

Chapter E

Institutional Study

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Chapter E Institutional study

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E.1 General Administration

E.1.1 General

There are nine provinces and 25 districts in Sri Lanka. The administration of Sri Lanka, however, consists of the following three levels:

- Central Government;
- Provincial Councils; and
- Local Authorities.

Under the 13th Amendment of the constitution in 1988, a sub-national level administration with legislative powers, the Provincial Council (PC), was introduced and the Local Authority itself became a subject under the Provincial Council. Prior to the introduction of the 13th Amendment, the Local Authority was a subject under a Central Government Ministry, combined with other subjects in such manner as Local Government and Health, Local Government and Social Services and lastly in 1987 as Local Government, Housing and Construction.

E.1.2 Central Government (Government)

In the Central Government, the elected President and Cabinet Ministers have broad executive powers. There are a large number of ministries. According to “the Government Notifications notified by the President’s Office on 28 February 2002”, there are 56 ministries as shown in the table below. The number and subjects/functions of ministries, however, are subjected to frequent change. To complicate things more, there are ministers of the cabinet (No 1 to No 37 in the table below) and non-cabinet ministers (No. 38 to 56).

Table E-1: Ministries and their Subjects/Functions

No	Ministry	Main Subjects and Functions
1	Ministry of Policy Development and Implementation	Formulation and Development of National Policies, etc.
2	Ministry of Power and Energy	Implementation of Policies, Plans and Programmes in respect of Power and Energy, etc.
3	Ministry of Transport, Highways and Aviation	Implementation of Policies, Plans and Programmes in respect of Transport, Highways and Aviation, etc.
4	Ministry of Home Affairs, Provincial Councils and Local Government	Implementation of Policies, Plans and Programmes in respect of Home Affairs, Provincial Councils and Local Government, etc.
5	Ministry of Justice, Law reform and National Integration	Implementation of Policies, Plans and Programmes in respect of Justice, Law Reform and National Integration, etc.
6	Ministry of Buddha Sasana	Implementation of appropriate programmes and projects to protect and foster the Buddha Sasana as provided for in Article 9 of the Constitution, etc.
7	Ministry of Irrigation and Water Management	Implementation of Policies, Plans and Programmes in respect of Irrigation and Water Management, etc.
8	Ministry of Finance	Implementation of Policies, Plans and Programmes in respect of Finance, etc.
9	Ministry of Foreign Affairs	Implementation of Policies, Plans and Programmes in respect of

