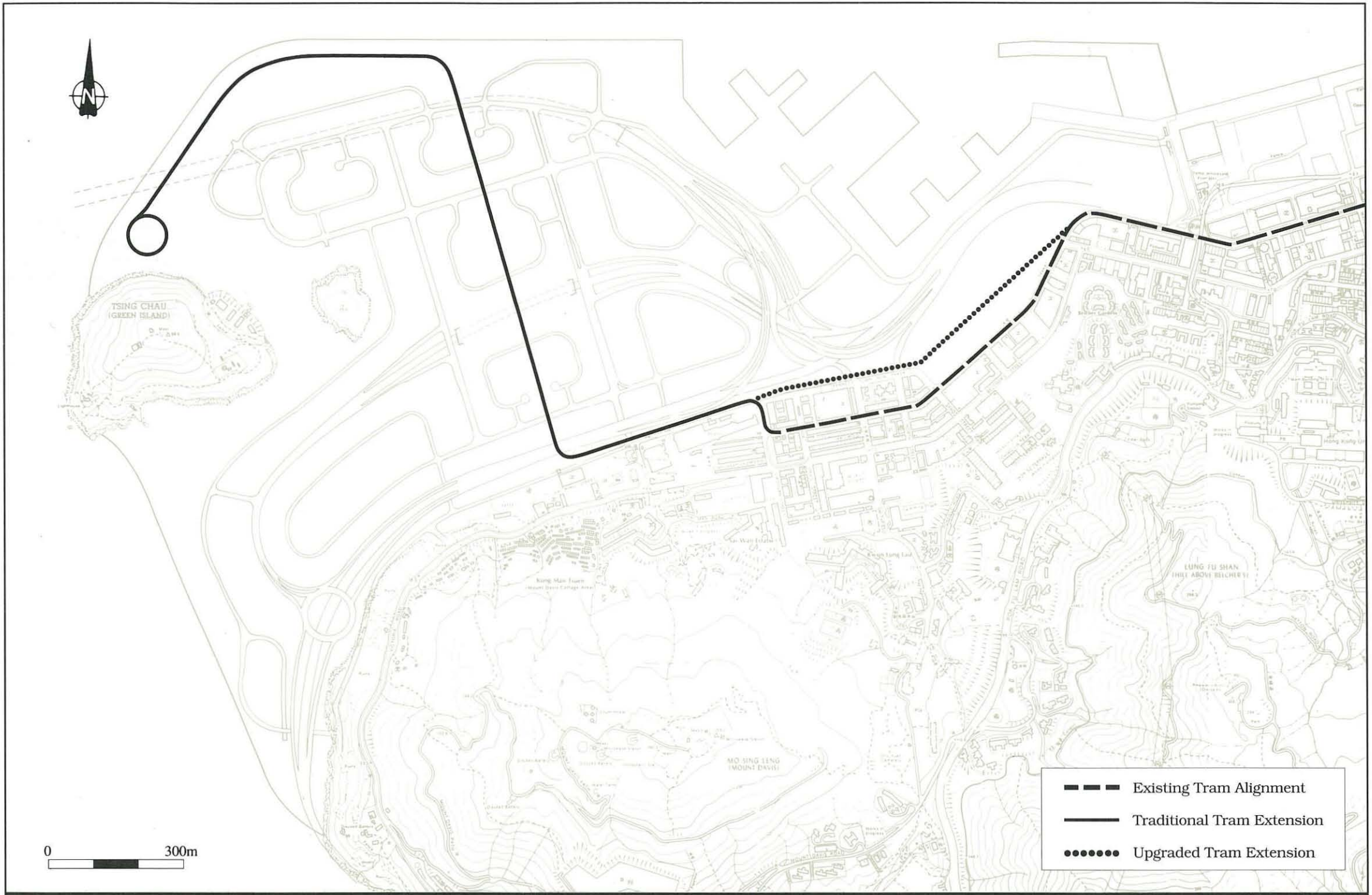


Fig. 3.14 Possible Tram Extensions

Depot requirements are a bigger issue for the upgraded tram than for the traditional one as new equipment and technology will be needed. The existing depots could not cater for a significant number of longer trams. Additional investment would also be required in new equipment for repair and maintenance.

The analysis undertaken has indicated that a small section of upgraded tram is unlikely to be profitable. A system wide upgrade, with an associated fare rise may occur between 1991 and 2011, but this will be dependent on Hong Kong Tramways.

Bus Provision

Franchised bus service needs have been examined under the with- and without-MTR scenarios. A similar level of service as exists in Kennedy Town has been assumed.

Four destination areas were identified:

- Cross Harbour
- Central & Eastern
- Pokfulam and Southern
- Local, within Western District

It has been assumed that the buses within these designated areas are all new services. It is possible that some of these routes may be an extension to existing services currently serving Kennedy Town.

Terminus facilities can be provided at the Green Island end of the routes, but terminus facilities at the destination end, especially in the Central and Eastern District, will be a problem. This issue should be addressed at detailed design of the reclamation public transport provision.

The Cross Harbour routes (Figure 3.15) have been designed to have as large a catchment as possible from Green Island, and then join the primary distributor where they will then have a limited number of stops before reaching the appropriate tunnel.

Buses to Central and Eastern (Figure 3.16) will circulate around the Green Island reclamation and then travel along the main district distributors, through Kennedy Town, to a widened Kennedy Town Praya and then along Des Voeux Road West. Some of these buses for longer distance trips could become express routes. It is assumed that feeder services to Sheung Wan MTR will operate this way if no MTR extension were to be constructed.

Although less than 10% of the trips from Green Island are to Pokfulam and the South, there are no alternative public modes except franchised buses and GMBs. Routes have been identified using both the Smithfield extension and Victoria Road (Figure 3.17).

The local routes designed for trips as far as Sheung Wan use a local distributor road which links to Smithfield and Kennedy Town Praya.

With the extension of the MTR to either Kennedy Town or Green Island MTR feeder services will be required. These services pick up in the residential areas of the reclamation and terminate at the appropriate MTR station.

With an MTR station at Green Island 16 bus routes have been identified: 4 cross harbour services; 4 to Central and Eastern; 2 to Pokfulam and the South; 3 local services; and 3 MTR feeders.

With an MTR station at Kennedy Town 17 bus routes have been identified: 4 cross harbour services; 4 to Central & Eastern; 2 to Pokfulam and the South; 3 local services; and 4 circular MTR feeder services.

With no MTR extension beyond Sheung Wan, 17 bus routes have been identified: 4 cross harbour services; 4 to Central & Eastern, 2 to Pokfulam And Southern; 7 local services within Western District which include MTR feeder services.

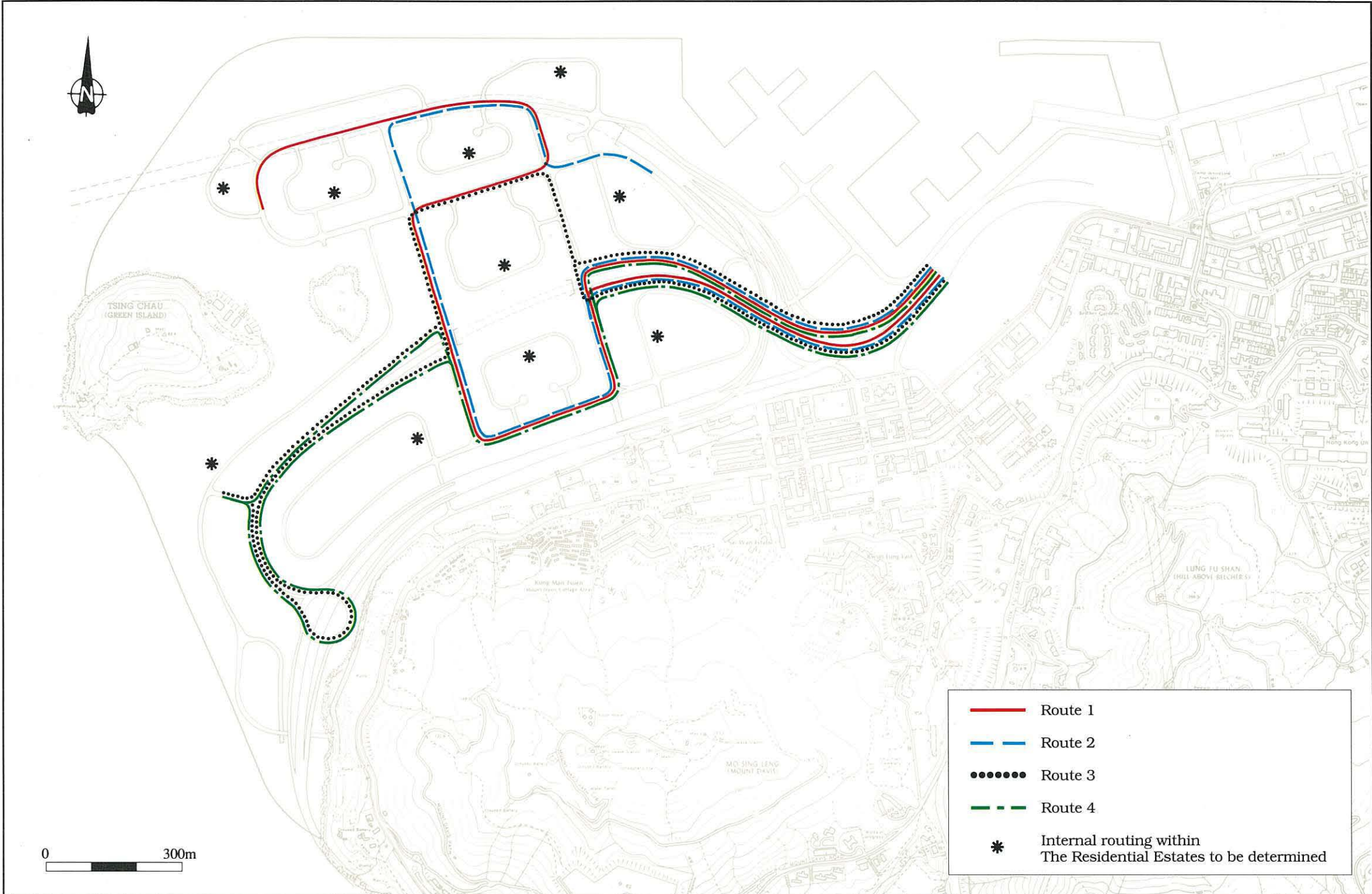
Green Mini-buses

The Green Mini-bus guidelines, TPDM Volume 9, Chapter 3, recommend that Green Mini-buses be used only to fill in gaps in the network where franchised buses, railways and trams cannot physically or economically operate.

Only trips within the reclamation area will be serviced with Green Mini-buses, i.e. 12,000 trips daily or 2,200 two-way trips in the peak hour.

Six routes with a 5 minute headway can service this level of demand. The exact routings within the car service estates on the development reclamation will require more detailed analysis and will be dependent on the exact layout of the development areas.

Fuller details of the Public Transport systems are presented in Volume 3 of this Report.



- Route 1
- - - Route 2
- Route 3
- - - Route 4
- * Internal routing within
The Residential Estates to be determined

Fig. 3.15 Bus Routes - Cross Harbour Routes

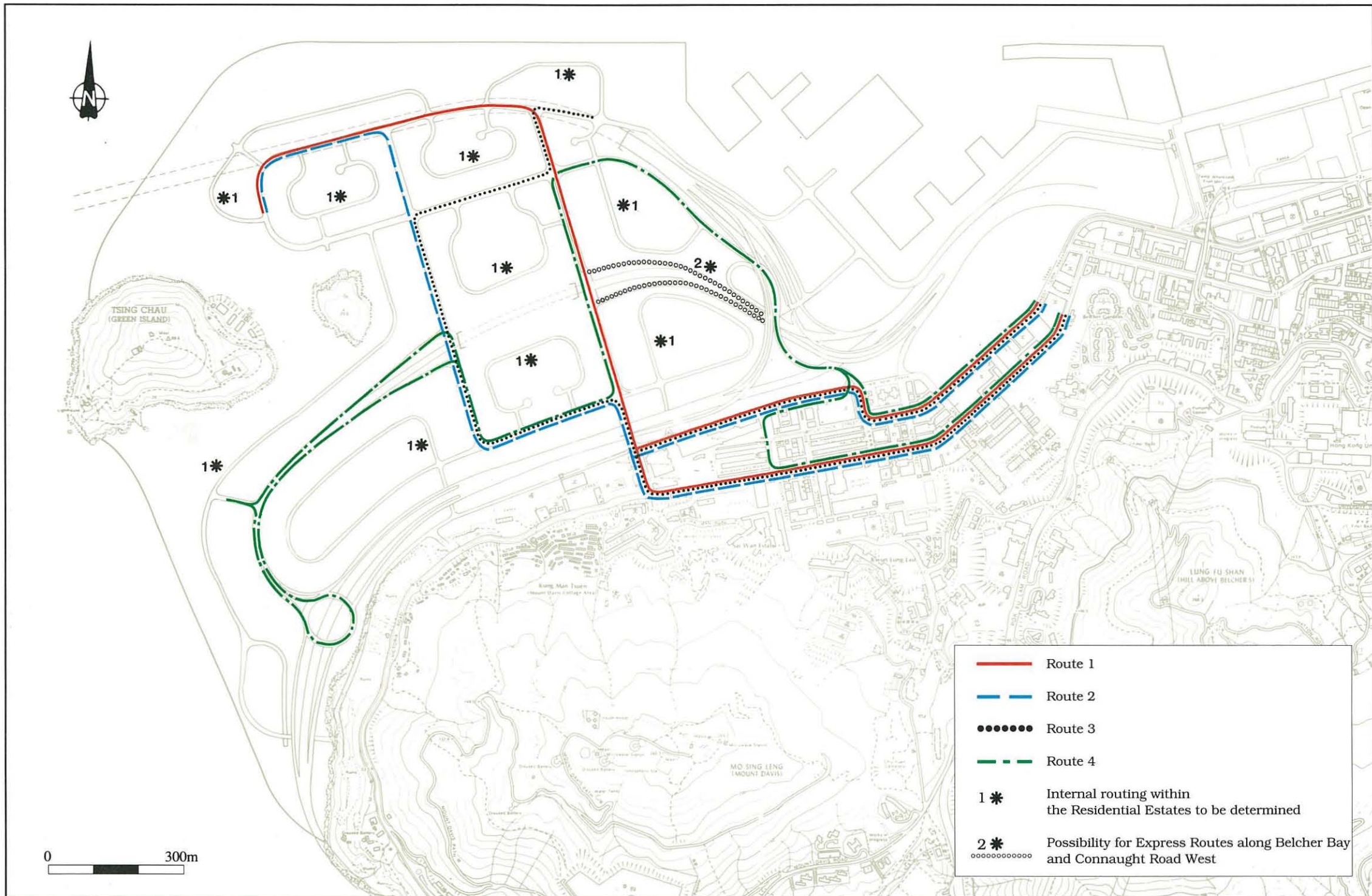


Fig. 3.16 Bus Routes - Routes to Central & Western

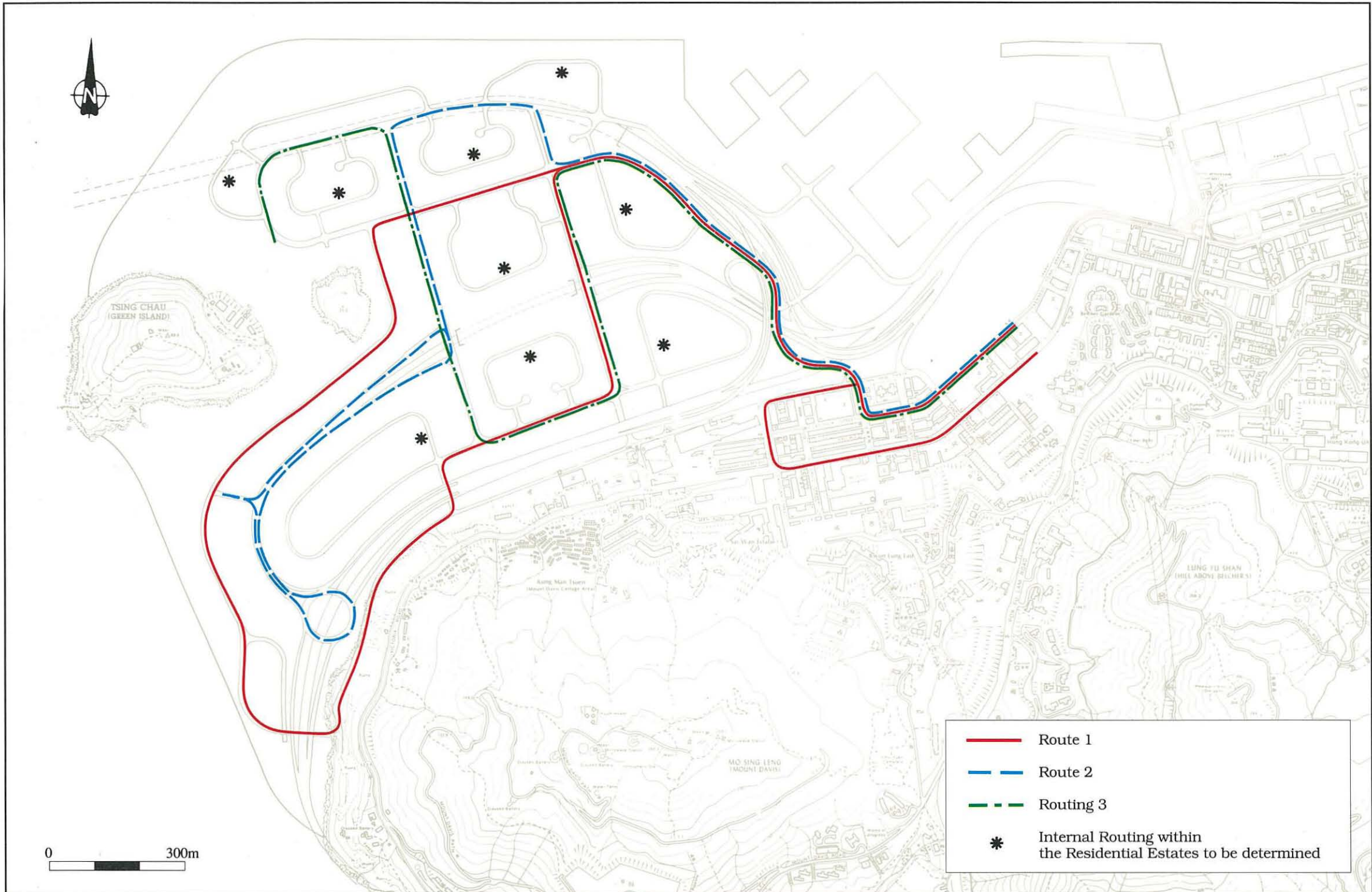


Fig. 3.17 Bus Routes - Local Services

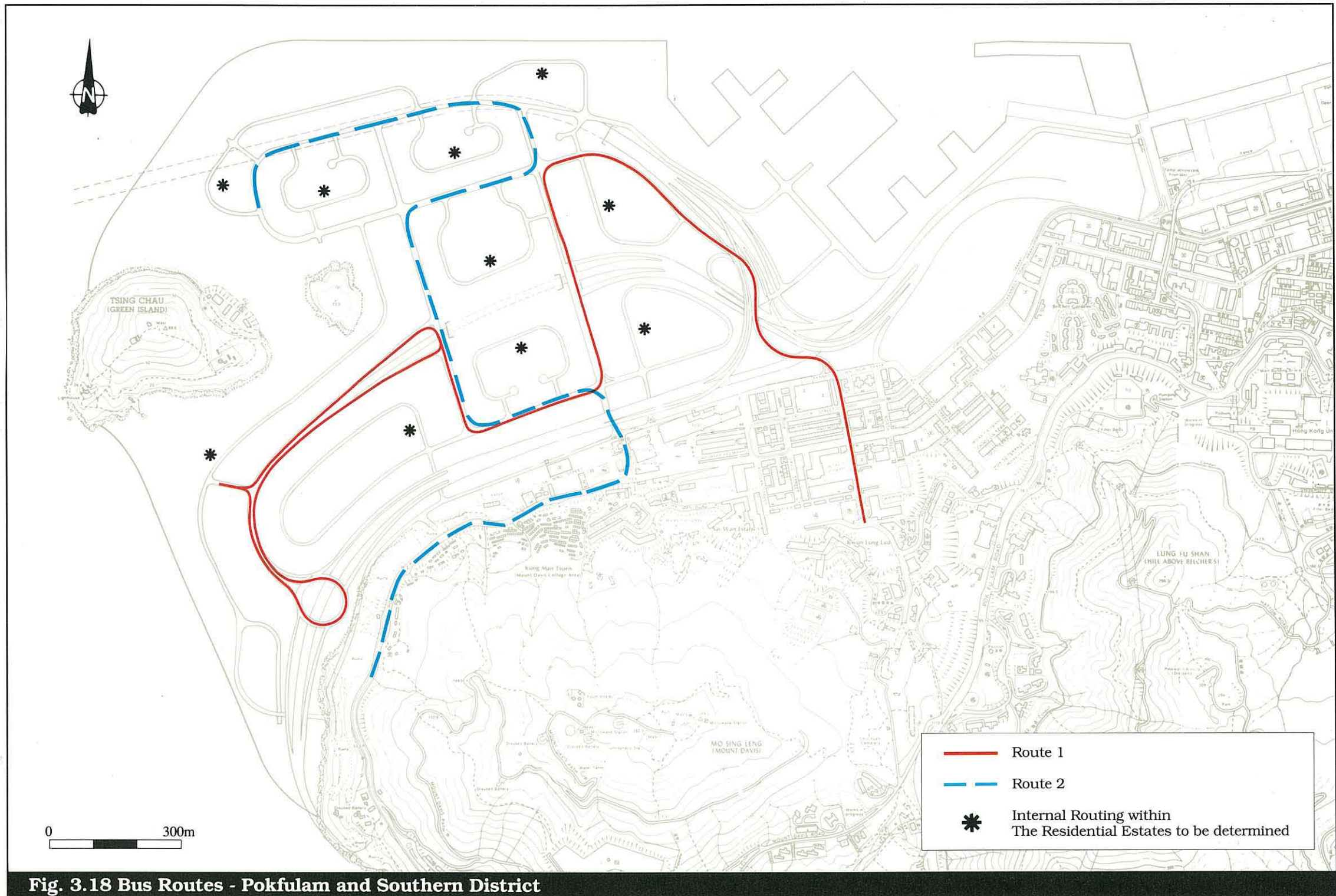


Fig. 3.18 Bus Routes - Pokfulam and Southern District

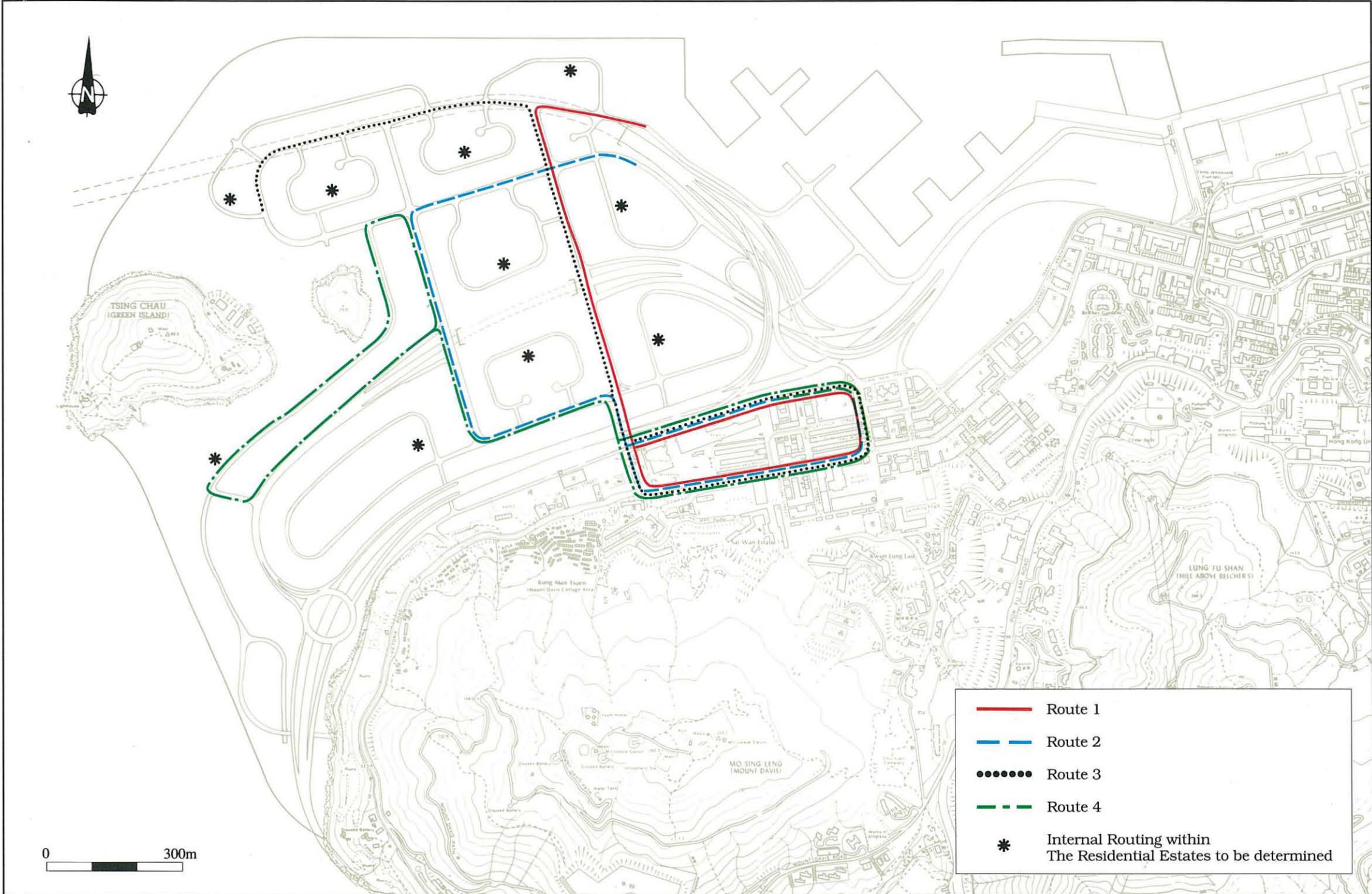


Fig. 3.19 Bus Routes - Feeder Services to Kennedy Town

3.2.4 Parking and Servicing

All new developments will be provided with parking and servicing facilities in accordance with Hong Kong Planning Standards and Guidelines. These are summarised in Table 3.15 for the different types of development in the Study Area.

3.2.5 Pedestrian and cycle-track routes

Two types of routes are designed for the Reclamation to serve pedestrians and cyclists: a combined cycle-track and footpath system and a footpath only. See Figure 3.20.

Cycle Track and Footpath System

The combined system of footpath and cycle-track provides an alternative transportation route. The system links Belcher Bay Reclamation/Kennedy Town to the Green Island Urban Fringe Park and continuous along the waterfront promenade and linear parks.

The combined footpath and cycle-track system will continue along the waterfront further southwards until it merges with the road crossing Route 7. The cycle-track will be separated from the footpath by an amenity planting strip.

Footpaths

All vehicular roads besides the primary distributor will have footpaths on both sides.

In addition, major pedestrian connections are designed through the housing developments to link up the open spaces and recreational facilities, thus maximising accessibility and shortening the distance between them.

Table 3.15 Planning Standards for Parking and Servicing Provision

Type of Development	Provision	
	Parking	Servicing/Loading/Unloading
Residential PSPS/HOS	1 space per 5 to 8 flats	1 space per 800 flats or 1 space per block
Rental Estates	1 space per 17 to 22 flats	
R1	1 space per 4 flats	1 space per 800 flats or 1 space per block
R2	1 space per flat	1 space per 800 flats or 1 space per block
R3	Minimum 1.5 spaces per flat	1 space per 800 flats or 1 space per block
Office/ Commercial	0 to 1 space per 240 sq m	1 loading /unloading space (11m x 3.5m) per 5000 sq m GFA 1 taxi layby for each 20,000 sq m for building of 5,000 sq m or more
Retail	1 parking space per 20-30 sq m of gross floor area	1 loading /unloading space per 1000 sq m GFA
Educational - Primary	4 to 6 car spaces per 24 room school	1 car/taxi layby for every 2/3 classrooms 3 school bus laybys
- Secondary	6 to 8 car spaces per 24 room school	1 car/taxi layby for every 3/5 classrooms
Retail Markets	Nil car parking	1 bay per 1000 sq m + 1 bay for refuse collection taxi/car laybys as necessary

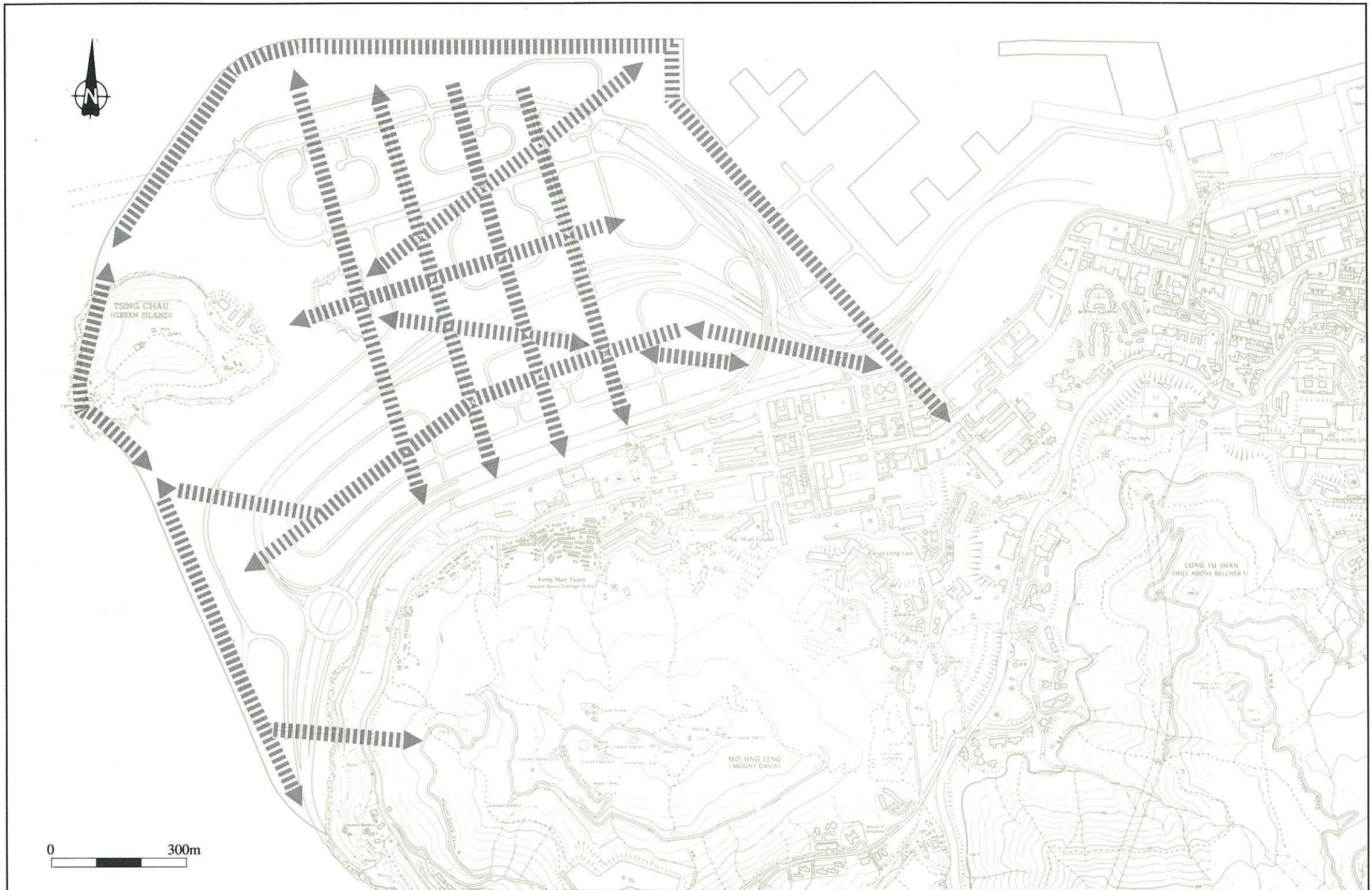
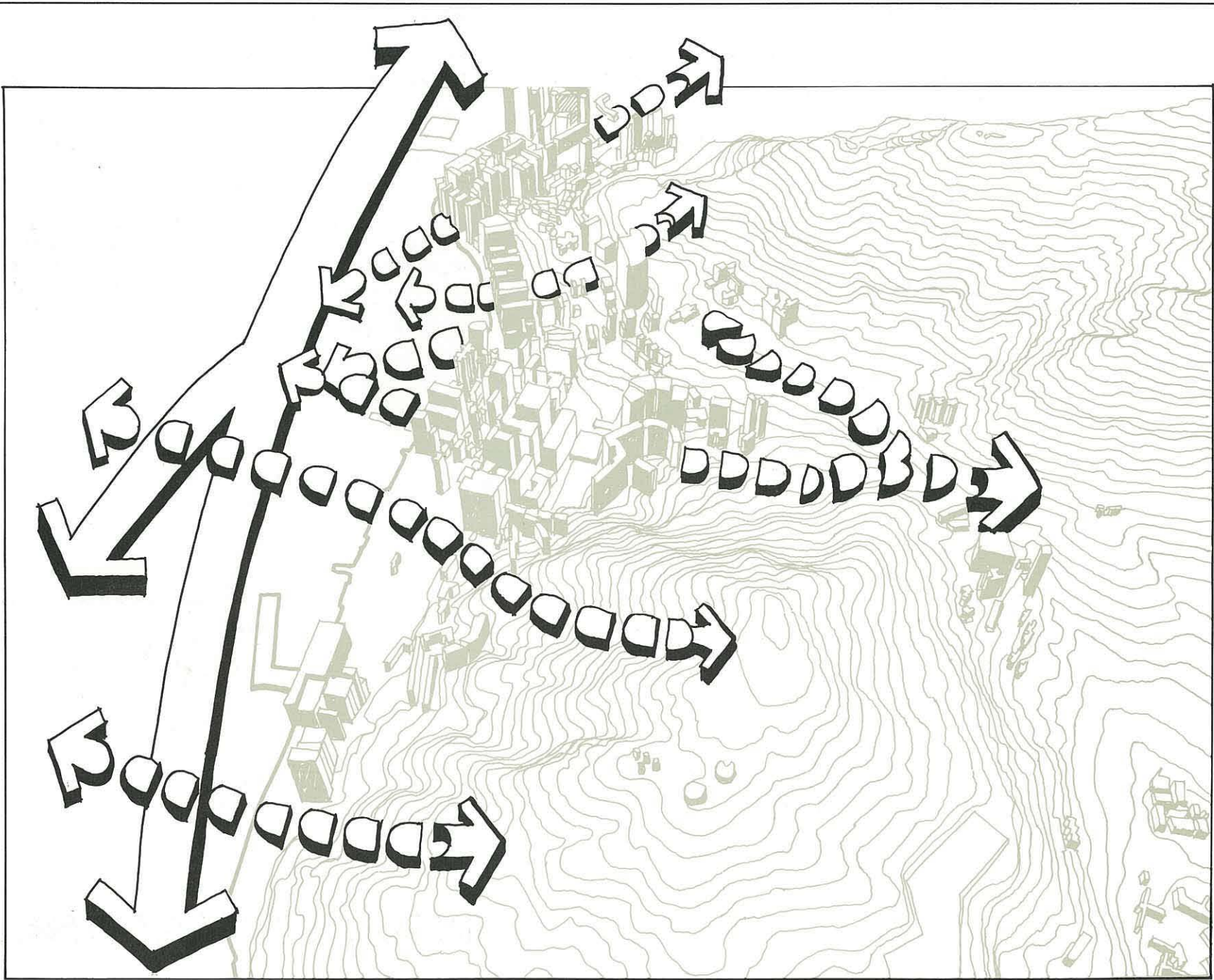
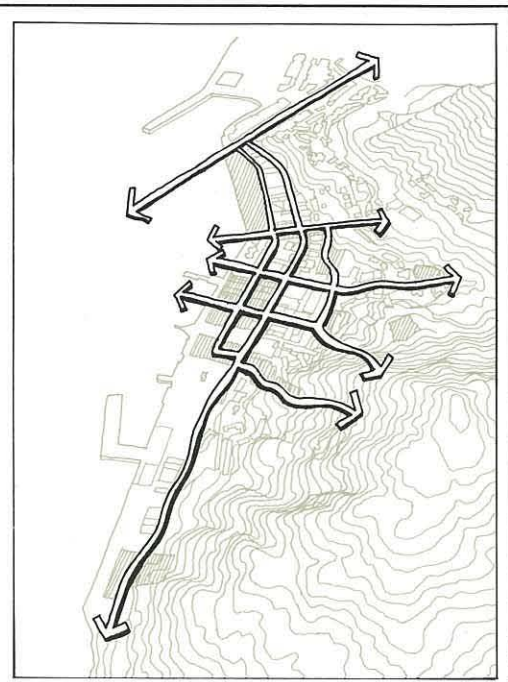


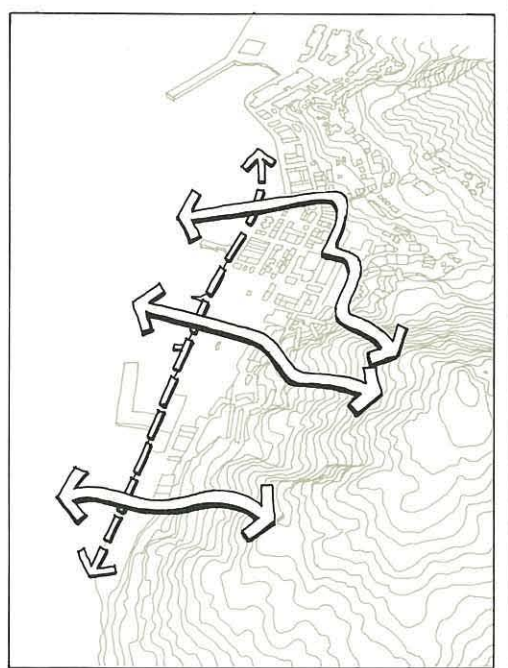
Fig. 3.20 Pedestrian Network



Ventilation Corridors



Pedestrian Routes



Access Links

Fig. 3.21 Linkages

3.3 Urban Design

3.3.1 Introduction

In the context of a feasibility study, the urban design process is the means by which the complex interaction of the competing requirements of a planned urban environment is resolved in a way which creates a balanced solution. This balance is essentially between quantitative and qualitative requirements. The first satisfies specific "mechanical" demands such as transport, the other the achievement of an improved quality of lifestyle.

Urban design principles were an input into the formulation of early planning options 'Urban Design and Landscape Guidelines' - TP13. They concentrated on three dimensional built form and visual aspects. These are inextricably linked to landscape, open space and general environmental principles. This close interaction has remained throughout the study, and has responded to and helped modify the more quantitative requirements. The final expression of this whole process is the Recommended Outline Development Plan. Being two dimensional in nature, this plan does not necessarily reflect the complexity of thought that was employed to achieve this planning statement. This section describes those urban design considerations involved in the process of producing the RODP.

3.3.2 Principles

'Urban Design & Landscape Guidelines' - TP13 - established certain urban design principles to be included in the generation of planning options. Kennedy Town and its environs formed the basis from which urban design principles for the reclamation area were developed. These principles concentrate on pedestrian connections and links with existing and potential open spaces in Kennedy Town and the Mount Davis backdrop, natural ventilation corridors, visual links and the massing of buildings. Figures 3.21 to 3.23 summarise these principles.

These urban design principles have remained a consistent input into the fluid evolution of the overall study objectives and parameters. The eventual resolution of territorially strategic issues relating to PADS projects and transportation requirements created a situation within which urban design principles had to respond.

