



Hong Kong Planning Standards and Guidelines Environment

Chapter 9



Planning Department

The Government of the Hong Kong
Special Administrative Region

CHAPTER 9

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ENVIRONMENT

1. Executive Summary

- 1.1 In June 1989, the Government published a major policy document, the White Paper on 'Pollution in Hong Kong'. The White Paper placed considerable emphasis on environmental planning, stating that "serious environmental pollution in Hong Kong is an unfortunate by-product of economic success and population growth. One of the Government's major priorities is to halt the decline in environmental conditions and to do more to improve our environment".
- 1.2 This chapter of the Hong Kong Planning Standards and Guidelines (HKPSG) provides guidance for including environmental considerations in the planning of both public and private developments. It applies both to the planning of permanent or temporary uses which will have potential to cause significant changes to the biophysical environment or which are sensitive to environmental impacts. The standards and criteria included in this document will need to be applied with a degree of flexibility and not in isolation. But any departure from them should not be accepted without full consideration of all the implications and the long term adverse effects on living conditions in Hong Kong.
- 1.3 A summary of the environmental guidelines for major land uses is shown in Table 1.1. The typical environmental factors influencing land use planning are given in Table 1.2. For reference, the recommended buffer distances for land uses are summarised in Table 1.3. The guidelines may be applied at three broad planning levels: strategic/territorial, sub-regional and district/local planning. It is of paramount importance to address environmental problems and incorporate environmental factors and criteria throughout the land use planning process. In applying the guidelines for the preparation of land use plans, it will be necessary to take account of resultant implications of alternative measures and trade-offs between associated costs and benefits to the community in general. It is essential that these guidelines should be applied with due regard to the application guidance given in Chapter 1 of HKPSG.
- 1.4 Section 2 of this chapter describes Government's approach to environmental planning and general environmental considerations in land use planning. Subsequent sections deal with different aspects of environmental quality and, where appropriate, contain :
 - (a) a summary of existing environmental legislation and its implications for planning;
 - (b) guidelines for locating new developments or redevelopments having the potential to cause nuisance or pollution with a view to minimising the adverse environmental impacts from them;
 - (c) guidelines for locating sensitive uses with a view to minimising the adverse environmental impacts on them;
 - (d) standards for and guidelines on the provision of environmental facilities; and

- (e) guidance on design, layout, phasing and operational controls for use in situations where non-environmental factors are overriding and restrict full application of the above.
- 1.5 Achieving a satisfactory environment depends to a large extent on incorporating environmental considerations in the early stages of planning. The opportunities for improvement are considerably greater in new developments and extensive redevelopments than in existing situations, particularly in the urbanised areas. However, there is little scope for improvement if the criteria for environmental quality of new developments are assessed in terms of their being no worse than those in existing urban areas. This is reflected in the higher standards set in this Chapter for new developments or redevelopments.
- 1.6 The relevant environmental protection legislation and regulations presently in force or under preparation are summarised in Appendix A. In general, the Environmental Protection Department (EPD) is the responsible authority for environmental protection matters, environmental planning and environmental impact assessment in Hong Kong. This chapter provides only broad guidelines and detailed advice should be sought from EPD on specific guidelines and mitigation measures. On matters for which DEP is not the authority, consultation should be made to the relevant authorities as shown in Appendix A. Co-operation from concerned departments is important in ensuring the successful implementation of the guidelines.
- 1.7 Many development projects have the potential to cause significant damage to the environment. Certain development projects, known as Designated Projects, in Hong Kong are subject to the Environmental Impact Assessment Ordinance (EIAO) (Cap.499). Designated Projects specified under Schedule 2 of the EIAO, unless exempted, must follow the statutory EIA process and require environmental permits for the construction and operation (and if applicable, decommissioning). In the environmental permit, appropriate mitigation measures may be set as conditions of implementing the projects. The purpose is to avoid, minimise and control the adverse impact on the environment arising from the projects.

Table 1.1 : Summary of General Environmental Guidelines for Major Land Uses

LAND USE	ASPECT	GUIDELINES
INDUSTRY	AIR	<ul style="list-style-type: none"> • Locate potentially air-polluting industries to the west of the Territory (3.2.2 and 3.3.1) • Avoid locating potentially air-polluting industries in airsheds with limited air dispersive capacity or areas where air pollution is very serious (3.2.2) • Provide adequate buffer areas between Specified Processes, industries giving rise to dusty, odorous and gaseous emissions, and any sensitive land uses (3.3, 3.4) • Make full use of godowns and amenity areas for buffering against sensitive uses (3.3.2, 3.4.3 - 5)
	NOISE	<ul style="list-style-type: none"> • Avoid locating noise-emitting industries close to noise sensitive uses in such a way that the maximum allowable noise levels at the nearest sensitive uses are exceeded (4.2.13 - 14, 4.3) • Position industries such that there is no line-of-sight to major noisy activities from adjacent noise sensitive uses (4.3) • If the required separation and screening between industries and sensitive uses cannot be provided, consider the feasibility of noise mitigation measures such as purpose-built noise barriers and innovative site layouts to minimise noise impacts (4.3)
	WATER	<ul style="list-style-type: none"> • Locate industries in areas adequately served by public foul sewerage (5.2.1) • In areas where no foul sewerage is available, avoid siting industrial developments that will result in effluent discharging into inland waters (5.2.1) • For effluent-producing industries, ensure adequate provision of suitable land and access for installation of effluent pre-treatment facilities (5.2.1 - 8) • Wherever possible, centralise industries of the same category to economise the provision of wastewater collection and treatment facilities (5.2.1)
	WASTE	<ul style="list-style-type: none"> • For industries with special requirements for waste disposal, ensure that adequate and suitably located space and access are provided for the collection, storage and transportation of waste (6.3.1 - 2) • Locate offensive trades in purpose-built industrial buildings within designated industrial areas and provide adequate buffer to minimise potential odour nuisance (6.3.3 - 4)
RESIDENTIAL	AIR	<ul style="list-style-type: none"> • Avoid siting high-rise residential developments close to low-rise industrial developments (3.3.3, 3.4.1) • Ensure that adequate buffer distance and/or intervening uses are available between residential and industrial uses (2.4, 3.3.2)

Note : Figures in brackets refer to sections of this chapter in which detailed descriptions are given.

Table 1.1 : Summary of General Environmental Guidelines for Major Land Uses (cont'd)

LAND USE	ASPECT	GUIDELINES
RESIDENTIAL (cont'd)	NOISE	<ul style="list-style-type: none"> • Allow no noise sensitive uses in areas within Noise Exposure Forecast (NEF) 25 for the Hong Kong International Airport (4.2.1 - 2) • Avoid siting residential developments close to, and with direct line-of-sight to, fixed noise sources, railways, helicopter facilities and routes and roads with heavy traffic such that the maximum noise criteria are exceeded (4.2.3 - 15) • If adequate buffer distance cannot be provided, adopt design guidelines to reduce noise exposure such as self-protecting building design, integrated building and noise source design, purpose-built noise barriers and acoustic insulation of buildings (4.3) • Avoid siting residential developments within 150m of uncovered MTR lines, 85m of KCR lines and 25m of LRT lines (4.2.10)
	WATER	<ul style="list-style-type: none"> • Locate major developments in areas which would be adequately served by existing or new public sewerage and sewage treatment facilities (5.2.4 - 8) • Locate residential and recreational developments away from stagnant waters, enclosed water bodies and existing water pollution black spots (5.3.7 - 8) • Locate residential developments away from natural streamcourses (5.3.15)
	WASTE	<ul style="list-style-type: none"> • Ensure adequate provision of suitable space and access for waste separation and collection facilities (6.2.6 - 24)
TRANSPORT FACILITIES	AIR	<ul style="list-style-type: none"> • Encourage the development and use of railways, especially in metropolitan and topographically-confined areas (3.2.3) • Avoid routing major trunk roads and nodes with heavy traffic through existing air pollution black spots (3.2.4) • Promote balanced land uses to minimise the need to travel, hence the traffic volume (2.3.2, 3.2.3 - 4) • Maintain a ventilation corridor for the dispersion of otherwise locally-trapped air pollutants (3.5)
	NOISE	<ul style="list-style-type: none"> • Avoid road alignments that would create excessive noise levels at adjacent noise sensitive uses (4.2.5 - 8) • Ensure that noise levels at sensitive uses due to rail lines, roadways, aircraft and helicopter movements do not exceed acceptable limits and that adequate separation is provided (4.2.1 - 13)

Note : Figures in brackets refer to sections of this chapter in which detailed descriptions are given.

Table 1.1 : Summary of General Environmental Guidelines for Major Land Uses (cont'd)

LAND USE	ASPECT	GUIDELINES
GOVERNMENT/ INSTITUTION/ COMMUNITY USES	AIR	<ul style="list-style-type: none"> For sensitive GIC uses such as schools and hospitals etc., avoid locating developments in existing pollution black spots or sites that are subject to direct impingement of air discharge plumes (2.4, 3.3, 3.4.1 - 2) For potentially polluting GIC uses such as markets and refuse collection points etc., provide adequate buffering against sensitive uses and ensure that the site layout does not restrict local air circulation (3.3.6 - 9, 3.5)
	WATER AND WASTE	<ul style="list-style-type: none"> Ensure adequate provision of suitable land and vehicular access for refuse transfer stations, public filling barging points and refuse collection points (6.2) For GIC uses with special requirements for waste disposal, ensure adequate provision of suitable land and access for collection, treatment and transportation of liquid and solid wastes and provide adequate buffer zones to minimise nuisances (6.4.1 - 4)
	NOISE	<ul style="list-style-type: none"> For noise-generating activities, ensure that there is no direct line-of-sight to noise sources from noise sensitive uses and that adequate buffering and screening are provided (4.2.14 – 15) Allow no noise sensitive developments within NEF 25 for the Hong Kong International Airport (4.2.1-2) Make full use of noise-tolerant GIC uses such as multi-storey car parks and markets etc. as screening structures (4.2.14, 4.3.7)
SLAUGHTERHOUSES	AIR AND NOISE	<ul style="list-style-type: none"> Avoid siting this facility within a distance of 300m of sensitive uses and commercial areas for slaughterhouses with a rendering plant and within a distance of 200m for slaughterhouses without a rendering plant (3.3.5)
	WATER AND WASTE	<ul style="list-style-type: none"> Ensure adequate provision of suitable space and access for the collection, storage, transportation and/or pre-treatment of waste and wastewater arising from the operations (6.4.2)
COMMERCIAL	AIR AND NOISE	<ul style="list-style-type: none"> Avoid siting commercial developments in areas where the traffic generated will cause adverse air pollution and noise impacts on nearby sensitive uses (3.3.2, 4.2.5 - 8)
	NOISE	<ul style="list-style-type: none"> Avoid locating offices within NEF 30 for the Hong Kong International Airport unless buildings are insulated (4.2.1 - 2) Make full use of insulated office blocks as noise screening structures (4.3.3 - 7)
	WASTE	<ul style="list-style-type: none"> Ensure adequate provision of suitable space and access for waste separation, collection and transportation facilities (6.2.14)

Note : Figures in brackets refer to sections of this chapter in which detailed descriptions are given.

Table 1.1 : Summary of General Environmental Guidelines for Major Land Uses (cont'd)

LAND USE	ASPECT	GUIDELINES
OPEN SPACE	AIR	<ul style="list-style-type: none">• Avoid locating active recreation activities within 20m of trunk roads and primary distributors, 10m of district distributors, and 5m of local distributors (3.4.3 - 5)• Active recreation activities within 50 - 100m of an industrial area need special consideration (3.4.3 - 5)
	NOISE	<ul style="list-style-type: none">• Make use of earth berms wherever practicable in passive recreation areas as noise screening structures to minimise noise impact from roads and rail lines (4.3.8)
ALL USES	WASTE	<ul style="list-style-type: none">• Avoid siting developments in close proximity to landfill sites, unless suitable precautionary measures are taken for potential hazard of landfill gas migration (6.5)

Note : Figures in brackets refer to sections of this chapter in which detailed descriptions are given.

Table 1.2 : Environmental Factor Influencing Land Use Planning

ASPECT	FACTORS
AIR	<ul style="list-style-type: none"> • prevailing north-easterly winds (3.2.1 - 2) • topographically-confined airsheds of limited dispersive capacity (3.2.1 - 2) • existing air pollution black spots in main urban areas or areas where the existing air pollution is serious (3.2.1 - 2)
NOISE	<ul style="list-style-type: none"> • aircraft noise (NEF contours) (4.2.1 - 2) • existing and committed fixed (such as industrial) and mobile (rail, road traffic, helicopter) noise sources (4.2.3 - 15)
WATER	<ul style="list-style-type: none"> • main tidal flow and navigation channels (5.1.2, 5.2.13) • waterbodies with limited dispersive capacity or stagnant waters (5.1.2, 5.3.7, 5.3.8) • areas requiring special protection including water gathering grounds, flood pumping grounds and areas for commercial fisheries (5.1.2, 5.3.3 - 5, 5.3.13) • coastal waters of high amenity value such as gazetted or non-gazetted beaches (5.1.2) • availability and adequacy of sewerage and sewage treatment facilities (5.2.4 - 8) • existing water pollution black spots such as typhoon shelters and other severely polluted watercourses and stagnant waterbodies (5.1.2, 5.3.9 - 12)
WASTE	<ul style="list-style-type: none"> • availability and adequacy of waste separation, collection, treatment and disposal facilities (6.2) • availability and capacity of the marine dumping grounds for disposal of surplus spoil from dredging (5.2.11) • livestock waste prohibition and control areas (Appendix 6.1, 6.3.5 - 6)
ECOLOGY	<ul style="list-style-type: none"> • reference to HKPSG Chapter 10 – Conservation

Note : Figures in brackets refer to sections of this chapter in which detailed descriptions are given.

Table 1.3 : Summary of Recommended Buffer Distances for Land Uses

Polluting Uses	Sensitive Uses	Buffer Distance	Reference
Multi-storey industrial buildings	residential areas, schools	100m	3.3.2
Multi-storey industrial buildings	commercial and GIC uses	30m	3.3.2
Industrial areas	hospitals	500m	3.4.2
Industrial chimneys	sensitive uses	within 500m, consult EPD	3.3.3
Industrial chimneys	high-rise buildings	200m	3.3.3
Industrial chimneys	active open spaces	10 - 100m	3.4.4
Slaughterhouses	sensitive uses and commercial areas	300m or 200m (with or without a rendering plant)	3.3.5
Village incinerator	sensitive uses	100m	3.3.7
Odour sources	sensitive uses	200m	3.3.9
Offensive trades	sensitive uses	200m	6.3.4
Dusty uses	sensitive uses	100m	3.3.10
Trunk roads	active open spaces	20m	3.4.4
Trunk roads	residential uses	300m 50m (with screening)	4.2.8
Primary distributors	residential uses	180m 40m (with screening)	4.2.8
District distributors/Local distributors	residential uses	120m 30m (with screening)	4.2.8
MTR lines	noise sensitive uses	150m	4.2.10
KCR lines	noise sensitive uses	85m	4.2.10
LRT lines	noise sensitive uses	25m	4.2.10

2. Principles of Environmental Planning

2.1 Aims of Environmental Planning

2.1.1 To achieve a better environment through planning, a systematic approach to environmental planning is essential. Environmental planning addresses the relationships among activities, environment, natural resources and environmental effects of activities for the purpose of optimising environmental quality and capacity. As outlined in the White Paper on Pollution, the Government's overall policy objectives for environmental planning are:

- (a) "to avoid creating new environmental problems by ensuring the consequences for the environment are properly taken into account in site selection, planning and design of all new developments"; and
- (b) to seize opportunities for environmental improvement as they arise in the course of urban redevelopment".

2.2 The Approach to Environmental Planning

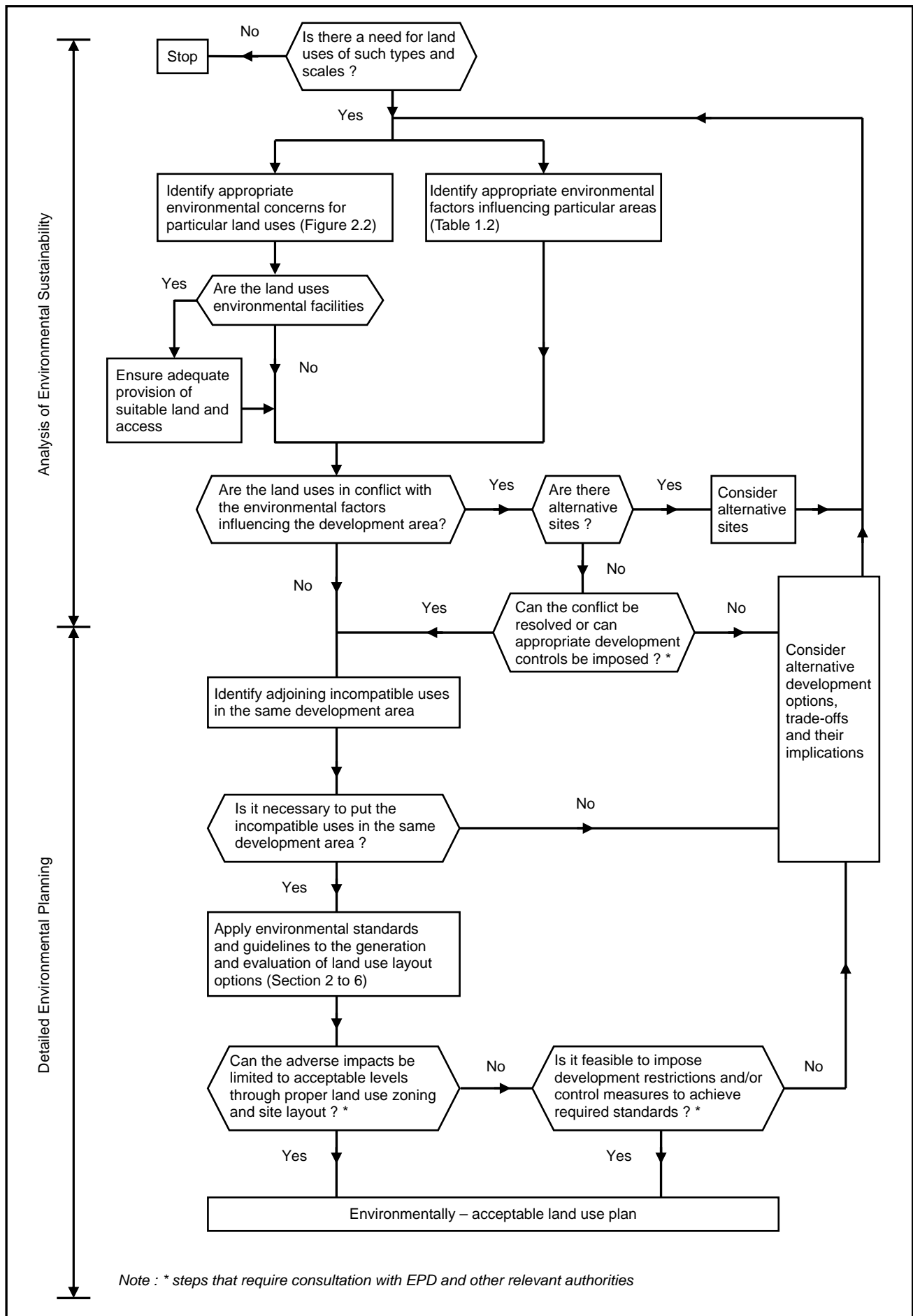
2.2.1 A flow chart showing the typical steps that should be taken in environmental planning is shown in Figure 2.1. Proper land use planning, along with appropriate controls at sources through licensing and enforcement of environmental protection ordinances, plays an important role in protecting the environment. Applying these planning steps will help achieve the following:

- (a) proposed land uses in particular development areas are environmentally suitable;
- (b) proposed land uses in the same development area are compatible with each other; and
- (c) adequate and suitably sited environmental facilities are provided to ensure proper handling and disposal of all wastes and waste water arising from proposed developments.

2.2.2 To promote the suitability of land uses in a particular development area, an analysis of the environmental implications of the development should be carried out by proponents or development agents in consultation with EPD. The environmental suitability of a site for a certain land use is governed by such factors as:

- (a) natural environmental characteristics including topography, climate, hydrological and hydrographical characteristics, vegetation, wildlife and habitat, and soil conditions;
- (b) the nature, distribution and consequences of the residuals including aerial emissions, wastes, sewage or noise generated by land uses in the development area;

Figure 2.1 : Flow Chart of Environmental Planning



- (c) the capacity of the environment to receive additional developments, for example, the capacity of an airshed or water basin to receive and assimilate residuals or the capacity of the environment infrastructure such as sewerage and waste reception facilities to accommodate further residuals; and
- (d) existing land uses.