		Foreign Affairs, etc.
10	Ministry of Health, Nutrition and Welfare	Implementation of Policies, Plans and Programmes in respect of Health, Nutrition and Welfare, etc.
11	Ministry of Interior	Implementation of Policies, Plans and Programmes in respect of Interior, etc.
12	Ministry of Tourism	Implementation of Policies, Plans and Programmes in respect of Tourism, etc.
13	Ministry of Agriculture and Livestock	Implementation of Policies, Plans and Programmes in respect of Agriculture and Livestock, etc.
14	Ministry of Samurdhi	Implementation of Policies, Plans and Programmes in respect of Samurdhi, etc.
15	Ministry of Enterprise Development, Industrial Policy and Investment Promotion	Implementation of Policies, Plans and Programmes in respect of Enterprise Development, Industrial Policy and Investment Promotion, etc.
16	Ministry of Constitutional Affairs	Implementation of Policies, Plan and Programmes in respect of Constitutional Affairs, etc.
17	Ministry of Port Development and Shipping	Implementation of Policies, Plans and Programmes in respect of Port Development and Shipping, etc.
18	Ministry of Eastern Development and Muslim Religious Affairs	Implementation of Policies, Plans and Programmes in respect of Eastern Development and Muslim Religious Affairs, etc.
19	Ministry of Women's Affairs	Implementation of Policies, Plans and Programmes in respect of Women's Affairs, etc.
20	Ministry of Environment and Natural Resources	Implementation of Policies, Plans and Programmes in respect of Environment and Natural Resources, etc.
21	Ministry of Housing and Plantation Infrastructure	Implementation of Policies, Plans and Programmes in respect of Housing and Plantation Infrastructure, etc.
22	Ministry of Fisheries and Ocean Resources	Implementation of Policies, Plans and Programmes in respect of Fisheries and Ocean Resources, etc.
23	Ministry of Plantation Industries	Implementation of Policies, Plans and Programmes in respect of Plantation Industries, etc.
24	Ministry of Defence	Implementation of Policies, Plans and Programmes in respect of Defence, etc.
25	Ministry of Rural Economy	Implementation of Policies, Plans and Programmes in respect of Rural Economy, etc.
26	Ministry of Co-operatives	Implementation of Policies, Plans and Programmes in respect of Co-operatives, etc.
27	Ministry of Western Region Development	Development of the Western Region comprising the Western Province, etc.
28	Ministry of Southern Region Development	Development of the Southern Region comprising the Southern Province, Ratnapura District and the Moneragala, etc.
29	Ministry of Central Region Development	Development of the Central Region comprising the Central Province, North Central Province and the Badulla District, etc.
30	Ministry of Human Resource Development, Education and Cultural Affairs	Implementation of Policies, Plans and Programmes in respect of Human Resource Development and Education, etc.
31	Ministry of Employment & Labour	Implementation of Policies, Plans and Programmes in respect of Employment & Labour, etc.
32	Ministry of Mass Communication	Implementation of Policies, Plans and Programmes in respect of Mass Communication, etc.
33	Ministry of Public Administration, Management and Reforms	Implementation of Policies, Plans and Programmes in respect of Public Administration, Management and Reforms, etc.
34	Ministry of Commerce and Consumer Affairs	Implementation of Policies, Plans and Programmes in respect of Commerce and Consumer Affairs, etc.
35	Ministry of Community Development	Implementation of Policies, Plans and Programmes in respect of the Community Development of Disadvantaged Groups, etc.
36	Ministry of Land	Implementation of Policies, Plans and Programmes in respect of Land, etc.
37	Ministry of Economic Reform, Science and Technology	Implementation of Policies, Plans and Programmes in respect of Science and Technology, etc.
38	Ministry of Water Management	Assisting the Ministry of Irrigation and Water Management in respect of Mahaweli Authority of Sri Lanka and the Development of Water Resources
39	Ministry of State Transport	Assisting the Ministry of Transport, Highways and Aviation in

		supervising the peoplised Transport Companies excluding Eastern Province
40	Ministry of Parliamentary Affairs	Implementation of Policies, Plans and Programmes in respect of Parliamentary Affairs, etc.
41	Ministry of Social Welfare	Assisting Ministry of Health, Nutrition and Welfare in respect of Public Assistance, etc.
42	Ministry of Housing Development	Assist the Ministry of Housing and Plantation Infrastructure in respect of Housing Development and the resettlement of slum dwellers, etc.
43	Ministry Assisting Foreign Affairs	Assist the Ministry of Foreign Affairs
44	Ministry of Samurdhi	Ministry assisting the Minister in charge of the subject of Samurdhi
45	Ministry of School Education	Assisting the Ministry of Human Resource Development, Education and Cultural Affairs in respect of School Education, etc.
46	Ministry of Rehabilitation, Resettlement and Refugees	Implementation of Policies, Plans and Programmes in respect of Rehabilitation, Resettlement and Displaced Persons, etc.
47	Ministry of Tertiary Education and Training	Assisting the Ministry of Human Resource Development, Education and Cultural Affairs in respect of Tertiary Education and Training, etc.
48	Ministry of Irrigation	Assisting the Ministry of Irrigation and Water Management in respect of Mahaweli Authority of Sri Lanka and Irrigation
49	Ministry of North West Regional Development	Development of the North Western Region comprising the North Western Province and the Kegalle District, etc.
50	Ministry of Youth Affairs and Sports	Implementation of Policies, Plans and Programmes in respect of Youth Affairs and Sports, etc.
51	Ministry of Industries	Assist in the Implementation of Policies, Plans and Programmes in respect of Industries, and Assisting the Ministry of Enterprise Development, Industrial Policy and Investment Promotion, etc.
52	Ministry of Small Holder Development	Assisting the Ministry of Plantation Industries in respect of Small Holder Development, etc.
53	Ministry of Urban Public Utilities	Assisting the Ministry of Housing and Plantation Infrastructure in respect of Urban Public Utilities, etc.
54	Ministry of Highway	Assist in the Implementation of Policies, Plans and Programmes in respect of Highways, and Assisting the Ministry of Transport, Highways and Civil Aviation in respect of Transport and Highways in the Eastern Province
55	Ministry Assisting Vanni Rehabilitation	Assist the Ministry of Rehabilitation, Resettlement and Refugees in respect of Vanni Rehabilitation, etc.
56	Ministry of Hindu Affairs	Implementation of Policies, Plans and Programmes in respect of Hindu Affairs, etc.