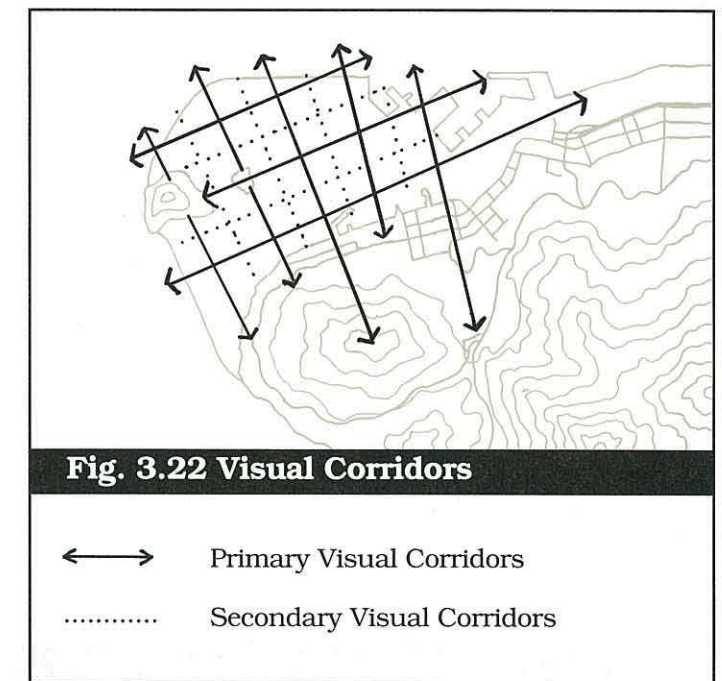
3.3.3 Quantitative Aspects

Route 7 and the Green Island Link performance criteria required very specific, technical solutions based on accepted standards. The internal planning of the main area of reclamation for a new community, including urban design principles, was, to a significant extent, determined by these 'external' influences. Metroplan policy provided a target population with a predetermined mix of residential types. Accepted standards for supporting facilities such as schools, community facilities, open space etc. followed from this overall target. Specific transport requirements for servicing the community required a particular hierarchy of roads. Other requirements such as industrial and waterfront activity re-provisioning provided a final set of land use areas. Together, all these considerations provide the quantitative framework and jigsaw puzzle of pieces that has to be assembled to form the total picture.

3.3.4 Qualitative Aspects

From the previous section the number of pieces in the puzzle has been determined but the overall picture which the completed puzzle represents is not totally clear. This is where the qualitative elements contribute. These elements include diversity, identity, legibility and an overall feeling of comfort which inhabitants and visitors will experience.

The complicated option generation and assessment process tended to overshadow some of the more subtle aspects inherent in the qualitative aspects of urban design. The resolution of option selection provided two tangible frameworks within which to explore urban design issues.



3.3.5 Translation

The Recommended Outline Development Plan for the preferred northern alignment of the Green Island Link is the main, visual expression of all the various considerations required by the study. This section describes the urban design inputs that are not readily obvious in such a plan.

Framework: Transport

Figure 3.24 shows the basic framework established by the solution of essential transport requirements on the reclamation area. 'Neighbourhood blocks' are defined within this pattern.

Framework: Open Space

Figure 3.25 illustrates the major open space structure which responds as closely as possible to the principles established early in the study.

Framework: Major Land Uses

The reclamation area is a predominantly residential township with full support services. Metroplan and industrial/waterfront re-provisioning requirements have resulted in the basic land use distribution pattern shown in Figure 3.26. Whilst private housing occupies prime waterfront areas, the more public oriented housing types (RS, HOS and PSPS) which together form a numerical majority are placed close to the main open space system. Industrial and shipping related activities form a discreet activity centre bounded by the Route 7 and the Green Island Link.

The residential land use pattern reflects the neighbourhood 'structure' defined in Figure 3.24.

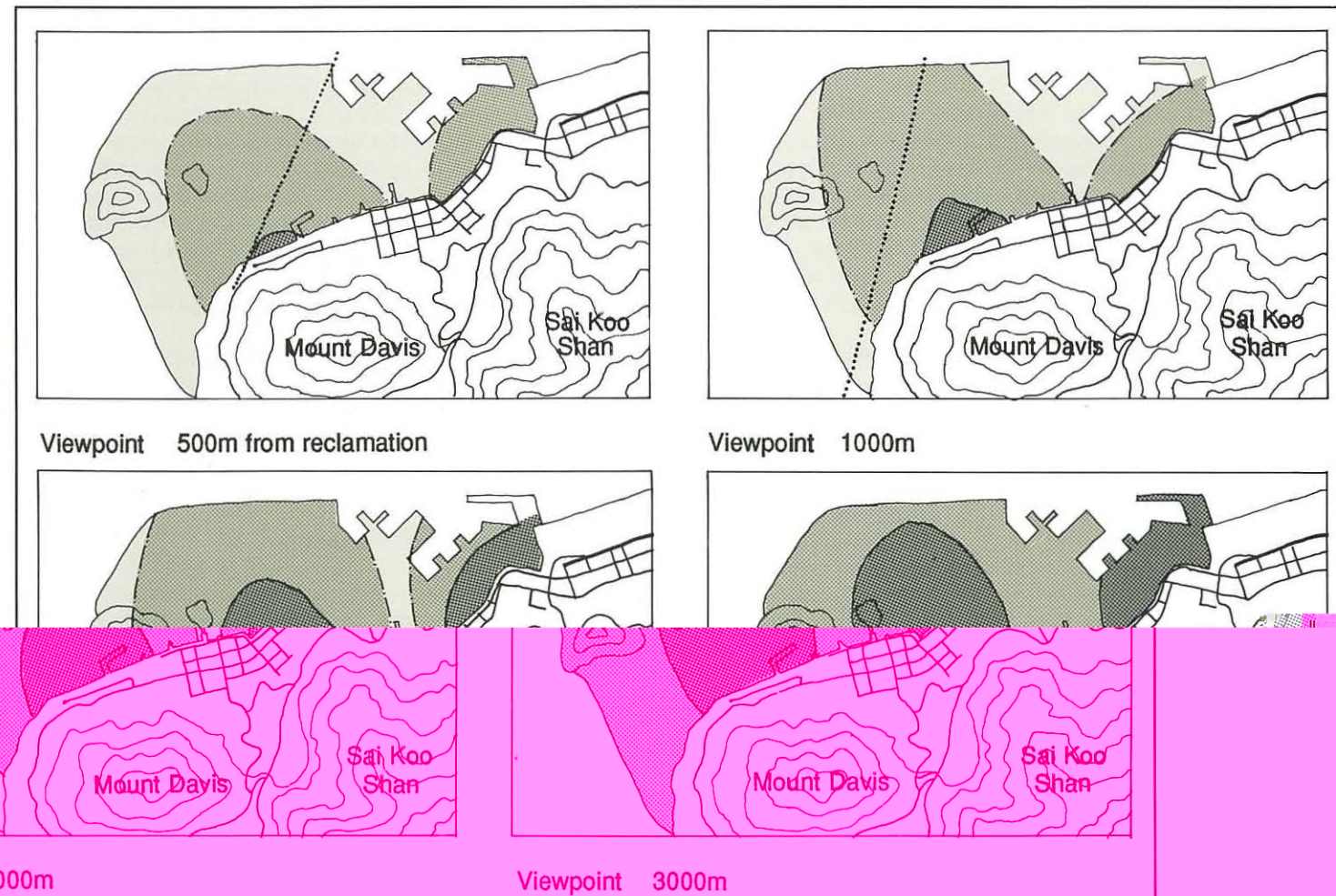


Fig. 3.23 Massing of Buildings

- 30 - 90 m high development
- 90 - 100 m high development
- Over 180 m high development
- Limit of 180m high development to maintain views of Victoria Peak from North West

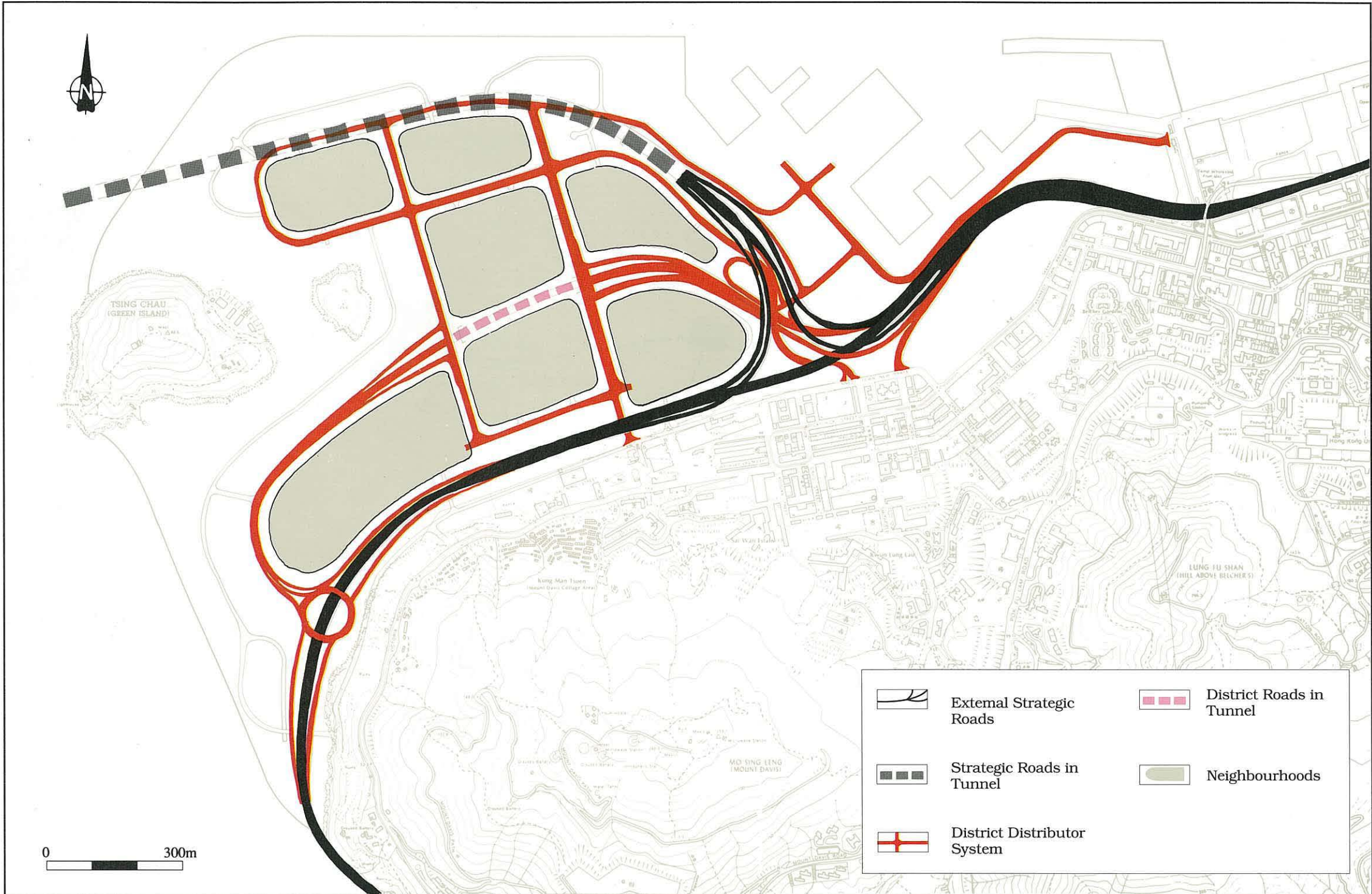


Fig. 3.24 Urban Design Framework - Transport

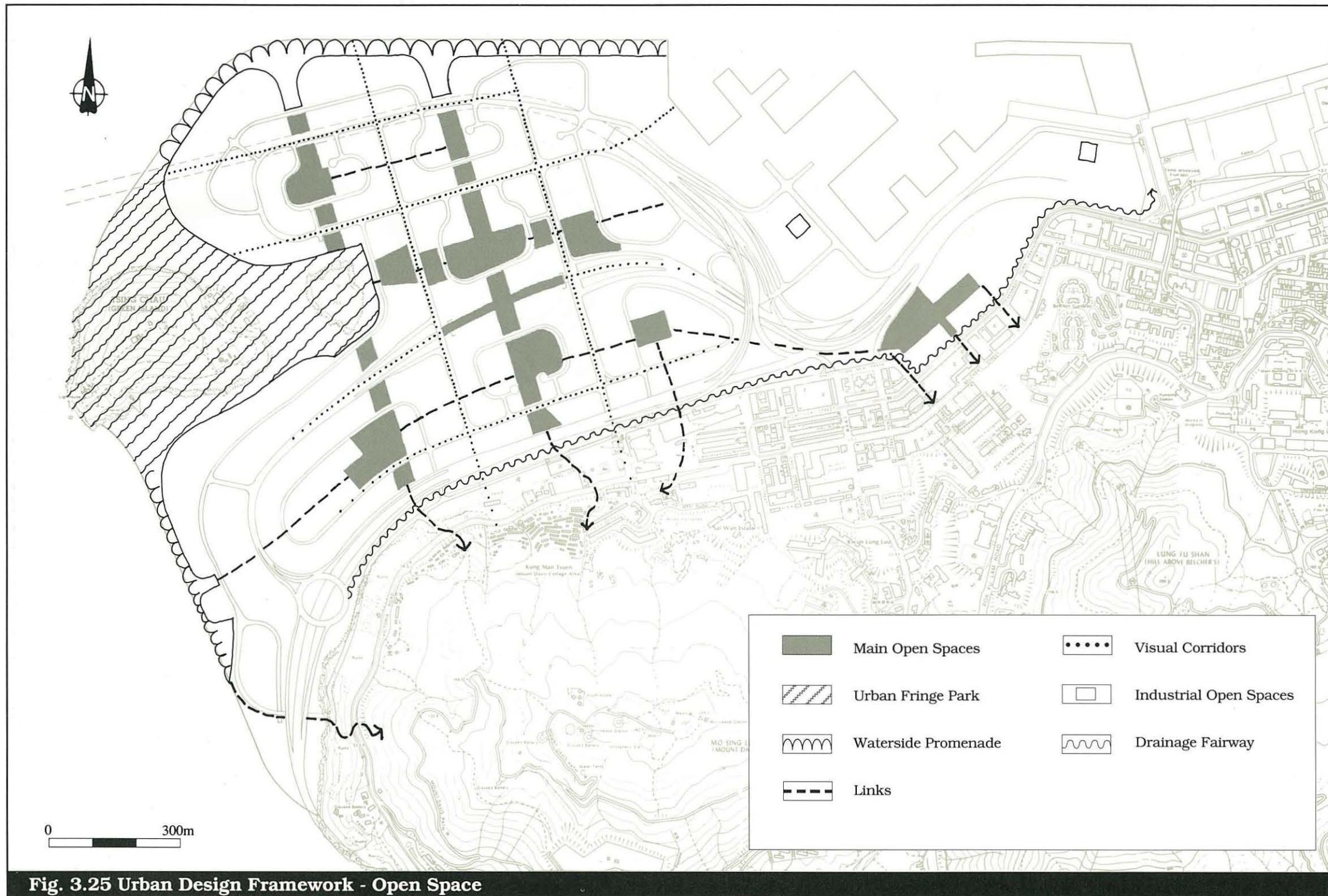


Fig. 3.25 Urban Design Framework - Open Space

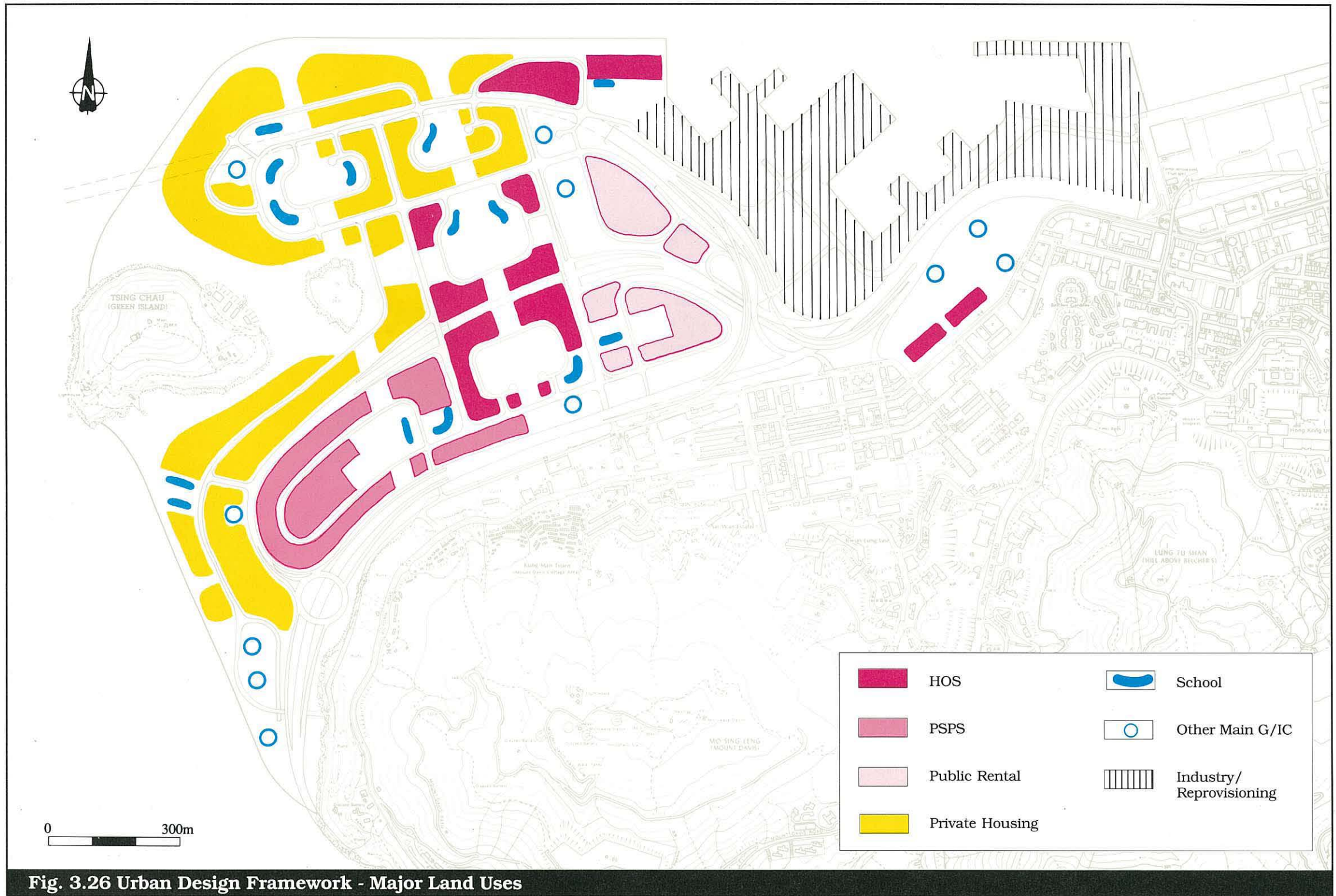
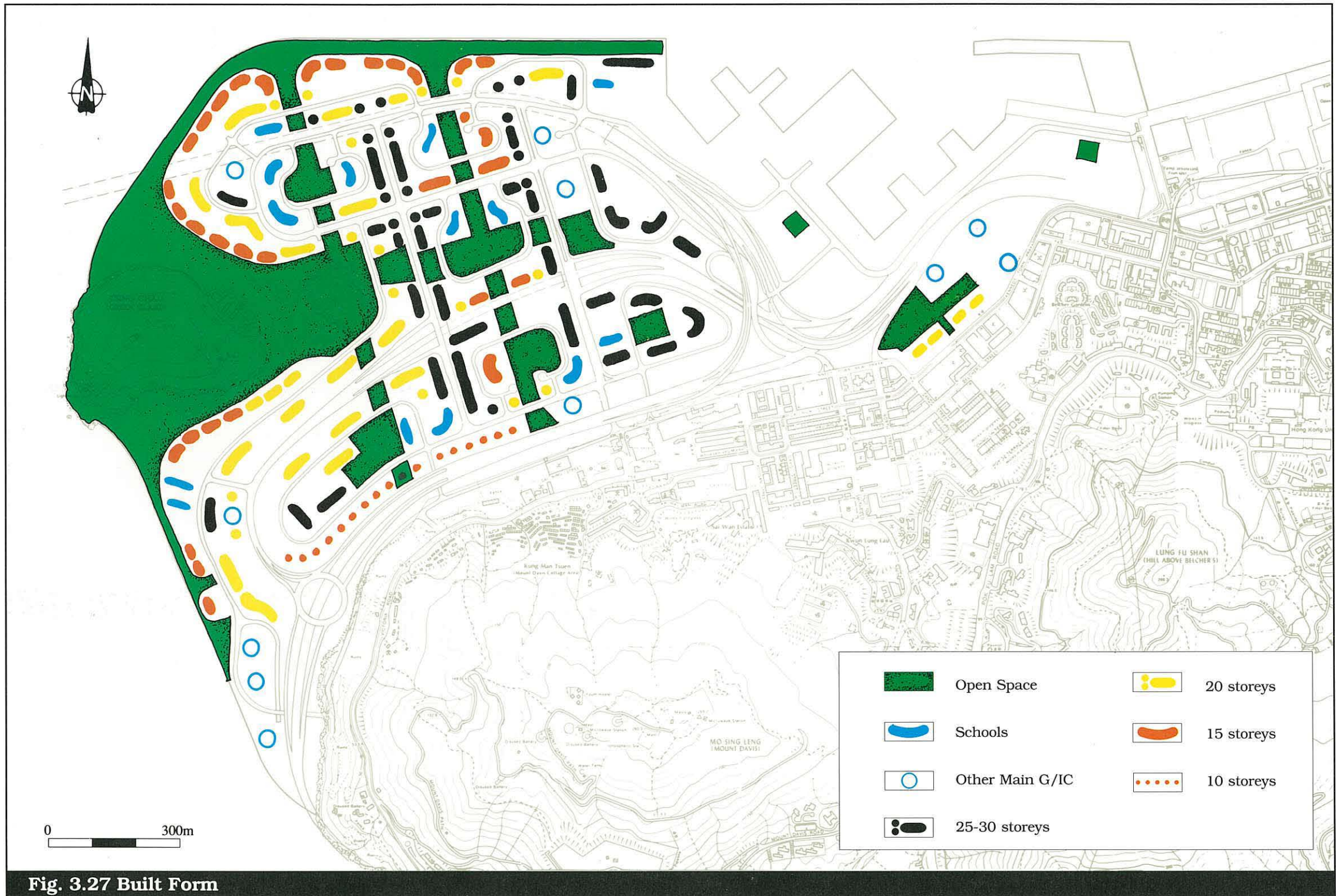


Fig. 3.26 Urban Design Framework - Major Land Uses



Built Form

The arrangement of buildings is the major three dimensional expression of the framework elements described above. Following the principles established earlier, the tallest buildings are grouped within the 'shadow' of Mount Davis (see Figure 3.23), so as not to break through the ridgeline. This grouping occurs alongside the main north-south distributors, and gives extra definition to these elements. In doing so a strong central core is defined containing major open spaces. This is the 'soft centre' of the core. Building massing steps down to create a more human scale edge to these central, open areas. G/IC facilities are also used to achieve this arrangement of built form. An enhanced environmental setting for these sensitive uses is thus provided.

Beyond this central core and progressing towards the limits of the reclamation, the built form and massing also 'dissolves out' to provide a softer edge to the overall development. Figures 3.27 and 3.28 illustrate the built form arrangement in relation to the framework elements. The detailed guidelines necessary to achieve these principles will be devised during the more detailed development of the results of this study.

3.3.6 Testing

In order to test the feasibility of the urban design proposals against the more quantitative requirements, a building block layout plan was produced. Standard or common housing block types were used for this purpose. Using the overall Metroplan requirements for a target population density and locational standards, blocks of different height were distributed according to the desired principles. Numbers of flats and population were calculated from the actual block types and compared with the gross calculations applied to the two-dimensional planning areas. This has resulted in a proposal that strikes a balance between the quantitative and qualitative principles referred to in Section 3.3.1, and is shown in Figure 3.29.

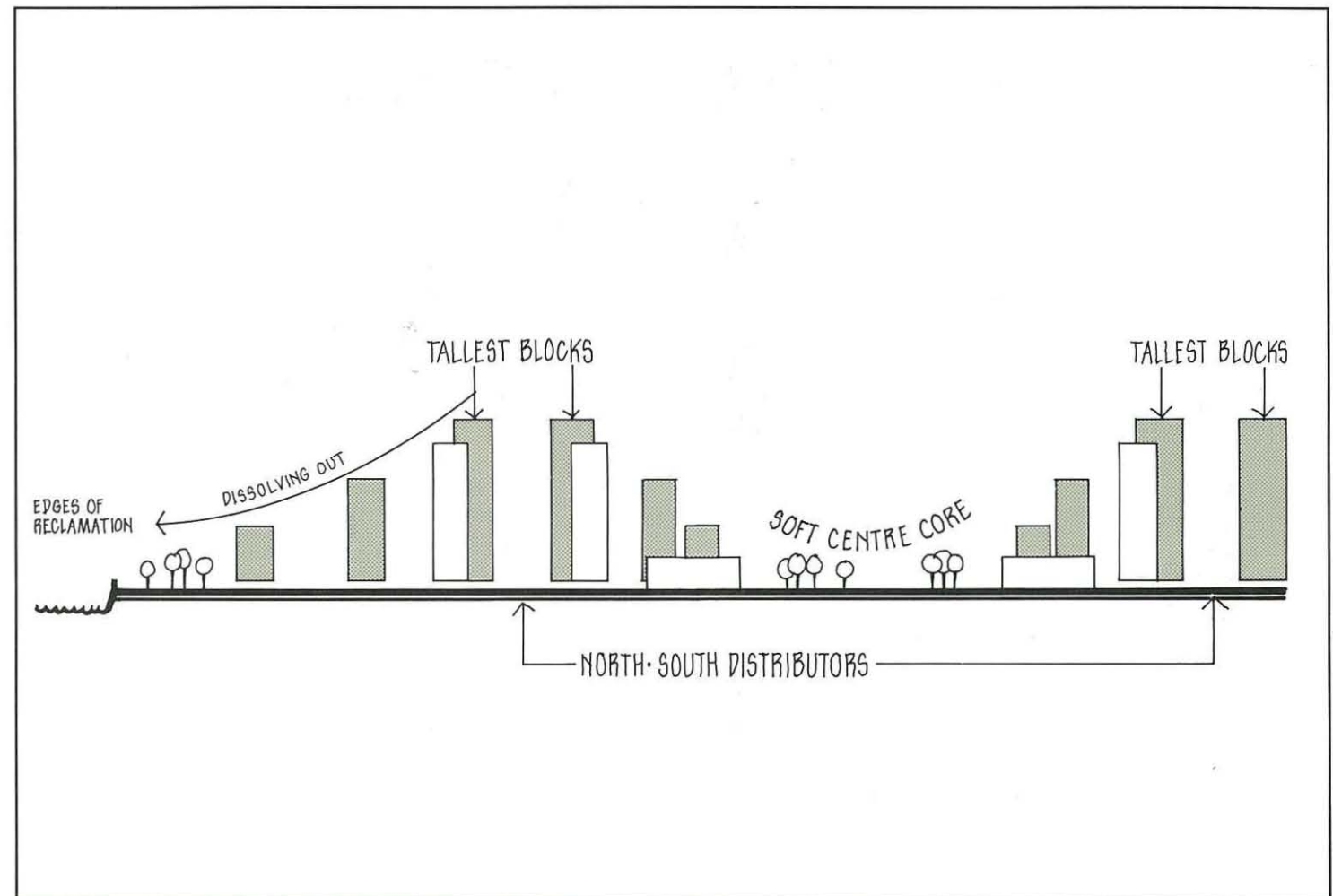


Fig. 3.28 Schematic East-West Section

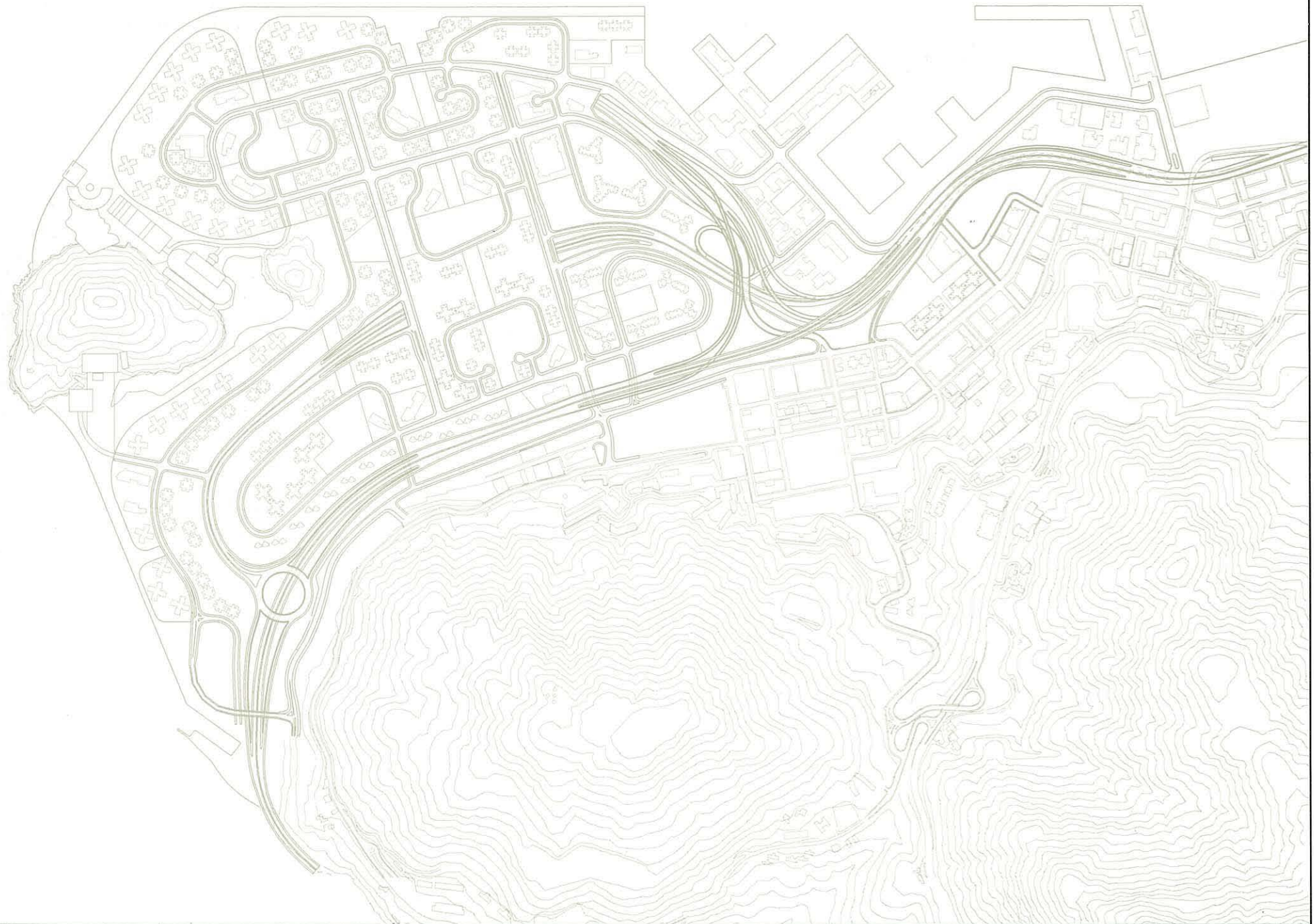


Fig. 3.29 Urban Design - Building Block Layout Plan

3.4 Master Landscape Plan

3.4.1 Introduction

The Master Landscape Plan (MLP) - Figure 3.30 - has been developed as a close adjunct to the RODP. The RODP has delineated the open space land use zoning and the MLP demonstrates the position and character of Amenity and Buffer Zones.

The MLP includes the area of reclamation, Kennedy Town and Belcher Bay.

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. Allied to this, it provides the conceptual layout for the open space distribution together with the recreation network.

The requirements in the Brief for the components of the Master Landscape Plan have included urban design principles, a landscape framework designating the different types of open space and landscape treatments for roads, footpaths, civic areas and precincts; together with an outline of planting types.

Table 3.16 Allocation of Active and Passive Open Space

Open Space Type	Area/ha	Active	Passive
Structural Local Open Space	5.84*	•	•
District Open Space	18.03*	•	•
1. District Park		•	•
2. Linear Parks		•	•
3. Waterfront Promenades			•

* Includes both Green Island Reclamation and Belcher Bay Reclamation. See Table 3.4c

3.4.2 Recreation Network

The requirement for a comprehensive recreation facilities network is recognised as an important determining factor in the open space provision for the MLP.

Based on recreation standards outlined in HKPSG, the RODP provides a comprehensive recreation network on the reclamation area for the residents as well as supplementing Kennedy Town's shortfall. The distribution of active recreation facilities reinforces the neighbourhood concept, enhancing a coherent and robust landscape and open space framework. This is shown on Figure 3.31.

Table 3.16 summarises the allocation of open space with respect to active and passive recreation activities. The actual distribution is shown on the Master Landscape Plan. The on Belcher Bay park reclamation, serving the combined populations of Green Island, Belcher Bay and Kennedy Town, provides many of the active recreation facilities.

Indoor Recreation

Indoor recreation is provided in athletic complexes and Indoor Recreation Centres (IRC). For the total population of Kennedy Town and Green Island Reclamation (183,930), HKPSG recommends one athletic complex, one Type A IRC, one Type B IRC and two Type C IRC's. Table 3.17 summarises the HKPSG requirements for indoor active recreation facilities and their distribution.

Indoor Recreation Centres provide four 'core activities': badminton, squash, table tennis and fitness training/dance. Indoor basketball, volleyball and tennis facilities are also desirable.

Outdoor Recreation

The outdoor recreation activities accommodated in the development are basketball, volleyball, handball, football, mini-soccer, jogging, tennis, children's play, roller skating and table tennis. The number of facilities required for each activity area is indicated in Table 3.16. The largest of these facilities, such as full-size and seven-a-side football pitches, have been located in the district parks. The allocation of the outdoor facilities for the various sectors on the reclamation is summarised in Table 3.18.

The recreational facilities form a focal point for each neighbourhood. The main centre for sporting activity is the athletics complex in the Urban Fringe Park which includes a full-size grass football pitch and athletic tracks.

Areas appropriate for passive recreation are proposed throughout the reclamation. Activities such as walking/strolling, morning exercise and sitting-out can take place wherever the setting is favourable. Features to promote such uses are incorporated in the open spaces adjacent to roadsides, footpaths, district centres, public areas and precincts as well as the parks.

Passive recreation activities vary between DOS and LOS. The District Parks have more high profile attractions such as water features, pavilions, theme gardens and cafes. Other DOS have more modest features including gardens, fountains, refreshment kiosks and display areas. At the local level, spaces include sitting-out areas and space for morning exercises.

The Urban Fringe Park, at the highest level of the open space recreation hierarchy, is significant in terms of providing recreation not only for the Green Island residents but also as a Territory-wide attraction. Possible features utilising the unique qualities of Green Island include an amphitheatre, panoramic scenic viewpoints, a hill walking trail with information points and picnic and barbecue sites. Taking further advantage of the location and the extensive sea views, a water-based theme could be developed which might include a lake and aquatic recreation facilities such as boating. The athletics complex provides the active recreation facilities.

Table 3.17 Requirement and Provision of Active Recreation Facilities

Recreation Activity	Standard	Kennedy Town and Belcher Bay 70,202	Deficiency (Required less existing)	Green Island 112,863	Total 183,065	Comments	Indoor Units	Outdoor Units (UFP, DOS, LOS, or IOS)
Athletics Complex	1 complex : 200,000-500,000	0	0	0	1	Track and field facilities, grass football pitch and spectator stand.	0	1
Indoor Recreation Centre	1 type A IRC: 15,000-24,999	1	1	0	1		1	0
	1 type B IRC: 25,000-49,999	0	0	1	1		1	0
	1 type C IRC: 50,000-64,999	1	1	1	2		2	0
Fitness Training	1 centre : 50,000	1	1	2	3	Indoors at recreation centres	3	0
Badminton	1 court :8,000	9	9	13	22	Indoors at recreation centre, 8 courts group: min. 2 courts group in housing area.	22	0
Squash	1 court : 10,000	7	7	11	18	Indoors at recreation centre , 3-4 courts. Private provision also.	18	0
Table Tennis	4 tables : 15,000	18	18	29	47	50% indoors, 50% outdoors in LOS and housing areas.	23	24
Tennis	1 court : 15,000	5	5	7	12	Outdoors, 3 or 6 court group DOS or LOS. Some indoor provision desirable. Part dual use with basketball or volleyball.	4	8
Basketball	1 court : 10,000	7	3	11	14	Outdoors, LOS, DOS and IOS. Mainly shooting practice areas also some indoor provision. Part dual use with Volleyball or tennis.	6	8
Volleyball	1 court : 10,000	7	7	11	18	Outdoors, LOS,DOS and IOS. Some indoor provision desirable. Part dual use with tennis or volleyball.	6	12
Handball	1 Court : 125,000	0	0	0	1	Outdoors, DOS.	0	1
Football (grass)	1 pitch : 200,000-250,000	0	0	0	1	In athletics complex	0	1
7-A-Side Soccer	1 pitch : 30,000	2	2	4	6	DOS and larger LOS	0	6
5-A-Side Soccer	1 pitch : 30,000	2	2	4	6	LOS and IOS and indoors.	4	2
Jogging	1 track (500-1000m): 30,000	2	2	4	6	Dos and urban fringe parks especially. Also part use of footpath system,.	0	6
Children's Playground	400 sq m : 5000	14 (5616 sq m)	11	22 (9029 sq m)	33	Mainly LOS and housing areas. Adventure playgrounds in DOS and UFP.	0	33
Roller Skating	1 track (500-1000m): 30,000	2	2	4	6	DOS and LOS	0	6
Swimming	1 complex :287,000	0	0	0	(1) existing	Smithfield Road swimming pool complex	0	0

* See Table 3.18 for Distribution of Outdoor Active Recreation Facilities.



Fig. 3.30 Master Landscape Plan

Legend for Fig. 3.30



















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



Fig. 3.31 Distribution of Outdoor Active Recreation Facilities




-  Urban Fringe Park
-  Coastal Park
-  Linear Park
-  District Park
-  Waterfront Promenade
-  Local Open Space
-  Amenity Planting along roads/
at interchanges
-  Buffer Zones
-  Slope Treatment

Fig. 3.32 Conceptual Landscape Plan

Table 3.18 Distribution of Outdoor Active Recreation Facilities

Facilities	UFP	DOS							LOS	IOS	Total
		Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7			
Athletics Complex	1	---	---	---	---	---	---	---	---	---	1
Table Tennis Table	---	2	---	2	2	---	3	---	13	2	24
Tennis Court	---	2	---	2	---	---	2	---	2	---	8
Basketball Court	---	1	1	---	1	---	1	1	2	1	8
Volleyball Court	---	2	1	2	---	2	1	1	2	1	12
Handball Court	---	---	---	1	---	---	---	---	---	---	1
Grass Football Pitch	1	---	---	---	---	---	---	---	---	---	1
7-A Side Soccer Pitch	---	1	1	1	---	1	1	1	---	---	6
5-A Side Soccer Pitch	---	---	---	---	---	---	---	---	1	1	2
Jogging Track (500-1000m)	2	1	---	1	---	---	1	1	---	---	6
Roller Skating Rink (300 sq m)	---	1	1	1	---	1	1	1	---	---	6
Children's Playground (400 sq m)	5	1	1	1	1	1	1	2	20	---	33

(See also Figure 3.31)

3.4.3 Conceptual Landscape Plan

The Urban Design and Landscape Guidelines' - TP13 - set out many of the principles guiding the landscape proposals for the reclamation. The landscape structure will be derived from a combination of open space and planting elements in the following: open spaces including parks, promenades, precincts etc; roadside planting, pedestrian and cyclist circulation systems, buffer zones and other planting areas. The distribution of these areas is illustrated on Figure 3.32.

The distribution is determined by a number of environmental and visual considerations. These include:

- maximising landscape and recreational assets, by preserving Green Island and Little Green Island for recreational use and developing the waterfront as a promenade with public access (Figures 3.33 and 3.34).
- development of an open space network which provides the recreation facilities required for the reclamation population and the shortfalls identified in Kennedy Town. Details of this have been described earlier in Section 3.4.2.
- alignment of roads and open space corridors to develop a series of visual corridors particularly emphasising views of the sea from the reclamation and where possible from Kennedy Town (Figure 3.35).
- development of a pedestrian network which affords shade and comfort from sun and heat whilst linking parts of Kennedy Town with facilities on the reclamation (Figure 3.36).
- retention of the ridgeline and its extension to Green Island to provide a screen between the rural / urban fringe (Figure 3.37).
- enhancement of the microclimate by the inclusion of ventilation corridors and a breezeway system (Figure 3.38).