2.2.3 Figure 2.2 gives a matrix showing environmental concerns for various land uses. Those land uses that are considered as environmental facilities are marked with an asterisk and efforts should be made to ensure adequate provision of suitable land and access for these facilities. The definitions of environmental terms that are commonly used in this chapter are listed in Appendix 2.1.

2.2.4 As shown in Figure 2.2, the environmental concerns relating to various types of land use against different environmental aspects can be classified into three types according to the likelihood and severity of, or sensitivity to, environmental impacts:

Type I:

Some of the activities common in such land uses may cause, or be sensitive to, environmental impacts under certain conditions, though less serious than Type II and III. These impacts may be minimised through careful disposition of land uses, imposition of development restrictions or control measures.

Type II:

A majority of the activities common in such land uses have potential to cause, or may be sensitive to, environmental impacts. Environmental standards and guidelines should be applied to minimise potential adverse impacts through proper land use zoning and site layout. The type and severity of environmental implications of the land uses should be identified. Scoped environmental assessments of the developments at the project planning stage may be necessary.

Type III:

The relevant land uses are likely to cause significant environmental concerns by virtue of either their potential to cause significant environmental impacts, or their high sensitivity to pollution. The greatest care must be exercised in site selection for these land uses to address the specific environmental concerns. The associated environmental standards and guidelines must be fully observed. Detailed Environmental Impact Assessments of the developments at the project planning stage may be necessary in such cases.



Figure 2.2 : Matrix Showing Environmental Concerns

LAND USE/ ACTIVITY	Air				Noise		Water			Waste		Reference
	Dusty emission	Odorous emission	Gaseous emission	Sensitivity to air pollution	Noise emission	Sensitivity to noise	Effluent	Disruption to waterbodies	Sensitivity to water pollution	Waste generation	Sensitivity to waste disposal	
<u>COMMUNITY FACILITIES</u>												
Slaughterhouses Auditoria etc		●	◐		●	◐	◐	○		●		3.3.5, 4.2.14, 6.4.2 4.2, 4.3
Public Filling Barging Points/Public Filling Areas/Public Fill Stockpiling Areas	◐	○			◐		○	○				5.2.9-12, 6.2.4-5
Carparks			○		○							4.3.7 3.3.8, 4.2.13-14, 6.4.3
Cooked Food Stalls		◐	◐		◐		◐			○	○	3.3.9
Crematoria	◐	◐										3.4.2, 4.2, 4.3
Hospitals	◐		◐	●		●	○			●		3.3, 3.4, 4.2, 4.3
Residential Care Homes for the Elderly				●		●						
Incinerators*	◐	◐	◐		○		○	○		◐		3.3.7
Landfills*	◐	●	●		●		●	●				5.2.9-12, 6.5
Markets		◐			◐		◐			◐		3.3.9 4.2.13-14, 6.4.3
Open Spaces (Active)				◐					◐		○	3.4.3-5
Open Spaces (Passive)				○		○					○	3.4.3-5, 4.3.8
Petrol Filling Stations		◐			○		○					3.3.8 4.2.15 5.2.13
Residential Uses				●		●	◐		◐	◐	○	2.4.1-2, 3.3, 3.4.1, 4.2, 4.3, 5.3.7-8, 6.2 3.3.8, 6.2.6-14
Refuse Collection Points*		●					○			●		
Refuse Transfer Stations*	○	◐			◐		○			○	○	6.2.2-3
School / Educational Institutions				●		●						3.3, 3.4.1, 4.2, 4.3.10
Sewage Treatment Works*		●			◐		●	○		●		3.3.6, 4.2.13, 5.2.4-8
Utility Sub-stations					●							4.2.13
<u>TRANSPORT</u>												
Aircraft, Airports			●		●		○	●		◐		4.2.1-2 5.2.9-12
Helipads					●							4.2.3-4
Pedestrianways				○					○			3.4.3-5
Railways					●			○				4.2.9-12
Roads / Highways	◐		●		●		○	○				3.2.3-4, 4.2.5-8 3.3.8
Transport Depots	◐		◐		◐		○			○		4.2.14-15, 4.3.7, 5.2.13
LEGENDS : ● Type III : likely to cause significant concern * environmental facility ◐ Type II : potential to cause concern ○ Type I : requires attention												

Figure 2.2 : Matrix Showing Environmental Concerns (cont'd)

LAND USE/ ACTIVITY	Air				Noise		Water			Waste		Reference
	Dusty emission	Odorous emission	Gaseous emission	Sensitivity to air pollution	Noise emission	Sensitivity to noise	Effluent	Disruption to waterbodies	Sensitivity to water pollution	Waste generation	Sensitivity to waste disposal	
INDUSTRY/ MANUFACTURING												<div>↑</div> <div>3.2.2, 3.3.1-3, 3.3.10, 3.4.1, 3.4.4, 4.2.13 - 14 4.3.3 - 9, 5.2.1-3, 6.3.1-2</div> <div>↓</div>
TYPE I (A)												
Electrical & Electronics		○	○		○		○			●		
Food Processing		◐	○		◐		●			◐		
General Industries												
Bleaching and Dying		○	●		◐		●			◐		
Laundry							○					
Machinery					○		○					
Paper & Paper Products		○	◐		◐		◐					
Photographic/ Optical							●			○		
Plastic Products		○			◐					◐		
Printing / Publishing		○			◐		○			◐		
Tannery and Leather Finishing		◐	○				◐			◐		
Textile (Spinning, weaving and garment making)	○		○		◐		○			○		
Metallurgical												
Basic Metal	○		●		◐		◐			◐		
Fabricated Metal Products	○	○	◐		●		●			●		
TYPE I (B)												
Chemical & Allied Industries												
Chemicals and Chemical Products manufacturing		○	●		●		◐			◐		
Oil refining, Petroleum and Coal Products Works	◐	○	◐		◐		◐	○		◐		
Food and Beverage												
Slaughtering, preparation of meat		●	○		○		◐			●		
Beverage		○	◐		◐		●			◐		
Metallurgical Industries												
Basic Metal Industries (eg Aluminum, copper, iron, steel, lead, metal recovery works)	○		●		◐		◐			◐		
Motor Vehicle Building or Assembly/ Repair		○			●		◐			◐		
Ship Building/Repairing					●		○	◐		◐		

Figure 2.2 : Matrix Showing Environmental Concerns (cont'd)

	Air				Noise		Water			Waste		
LAND USE/ ACTIVITY	Dusty emission	Odorous emission	Gaseous emission	Sensitivity to air pollution	Noise emission	Sensitivity to noise	Effluent	Disruption to waterodies	Sensitivity to water pollution	Waste generation	Sensitivity to waste disposal	Reference
Minerals etc Industries												<div style="text-align: center;">  3.2.2, 3.3.1-3, 3.3.10, 3.4.1, 3.4.4, 4.2.13 - 14,4.3.3-9, 5.2.1-3, 6.3.1-2 <div style="text-align: center;">  </div> </div>
Minerals (non-metallic) Works (eg asbestos, cement, ceramic, frit, tar & bitumen)	●		◐		◐		◐			◐		
Concrete Batching Plant	●				◐		◐					
Public Utilities												
Electricity, Gas and Steam Generation Works	○		●		●		●	○		●		
TYPE I (C)												
General Warehousing		○								○		
Oil Storage		○	○				○	○		◐		
Open Storage	◐				◐		○	○				
Sand Storage	○											
OFFENSIVE TRADES		●	◐		○		◐			●		3.3.9, 5.2.1, 6.3.3-4
SPECIAL USES												
Agriculture				○			○	○	○			5.3.6
Bathing Areas							○		●		○	5.3.1-2
Borrow Areas	●				●			◐				3.3.10, 4.2.13
Civil Engineering Works	●				●		○	●		◐		3.3.10,, 4.2.13, 5.2.9-12
Commercial Uses			○	○		○						3.3.2, 4.3.3-7
Container Terminals			●		●			◐				3.2.4, 4.2.13-14, 5.2.9-12
Country Parks				◐		●			●	○	○	3.4.3-5, 4.4, 5.3.13-14
Fisheries							○	○	●	○	◐	5.3.3-5
Livestock Yards		◐			◐		●			●		3.3.9, 6.3.5-6
Mariculture							◐	◐	●	○	◐	5.3.3-5
Marinas							◐	◐	◐			5.3.9-12
Public Cargo Working Areas			●		◐			◐		○		3.2.4, 4.2.13 5.2.9-12
Quarries	●				●		○					3.3.10, 4.2.13
Sites of Special Scientific Interest				◐		◐			●		●	5.1.2, 5.3.14
Typhoon Shelters							◐	◐	◐	◐		5.3.9-12
Water Catchments									●		●	5.3.13

- 2.2.5 Those land uses which are in conflict with environmental constraints of development areas should be avoided or relocated as far as possible. If the location of incompatible land uses in close proximity is unavoidable, the environmental standards and guidelines regarding the disposition of land uses and structures should be applied to limit the impacts to acceptable levels. The feasibility of imposing development restrictions or control measures should be considered, in cases where there are limitations on the extent to which impacts may be minimised through land use zoning and site layout.

2.3 General Environmental Considerations in Land Use Planning

- 2.3.1 The following general environmental considerations should be considered at the earliest possible stage in preparing land use plans and/or planning briefs.

Air Quality Considerations

- 2.3.2 Air quality is affected by such factors as the emission rate of air pollutants, the separation distance between emission sources and receptors, topography, height and width of buildings as well as meteorology. Every planning effort should be made to ensure that:
- (a) large air pollution emitters are not located in areas where the dispersion of air pollutants is inhibited or where the present air pollution is already serious;
 - (b) wherever practicable, major air pollution emitters are sited to the west or southwest of urban areas and new towns to take advantage of the prevailing north-easterly winds;
 - (c) in the siting of Specified Processes (as defined in the Air Pollution Control Ordinance and summarised in Appendix 3.3), which are major air pollution emitters, the anticipated air quality impacts should be adequately addressed prior to the finalisation of the site;
 - (d) high-rise buildings and low-rise air pollution emitters are not located close to each other;
 - (e) new traffic generators, especially those of goods vehicles, are not located in areas which currently have severe air pollution;
 - (f) adequate buffer distance or screening is provided between sensitive receptors and potential air pollution emitters; and
 - (g) the land use pattern will minimise the demand for road traffic and facilitate the development of railway network so that the vehicle emissions can be kept to the minimum.

Noise considerations

- 2.3.3 The basic role of planning against noise is to provide an environment whereby noise impacts on sensitive uses are maintained at acceptable levels. The principle is to ensure that:
- (a) new noise sensitive uses are located where they will not be exposed to excessive noise levels;
 - (b) new noise emitters are located as far as possible so as not to introduce excessive levels of noise to existing, committed or planned sensitive uses; and
 - (c) where other constraints do not permit either of the above, noise reduction designs should be incorporated into the noise emitters at the earliest stage of planning. Where a completely acceptable noise exposure cannot be obtained at the noise sensitive uses, acoustic insulation should be provided.

Water Quality Considerations

- 2.3.4 It should be noted that there is a general shift of estuarine to oceanic conditions in a west to east direction in the coastal waters of Hong Kong. Any major developments which are likely to cause significant disruption to water circulation should be either avoided as far as possible or subjected to water quality modelling tests prior to the finalisation of site selection.
- 2.3.5 Any development which causes either conflict with the constraints or damage of the resources and amenity areas should be avoided, unless the conflict can be resolved or the imposition of appropriate development controls is practicable. The water-based developments should be located such that bulk water exchange is maximised.

Waste Management Considerations

- 2.3.6 In the preparation of land use plans, effort should be made to reserve sufficient sites in suitable locations for municipal waste reception and transfer facilities. Consideration should also be given to the special requirements for waste disposal of some community facilities and industries. As some uses have potential to cause nuisances and to give rise to special requirements for waste disposal and effluent discharge, due consideration should be given to their location and design to minimise the potential impacts.

2.4 Hybrid Environmental Planning Issues

Industrial and Residential Interface (I/RI)

2.4.1 Industrial and residential interface problems arise due to the close proximity of industrial developments to residential areas, often causing air, noise, and water pollution. In planning for a new development or redevelopment area, consideration should be given as to whether I/RI situations exist or may arise in the planning areas in future, with special regard to high-rise sensitive developments. Classification of the I/RI problems and possible measures to redress the problem are listed in the following table. Opportunities for redressing the interface problems should be explored during the planning of redevelopments with a view to reducing the extent and severity of I/RI problems.

Type of pollution	Types of Interface	Nature of Problems	Possible Measures	Reference Section
Air	chimney interface	air pollutant plume	adequate buffering, height restrictions on developments	3.2.2, 3.3.3, 3.4.1
	non-chimney interface	odour, heat	Adequate buffering	3.3.2, 3.4.1
Air and Noise	large scale interface	multiple pollution sources	adequate buffering, comprehensive redevelopment	3.2.2, 3.3.2, 3.3.3, 4.2.13 - 14, 4.3
Noise	extremely noisy interface	severe noise source (same as Type III in Figure 2.2)	buffering, screening, comprehensive redevelopment	4.2.13 - 14, 4.3
	moderately noisy interface	moderate noise source (same as Type I & II in Figure 2.2)	buffering, screening, land use layout barriers or insulation	4.2.13 - 14, 4.3
Water	wastewater/runoff interface	polluted streams/watercourse	buffering, screening, local improvement scheme	5.2.1

2.4.2 Large scale interfaces are most problematic, involving long stretches of I/RI with multiple pollution sources often causing serious air pollution and noise problems. Although buffering and screening can be used to ameliorate the adverse impacts under certain conditions,

the possibility of comprehensive and properly planned redevelopment of the affected areas, along with appropriate controls at sources, should be fully explored. The standards and guidelines described in other sections of this chapter should be applied as vigorously as possible.

Development Phasing

- 2.4.3 Phasing of developments or redevelopments is a relevant issue as incompatible uses may exist in close proximity to each other during transition periods. In some comprehensive redevelopments of certain industrial areas in the past, a portion of the industrial area was redeveloped into a residential use while the remaining part remained unchanged, causing severe air, noise and water pollution at the industrial and residential interface. When planning large scale developments or redevelopments, due consideration should be given to the programme phasing in order to minimise any environmental problems during transitional periods due to industrial and residential interfaces, high-rise buildings and low-rise emitters, or construction and earth moving activities.

Appendix 2.1

Definitions of Environmental Terms

A number of terms which are commonly used in this chapter are defined as follows :

- (a) **Polluting uses** : land uses which, by virtue of the nature, scale and distribution of the activities thereon, generate residuals such as wastewater, aerial emissions, solid waste, runoff, noise, odour and visual impact, or create physical changes causing impacts on other land uses or on environmental resources;
- (b) **Sensitive uses** : land uses which, by virtue of the nature of the activities thereon or resources therein, are susceptible to the influence of residuals or physical changes generated by polluting uses. Examples include schools and residential areas;
- (c) **Environmentally sensitive areas** : areas whose environmental quality and capacity, by virtue of their natural environmental attributes and existing land uses, are significantly affected by activities which generate residuals or create a demand on resources. Examples are topographically-confined airsheds and commercial fisheries;
- (d) **Environmental facilities** : facilities which fulfill the functions of collection, handling, storage, treatment, transportation, disposal or recycling of residuals generated by human activities. Examples are refuse collection points and wastewater treatment plants;
- (e) **Environmental capacity** : the capability of the environment either to accommodate changes induced by human activities without long term damage, to sustain natural resources for future developments or to assimilate the residuals generated by such activities;
- (f) **Environmental suitability** : the suitability of a site, in environmental terms, for a particular land use;
- (g) **Land use incompatibility** : a situation in which the co-existence of a particular land use on a site, or two or more land uses in close proximity, either creates adverse environmental impacts beyond acceptable limits or compromises the proper functioning of the affected land uses;
- (h) **Buffer area** : an area of land separating incompatible land uses, being of sufficient extent to minimise the potential conflict between them. These areas may contain non-sensitive structures or uses; and
- (i) **Buffer distance** : the shortest horizontal distance between the lot boundaries of two incompatible land uses, unless otherwise stated.

3. Air Quality

3.1 Policy Objectives

3.1.1 The Government's overall policy objectives for air pollution are :

- (a) to limit the contamination of the air in Hong Kong, through land use planning and through the enforcement of the Air Pollution Control Ordinance, to safeguard the health and well-being of the community; and
- (b) to ensure that the Air Quality Objectives for 7 common air pollutants, as laid down in Appendix 3.1, are met as soon as possible.

3.1.2 Appendix 3.2 presents the principal framework for planning against air pollution and a summary of common pollution sources and sensitive uses.

3.2 Broad Locational Guidelines

3.2.1 In the preparation of land use plans, due consideration should be given to the location of major polluting uses with a view to improving the regional air quality. Major factors to be considered are:

(a) **Current Air Pollution Levels**

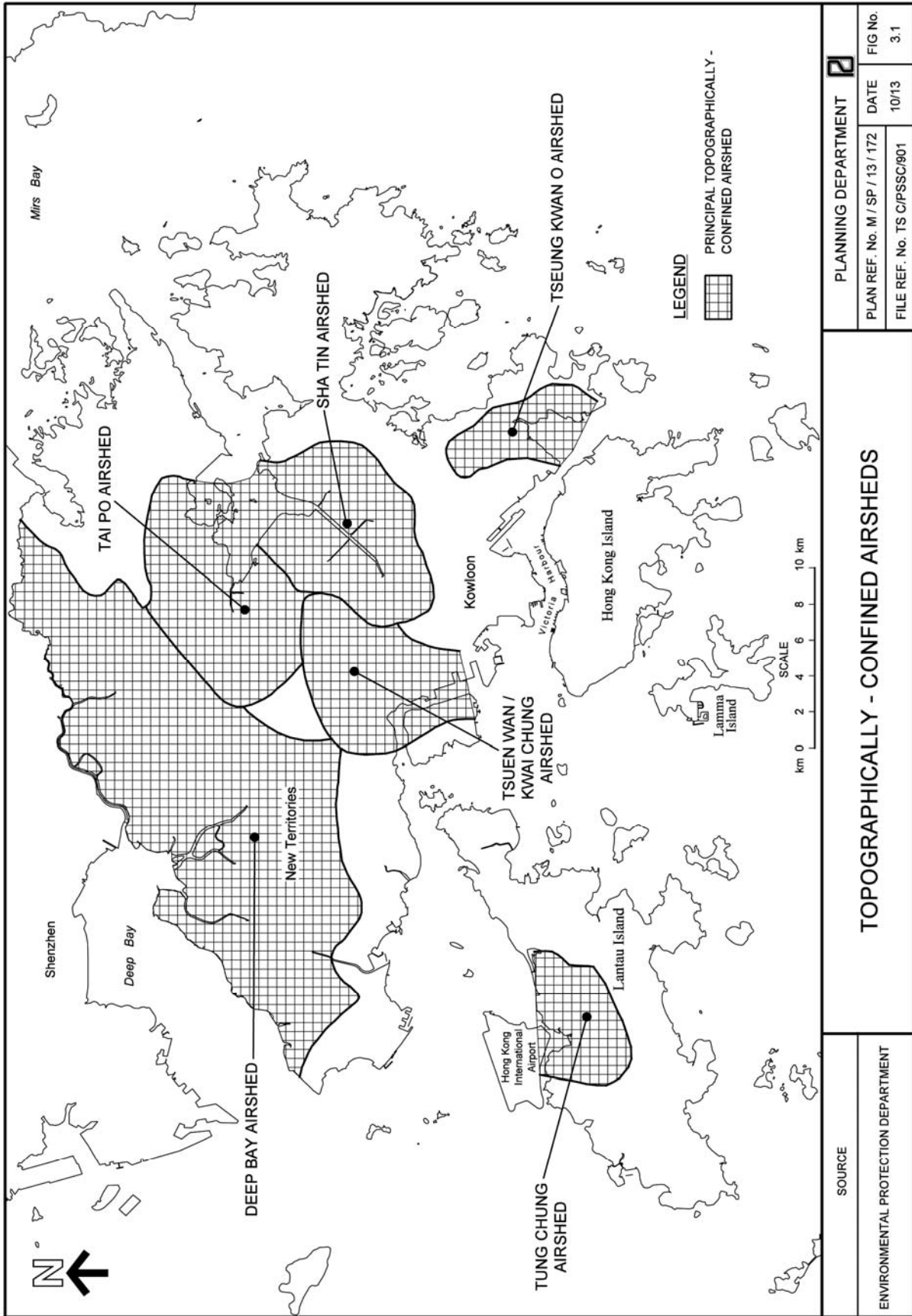
Concentrations of NO₂ and particulates are high, particularly at the older urban areas where motor vehicle usage is intense and vehicle exhausts are trapped between narrow roads and tall buildings. Ozone concentration shows a rising trend over the past decade. The phenomenon is more obvious outside the urban centres where regional air quality impact of the area within and around Hong Kong dominates.

(b) **Topography**

Many areas in Hong Kong are topographically confined by hills and the air pollution dispersion in these areas is inhibited. The major airsheds of limited dispersive capacity are shown in Figure 3.1.