(Source) Government Notifications on 28 February 2002

E.1.3 Provincial Council (PC)

a. Administrative Structure

The administrative structure of a provincial council is similar to that of the central government as shown in the figure below.

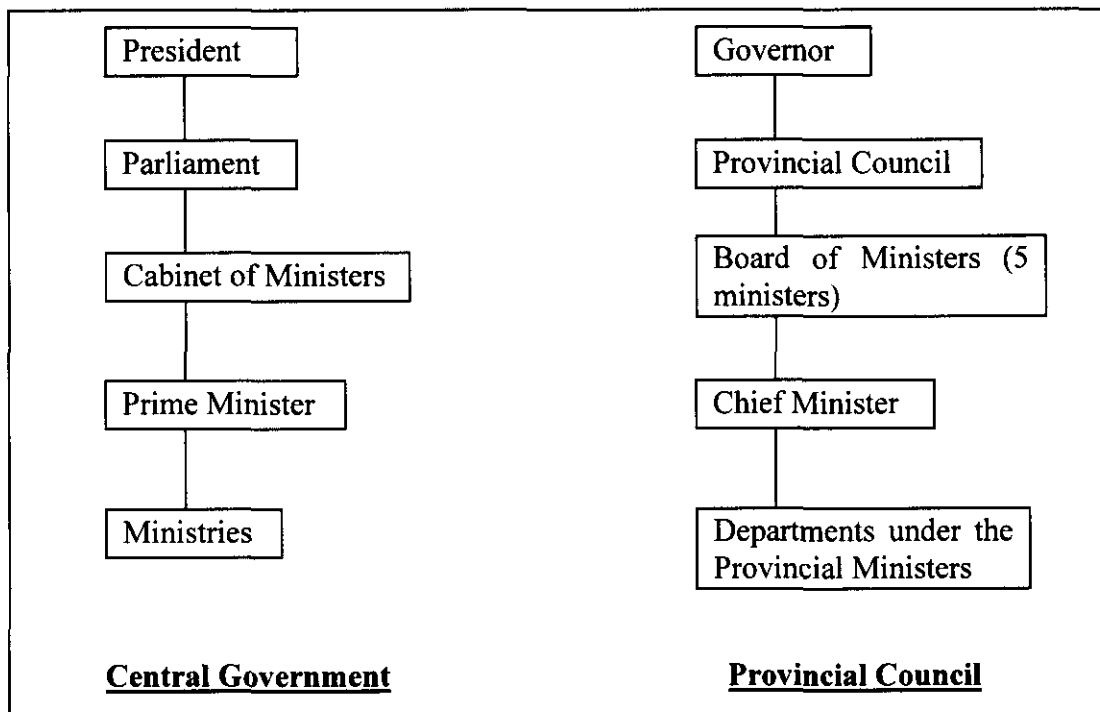


Figure E-1: Administrative Structure of Central Government and Provincial Council

b. Organization

The organizational structure of a provincial council is also similar to that of the Central Government. Figure E-2 presents the organizational structure of the Western Province Provincial Council (WPPC).