The distribution of the various facilities and landscape network has been derived from these broad guidelines. The locations and uses are described in more detail in Section 3.4.4, whilst their design is addressed in Section 3.4.6 and Appendix C.

3.4.4 Landscape and Open Space Hierarchy

This section briefly describes the functions of the various open space and landscape areas and their distribution which is shown on the Concept Landscape Plan (Figure 3.32) and the MLP (Figure 3.30).

Urban Fringe Park

Urban Fringe Parks, as described in the Metroplan Landscape Strategy, are introduced into the open space hierarchy to provide recreational facilities which are not usually available in urban parks and which take advantage of vantage points and topography, but still remain close to the urban area. The designation of the Green Island and Little Green Island area as an Urban Fringe Park allows landscape features, recognised as significant in visual terms and worthy of retention, to be incorporated into the open space network. Likewise the importance of conserving a natural coastline at this location is readily assimilated by use of the area as an Urban Fringe Park. Uses are described in more detail in Appendix C; however in broad terms the hilly areas would be proposed for retention, with the possible inclusion of some contour footpaths and low key shelter and picnic area facilities. The flatter areas around the two islands could be developed for more innovative and special active recreation facilities.

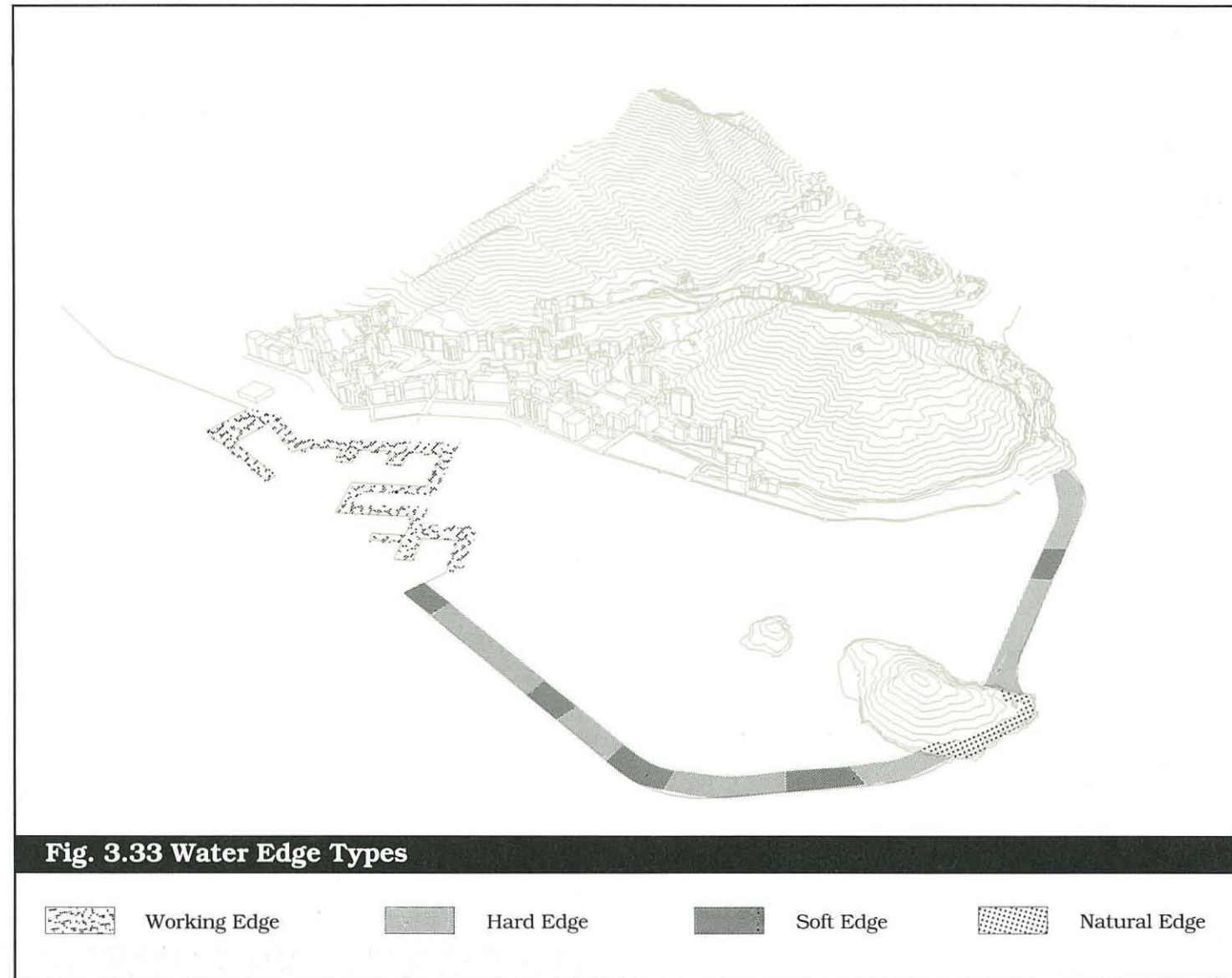
District Open Space

District Open space (DOS) will be intensively used for active and passive recreation facilities. The main areas of DOS are the District Parks which comprise part of the main axis from the UFP, the Waterfront Promenades which extend southwards and eastwards from the UFP, and the linear parks which stretch in a north/south orientation parallel to the road grid. The facilities in the DOS are designed to cater for a balanced mix of active and passive recreation as well as forming a major component in the footpath network which is illustrated on Figure 3.30.

The District Parks provide nodes within the landscape corridors where activity centres are located. Active recreation facilities are also provided in the linear parks, and in particular are recommended for the covered area above submerged sections of roadway. The waterfront promenade contains facilities more suited for passive activities, particularly strolling and taking advantage of the magnificent waterfront location and views across the harbour and Lamma Channel.

Local Open Space

The Local Open Space distribution shown on Figure 3.30 consists of that which has been allocated as structural LOS. The LOS also contributes to the landscape networks and breezeway systems. The use to which LOS is put varies; active and passive recreation are both accommodated.



Amenity Areas

Land classified as 'Amenity' falls broadly into two categories; roadside planting and environmental buffer zones. Roadside planting consists mainly of amenity strips, parallel to the road and in some cases central median planting. These north-south avenues will assist the breezeway function and frame the visual corridors. Where larger areas are available, such as at interchanges, planting will be incorporated where possible. Buffer zones, necessary because of noise attenuation requirements, are located between residential developments and roads in some areas. These areas have been designated as Amenity on the plan.

Slope Treatment

The landscape analysis identified existing slopes in and behind Kennedy Town which could be improved in visual terms by the application of treatments including planting. These areas shown in Figure 3.39 will be visible from the reclamation and thus their reinstatement is part of the landscape works related to the reclamation area.

3.4.5 Planting Strategy

The planting framework proposed in the Master Landscape Plan achieves a number of design principles, by the use of different planting types. The function and design intentions of the planting framework are listed below:

- to benefit visual amenity
- to frame views and to define and accentuate view corridors
- to ameliorate climatic conditions
- to provide shade and aid pedestrian comfort
- to reduce dust and the effects of vehicular emissions
- to reduce glare
- to provide variety in public places, parks etc.
- to maximise planting opportunities
- to preserve existing vegetation particularly in land mark nodes

The new planting types have been divided into six categories. One, or a combination of these planting types may be used in different landscape areas. The Landscape Guidelines in Appendix C indicate which type of planting is proposed for which areas and Table 3.19 summarises this proposal.

The existing vegetation on Green Island and Little Green Island will be preserved as much as possible. Infill and additional planting may be incorporated in some areas and reinstatement planting will be necessary in certain

areas where new development such as the sea wall abuts the islands' shores.

Woodland Planting

Woodland planting is included in areas which are sufficiently extensive to permit an expanse of planting and where slopes require stabilisation or reinstatement. Areas of woodland planting are proposed in all the major open spaces and for roadside planting where space permits.

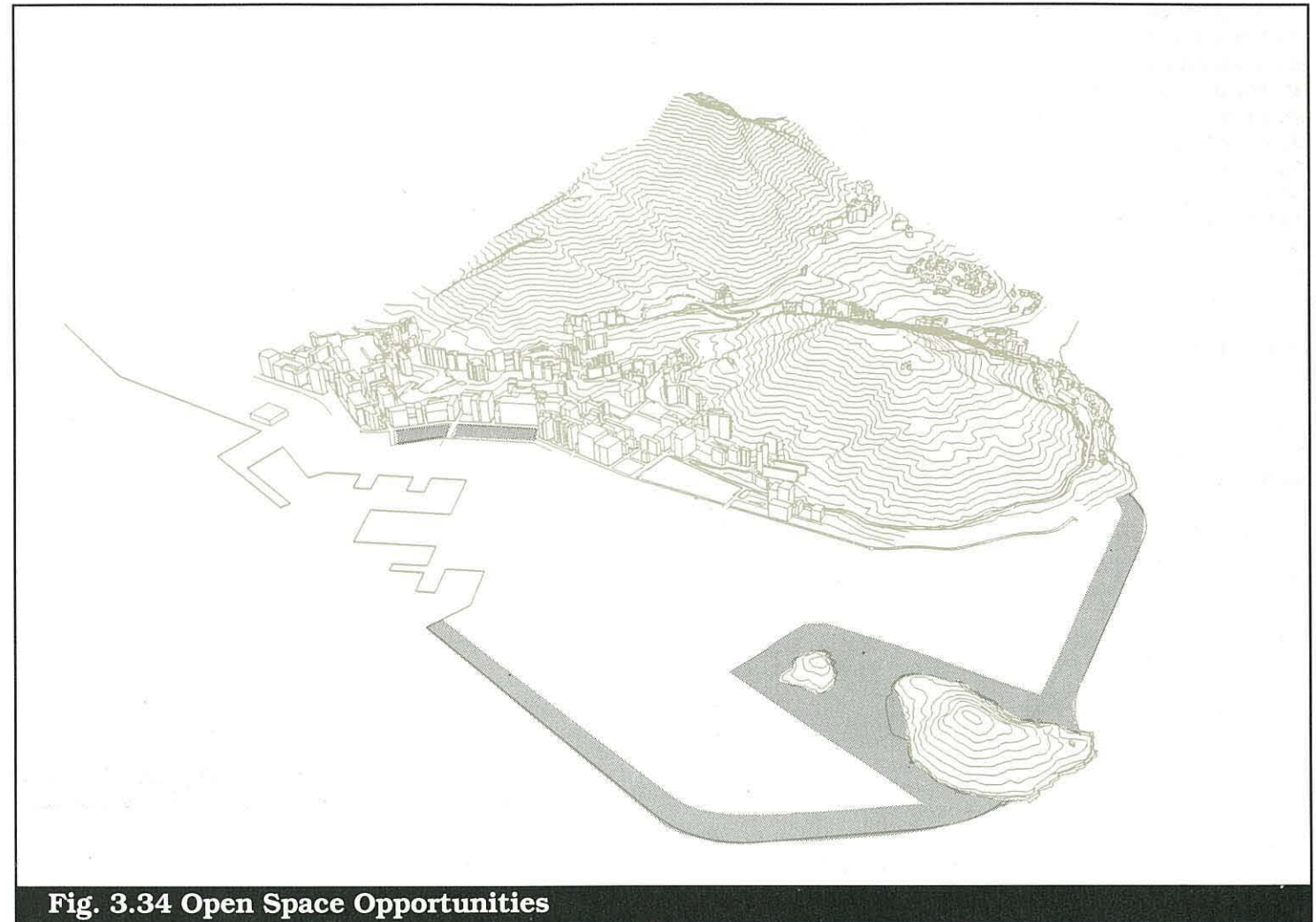


Fig. 3.34 Open Space Opportunities

Table 3.19 Proposed Plant Species and Their Uses

Species	Woodland Planting	Amenity Planting	Ornamental/ Feature Planting	Podium Planting	Trees in Hard Areas	Reinstatement (Slopes/Borrow Areas)
Trees						
Acacia confusa	•	•				•
Acacia mangium	•					•
Ailanthus fordii			•			
Albizia lebbek		•	•			
Aleurites moluccana		•			•	
Alnus formosana	•					•
Araucaria araucaria			•			
Artocarpus altilis		•	•			
Bauhinia blakeana		•	•		•	
Bischofia trifoliata		•				
Bombax malabaricum			•	•	•	
Cassia nodosa			•			
Cassia siamea		•			•	
Casuarina equisetifolia	•					•
Chukrasia tabularis		•			•	
Cinnamomum camphora	•	•				
Cinnamomum inerve	•					•
Delonix regia		•	•			
Erythrina arborescens		•	•			
Erythrina variegata			•	•		
Ficus microcarpa	•	•			•	•
Ficus rumphii	•		•			
Firmiana simplex		•				
Grevillea robusta		•			•	
Jacaranda acutifolia			•			
Lagerstroemia speciosa			•			
Liquidambar formosana	•					•
Macaranga tanarius		•		•		
Machilus chinensis		•		•		
Mallotus paniculatus	•					•
Mangifera indica			•			
Melaleuca leucadendron		•				
Melia azedarach		•	•			
Michelia alba		•		•		
Peltophorum pterocarpum		•	•			
Platanus orientalis			•		•	
Plumeria rubra			•	•		
Podocarpus rumphii			•			

Table 3.19 Proposed Plant Species and Their Uses

Species	Woodland Planting	Amenity Planting	Ornamental/ Feature Planting	Podium Planting	Trees in Hard Areas	Reinstatement (Slopes/Borrow Areas)
Trees						
Pongamia pinnata		•			•	
Pterocarpus indicus	•	•				
Pyrus calleryna	•					
Salix babylonica		•	•			
Sapium discolor	•					•
Sapium sebiferum	•					•
Schefflera octophylla	•					•
Schima superba		•				
Spathodea campanulata			•			
Tristania conferta	•	•				•
Palms						
Archontophoenix alexandrae		•	•		•	
Arecastrum romanzoffianom			•		•	
Caryota ochlandra	•	•		•		
Chrysalidocarpus lutescens		•		•		
Cycas revoluta		•	•			
Livistona chinensis			•	•		
Phoenix roebellenii		•		•		
Rhapis excelsa		•				
Roystonea regia			•			
Trachycarpus Fortuneii			•			
Washingtonia robusta			•			
Shrubs						
Aglaia odorata		•		•		
Allamanda cathartica		•		•		
Allamanda neriifolia		•		•		
Azalea spp.			•			
Barleria cristata		•				
Bougainvillea spp.		•	•	•		
Caesalpinia pulcherrima		•				
Calliandra haematocephala		•	•			
Camellia spp.			•	•		
Carmona microphylla		•				
Clerodendron kaempferi	•	•				
Duranta repens		•				
Ervatamia divarica-ta		•		•		
Euphorbia pulcherima		•		•		
Excoecaria cochinchinensis	•	•				

Table 3.19 Proposed Plant Species and Their Uses

Species	Woodland Planting	Amenity Planting	Ornamental/ Feature Planting	Podium Planting	Trees in Hard Areas	Reinstatement (Slopes/Borrow Areas)
Shrubs						
Fatsia japonica			•			
Ficus hispida			•			
Gardenia jasminoides		•	•			
Hibiscus rosa-sinensis		•	•			
Ixora spp.	•	•		•		
Jasminum mesnyi		•		•		
Jatropha podagrica			•			
Malpighia coccigera		•		•		
Malvaviscus arboreus	•	•				
Melastoma candidum	•					•
Monstera deliciosa			•			
Murraya paniculata		•		•		
Nandina domestica		•		•		
Osmanthus fragrans			•			
Pandanus remotus			•			
Philodendron selloum		•	•			
Pittosporum tobira		•		•		
Rhododendron spp.			•			
Spiraea cantoniensis		•				
Thevetia peruviana		•				
Thunbergia erecta		•		•		
Tibouchina semidecandra			•			
Viburnum odoratissimum	•					•
Small Shrubs, Herbaceous, Groundcover						
Agapanthus umbellatus			•			
Agave americana			•			
Alocasia amazonica	•		•			
Alpinia purpurata			•	•		
Alpinia speciosa			•	•		
Asparagus sprengeri		•		•		
Caladium spp.			•			
Canna indica			•			
Crinum asiaticum		•	•	•		
Eranthemum nervosum		•				
Euphorbia milii		•		•		
Heliconia rostrata			•			
Hymenocallis americana			•			

Table 3.19 Proposed Plant Species and Their Uses

Species	Woodland Planting	Amenity Planting	Ornamental/ Feature Planting	Podium Planting	Trees in Hard Areas	Reinstatement (Slopes/Borrow Areas)
Small Shrubs, Herbaceous, Groundcover						
Juniperus chinensis			•			
Liriope spicata		•		•		
Lonicera japonica		•		•		
Mimosa pudica	•	•				
Philodendron scanadens			•			
Plumbago capensis		•		•		
Psychotria serpens	•					
Pyrostegia ignea			•			
Rhoeo discolor		•		•		
Russellia equisetiformis		•		•		
Scindapsus aureus	•	•		•		
Serissa serissoides		•		•		
Strelitzia nicolai			•			
Trachelospermum jasminoides	•					
Tristellata australasia		•		•		
Wedelia trilobata		•		•		
Yucca smalliana			•			
Bamboos						
Bambusa multiplex		•	•			
Bambusa tuldooides	•	•				
Bambusa ventricosa	•	•		•		
Phyllostachys nigra		•	•			

Woodland planting is economical to implement as it generally comprises young plant material planted about 1 and 2 metres apart. A spread of topsoil is not normally required. Woodland edges and areas where sightlines dictate lower species will include shrub and ground cover species. As woodland areas are planted using young and thus small plant material, it is beneficial to plant as early as possible.

Amenity Planting

Amenity planting comprises a combination of trees, shrubs and ground cover. It is used for a variety of purposes including screening, roadside planting, planting in parks and open spaces, and in urban areas and precincts, provision of shade and visual interest. The planting can be at ground level, or in raised planters. Expanses of grass may also be included in Amenity planting areas.

Ornamental / Feature Planting

Areas of ornamental and feature planting will be included at significant places such as landmarks and nodes, large parks to accentuate certain areas, prestigious urban squares or courtyards and at special locations along the linear parks and waterfront promenades. Feature planting may include a single particularly prominent species, such as certain palms and trees like *Araucalia excelsa*, or significantly prolific flowers such as *Bombax malabaricum*. It may also comprise an assembly of trees and shrubs in special combinations contrasting with the surrounding areas.

Podium Planting

Species suitable for podium planting will generally be shrubs, ground cover and smaller trees. Planting on podia will almost inevitably necessitate planter boxes, which ultimately restricts root growth. Podia can also be quite windy, thus requiring hardy species. Podium planting and hard landscape elements in combination meet many of the planting strategy objectives.

Trees in Hard Paving

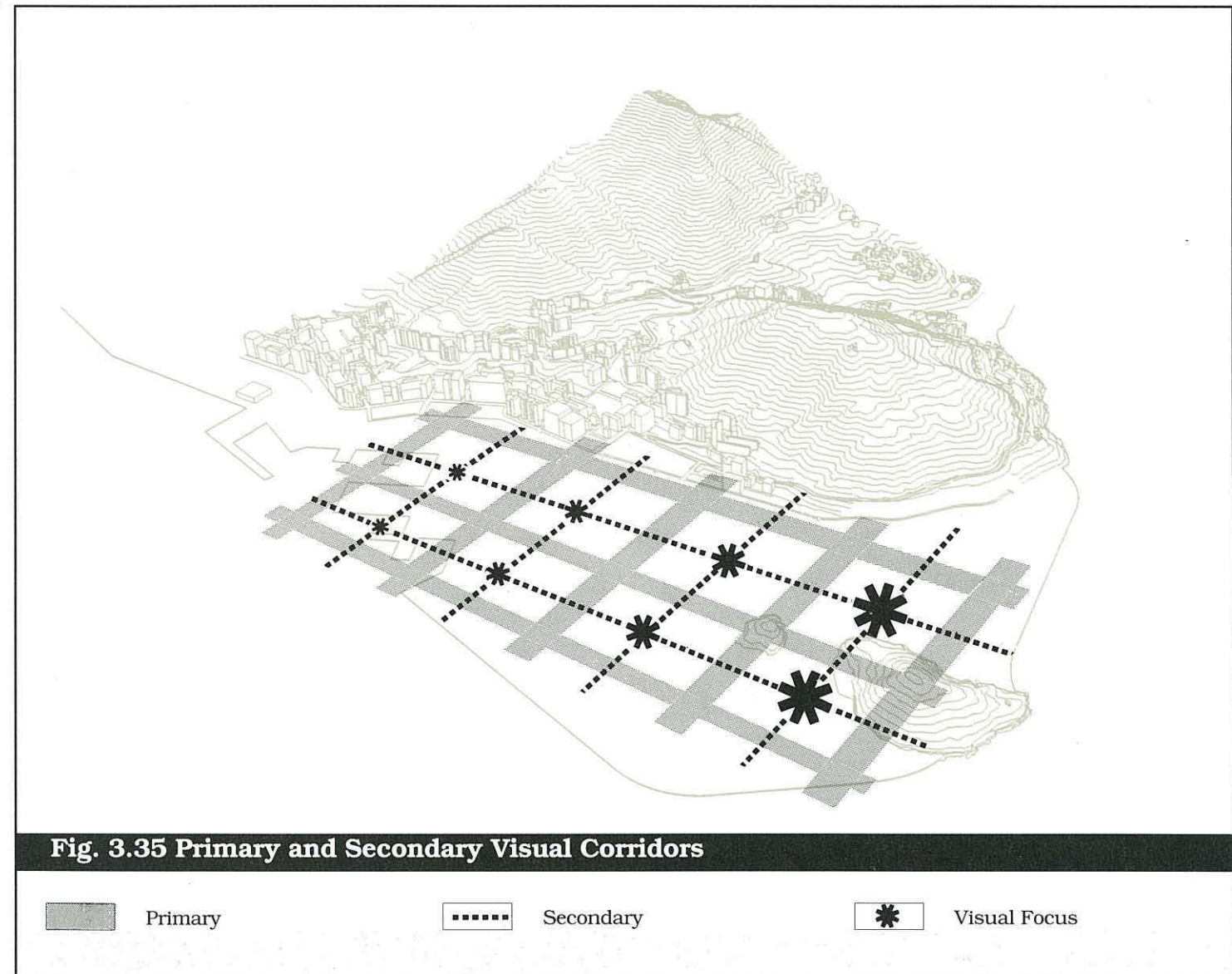
Civic squares, the waterfront promenades and congregation areas in the larger parks benefit from the use of large, shade-giving trees in areas of hard paving. Shade and visual interest are provided without restricting pedestrian movement.

Successful development of trees in such situations needs consideration of root aeration and drainage. Aeration and drainage can be enhanced by cross drains

between the tree positions and the use of tree grilles to prevent soil becoming too compact.

Reinstatement Planting

Reinstatement planting will comprise similar species and techniques to woodland planting. The reinstatement planting would particularly aim to blend new planting with the adjacent surroundings. It would be used in slope treatment works behind Kennedy Town and for restoration of land-based borrow areas.



3.4.6 Landscape Guidelines

Landscape design guidelines have been prepared for the various types of open space included on the MLP. They list all the conceptual principles, the open space uses and the design aspects, including planting, which have been selected for the open space hierarchy. This will provide a basis for a brief for the development of the different open spaces. These guidelines are presented in Appendix C of this report.

3.4.7 Maintenance and Management

An essential factor on which the success of the landscape proposals shown on the MLP will depend is the effective management and maintenance of the open space facilities and planning in the parks, amenity areas and buffer zones.

The allocation of extensive new areas of landscape and open space for maintenance will require the relevant

Government Departments to increase their resources in order to be able to allocate human resources to the tasks required. Under existing division of responsibility, the administration of various open space and amenity areas lies with the Urban Services Department, who are also responsible for the maintenance of all softworks and recreation facilities.

The design of hardworks elements in the parks and open spaces will select materials which will be durable and robust and thereby minimise future maintenance operations. During the design process liaison with the relevant maintenance authorities should be undertaken to identify maintenance requirements.

The majority of the planting along the roads and much of that in the open spaces is defined as "amenity planting". This will mainly comprise shrubs or ground cover and trees in relatively narrow bands or strips. Planting in these locations will require ongoing maintenance; particularly watering, pruning and fertilising. Before plants have established a dense cover, mulching will be required initially. In the longer term, more intermittent maintenance tasks will be required such as thinning, loosening stakes and ties, and ultimate removal of tree guards and stakes.

Areas of woodland planting are mainly identified in the Urban Fringe Park, in larger DOS and LOS sites, in buffer zones and embankment planting at roundabouts and interchanges. Woodland planting will require less intensive and less frequent maintenance than amenity planting. An initial establishment period of 2 years by the contractor is recommended. After this stage, maintenance would involve mainly silvicultural practice such as thinning and pruning. The species would be selected at design stage to be hardy enough to survive in the planted areas after initial establishment with no ongoing watering and fertilising.

During the development of design proposals for the Green Island Reclamation it would be necessary to make a detailed assessment both of the plant material which would be required and the personnel and equipment necessary to undertake the care and maintenance of the landscape. Locations would need to be identified for maintenance depots and possibly the development of a nursery in the area. Part of a buffer zone could be used as a nursery if one was required.

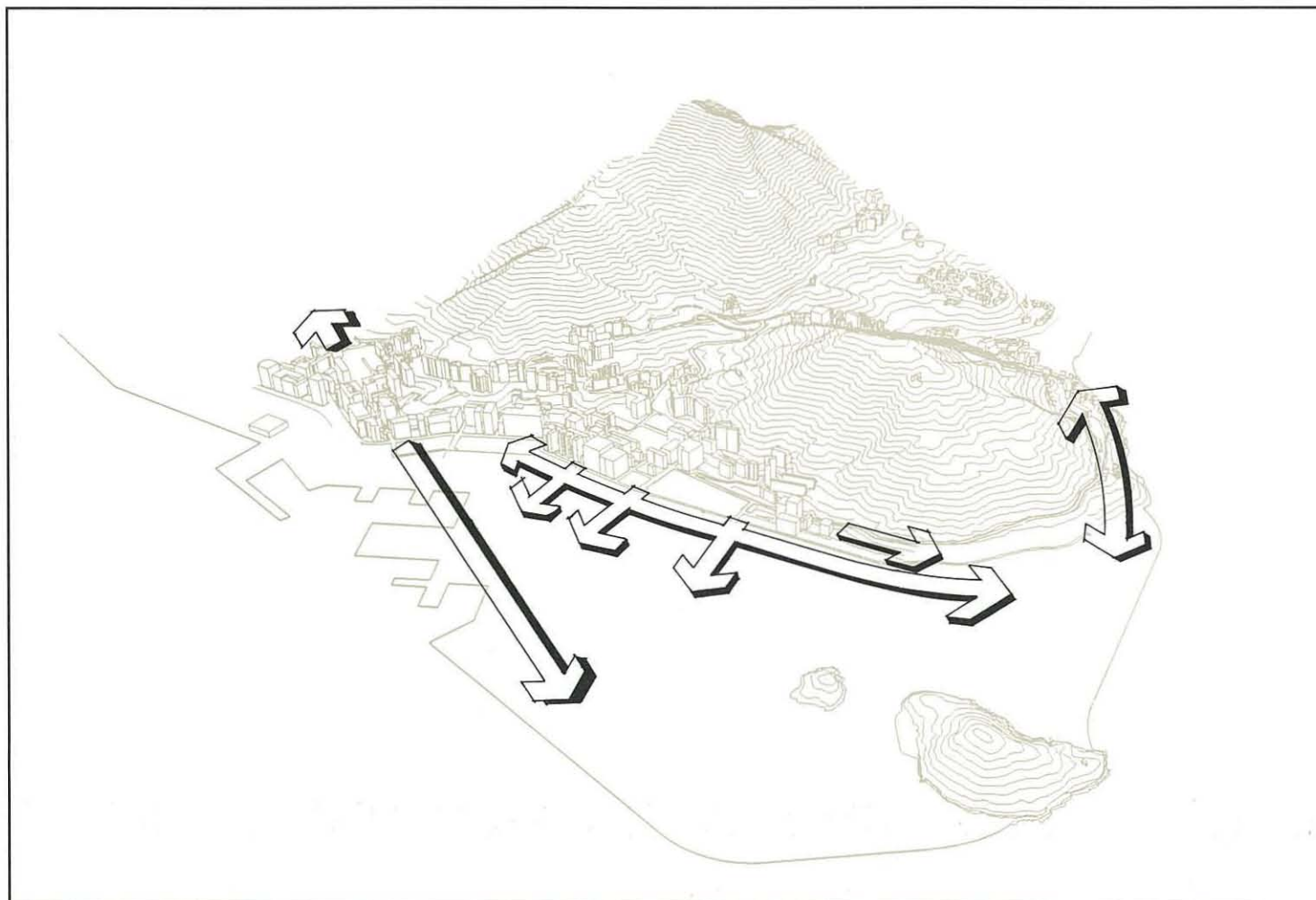


Fig. 3.36 Pedestrian Links

3.5 Infrastructure

The Brief requires that proposals be made for the servicing of the new reclamation area to allow development of the uses set out in the RODP. The services include foul sewerage and stormwater drainage networks, taking into account existing discharges and outfalls within the Study Area. Water supply networks and storage, utility services (electricity, gas, telephones, etc) and waste disposal schemes have also been studied.

3.5.1 Foul Sewerage

• Related Studies

The design of the foul sewerage system to serve the reclamation takes account of work of separate studies for adjacent areas and for the whole of Hong Kong island. These include :-

- Central and Wan Chai Reclamation Study;
- Central, Western and Wanchai West Sewerage Master Plan Study;
- Strategic Sewage Disposal Scheme;
- Study of Potential Use of Space Underground (SPUN);
- Cavern Project (CAPRO)

These studies influence the services provision as follows:-

- there is no requirement for the foul sewerage system to accommodate any flow from the Central and Wan Chai reclamation area, as the latter will drain eastwards.
- sewage treatment works will be constructed beneath Mount Davis as part of the strategic scheme. This will be designed with capacity to receive and treat the flow from the reclamation area and there is thus no requirement for further treatment works to be provided on the reclamation.
- the performance of Kennedy Town sewerage would improve if part of the flow could be diverted into the new system, and the Sewerage Master Plan being prepared for the area assumes such diversion of part of the flow.

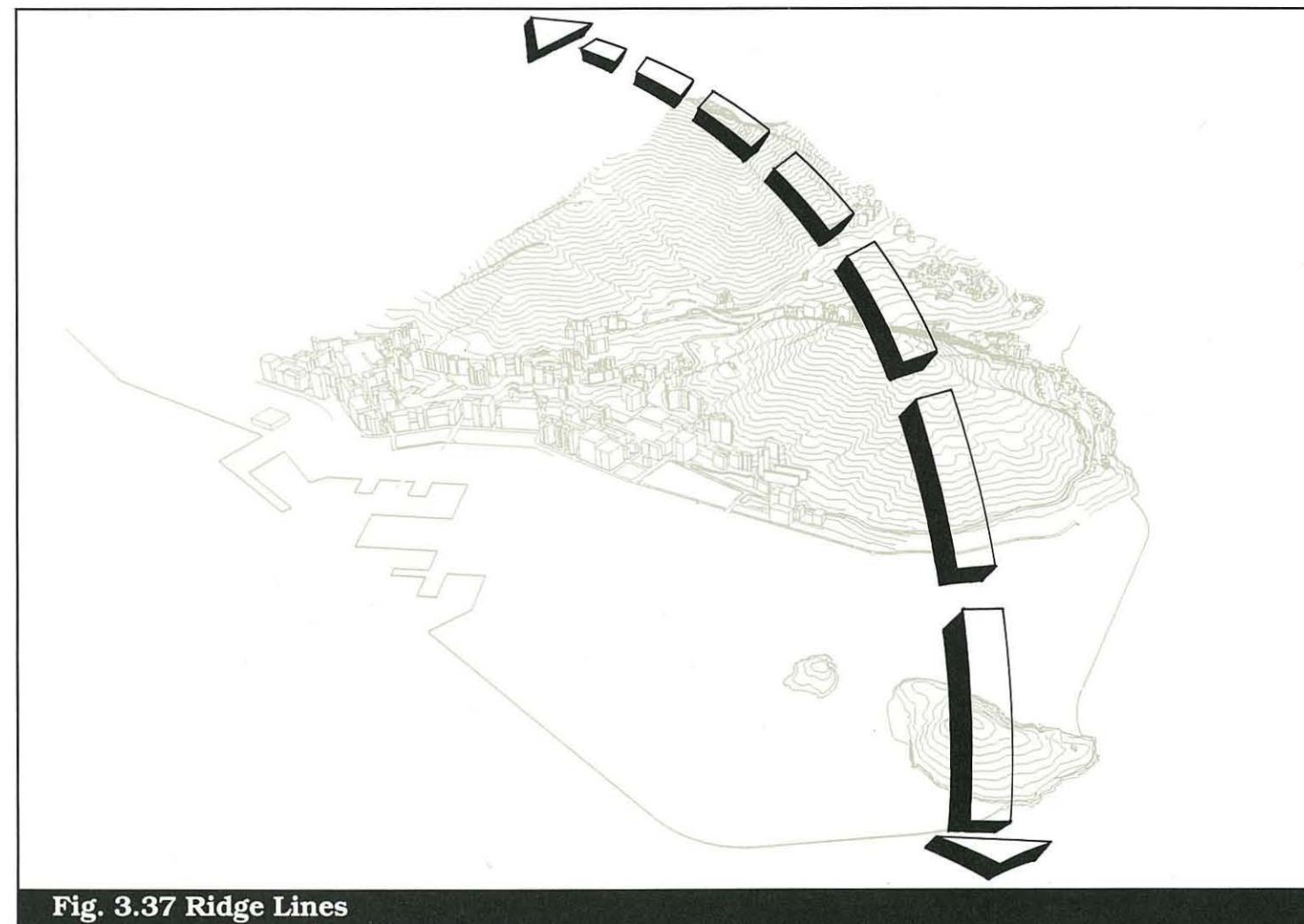
• Outline Design of System

The layout of the proposed system is based on the following two main principles:-

- a collector sewer will run east-west along the approximate alignment of the existing seawall to receive flow from both the new reclamation and where necessary from Kennedy Town existing systems.

- the general direction of flow in the system will be from north to south to drain directly into the collector sewer without pumping. This would not be possible with a radial or northward draining network.

Sewage treatment will be provided within Mount Davis. The collector sewer will drain westwards to meet the proposed deep tunnel strategic system near the south-west corner of the reclamation. It is not yet known whether an independent pumping station will be required for the Green Island flow or whether the pumping



facilities provided under the strategic scheme can be utilised. The proposal for the latter is not sufficiently developed at the time of writing this Report.

5 The primary sewerage network is shown in Figure 3.40. The two main north-south arterial sewers will be aligned to avoid the primary distributor road tunnel and will pass under the approach roads instead. As the reclamation is at its highest adjacent to the tunnel, the sewer may be 6-8m deep for short lengths in this area.

6 The preliminary design of the system has been based on a per capita contribution of 300 litres/day, and a flow peaking factor of four times dry-weather flow, in accordance with the Civil Engineering Design Manual. However with the use of mathematical modelling techniques during the detailed design, it is recommended that more specific factors (from 6 for small-bore sewers to 2 for main trunk sewers) should be used in accordance with current international practice.

does not tie in with JSDS prediction.

7 It has been assumed that a gravity flow of up to 260 litres/sec will be received from the Kennedy Town system in accordance with provisions of the Central and Western Sewerage Master Plan.

8 In the preliminary design, adequate gradients have been adopted to achieve self-cleansing velocities of flow and to avoid backfalls developing on the event of settlement. However, steeper gradients should be adopted if possible during detailed design when it has been established whether the strategic sewerage pumping system can be utilised.

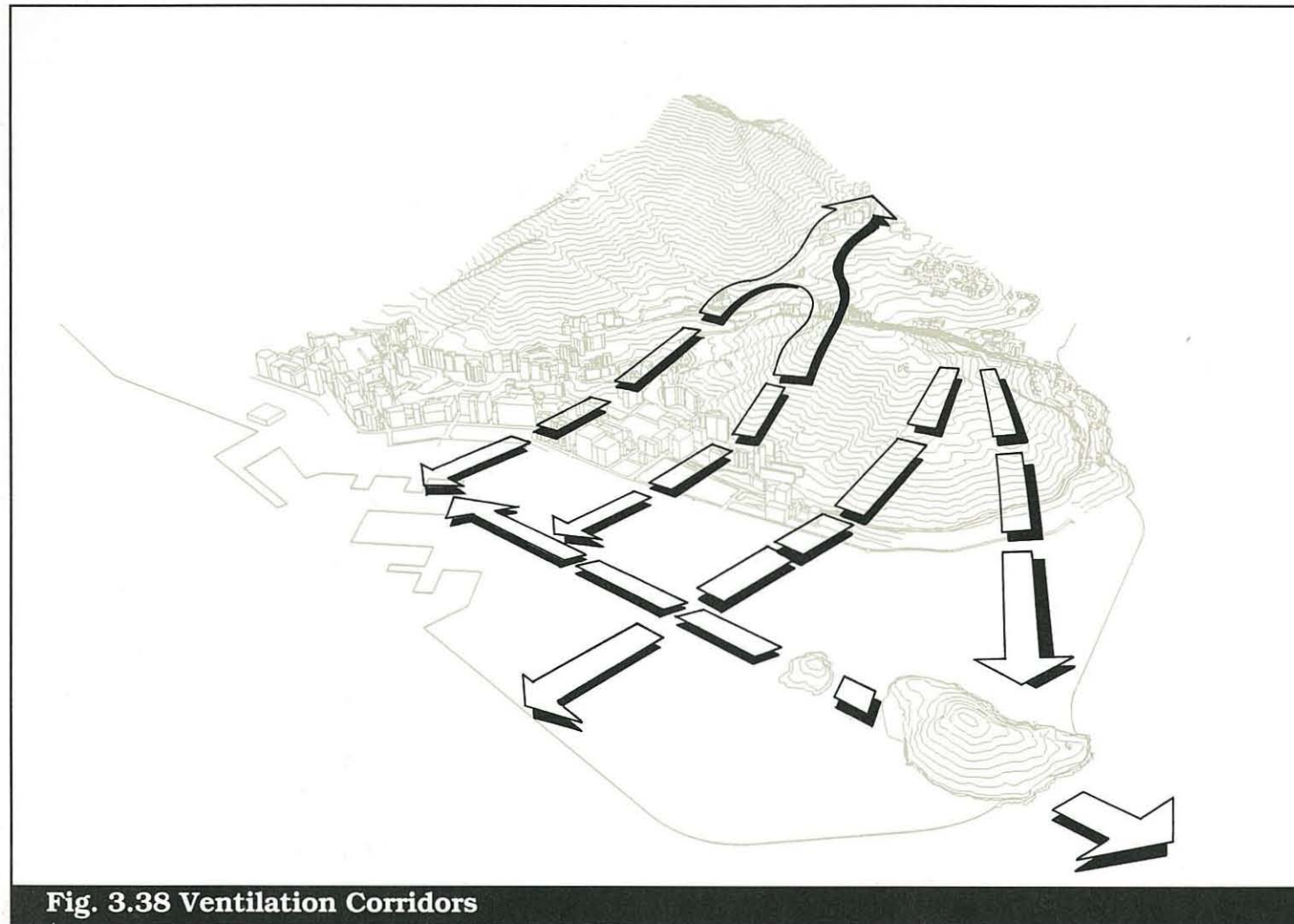
3.5.2 Stormwater Drainage

• Outline Design of System

The proposed layout of the primary stormwater drainage system is based on the following main principles:-

- a major collector system will be constructed along the alignment of the existing seawall to pick up the 16 existing storm water discharges from Kennedy Town. Part of this will be constructed under the Belcher Bay Link contract.
 - drainage from the reclamation area is generally radial from the central higher ground level area to minimise the depth of sewers;
 - the reclamation area has been divided into catchments in a pattern which remains unaffected generally by the position of the Green Island Link, except at the tunnel approaches;
 - no discharge of stormwater is planned within the PCWA or any other confined water area.
- The length of the existing seawall and the volume of existing discharges from Kennedy Town are such that it is necessary to divide the main collector system into separate catchments. These are shown on Figure 3.41 draining eastwards and westwards. The actual point of division can be varied if necessary during detailed engineering design to suit the existing invert levels of the drains to be collected.