(c) **Prevailing Winds**

The prevailing winds in Hong Kong are north-easterly for about 80% of the year.



Industrial areas

- 3.2.2 As a general guideline, further industrial developments in areas subject to severe air pollution, such as Kwun Tong, Tsuen Wan and Kwai Chung, are not advisable. Future plans should aim, wherever practicable, at thinning out the industries in these areas. Sites for air-polluting industries should be located to the west or southwest of the main urban centres and new towns. Major air-polluting industries should preferably not be located in topographically-confined area. If this is unavoidable, an air quality impact assessment is likely required to evaluate the suitability of the site.

Trunk Roads and Transportation Systems

- 3.2.3 There are considerable environmental advantages in the use of mass transportation systems, walking and, wherever appropriate, bicycling in the metropolitan area as well as in the topographically-confined areas. With regard to mass transportation systems, the use of electrically powered underground railways, particularly in high density development corridors, is environmentally preferable.
- 3.2.4 Wherever practicable, trunk roads should be aligned at the outskirts of urban centres in order to minimise adverse air quality impacts. With the same objective, major trunk roads and major traffic generating or attracting activities such as major ports and terminals should be located to the west of the main urban centres and new towns, wherever possible.

3.3 Guidelines for Potentially Polluting Uses

Specified Processes

- 3.3.1 The air quality impacts of any sites for Specified Processes (Appendices 3.2 and 3.3) should be adequately addressed by means of an air quality impact assessment and mitigated as far as possible through the site selection process. Siting these processes to the west or southwest of the territory is environmentally desirable.

Industrial Zones

- 3.3.2 For general multi-storey industrial sites without chimneys, a buffer distance of at least 100m from sensitive uses is normally required. Acceptable uses in the buffer area include godowns, cold storages, carparks, amenity areas and open spaces. There are some constraints for active open space uses (see Section 3.4.3). Other less sensitive uses such as commercial and government/institutional facilities can also be considered. However, these uses should be comparatively low-rise, air-conditioned and the distance between buildings and the industrial sites should exceed 30m.

- 3.3.3 High-rise buildings and comparatively low-rise chimneys or industrial buildings should not be located close to each other as it would cause serious air pollution due to direct impingement by the chimney plume onto the taller buildings. Thus, chimneys and industrial buildings will pose severe restraints on nearby new buildings. For major industrial areas such as Kwun Tong, Tsuen Wan and Kwai Chung, the required separation distance may be well over 200m. EPD should be consulted if any sensitive uses are to be sited within 500m of an industrial area.

Local Road Traffic

- 3.3.4 The minimum buffer distance required between roads and active open spaces is given in Table 3.1. In many cases, the impact of noise is the most serious effect of road traffic on the surrounding environment (see also Sections 4.2.5 - 4.2.8).

Slaughterhouses

- 3.3.5 Slaughterhouses and associated facilities for transporting livestock have the potential for odour nuisance from rendering operations and also have a pervading background odour from pens, paunch offal disposal and production areas. Wherever practicable, slaughterhouses should be sited in large open areas. Their separation from any residential areas, hospitals, schools and commercial areas should not be less than 300m with a rendering plant or not be less than 200m without a rendering plant. Low-rise buildings with ample open space in the surrounding areas should be encouraged.

Table 3.1 : Guidelines on Usage of Open Space Site

Pollution Source	Parameter	Buffer Distance	Permitted Uses
Road and Highways	<i>Type of Road</i>		
	Trunk Road and Primary Distributor	> 20m	Active and passive recreation uses
		3 - 20m	Passive recreational uses
		< 3m	Amenity areas
	District Distributor	> 10m	Active and passive recreational uses
		< 10m	Passive recreational uses
	Local Distributor	> 5m	Active and passive recreational uses
		< 5m	Passive recreational uses
	Under Flyovers		Passive recreational uses
Industrial Areas	<i>Difference in Height between Industrial Chimney Exit and the Site</i>		
	< 20m	> 200m	Active and passive recreational uses
		5 - 200m	Passive recreational uses
	20 - 30m (*)	> 100m	Active and passive recreational uses
		5 - 100m	Passive recreational uses
	30m - 40m	> 50m	Active and passive recreational uses
		5 - 50m	Passive recreational uses
	> 40m	> 10m	Active and passive recreational uses
Construction and earth moving Activities	-	< 50m	Passive recreational uses
		> 50m	Active and passive recreational uses

Remarks :

- In situations where the height of chimneys is not known, use the set of guidelines marked with an asterisk for preliminary planning purpose and refine as and when more information is available.
- The buffer distance is the horizontal, shortest distance from the boundary of the industrial lot, the position of existing chimneys or the edge of road kerb, to the boundary of open space sites.
- The guidelines are generally applicable to major industrial areas but NOT individual large industrial establishments which are likely to be significant air pollution sources. Consult EPD when planning open space sites close to such establishments.
- Amenity areas are permitted in any situation.

Sewage Treatment Works

- 3.3.6 Sewage treatment works can create an odour nuisance to neighbouring uses. Suitable buffer and landscaping features should be provided to minimise environmental and visual impacts on adjacent sensitive uses. The required buffer distance varies considerably, depending on the types of treatment facilities and whether or not the treatment works are enclosed.

Village Incinerators

- 3.3.7 Village incinerators have the potential to cause severe local nuisance. It is intended to reduce the number of village incinerators through the provision of refuse collection services. In remote villages where the use of village incinerator is inevitable, a buffer distance of at least 100m from sensitive uses is required. Moreover, village incinerators should be sited in open areas.

Other Polluting Uses

- 3.3.8 These uses include :

- bus termini/public transport interchange
- taxi and minibus stands
- petrol filling stations
- lorry parks
- refuse collection points
- cooked food stalls

They should preferably be located in relatively open areas. Provision of low-rise surrounding buildings and ample open space is desirable. In the case where bus termini, lorry parks, taxi and minibus stands, refuse collection points and cooked food stalls are located within or beneath buildings, adequate mechanical ventilation and necessary pollution control measures will be required to avoid accumulation of aerial emissions. Siting petrol filling stations within buildings should be avoided as far as possible.

Odour Sources

- 3.3.9 Some small scale community uses can cause significant air pollution nuisance, primarily due to odour. These include :

- crematoria
- stock wagon washing areas
- livestock yards
- wholesale fish and poultry markets

Wherever practicable, these uses should be sited away from the main urban centres. Usually a buffer distance of at least 200m from nearby sensitive uses is required. Acceptable uses in the buffer area include industrial areas, godowns, cold storages, carparks and amenity areas. Open space uses may also be tolerated.

Dusty Uses

- 3.3.10 Virtually all uses, except for construction-related activities, are sensitive to dust nuisance. Siting of dusty uses in main urban areas or near to residential developments should be avoided as far as possible. As concrete batching plants and open storage areas are usually temporary, it is desirable to site these uses either in new reclamation areas sufficiently far away from urban areas or in other areas which are not yet fully developed. A buffer distance of at least 100m from other uses is required. The transportation routes to and from these uses should be designed, and necessary protective measures taken, to minimise dust nuisance.

3.4 Guidelines For Sensitive Uses

High-rise Buildings

- 3.4.1 The siting of high-rise buildings or buildings at a topographically higher position should take into account any air plume impingement due to comparatively low-rise chimneys (see Section 3.3.3).

Hospitals

- 3.4.2 Hospital sites generally require good air quality. Air conditioning may reduce some of the suspended particulates in polluted air but will not reduce other gaseous air pollutants. Siting of new hospitals within 500m of major industrial areas and large air pollution emitters such as quarries and incinerators, or in severely polluted urban centres should be avoided. If this guideline cannot be adhered to, EPD should be consulted. Conversely, hospitals may require large boilers and special purpose incinerators to burn pathological waste. Chimneys associated with this equipment have the potential to cause nuisance to neighbours and EPD should be consulted on their disposition and design.

Open Space Sites

- 3.4.3 Classification and evaluation of open space sites and their permitted uses are given below :

Classification	Criteria	Permitted Use
Acceptable	The health and enjoyment of users will not be adversely affected	Active and passive recreational uses
Tolerable	Under normal situations, the health of users should not be adversely affected but the enjoyment may be diminished	Passive recreational uses
Unacceptable	In the case of prolonged exposure, the health of users may be adversely affected	Amenity areas

- 3.4.4 It should be noted that these classifications and their associated use restrictions may not necessarily apply to entire sites. In many cases, different portions of a site will have different classifications. Hence, the use restriction can often be accommodated through good layout design. The required buffer distance for each classification depends on the type of pollution source and the associated parameters. Three major pollution sources of concern are roads and highways, industrial areas, and construction and earth moving activities. The pollution sources, parameters to be considered, buffer distance requirements and permitted uses are given in Table 3.1.
- 3.4.5 Greater buffer distances for active facilities and children playgrounds should be encouraged. In any case, children playground should not be sited within 10m of any industrial building. As many dust-producing activities are temporary, the air quality constraints can often be accommodated through good development phasing.

3.5 Ventilation Corridors

- 3.5.1 Buildings can create an artificial confinement which can inhibit pollutant dispersion. In designing the land use pattern, space between buildings should be maximised. Moreover, the disposition of open spaces and building areas should be such that ventilation corridors passing through urban centres may be maintained to facilitate dispersion of air pollutant. These ventilation corridors will be most effective if they can cross major trunk roads. Flyovers built over trunk roads, or double-decked roads, in areas with poor air quality should be avoided as this arrangement can lead to the accumulation of air pollutants in the air space between. A set of guidelines is provided in Chapter 11 for reference during planning and design stages of projects for the purpose of improving air ventilation at district and site levels.

Appendix 3.1 : Hong Kong Air Quality Objectives (AQOs)

Pollutant	Averaging time ⁽ⁱⁱ⁾	Concentration in microgrammes per cubic metre ($\mu\text{g}/\text{m}^3$) ⁽ⁱ⁾	No. of exceedances allowed per calendar year	Health effects of pollutant at elevated ambient levels
Sulphur dioxide (SO_2)	10-minute	500	3	Respiratory illness; reduced lung function; morbidity and mortality rates increase at higher levels.
	24-hour	125	3	
Respirable suspended particulates (PM_{10})	24-hour	100	9	Respiratory illness; reduced lung function; cancer risk for certain particles; morbidity and mortality rates increase at higher levels.
	Annual	50	NA	
Fine suspended particulates ($\text{PM}_{2.5}$)	24-hour	75	9	
	Annual	35	NA	
Nitrogen dioxide (NO_2)	1-hour	200	18	Respiratory irritation; increased susceptibility to respiratory infection; lung development impairment.
	Annual	40	NA	
Ozone (O_3)	8-hour	160	9	Eye irritation; cough; reduced athletic performance; possible chromosome damage.
Carbon monoxide (CO)	1-hour	30,000	0	Impairment of co-ordination; deleterious to pregnant women and those with heart and circulatory conditions.
	8-hour	10,000	0	
Lead (Pb)	Annual	0.5	NA	Affects cell and body processes; likely neuropsychological effects, particularly in children; likely effects on rates of incidence of heart attacks, strokes and hypertension.

Notes:

- (i) Gaseous air pollutants are measured at 293K (20°C) and 101.325 kPa (one atmosphere).
- (ii) Refer to Air Pollution Control (Amendment) Ordinance 2013.
- (iii) Respirable suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 10 μm or less.
- (iv) Fine suspended particulates means suspended particles in air with a nominal aerodynamic diameter of 2.5 μm or less.
- (v) 'NA' stands for Not Applicable.

Appendix 3.2 : Principal Framework for Planning against Air Pollution

- (a) The principal legislation is the Air Pollution Control Ordinance (APCO) and its subsidiary Regulations. The whole of the Territory has been covered by Air Control Zones. The Government aims to achieve the AQOs given in Appendix 3.1 as soon as reasonably practicable. To help achieve the AQOs in areas where they are already exceeded, every planning effort should be made to reduce the air pollution emitters in these areas.
- (b) Under the Fuel Restriction Regulations of APCO, only gaseous fuels are permitted in Shatin. For other areas, the fuel sulphur restriction is imposed to limit the content of sulphur to 0.005% by weight for liquid fuels and 1.0% for solid fuels.
- (c) The APCO, among other things, provides for the licensing of Specified Processes. These are industries with potential to cause substantial air pollution (Appendix 3.3). A licence issued by the EPD for operation of these processes is required by the Air Pollution Control Ordinance.

Common Pollution Sources and Sensitive Uses

Common air pollution sources in Hong Kong and uses which are particularly sensitive to air pollution are listed below :

- (a) Pollution Sources :
 - industrial processes - major sources of sulphur dioxide (SO₂), smoke, nitrogen oxides (NO_x), suspended particulates, dust, fluff, toxic chemicals and odour;
 - motor vehicles - major sources of smoke, carbon monoxide (CO), NO_x, suspended particulates, volatile organic compounds and in some cases, odour;
 - construction and reclamation sites - major sources of dust and suspended particulates;
 - odour sources - including offensive trades, pig roasting factories, crematoria, sewage treatment works and pumping stations, slaughterhouses and associated facilities for transporting livestock, wholesale fish and poultry markets, petrol filling stations, refuse handling and disposal facilities and bus termini;
 - dusty uses - including concrete batching plants, quarries, asphalt plants, refuse handling and disposal facilities, storage of aggregates and building materials, borrow areas, cement plants and open storage uses; and
 - miscellaneous sources - including cargo handling areas, nullahs, sewers, foodstalls and restaurants.
- (b) Sensitive Uses :
 - residential areas;
 - child care centres;
 - residential care homes for the elderly;
 - hospitals and clinics;
 - schools; and
 - active recreational activities.

Appendix 3.3 : List of Specified Processes

(Extracted from Schedule 1 of the Air Pollution Control Ordinance)

1. Acrylates Works
2. Aluminium Works
3. Cement Works
4. Ceramic Works
5. Chlorine Works
6. Copper Works
7. Electricity Works
8. Gas Works
9. Iron and Steel Works
10. Metal Recovery Works
11. Mineral Works
12. Incinerators
13. Petrochemical Works
14. Sulphuric Acid Works
15. Tar and Bitumen Works
16. Frit Works
17. Lead Works
18. Amines Works
19. Asbestos Works
20. Chemical Incineration Works
21. Hydrochloric Acid Works
22. Hydrogen Cyanide Works
23. Sulphide Works
24. Pathological Waste Incinerators
25. Organic Chemical Works
26. Petroleum Works
27. Zinc Galvanising Works
28. Rendering Works
29. Non-ferrous Metallurgical Works
30. Glass Works
31. Paint Works

4. Noise

4.1 Policy Objectives

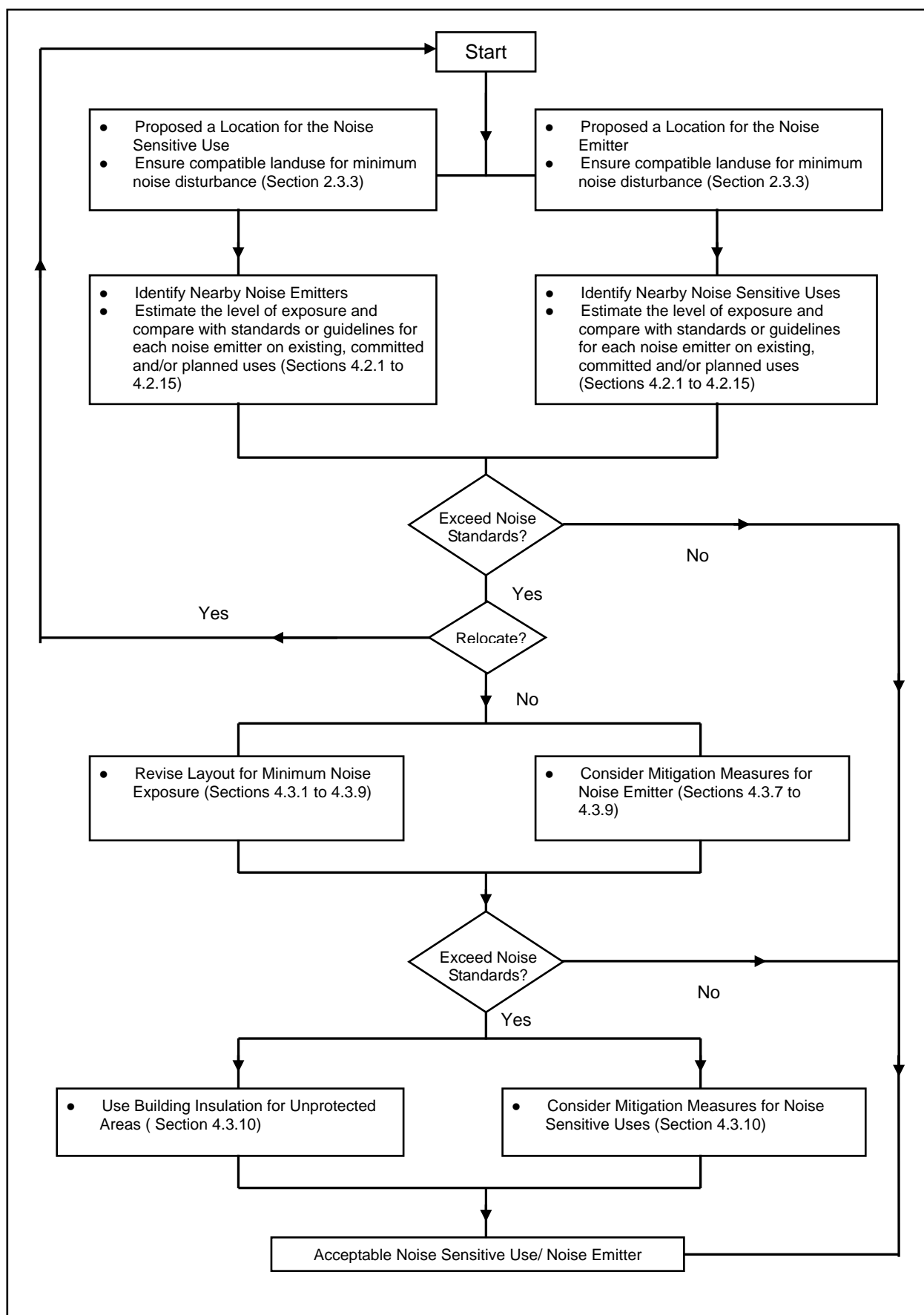
- 4.1.1 The Government's overall policy objectives for noise control are :
- (a) to control specific sources of noise through enforcement of the Noise Control Ordinance (NCO) and its associated regulations;
 - (b) to prescribe noise standards to guide those concerned with development in planning against noise in both the public and private sectors; and
 - (c) to have due regard to noise in planning public development projects.
- 4.1.2 Excessive levels of noise often interfere with verbal communication, disturb concentration, disrupt sleep, contribute to stress or otherwise detract significantly from the quality of life. These problems can occur within dwellings, schools, hospitals, residential care homes for the elderly and in recreational areas. Planning is one of the most effective means to ensure that such problems are avoided or reduced.
- 4.1.3 Appendix 4.1 presents the principal framework for planning against noise and a summary of noise emitters, noise sensitive and noise tolerant uses. A flowchart is included in Figure 4.1 to show the steps required for the planning of land uses which can be emitters or sensitive uses.

4.2 Guidelines of Noise Emitters

Aircraft

- 4.2.1 Exposure to aircraft noise is described by Noise Exposure Forecast (NEF) contours. NEF contours should be used together with the standards described in Table 4.1 to define areas where certain noise sensitive uses should not be located within specified NEF contours. The NEF standards applicable to the Hong Kong International Airport at Chep Lap Kok as stipulated in Table 4.1 should not be exceeded.
- 4.2.2. Aircraft noise is governed by the Civil Aviation (Aircraft Noise) Ordinance (Cap 312). For details of the aircraft noise management, Civil Aviation Department should be consulted.

Figure 4.1 : Flow Chart for Planning Noise Sensitive Uses/Noise Emitters



Helicopter

4.2.3 Helicopters are extremely versatile aircraft and their noise impact cannot be easily defined without elaborating definitions of a variety of operating parameters. Owing to their relatively infrequent movements, it is more appropriate for planning purposes to observe the daytime (7 a.m. - 7 p.m.) permissible maximum noise levels at noise sensitive uses. Night-time operations of helicopters will generally be more intrusive than daytime operations. In general, a helipad should not be located in such a way that the daytime maximum noise levels at sensitive uses listed in Table 4.1 will be exceeded. Advice from EPD should be sought if it is anticipated that helicopters will be operated:

- (a) in a tranquil environment; or
- (b) during late-evening and night-time.

4.2.4 While the impacts on the immediate environs of the helipad should be of the greatest concern due to the relatively longer duration of manoeuvring over the helipad compound, the flight paths should also be one of the considerations for siting a helipad.