There are five ministers in a PC in accordance with law. In the case of WPPC, they share responsibilities on 36 to 37 administrative subjects as follows:

1. Chief Minister in charge of law & order, finance and planning, education, employment, construction, provincial administration, local authority and rural development.
2. Minister for agriculture, lands, minor irrigation, animal production and health.
3. Minister for transport, highways, electricity, town planning, sports and youth affairs.
4. Minister for health co-operatives and women's affairs.
5. Minister for industries, social services, cultural probation and child care, arts and tourism.

The Chief Secretary/Chief Accounting Officer (CSCAO) is the top bureaucrat in the provincial council under the Chief Minister. There is a Minister's Secretary under each Minister including the Chief Minister's Secretary, and under him are the heads of the departments. There are five Minister's

Secretaries and five heads of the departments as shown in Figure E-2. The Senior Assistant Secretary and Commissioner of Local Government, under the Chief Minister's Secretary, is responsible for the affairs of LAs. Figure E-3 presents the relationship between the PC and LAs in Western Province.

Regarding human resources, PC assigns top-level officers such as commissioners to LAs. Employees of a PC are categorized into the following three levels:

1. Top level officers for managerial service who are employed by the (National) Public Service Commission;
2. Middle level officers for combined service (22 grades of positions) who are employed by the Provincial Public Service Commission; and
3. Lower level officers for council service who are employed by PC.