The gradients adopted in the design of the stormwater system vary from those of the foul sewerage since the sea level at the discharge is a limiting factor. Irrespective of the physically-constructed gradient, the actual hydraulic gradients will be dictated by the sea level.



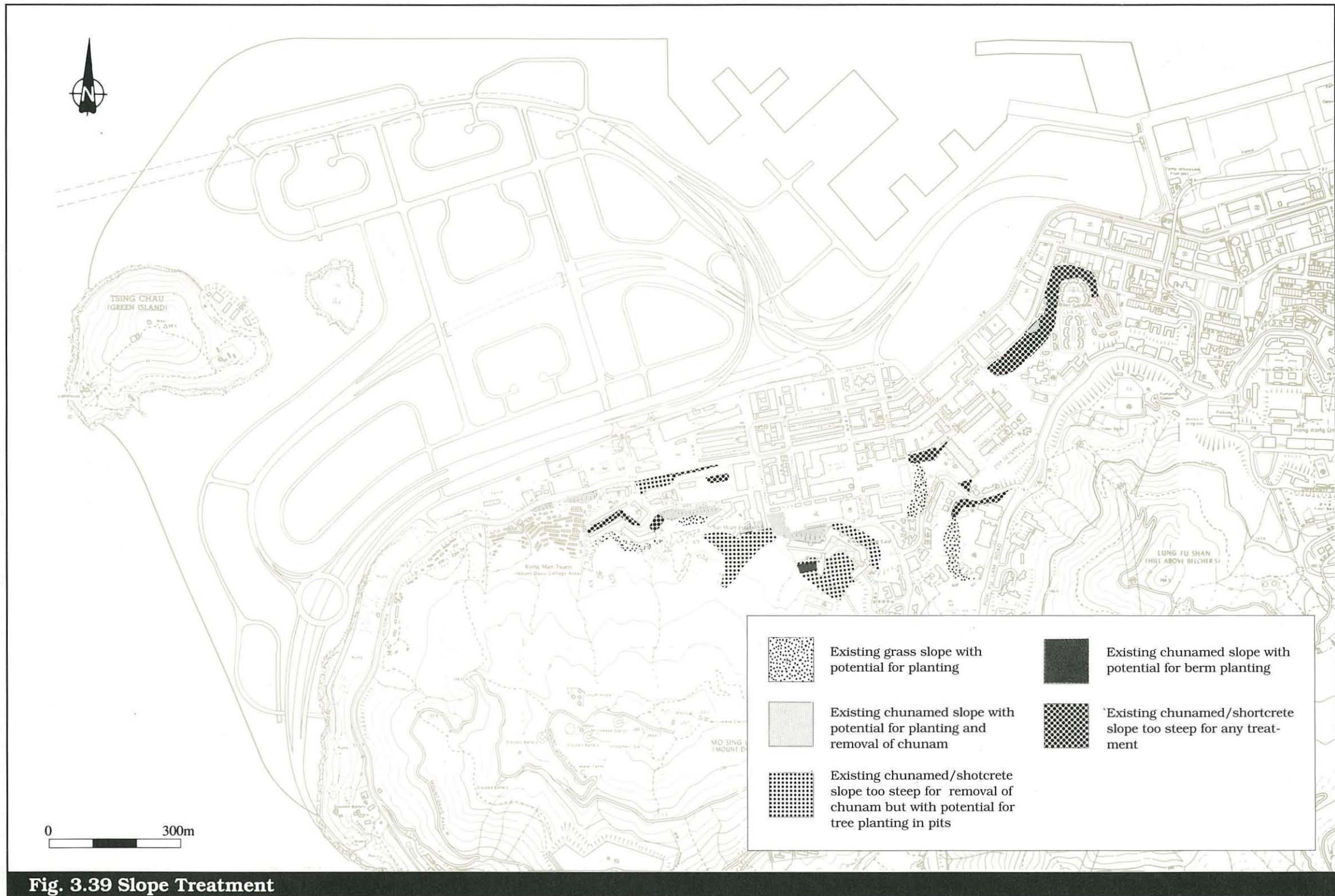


Fig. 3.39 Slope Treatment

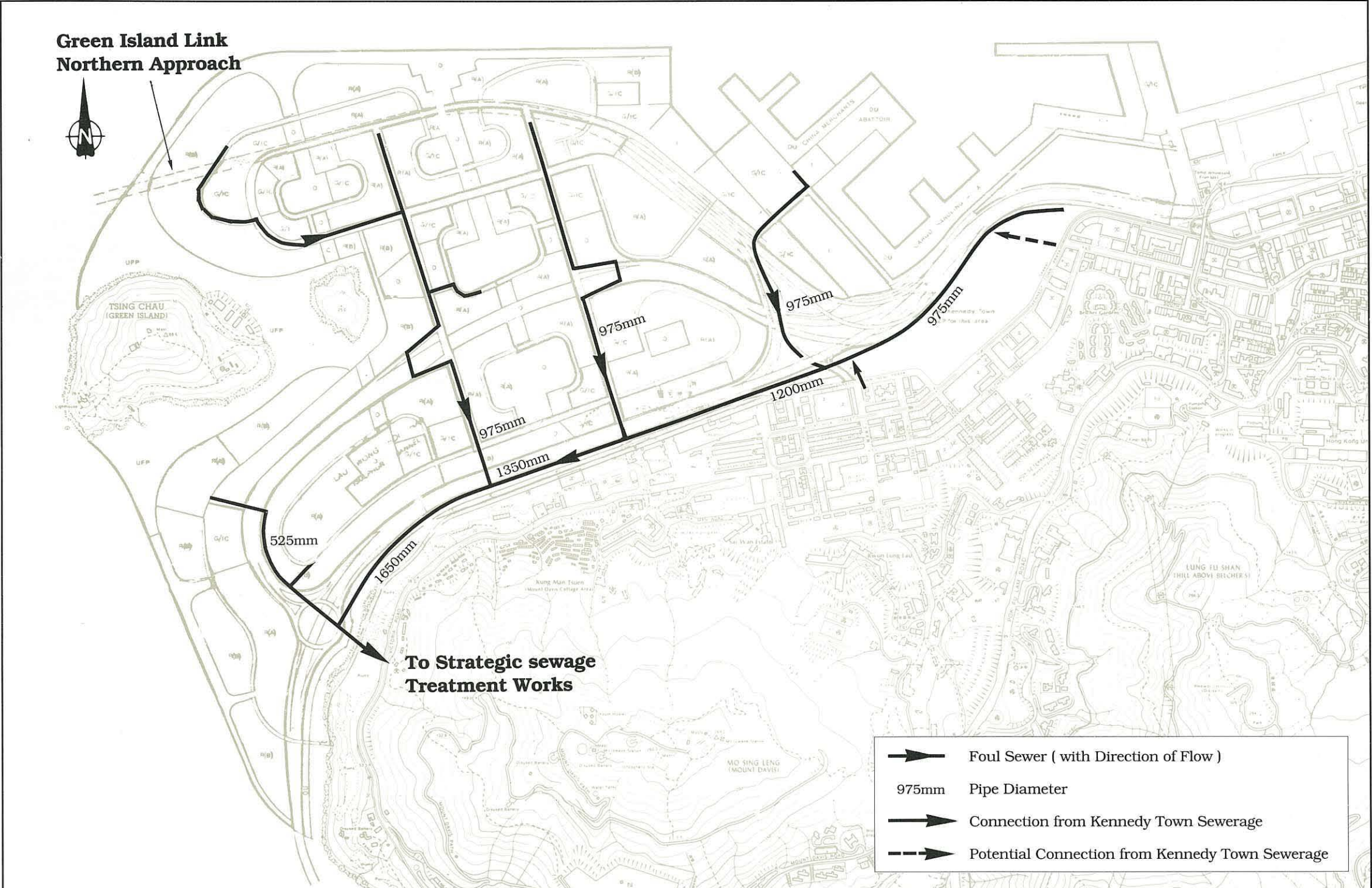
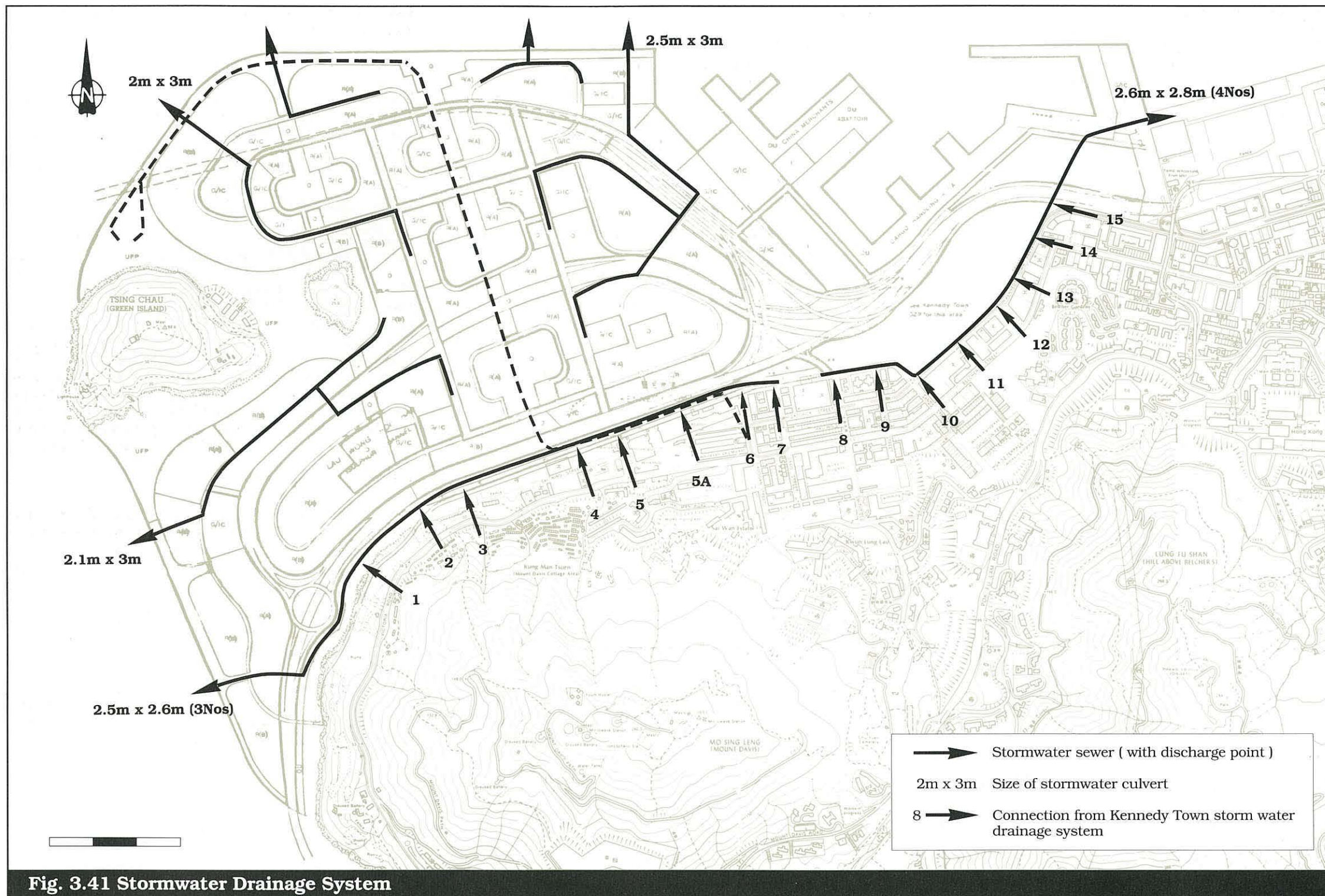


Fig. 3.40 Sewerage System



The preliminary design of the system has been based on a 200 year return-period storm in accordance with the C.E. Design manual. Highway drainage systems are unlikely to be able to conduct the run-off from such an extreme event into the drainage network, and some surface flooding is considered inevitable. This is particularly likely along the toe of the fairly steep slopes of Kennedy Town where existing ground and building threshold levels are low.

The concept of a "clearway" at a slightly lower level than the general reclamation has been introduced to cope with this. The clearway will consist of an unobstructed corridor some 20 metres wide, finished at a level of 4mPD and will closely follow the existing seawall. This can accommodate initial surface flooding with a minimum of discription to the adjacent developed areas and will provide a reserve for the stormwater and foul water sewers.

• Special Considerations

It will be necessary to relay the final length of some of the existing Kennedy Town storm sewers to enable them to be received by the new collector system. The capacity will not be compromised in any of the affected sewers.

At present there are expedient industrial and residential connections discharging polluted water to the existing storm drains from Kennedy Town. They will be reconnected to the sewerage system during implementation of the Central, Western and Wanchai West Sewerage Master Plan Study.

During reclamation, the existing storm drains from anticipated is in the range of 300-390 litres/head/day, plus an appropriate allowance for industrial use of up to 40 litres/head/day depending on the specific nature of the industry.

A new cross-harbour delivery main will be required in each case, and a new reservoir will be required adjacent to the new reclamation to service the development. This will occupy an area of some 10,000m. A site at Kung Man Tsuen, which is due to be developed by Water Supplies Department to serve Kennedy Town, may be suitable.

The distribution network will generally follow the road network within the reclamation, or the open spaces and service reserves where necessary. The development of the network has been arranged to suit the phasing of reclamation.

• Flushing Water

The Kennedy Town Saltwater Pumping Station will have to be abandoned when the reclamation proceeds. It will be replaced by a new station requiring some 1500m on the new waterfront. The intake should be located 100m from marine activities and stormwater discharges. The existing capacity of 3270m³/day will have to be increased to provide an additional 70 litres/head/day for the reclamation and industrial use.

The new station will also supply the existing Kennedy Town system and feed a new reservoir to service the reclamation development. The reservoir will be similar in level and location to the potable water reservoir, but will require an area of approximately 2500sqm.

The saltwater distribution system will generally follow the potable water distribution system.

Consideration must be given during the detailed engineering design to the requirement for disinfection of the flushing water supply, which will depend on water quality at the proposed intake. It is normal to chlorinate the water from Victoria Harbour.

• Cooling Water

The existing pumping station, located on the sea front and supplying cooling water to the abattoir will be relocated with the abattoir.

The requirement for further cooling water supplies will have to be assessed when the nature of specific industries within the development is established. The requirement for disinfection should also be noted.

3.5.4 Other Utilities

• Electricity

Power to the proposed development will be provided from the Hong Kong Electricity Company's existing Mount Davis - Sheung Wan circuit. Two sub-stations will be required on the reclamation, each occupying some 1600-2000sqm. One sub-station will be located in the east of the development and one in the west.

Cables will follow roads and footpaths in accordance with standard practice, except for passage through open spaces and service corridors. They will generally have a cover of at least 1.2m beneath roads and 0.6m

beneath footpaths. Ducts will be required under major road crossings.

• Gas

The gas supply to the new development will probably be from the North Point Depot of the Hong Kong & China Gas Company and will require a new intermediate pressure main (240-700 kPa). The pressure will gradually reduce to medium (7.5- 240 kPa) and low (2-7.5 kPa) within the distribution network, which will generally follow the alignment of the electricity and water.

Mains will be laid with a cover of 600-1100 mm depending on working pressure and location.

There is a possibility that the gas supply will have to be brought from Tsuen Wan rather than North Point if the present demand in Central and Wanchai increases. This will require a new cross-harbour main and a pigging station at the landfall on the reclamation. Provision has been made in the development plan for a site of 2500sqm. The station will require a clearance of at least 15m on three sides and 50m on the fourth side in compliance with statutory safety regulations. The 50m clearance has been arranged on the seaward face.

• Telephone

The Hong Kong Telephone Company has advised that two exchanges will probably be required to serve the reclamation, each requiring some 2500sqm. These need to be remote from electric rail or tram systems (at least 200m).

Provision has been made for one in the east of the development and one in the west.

• Cable TV

At the time of detailed engineering design it will be appropriate to consider whether provision should also be made for Cable TV conduits.

3.6 Environmental Assessment of the Plan

3.6.1 Air Quality

Introduction

This section gives an overview of the air quality of the reclamation and the effects of the reclamation on air quality in Kennedy Town. The RODP indicates the likely land usages but does not identify the type of industry or the precise layout of the buildings that may occupy the areas.

It will be necessary to continue the process of environmental assessment during the implementation of the development to minimise impacts.

Air Quality Guidelines

Overall policy objectives for air pollution are stated in Chapter 3 of HKPSG. The guidelines suggest that due consideration be given to the location of major polluting uses to improve the regional air quality and broad guidelines are presented for industry, residential and transportation systems.

These broad guidelines have been used to select environmentally acceptable solutions where choices have existed.

Assessment

The principle air quality impacts are road vehicle emissions and industry emissions.

A broad assessment has concentrated on identifying worst case scenarios for traffic emissions and on reducing the potential for industrial emissions which have an impact on sensitive receivers.

• Traffic Emissions

During peak traffic the centre of Kennedy Town suffers from traffic congestion with low vehicle speeds. The pollution emission rates can be relatively high due to these low speeds. The predicted concentrations of pollutants are generally well within the AQO standards. The levels of nitrogen oxides (NOX) approach the AQO for nitrogen dioxide (NO2) at some locations. The results indicated a typical picture for an urban environment with congested traffic and a high proportion of heavy diesel vehicles.

Predictions were made, using worst case scenarios, of pollutants derived from vehicle emissions. The predictions were based on the forecast AM and PM Peak Hour Traffic Flows for the RODP in the year 2011. These predictions show that the AQO for carbon monoxide and lead will be maintained.

Predicted concentrations of NOX are high and calculations showed that the 1 hour AQO standard may be exceeded in three areas:

- Green Island Link Approach Roads
- Primary Distributor PDI Tunnel Portals
- Route 7 across Belcher Bay

These concentrations will decrease with distance from the roads, rapidly dropping to within the AQO. The predicted dispersions indicate that AQO should not be exceeded beyond 25m from the roadside.

Although predictions of vehicle emitted pollutants indicated the potential for unacceptable conditions to be generated at three locations, these predictions are worst case estimates. Improvements to vehicle emissions are already underway. The imposition of new vehicle emission standards, the availability of catalytic converters and unleaded petrol will beneficially affect the levels of vehicle emitted pollutants.

The ventilation stack for the Green Island Link has been located on the northwest corner of the reclamation on the tunnel alignment. This location will provide dispersion of the exhaust emissions plume by prevailing winds for 70% of the year. Winds from the west to north quadrant pose the possibility of impact on the adjacent development for about 10-15% of the year.

A prediction has been carried out based on traffic mix and flows for the year 2011 and assuming a 20m high stack. This prediction suggests that the emissions will not exceed the AQO in the surrounding areas.

Further detailed study of the pollutants and their emission rate is required before a more rigorous assessment can be made of the ventilation impact. At that stage consideration should be given to the height, velocity and direction of release, composition of the emission and possible landscape and visual appearance of the ventilation building and stack.

• Industrial Emissions

There are several sources of industrial air pollution in the Study Area; the principle ones are the Kennedy Town incinerator, the Kennedy Town abattoir and Green Island Cement plant.

Serious environmental concerns have been expressed previously about the incinerator and abattoir emissions. Both emissions suffer from poor dispersion conditions due to the height of the emission relative to surrounding buildings and the local topography.

The problems of the Green Island Cement plant are mainly fugitive emissions, spillage of material and contamination of the road system by vehicles. Re-entrainment of the dust into the atmosphere by the wind or moving vehicles also causes nuisance.

The incinerator is planned for shut-down in 1992. The abattoir will be relocated into the new port area. The related by-products and cremation facilities will be relocated outwith the Study Area. The Green Island Cement plant will not be reprovisioned in the Study Area.

The abattoir and rendering plant have been located such that a buffer zone of 300m is provided in the RODP. The reprovisioning of the abattoir will allow up-to-date process design and pollution abatement equipment to be incorporated. This will significantly reduce the impact of the installation.

In time other industries will be located in the district. In view of the high proportion of residential land use, the area is not one that can satisfactorily accommodate industry which has the potential for significant emissions.

Industrial emissions should be confined to the port areas. New industrial ventures should incorporate up-to-date process design and pollution abatement equipment to reduce emissions to an acceptable level.

Further detailed study of the pollutants & their emission rate is required before a more rigorous assessment can be made of the ventilation impact.

3.6.2 Water Quality

Introduction

There are no natural surface water courses in the Study Area. Water quality objectives have been assessed for marine waters and how these may be influenced by the proposed development.

As with noise and air quality, it will be necessary to continue the process of environmental assessment during the development of detailed plans for the proposed project.

• Water Quality Guidelines

The objectives of The Hong Kong Planning Standards and Guidelines that relate to water quality have influenced the RODP development and resulted in

- location of industries in areas adequately served by public foul sewerage.
- location of major residential developments in areas which will be adequately served by existing or new public sewerage and sewage treatment facilities.

Assessment

The principal factors affecting water quality in the surrounding water region will be public sewerage, wastewater treatment and disposal, operations within the new port area and PCWA.

Kennedy Town has systems for the collection and transport of surface drainage and foul sewerage. The system for surface drainage has been utilised to carry foul flows. Discharges into Victoria Harbour from the Kennedy Town system form significant sources of pollution.

Domestic sewage arisings and industrial flows are directed to the Central screening plant or to stormwater drains. There will be high organic and silt loads entering Victoria Harbour from Kennedy Town but there may also be inorganic pollutants arising from industries located in the area.

Other significant sources of industrial pollutants include the abattoir, the incinerator, lightering traffic and wharfage activities.

Modelling of impacts from reclamation req'd?

Water quality in the vicinity of the proposed reclamation site is reasonable although it is deteriorating. At present the waters off Kennedy Town appear capable of assimilating the current pollution loads, although this capacity is diminishing.

The proposed development will have a net beneficial impact on water quality. This will result from the following factors:-

- Efficient sewerage systems will transfer foul sewerage for treatment in the Sewage Treatment Works in Mount Davis and discharge only surface water to the harbour.
- The relocated and reprovisioned abattoir should provide effluent treatment which will significantly improve the quality of discharges.
- Detailed guidelines for the control of port and PCWA operations should be drawn up and enforced to minimise water pollution and aid the improvement of water quality.

3.6.3 Noise Impact

Introduction

This section assesses the traffic noise levels likely to affect the reclamation and to presents noise mitigation measures that may be necessary. The RODP indicates the likely usages of the various plots of land but it does not give the precise layouts of buildings. It is therefore not possible to calculate the precise level of noise at each building facade.

Noise Limits

The Hong Kong Planning Standards and Guidelines (HKPSG) recommend maximum allowable noise levels outside buildings of different categories. The limits for the following are :

Dwellings	70dB(A)
Schools	65dB(A)
Hospitals	55dB(A)

The HKPSG levels have been based on achieving acceptable internal noise levels with open windows and on maintaining a reasonable level of noise in external areas close to buildings.

Experience has shown that these limits are difficult to achieve without large set-backs from even lightly trafficked roads.

Assessment

The level of traffic noise to be expected at the facades of noise sensitive receivers (NSR) has been estimated and the results are shown on Figure 3.42.

It should be noted that the predicted noise levels shown on Figure 3.42 are not necessarily those experienced outside the facade of buildings at that position. The design of the building, in particular the orientation of the windows, influences the resulting noise levels. As these factors cannot be determined at this stage, a 'worst case' situation has been taken of a minimal setback from the road (10m) and a large angle of view.

Unless mitigation measures are taken, traffic noise levels are likely to exceed the limits given in the HKPSG.

Reductions In Traffic Noise At Facades

Four broad categories of mitigation measures can reduce the level of traffic noise affecting noise sensitive areas.

• Land use planning

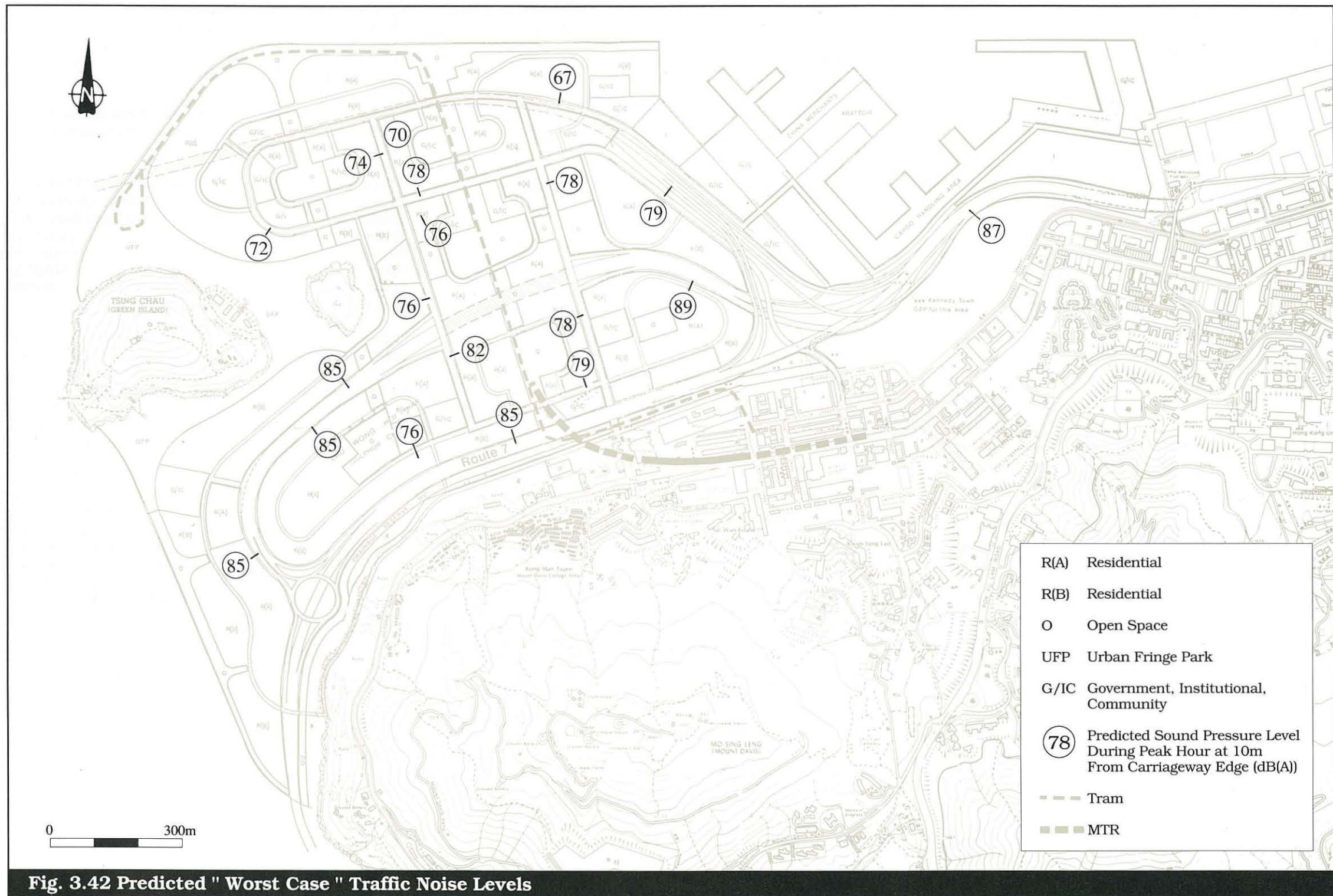
- plan compatible land uses
- use non-sensitive buildings as screens
- provide distance setbacks between roads and residential areas

• Traffic measures

- reduce traffic speeds on high speed roads

• Road design

- use open textured macadam surfacing on a cushion course
- provide roadside noise barriers
- use tunnels or deep cuttings



• **Architectural design**

- minimise angle of view to traffic noise
- limit area of openable windows
- use non-sensitive rooms as buffers
- use single aspect housing
- use podium to provide acoustic shadow

Recommendations

Many of these mitigation measures have been used in developing the RODP. Other specific measures are recommended to be adopted when taking the plans to a more detailed stage.

It is recommended that a sound absorbing road surface be provided for:

- Strategic Links
- Primary Distributors
- District Distributors
- Local Distributors

Single aspect housing should be provided along the north of Route 7.

A roadside noise barrier should be constructed along the Green Island Link approach. The height of the barrier is estimated to be 6m above ground level but this will depend upon the height and setback of nearby buildings.

The primary distributor road PD1 will be located in a tunnel for 300m in the centre of the reclamation.

A roadside noise barrier should be provided where the primary distributor road enters the tunnel.

Acoustic screens should be used along the Route 7/ Green Island Link interchange.

The schools should be located away from the strategic links and the primary distributor. Optimum setbacks and careful orientation of the schools is essential.

The RODP makes use of non-sensitive buildings (eg commercial/ retail and sports halls) to screen sensitive areas located close to the strategic links particularly along Route 7.

Residential developments should be angled to major roads to reduce the 'angle of view' of the traffic noise.

Turning radii for trams should be at least 75m.

Developers should be encouraged to incorporate the tram turning areas below the podium of a development. A reduced turning radius would then be acceptable.

Tram lines should be installed as straight as possible and high quality rails used.

Figure 3.43 shows the noise control recommendations.

Area Exceeding HKPSG Guidelines

Not acceptable!

Implementation of all the above recommendations will not reduce noise to acceptable levels in all areas. Some developments will need to incorporate noise mitigation within their design.

An indication of the areas where this is likely to be necessary is shown on Figure 3.44. It has been assumed that the setback would be 10m from the edge of the carriageway and that the angle of view was more than 60°. Mutual screening by blocks is likely to ensure that only the areas at the perimeter of the plot exceed the HKPSG guidelines.

3.6.4 Visual Impact

Visual impact can be assessed in the way the existing landmarks and landscape character have been retained and the way the overall plan optimises the urban design opportunities.

Two specific landscape elements give character to the site. Firstly, the Sai Koo Shan - Mount Davis ridge line is a powerful visual spine of Hong Kong Island that provides a natural backdrop to the urban area and the future reclamation site. It is an important visual separation between the urban fringe and rural areas. Secondly, the two Green Islands mark the entrance to Victoria Harbour. Green Island especially, with its mass, vegetation and water surround is a distinct landmark.

The study objective to minimise the environmental impact on Kennedy Town has been achieved by creating good linkages between Kennedy Town and the reclamation and by providing open space to compensate for existing shortfalls.

Another objective is to adopt high visual standards for the development and to optimise the use of existing landform to guide built form.

This is achieved through overall massing, the positioning of appropriate land uses and features at landmark locations, limiting building heights in significant locations.

The urban design guidelines described in section 3.3 are the means by which the visual standards for the housing and industrial areas are developed.

Urban design guidelines and development control can be an effective mechanism in sculpturing the massing of the development to create an effect that retains the views to the ridgeline and emphasises the backdrop of the mountains. The development site can be zoned into areas of maximum heights ensuring no building can destroy the effect of the building mass profile.

The use of landmarks and features creates an identity for the area. The retention of Green Island and Little Green Island within a park setting will enhance their visual significance as landmarks. Features created at nodes throughout the park network will contribute to the development of a coherent open space network which is enhanced by the vistas and axes. Landmarks may also have functional requirements such as the tunnel ventilation shaft in the Urban Fringe Park.

The implementation of the development according to the urban design guidelines and MLP is crucial to meeting the visual objectives laid down for the development.

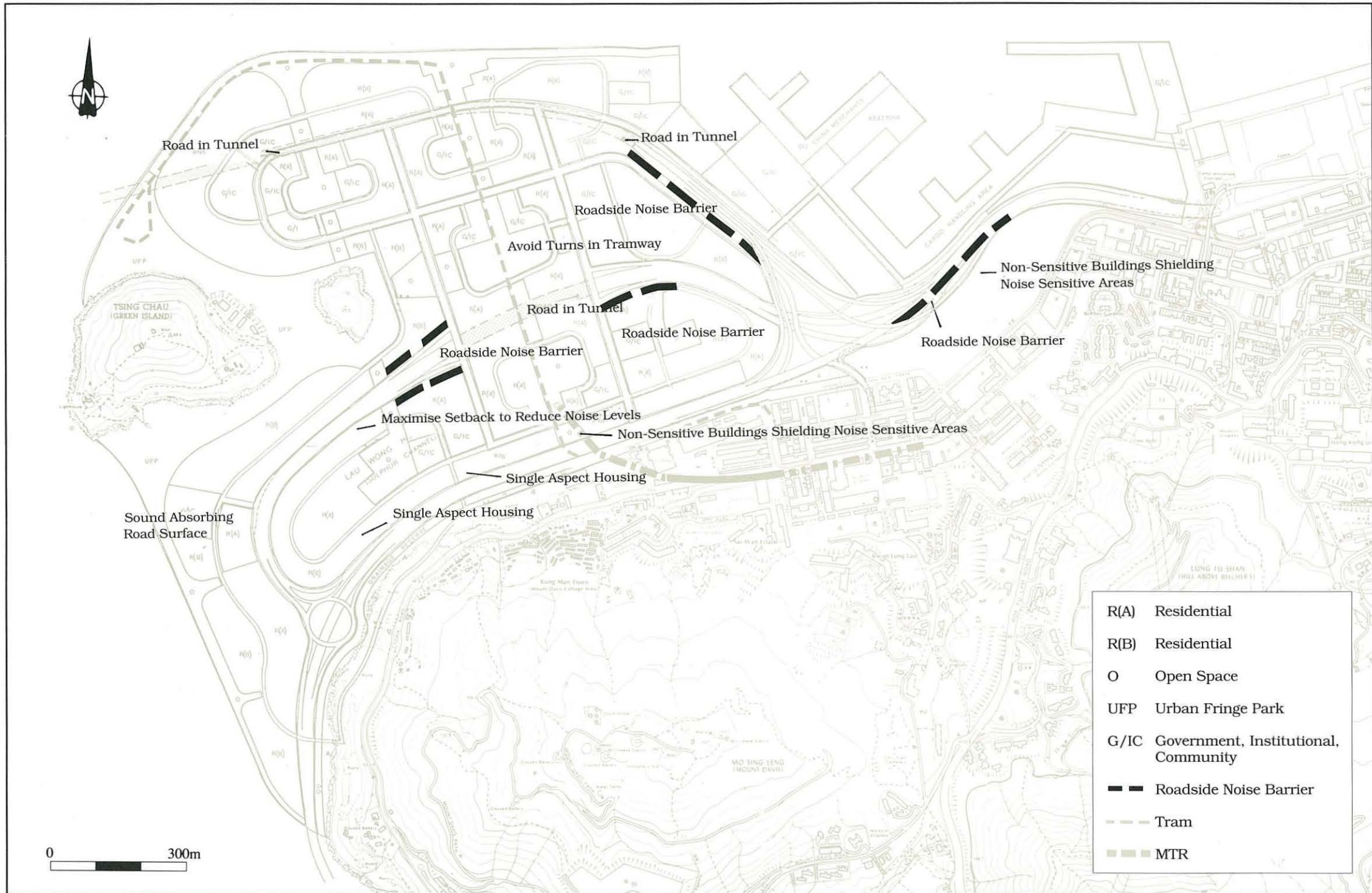
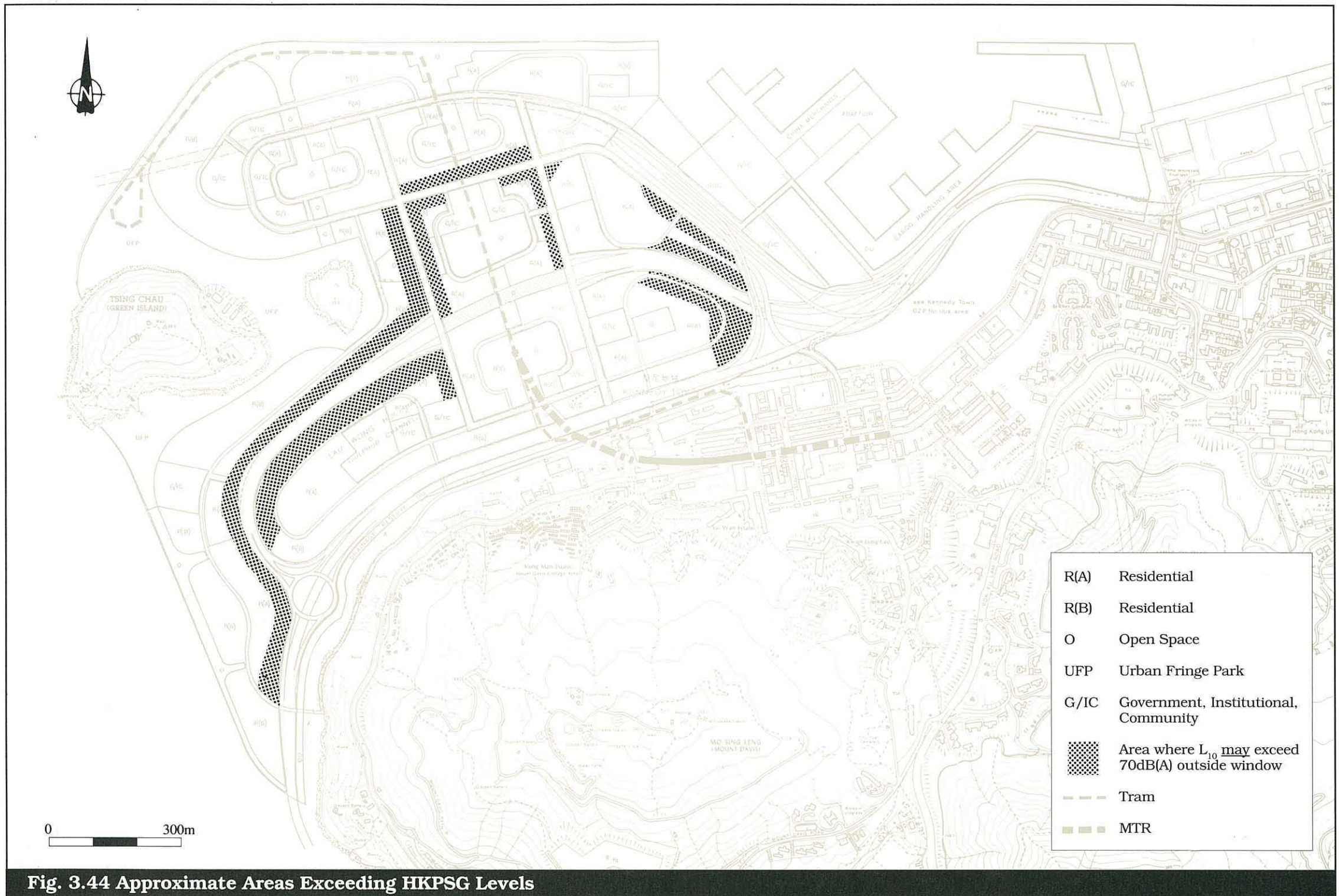
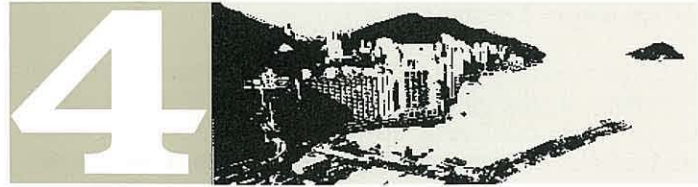


Fig. 3.43 Noise Control Recommendations





Kennedy Town

4.1 Key Issues

The Study Brief calls for recommendations of proposed amendments to the draft Kennedy Town and Mount Davis Outline Zoning Plan No.S/H1/2. These changes should resolve any problem identified and should ensure that the RODP ties in with the land use proposals for the existing urban area.

The key planning issues which are relevant to possible Outline Zoning Plan (OZP) modifications are :

- the urban renewal opportunities in Kennedy Town and the extent to which sites can be identified for comprehensive redevelopment.
- the potential contribution which urban renewal can make to the environmental upgrading of Kennedy Town.
- the provision of G/IC and Open Space facilities to meet the current and projected deficiencies in Kennedy Town.
- the impact of the reclamation upon existing waterfront activities in Kennedy Town and the measures required to ameliorate the adverse impacts.
- linkages between Kennedy Town and the reclamation area; the pedestrian/vehicular circulation system and the landscape/open space network.
- the relationship between existing and future land uses in Kennedy Town and the reclamation area (particularly Belcher Bay).