Road Traffic

4.2.5 The severity of road traffic noise impact on sensitive uses depends on many variables, some of which can be controlled or influenced by land use planning. These variables include :

- (a) road alignment, i.e. providing distance separation between the noise receiver and the vehicles;
- (b) traffic composition and volume, i.e. using traffic planning and management to control vehicle movements and type of vehicles at different times of the day;
- (c) line-of-sight, i.e. using noise-tolerant buildings to reduce the angle of view of receiver on road traffic; and
- (d) shieldings, i.e. using barriers, road enclosures or road decking and the like.

Table 4.1 : Summary of Noise Standards

Noise Source	Aircraft Noise (Noise Exposure Forecast : NEF)	Helicopter Noise	Road Traffic Noise	Rail Traffic Noise	Fixed Noise Source
Noise Standards		Lmax dB(A)	L10 (1 hour) dB(A)		
Uses					
All domestic premises including temporary housing accommodation	25	85	70	(a) Leq (24 hr) = 65 dB(A) and (b) Lmax (2300 - 0700) = 85 dB(A)	(a) 5dB(A) below the appropriate Acceptable Noise Levels shown in Table 2 of the Technical Memorandum for the Assessment of Noise from Places Other than Domestic Premises, Public Places or Construction Sites and (b) the prevailing background noise levels
Hotels and hostels	25	85	70		
Offices	30	90	70		
Educational institutions including kindergartens, child care centres and all others where unaided voice communication is required	25	85	65		
Places of public worship and courts of law	25	85	65		
Hospitals, clinics, convalescences and residential care homes for the elderly - diagnostic rooms - wards	25	85	55		
Amphitheatres, and auditoria, libraries, performing arts centres and Country Parks	depend on use, extent and construction	depend on locations and construction			

Notes :

1. The above standards apply to uses which rely on opened windows for ventilation.
2. The above standards should be viewed as the maximum permissible noise levels at the external facade.
3. Definitions of noise units and criteria are included in Appendix 4.2.
4. For details of the aircraft noise management, Civil Aviation Department should be consulted.

- 4.2.6 In order that the noise standards in Table 4.1 are met, noise levels can be established either by measurement or prediction. Predictions should be based on the designed traffic conditions and should take into consideration future (both committed and planned) as well as existing land uses.
- 4.2.7 Predictions can be reliably based on the procedures given in the U.K. Department of Transport's "The Calculation of Road Traffic Noise". For application in Hong Kong, the road traffic noise is represented in terms of L10(1h) dB(A) for the hour having the peak traffic flow. For quick reference, the range of facade noise levels at receivers at 10m away from the kerb of the road having a direct line-of-sight of a level concrete road with 30% heavy vehicles at typical vehicular speeds are tabulated in Table 4.2.

Table 4.2 : Facade Noise Levels from Road Traffic

Peak hour traffic flow (veh/h)	Facade noise levels L10(1h), dB(A)				
	Vehicular speed (kph)				
	30	50	70	85	100
250	70	71	72	73	74
500	73	74	75	76	77
1 000	76	77	78	79	80
2 000	79	80	81	82	83
3 000	80	81	82	83	84
5 000	83	84	85	86	87
10 000	86	87	88	89	90

- 4.2.8 In order to facilitate a rough estimation of the likely road traffic noise levels at nearby sensitive land uses and to illustrate the noise reduction alternatives applicable to land use planning, two prediction examples are presented in Appendix 4.3. As a general guide, Table 4.3 gives the approximate separations required for achieving the noise standard for residential developments fronting various types of roads. For typical Hong Kong situations, the largest reduction would most likely be obtained by using noise tolerant buildings as screening structures, rather than by means of the separation between road and receiver.

Table 4.3 : Broad Guidelines of Separations Required between Various Types of Roads and Residential Development

Road Type	Assumptions		Distance Separation to meet L10(1h) 70dB(A)	
	Traffic flow (veh/h)	Vehicular speed (kph)	without screening	with screening*
Trunk	5 000	70	approx. 300m	approx. 50m
Primary Distributor	3 000	50	approx. 180m	approx. 40m
District Distributor/ Local Distributor	2 000	50	approx. 120m	approx. 30m

* under or about 45° angle of view of receiver on road traffic

Rail Traffic

4.2.9 Community reaction to rail noise depends largely on three factors: the maximum pass by noise level, the frequency of movement and the time of the noise events. In Hong Kong, where rapid rail cars inevitably pass through densely populated high-rises for most of the day, planning of new sensitive uses contiguous to existing rail lines and planning of new rail lines must take full cognizance of these factors.

4.2.10 In the process of planning, efforts should be made to ensure that the separation between the rail line and the development is such that the standard noise levels contained in Table 4.1 are not exceeded. As an indication, based on existing typical operational characteristics, the following horizontal separation from the edge of track to the facade of sensitive uses are required :

MTR	-	150m (open form construction)
		25m (the side parapets break the line of sight of the bogie)
KCR	-	85m
LRT	-	25m

However, since a number of operational characteristics (e.g. speed, frequency etc.) could affect the overall noise energy produced, advice from EPD should be sought if the rail operation is anticipated to be substantially different from the existing rail systems in terms of rail car characteristics, number of movements or operating speed.

4.2.11 In the absence of screening elements, large separations as shown in section 4.2.10 will be required to meet the rail noise standards in Table 4.1. Consideration should therefore be given to providing screening by means of track-side noise barriers, earth berms and noise tolerant buildings and the like. It should be noted that shielding is only effective if it breaks the line-of-sight from the window of a sensitive use to the rail sources. In the early planning stage, serious consideration should be given to integrating the railway lines into adjacent developments. In the case of rail depots, complete decking over of the railways and the depots would be the most effective means to reduce noise impact. Section 4.3.7 provides further details of integrated building design.

4.2.12 Due to the diverse range of speeds over which the LRT is designed to operate, it is possible that in town centres, where the LRT is operated at a lower speed, the separation distance of 25m could be reduced. However, under those conditions, care must be taken to ensure that the problem of squeal noise does not occur. As a general rule, a radius of track curvature of less than 70 metres should be avoided.

Fixed Sources

- 4.2.13 Noise assessments will normally be conducted in accordance with the Technical Memorandum For The Assessment Of Noise From Places Other Than Domestic Premises, Public Places Or Construction Sites (TM), published under the Noise Control Ordinance. The TM lays down statutory Acceptable Noise Levels (ANL). However, in order to plan for a better environment, all fixed noise sources should be so located and designed that when assessed in accordance with the TM, the level of the intruding noise at the facade of the nearest sensitive use should be at least 5 dB(A) below the appropriate ANL shown in Table 3 of the TM or, in the case of the background being 5 dB(A) lower than the ANL, should not be higher than the background.

Other Facilities

- 4.2.14 While specific noise level standards are not applicable for many of the noise emitters described in Appendix 4.1, noise should be a major consideration in determining their locations and site layout. Efforts should be made to ensure that the noise impact caused by these facilities will be minimised. Some of the general considerations to be taken during the planning stage are to:
- (a) locate the facilities so that there is no line-of-sight of the noise sources at the noise sensitive uses; provide screening to the noise sources as far as possible by making use of natural landscape, embankment or noise tolerant buildings;
 - (b) avoid locating open-form major public transport termini in proximity to noise sensitive uses;
 - (c) consider adopting a complete podium decking over noisy facilities; and
 - (d) locate lairs and sidings away from noise sensitive uses and separate them with high solid barriers.
- 4.2.15 Where opportunity arises and having due regard to the operational requirements, the siting of facilities such as bus depots, lorry parks or petrol filling stations etc, should take into account the potential locations of ingress/egress and the consequent noise disturbances due to traffic routings, particularly during sensitive hours. Consideration should also be given to adopting administrative controls so that the degree of noise disturbances can be further reduced.

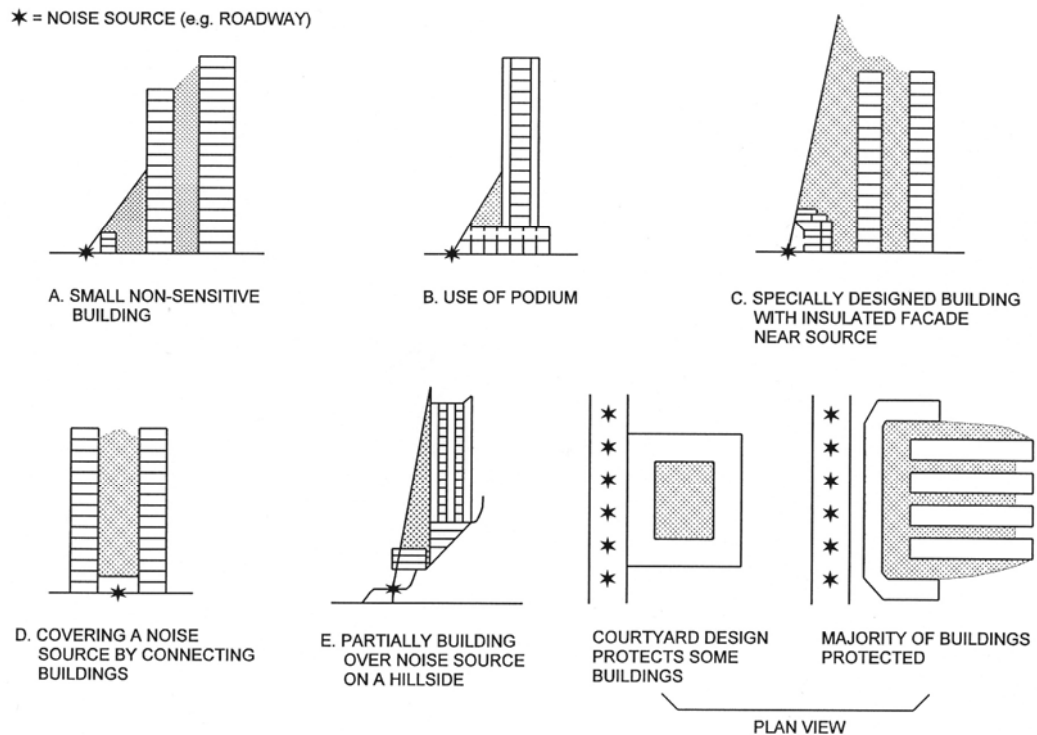
4.3 Guidelines to Reduce Noise Exposure

- 4.3.1 In situations where adequate separations between sensitive uses and noise emitters cannot be provided, the following methods, which are described in details in Sections 4.3.3 to 4.3.10, should find applications in the Hong Kong context :
- (a) self-protecting building design and arrangement;
 - (b) integrated building and noise source design (e.g. decking over);
 - (c) purpose-built noise barriers; and
 - (d) acoustic insulation of buildings.
- 4.3.2 While detailed design of the applications should be left to the engineers or architects of the project, the feasibility of these measures should be considered in the planning stage to ensure that a certain site will not be so constrained as to preclude any reasonable and practical noise abatement design.

Self-Protecting Building Design and Arrangement

- 4.3.3 The design and arrangement of buildings specifically adopted to shield noise sources often offer the most economical solution to noise problems and may involve no additional cost. This approach to noise problems is most relevant at the detailed stage of site planning and layout.
- 4.3.4 The aim is for a small part of the building bulk, preferably with a noise tolerant use, to shield the rest. Guidance for preliminary design is provided by ray diagrams which indicate those parts of the development included in “shadow zones” (Figure 4.2). Buildings in the shadow zone will often be adequately protected from noise. The shaded area in Figure 4.2 will have their noise levels lowered by between 5 and 15 dB(A).
- 4.3.5 As Figure 4.2 indicates, the noise reduction is greater if the shielding building is placed closer to the noise source. This may also result in savings in land.

Figure 4.2 : Design Concepts for Building Layouts to Reduced Noise Exposure. Noise Shielded “Shadow Zones” are Shaded



- 4.3.6 Internal building layout can also be effective in reducing noise exposure. Non-sensitive areas such as corridors, bathrooms, lifts, and the like can be used to shield sensitive areas. Suitably-designed buildings may be located where the noise standards for unprotected buildings are exceeded.

Integrated Building-Noise Source Design

- 4.3.7 A building design which integrates the noise source (including those associated with transportation systems) within the development is most suitable in the Hong Kong context, where shortage of land and reliance on public transport render such a design very attractive. Good examples are comprehensive development on a podium above a railway station or a transport interchange. Both the railway and the major roadways could be substantially covered by the podium, thus reducing the noise reaching the developments above the podium. With careful design, noise tolerant structures, e.g. office blocks, multi-storey car parks or markets, can be located in noisier areas. Figures 4.3(a) and (b) illustrate the concept of integrated building design for road and rail systems. When decking over roadways and termini, the air quality aspect should also be addressed (see Section 3.3.8).

Figure 4.3(a) : Example of an Integrated Design to Reduce Road and Traffic Noise

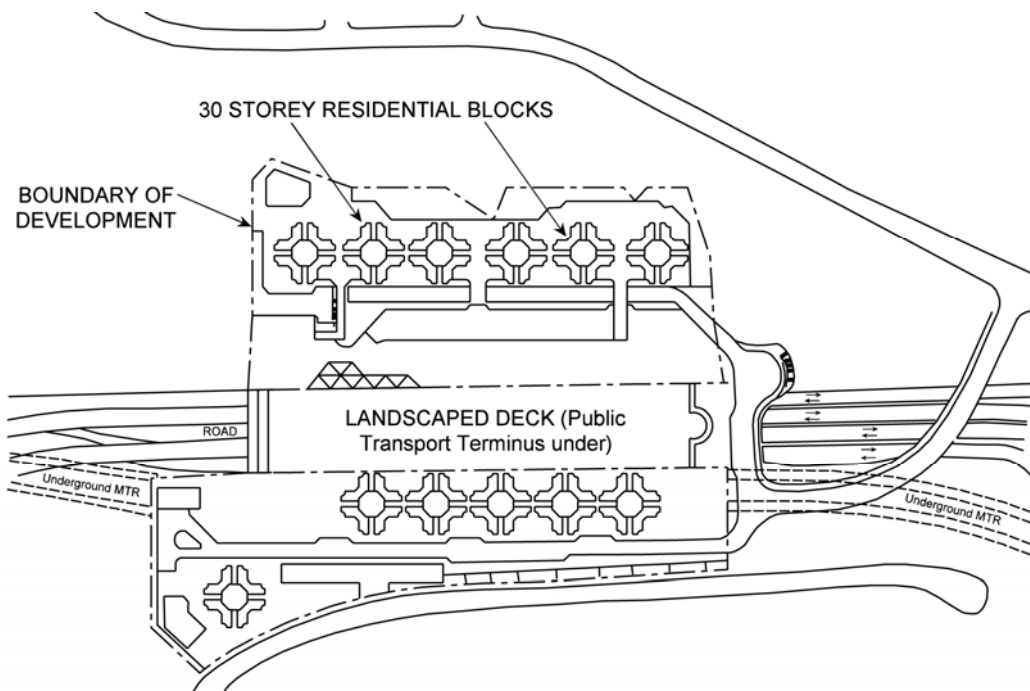
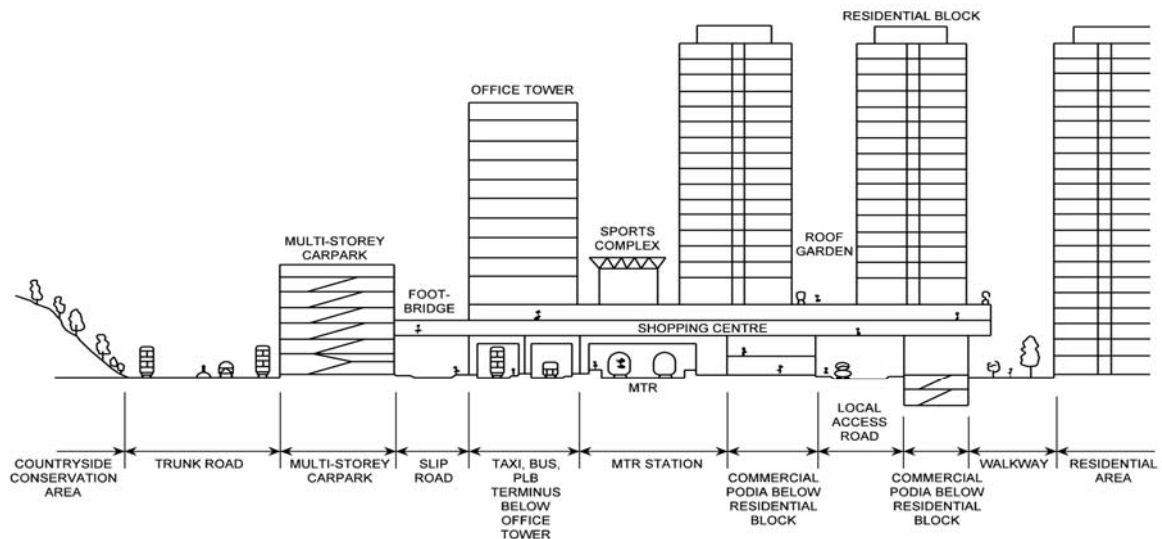


Figure 4.3(b) : Example of a Typical Section of a Podium Decking Design of Developments Over a Major Public/rail Transport Interchange



Purpose-Built Noise Barriers

4.3.8 Barriers, in the form of earth berms or solid fences, can be built adjacent to noise sources such as roadways and railways. They can be effective in reducing noise when they prevent line-of-sight between the source and the receiver. However, the visual impact of the noise barrier should be considered and properly addressed. It is unlikely that they will have widespread applications in Hong Kong where high-rise buildings require protection. Their use should however be investigated in the following situations :

- (a) where low-rise buildings are to be protected (e.g. in the New Territories);
- (b) on urban flyovers and elevated roadways built very close to noise-sensitive uses and where extreme noise levels at the worst affected floors must be alleviated; and
- (c) in passive recreation areas where earth berms may be incorporated into landscaping works.

4.3.9 There may be overriding constraints on the location and design of a development that prevent the guidelines in Sections 4.3.1 to 4.3.8 from being strictly followed. If compromise is necessary, attempt should still be made to maximise the proportion of dwellings protected, using the guidelines indicated in Sections 4.3.3 to 4.3.8. The rest of the remaining unprotected dwellings should be insulated using the guidelines described in the ensuing Section 4.3.10.

Acoustic Insulation of Buildings

4.3.10 Acoustic insulation is often the “last-resort” in an attempt to abate noise disturbances because it will practically deprive the receiver of outdoor activities and an “open-window” life style. While acoustic insulation is commonly found in some western countries, the warm and humid climate in Hong Kong makes it very expensive for noise sensitive uses due to the need to provide air-conditioning for a “closed-window” environment. The suitable window types are shown in Appendix 4.4.

4.4 Guidelines for Developments in Rural Area

4.4.1 In planning any new development in rural areas, a more sensitive approach has to be taken in order to preserve the existing tranquil environment and the quality of life. As a general rule, any noise emitters introducing a fairly consistent excess of 10 dB(A) above the prevailing background should be avoided. If the noise emitters must be located in a rural setting, anti-noise design must be incorporated to reduce the noise impact. In most cases, this will involve the shielding of the sensitive use from the noise emitters by tunneling, cut and cover, barriers, enclosures, and acoustic design of noise emitters. In some cases, it may be necessary to impose restriction on operating hours.

Appendix 4.1 : Principal Framework for Planning against Noise

All noise emitters (excluding aircraft and road traffic) identified below come under the control of the NCO. Statutory action will be taken if noise from any of the sources constitutes an annoyance under the relevant provisions. In siting these noise emitters, it is therefore important to ensure that the noise criteria described in Section 4.2.13 are followed to avoid the future violation of the provisions in the NCO after the development is completed.