Organization Chart of Institutions set up of Western Province Provincial Council

E-6

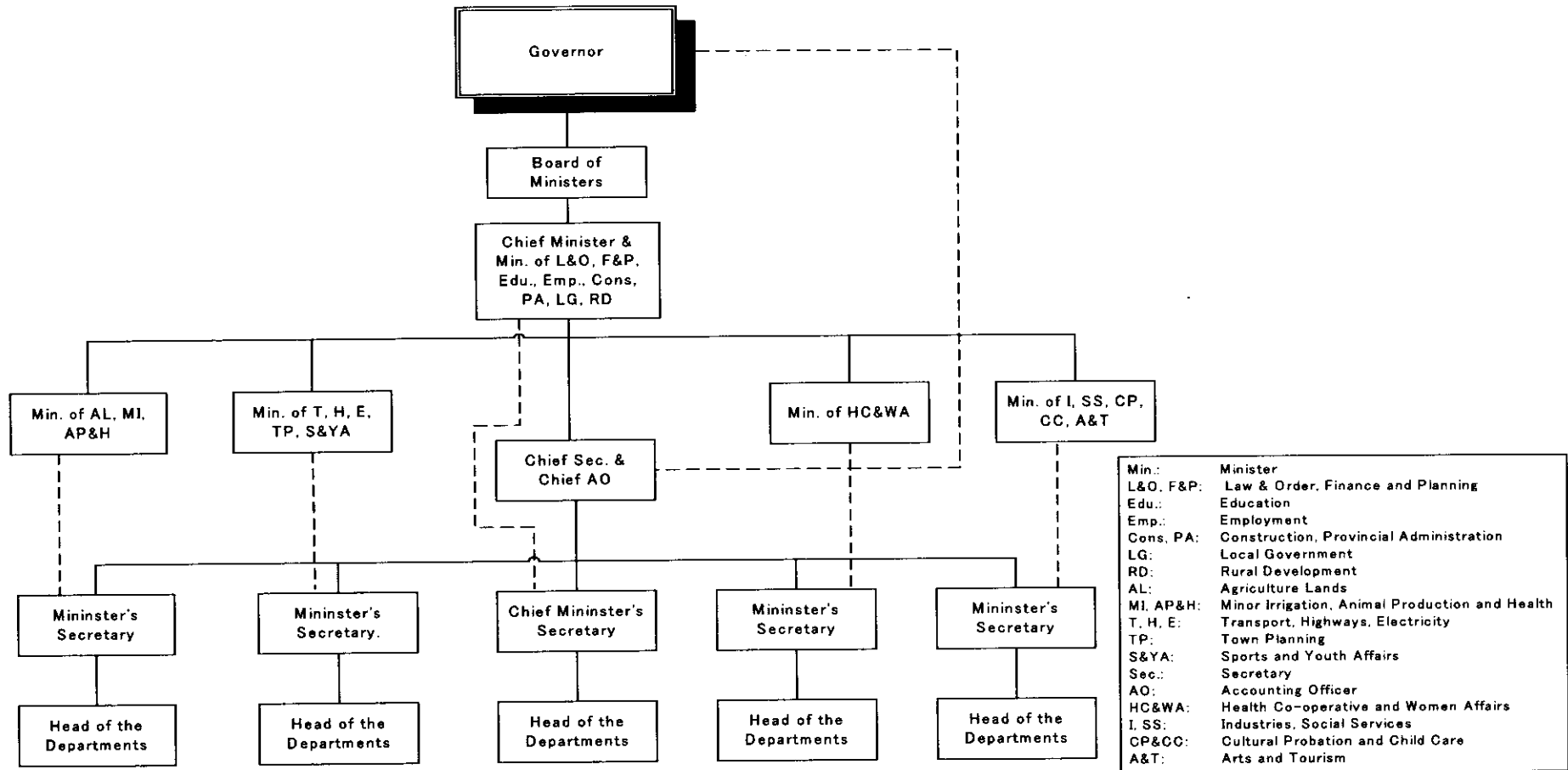


Figure E-2: Organization Chart of Western Province Provincial Council

**Relationship between the Provincial Council and Local Authorities
Western Province (WP)**

E-7

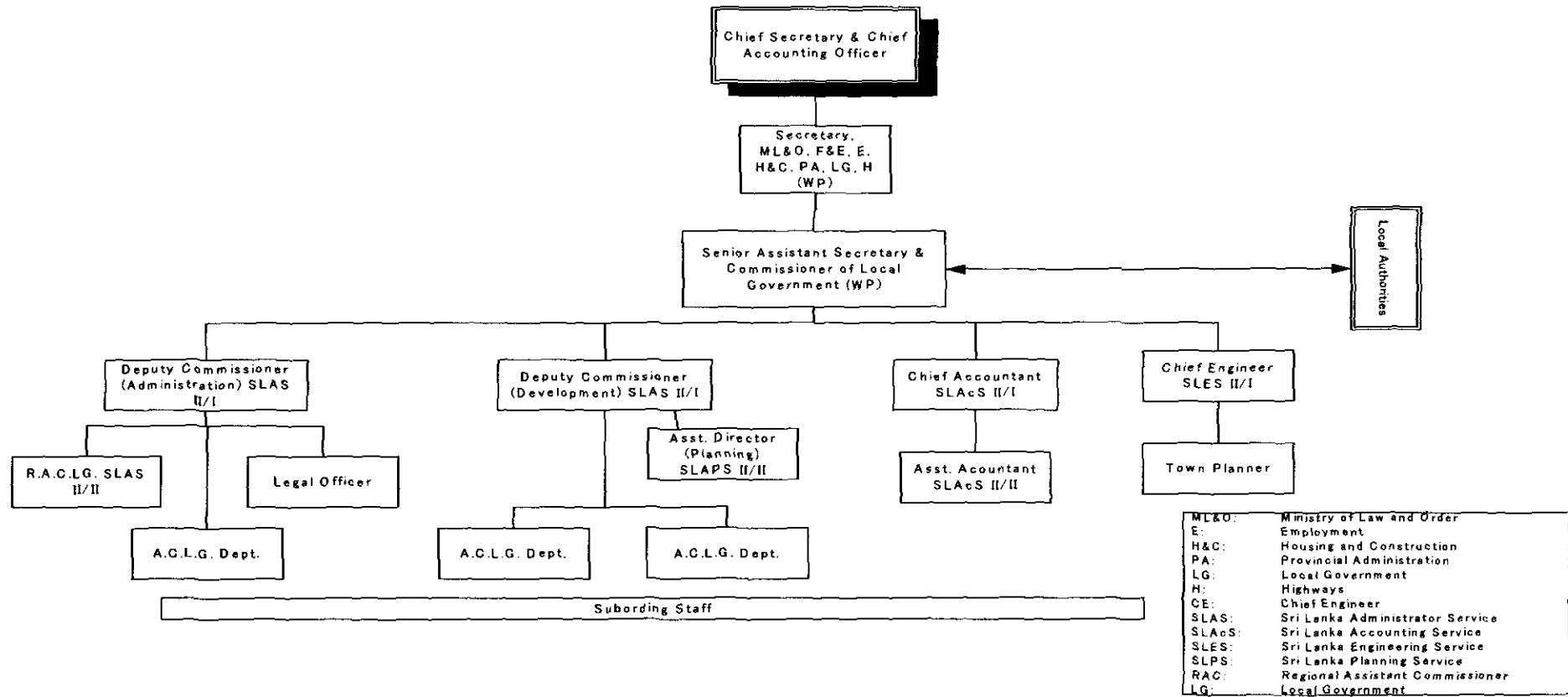


Figure E-3: Relationship between Provincial Council and Local Authorities in Western Province

c. Power

The members of a provincial council are democratically elected. The Governor, the top of a provincial government, is appointed by the President. The Provincial Governments (Councils), of which there are nine, acquired their powers from the 13th Amendment of the Constitution in 1988. There are three schedules determining these powers as follows:

1. Reserved List (for the Central Government);
2. Provincial Council List (for the Provincial Government); and
3. Concurrent List.

The Central Government may, with the agreement of the provincial council, exercise some or all of the powers contained in the Reserved and Concurrent Lists. Under the Constitution, the President also has the power to dissolve the provincial council and either call for an election, or assume the powers in concert with the Central Government. Though the provincial governments generate income from their assets through local levies and taxes, a significant portion of their budget comes from the Central Government. In terms of finance, the self-governing capability of a Provincial Council is considered to be only less than 20 % although 13 years have passed since their establishment.

E.1.4 Local Authority (LA)

a. Type of Local Authority

Under the provincial government structure, there are the following three types of local authorities:

- Municipal Councils (MC);
- Urban Councils (UC); and
- Pradhashiya Sabha (PS).