- the interface between existing development in Kennedy Town and the proposed alignment of Route 7.
- the potential for improved accessibility to/from Kennedy Town by MTR and strategic road links.
- the opportunity to improve the local road system in Kennedy Town by improved traffic management measures.

4.2 Urban Renewal Context

4.2.1 Introduction

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. Data was collected on age, condition and the provision of basic amenities for all residential blocks in the Study Area. Information on floorspace, plot ratio, bad neighbour uses and urban street quality has been assessed. These factors can all be expected to influence the possibility of future re-development taking place. The multiplicity of ownership within many of the blocks and lack of knowledge of the intentions of individuals makes any predictions of likely redevelopment speculative.

It is therefore important, in proposing modifications to the existing OZP, to identify large packages of urban renewal which can be managed by major private sector developers within an overall planning framework which will seek to improve the physical and environmental conditions in Kennedy Town.

The scope for larger packages of urban renewal is limited by the presence of both anticipated and recently completed developments which are dispersed throughout most street blocks. Whilst this does not preclude further renewal, it does limit to some extent, the scope for comprehensive renewal.

4.2.2 Parameters For Urban Renewal

MTR Link

Options for the MTR and station location in Kennedy Town will be an important consideration in any urban renewal programme for Kennedy Town. The southerly alignment and station position shown in the existing Outline Zoning Plan have not been taken as a constraint in this analysis.

The Green Island Reclamation

The timing, form and nature of development on the Green Island reclamation will influence urban renewal proposals for Kennedy Town. The reclamation will facilitate and most likely encourage renewal. The recommendations for the draft OZP are based on the premise that the reclamation will be undertaken, otherwise further revisions to the OZP will be required.

Belcher Bay

The Belcher Bay area of reclamation will provide an important contribution towards the shortfalls in G/IC and open space provision in Kennedy Town. It also provides residential areas which can be used for decanting during programmes of urban renewal.

Sites Released By Reprovisioning Measures

Reprovisioning of existing waterfront uses has been highlighted in Section 3.1.3. Figure 3.3 outlined non-industrial uses which require reprovisioning.

The Kennedy Town New Praya between Cadogan Street and Sands Street is classified as a 'permitted seafront' and is connected with the activities of the wholesale market and the Green Island Cement Company. The Fruit and Vegetable Guild have indicated that their waterfront operations would be transferred with the wholesale market, when it is relocated to the Western Reclamation by 1994.

The Green Island Cement Company is currently a source of environmental nuisance; they will lose their marine access should the reclamation take place. The bridge and pier are held on a licence and short term tenancy respectively; each can be terminated by 6 months notice in writing from the District Lands Office. This activity should be relocated outwith the Study Area.

The Kennedy Town abattoir is an environmentally polluting use which regularly causes complaints about odour and noise from nearby residents. The odour is generated by the animal lairage and slaughtering activities and exacerbated by emissions from the by-product plant and cremator. The Privatisation of the abattoir took effect in November 1990. The replacement abattoir and rendering plant will be relocated in the new port area, where it has a waterfront and is easily accessible by vehicles for distribution on HK Island.

The by-products plant should be relocated outside the Study Area.

The incinerator will be phased out by 1992. A refuse transfer station (RTS) will be established in Western District and waste will be transferred by barge to the Western New Territories Landfill. Prior to the Island West RTS becoming operational, an RTS will be located in east HK Island by 1992. This will render the existing incinerator obsolete.

The Wholesale Market comprises the freshwater fish market and the imported vegetable market. These two markets will be relocated to the permanent wholesale market complex in Kennedy Town which is presently being completed. The freshwater fish market will be relocated in late 1991. The imported vegetable market is to be relocated under the second phase which has provisionally been programmed for 1994.

The China Merchants Company is the largest lighterage and sea transport company in Hong Kong. The Green Island Reclamation will make the wharf redundant and will jeopardise the continued use of godown floorspace. A site has been reserved on the reclamation for re-provisioning to enable the continuation of their operations.

Environmental Improvements

Five environmental aspects which require amelioration and will benefit pedestrian comfort, open space provision and visual quality are :

- microclimate
- pedestrian movement patterns
- recreation use of Mount Davis and slope treatment
- urban street quality
- deficiency of open space

Microclimate

Various climatic factors influence the ventilation of the developed parts of Kennedy Town. These include the predominantly east/west synoptic wind, morning sea breezes developed into anabatic (uphill) breezes, cool air drainage and thermal flows around buildings. The following will promote better ventilation :

- major east-west and / or northeast-southwest ventilation corridors
- north-south ventilation corridors at the waterfront
- ventilation corridors on east and northeast facing slopes

Pedestrian Movement Patterns

A detailed study of the existing pedestrian movement pattern and an identification of blockages to pedestrian routes has resulted in the following recommendations :

- provision of north-south pedestrian links, especially to the reclamation area
- provision of direct pedestrian links to and from Belcher Street
- an open space link with the reclamation area and the Belcher bay reclamation
- provision of pedestrian links between shopping and civic uses and residential areas to the south of Kennedy Town

Recreational Use of Mount Davis

Mount Davis provides an opportunity to relieve pressure on Country Parks and the nearby DOS/LOS and also provides footpath links between the urban area and Country Parks. Metroplan designates Mount Davis a Landscape Protection Area and proposes it as an Urban Fringe Park to supplement the provision of open space, which is deficient. Pedestrian links will have to be improved for the Urban Fringe Park to be successful.

Urban Slope Treatment

The lower slopes and ridges of Mount Davis form the backdrop to the Kennedy Town area. Many of these slopes have rigid protective treatment, ranging from shotcrete and chunam to masonry. These slopes are visible from distance with a negative visual effect.

Vegetation should be the primary protection for all engineered slopes in soils and weathered rock, especially when the angle of slope is less than 45°. Other more structured forms of protection are required when the angle of slope is larger than 45°. Slopes where a potential exists to change from a rigid surface to a bio-engineered treatment in order to ameliorate the visual impact are identified in Section 3.4.4.

Urban Street Quality

The urban street quality has been evaluated using a matrix of vegetation, character, conflicts in use, pedestrian provision, enclosure and scale. This assessment identifies:-

- the constraints of the present development pattern which restricts the opportunity of planting only to the existing open spaces and planted sites.
- the major conflicts which exist in the circulation patterns of trams and commercial vehicles, and pedestrian primary routes and shop fronts and goods delivery.
- proposals to enhance shelter of pedestrian routes.

Improvement would result from enforcement of legal constraints regarding shopfront infringement of footways, sensitive redevelopment to retain character and development of new view corridors wherever possible.

Open Space Deficiency

The existing development pattern has a shortfall in open space provision. To meet the requirement of the HKSPG, open space opportunities have been identified on the Green Island and Belcher Bay reclamations. It would be impossible to provide enough DOS/LOS to fulfil HKSPG requirements within the present street pattern.

4.2.3 Potential Sites For Urban Renewal

'Urban Renewal Potential' - TP 9A - identified 107 individual sites with the potential for redevelopment. The priority sites for urban renewal are shown Figure 4.1:

Hau Wo Street Area

The two street blocks centred on Hau Wo Street and contained within Catchick Street, Smithfield, Belcher's Street and Davis Street contain a concentration of buildings identified as having the potential for renewal. This area, along with the Green Island Cement depot, cinema and existing residential and godown buildings to the north, is identified as the highest priority area for comprehensive renewal.

Sands Street/North Street Area

This area within the wedge formed by Sands Street and North Street, divided into three blocks by Catchick and Belcher's Street contains a high proportion of buildings which have renewal potential. This area is identified as the second priority area for comprehensive renewal. Several recent and substantial buildings restrict freedom to make major layout changes, although there are opportunities to improve several of the streets by setting back frontages and widening footpaths. A Section 16 Application for a 298 room Hotel/Residential Development has been approved for a site on the junction of Sands Street and Catchick Street.

Hill Road/South Lane Area

Several buildings with redevelopment potential are concentrated at the eastern end of the Study Area, in the vicinity of Hill Road and South Lane. While some on South Lane offer scope for early replacement, others on Hill Road and Queen's Road West are more substantial and might therefore be suitable for redevelopment beyond 2000.

Mount Davis Cottage Area

The Housing Department has stated it does not intend to clear all remaining Cottage Areas by 1991. There is no timed schedule for redevelopment, although it is expected that the cottage area will be cleared by the late 1990's. Appropriate future uses could include housing (high density or medium/low density) or recreational use of the Green Belt extension.

Upper Sands Street/Tai Pak Terrace Area

The upper part of Sands Street and the adjoining To Li Terrace, Ching Lin Terrace and Tai Pak Terrace, contain a concentration of sites with renewal potential. 6-storey height limit exists in this area but the renewal potential derives from age and condition rather than increased floor space potential.

Abattoir/Incinerator/Wholesale Market Site Area

This site lends itself to a central function for the combined area. The size of the site gives high potential for redevelopment, which could possibly extend onto the reclamation, providing a physical link between Kennedy Town and the reclamation.

4.2.4 Population Projections for Kennedy Town

The proposed amendments to the OZP could result in population changes in Kennedy Town by the year 2011.

Several assumptions have been used in this analysis.

- There will be no redevelopment of existing public rental blocks. Population in RS housing is assumed to stabilise at 8,000 persons by 2001. This assumes that the occupancy is 3.0 persons per occupied flat and the total number of RS units in the area is 2,700.
- All industrial buildings will be redeveloped for other uses by 2011.
- Population in non-domestic units is assumed to remain constant after 1996.

The 2011 Kennedy Town population figure of 68,534 will be taken to represent the impact of redevelopment upon population change in the existing urban area.

4.3 Proposed Amendments to the OZP for Kennedy Town

4.3.1 Introduction

A Recommended OZP for Kennedy Town has been prepared which complements the RODP proposals presented in Chapter 3.

The statutory zoning for the Study Area (illustrated in Figure 4.2) is contained in the Kennedy Town and Mount Davis Outline Zoning Plan, which was amended in August 1988, (Plan No. S/H1/2), and is supported by an Explanatory Statement and Schedule of Amendments.

The planning and development issues relating to both Kennedy Town and the reclamation area have been examined simultaneously. Two key issues have been considered:

- how should the statutory zoning plan for Kennedy Town be modified in the short term, prior to reclamation taking place.
- how should the statutory zoning plan reflect Kennedy Town becoming part of a larger community in the long term when land use and transportation elements can be integrated.

Two statutory OZP's have therefore been prepared for Kennedy Town which illustrate:

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 without competition in the market.

Long-term amendments for restructuring of the existing urban area which can be encouraged through a modified OZP. This should recognise the land-use zoning changes that are required to integrate Kennedy Town with a new urban community.

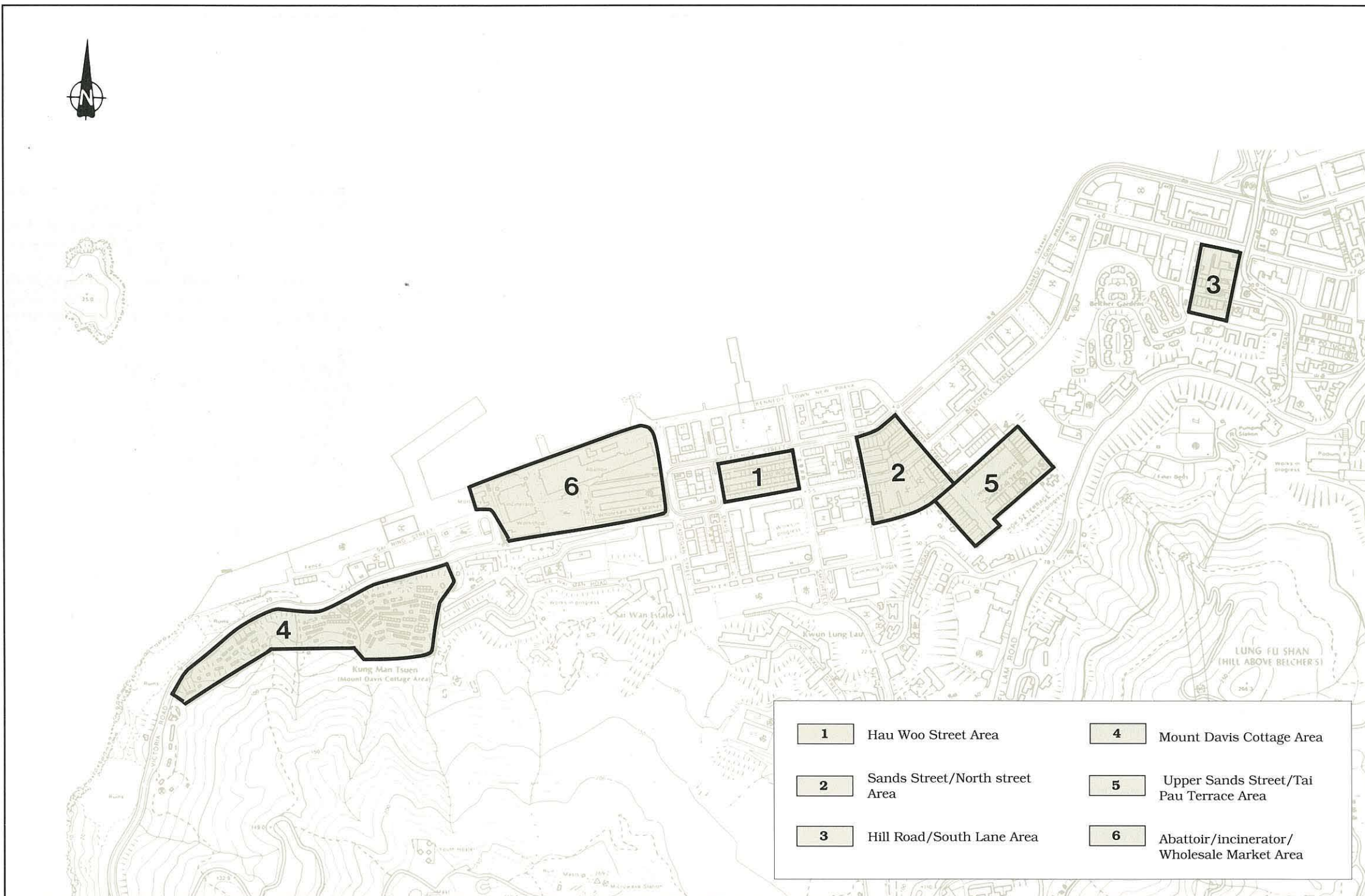


Fig. 4.1 Sites for Urban Renewal

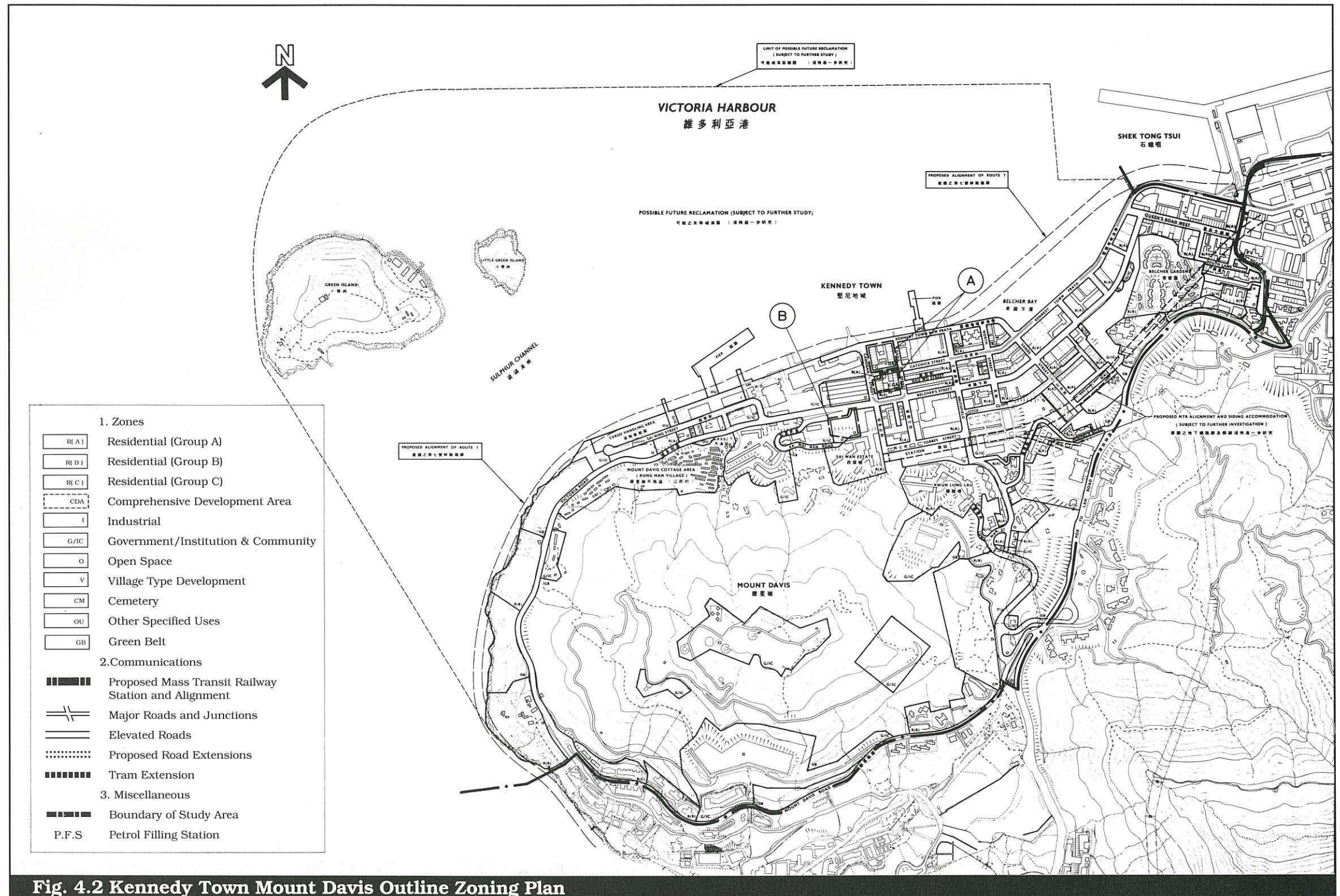


Fig. 4.2 Kennedy Town Mount Davis Outline Zoning Plan

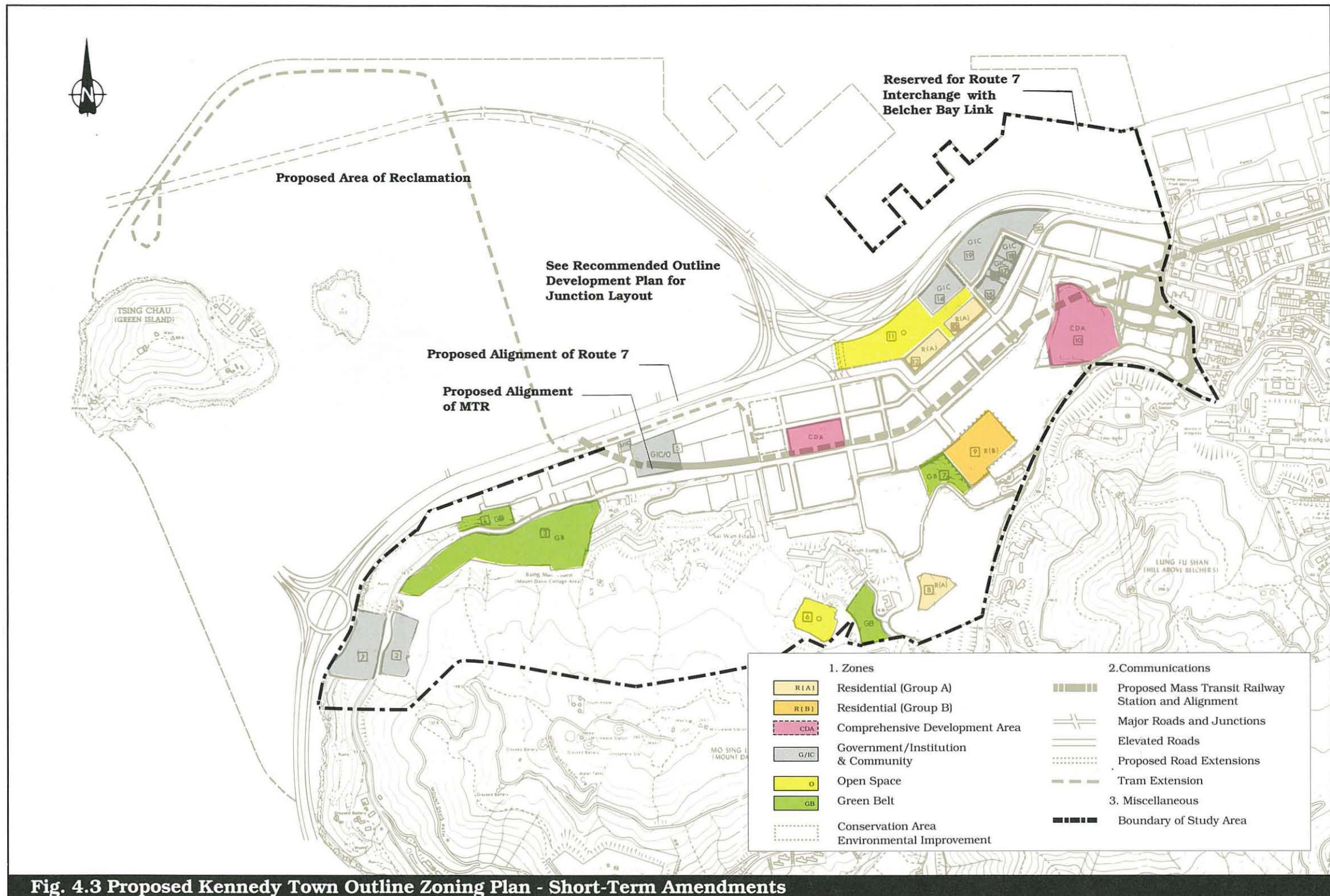


Fig. 4.3 Proposed Kennedy Town Outline Zoning Plan - Short-Term Amendments

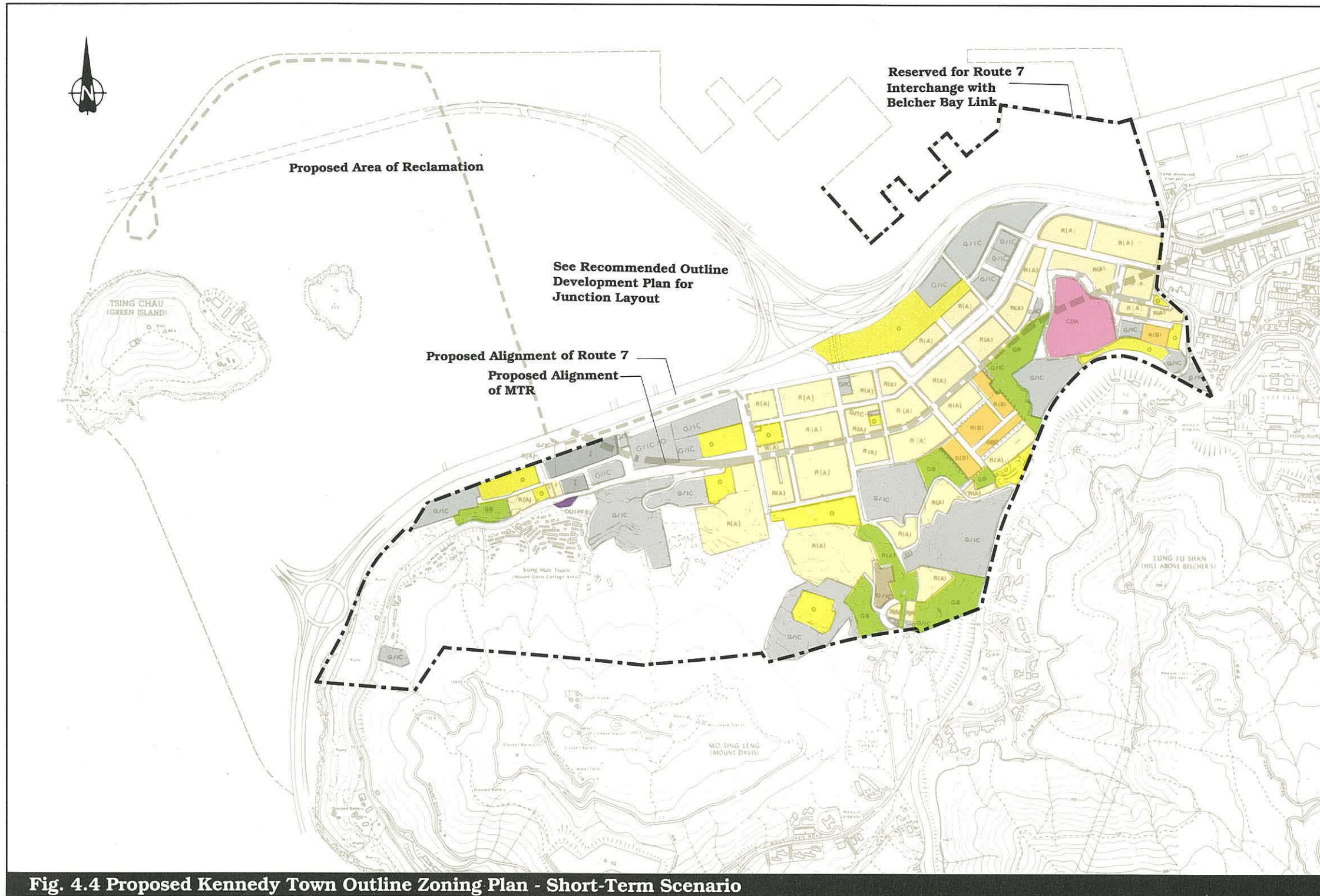


Fig. 4.4 Proposed Kennedy Town Outline Zoning Plan - Short-Term Scenario

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
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.

The rationale behind a need for two plans relates primarily to the following four factors :

- the implementation of the MTR extension
- reprovisioning of the existing waterfront uses
- the implementation of various Comprehensive Development Areas (CDA)
- the provision of two scenarios allows flexibility in adoption of the OZP plan.

4.3.2 Short-term Land-use Scenario

Figure 4.3 illustrates the short-term zoning changes which are proposed for the Kennedy Town OZP. Figure 4.4. illustrates a revised OZP, which incorporates these proposed amendments. The following paragraphs outline these zoning changes on a site-by-site basis.

Site 1 Designated R(B) Site, Victoria Road

Approval has been given in principle by Government to the development of this site for R2 housing. The GEO have indicated that the slopes on the site are unstable.

R2 housing on this site does not complement proposals for adjacent sites (the alignment of Route 7, retention of Mount Davis as a landscape Protection Area). Rezoning as part of the Green Belt is recommended.

Site 2 Designated GIC Site, Victoria Road

Following consultation with the Education Department, it is proposed that the existing kindergarten facility be retained and the remaining site rezoned as an extension to the Green Belt.

Site 3 Mount Davis Cottage Area (Kung Man Village)

The likely redevelopment of the Cottage Area in the 1990's allows the cleared site to be rezoned into an extension of the Green Belt.

Site 4 Sai Ning Street (South)

It is proposed that the Open Space site at the western end of Sai Ning Street is rezoned Green Belt as the existing slopes limit development opportunities and the resumption of private properties could prove difficult.

Site 5 Designated GIC and Open Space Site, Cadogan Street

The site, which is currently occupied by the abattoir, the incinerator, the wholesale market, the Mechanical Department workshop and the public mortuary occupies an area of over 3.5 hectares. In the short term, only one zoning amendment - Open Space - is shown for the incinerator site.

Site 6 Lung Wah Street

It is proposed that the District Open Space portion of this site be rezoned for Local Open Space.

Site 7A Rock Street 7B Lung Wah Street

These sites are unsuitable for the construction of Education facilities. Their intended future use as school sites as shown on the Kennedy Town and Mount Davis Outline Development Plan is unrealistic due to the steep slopes. Figure 4.3 illustrates the rezoning of these sites as Green Belt extension. An existing surplus in provision of educational facilities in Kennedy Town has been identified. School sites to meet future population increases will be provided on the reclamation.

Site 8 Smithfield Designated Open Space Site

The site comprises 0.53 hectares. This site is proposed to be rezoned for residential development, with potential as a decanting site for the CDA schemes. The scheme would incorporate 0.15 ha of amenity open space at street level.

Site 9 Sands Street Environmental Improvement & Conservation Area

It is proposed that the existing character of this area be preserved and enhanced. The 6 storey height limit imposed by Government for redevelopment projects is supported.

Site 10 Belcher Gardens CDA

Figure 4.3 illustrates the rezoning of this site as CDA. It is proposed to sub-divide this 2.2 ha site into 3 areas. A linear strip of open space is proposed along the centre of the site, to preserve the natural ridgeline and in addition, provide the residents of the development with 0.48 ha of public local open space.

Two areas of residential development are proposed adjacent to the open space. These areas will comprise 1.72 hectares of R(B) development. The boundary of the development area excludes land that is considered to be too steep for development; land with excessive slopes has been rezoned Green Belt.

The proposed residential redevelopment of this site at the permitted plot ratio of 8 should be reviewed. The pressures to maximise the redevelopment opportunities on this site will be considerable, given its proximity to the proposed MTR station at Whitty Street.

Preliminary proposals for this site indicate that a maximum plot ratio of 6 for gross residential development would be more appropriate.

Proposed MTR Alignment and Station Location

Although the provision of the MTR is a long-term planning objective, it is important that the alignment be shown on short-term plans to safeguard the reserve from encroachment by adjacent developments. The alignment is shown in Figure 4.3.

Site 11 (Belcher Bay Reclamation)

Belcher Bay provides an opportunity for 1.9 hectares of District Open Space (which contributes towards Kennedy Town's deficiency). Combined with the proposed adjoining Recreation Centre this area is planned to become a focus for leisure and recreation. A further 0.2 hectares will be released once the temporary access to Belcher Bay Link is removed in the final phase of the development of Route 7.

Sites 12/13 (Belcher Bay Reclamation)

Set back from Kennedy Town Praya are two HOS residential sites comprising 0.8 hectares. These sites are buffered from Route 7 by open space and the sports hall to the north of Belcher Bay.

Site 14 (Belcher Bay Reclamation)

An indoor sports hall (type 'C') is proposed adjacent to Route 7. This contribution to Kennedy Town's community facilities covers an area of 0.62 hectares.

Sites 15 - 19 (Belcher Bay Reclamation)

The western part of the reclamation is planned for G/IC uses, with the exception of a small strip of open space (Site 16). G/IC uses consist of Government Service land : a sub-divisional Fire station and a joint Ambulance Depot (sites 17 and 18), housing for Government Employees (site 15) and a USD vehicle depot (site 19).

Site 20 (Belcher Bay Reclamation)

A drainage reserve runs parallel to Kennedy Town Praya, taking up 2.10 hectares of land.

4.3.3 Long-term Land Use Scenario

Figure 4.5 illustrates the zoning changes which are proposed for the Kennedy Town OZP in the long term. Figure 4.6 illustrates the revised OZP which incorporates these proposed amendments.

A critical aspect of the long-term plan depends on the implementation of the proposed MTR which will provide the stimulus and incentive to unlock areas of potential redevelopment opportunity.

Site 21 Designated G/IC and Open Space Sites, Cadogan Street

It is proposed that this site be redeveloped for commercial (2.5ha) and open space use (1.0ha). The site is created by the reprovisioning of the abattoir, the public mortuary, the Mechanical Department workshop and the closure of the incinerator. This is the preferred location of the Kennedy Town MTR station.

Site 22 Hau Wo Street

Two development blocks centred on Hau Wo Street are proposed as CDA's with potential for commercial/residential use. They will benefit from the proximity to the adjacent MTR station redevelopment.

Site 23 Sands Street

Two development blocks on Sands Street, currently zoned R(A), have been identified as suitable CDA sites. The redevelopment of the most southerly development block will incorporate the proposed Rock Hill Street extension. The hotel/residential development at the northern junction of Catchick Street and Sands Street could act as a stimulus to the redevelopment of this site.

Site 24 South Lane

South Lane CDA incorporates two development blocks. It is proposed that the southern site is rezoned for open space uses, possibly within an overall CDA development. The proximity of these sites to the proposed Whitty Street MTR station will provide the required impetus for these measures.

4.4 Implementation

4.4.1 Introduction

Implementation of these proposed amendments to the OZP needs consideration of agencies responsible for redevelopment and the possible role of the private sector.

Aspects of Implementation

Key aspects of implementation include :

- how to achieve renewal of areas which suffer from the most severe problems and/or have high potential for redevelopment;
- how to upgrade the environment of streets and spaces;
- how to redress deficiencies identified in open space and G/IC facilities, including schools, recreational facilities and centres for the elderly;
- means of combining sites to provide areas of sufficient size for effective planning
- means of overcoming problems of multiple and untraceable ownership
- displaced population and population decanting
- capacity of implementing agencies
- phasing
- priorities

Land use zoning and designations on statutory plans play a key part in ensuring that developments generally conform to agreed intentions. Land use, communication, route alignments and densities are covered in the Outline Zoning Plan and its Explanatory Statement. The effect of the Plan is to ensure conformity in the event

of development rather than to initiate action.

Comprehensive Development Area (CDA) is an appropriate zoning as a basis for effective planning of a concentration of sites with renewal potential. CDA designations restrict and freeze re-developments which do not form part of a master layout plan covering land use, layout, flat sizes, G/IC and recreational facilities, open space, access, parking, landscape and phasing.

4.4.2 Implementation Agencies

Land Development Corporation

The Land Development Corporation (LDC), set up in 1987, is a major force in urban renewal, particularly through its ability to assemble sufficient site areas for effective redevelopment. LDC is also empowered to assemble land for the purpose of providing for open space and community requirements. Where the LDC is unable to assemble or enter into agreements to acquire sufficient land to ensure its redevelopment, it may then request Government to resume the remaining land.

LDC have made a preliminary expression of interest in two proposed CDAs:

Site 17 - South Lane, for commercial/residential uses

Site 8 - Sands Street, for R(A) housing, open space and road improvements.

Hong Kong Housing Society

The Hong Kong Housing Society (HKHS) has an objective of providing a good housing environment for low-income groups, and schemes are designed specifically to suit individual sites. Whilst its scope is more restricted than LDC, HKHS involvement might be appropriate in some of the Kennedy Town renewal proposals, particularly where population decanting will be required. The maximum size of single project likely to be undertaken by HKHS is understood to be in the order of 2 hectares, or up to 2,000 population. Two distinct development approaches are undertaken by HKHS:- firstly, estates (e.g. Kwun Lung Lau) and secondly, Urban Improvements projects (e.g. Tai Pak Terrace, Cadogan Street). Both types provide units for sale and for rent. HKHS are able to undertake the development of open space in addition to that associated with an adjacent HKHS scheme on an entrustment arrangement on behalf of Government.

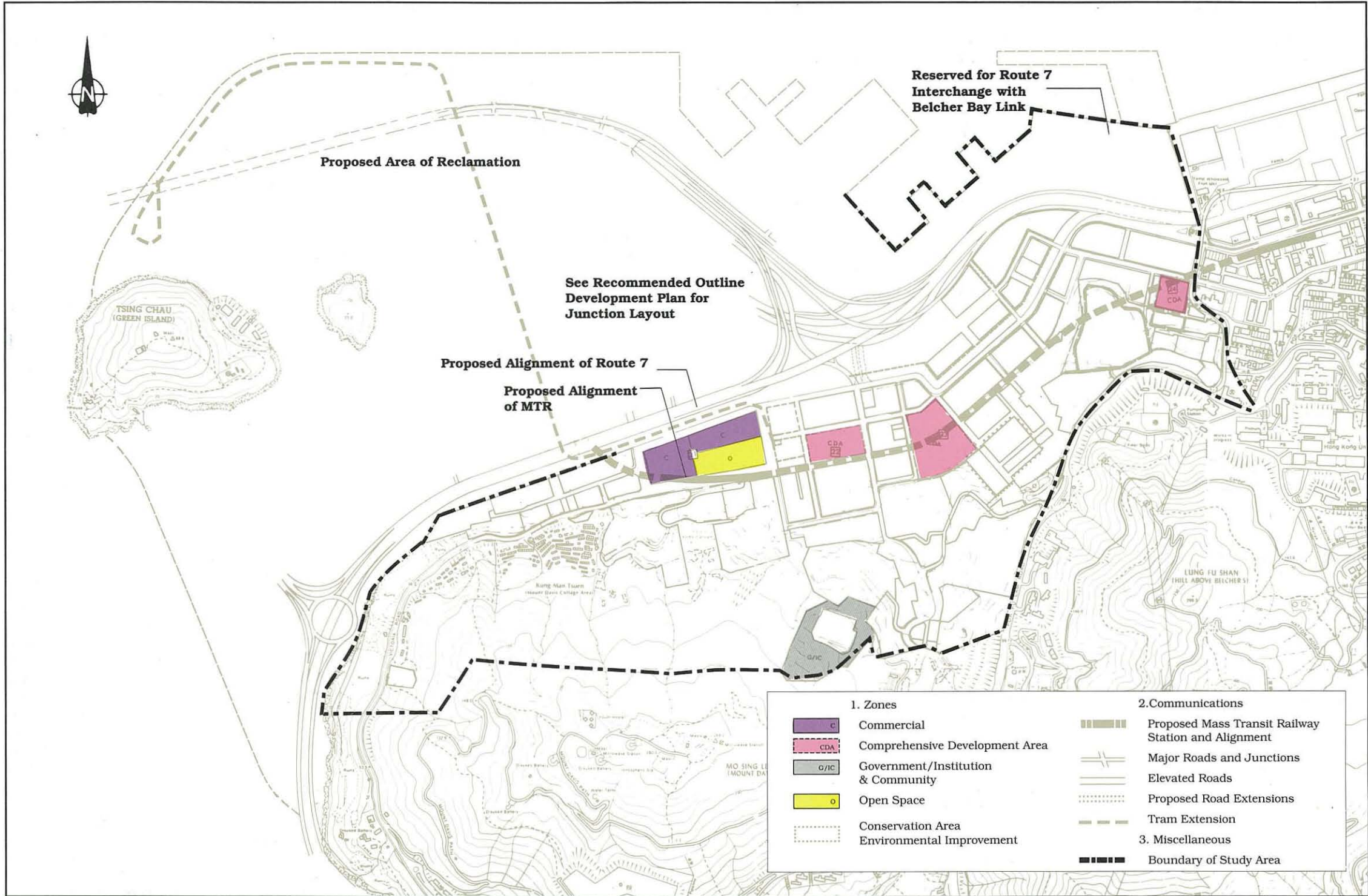


Fig. 4.5 Proposed Kennedy Town Outline Zoning Plan - Long-Term Amendments

Hong Kong Housing Department

The Housing Department has responsibility for the Sai Wan Estate and the Mount Davis Cottage Area. Its activities cover large-scale public housing with an increasing emphasis towards flats for sale. In the Study Area only 15% of the total population lives in public rental housing (compared with 40% over the whole Territory). Metroplan is pursuing a more balanced housing mix between public and private sectors. Housing Department considers that there is scope for increasing its involvement in this area.

Mass Transit Railway Corporation (MTRC)

Discussions have been held with the MTRC to examine the feasibility of extending the MTR line to Kennedy Town (and possibly beyond to the reclamation area). The proposed OZP for Kennedy Town illustrates an MTR alignment to the existing Abattoir/Incinerator/Wholesale Market site which is proposed to be rezoned for commercial development in the long term.

Government Departments

Programming and implementation of open space and G/IC developments are controlled through the works programmes of such Government department as Urban Services, Health Department and Education Department.