Noise Emitters, Noise Sensitive and Noise Tolerant Uses

Major Emitters :

Transport	<ul style="list-style-type: none">● aircraft (including helicopters)● rail traffic (MTR, LRT, KCR)	<ul style="list-style-type: none">● road traffic
Major Fixed Noise Sources	<ul style="list-style-type: none">● general industrial sources● pump houses● gas pressure reduction plants● quarries	<ul style="list-style-type: none">● concrete batching plants● electricity sub-stations● rock crushing plants
Other Facilities	<ul style="list-style-type: none">● railway depots/marshalling yards● wholesale markets● open car/lorry parks● refuse handling areas● container terminals● public cargo working areas	<ul style="list-style-type: none">● airport facilities● bus depots/termini● vehicle pounding areas● slaughterhouses● sand depots● multi-purpose terminals

Potential Emitters :

- | | |
|---|--|
| <ul style="list-style-type: none">● fire stations● trams● tram depots | <ul style="list-style-type: none">● ambulance depots● petrol filling stations |
|---|--|

Major Sensitive Uses :

Residential Uses	<ul style="list-style-type: none">● all domestic premises including temporary housing	
Institutional Uses	<ul style="list-style-type: none">● educational institutions including kindergartens and child care centres● medical clinics● convalescent homes● libraries● performing arts centres● amphitheatres	<ul style="list-style-type: none">● hospitals● residential care homes for the elderly● places of public worship● courts of law● auditoria
Others	<ul style="list-style-type: none">● hotels● country parks	<ul style="list-style-type: none">● hostels● offices

Noise-tolerant Uses :

- | | |
|--|--|
| <ul style="list-style-type: none">● multi-storey carparks● offices (with acoustic insulation)● community uses (eg. Sports complexes, community centres etc.) | <ul style="list-style-type: none">● multi-storey markets● godowns |
|--|--|

Appendix 4.2 : Definitions of Noise Units and Criteria

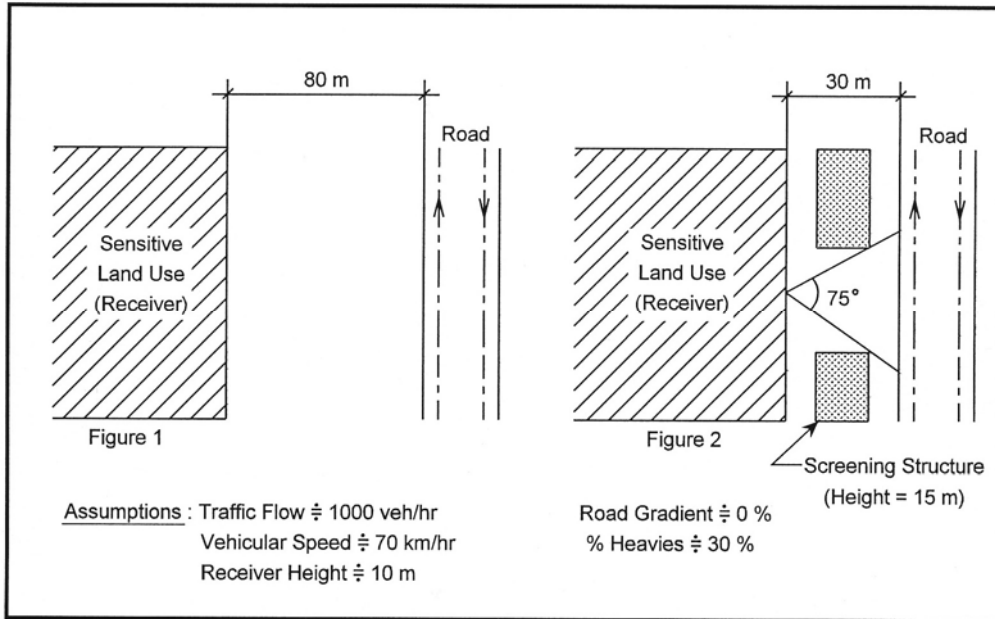
For convenience, the guidelines are given in terms of external noise levels. It should be noted, however, that these are based largely on standards within buildings, since this is where the main activities which are affected by noise occur.

Noises from different sources are measured in different ways and alternatives are often available, even for one type of noise. In each case, the noise scales chosen provide the best measure of how people are affected. All environmental noise is measured using the A-weighted sound level - dB(A). The following descriptors take the variability of the noise and the response of the community into account:

NEF	Noise Exposure Forecast. A complex composite measure of exposure to aircraft noise taking into account the peak noise level, the duration of flyover, the tonal characteristics and the number of aircraft movements in both the daytime and night-time period.
Lmax	The maximum noise level during a designated time interval or a noise event.
Leq(24 hour)	Equivalent continuous sound level. A measure of energy level of a time-varying noise.
L10(1 hour)	The noise level exceeded for 10% of the one-hour period. Generally used for road noise at peak traffic flow.
L90(1 hour)	The noise level exceeded for 90% of the one-hour period. Generally used as a measure of the background noise level.

Appendix 4.3 : Assessment of Road Traffic Noise Impact

Example 1 : Benefit of using screens for noise reduction



To achieve noise standard : L10 (1 hour) 70 dB(A)

Land use arrangement A : Separation without effective screening (Figure 1)

Facade noise level from road traffic (from Table 4.2) : 78 dB(A)

Noise reduction required (78 dB(A) - 70 dB(A)) : 8 dB(A)

Separation between source and receiver required : 80m (approx.)
(from Figure A1)

Land use arrangement B : Separation with effective screening (Figure 2)

Facade noise level from road traffic (from Table 4.2) : 78 dB(A)

Noise reduction required (78 dB(A) - 70 dB(A)) : 8 dB(A)

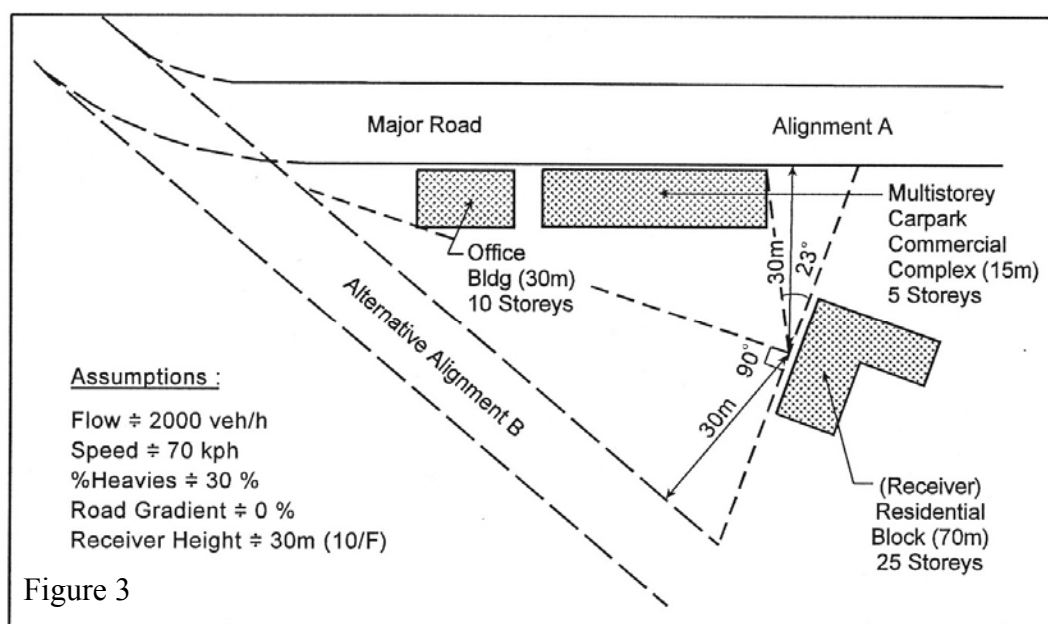
Noise reduction due to 30m separation : 4.2 dB(A)
(from Figure A1)

Using 15m high screening structures and placed as shown in Figure A2, separation between source and receiver for the remaining required reduction is reduced to : 30m (approx.)

Remark : The usefulness of screening structures under small source and receiver separation is demonstrated.

Appendix 4.3 : Assessment of Road Traffic Noise Impact (cont'd)

Example 2 : Benefit of road alignment consideration for noise improvement



To achieve noise standard : L10 (1 hour) 70 dB(A)

Alignment A :

Road alignment fronting noise tolerant buildings offering shielding to receiver

Facade noise level from road traffic (from Table 4.2) : 81 dB(A)

Noise reduction due to separation between source and receiver (from Figure A1) : -5 dB(A)

Noise reduction due to screening (23°) (from Figure A2) : -9 dB(A)

Overall facade noise level : 67 dB(A)

Alignment B : Road alignment being exposed to receiver

Facade noise level from road traffic (from Table 4.2) : 81 dB(A)

Noise reduction due to separation between source and receiver (from Figure A1) : -5 dB(A)

Noise reduction due to screening (90°) (from Figure A2) : -3 dB(A)

Overall facade noise level : 73 dB(A)

Remark : Given the same separation between source and receiver, Road Alignment A is environmentally better than Road Alignment B.

Appendix 4.3 : Assessment of Road Traffic Noise Impact (cont'd)

Figure A1 : Noise reduction with respect to receiver distance / height

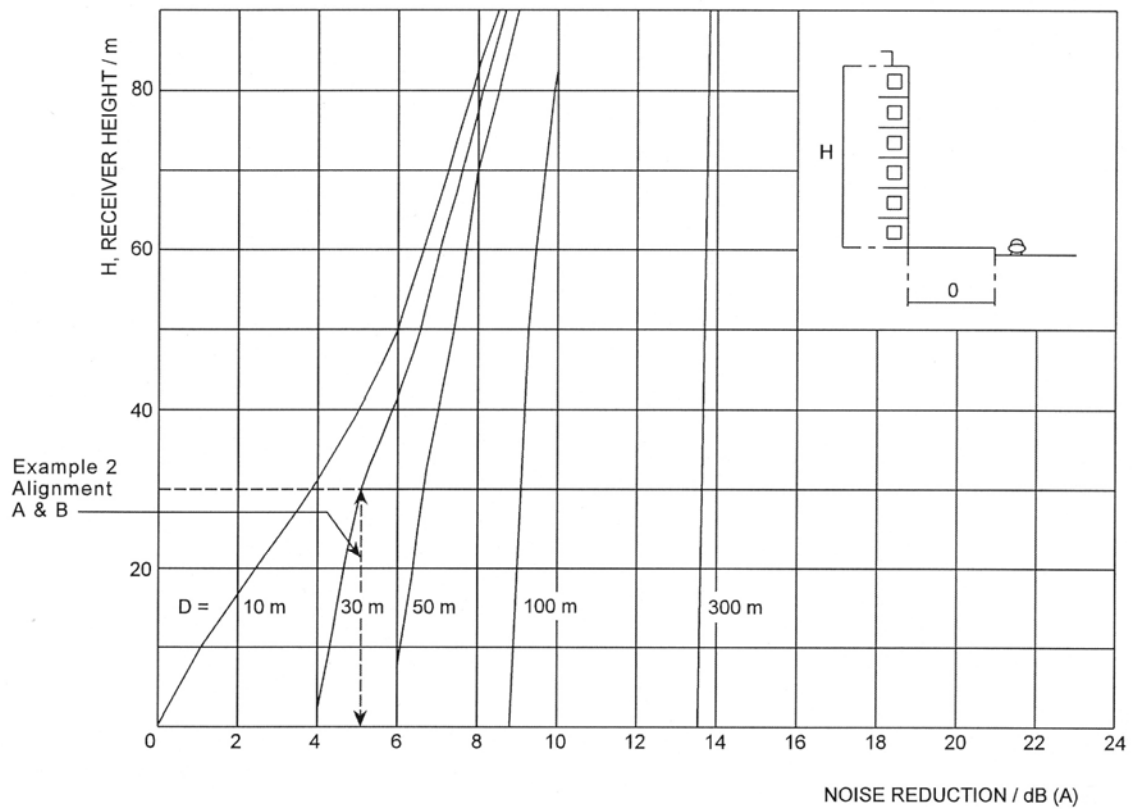
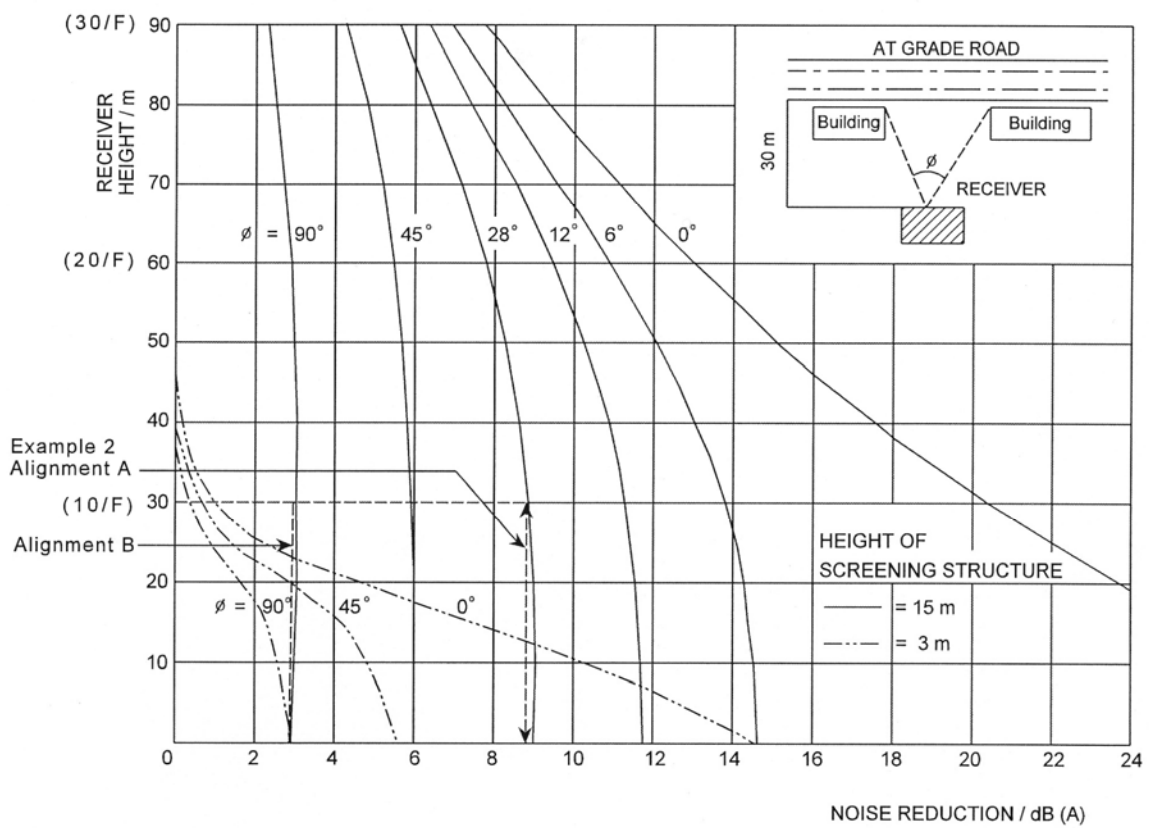


Figure A2 : Noise reduction with respect to view angle and height of screening structure
(Note : This figure is valid for a typical setback distance of 30 m)



Appendix 4.4 : Suitable Window Types for Noise Insulation

Suitable window types when the estimated noise level will exceed the relevant standard by β value.

Exceedance Over Standard Noise Source	Window Types	I	II	III	Section Ref.
Rail Traffic		$\beta < 5$	$5 \leq \beta < 10$	$\beta \geq 10$	4.2.9
Road Traffic		$\beta < 10$	$10 \leq \beta < 15$	$\beta \geq 15$	4.2.5
Aircraft		-	$\beta < 10$	$\beta \geq 10$	4.2.1
Helicopter		$\beta < 5$	$5 \leq \beta < 10$	$\beta \geq 10$	4.2.3
<p>WINDOW TYPES</p> <p>I - Openable well-gasketed window, 6mm pane</p> <p>II - Openable well-gasketed window, 8mm pane</p> <p>III - Openable well-gasketed window, 12mm laminated pane</p>					

5. Water Quality

5.1 Policy Objectives

5.1.1 The Government's overall objectives for planning against water pollution are :

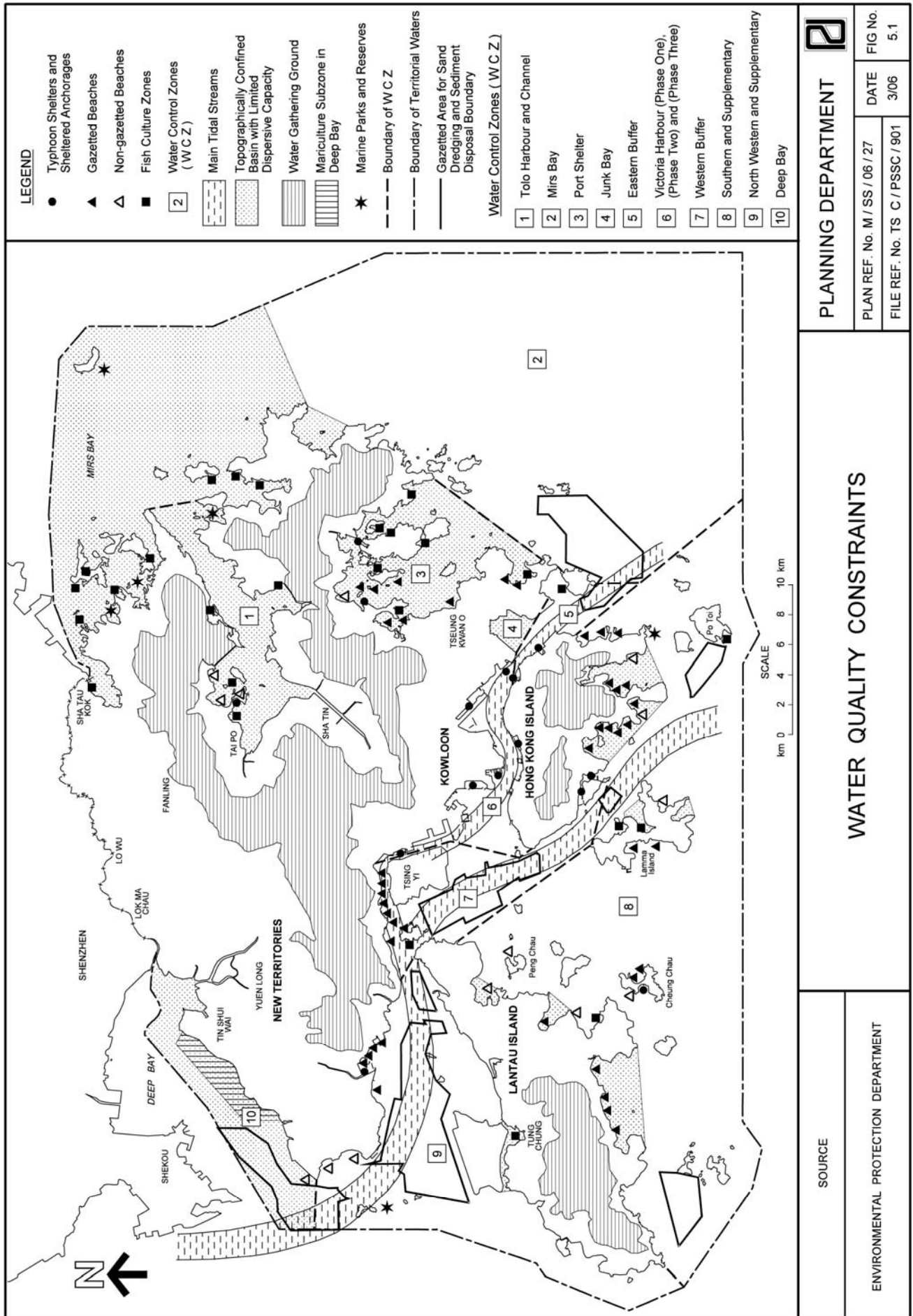
- (a) to achieve and maintain the quality of inland waters, coastal waters, marine waters and ground waters so that they can be used for their legitimate purposes; e.g. bathing, other recreation, as a habitat for marine life, as a source for food or commercial fisheries, irrigation, navigation and shipping, etc. depending on the area;
- (b) to provide adequate public sewerage, wastewater treatment and disposal facilities for all wastewaters; and
- (c) to put in place and enforce water pollution control legislation aimed at safeguarding the health and welfare of the community.

5.1.2 In planning any new developments or redevelopments, the water quality constraints, summarised in Figure 5.1, should be considered as fully as possible. The main tidal streams and the topographically-confined waterbodies which may have limited dispersive and assimilative capacity for pollutant discharges are shown in Figure 5.1. Consideration must also be given to protecting listed Sites of Special Scientific Interest (see also Chapter 10 for locations of SSSIs) and other sensitive receivers such as water intakes, bathing beaches, fish culture zones, site of ecological sensitivity including marine parks and marine reserves.

5.1.3 In the preparation of Outline Zoning Plans, Development Permission Area Plans, Outline Development Plans and Layout Plans, effort should be made to:

- (a) consider the requirements of the beneficial uses of the water body and check whether or not the proposed land uses are in conflict with the beneficial uses of the respective water control zone (WCZ);
- (b) consider the implications of effluent standards and licensing restrictions on the type of land use that will be permitted and the extent of its development; and
- (c) ensure adequate provision of suitable land and access for the necessary treatment and disposal facilities.

5.1.4 Appendix 5.1 presents the principal framework for planning against water pollution and a summary of potentially polluting and sensitive uses.



5.2 Guidelines for Potentially Polluting Uses

Industry

- 5.2.1 Care is required in locating all effluent-producing industries. Overall water quality management constraints will be met more readily and with less expenditure on pollution control measures if the following guidelines are followed :
- (a) preference should always be given to locating industries in areas served by public foul sewerage connected to public treatment facilities which have the capability for treating industrial sewage;
 - (b) industries producing effluents containing toxic materials (e.g. from fabricated metal processing etc.) such as cyanide, phenols and metals, must reduce these substances, by means of treatment or other waste reduction measures, to acceptably low concentrations. Industries producing only biodegradable effluents (e.g food processing, beverage etc.) will also be required to be treated to a satisfactory standard on-site. The acceptability of a discharge of effluent into the waters of Hong Kong is largely reliant on the capability of that waterbody to dilute and disperse any pollutants remaining in that effluent. This is necessary to ensure compliance with Water Quality Objectives defined in the Water Pollution Control Ordinance. It must be stressed that the inland waters of Hong Kong rarely, if ever, provide adequate and reliable dilution;
 - (c) care should be taken in locating those industries that produce certain substances which are normally prohibited in effluents. Adequate treatment and waste reduction or recycling will always be required to prevent the discharge of these substances, which include dioxins, polycyclic aromatic hydrocarbon (PAHs), polychlorinated biphenyl (PCBs), pesticides, radioactive substances, sludges, calcium carbide, petroleum oil or tar, and organic solvents;
 - (d) as a general guideline, industrial wastes should not be discharged to sewers unless the effluent discharge standard prescribed in the Technical Memorandum on Effluent Standards can be met. Wastes not meeting these standards require either pre-treatment before discharge to sewers or interim storage prior to treatment/disposal at appropriate licenced waste disposal facilities. In all cases, discharge of industrial wastes to stormwater drains is strictly prohibited;
 - (e) planners must take into account the needs of industrial establishments to have adequate space and access for on-site pre-treatment of wastewater before discharge into public sewers; and

- (f) industries of the same category should ideally be spatially concentrated so that communal treatment facilities and any other special facilities that may be required can be furnished economically.
- 5.2.2 The provisions of the Water Pollution Control Ordinance (WPCO) apply to all discharges. Most of the industries likely to produce effluents are shown in Figure 2.2. Discharges from these industries need to be licensed by the Director of Environmental Protection and are required to abide by the conditions in the license.
- 5.2.3 For the control, treatment and disposal of toxic chemicals, refer to Section 6 on Waste Management.

Sewage Collection and Disposal

- 5.2.4 Proper collection and treatment of sewage is a basic sanitation requirement to safeguard public health and environmental hygiene. Sewage disposal is therefore a major factor influencing water quality. Suitable disposal means should be chosen for individual circumstances to achieve the best protection to the public and environment:
- (a) in general, public sewerage should be used as this is the most efficient and safe means;
 - (b) at locations where public sewerage is not available and population is more than 50 people, sewage treatment plants should be installed. They may be communal plant serving a number of premises or small plant serving individual premises; and
 - (c) for isolated premises with small number of occupants, septic tank and soakaway system can be adopted as long as the location is suitable for operation of the system.
- 5.2.5 Developments should be served by public sewerage and sewage treatment facilities as far as possible. Construction should be programmed such that sewerage facilities are commissioned before occupation of new developments. Where a public sewerage system exists, new developments should be so planned as to make the best use of the system. The impact on the public sewerage system arising from major developments should be properly assessed by way of Sewerage Impact Assessment (SIA). Proponents of major development should initiate and allow adequate time for SIA be carried out. Whether SIA is required or not should be advised by EPD on a case-by-case basis.

- 5.2.6 In cases where connection of the new developments to public sewerage is not feasible, project proponent should put in place adequate sewage treatment facilities. Sewage treatment plants (STPs) should be designed such that their treated effluent meets statutory discharge standards. The STP discharge location should be properly selected taking into due consideration of the assimilative capacity of the receiving water bodies. In addition, discharge of treated effluent should be avoided in sensitive areas like gazetted beaches, typhoon shelters, marinas, Sites of Special Scientific Interest and Marine Fish Culture Zones. For STP discharge location within water gathering grounds, reference should be made to Section 5.3.13. For major STPs causing unacceptable impact on the receiving waters, the effluent may be conveyed for discharge into other suitable water bodies.
- 5.2.7 STPs should also be suitably sited and designed so as not to cause nuisance to the nearby residents or pollution to the environment, including odour, noise and safety impacts. The siting considerations include good buffering distance from residential dwellings, aesthetical shielding or physical enclosure, and designated area or demarcating fencing for the STP. Provisions may also be allowed for possible reuse of treated effluent from the plants. The design of small sewage treatment plants (serving population below 2 000) should make reference to EPD's "Guidelines for the Design of Small Sewage Treatment Plants".
- 5.2.8 Septic tank and soakaway systems may also be considered for small rural populations resided in locations suitable for operation of the system. These include areas where there are sufficient space between houses, low ground water table, ample distance from retaining walls, wells, streams, pools, beaches and slopes, and adequate soil percolation capacity. The design of septic tank and soakaway systems should make reference to EPD's Practice Note for Professional Person (ProPECC) PN 5/93 "Drainage Plans subject to Comment by the Environmental Protection Department". Use of septic tank and soakaway systems within water gathering grounds should be avoided (please refer to section 5.3.13). Supporting facilities such as vehicular access should be provided to facilitate proper operation and maintenance of both sewage treatment plant and septic tank and soakaway systems.

Civil Engineering Infrastructure and Operation

- 5.2.9 This category of potentially polluting uses and activities includes reclamation, dredging, dredged spoil disposal, landfills, man-made lagoons, potentially hazardous installations, bulk chemical stores, roads, port facilities, dams and comparable permanent structures, well boring, site investigation work, excavation of fill from sources on land or the sea bed, drainage works, river training and the construction phases of major works. The main concern is pollution caused by silt, oil and floating refuse while work is in progress, but some works, especially reclamation from the sea, road construction and fill excavation, may have long term effects on drainage, siltation and pollution. Care should be taken in planning and implementation of works to avoid, minimise or ameliorate the occurrence of these adverse effects on water bodies, especially those in:

- (a) unspoilt areas designated for conservation and in Sites of Special Scientific Interest;
 - (b) areas which already suffer some degree of pollution, where there is a risk that any additional environmental stress will result in adverse ecological changes; and
 - (c) areas used for commercial fisheries including fish culture and shellfish cultivation, or for contact recreation, including both primary (e.g. bathing) and secondary recreation (e.g. canoeing, sailing etc.).
- 5.2.10 Reclamation and watercourse training projects, and extraction of marine sand as a source of fill involve extensive dredging activities. As dredging, produces considerable disturbance in the environment, the necessary measures to minimise adverse effects include the avoidance of dredging; the carrying out of assessment studies prior to the commencement of operations; the selection of management strategies, dredging method and machinery to minimise the impact on aquatic life, particularly in the vicinity of commercial fisheries and aquaculture operations; the control over the timing of the operations to prevent interruption of the sensitive uses in affected areas; and the monitoring of water quality prior to and during dredging activities.
- 5.2.11 If not required as fill the dredged material may normally be transported to and deposited at gazetted marine dumping grounds or sites approved by the EPD. Considerations should be given to minimise dredging and hence the quantity of dredged material required to be disposed of so as not to overstress the available capacity of the existing, committed or planned marine dumping grounds. Dumping of spoil at sea, even within a gazetted mud disposal area is only allowed under the conditions of a permit issued by EPD in accordance with the Dumping at Sea Ordinance. On no account should any material be dumped directly into an inland watercourse. Particular care must be taken in cases where the dredged material may be contaminated in any way.
- 5.2.12 All reclamations will affect water flow patterns. Before proceeding with any reclamation proposal, the effects on hydrography and water quality must be fully investigated by computer modelling or other suitable techniques. Care should be taken by those involved in planning reclamation work to avoid the creation of enclosed or stagnant pools of water during the reclamation stage, which may be susceptible to pollution.

Transport Facilities

- 5.2.13 As bus depots involve the construction, repair and maintenance of buses, significant amount of wastes and wastewater can be produced. Adequate space should be provided for appropriate facilities for the collection, storage and disposal of wastes and wastewater. Consideration needs to be given to the provision of adequate space for waste and wastewater collection and disposal facilities, arising from the operations of petrol filling stations and ferry terminals.

5.3 Guidelines for Sensitive Uses

Bathing Waters and Other Contact Recreational Facilities

- 5.3.1 Where the provision of bathing waters involves construction of an enclosed area or artificial lagoon, or where waterside recreational facilities are to be provided, care must be taken to ensure that the design of the facility provides for adequate flushing with clean water and that polluted surface waters are diverted away from the bathing areas.
- 5.3.2 Permissible standards for effluents must be consistent with the Water Quality Objective for Bathing Beach Subzones. No new discharge outlet, either storm or foul drain, nor any soakaway pit for effluent disposal should be located within 100m of the boundaries of any gazetted beach in any direction, including rivers and streams (Figure 5.1).

Aquaculture and Fisheries

- 5.3.3 Mariculture is allowed under licence only in designated Fish Culture Zones (Figure 5.1) and must comply with the conditions laid down in the Marine Fish Culture Ordinance.
- 5.3.4 Marine Fish Culture Zones, fresh water fish ponds, oyster beds, fish nursery and spawning grounds and other marine culture resources require pollution-free environments. Good water quality should therefore be maintained in these locations. Care should be taken to prevent or minimise pollution from discharges which may be carried by tides, currents or natural watercourses into these sites, even from relatively remote locations. No new effluent will be allowed within 200m of the seaward boundaries and 100m of the landward boundaries of a marine fish culture zone.
- 5.3.5 Fish Culture Zones, if not planned and operated properly, can cause considerable pollution on a local scale. Pollutants, arising from surplus fish feed and fish faecal matter easily accumulate on the seabed. Fish Culture Zones should therefore be located in areas with good water circulation where the pollutants can be readily dispersed. To further minimise pollution, habitation of the rafts in the zone should be strictly prohibited. Adequate supporting infrastructure including means of access (e.g. roads or piers), toilets and waste collection and disposal facilities should be provided for the proper collection, treatment and disposal of waste generated in the Fish Culture Zone.

Agriculture

- 5.3.6 Abstraction of water and discharge of effluents should not be carried out in a manner that will cause detrimental effects on downstream agricultural uses.

Residential and Recreational Development

- 5.3.7 Residential and recreational developments, including urban recreational space, should preferably be located away from stagnant waters where pollutants might accumulate and give rise to nuisance. Where polluted water bodies might affect such developments, the first objective must be the removal of the sources of pollution. Further remedial measures, such as dry weather flow diversion, dredging and aeration may also be required to eliminate nuisance. All buildings should be provided with sewage treatment facilities or be connected to a sewer.
- 5.3.8 If it is envisaged that substantial improvement in water quality in existing pollution black spots cannot be attained in the near future, residential and recreational development should be located sufficiently far away from the polluted water body so that the nuisance from water pollution will not adversely affect the residents.

Typhoon Shelters, Marinas and Boat Parks

- 5.3.9 The location and configuration of typhoon shelters, marinas or boat parks should be planned in such a way as to ensure adequate flushing and good water exchange between the water bodies inside and outside the shelter, marina or boat park. Hydraulic modelling tests will usually be required to ensure that the design provides adequate flushing in the whole of the typhoon shelter, marina or boat park and that no stagnant water is created by the development.
- 5.3.10 Typhoon shelters, marinas and boat parks should not be located in areas with poor water quality. They should either be located at sufficient distance from sewage and storm water outfalls or they should be designed in such a way that the discharge plumes of these outfalls are not carried into the typhoon shelter, marina or boat park. Existing outfalls and storm drains should be diverted to discharge away from any new typhoon shelter, marina or boat park. If the diversion of existing storm drains is not feasible, alternative sites should be found.
- 5.3.11 No discharges from new sewage outfalls, storm water outfalls or nullahs should be allowed to drain into a typhoon shelter, marina or boat park (Figure 5.1).
- 5.3.12 Adequate shore-based utilities including toilets and waste collection and disposal facilities must be provided for the proper collection, treatment and disposal of waste. No waste should be dumped directly into the typhoon shelter, marina or boat park. Effluent discharges from the utilities in the shelters, marinas or boat parks should meet the established guidelines for effluent control.

Water Gathering Grounds

- 5.3.13 Developments within the water gathering grounds (WGG) (Figure 5.1) are strictly controlled by the Water Supplies Department. Planning of development or projects to be located inside or near the WGG should follow guidelines laid down by Water Supplies Department. Because of the importance of protecting such water resource from pollution, all developments within the WGG should be connected to public sewerage. If public sewerage is not available, sewage treatment plant should be provided. Discharge from the sewage treatment plant will have to comply with discharge standards for Group A inland waters as specified in the Technical Memorandum on Effluent Standard drawn up under the Water Pollution Control (Amendment) Ordinance 1990. Use of septic tank/soakaway systems should be avoided.

Nature Reserves and Sites of Special Scientific Interest (SSSIs)

- 5.3.14 These areas should be adequately protected from the effects of pollution and from the diversion of natural flows. Reference should be made to HKPSG Chapter 10 – Conservation.

Natural Streams/Rivers

- 5.3.15 Development should preferably be located away from any natural streamcourse.

Appendix 5.1 : Principal Framework for Planning against Water Pollution

- (a) The principal legislation is the Water Pollution Control Ordinance (WPCO) which allows for gazettal of Water Control Zones (WCZ) within which the discharge of liquid effluents and the deposit of matter into any water bodies and public sewers and drains are controlled. Water Quality Objectives are declared for each Water Control Zone on the basis of the beneficial uses of the water bodies therein. In turn, the Objectives, which may vary spatially, form a basis for fixing the conditions contained in licences under which discharges and deposits may occur.
- (b) The Water Pollution Control Ordinance applies control to all discharges and deposits. Technical Memorandum has been provided under the Ordinance which acts as a guide to the setting of the standards required, in various circumstances, for inclusion in licences with which the discharge must comply.
- (c) The discharge of polluting effluents is tightly controlled in the Water Gathering Grounds with high level of treatment being required (Figure 5.1).
- (d) Other relevant legislation includes the livestock waste control provisions of the Waste Disposal Ordinance which prohibit livestock keeping in urban areas and provide for the implementation of the Livestock Waste Control Scheme in other areas (See Appendix 6.1 for details).
- (e) Those involved in the planning and implementation of works should also determine if the planning area falls within or includes a marine Fish Culture Zone. A number of Fish Culture Zones have been designated under the Marine Fish Culture Ordinance (Figure 5.1). It is an offence to pollute the waters of these zones.

Potentially Polluting and Sensitive Uses

- (a) Potentially polluting uses :
 - industry and agriculture (including livestock keeping and slaughterhouses);
 - sewage disposal (including sewage from private residential developments);
 - civil engineering works (including all building works, well boring, site investigation, dredging, reclamation, excavation of fill, man-made lagoons etc.); and
 - transport facilities.
- (b) Sensitive uses, which may also have the potential to cause significant environmental impact :
 - bathing;
 - aquaculture and fisheries;
 - agriculture;
 - residential and recreational development; and
 - typhoon shelters, marinas and boat parks.

(c) Other sensitive uses :

- water gathering grounds;
- nature reserves;
- Sites of Special Scientific Interest;
- marine parks/marine reserves;
- coastal protection areas;
- conservation areas; and
- fish spawning grounds.

6. Waste Management

6.1 Policy Objectives

- 6.1.1 The Government's overall objectives for waste management planning are to ensure :
- (a) the promotion of sustainable approach to waste management, in which we produce less waste and reuse or recover value from waste;
 - (b) the adequate provision of facilities for cost-effective and environmentally satisfactory disposal of all wastes; and
 - (c) the availability of and proper enforcement of legislation on storage, collection, transport, treatment and disposal of wastes, to safeguard the health and welfare of the community from any adverse environmental effects.
- 6.1.2 Appendix 6.1 presents the principal framework for waste management and a summary of waste reception/transfer facilities and uses with special requirements for waste management.

6.2 Standards and Guidelines for Waste Reception and Transfer Facilities

- 6.2.1 Waste reception and transfer facilities should be sited so that any adjacent development is very well buffered. Provisions should be made in the building configuration to allow for the separation and recovery of recyclables. For facilities handling the reception and disposal of dusty or odoriferous wastes, special precautions should be taken to avoid nuisance to surrounding areas. Note should be taken of prevailing wind direction and subsequent potential for nuisance.

Refuse Transfer Stations

- 6.2.2 A refuse transfer station (RTS) provides a regional and sub-regional destination for unloading of refuse collection vehicles, where the waste is containerised for haulage in bulk to a final disposal facility. A RTS aims primarily at reducing the cost of transporting waste and minimising environmental nuisance by better containment of waste. Consideration should be given to providing such a facility for handling 500 - 2 000 tonnes a day of waste in the Urban Area, equivalent to 500 000 - 2 million population, or 100 - 1 000 tonnes in the NT, equivalent to 100 000 - 1 million population. A site area of between 1 and 2 hectares is required for each such facility.
- 6.2.3 A RTS should be centrally located in the waste catchment it serves, preferably on the water front, with barge access. To minimise incompatibility with adjacent sensitive land uses, a RTS should be sited in an industrial or other non-sensitive area or, if possible, underground. Sufficient space should be provided for reception and queuing of refuse collection vehicles (RCVs). Short vehicular access from and to major transport routes is preferred, to avoid traffic congestion and delays to

RCVs. The adequacy of adjoining road capacities for the RCVs should be determined. Considerations should be given to the provision of fully enclosed stations and/or suitable barriers for odour and dust control. Adequate control measures should be provided to minimise the impacts and may include provisions for noise control of the machinery and the structure, leachate treatment/disposal systems and installation of air/exhaust cleaning systems.

Construction Waste Management Facilities

- 6.2.4 Disposal outlets for construction waste, either in the form of public filling barging points or public filling areas, C&D materials sorting facilities, fill banks or similar construction waste management facilities, should be provided to facilitate the use or proper disposal of these materials and to reduce the temptation to illegal dumping. The aim is to ensure that suitably located outlets serving particular catchments are available throughout the territory. Pollution control measures should be provided to prevent spillage of material during unloading, to suppress dust blow and wind blown litter, to minimise noise from all plant, to prevent waste, soil and debris from being washed off the site or into the sea and to restrict working hours.
- 6.2.5 The provision of construction waste management facilities must give due regard to their proper siting, the timing of implementation and the required pollution control measures. These facilities will require sea frontage, good road access and sufficient space for reception and queuing of waste-carrying vehicles within the site. Wherever practicable, they should be located in industrial or other non-sensitive land uses.

Refuse Collection Points

Provision in Urban and New Town Areas

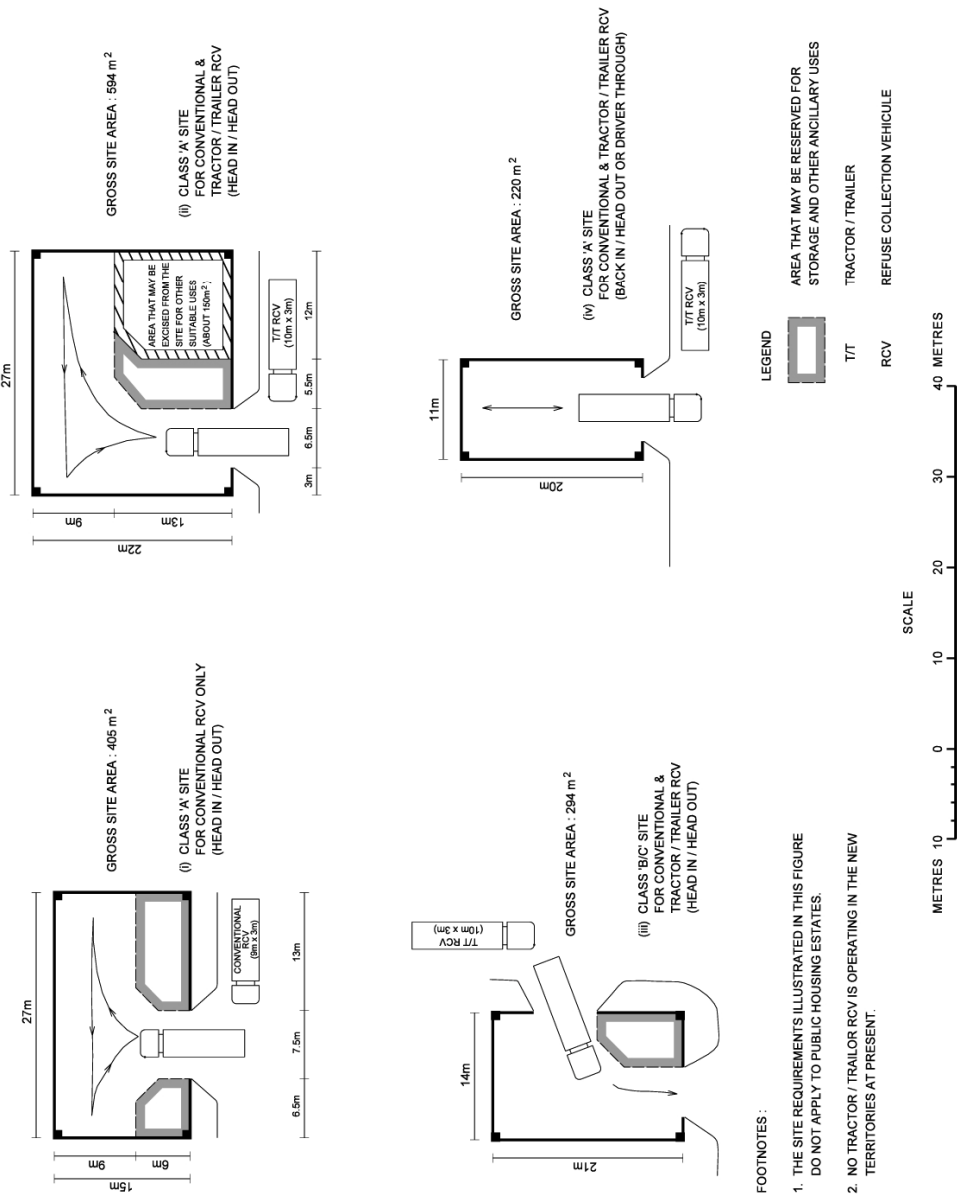
- 6.2.6 A refuse collection point (RCP) is required to serve the needs of each population of 20 000 persons or areas within a distance of 500 metres. In industrial and commercial areas, or in areas where adequate private facilities are or will be available, this level of provision may need to be adjusted to suit anticipated needs. Director of Food and Environmental Hygiene should be consulted on detailed requirements.
- 6.2.7 For road safety reasons, new RCPs should be planned to allow head-in and head-out movements of refuse collection vehicles (RCVs). A gross site area of not less than 294m² (with a minimum width of 14m) is required in the case of island or corner sites. For hemmed-in or gap sites, a gross site area ranging from 405m² to 594m² (with a minimum width of 27m) will be required. The former can accommodate conventional RCVs only whereas the latter can cater for both conventional and tractor/trailer RCV. Where a large gap site is provided to cater for tractor/trailer RCV head-in and head-out movement, an area in the region of 150m² may be excised for other compatible uses if identified. The site requirements for different classes of site and types of RCV are illustrated in Figure 6.1.