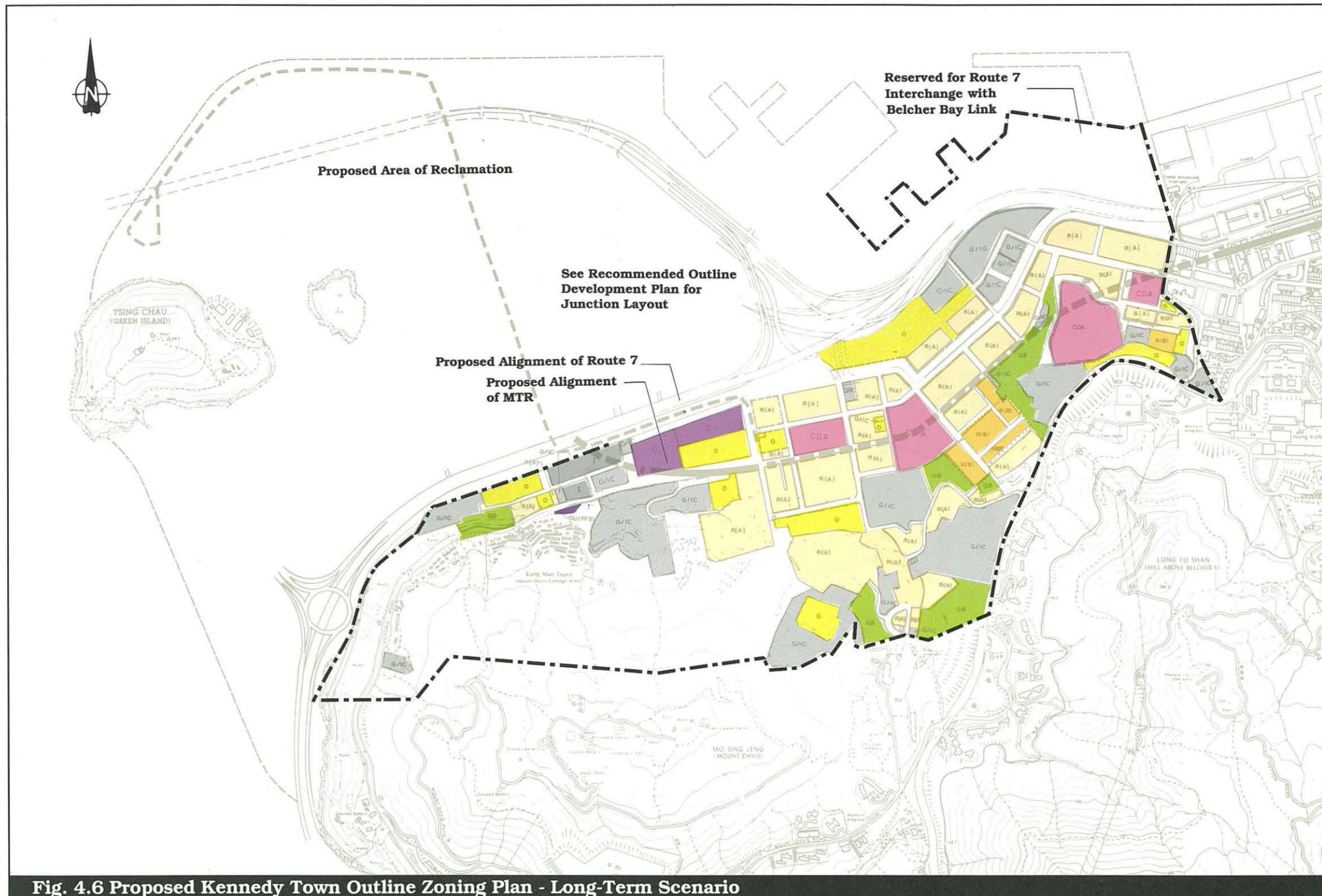
Private Development

A considerable proportion of the total urban renewal effort in Kennedy Town can be implemented as a result of private initiative. An urban renewal plan should ensure (through zoning) that overall renewal aims do not conflict with, or inhibit, further effective development. It is equally important to ensure that zoning does not hold back private initiatives unduly such that sites become blighted. Comprehensive Development Areas should therefore be designated only where schemes can be implemented within a reasonable period of time.

4.5 Conclusion

The short-term amendments will facilitate the future integration of Kennedy Town with the proposed reclamation area without having to undermine market 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.

'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. The MTR extension to Kennedy Town 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 this process of renewal.



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

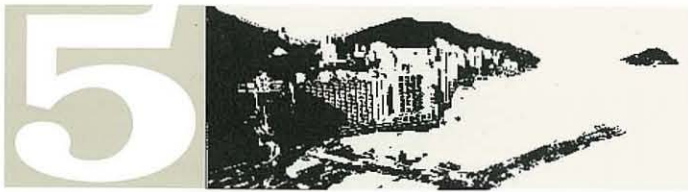
- Boundary of Study Area
- P.F.S Petrol Filling Station

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



Development & Implementation

This chapter reports on the Engineering Feasibility Study. It is concerned with the development, implementation, programming and cost of the proposed reclamation at Green Island. It contains a review of the geotechnical and other engineering aspects with particular emphasis on sources of fill material, recommended methods of construction and phasing of the reclamation. Land servicing requirements, a programme for implementation and costs are then presented.

5.1 Reclamation and Phasing

5.1.1 Existing Ground Conditions

A site investigation comprising 13 marine boreholes and over 69 kilometres of geophysical survey tracking took place between September 1988 and January 1989. Laboratory testing of the soft clays was carried out to determine the index properties and consolidation characteristics.

In the area of the reclamation four well defined stratigraphic horizons were found.

• Marine Deposits

Soft and very soft dark grey silty clays with occasional sandy horizons, these deposits are up to 30m thick and are found to depths of up to 40m below Principal Datum.

• Alluvial Deposits

Medium dense and dense clayey sands and firm to stiff sandy clays form the alluvium which is typically 5m to 7m thick, but along the northern part of the Study Area

Table 5.1 Reclamation Fill Requirements

	Soft Fill (M. cu. m.)	Rockfill (M. cu. m.)	Mud (M. cu. m.)
Quantity	50	2 (25-500 kg) 0.5 (2-6 tonne)	25
Time Scale	(1998-2006)	(1996-2004)	(1996-2004)

it is in excess of 15m thick. The deepest alluvium, up to 50m below Principal Datum, is found in a narrow band through Sulphur Channel.

• Soil above Rockhead

The soil materials are sandy clays weathered in-situ from the underlying bedrock. They are of highly variable thickness normally less than 15m thick but in excess of 30m thick north of Green Island.

• Bedrock

Intrusive igneous rock and volcanic tuffs of Jurassic and Cretaceous Age form the bedrock. Within the Sulphur Channel rockhead is lower than 50m below Principal Datum and at these deeper levels there is a distinct NE/SW trend possibly representing an extension of the Tolo Harbour fault line.

5.1.2 Sources of Fill Material

The total estimated volume of soft fill material needed for the reclamation, based on an average finished level of 5mPD, varies depending on the approach adopted to the soft marine deposits.

If all marine deposits are left in place and 3 metres is allowed for consolidation settlement of the soft silty clays during the reclamation process, then 30 million cubic metres of fill will be required. If all the marine deposits are removed, the amount of fill required is 50 million cubic metres.

'Availability of Fill Material' - TP 2 - summarised published data on available sources of fill. It concluded that fill availability exceeded the requirement for the Green Island Reclamation. TP 2 did not seek to define where fill material for Green Island Reclamation should come from. It identified a number of potential marine sand borrow areas and considered potential borrow areas at

Mount Davis and Pok Fu Lam. Subsequent to this, in June 1989, the Fill Management Committee (FMC) was established with terms of reference to manage the Territories' major fill resources.

Details of fill requirements for Green Island Reclamation have been given to the FMC. This information includes the quantities and types of special rock fill required for seawall construction and the likely quantity of marine mud for disposal, with tentative programme dates as shown in Table 5.1.

Reclamation Fill Requirements

• Borrow Areas

An investigation of potential borrow areas at Mount Davis and the hillside areas of Po Fu Lam was carried out. Three possible areas at Mount Davis were considered in conjunction with housing developments. It was found that these sites together with similar sites at Pok Fu Lam could produce fill material suitable for reclamation but at an unattractive cost. The environmental problems associated with the excavation and transport of fill from these sites close to existing residential areas were also considered.

Given the availability of other sources of fill, in particular marine dredged sand, the fill requirements for Green Island Reclamation did not provide sufficient justification for recommending development of sites for borrow at Mount Davis and Pok Fu Lam.

• Marine Dredged Sand

Under the direction of the FMC, the GEO have embarked upon a detailed investigation of potential sources of usable deposits of sand. Investigations to date indicate a territory wide resource of sand in excess of 350 million m³. In general terms, use of marine sand for filling reclamations is preferable to use of excavated material from borrow areas on land. The environmental problems

associated with land borrow, particularly in the urban area, are no longer acceptable. Marine sand can be transported and placed by modern purpose-built dredgers much more quickly and economically than can excavated material from borrow areas. Marine borrow areas can also provide additional areas for the disposal of considerable volumes of marine mud. These arguments favour the use of marine sand fill material for Green Island Reclamation.

• **Special Rock Fill**

Rock borrow areas will need to be developed to supply the required quantities of special rock fill for seawall construction (see Table 5.1). Present indications are that the Tsing Chau Tsai borrow area on Lantau, which is to be set up as part of the Lantau Port Peninsula project, can produce special rock fill in sufficient quantities for Green Island reclamation needs in addition to other demands.

It would be undesirable from an environmental point of view for many small rock borrow areas to be set up around the Territory to supply individual reclamation requirements. Tsing Chau Tsai is recommended as the best option for supply of rock to Green Island Reclamation.

• **Public Dumping**

The Fill Management Committee Public Dumping sub-committee is charged with ensuring that there is an adequate number of "public dumps" for the disposal of surplus spoil and good quality building debris arising from construction sites. This is currently estimated to be about 3 million m³ per annum. Such material should not be placed in areas where foundations, basements and tunnels would subsequently be constructed. Areas for public dumping could be made available on the reclamation providing control of location, timing and access is resolved.

• **Pulverised Fuel Ash**

The feasibility of using PFA as fill for Green Island Reclamation has been considered. Use of PFA as fill underwater is not well documented. Little is known about its strength and settlement characteristics when placed in seawater. The risk of heavy metals leaching out into surrounding waters would require consideration. Use of PFA as fill below the water table level is not therefore recommended. Above the water table PFA can

be placed and compacted in a controlled manner. It may be used satisfactorily as general fill to within 2 metres of the final surface level in order not to affect vegetation growth.

5.1.3 The Reclamation

The Green Island Reclamation will encompass an area of seabed equal to approximately 181ha. The Southern Fairway, which is at present one of the main navigational routes used to enter and leave the Harbour will be affected by the reclamation.

• **Reclamation Limits**

The reclamation requires the Southern Fairway to be relocated northwards and to be dredged. Twelve harbour mooring buoys will be lost by this move. Figure 5.1 shows the northerly limit of the new Southern Fairway on a line bearing 270° from Victoria Buoy. This line has been taken as the absolute constraint fixing the northern extent of the reclamation which avoids loss of further buoys.

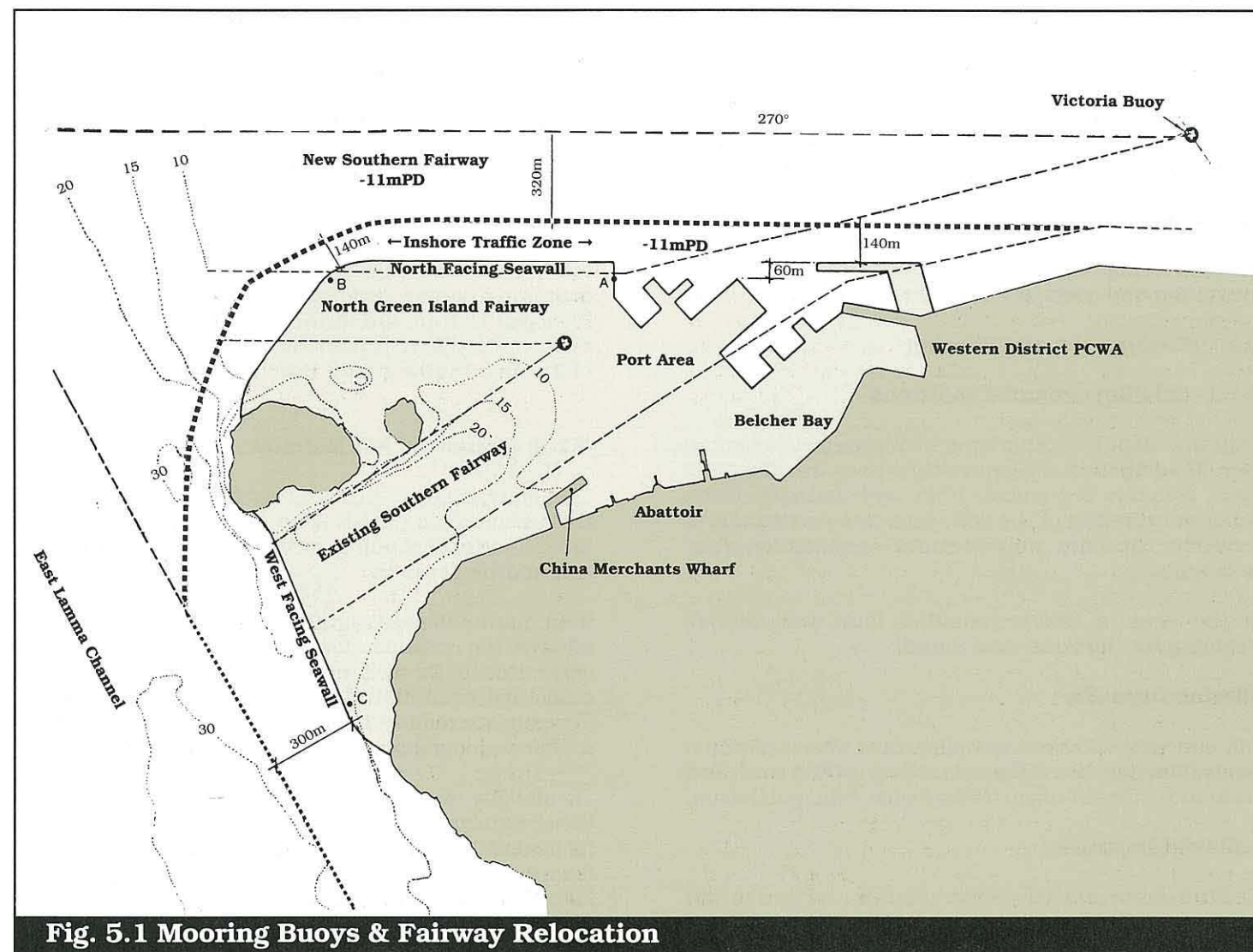


Fig. 5.1 Mooring Buoys & Fairway Relocation

Continuity of an inshore traffic zone between the new fairway and the seawall has been maintained.

The depth of water increases rapidly to the west towards the Lamma Channel. Any modest gain in area here is offset by the increased difficulty and costs associated with seawall construction in very much deeper water. The decision to retain Green Island and its natural shoreline give no reason to extend west.

The seawall layout eastwards from point A provides for the reprovisioning of the China Merchants Company, the abattoir, and the Western District PCWA. Additional lengths of wharf are also provided for Government uses within the Study Area. This port area configuration allows for the continuing operation of the China Merchants Company within the Study Area. A length of berth equivalent to their existing wharf is provided in deep water adjacent to the new fairway. Further discussions and consultations with all interested parties will be necessary during the preliminary design stage.

• Reclamation Levels

The final level of the reclamation will be in the range of +4.5 to 5.0mPD. A level of +5mPD will be necessary in the centre of the reclamation to ensure that falls on surfaces outwards to the perimeter can be maintained. Seawall cope levels will be generally +4.5mPD except in the west where higher crest levels up to +6.0mPD will be necessary to prevent overtopping during high seas.

• Types of Seawall

Seawalls within the port area must be suitable for berthing. The standard form of vertical concrete blockwork gravity seawall will be suitable for the PCWA and most of the other frontages in the port area. For the deeper water berths either piled decks, finger piers, or box caisson quay walls should be considered. Detailed designs should be developed to take account of the individual operator's requirements. Individual designs will also be necessary for the specific requirements of government departments such as the Marine Police, Water Supplies Department and Port Works Division.

All other seawalls around the reclamation can be revetment or sloping armoured type, depending on their degree of exposure to high waves. The wall should remain vertical along the north where an inshore traffic zone is of minimum operational width.

Where the inshore marine traffic zone increases in width the vertical wall can change to sloping revetment. South of Green Island a sloping wall is necessary. Design, armour size and crest level depend on the timing of its construction with respect to completion of the Western Harbour Breakwater. A specific seawall design will be required for the Island West RTS barge berth.

5.1.4 Methods of Construction

Construction of the Green Island Reclamation will be more difficult than most reclamations in Hong Kong because of:

- exceptionally thick marine deposits
- strong tidal currents
- deep water in the Sulphur Channel

None of these is a new problem; at Green Island they are just greater.

The conventional reclamation method of filling directly on top of the untreated clay will result in unacceptably large settlements continuing over a period of as much as 20 years.

Of the various methods available to reduce and accelerate settlements the following is recommended.

- Complete removal of marine clay along sea wall alignments.
- Installation of wick drains across all the reclamation area, followed by careful placement of a 3m thick sand blanket on top of the clay to provide a drainage medium for the wicks and to prevent disturbance of the clay during subsequent general filling.

Wick drains do not reduce the total settlement; they accelerate the rate of settlement such that the majority takes place during construction, leaving an acceptably small amount to develop after completion of the reclamation. The spacing of wick drains can be varied to suit the intended land use in each area.

Fill must be placed in still water to avoid wasteful erosion. This will mean filling within areas protected by advanced seawall construction.

The methods to be adopted during filling depend to some extent on the source and type of fill to be used.

- Marine dredged sand obtained by trailing suction hopper dredger can be transported to the reclamation in the hold of the dredger and bottom dumped up to a level controlled by the draught of the vessel. Thereafter after marine sand may be pumped ashore either from the vessel or from a re-handling basin using a cutter suction dredger.
- Excavated fill from borrow on land can also be placed by bottom dumping up to the limit imposed by the draft of the barge but must first be transported overland to a loading jetty and then barged to the reclamation area. Thereafter it is usual practice to transport the fill to the reclamation and proceed by end-tipping onto the bottom dumped material.

Greater speed and economy is achieved by filling with marine sand using the methods described. These methods are now expected on all future large reclamations.

5.1.5 Reclamation Phasing

The key constraints affecting phasing of the Green Island Reclamation are:

- the need to relocate twelve mooring buoys affected by realignment of the Southern Fairway, prior to dredging a new Southern Fairway and before reclamation within existing fairway limits;
- the need to retain marine access to the abattoir waterfront and the China Merchants Wharf until these operations can be transferred to new locations within the Study Area;
- the need to meet the construction programme for the Green Island Link;
- the need to provide the amount of housing as proposed by Metroplan for 2006.

The first constraint influences the start date for any reclamation.

Kellett Bank is no longer available to accommodate mooring buoys as the reclamations for Container Terminal No. 8 and the West Kowloon Reclamation have displaced buoys which will be relocated at Kellett Bank.

A suitable area for anchorage will need to be found in the Western Harbour to accommodate buoys displaced by realignment of the Southern Fairway.

The reprovisioning requirement influences the sequencing of reclamation. The main waterfront operations presently carried out are located west of Sands Street and include:-

- the Green Island Cement Company
- the Wholesale Fruit & Vegetable Market
- the abattoir
- China Merchants Company

The Green Island Cement plant, although not recommended for reprovisioning within the Study Area, is a significant operation and access to its pier should be preserved for a period which allows sufficient time for alternative locations to be found.

The new Wholesale Market on the Western Reclamation area should be ready by 1993. Marine access should be retained until the time of relocation to avoid disruption to existing operations .

The abattoir and China Merchants Company (CMC) will be reprovisioned within the Study Area. Marine access is vital to CMC operations and this must be retained until relocation. Road access must also be maintained during the reclamation and construction stages.

The temporary RTS barging berth and rail facilities due to be complete in 1994 will also need to be reprovisioned and will influence later phases after of the reclamation.

Phase 1 of the Reclamation

The first phase of reclamation must:

- avoid disruption to existing formal waterfront activities;
- provide accommodation for those activities to be reprovisioned;
- be accessible by an established road system.

The reclamation for the Belcher Bay ground level link road (Phase 1a) meets these criteria and does not encroach into the existing Southern Fairway. It cannot

accommodate all the reprovisioning needs within the Study Area.

There is an over-riding case for the first phase (Phase 1b) of the reclamation to extend the Belcher Bay Reclamation, see Figure 5.2. However, any viable extension of the Belcher Bay Reclamation encroaches into the Southern Fairway.

The sequence of events are :

- relocate mooring buoys affected by the move northwards of the Southern Fairway.
- dredge the new Southern Fairway
- reclaim Phase 1b area - start reprovisioning development
- reclaim Phase 1c area - start GIL construction
- reprovision the formal waterfront activities

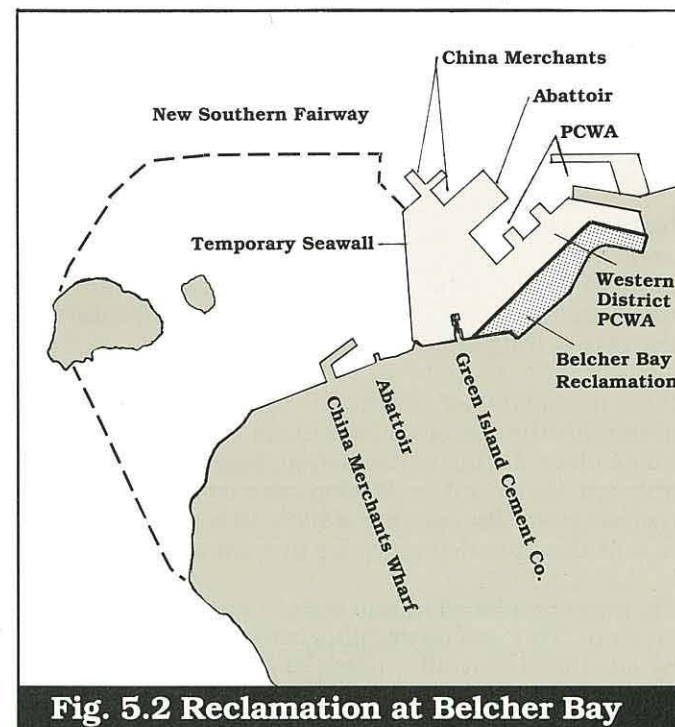


Fig. 5.2 Reclamation at Belcher Bay

The phasing should emphasise the relocation of CMC to an acceptable site as soon as practical. Reclamation can then proceed together with the development of the local road network.

• Closing Sulphur Channel

Phase 1 reclamation will effectively reduce by half the cross-sectional area for tidal flow between Little Green Island and the Western District PCWA, see Figure 5.3.

This circumstance is unique to Green Island Reclamation and sets it apart from other urban reclamations, which have generally been aligned parallel to, rather than across, tidal channels.

The consequences of this reduction in flow area are expected to be an increase in current velocities and the erosion of seabed material from the Sulphur Channel.

The erosion of any contaminated seabed material in this way should be prevented by its removal to a designated dumping area. The area gazetted for dredging during Phase 1 should be extended to include this.

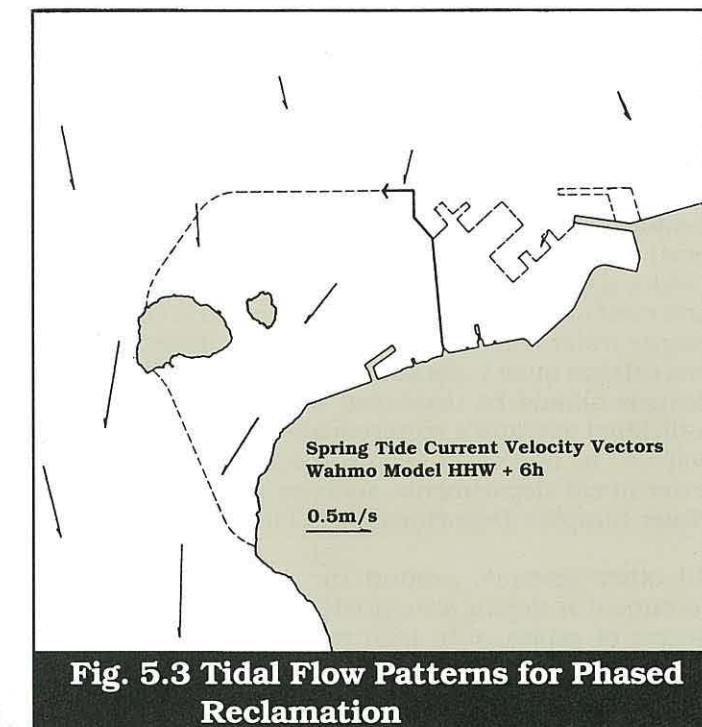


Fig. 5.3 Tidal Flow Patterns for Phased Reclamation

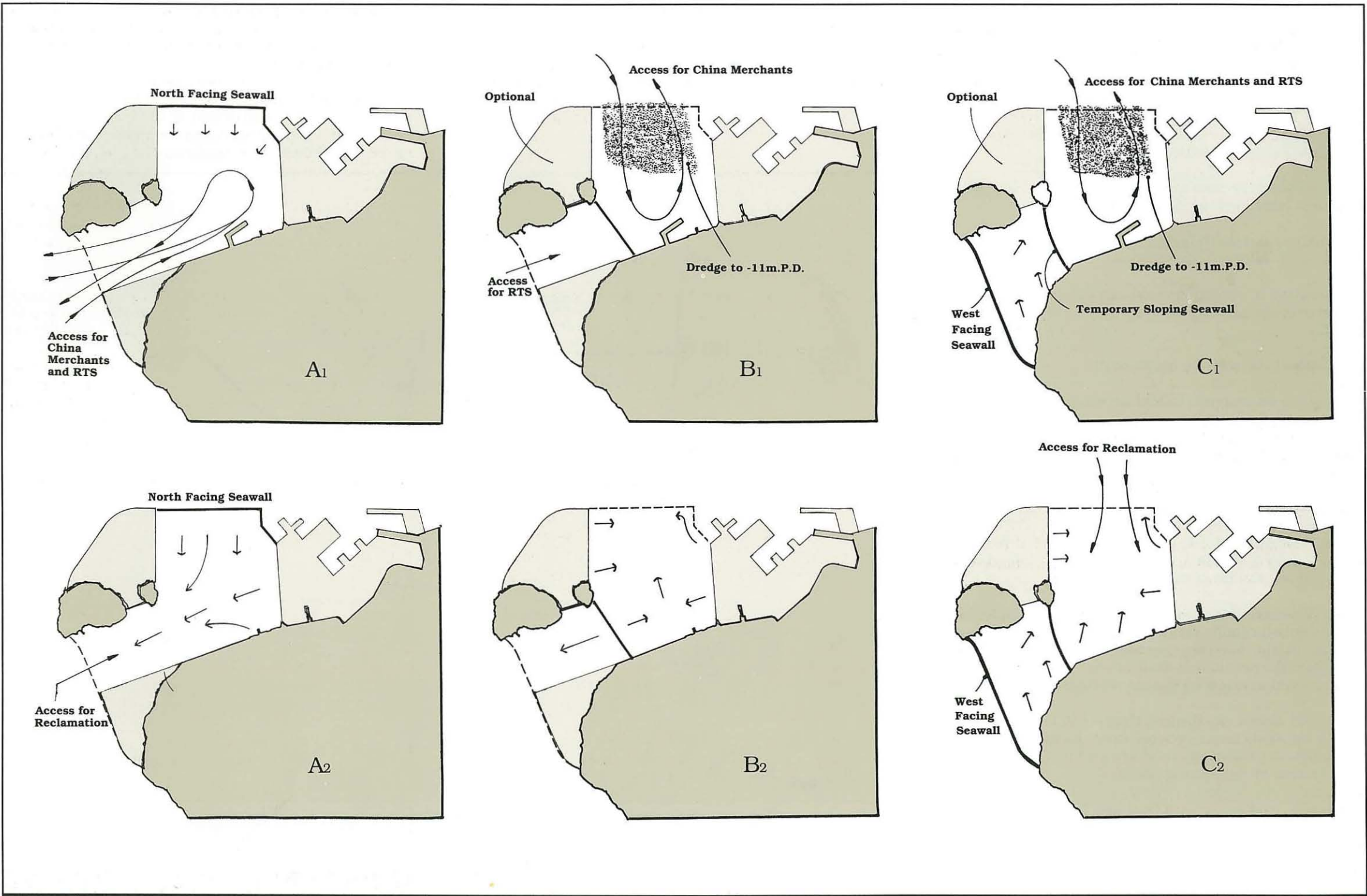


Fig. 5.4 Options for Phase 2 & 3

Second Phase Options

Two options are considered in the second phase of reclamation:

- 1-CMC still operate from their existing wharf ;
- 2-CMC have relocated to the new port area site and the existing wharf activities have ceased.

Three methods to close Sulphur Channel and stem the tidal flow have been considered. These are:

- A-construct the north facing seawall after reclamation of Phase 1C north of Green Island.
- B-construct a rubble mound between Little Green Island and the existing seawall at the end of Sai Ning Street.
- C-construct the west facing seawall.

Six sequences are possible and are shown in Figure 5.4.

The Sulphur Channel is best closed by building up a wall uniformly along its length. Tidal currents over such a wall are expected to increase and then diminish as the tidal flow is stemmed. The accurate placing of seawall blocks, particularly for the north facing seawall, may prove to be too difficult during certain tides. Option B1 is an alternative which can be considered if further studies during detailed design favour a more direct approach to closure of Sulphur Channel.

If the Western Harbour Breakwater is completed it would substantially reduce locally generated wave heights in the Western Harbour. This would have benefits to the permanent design conditions and temporary protection required during reclamation.

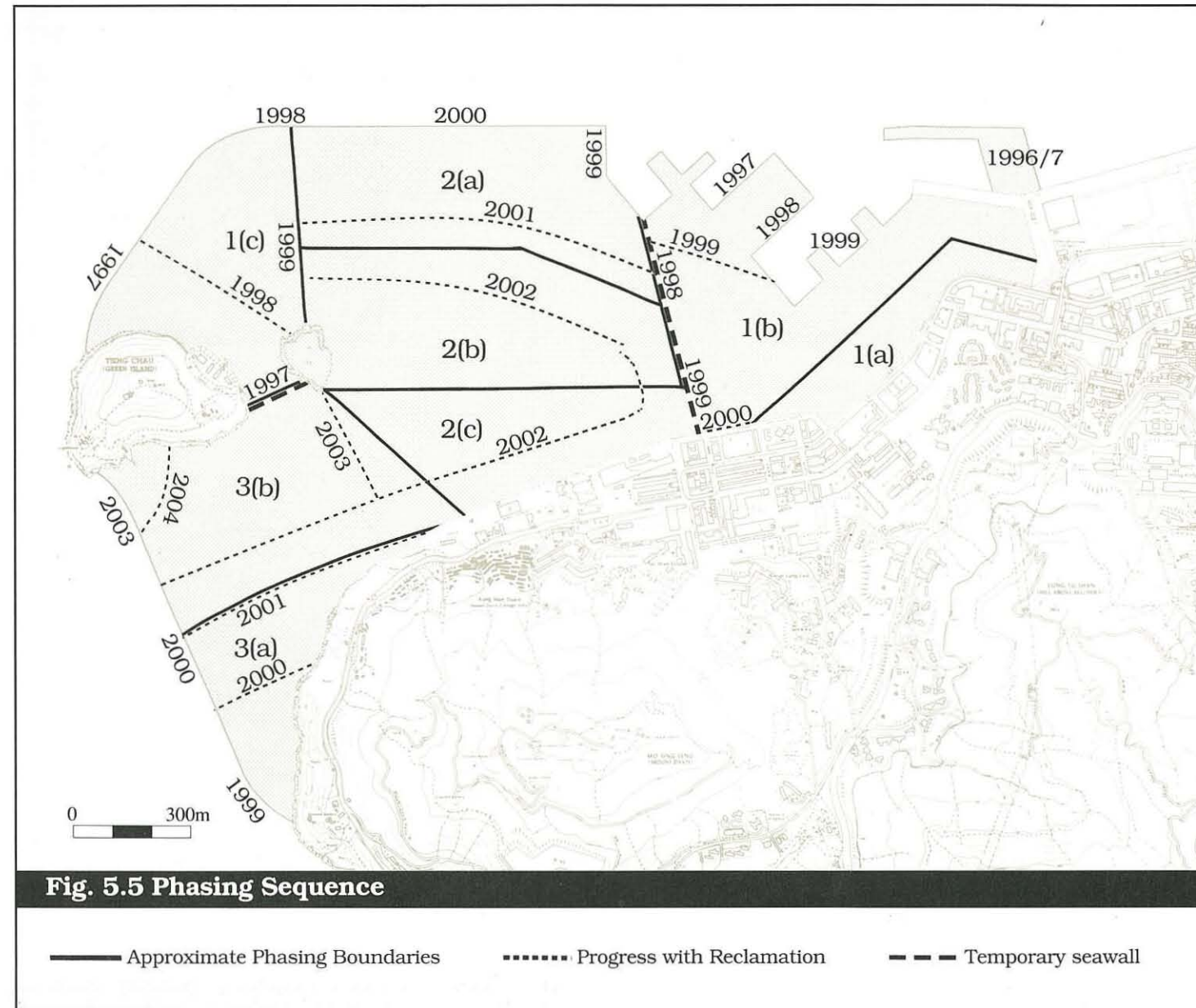
Option C1 is less satisfactory than A1 in that reclamation in the west cannot proceed in conjunction with the development of strategic road links while CMC remain in operation at its existing wharf.

Options A₁ and A₂ perform best and benefit early construction of the Green Island Link. They have been used to formulate a programme for implementation of the reclamation.

The reclamation process for Phase 2 will follow the sequence shown in Figure 5.5. A continuing advance of the reclamation front in a southwestward direction will remove the need for construction of temporary seawalls and consequential reduction in costs.

Phase 3 of the Reclamation

The final stages of reclamation are also dictated by reprovisioning. Phase 3a must be reclaimed and the Refuse Barging Station constructed prior to reclamation in front of the temporary barge facility. Phase 3a also allows and construction of the collector sewer to Mount Davis to processed and be linked to the Phase 2 areas while Phase 3b is underway.



work proposal to build a public dump site

5.1.6 Environmental Effects During Reclamation

The process of reclamation and construction of serviced land will produce impacts on the local environment. Ways in which these impacts can be minimised have been considered.

Air Quality

During the reclamation process dust generation, liberation and dispersion is likely to be the major source of air quality impairment.

The use of marine fill as the primary fill material will significantly reduce the amount of dust that could be generated by this operation. The use of trailing suction hopper dredgers will further reduce the likelihood of dust generation. Depending on the location of material to be used for the sea wall construction, dust could be generated during its winning, transport and placement. It is unlikely that there would be much dust associated with this operation in the vicinity of the reclamation itself.

PFA may be used as fill material. When dry, PFA is a very dusty material, with a potential to cause severe nuisance. It should be brought to site at a conditioned moisture of at least 20%. Pumping as a slurry would be the preferred handling technique. PFA will also dry out very quickly, hence final cover should be placed quickly to prevent drying out.

The use of construction debris as a fill material presents significant problems with dust control. The area to be filled would need to be kept open for a significant period of time and would require road access. This source of potential dust is significant.

Management plans should be prepared for dust control measures. It will be necessary to employ water as a suppressant applied by sprinkler vehicles or pipelines. The imposition of controls on vehicle movements and speed are effective in reducing the generation of dust emissions. Windbreaks and enclosures may also be effective in reducing emissions.

A monitoring programme should be implemented to ensure that control measures are efficiently applied. The control programme should describe the stages necessary should AQO for particulate concentrations be breached. This should be developed at the detail design stage.

Reduction in the dust nuisance will be most beneficial during Phase 1 when the prevailing winds could carry dust towards western Kennedy Town. Thereafter with the western progress of the reclamation the significance of dust nuisance will diminish.

Water Quality

1 The construction of the reclamation has potential to cause significant impact on the water quality in the immediate vicinity of the works and at the source of any marine fill.

2 These impacts result from an increase in suspended sediment caused by dredging and reclamation works and the possible associated increase in biological oxygen demand, depleted dissolved oxygen concentration and released contaminants. The dredging and placement of fill should be carried out in accordance with guidelines. A monitoring programme should be undertaken to ensure that the guidelines are achieved. This should be developed at the detailed design stages of the project.

3 The effects on tidal flows of partial reclamation have not, however, been quantified in detail using mathematical models. An increase in current velocities can be expected which may result in a movement of seabed materials, some of which may be contaminated.

4 Once tidal flows through Sulphur Channel have been stemmed, tidal currents in the area north of the reclamation will diminish. The changes to tidal flow once full reclamation is completed have been studied using both the WAHMO mathematical models and the physical tidal model.

5 All the phasing options result in the containment of water in the centre of the proposed reclamation. The lagoon created by construction of the north facing seawall in option A may experience water movements in and out with the tide. Such a flushing action of the tide would have potential water quality benefits in the short term.

6 The retention of a natural land/sea interface at the western edge of Green Island itself will promote the colonisation of the new manmade seawalls. In this way the existing populations of marine organisms around Green Island should not be displaced.

7 The removal of marine mud and its subsequent disposal provides the potential for significant impact on water

quality. Removal techniques should be adopted which minimise the potential for dispersion of suspended solids in the water column. Disposal should be carried out so that settlement of the mud is as rapid as possible and there is little opportunity for resuspension and transport action. Consideration must be given to the increased environmental impact which removal of contaminated mud will cause. It is recommended that the degree of contamination of the mud and the presence of gas in the muds be determined at detailed design stage.

8 Measures to prevent foul water being discharged to the central area of the reclamation should be included in Phase 1. There should also be adequate provision for dealing with liquid wastes arising from the new abattoir site particularly during Phase 1 when permanent facilities may not be completed.

Construction Noise Impact

Construction work should comply with the requirements of the Noise Control Ordinance for construction sites and the "Technical Memorandum on Noise from Construction Work other than Percussive Piling" (TM). A Construction Noise Permit (CNP) should be obtained for any construction work carried out between the hours of 7.00 pm and 7.00 am. Daytime construction noise should be limited to 75 dB(A) at the nearest sensitive buildings.

The major noise sources occurring during the reclamation operation are:

- gaining the fill (e.g. blasting, dredging etc)
- transporting the fill (e.g. lorry movements, barge movement etc)
- placing the fill (e.g. pumping, bottom dumping, end-tipping)

The significance of these noise sources depends on the location and nature of the fill. Marine fill is recommended for general reclamation material and rock fill and armour is required for seawall construction.

- Gaining and Transportation of Marine Fill

The gaining and transporting of marine fill has significant advantages as it is considerably less noise critical than land-based fill. The fill will be obtained from locations remote from residential areas. Transport will

be by sea.

The precise location for dredging of the fill is not known. It is therefore not possible to predict with accuracy how the gaining and transportation of the fill will affect any Noise Sensitive Receivers. It is unlikely that the gaining of fill will have any adverse noise impacts, even though the process is likely to continue on 24 hours per day basis.

Blasting will be required to obtain the rock fill for seawalls. Normal controls on blasting and quarry operations should be imposed so that noise from the quarrying operation is within acceptable levels.

If rockfill is taken from Tsing Chau Tsai in North Lantau, it will be transported by sea and this is less of a noise impact than road transport through the urban areas.

• **Placing of Fill**

Seawall Construction

Dredging for the seawall is likely to be undertaken by a Cutter Suction Dredger or a Grab Dredger.

Estimates using data for a Grab Dredger, Tug Boat and Mobile Crane indicate the dredging and laying of seawalls would be restricted to distances of at least 280m from any NSRs for evening operation. Nighttime work would not be allowed within the area of the reclamation.

Bottom Dumping

Whilst bottom dumping in parts of the reclamation area could be allowed during the evening, it is considered unlikely that this would be necessary.

Pumping Marine Fill

Pumping of marine fill would normally operate on a continuous basis. The pumps would be located close to the seawalls, well away from any residential areas. Acoustic treatment to the pumps may be necessary to achieve acceptable noise levels.

A 24 hour pumping operation would depend upon the marine fill being delivered in a quiet manner, which is considered feasible.

Dumping of Marine Fill Using Lorries

Bottom dumping becomes impossible when the water becomes too shallow. Land based vehicles are then required to transport the fill for placement by end-tipping.

Dumping from lorries should be restricted during the evening and certainly not allowed at night. If working areas are well away from noise sensitive receivers, dumping may be allowed into the evening. The working areas would need to be approximately 400m from the nearest NSR, although this would depend upon the number of lorries being used.

Rolling and Compacting

Some restrictions on rolling operations are likely during the evening and night. Evening work may be possible in certain areas in the northern areas of the reclamation.

• **Summary and Conclusions**

Some control will need to be placed on the noise created by construction activities during the reclamation process. The programming for the reclamation must take account

of the likely restrictions which will be placed on evening and nighttime construction activity. These restrictions are outlined in Table 5.2. The restrictions will depend upon the precise number and type of equipment used. It is also recommended that construction noise be monitored during the construction process.