- 6.2.8 Although reversing movements of RCVs should normally not be allowed for road safety reasons, due consideration should be given to the land constraints in certain areas and cost implication of providing standard sites. In such areas, sites which only allow back-in and head-out movements of RCVs could be considered for RCPs provided that they are located on minor roads having relatively low vehicular and pedestrian flows. In this case, a smaller site with an area of not less than 220m² (11m frontage and 20m deep), as shown in Figure 6.1, will suffice. However, it should be stressed that the selection of the smaller sites for RCPs should be regarded as the exception rather than the rule. The Transport Department should be consulted.
- 6.2.9 The gross site area and dimensions specified are the minimum operational requirements to accommodate both conventional and tractor/trailer RCVs. Should specific configuration and physical conditions of an individual site dictate, or should other government/institution/community facilities be required to be incorporated on upper floor, the site requirements may have to be adjusted to suit special design and layout. In general, suitable material recovery areas should be set aside in the RCPs.

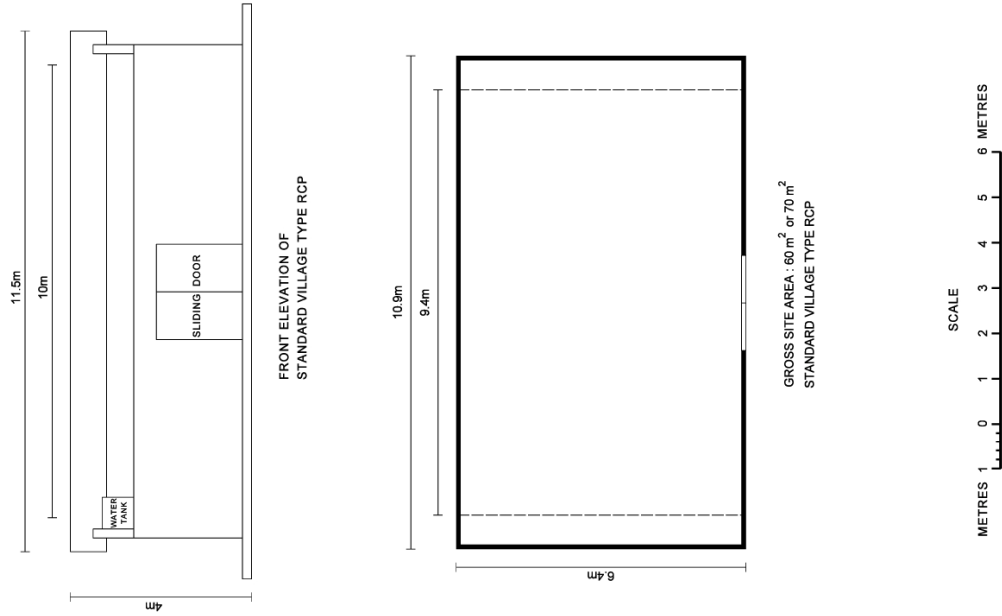
Provision in Rural Areas and Remote Villages

- 6.2.10 In rural areas or remote villages which are characterised by wide geographical spread and scant population, standard village-type RCPs and bin sites are the basic provision. Standard village-type RCPs each measuring from 9.4m x 6.4m (about 60m²) to 10.9m x 6.4m (about 70m²) depending on operational needs should be provided to serve one or more adjoining villages up to a maximum population of about 1 000 persons. They should be conveniently located so that collection by RCVs can be effected from either a lay-by or a designated parking space without causing undue obstruction to other road users. Additional RCPs should be provided to clusters of settlements at the rate of one RCP per 1 000 of population or part thereof. Village-type RCPs and bin sites should also be provided to those less-remote village development areas of the new towns where the previously noted provision for urban and new town areas may not be applicable. Bin sites, wherever appropriate, should be provided in close proximity to refuse-generating sources depending on land availability and accessibility to vehicles. In general, suitable material recovery areas should be set aside in the RCPs.

IN URBAN AND NEW TOWN AREAS



IN RURAL AREAS AND REMOTE VILLAGES



SOURCES

ARCHITECTURAL SERVICES DEPARTMENT
FOOD AND ENVIRONMENTAL
HYGIENE DEPARTMENT

MINIMUM SITE REQUIREMENTS FOR REFUSE COLLECTION POINTS

PLANNING DEPARTMENT

PLAN REF. No. M / SS / 06 / 32	DATE	FIG No.
FILE REF. No. TS C/PSSC/902	4/06	6.1

General Locational and Design Guidelines

- 6.2.11 RCPs should be sited so as to minimise disruption to traffic or the creation of traffic safety hazards. RCPs should therefore not be located on trunk or primary distributor roads, on steep roads, or locations where turning trucks may create traffic problems.
- 6.2.12 Adequate provision of off-street (enclosed) parking of bulk collection vehicles and separate access for the public and private refuse collectors should be provided where appropriate.
- 6.2.13 The location and design of RCPs should aim to minimise nuisance to the public and people living and working nearby, where appropriate, by enclosing the whole facility and, if necessary, through the provision of odour control equipment and ventilation. Water points should be a minimum requirement for all RCPs for regular cleaning purpose. For new, purpose-built RCPs which allow entry of RCVs, design features such as air/exhaust cleaning, high-pressure water cleaning and leachate drainage and disposal should be incorporated. Architectural design of RCPs should also incorporate landscaping wherever possible as visual screening to and as a buffer from adjacent sensitive land uses. Every possible effort should be made to replace all existing on-street RCPs.
- 6.2.14 Due to the difficulties in finding suitable sites for RCPs especially in the built-up areas, RCPs should be incorporated in large-scale developments and redevelopments of both public and private sectors, wherever possible. To reduce the need for waste handling and minimise potential nuisance problems, appropriate waste collection and handling facilities should be included in these large-scale developments and redevelopments in future.

Provision in Public Housing Estates

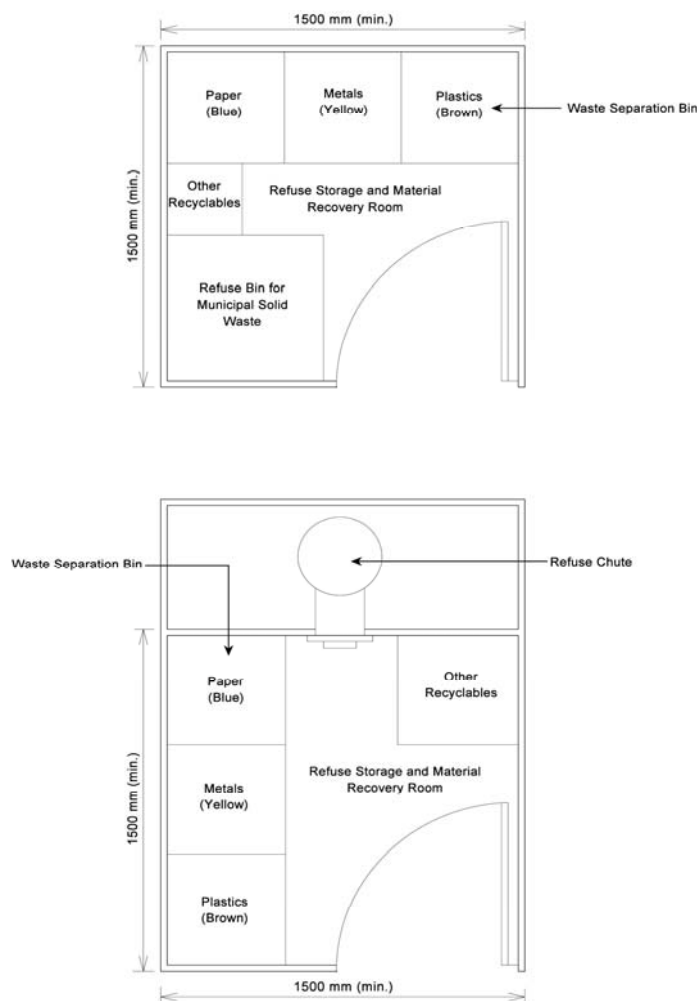
- 6.2.15 Whilst the above standards and guidelines are related to provision of RCPs in urban, new town and rural areas, they do not apply to public housing estates which are subject to separate provision standard and design criteria for refuse collection. The major provision of refuse collection in public housing estates include:
 - (a) Refuse Storage and Material Recovery Chamber (RS & MRC) shall be provided in each domestic block to meet sufficient daily operational requirements for the total number of flats in the block pursuant to Building Regulations, Chapter 123H of Buildings Ordinance for the minimum floor space of RS & MRC.
 - (b) Optional provision of Refuse Storage & Material Recovery Room (RS & MRRs) at Typical Floor : providing sufficient daily storage and material recovery facilities. Details of typical layouts and minimum dimension for RS & MRRs are shown in Figure 6.2.

- (c) Refuse Collection Point: an enclosed structure to provide sufficient daily storage for the total number of flats in the estate where refuse is collected by the Food and Environmental Hygiene Department (FEHD).

Block to Block Collection Option: where the site dictates the RCVs would have direct access to individual buildings across clearly defined vehicular routes, with either a lay-by or turning circle in a cul-de-sac situation provided adjacent to the RS & MRCs. This option, which will cause nuisance to the public and the estate tenants living nearby, is to be adopted in exceptional cases only, e.g. the site topography is such as to make it impossible for a RCP to be provided to serve two or more blocks.

- (d) Junk Collection Points: a separate storage area for those items which cannot be handled by the normal refuse collection service.

Figure 6.2 : Examples of Layout Plan for Refuse Storage and Material Recovery Chamber



Note : The above is subject to modifications to suit any other suitable waste separation systems

- 6.2.16 All refuse storage and material recovery facilities should be sheltered from weather.
- 6.2.17 An independent junk collection point will be provided for large commercial centre with a wet market.
- 6.2.18 In all cases, the access route for RCVs in public housing estates should be clearly defined by suitable choice of materials and colours, use of pavement kerbs and/or landscape features to differentiate the vehicular access from the pedestrian areas of the estate.

Provision of Refuse Collection Facilities in Private Domestic, Non-domestic, Industrial and Composite Building Developments

- 6.2.19 The provision of refuse storage and material recovery chambers/rooms and requirement on the associated mechanical ventilation and air-purifying facilities in private domestic, non-domestic, industrial and composite building developments should comply with the Building (Refuse Storage and Material Recovery Chambers and Refuse Chutes) Regulations which came into effect on 1 November 2000. Under these regulations, the minimum floor space requirements for refuse storage and material recovery chambers and the need to provide vehicular access are specified according to the scale of development. The FEHD may stipulate certain terms and conditions regarding the removal of household waste from premises under the Public Cleansing and Prevention of Nuisances Regulation.
- 6.2.20 A Refuse Storage & Material Recovery Chamber (RS & MRC) should be provided at ground floor or basement for refuse storage and material recovery activities including sorting and storage of recovered materials. The floor space and vehicular access requirements of RS & MRCs under the Building (Refuse Storage and Material Recovery Chambers and Refuse Chutes) Regulations are summarised in Table 6.1. For domestic or composite building development with a total usable floor space (UFS) of 13 200m² or more, and non-domestic building development with a total UFS of 39 600m² or more, vehicular access to refuse storage and material recovery chamber will be required with adequate ingress and egress for a refuse collection vehicle customarily used by the collection authority. This would facilitate refuse collection to be carried out within the development to minimise environmental nuisance. For small scale developments, household waste will be hauled to a nearby refuse collection point serving a wider area, which will then be collected by refuse collection vehicles.
- 6.2.21 Optional provision of refuse storage and material recovery facilities could be made at each floor. One option is to provide a Refuse Storage & Material Recovery Room (RS & MRR) at each floor and the minimum area of the room are as follows:
 - (a) the Room should not have any dimension less than 1.5m (i.e. the size of such room should not be less than 2.25m²).

- (b) the height, measured to the ceiling, of every room should not be less than 2m.

The area requirements of the RS & MRR do not include the area for the installation of refuse chute and other associated facilities. However, if refuse chute or other associated facilities are required, it should preferably be placed within the RS & MRR or at its proximity so as to enhance separation of recyclables before disposal into the refuse chute. Details of typical layouts and minimum dimensions for RS & MRRs are shown in Figure 6.2.

- 6.2.22 Requirements on mechanical ventilation and air purifying facilities are given in the “Practice Note for Authorised Persons and Registered Structural Engineers (PNAP 98)” issued by the Buildings Department.
- 6.2.23 Where Automated Refuse Collection System is adopted, provisions should be made to allow for separation and recovery of recyclables.
- 6.2.24 Detailed requirements for refuse storage and material recovery chambers/rooms may be updated from time to time and reference should be made to the latest version of the Building (Refuse Storage and Material Recovery Chambers and Refuse Chutes) Regulations and associated Practice Notes.

Table 6.1 : Summary of Requirements of Refuse Storage and Material Recovery Chambers in Private Domestic, Non-Domestic, Industrial and Composite Building Developments

Description of Building	Total floor area as shown on plan	Description of material recovery chamber/refuse storage and material recovery chamber	Minimum floor space of material recovery chamber/refuse storage and material recovery chamber
Domestic Building	a) Usable floor space 1 320m ² or more but less than 13 200m ²	Refuse storage and material recovery chamber	Total usable floor space in m ² divided by 347
	b) Usable floor space 13 200m ² or more	Refuse storage and material recovery chamber with vehicular access	Total usable floor space in m ² divided by 347
Non-domestic Building (except Industrial Building)	a) Usable floor space 3 960m ² or more but less than 39 600m ²	Refuse storage and material recovery chamber	Total usable floor space in m ² divided by 925
	b) Usable floor space 39 600m ² or more	Refuse storage and material recovery chamber with vehicular access	Total usable floor space in m ² divided by 925
Industrial Building	a) Usable floor space 3 960m ² or more but less than 39 600 m ²	Material recovery chamber	Total usable floor space in m ² divided by 2 320 but not less than 2.25 m ²
	b) Usable floor space 39 600m ² or more	Material recovery chamber with vehicular access	Total usable floor space in m ² divided by 2 320
Composite Building	a) Aggregate usable floor space 1 320m ² or more but less than 13 200m ²	Refuse storage and material recovery chamber	Aggregate of - a) the total usable floor space of the domestic building component in m ² divided by 347; and b) the total usable floor space of the non-domestic building component in m ² divided by 925.
	b) Aggregate usable floor space of 13 200m ² or more	Refuse storage and material recovery chamber with vehicular access	Aggregate of – a) the total usable floor space of the domestic building component in m ² divided by 347; and b) the usable floor space of the non-domestic building component in m ² divided by 925.

Note : For the latest requirements, please refer to the Schedule to Building (Refuse Storage and Material Recovery Chambers and Refuse Chutes) Regulations.

6.3 Guidelines for Industries with Special Requirements for Waste Disposal

Chemical Waste Producing Industries

- 6.3.1 These industries should be located in either industrial buildings within designated industrial areas or more preferably within specific purpose-built buildings with communal waste storage and/or treatment facilities; and they must comply with the requirements of the Waste Disposal (Chemical Waste) (General) Regulation.
- 6.3.2 Where industrial buildings are intended to accommodate chemical waste producing industries, special requirements for access and space associated with the storage, treatment, and/or collection of waste should be considered. Such requirements will generally include:
- (a) provision of suitable on-site treatment facilities and collection systems;
 - (b) provision of adequate facilities for the interim storage of chemical wastes and for their collection and transport by licensed waste collectors to off-site treatment and disposal facilities. Such provisions can include sufficient containers for temporary waste storage, designated storage areas with impermeable floors and bunding to prevent waste leakage and spillage and appropriate design of equipment for the safe handling of waste. Storage area requirements should be based on discharge patterns or arising frequency of the wastes and must consider the necessity for separate storage of incompatible wastes. In general, 2 to 5% usable floor area in each floor should be allocated for interim storage of chemical wastes, along with a loading bay with direct access to a goods lift. Alternatively, 2 to 5% of gross floor area of the building should be provided on a single floor for the joint use of all tenants;
 - (c) storage of chemical wastes classified as Dangerous Goods (DG) must comply with the requirements of the Dangerous Goods Ordinance; and
 - (d) sufficient off-street parking space for chemical waste collection vehicles as appropriate.

Offensive Trades

- 6.3.3 Offensive trade activities require a licence granted by the Director of Food and Environmental Hygiene and must comply with the conditions laid down in the Offensive Trades Regulation. In general, offensive trades should be located in purpose-built industrial buildings with sufficient ventilation and adequate facilities to control and dispose of any noxious wastes or effluents. Drainage openings should be fitted with removable galvanised gratings or refuse traps and where appropriate, grease traps should be provided.

- 6.3.4 Industrial buildings housing offensive trades should be well buffered from nearby sensitive uses. Usually, a buffer distance of at least 200m is required to minimise potential odour nuisance.

Livestock Rearing

- 6.3.5 Livestock premises located in statutory Control Areas must comply with the requirements of the Waste Disposal (Livestock Waste) Regulations. Precautions should be taken to prevent any nuisance or annoyance to the public and any pollution to watercourses and water gathering grounds within the meaning of the Waterworks Ordinance.
- 6.3.6 Adequate provision for the temporary storage of livestock waste in properly designed and constructed containers should be made. Where livestock waste is to be used for composting on livestock premises, properly constructed areas or enclosures should be provided. In order to prevent potential pollution of water gathering grounds, soakaway pits must be located not less than 30m from any reservoir, saline waters, spring, watercourse or well for potable use.

6.4 Guidelines for Community Facilities with Special Requirements for Waste Disposal

- 6.4.1 When planning these community facilities, allowance should be made for adequate space provision for the storage, collection and disposal of solid wastes. This should be in the form of a refuse storage area on the ground floor or any floor with direct vehicular access. The area should be close to the goods lift and there should be adequate provision for off-street vehicular access for loading of refuse collection vehicles. The refuse storage and material recovery chambers should be built to similar standards as those required for residential developments under the Building (Refuse Storage and Material Recovery Chambers and Refuse Chutes) Regulations. Regarding locational guidelines, reference should be made to Section 6.2.

Slaughterhouses

- 6.4.2 Slaughterhouses should include adequate waste treatment facilities to handle all waste forms generated. These should include treatment facilities for carcasses, condemned meat, blood, skin, offals, grease, stomach content, nails, hair and waste water. There should be a separation of waste water sewerage from storm water sewerage.