Visual Impact and Landscape Treatment

During construction of the reclamation, it is unavoidable that there will be a high degree of visual disturbance resulting from reclamation operations. This will be visible from afar, from the sea and also by residents and workers in Kennedy Town. Screening large scale reclamations such as this is not practicable except in particular isolated instances.

Landscape mitigation such as mounding and planting can contribute to alleviating some of the visual impact by partial screening. In such an expanse of reclamation these mitigation measures should wherever possible be introduced in the areas which will ultimately be planted and mounded.

This ground modelling and planting should be as flexible as possible in order not to jeopardise future designs.

Table 5.2 Noise Control Restrictions on Construction Work

Summary	0700-1900h	1900-2300h	2300-0700h
Dredging (gaining of fill)	N/R	N/R	N/R
Dredging (for seawalls)	N/R	Restricted*	Restricted*
Pumping of fill	N/R	N/R	Yes+
Placing of fill, bottom dumping	N/R	Restricted*	Not Allowed
Land fill using lorries	Restricted^	Restricted*	Not Allowed
Compacting	N/R	Restricted*	Not Allowed

+ Acoustic treatment to pumps may be required.

* Nature of restriction depends upon the number of plant items to be using during the evening.
N/R No restrictions are considered likely.

^ Some restrictions on the use of lorries close to Kennedy Town will be necessary if 75 dB(A) daytime limit is to be achieved.

5.1.7 The Need for Hydraulic Modelling

Hydraulic modelling of the new site and the stages of reclamation was considered during the study. Pressure on the use of the WAHMO model was such that access for this study was unavailable at the time its use would have been of most value. No mathematical hydraulic modelling has been carried out.

Certain engineering aspects have been decided on the basis of engineering judgement. Those which might have been considered in more detail by modelling to gain greater confidence are :

- scour of contaminated mud,
 - scour of marine clay below the contaminated mud,
 - redeposition of scoured material,
 - construction aspects of seawalls when closing Sulphur Channel.
- **Scour of Contaminated Mud**

A detailed soil investigation for the area is expected to show that there is contaminated mud over part of the site to a depth of about 1.5 metres. It is clearly essential to ensure that this material does not get mixed into the water column. This material should be dredged and disposed of in a controlled manner, if there is a risk of it being scoured out at any stage.

Whilst it is not clear whether this material will be scoured out as a result of the construction of the Phase 1b reclamation it is expected that scour will have taken place by the completion of Phase 1c reclamation. On this basis if it is essential to determine which phase of the reclamation will cause scour then modelling may be desirable though not necessary until the detailed design stage.

• Scour of Marine Clay Below the Contaminated Mud

Scour of the uncontaminated marine clay does not present any problems other than an increase in the volume of fill required for reclamation. If the marine clay is removed as part of the design of the reclamation then there is no impact. The extent of this scour will depend on the number of tidal cycles to which it is subjected prior to filling. Mathematical modelling at this stage is not necessary and may not even be warranted at detailed design stage if dredging of the mud is to be carried out.

• Redeposition of Scoured Marine Clay

The scoured marine clay may be deposited within the newly dredged area for moorings on Kellett Bank. The quantity involved, should this occur, is not significant when compared with the potential for silting up this area by the main water body from the Pearl River. No mathematical modelling has yet been carried out to study this.

• Construction Aspects of Seawalls when Closing Sulphur Channel

It is proposed to close the channel by progressively raising the entire length and width of the North Seawall. This will result in changes to water velocities over the seawall during construction which may influence the construction windows available to the contractor.

Modelling of this aspect of the phasing may be warranted at detailed design stage.

It is concluded that no hydraulic modelling is needed to demonstrate the feasibility of the proposed phasing for the implementation of the reclamation. It is recommended that at the detailed design stage mathematical hydraulic modelling be considered to examine specific solutions for construction.

5.2 Land Servicing

The required infrastructure and utilities for the reclamation were described in Section 3.5 and Figures 3.40 and 3.41. These works require to be phased in line with the reclamation process to provide serviced land for development.

5.2.1 Stormwater Drainage

The first phase of stormwater drainage will be within the port areas in Phase 1b which accommodates the reprovisioning of CMC and the Western District PCWA. Most of this area falls within the catchment of the most easterly stormwater outlet through the north facing seawall. The programme for reclamation of Phase 2a allows this outlet to be constructed in line with the Phase 1b servicing. To the south at Belcher Bay the proposed major collector system to be constructed along the existing seawall should be in place. This will convey the existing praya stormwater outlets and the area to the south of Route 7 eastwards.

Progress with the next stage of reclamation from north to south would enable the remainder of the outlets in the north facing seawall to be constructed. These would drain the catchments which are north of the centre of the reclamation.

Once the reprovisioning on Phase 1b reclamation is completed, construction of the remainder of the major collector system draining west and the outfalls through the west facing seawall will follow.

5.2.2 Foul Sewerage

In the long term sewage will be conveyed to the proposed treatment works at Mount Davis and major development on Green Island Reclamation is conditional on its completion. In the short term for the development of Phase 1b, an alternative disposal point will be necessary. The only feasible disposal point is the Kennedy Town system which is due for upgrading under the implementation of the Central, Western and Wanchai West Sewerage Master Plan. This is expected to be available in mid 1998. Parts of the proposed permanent foul sewerage network could be constructed as part of this temporary disposal arrangement. Temporary pumping facilities to the upgraded Kennedy Town system might be necessary. Only sewage from Phase 1b for reprovisioning could be disposed of in this way.

Confirmed with SREP that that can be accommodated

The reclamation phases and programme allow for construction of the permanent foul sewerage collector beginning on phase 3a and proceeding upstream along the existing shoreline, after reprovision is complete, to the main sewer in road DD2 to serve the first development areas completed in 2006.

5.2.3 Water Supply

The water supply for Phase 1b may have to come from the existing Kennedy Town system if the new reservoir at Kung Man Tsuen is not complete. Part of the permanent distribution system could nevertheless be constructed. For further development beyond Phase 1 the Kung Man Tsuen reservoir should be operational. It would be possible to distribute water through the proposed system with no temporary arrangements.

5.2.4 Other Utilities

The electricity distribution system for Phase 1 forms part of the permanent network. It is necessary to accommodate a sub-station within the Phase 1b development. Thereafter arrangements will be made for electricity supply to the new developments and GIL from the sub-stations constructed during Phases 2 and 3 depending on the demand.

A gas supply if necessary for Phase 1b reprovisioning can be distributed through part of the permanent system if supply is from North Point. If the supply is from Tsuen Wan, however, provision will have to be made for the proposed Pigging Station, unless a temporary connection to Kennedy Town is established. The permanent gas distribution system can be installed and utilised with development of the remainder of the reclamation irrespective of the source of gas.

One of the telephone exchanges necessary to serve the whole reclamation will be accommodated on Phase 1b to serve the port and reprovisioned developments. A second exchange will be required once development of the remainder of the reclamation takes place.

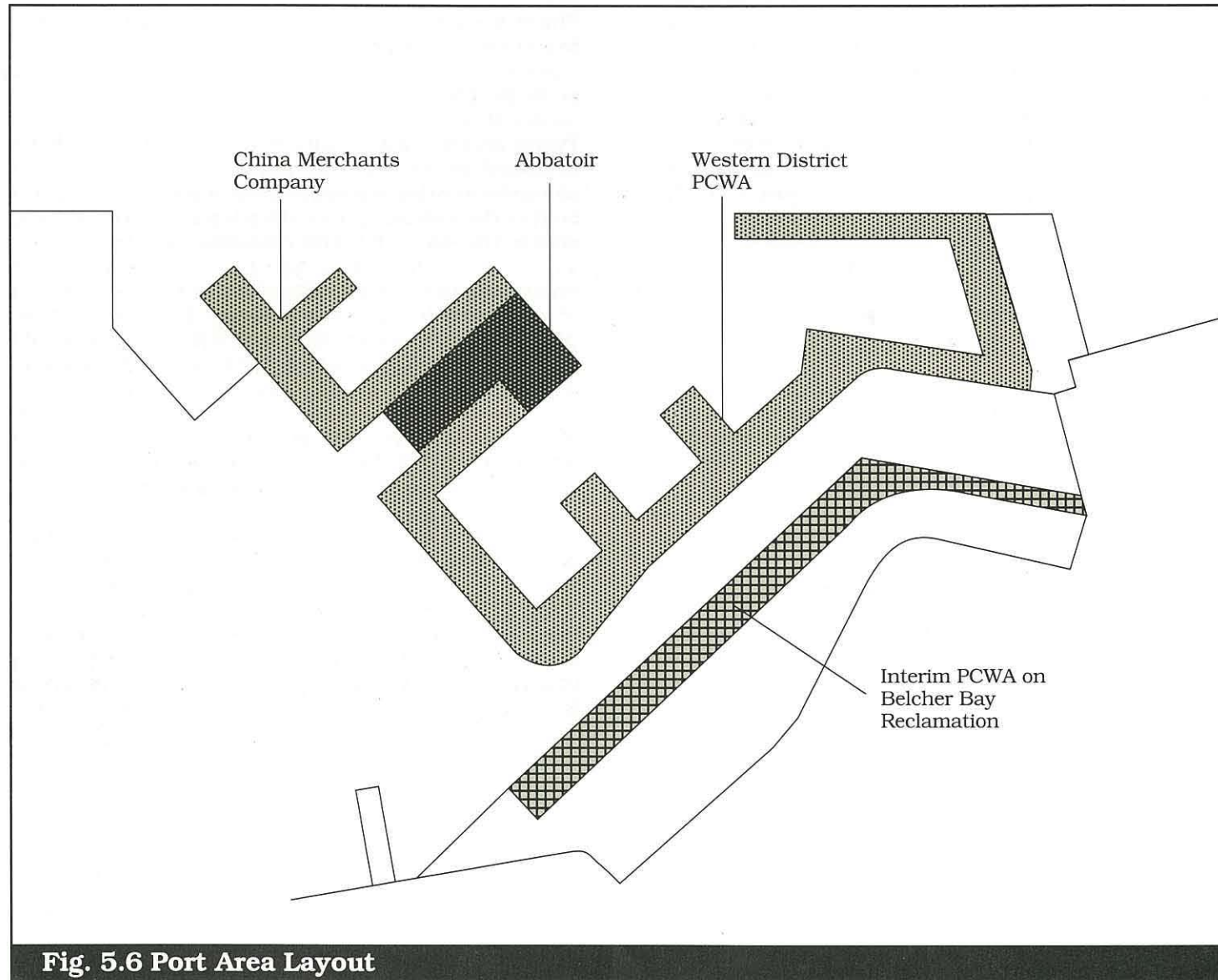


Fig. 5.6 Port Area Layout

5.3 Reprovisioning

The reprovisioning that will be necessary has been described in Chapter 3 and Table 3.3

The reprovisioning requirement has dictated the sequencing of reclamation. The emphasis has been to relocate formal waterfront activities to acceptable sites as soon as practical enabling reclamation to proceed in a westerly direction.

The main waterfront activities to be reprovisioned on Phase 1 of the reclamation are :

The China Merchants Company (CMC)
The Abattoir
The Western District PCWA

The RTS Temporary Barge Facility due to be completed in 1994 will need to be reprovisioned to Phase 3a.

5.3.1 The China Merchants Company

The area of waterfront allocated to CMC is as shown in Figure 5.6. The location has deeper water near the Southern Fairway and is separate from the remainder of the port activities associated with the PCWA.

The steps to relocate CMC to this site are as follows:

- construct Phase 1b with the PCWA, berths suitable for CMC and the abattoir,
- construct access roads, drainage, sewerage and utilities to service these new sites,
- allow private treaty development of godowns and offices for the relocation of CMC to the new deep water berths.

The time required to complete relocation of CMC to a new site is estimated to be between 6 and 7 years. This is reflected in the programme described in Section 5.4.

5.3.2 The Abattoir

The proposed site for the new abattoir is shown in Figure 5.5 adjacent to the new CMC Wharf. Removal of the abattoir from its present site will contribute to an improvement in the water quality in the harbour water. It is therefore desirable that development of the new abattoir site is concurrent with that for CMC.

5.3.3 The Western District PCWA

The total length of wharfage and back-up area designated for the new Western District PCWA is shown in Figure 5.5. The existing PCWA and the proposed extension of waterfront planned as part of Belcher Bay Reclamation is also indicated. The aim during reprovisioning will be to keep in operation as much waterfront PCWA as possible within a single controlled area. It is expected that these works will be carried out concurrently with the remainder of the reprovisioning within the new port area.

5.3.4 RTS Temporary Barge Facility

The temporary barge facility for the RTS at the end of Sai Ning Street, due for completion in 1994, will need to be reprovisioned on the Phase 3a reclamation. This reprovisioning is programmed to be complete at about the same time as the remainder of the reprovisioning. It should not interrupt progress with reclamation towards the western seawall and the land servicing for the first development areas which are to be completed in 2006.

5.4 Development Programme

A programme for implementing the Green Island Reclamation in stages is based on the phasing plan (Figure 5.5) and takes into account the work done in the Green Island Link Pre-Feasibility Study. The programme is shown in Figure 5.7 and is accompanied by Figures 5.8 and 5.9 which show the main elements described in the programme.

5.4.1 Production Rates

The development programme has been based on the following rates of production:

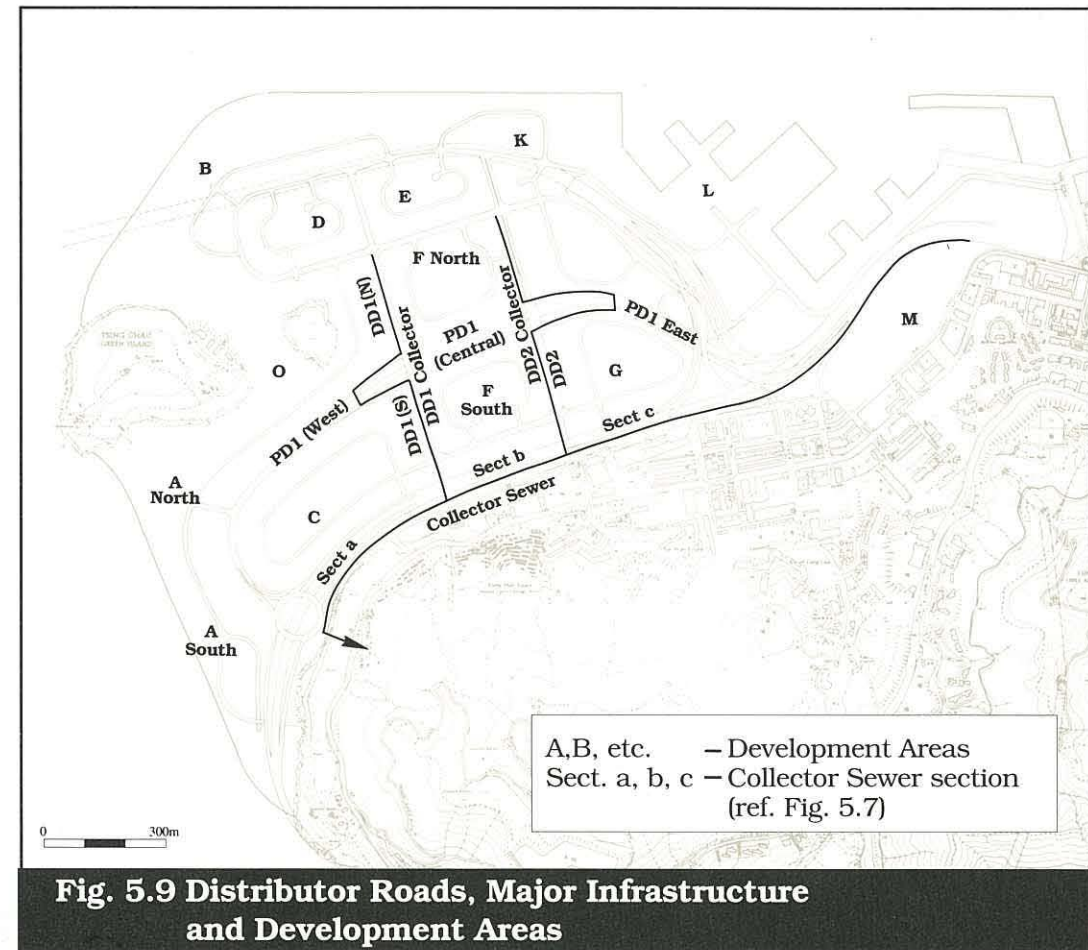
• Seawalls

Two types of seawall are proposed for Green Island Reclamation, sloping armoured rubble mound walls and vertical concrete blockwork walls. In general a faster rate of production has been achieved with sloping rubble mound walls. Recently, as an example, about 1200m of breakwater for Yau Ma Tei typhoon shelter was completed in an effective contract period of about 450 days. This represents a production rate of about 950m/year. In terms of its overall height and width the Yau Ma Tei breakwater is not as large as the seawalls proposed at Green Island, because of the deeper water and dredging depths. In view of this and other factors of dissimilarity between the structures, rates of sloping wall production of 700-800m/year are assumed for the development programme for Green Island.

Vertical seawall block handling and placing to a tolerance is a slower activity than is the handling and placing of rubble and armour. Rates of production of between 350m/year to 500m/year have been achieved on contracts under a variety of circumstances. It is doubtful that rates much above 500m/year can be achieved with this type of wall in the deeper water and changing tidal flow conditions likely along the north facing seawall.

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 Reprovisioning																							
1.3 Barge Point Reprovisioning (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. 5.7 Programme



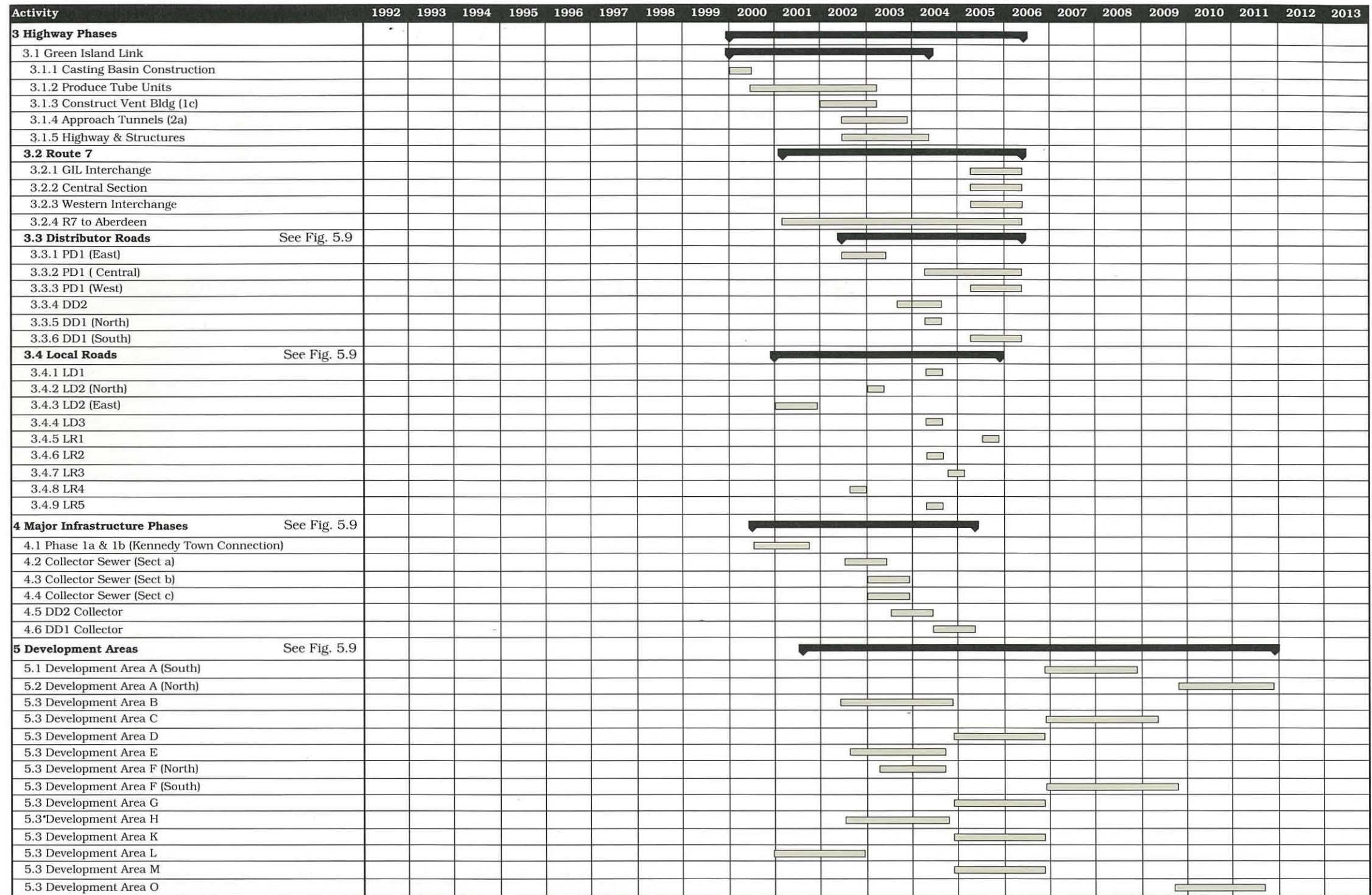


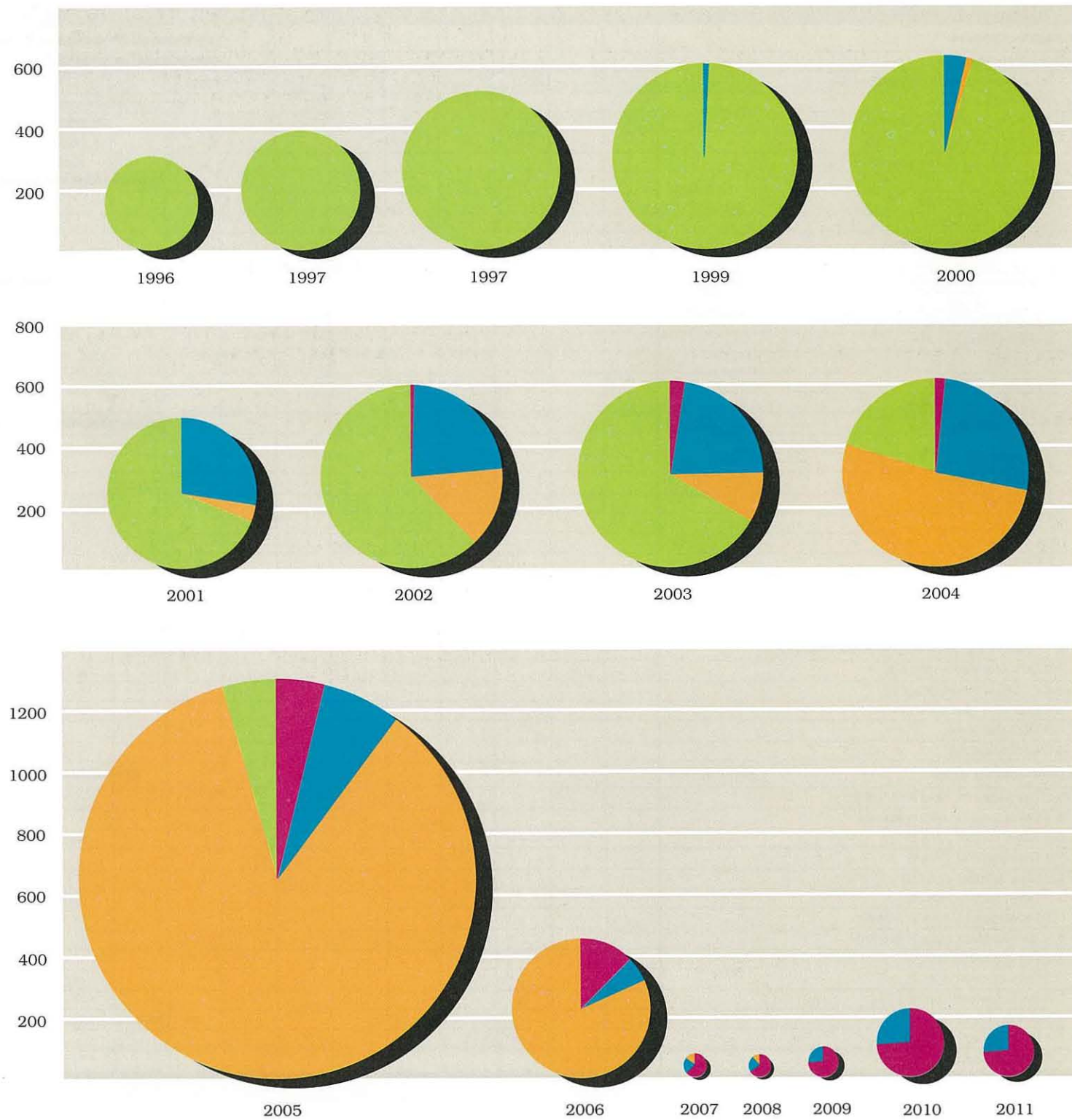
Fig. 5.7 Programme (Continued)

Table 5.3 Construction Costs

Year	Reclamation	Infrastructure	Landscaping	Roads	Total
1996	306.4	----	----	----	306.4
1997	390.2	----	----	----	390.2
1998	518	----	----	----	518
1999	602.7	5.6	----	----	608.3
2000	601.3	24.2	----	5.8	631.3
2001	338.9	136.1	----	17.2	492.2
2002	371.8	137.3	4.8	84.1	598
2003	404.7	136.6	15.4	51.4	608.1
2004	124	161.2	11.8	317.2	614.2
2005	62	88.9	57.5	1190	1398.4
2006	----	26.7	57.5	369.7	453.9
2007	----	16.3	46.9	11.2	74.4
2008	----	16.4	46.8	8.4	71.6
2009	----	25.2	72.3	----	97.5
2010	----	57.2	164	----	221.2
2011	----	42.9	123	----	165.9
Total	3720	874.6	600	2055	7249.6



in millions



- **Filling**

The reclamation filling activity will need to lag behind seawall construction by up to a year to prevent loss of material by washout.

- **Settlement**

The programme allows for a period of settlement of 6 months prior to the start of land servicing etc. This is based on likely consolidation times using wick drains to accelerate settlement of the marine clays. In areas such as along the GIL where the degree of settlement is critical to either the design or the programme then it is recommended that all the soft marine clays are removed.

5.4.2 A Programme for Development

The key factors which determine a programme for Green Island Reclamation are :

- the need for Green Island Link to be opened by 2004.
- the need for a proportion of housing to be completed by 2006 and all housing development completed by 2011.

The Green Island Link Preliminary Feasibility Study (Draft Final Report - Dec '91) has determined, by considering various options for road and tunnel construction, the dates by which those relevant parts of the reclamation need to be in place for GIL.

These dates are :

- Reclamation north of Green Island (Phase 1c) by 1999 or 2000 (depending on the type of tunnel construction).
- Reclamation area for reprovisioning (Phase 1b) by mid 2002.
- Reclamation Phase 2a, the middle section behind the north facing seawall, also by mid 2002.

The Green Island Link Study has determined that the latest date for commencement of Phase 1c should be mid 1997 in order to have the road open by the end of 2004.

To achieve the first housing development requirements by 2006 the programme shows that a start earlier than Phase 1(c) will be necessary for phase 1(b) reclamation for reprovisioning. A start date of 1996 i.e. following on from completion of Belcher Bay reclamation, is recommended, A start earlier than 1996 i.e. during the Airport and related core projects construction, may not be practical due to the commitment of plant and resources for large scale reclamation.

The attraction of more reclamation work, following completion of the PADS projects, may well prove beneficial to pricing because of continuity of work for marine plant but this has not been considered in the cost estimation.

Before construction can commence a number of preliminary activities must be carried out: a lead-in time of 24 months for these activities should be allowed.

- Decision by Government to proceed with the Green Island reclamation project. The RODP 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 approved.
- The implementing office will be identified and will seek the allocation of funds for the project implementation.
- Further design work will be required to develop the plans to a greater level of detail such that gazetting can be carried out under the Foreshores and Seabeds Ordinance. The OZP will be gazetted under the Town Planning Ordinance.
- Design, tender and contract procedures will then lead to the start of implementation of the construction activities.

If it is decided that consultants should be appointed to carry out design, tender and contract implementation, their appointment is recommended early in this process. This will allow the development of plans for gazetting.

5.5 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. These have now been brought up to date and are given as current costs for the fourth quarter of 1991.

The capital cost estimates have been linked to the implementation programme as shown in Table 5.3, and indicate 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%
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, infrastructure, roads and landscaping is shown as figure 5.10.

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

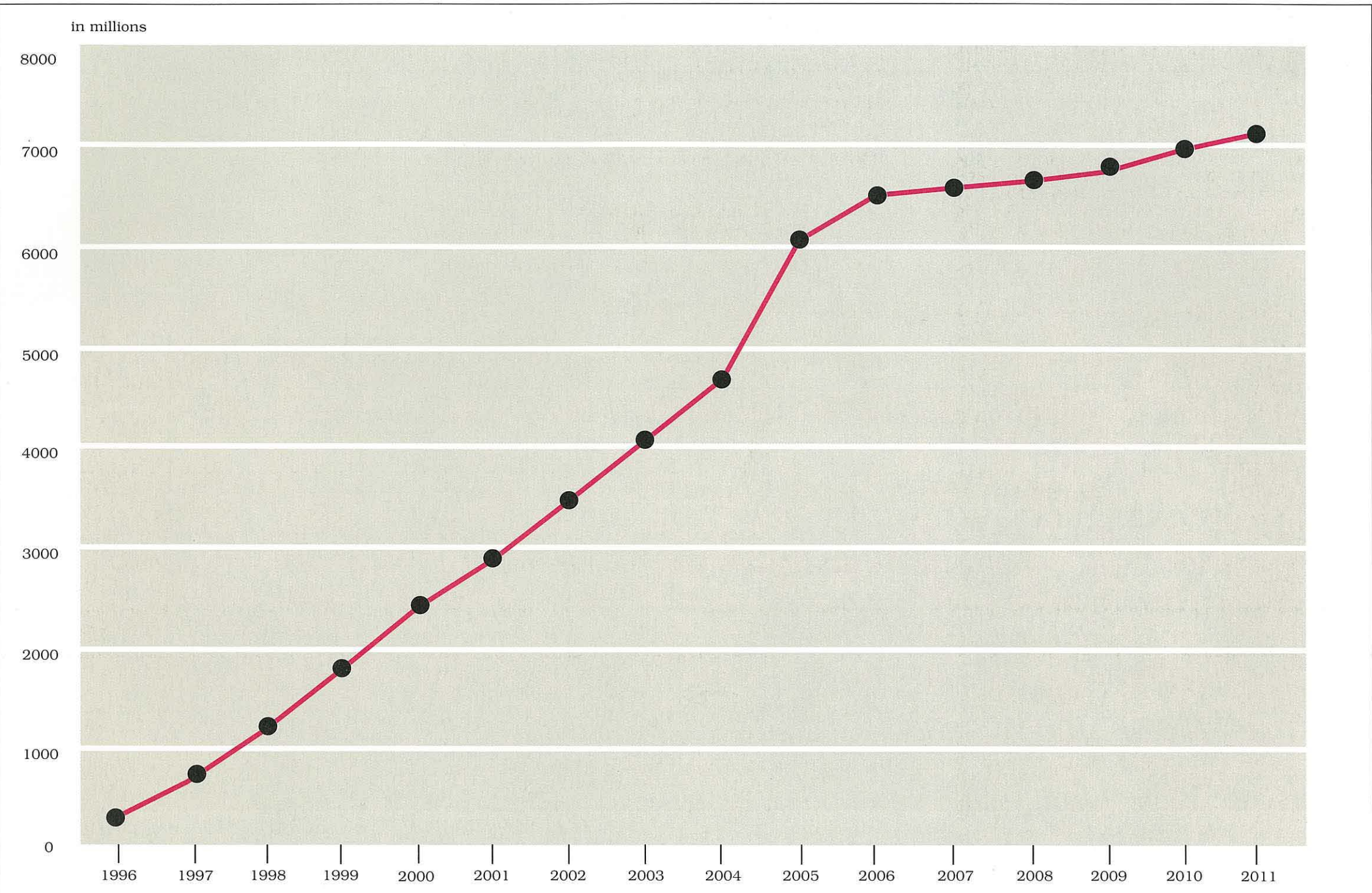
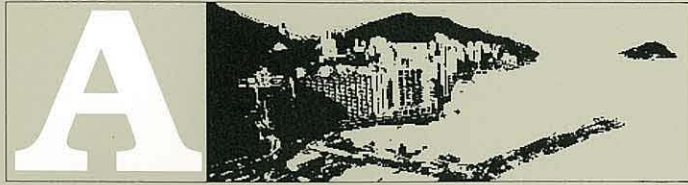


Fig. 5.10 Cumulative Expenditure Curve



Appendix A
Green Island Link
Options - Outline
Zoning Plans

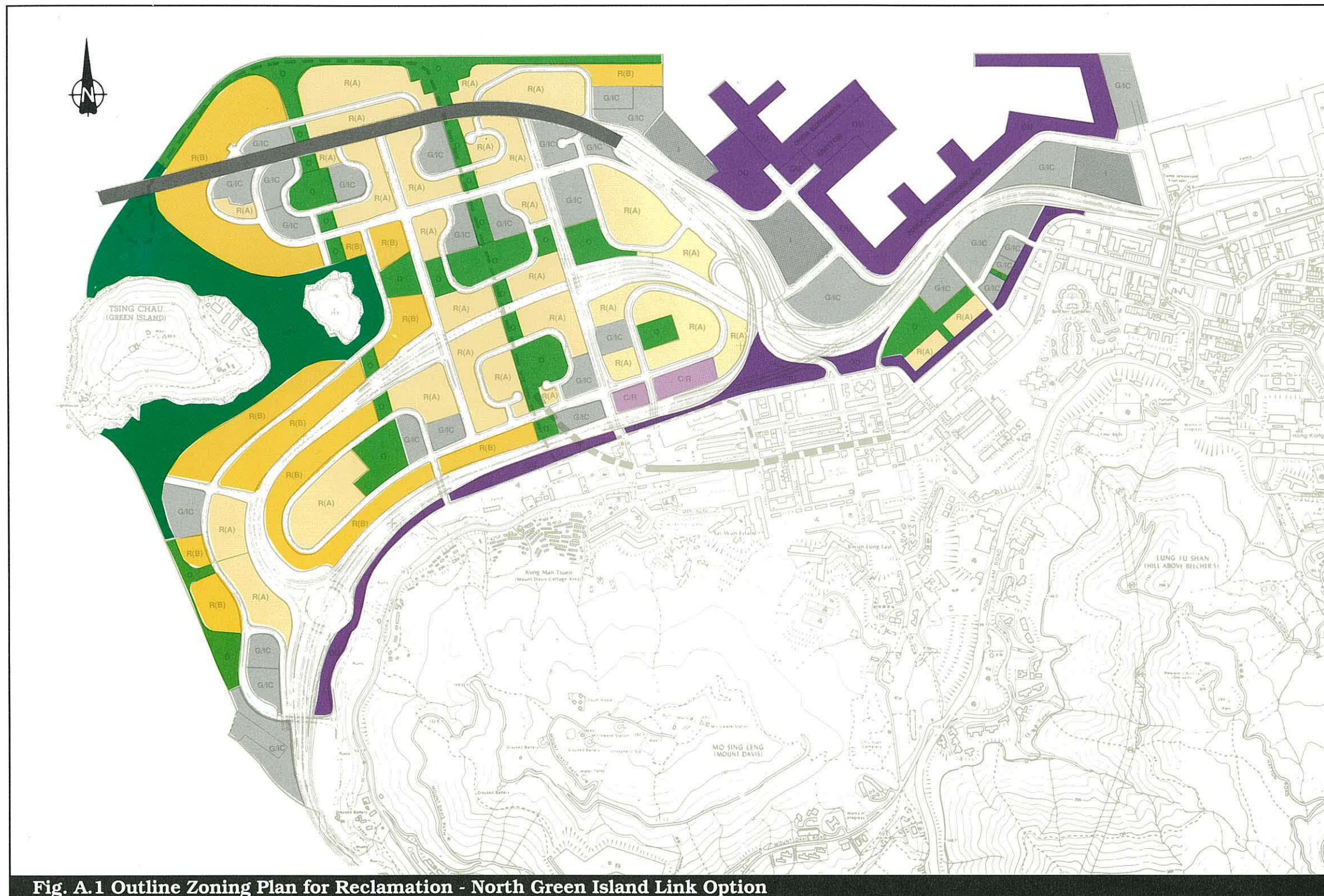


Fig. A.1 Outline Zoning Plan for Reclamation - North Green Island Link Option

Legend for Fig. A.1

Notation

- C/R Commercial / Residential
- R(A) Residential (Group A)
- R(B) Residential (Group B)
- I Industrial
- O Open Space
- G/IC Government/Institution & Community
- OU Other Specified Uses
- UFP Urban Fringe Park

Communications

- Local Roads
- Major Roads
- Tram
- Major Road in Tunnel
- MTR & Station

Schedule of Uses and Areas

Uses	Hectares	%
Commercial/Residential	1.16	0.62
Residential (Group A)	31.83	16.98
Residential (Group B)	21.73	11.62
Industrial	4.85	2.58
Open Space	17.77	9.48
Government/Institution & Community	22.81	12.17
Other Specified Uses	20.22	10.78
Urban Fringe Park	26.61	14.19
Local Roads	9.95	5.31
Major Roads etc.	30.51	16.27
Total Development Area	187.44	100.00

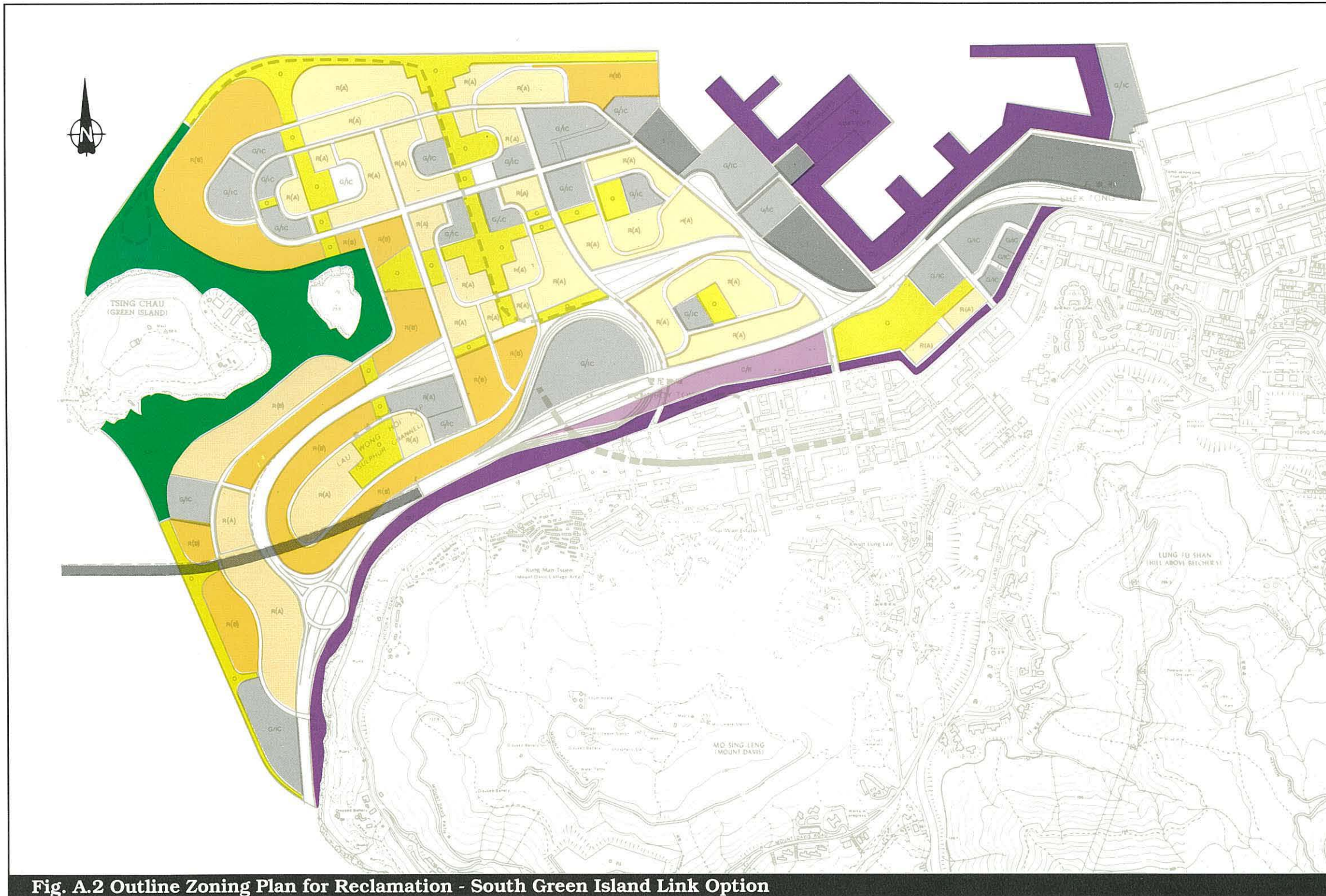


Fig. A.2 Outline Zoning Plan for Reclamation - South Green Island Link Option

Legend for Fig. A.2

Notation

- C/R Commercial / Residential
- R(A) Residential (Group A)
- R(B) Residential (Group B)
- I Industrial
- O Open Space
- G/IC Government/Institution & Community
- OU Other Specified Uses
- UFP Urban Fringe Park

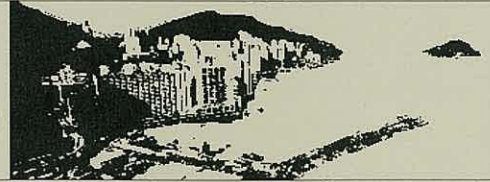
Communications

- Local Roads
- Major Roads
- Tram
- Major Road in Tunnel
- MTR & Station

Schedule of Uses and Areas

Uses	Hectares	%
Commercial/Residential	2.16	1.15
Residential (Group A)	30.54	16.28
Residential (Group B)	21.12	11.26
Industrial	6.85	3.65
Open Space	18.41	9.81
Government/Institution & Community	24.62	13.12
Other Specified Uses	14.58	7.76
Urban Fringe Park	26.61	14.19
Local Roads	10.82	5.78
Major Roads etc.	31.81	17.00
Total Development Area	187.52	100.00

B



**Appendix B
Planning Area
Land Uses**

Appendix B Table B.1 Outline Development Plan: Land Uses

Area No.	Area Ha.	R1	HOS	PSPS	RS	G/IC	OS	LDR	OU	C/R	IND	OCC Rate	No of Flats	No of Persons	Comments
A1	1.35	---	---	---	---	---	1.35	---	---	---	---	---	---	---	OS
A2	2.17	---	---	---	---	2.17	---	---	---	---	---	---	---	---	Refuse Barging Station (2 Sites)
A3	1.50	1.50	---	---	---	---	---	---	---	---	---	2.69	1120	3013	R1
A4	1.03	1.03	---	---	---	---	---	---	---	---	---	2.69	720	1937	R1
A5	0.53	0.53	---	---	---	---	---	---	---	---	---	2.69	480	1291	R1
A6	1.07	---	---	---	---	1.07	---	---	---	---	---	---	---	---	Primary and Secondary Schools
A7	1.00	1.00	---	---	---	---	---	---	---	---	---	2.69	920	2475	R1/ Bus STN/Post Office/ ESS
A8	2.80	2.80	---	---	---	---	---	---	---	---	---	2.69	2000	5380	R1/ Kindergarten
A9	2.30	2.30	---	---	---	---	---	---	---	---	---	2.69	1120	3013	R1
A10	0.16	---	---	---	---	---	0.16	---	---	---	---	---	---	---	OS
A11	1.20	1.20	---	---	---	---	---	---	---	---	---	2.69	1040	2798	R1
A12	0.70	---	---	---	---	---	0.70	---	---	---	---	---	---	---	OS
A13	0.45	---	---	---	---	0.45	---	---	---	---	---	---	---	---	WSD/ASD Maintenance & Contractors Depot
LDR	2.40	---	---	---	---	---	---	2.40	---	---	---	---	---	---	Local Distributor Roads
	18.66	10.36	0.00	0.00	0.00	3.69	2.21	2.40	0.00	0.00	0.00	---	7400	19907	
B1	0.66	0.66	---	---	---	---	---	---	---	---	---	2.69	800	2152	R1
B2	0.26	0.26	---	---	---	---	---	---	---	---	---	2.69	320	861	R1
B3	0.20	---	---	---	---	---	0.20	---	---	---	---	---	---	---	OS
B4	6.70	6.70	---	---	---	---	---	---	---	---	---	2.69	4680	12589	R1
B5	0.57	---	---	---	---	0.57	---	---	---	---	---	---	---	---	Type C IRC/Petrol Filling Station
B6	0.58	---	---	---	---	0.58	---	---	---	---	---	---	---	---	Secondary School
B7	0.18	---	---	---	---	---	0.18	---	---	---	---	---	---	---	OS
B8	2.55	2.55	---	---	---	---	---	---	---	---	---	2.69	1520	4089	R1/Kindergarten
B9	1.20	1.20	---	---	---	---	---	---	---	---	---	2.69	1200	3228	R1
B10	0.38	0.38	---	---	---	---	---	---	---	---	---	2.69	640	1722	R1/Post Office/ Bus Station/Kindergarten
LDR	1.20	---	---	---	---	---	---	1.20	---	---	---	---	---	---	Local Distributor Roads
	14.48	11.75	0.00	0.00	0.00	1.15	0.38	1.20	0.00	0.00	0.00	---	9160	24641	

Appendix B Table B.1 Outline Development Plan: Land Uses Continued

Area No.	Area Ha.	R1	HOS	PSPS	RS	G/IC	OS	LDR	OU	C/R	IND	OCC Rate	No of Flats	No of Persons	Comments
C1	0.33	---	---	0.33	---	---	---	---	---	---	---	2.78	160	445	
C2	4.30	---	---	4.30	---	---	---	---	---	---	---	2.78	1720	4782	
C3	2.13	---	---	2.13	---	---	---	---	---	---	---	2.78	1800	5004	
C4	1.24	---	---	---	---	---	1.24	---	---	---	---	---	---	---	
C5	0.57	---	---	---	---	0.57	---	---	---	---	---	---	---	---	
C6	0.52	---	---	---	---	0.52	---	---	---	---	---	---	---	---	
C7	1.33	---	---	1.33	---	---	---	---	---	---	---	2.78	1120	3114	
C8	0.17	---	---	---	---	---	0.17	---	---	---	---	---	---	---	
LDR	1.48	---	---	---	---	---	---	1.48	---	---	---	---	---	---	
	12.07	0.00	0.00	8.09	0.00	1.09	1.41	1.48	0.00	0.00	0.00	---	4800	13345	
D1	1.36	1.36	---	---	---	---	---	---	---	---	---	2.69	1360	3658	R1
D2	0.15	---	---	---	---	---	0.15	---	---	---	---	---	---	---	OS
D3	0.56	---	---	---	---	0.56	---	---	---	---	---	---	---	---	Secondary School
D4	0.56	---	---	---	---	0.56	---	---	---	---	---	---	---	---	Primary School
D5	0.16	---	---	---	---	---	0.16	---	---	---	---	---	---	---	OS
D6	0.82	---	---	---	---	---	0.82	---	---	---	---	---	---	---	OS
D7	0.56	---	---	---	---	0.56	---	---	---	---	---	---	---	---	Primary School
D8	0.20	0.20	---	---	---	---	---	---	---	---	---	2.69	120	323	R1
LDR	0.72	---	---	---	---	---	---	0.72	---	---	---	---	---	---	Local Distributor Roads
	5.09	1.56	0.00	0.00	0.00	1.68	1.13	0.72	0.00	0.00	0.00	---	1480	3981	
E1	1.28	1.28	---	---	---	---	---	---	---	---	---	2.69	1200	3228	R1/Youth Centre
E2	0.74	---	---	---	---	0.74	---	---	---	---	---	---	---	---	Secondary School
E3	0.38	---	---	---	---	---	0.38	---	---	---	---	---	---	---	OS
E4	0.50	0.50	---	---	---	---	---	---	---	---	---	2.69	360	968	R1/Kindergarten
E5	1.15	1.15	---	---	---	---	---	---	---	---	---	2.69	880	2367	R1/Child Centre/Post Office
E6	0.14	---	---	---	---	---	0.14	---	---	---	---	---	---	---	OS
LDR	0.71	---	---	---	---	---	---	0.71	---	---	---	---	---	---	Local Distributor Roads
	4.90	2.93	0.00	0.00	0.00	0.74	0.52	0.71	0.00	0.00	0.00	---	2440	6563	

Appendix B Table B.1 Outline Development Plan: Land Uses Continued

Area No.	Area Ha.	R1	HOS	PSPS	RS	G/IC	OS	LDR	OU	C/R	IND	OCC Rate	No of Flats	No of Persons	Comments
F1	0.59	---	0.59	---	---	---	---	---	---	---	---	2.78	720	2002	HOS
F2	0.33	---	---	---	---	---	0.33	---	---	---	---	---	---	---	OS
F3	0.92	---	0.92	---	---	---	---	---	---	---	---	2.78	760	2113	HOS
F4	1.53	---	---	---	---	---	1.53	---	---	---	---	---	---	---	OS
F5	0.61	---	---	---	---	0.61	---	---	---	---	---	---	---	---	Primary School
F6	0.35	---	---	---	---	---	0.35	---	---	---	---	---	---	---	OS
F7	0.52	---	---	---	---	0.52	---	---	---	---	---	---	---	---	Secondary School
F8	0.55	---	0.55	---	---	---	---	---	---	---	---	2.78	720	2002	HOS
F9	0.24	---	---	---	---	---	0.24	---	---	---	---	---	---	---	OS
F10	0.87	---	0.87	---	---	---	---	---	---	---	---	2.78	760	2113	HOS
F11	0.19	---	---	---	---	---	0.19	---	---	---	---	---	---	---	OS
F12	0.70	---	---	---	---	---	0.70	---	---	---	---	---	---	---	OS
F13	1.20	---	1.20	---	---	---	---	---	---	---	---	2.78	1200	3336	HOS
F14	0.20	---	---	---	---	---	0.20	---	---	---	---	---	---	---	OS
F15	1.61	---	1.61	---	---	---	---	---	---	---	---	2.78	1800	5004	HOS
F16	0.92	---	0.92	---	---	---	---	---	---	---	---	2.78	480	1334	HOS/Multi Service Centre/Day Care Centre
F17	1.50	---	---	---	---	---	1.50	---	---	---	---	---	---	---	OS
F18	0.13	---	0.13	---	---	---	---	---	---	---	---	2.78	120	334	HOS
F19	0.50	---	---	---	---	0.50	---	---	---	---	---	---	---	---	Primary School
F20	0.54	---	---	---	---	0.54	---	---	---	---	---	---	---	---	Type C IRC (Part Under Route 7)
F21	0.23	---	---	---	---	---	0.23	---	---	---	---	---	---	---	OS
F22	0.62	---	0.62	---	---	---	---	---	---	---	---	2.78	280	778	HOS/ESS
LDR	1.79	---	---	---	---	---	---	1.79	---	---	---	---	---	---	Local Distributor Roads
	16.64	0.00	7.41	0.00	0.00	2.17	5.27	1.79	0.00	0.00	0.00	---	6840	19016	

Appendix B Table B.1 Outline Development Plan: Land Uses Continued

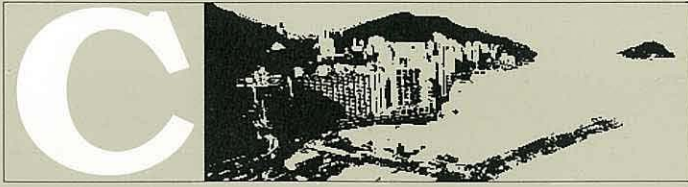
Area No.	Area Ha.	R1	HOS	PSPS	RS	G/IC	OS	LDR	OU	C/R	IND	OCC Rate	No of Flats	No of Persons	Comments
G1	0.37	---	---	---	---	---	---	---	---	0.37	---	---	---	---	Retail/PFS/District Community Centre
G2	0.79	---	---	---	---	---	---	---	---	0.79	---	---	---	---	Retail/Elderly Centre/Kindergarten Post Office/Market/Clinic
G3	0.78	---	---	---	0.78	---	---	---	---	---	---	3.08	560	1725	RS
G4	2.17	---	---	---	2.17	---	---	---	---	---	---	3.08	2240	6899	RS
G5	0.52	---	---	---	---	---	0.52	---	---	---	---	---	---	---	OS
G6	0.53	---	---	---	0.53	---	---	---	---	---	---	3.08	560	1725	RS
G7	0.52	---	---	---	---	0.52	---	---	---	---	---	---	---	---	Secondary School
G8	0.65	---	---	---	0.65	---	---	---	---	---	---	---	---	---	RS (Unbuilt EG Parking)
LDR	0.65	---	---	---	---	---	---	0.65	---	---	---	---	---	---	Local Distributor Roads
	6.98	0.00	0.00	0.00	4.13	0.52	0.52	0.65	0.00	1.16	0.00	---	3360	10349	
H1	0.95	---	---	---	---	0.95	---	---	---	---	---	---	---	---	Police Station/Tel Exchange
H2	0.80	---	---	---	---	---	0.80	---	---	---	---	---	---	---	OS
H3	2.34	---	---	---	2.34	---	---	---	---	---	---	3.08	1890	5821	RS
H4	0.83	---	---	---	0.83	---	---	---	---	---	---	3.08	560	1725	RS
LDR	0.50	---	---	---	---	---	---	0.50	---	---	---	---	---	---	Local Distributor Roads
	5.42	0.00	0.00	0.00	3.17	0.95	0.80	0.50	0.00	0.00	0.00	---	2450	7546	
K1	0.68	0.68	---	---	---	---	---	---	---	---	---	2.69	520	1399	R1
K2	1.68	---	1.68	---	---	---	---	---	---	---	---	2.78	1480	4114	HOS/Kindergarten
K3	1.00	---	1.00	---	---	---	---	---	---	---	---	2.78	720	2002	HOS
K4	0.50	---	---	---	---	0.50	---	---	---	---	---	---	---	---	Primary School
K5	4.16	---	---	---	---	---	4.16	---	---	---	---	---	---	---	OS/Public Landing Steps
LDR	0.50	---	---	---	---	---	---	0.50	---	---	---	---	---	---	Local Distributor Roads
	8.52	0.68	2.68	0.00	0.00	0.50	4.16	0.50	0.00	0.00	0.00	---	2720	7515	

Appendix B Table B.1 Outline Development Plan: Land Uses Continued

Area No.	Area Ha.	R1	HOS	PSPS	RS	G/IC	OS	LDR	OU	C/R	IND	OCC Rate	No of Flats	No of Persons	Comments
L1	0.92	---	---	---	---	0.92	---	---	---	---	---	---	---	---	Fresh & Salt Water Pump Stn/Gas Piggng Stn/ESS
L2	1.10	---	---	---	---	---	---	---	---	---	1.10	---	---	---	Marine Industry
L3	1.43	---	---	---	---	1.43	---	---	---	---	---	---	---	---	Bus, Fire, Ambulance Stn/TYPERA' IRC
L4	1.90	---	---	---	---	---	---	---	1.90	---	---	---	---	---	Port Works Div/PFS/Water Selling Kiosk
L5	2.24	---	---	---	---	---	---	---	2.24	---	---	---	---	---	China Merchants
L6	0.35	---	---	---	---	---	---	---	---	---	0.35	---	---	---	Cold Storage
L7	1.60	---	---	---	---	---	---	---	1.60	---	---	---	---	---	Abattoir
L8	1.80	---	---	---	---	---	---	---	---	---	1.80	---	---	---	Industry
L9	2.10	---	---	---	---	2.10	---	---	---	---	---	---	---	---	GSL Inc H'Ways Maint Depot
L10	7.40	---	---	---	---	---	---	---	7.40	---	---	---	---	---	Public Cargo Working Area
L11	1.28	---	---	---	---	1.28	---	---	---	---	---	---	---	---	Marine Police Base & Customs
L12	1.60	---	---	---	---	---	---	---	---	---	1.60	---	---	---	Industry
L13	1.50	---	---	---	---	1.50	---	---	---	---	---	---	---	---	Police Vehicle Weighing Station/ESS
	25.22	0.00	0.00	0.00	0.00	7.23	0.00	0.00	13.14	0.00	4.85	---	0	0	
M1	1.71	---	---	---	---	1.71	---	---	---	---	---	---	---	---	USD Vehicle Depot
M2	0.68	---	---	---	---	0.68	---	---	---	---	---	---	---	---	Type 'B' IRC
M3	1.30	---	---	---	---	---	1.30	---	---	---	---	---	---	---	OS
M4	0.40	---	0.40	---	---	---	---	---	---	---	---	2.78	300	834	HOS
M5	0.40	---	0.40	---	---	---	---	---	---	---	---	2.78	300	834	HOS/Kindergarten
M6	0.26	---	---	---	---	0.26	---	---	---	---	---	---	---	---	Gov't Quarters
M7	0.07	---	---	---	---	---	0.07	---	---	---	---	---	---	---	OS
M8	0.44	---	---	---	---	0.44	---	---	---	---	---	---	---	---	Fire/Ambulance Station
	5.26	0.00	0.80	0.00	0.00	3.09	1.37	0.00	0.00	0.00	0.00	---	600	1668	


Appendix B Table B.1 Outline Development Plan: Land Uses Continued

Area No.	Area Ha.	R1	HOS	PSPS	RS	G/IC	OS	LDR	OU	C/R	IND	OCC Rate	No of Flats	No of Persons	Comments
N1	0.15	---	---	---	---	---	---	---	0.15	---	---	---	---	---	Drainage Fairway
N2	0.26	---	---	---	---	---	---	---	0.26	---	---	---	---	---	Drainage Fairway
N3	0.67	---	---	---	---	---	---	---	0.67	---	---	---	---	---	Drainage Fairway
N4	0.65	---	---	---	---	---	---	---	0.65	---	---	---	---	---	Drainage Fairway
N5	1.57	---	---	---	---	---	---	---	1.57	---	---	---	---	---	Drainage Fairway
N6	0.35	---	---	---	---	---	---	---	0.35	---	---	---	---	---	Drainage Fairway
N7	2.30	---	---	---	---	---	---	---	2.30	---	---	---	---	---	Drainage Fairway/Lorry Park (1.2 ha under Route 7)
N8	1.13	---	---	---	---	---	---	---	1.13	---	---	---	---	---	Drainage Fairway
	7.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.08	0.00	0.00	---	0	0	
01	26.61	---	---	---	---	---	26.61	---	---	---	---	---	---	---	Urban Fringe Park
	26.61	0.00	0.00	0.00	0.00	0.00	26.61	0.00	0.00	0.00	0.00	---	0	0	
Grand Total	156.93	27.28	10.89	8.09	7.30	22.81	44.38	9.95	20.22	1.16	4.85	---	41250	114531	



Appendix C
Landscape Guidelines

Appendix C Landscape Guidelines

Landscape Type	Functions and Uses	Design Criteria
<p>Urban Fringe Park</p> <p>The Urban Fringe Park will need to be comprehensively planned and designed to include features appropriate for its status as a territory-wide attraction. Guidelines at present favour a low key approach to development in the existing wooded islands, with more active recreation development in the intervening flatter ground. See Figure C.1</p>	<p>Landscape</p> <ul style="list-style-type: none"> • retain major landscape features and landmarks • provide culmination of east/west vista • incorporate natural edge for waterfront walkway and park • retain natural vantage point on high ground <p>Open Space and Recreation</p> <ul style="list-style-type: none"> • retain significant element in breezeway system • include water features and lake for recreation • develop lighthouse as observation tower <p>Circulation</p> <ul style="list-style-type: none"> • provide integral part of footpath and cycletrack system • provide easy access from the Green Island recreation network, the South Island cycletrack, adjacent UFP at Mount Davis and from the tram terminus immediately north of the Park 	<ul style="list-style-type: none"> • retain existing vegetation and landform • complement existing landform with ground modelling in reclamation areas • create vistas to peaks and shoreline • emphasise two peaks of the two islands • include more natural shoreline details • create a park of contrasts with natural hillside uses for picnics, trails and walking in island zone; reclamation area houses water based activities, an amphitheatre, active sports facilities and play areas as well as rest areas and food centres • include sensitively designed small buildings like theme musea and larger space occupiers like underground car parks • include water based theme in lake area - use still water to create impression of spaciousness and maintain island character in part • emphasise entrance areas where park extends into open space network to announce arrival at the park • form eye catching waterfront features (incorporating tunnel ventilation shaft) • distinguish through routes for cycletracks and footpaths from internal circulation • use screening and mounding adjacent to peripheral roads • allow nighttime use, particularly for amphitheatre and restaurants • include floodlighting to spotlight features • incorporate woodland planting for screening and enclosure, amenity planting for provision of shade and visual interest and feature planting for emphasising landmarks, such as the lake and the waterfront promenade • design for heavy use, whilst allowing grass areas for informal recreation activities
 <p>Fig. C.1 Urban Fringe Park</p>		

Appendix C Landscape Guidelines

Landscape Type	Functions and Uses	Design Criteria
<p>District Open Space</p> <p>The District Open Spaces provide opportunities for both active and passive recreation whilst contributing strongly to the open space pattern over the reclamation area. The District Open Spaces fall generally into four different areas, where the design guidelines will vary and contrast, creating distinctive character to the different parks.</p> <ul style="list-style-type: none"> • Waterfront Promenades (Figure C.2) 	<p>Landscape</p> <ul style="list-style-type: none"> • take advantage of views across the harbour to Kowloon and islands • provide landmarks at termination of vistas <p>Open Space and Recreation</p> <ul style="list-style-type: none"> • provide public access to the waterfront • provide passive recreation facilities including cafes and restaurants which optimise the waterfront location • provide shade and shelter <p>Circulation</p> <ul style="list-style-type: none"> • provide a continuous waterfront walkway and cycle-track • contribute to the overall pedestrian network 	<ul style="list-style-type: none"> • create over-riding robust waterfront marine theme • emphasise the geometry of the grid open space system • provide “civic square” treatment in proximity to commercial development • relate to adjacent architecture • diversify character along the waterfront, creating a sequence of different experiences • contrast waterfront edges, hard and soft. (see Figure 3.35) • incorporate landmarks, nodes and vistas • provide shade by trees in hard paving, contrast to be provided by inclusion of spectacular nodes of ornamental and amenity planting • use diverse hardworks materials to create contrast • include sculptures and art

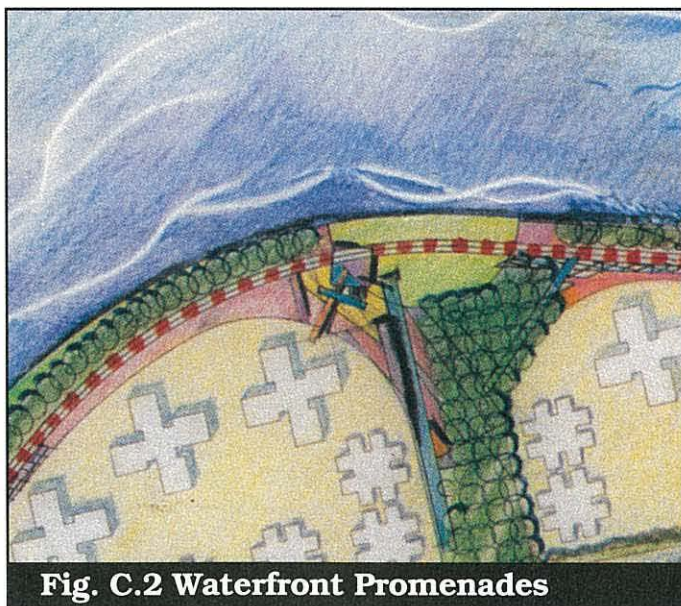


Fig. C.2 Waterfront Promenades

Appendix C Landscape Guidelines

Landscape Type	Functions and Uses	Design Criteria
<p>District Open Space</p> <ul style="list-style-type: none">• Linear Parks (Figure C.3)	<p>Landscape</p> <ul style="list-style-type: none">• provide landscape corridors linking large open space areas• form vistas to sea in one direction and Mount Davis in the other, contributing an essential element to the visual corridors• provide a landscape corridor through which the tram passes in the central linear park• create an important element in the breezeway system <p>Open Space and Recreation</p> <ul style="list-style-type: none">• provide both passive and active recreation facilities <p>Circulation</p> <ul style="list-style-type: none">• provide links to Kennedy Town• provide footpath and cycle-track links as part of overall circulation networks	<ul style="list-style-type: none">• establish avenue planting to emphasise view corridors• incorporate nodes for active recreation facilities such as play areas to avoid creation of a solely transport corridor• route footpaths and cycle-tracks occasionally in curvilinear manner to incorporate intermittent features/facilities• distinguish cycle-tracks from footpaths by use of different materials• provide colour and variety in planting, with feature planting at nodes and crossings• provide shade• include robust directional signs and street furniture

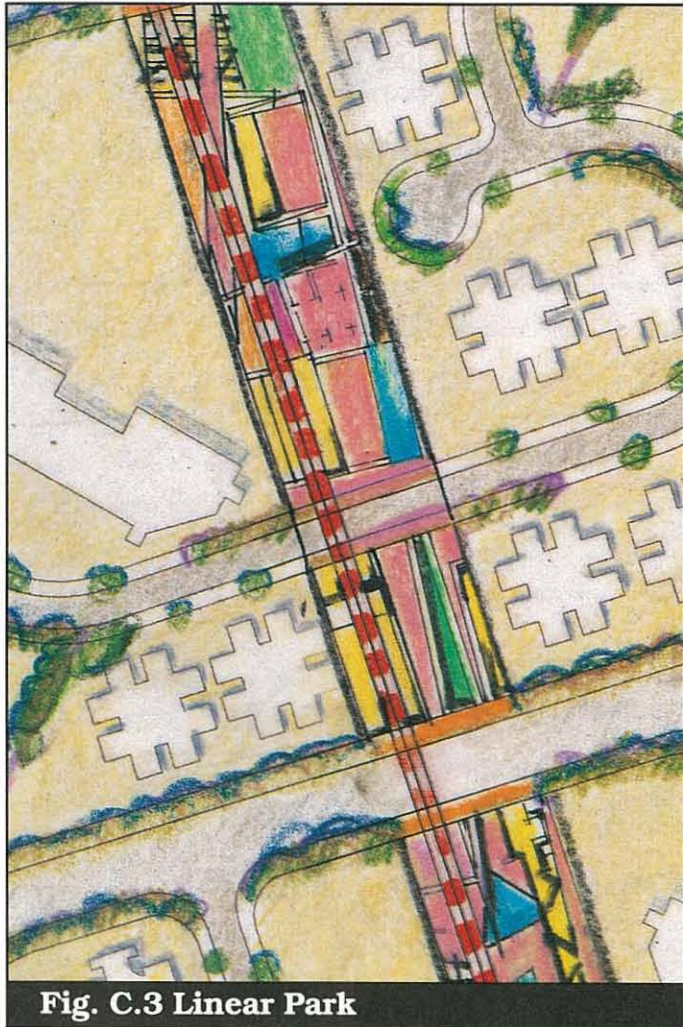



Fig. C.3 Linear Park

Appendix C Landscape Guidelines

Landscape Type	Functions and Uses	Design Criteria
<p>District Open Space</p> <ul style="list-style-type: none"> • District Parks (Figure C.4) 	<p>Landscape</p> <ul style="list-style-type: none"> • contribute to the landscape structure planting • contribute to breezeway system • contribute to visual corridors (north-south and east-west) <p>Open Space and Recreation</p> <ul style="list-style-type: none"> • provide a balanced mix of active and passive recreation facilities • provide rest areas, shade structures, water features and food centres/restaurants and cafes 	<ul style="list-style-type: none"> • create a distinctive character for each park, emphasising entry into a different space • create civic character by formal design where adjacent land uses comprise commercial or G/IC • integrate design with linear parks and waterfront parks where they meet • continue vistas and boulevards formed by linear parks • maximise opportunities to vary footpaths and cycle-track network away from direct north-south grid • distinguish through routes for cycle tracks and footpaths from internal circulation • provide enclosure by screening with woodland planting and mounding • include amenity and ornamental planting
<p>District Open Space</p> <ul style="list-style-type: none"> • Belcher Bay District Park (Figure C.4)  <p>Fig. C.4 District Park</p>	<p>Landscape</p> <ul style="list-style-type: none"> • significant location in providing connections from Kennedy Town <p>Open Space and Recreation</p> <ul style="list-style-type: none"> • provide active recreation facilities • provide some of the facilities identified in the shortfall for Kennedy Town because of close proximity • act as a buffer between Route 7, its various slip roads and Kennedy Town 	<ul style="list-style-type: none"> • provide dense screening and mounding along edges bordered by roads • create significant mounding between active recreational facilities to provide variety in relief • create screened compartments for locating recreational facilities • create contrasting areas for passive recreation which provide shade and quiet • create access routes to major active recreational facilities for footpaths and cycle tracks • incorporate planting to emphasise compartmentalisation, using woodland planting on embankments and for screening • emphasise entrances with feature planting • provide robust signs • include floodlighting to allow use of facilities at night

Appendix C Landscape Guidelines

Landscape Type	Functions and Uses	Design Criteria
<p>Local Open Spaces</p> <p>The Local Open Spaces on the reclamation have been divided into structural LOS and non-structural LOS. The structural LOS have been located on the MLP because their location is an integral and fundamental part of the open space system.</p> <p>Other Local Open Spaces will be located within the residential areas, the positions of which will be determined at more detailed planning stages. Important connections through the residential areas are shown on the MLP, and these would logically pass through LOS sites.</p> <p>• Structural LOS</p>	<p>Existing Landscape</p> <ul style="list-style-type: none"> • contribute to breezeway system • contribute to visual corridors • provide opportunities to increase width of planting belts thereby emphasising structure planting <p>Open Space and Recreation</p> <ul style="list-style-type: none"> • assist in regular distribution of open space • provide tranquil areas for passive recreation • provide a neighbourhood type arrangement for recreation facilities <p>Circulation</p> <ul style="list-style-type: none"> • provide continuous footpath linkages, particularly along the north-south grid 	<ul style="list-style-type: none"> • provide screening and mounding adjacent to peripheral roads • maintain framed views along lines of view corridors • achieve screening and shade provision by use of mainly woodland planting with some amenity planting • provide shade and shelter • provide contrast and variety whilst using more modest detailing and materials than those used in the DOS system
<p>Local Open Space</p> <p>• Non-structural LOS</p> <p>The non-structural LOS are not illustrated on the MLP because their positions and layout will be developed and formulated as part of more detailed planning of the residential areas. The main factors determining the use and design of these areas would be that they should perform as follows:</p>		<ul style="list-style-type: none"> • achieve a regular distribution of open space • contribute to the structure planting and open spaces where appropriate • create local breezeways • create vistas and views of the sea and hills from the housing areas • provide neighbourhood recreation facilities close to schools and community centres • design should reflect the adjacent housing layouts • provide footpath and cycle-track connections

Appendix C Landscape Guidelines

Landscape Type	Functions and Uses	Design Criteria
<p>Buffer Zones</p> <p>The buffer zones are proposed adjacent to major highways. The buffer zones comprise mounding and planting, although more detailed planning layouts of adjacent areas, such as housing, may incorporate peripheral non-noise sensitive uses into the buffer zones at a later date.</p>	<ul style="list-style-type: none"> • provide screen • reduce visual and air pollution impacts resulting from the road • assist in noise attenuation for uses adjacent to the highways • incorporate where possible some LOS for inclusion in adjacent housing layouts, especially in zones away from the road • include footpath and cycle-track connections where appropriate 	<ul style="list-style-type: none"> • maximise mounding to screen noise-sensitive uses from roads • maximise dense woodland type planting to assist in visual screening from lower levels of adjacent buildings • create a low-maintenance requirement vegetation cover
<p>Industrial Open Spaces</p> <p>Industrial open spaces are included on the MLP to establish a network of open spaces within the industrial area.</p>	<ul style="list-style-type: none"> • provide workers with active and passive recreation facilities • assist in segregating the industrial zones from adjacent residential areas • contribute to the cycle-track and footpath links 	<ul style="list-style-type: none"> • robust detailing • functional design • large fast growing tree species
<p>Podia And Precincts</p> <p>The MLP does not go into details of positions of podia and precincts. In developing the layout particularly for residential areas in more detail, the importance of podia and precincts in the open space networks will become apparent.</p>		<ul style="list-style-type: none"> • incorporate uses for which they have been allocated • reflect designs of adjacent architecture • link into overall open space network • select planting species suitable for containers, raised beds or hard paving
<p>Slope Planting And Borrow Areas</p> <p>The landscape treatment in borrow areas and for improving the visual quality of some of the existing slopes behind Kennedy Town will involve mainly planting of the woodland type.</p> <p>Land based borrow areas have not yet been identified. However, principles for their reinstatement can be mentioned here, as the planting of any slopes would be an appropriate means for this restoration.</p>	<ul style="list-style-type: none"> • blend new/improved slopes with existing • provide slope treatments that are visually attractive whilst geotechnically stable 	<ul style="list-style-type: none"> • grade slopes to blend with existing, avoid sharp edges • specify woodland planting techniques, including hydroseeding for initial stabilisation followed by pit planting of woodland tree and shrub species • planting to be designed to look as natural as possible • species to be selected from those growing in adjacent areas, where appropriate

Appendix C Landscape Guidelines Continued

Circulation Systems	Roads	Footpath/Cycle-track System
<p>The circulation systems comprise the roads, footpaths and cycle-tracks. They all contribute markedly to the opportunities for structure planting throughout the reclamation area and provide further opportunities to achieve microclimatic and view corridor objectives identified in the Conceptual Landscape Plan (Figure 3.32). The main uses are as transportation links for vehicles, pedestrians and bicycles. Their positions enable them to contribute to other criteria set for the urban design and landscape structure of the development.</p>	<ul style="list-style-type: none">• achieve landscape treatment along roads in keeping with the landscape structure and in scale with the roads (Figure C.5)• use robust hardworks detailing to provide continuity throughout the road system• devise bollard/barrier/tree with guards and grilles arrangements to prevent illegal parking• include embankments where possible for elevated sections of road, to enable further structural urban woodland planting to be included, and to incorporate mounding to assist screening the road• provide more effective pedestrian/cyclist separation from road and prevent misuse of planting areas by planting in raised beds• vary roadside planting and amenity areas to create views and give variety along pedestrian and vehicular routes• identify planting species for roadside amenity; include trees which are suited to restricted root conditions, which will not be disruptive to adjacent drains and services. Trees should be narrow crowned and/or suitable for pruning for roadside or medians. Larger shade trees are appropriate further back, adjacent to footpaths. Trees and shrubs should be selected to provide filtering from some particulate emissions• allow for underground utilities in footpath/cycle-track reserve enabling tree planting in amenity areas• preserve sight-lines• position tree planting to avoid conflict with road signs and lighting• divert footpath/cycle-track links through open spaces rather than alongside road, where appropriate• incorporate bus-bays within the amenity and cycle-track/footpath strip as an integral part avoiding pedestrian/cyclist conflict and provide shade planting at bus stops	<ul style="list-style-type: none">• separate footpath and cycle-track system from vehicular areas; link the open spaces and provide a waterfront walk• vary path widths according to location and anticipated use, ranging from 2m in LOS and parks for minor footpath routes, to an average of 2.75m for roadside and main footpaths, with a maximum of up to 10m wide for some areas of the waterfront promenade.• cycleways will be 3.5m wide• paving material for cycle-tracks should be of a single distinctive type to identify cycle-tracks from footpaths• footpath materials will vary; brushed concrete would be appropriate for roadside footpaths, but use of blocks and unit slabs or concrete with edge detailing would be used in the parks and DOS.• pedestrians and cyclists should be segregated from roadside by amenity planting strips (see Figure C.5)• where cycle-tracks and footpaths are parallel and not separated by an amenity planting strip, a low wall, railing or high kerb should be used as a divider• crossing of cycle-track and footpath should be clearly marked• speed humps should be incorporated on cycle-tracks at approaches to footpath crossing points• use at grade crossings where appropriate• footbridges should be designed in harmony with surroundings• take advantage of podium level crossings where possible and incorporate escalator links in commercial areas• underpasses should be provided with ramps and approaches be graded to allow planting where possible. Vertical approach walls and internal facings to subway barrels to be designed to add interest and in keeping with local surroundings

Circulation Systems	Roads	Footpath/Cycle-track System
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- covered cycle parks should be provided, adjacent to district centres, recreation centres, district parks and within the residential and industrial areas
- a standard range of fencing, bollards, litterbins, seating and other street furniture should be adopted for inclusion along the footpath and cycle-track network
- directional signs should be designed for the footpath/cycle-track system
- planting should be mainly amenity planting adjacent to the footpath and cycle-track systems providing shade from spreading trees where possible. Where more extensive planting areas about the cycle-track and footpath systems they would pass through woodland planting areas.

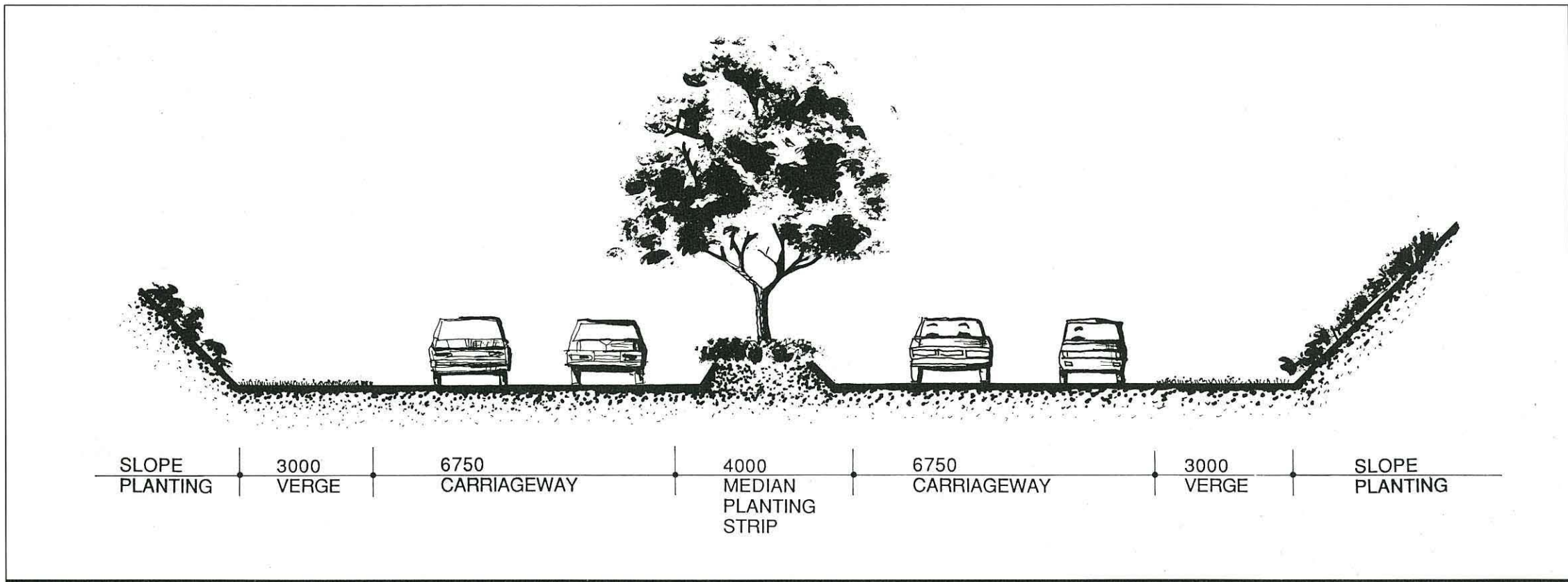


Fig. C.5 Circulation

Ove Arup & Partners
56/F Hopewell Centre,
183 Queen's Road East,
Hong Kong.
Telephone 528 3031
Telex 65263 OVARP HX
Facsimile 865 6493

PYPUN - Howard Humphreys Ltd
3rd Floor, Asian House,
1 Hennessy Road,
Wanchai, Hong Kong.
Telephone 866 3688
Telex 75258 PHH
Facsimile 529 5056