Markets and Cooked Food Stalls

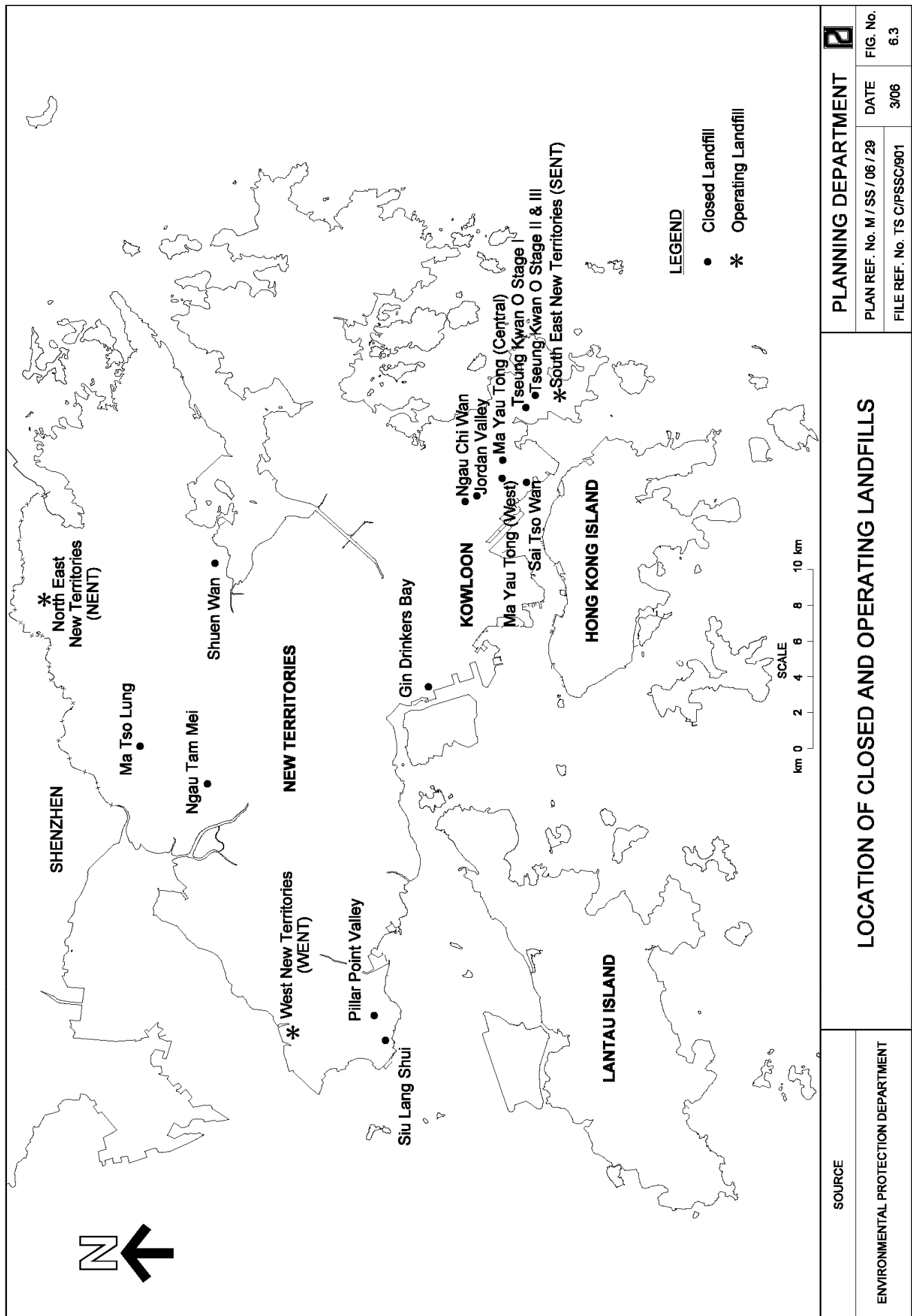
- 6.4.3 Many of the wastes produced by these facilities are highly putrescible. Adequate refuse storage area should be provided and located so as to minimise potential nuisance to the public and people living and working nearby. Animal carcasses, commonly generated by the activities within these facilities, should be segregated from other waste streams and separate temporary storage and collection facilities be provided. The facilities should preferably be confined in covered areas and grease traps should be provided to prevent the chokeage of sewers.

Hospitals/Clinics

- 6.4.4 All clinical wastes should be separately collected from other municipal wastes. All clinical wastes must be disposed of in facilities as designated by the Authority.

6.5 Guidelines for Developments close to Landfills

- 6.5.1 Figure 6.3 shows the locations of operating and closed landfills. Landfills, whether closed or still in operation, may give rise to hazards in nearby land uses due to lateral migration of landfill gas (LFG). Landfill gas has the potential to cause asphyxiation, fire or explosion as it migrates into and accumulates in confined air spaces during excavation and foundation work, basement construction and maintenance of drains or other underground services. Other susceptible locations include site huts, basements and similar poorly ventilated enclosures that exist during construction and in completed buildings.
- 6.5.2 Building developments and community facilities should be sited away from landfills. The level of hazards depends on such factors as the existence of gas control systems and barriers, the landfill site configuration, local geological conditions and building configurations of the development. In some overseas cases, landfill gas was reported to have migrated hundreds of metres away from the landfill sites. If buildings are to be developed close to landfills, features such as confined spaces at ground level, basements and other underground spaces should be avoided. The design of podium would require special attention to ensure sufficient ventilation. These developments close to landfills should incorporate adequate monitoring measures and safety precaution measures. EPD should be notified at the earliest planning stage of such development so that the necessary controls are agreed upon before work proceeds.
- 6.5.3 For the purpose of protecting the development from the potential hazards of landfill gas migration, an evaluation of the risks posed by landfill gas is required for any development which is proposed within the 250m “Consultation Zone”. The Consultation Zone represents the area of land surrounding the landfill boundary as defined by a line, running parallel to and 250m away from the edge of the waste if this can be identified or, if not the recognized landfill site boundary. Plans of landfill sites showing the extent of Consultation Zones are attached in Annex A of EPD’s publication “Landfill Gas Hazard Assessment - Guidance Note”, is available at EPD’s website at www.epd.gov.hk (see Environmental Standards and Guidelines – Non-statutory).
- 6.5.4 Guidance for the evaluation of risks associated with landfill gas is contained in the “Landfill Gas Hazard Assessment – Guidance Note” issued by the Director of Environmental Protection. Development proponents should initiate and allow adequate time for Landfill Gas Hazard Assessment be carried out.



Appendix 6.1 : Principal Framework for Waste Management

- (a) A Policy Framework for the Management of Municipal Solid Waste 2005 – 2014 (Policy Framework), which adopts the “polluter-pays” principle, sets out a comprehensive framework for managing waste in Hong Kong.
- (b) The Policy Framework is based on a three-tier approach in the waste hierarchy, which involves, in descending order of priority:
- avoidance and minimization ;
 - reuse, recovery and recycling; and
 - bulk reduction and disposal.

The first priority – avoidance and minimization – is to address the problem at source and to encourage people to reduce waste generation as much as possible. The next priority is to maximize the reuse, recovery and recycling of suitable recyclable. When all the possibilities of waste avoidance, minimization and recycling have been exhausted, we must properly treat and reduce the bulk of waste requiring final disposal through appropriate treatment technologies. Landfill disposal is the last resort only for the residual waste after waste treatment.

- (c) The Waste Disposal Ordinance (WDO) stipulates the preparation of a statutory Waste Disposal Plan which provides for long-term planning of waste management provisions and facilities. The Waste Disposal Plan sets out the framework for the disposal of municipal solid waste at three strategic landfills in the remote New Territories, served by a network of transfer facilities built close to major centres of population.
- (d) Provisions under the WDO to control livestock waste were introduced in 1987. Under these provisions, livestock keeping is prohibited in urban areas and new towns, and the disposal of livestock waste is controlled in the remainder of the territory. The demarcation of Prohibition and Control Areas is shown in Figure 6.4.
- (e) Regulations for chemical waste control were introduced in 1992 to control the handling, collection, treatment and disposal of chemical wastes. In association with this new regulatory programme, a Chemical Waste Treatment Centre is set up in Tsing Yi.
- (f) It is intended to amend the WDO to extend the licensing requirements to cover all types of waste treatment and disposal facilities, including those operated by Government.

Waste Reception/Transfer Facilities and Uses with Special Requirements for Waste Management

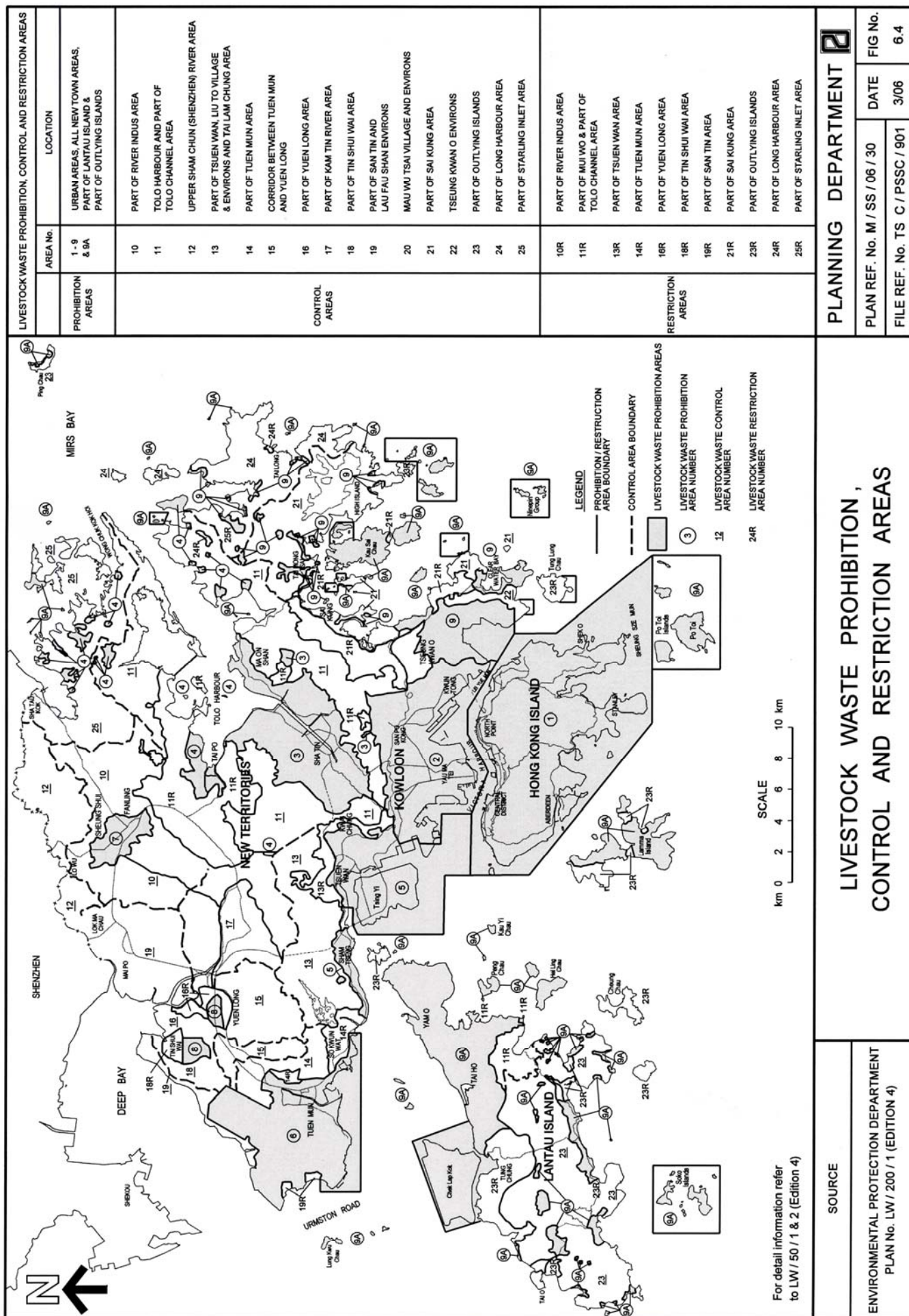
- (a) *Waste Reception and Transfer Facilities*
- Waste handling facilities in building development
 - Refuse collection points
 - Refuse transfer stations
 - Construction waste management facilities

(b) *Industries with Special Requirements for Waste Management*

Offensive Trades - as declared under the Public Health and Municipal Services Ordinance, Section 48. The Authority may by notification in the Gazette declare to be an offensive trade any trade, business, process or manufacture which, in the opinion of the Authority, causes offensive or noxious effluvia or dust or its otherwise of an offensive or harmful nature or which involves the slaughtering of animals or birds. A schedule of offensive trades is shown in Appendix 6.2.

(c) *Community Facilities with Special Requirements for Waste Management*

- Slaughterhouses
- Hospitals/clinics
- Markets
- Cooked Food Stalls



Appendix 6.2 : Offensive Trades

The following trades, businesses, processes and manufactures are declared to be offensive trades under Section 48 of the Public Health and Municipal Services Ordinance and Declaration of Offensive Trades Notice.

Schedule of Offensive Trades

Trade, business, process or manufacture

Item

1. Boiling of bones.
2. Burning of bones.
3. Crushing of bones.
4. Scraping of bones.
5. Storing of bones.
6. Manufacture of chloride of lime.
7. Boiling of fat.
8. Fell-mongery.
9. Cleaning of feathers.
10. Sorting of feathers.
11. Storing of feathers.
12. Processing of fish meal.
13. Manufacture of glue.
14. Manufacture of gluten reduced starch (Tung Min) by fermentation process.
15. Cleaning of hair.
16. Boiling of lard.
17. Dressing of leather.
18. Tanning of leather.
19. Crushing, packing or otherwise dealing in any way with manganese ore or manganese dioxide.
20. Processing of manure.
21. Boiling of resin.
22. Processing of sharks' fins.
23. Manufacture of size.
24. Boiling of soap.
25. Melting of tallow.

Appendix A : Environmental Protection Legislation

1. EXISTING POLLUTION CONTROL LEGISLATION FOR WHICH ENVIRONMENTAL PROTECTION DEPARTMENT IS THE AUTHORITY

Cap 311 Air Pollution Control Ordinance

Regulations	<ul style="list-style-type: none"> - Furnaces, Ovens & Chimneys (Installation & Alteration) - Dust and Grit Emission - Fuel Restriction - Smoke - Appeal Board - Specified Processes - Vehicle Design Standards (Emission) - Motor Vehicle Fuel - Open Burning - Asbestos (Administration) - Construction Dust - Petrol Filling Stations (Vapour Recovery) - Dry-cleaning Machines (Vapour Recovery) - Emission Reduction Devices for Vehicles - Volatile Organic Compounds
Technical Memorandum	<ul style="list-style-type: none"> - For Specifying Air Quality Objectives for Hong Kong - For Issuing Air Pollution Abatement Notices to Control Air Pollution from Stationary Polluting Process - For Allocation of Emission Allowances in Respect of Specified Licences
Code of Practice	<ul style="list-style-type: none"> - Asbestos Work Using Full Containment or Mini Containment Method - Asbestos Work Using Glove Bag Method - Preparation of Asbestos Investigation Report, Asbestos Management Plan and Asbestos Abatement Plan - Safety Handling of Low Risk Asbestos Containing Material
Order	<ul style="list-style-type: none"> - Air Control Zones (Declaration)(Consolidation) - Specified Processes (Specification of Required Particulars and Information) - Specified Processes (Removal of Exemption)

Cap 354 Waste Disposal Ordinance

Regulations	<ul style="list-style-type: none"> - Livestock Waste - Chemical Waste (General) - Permits, Authorizations & Licences (Fees) - Appeal Board - Charges for Disposal of Chemical Waste - Charges for Disposal of Waste - Designated Waste Disposal Facility - Refuse Transfer Station - Charges for Disposal of Construction Waste - Clinical Waste (General) - Charges for Disposal of Clinical Waste
Code of Practice	<ul style="list-style-type: none"> - on the Handling, Transportation and Disposal of Asbestos Waste - on the Handling, Transportation and Disposal of Polychlorinated Biphenyl (PCB) Wastes - Livestock Waste Management - Chemical Waste Management – on the Packaging, Labelling and Storage of Chemical Waste - Clinical Waste Handling and Disposal – Clinical Waste Disposal Control at Landfills

Appendix A : Environmental Protection Legislation (cont'd)

Cap 358 Water Pollution Control Ordinance

- | | | |
|----------------------|---|--|
| Regulations | - | Appeal Board |
| | - | General |
| | - | Sewerage |
| Technical Memorandum | - | Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters |
| Orders | - | Water Control Zones |
| | - | Water Control Zones (Appointed Days) |
| Statement | - | Water Quality Objectives |

Cap 400 Noise Control Ordinance

- | | | |
|----------------------|---|---|
| Regulations | - | General |
| | - | Appeal Board |
| | - | Air Compressors |
| | - | Hand Held Percussive Breakers |
| | - | Motor Vehicles |
| | - | Construction Work |
| Technical Memorandum | - | For the Assessment of Noise from Places Other Than Domestic Premises, Public Places or Construction Sites |
| | - | On Noise From Construction Work Other Than Percussive Piling |
| | - | On Noise from Construction Work in Designated Areas |
| | - | On Noise from Percussive Piling |

Cap 403 Ozone Layer Protection Ordinance

- | | | |
|-------------|---|---|
| Regulations | - | Fees |
| | - | Controlled Refrigerants |
| | - | Products Containing Scheduled Substances (Import Banning) |

Cap 466 Dumping at Sea Ordinance

- | | | |
|-------------|---|-----------|
| Regulations | - | Fees |
| Order | - | Exemption |

Cap 499 Environmental Impact Assessment Ordinance

- | | | |
|----------------------|---|--|
| Regulations | - | Environmental Impact Assessment (Appeal Board) |
| | - | Environmental Impact Assessment (Fees) |
| Technical Memorandum | - | On Environmental Impact Assessment Process |

Cap 595 Hazardous Chemicals Control Ordinance

- | | | |
|-------------|---|---------|
| Regulations | - | General |
| | - | Fees |

Cap 603 Product Eco-responsibility Ordinance

- | | | |
|------------|---|-----------------------|
| Regulation | - | Plastic Shopping Bags |
|------------|---|-----------------------|

Cap 611 Motor Vehicle Idling (Fixed Penalty) Ordinance

- | | | |
|------------|---|---------------|
| Regulation | - | Fixed Penalty |
|------------|---|---------------|

Appendix A : Environmental Protection Legislation (cont'd)

2. LEGISLATION RELEVANT TO POLLUTION CONTROL FOR WHICH ENVIRONMENTAL PROTECTION DEPARTMENT IS NOT THE AUTHORITY

- Cap 53 Antiquities and Monuments Ordinance (Secretary for Development)**
- Cap 59 Factories & Industrial Undertakings Ordinance (Commissioner for Labour)**
- Cap 60 Import & Export Ordinance (Commissioner of Customs & Excise)**
- Cap 102 Waterworks Ordinance (Water Authority)**
- Cap 121 Buildings Ordinance (Application to the New Territories) Ordinance (Director of Lands)**
- Cap 123 Buildings Ordinance (Director of Buildings)**
Regulations - Demolition Works
 - Refuse Storage & Material Recovery Chambers & Refuse Chutes
 - Standards of Sanitary Fitments, Plumbing, Drainage Works & Latrines
 - Oil Storage Installations
- Cap 131 Town Planning Ordinance (Town Planning Board)**
- Cap 132 Public Health & Municipal Services Ordinance (Director of Food and Environmental Hygiene)**
Regulations - Offensive Trades
 - Ventilation of Scheduled Premises
- Cap 139 Public Health (Animals & Birds) Ordinance (Director of Agriculture, Fisheries and Conservation) (Director of Health)**
Regulations - Poultry (Slaughtering for Export)
- Cap 170 Wild Animals Protection Ordinance (Director of Agriculture, Fisheries and Conservation)**
- Cap 171 Fisheries Protection Ordinance (Director of Agriculture, Fisheries and Conservation)**
- Cap 208 Country Parks Ordinance (Director of Agriculture, Fisheries and Conservation)**
- Cap 209 Hong Kong Industrial Estates Corporation Ordinance (Hong Kong Science and Technology Parks Corporation)**
- Cap 228 Summary Offences Ordinance (Commissioner of Police)**
- Cap 295 Dangerous Goods Ordinance (Commissioner of Mines) (Commissioner of Police) (Director of Fire Services) (Director of Marine)**
Regulations - General

Appendix A : Environmental Protection Legislation (cont'd)

- | | |
|----------------|---|
| Cap 303 | Radiation Ordinance (Commissioner for Labour) (Radiation Board) (Director of Health) (Director General of Trade and Industry)
Regulations - Control of Radioactive Substances
<div>(Commissioner for Labour is the authority in relation to an affected industrial undertaking)
(Director of Health is the authority in relation to an affected undertaking, or in relation to any person not engaged in an undertaking)</div> |
| | - Control of Irradiating Apparatus |
| Cap 312 | Civil Aviation (Aircraft Noise) Ordinance (Director of Civil Aviation) |
| Cap 353 | Marine Fish Culture Ordinance (Director of Agriculture, Fisheries and Conservation) |
| Cap 374 | Road Traffic Ordinance (Commissioner for Transport)
Regulations - Construction and Maintenance of Vehicles |
| Cap 413 | Merchant Shipping (Prevention and Control of Pollution) Ordinance (Director of Marine) |



Environment