There are 311 LAs (local authorities) in total in the country consisting of 18 MCs, 37 UCs, 256 PSs. Municipal and Urban Councils are related to the urban areas and Pradhashiya Sabha to the rural areas. The members of these councils are elected democratically.

As for the main difference of LAs, an MC is independent on decision making of its administration while a PS is less independent and for some decisions it has to get consent from the PC. In terms of independence UCs are in the middle of MCs and PSs. Maximum tax rates to assess MC, UC and PS are 30%, 20% and 9%, respectively. However, the actual rate is far less than the maximum and the average rate of LAs is between 4 – 6%. The criteria for upgrading an LA are area, population density, economic development and social environment.

b. Power

Municipal Councils have responsibility for larger cities and exercise broader powers than the other units of local authority. In general, both the Municipal and Urban Councils handle most local authority functions including water, electricity, sewerage and storm water, solid waste disposal, road and fire fighting services. However, the Central Government has the power under the Constitution to define, and declare, the jurisdictional demarcation of each Council.

Although local authorities have their own income sources, most of the funds for their operations are disbursed through the provincial government. The structure of devolution under a Provincial Council is presented in Figure E-4.

The main functions of Government Agencies (GA), such as the district/divisional offices in Figure E-4, are coordination and execution of elections.

E.2 Administration of SWM

The environment is considered to be a domain warranting the full, coordinated response of all Government agencies in Sri Lanka. Therefore both the Central Government and Provincial Councils have related powers and responsibilities below.

E.2.1 Central Government

a. Ministry of Home Affairs, Provincial Councils and Local Government (MOHAPCLG)

The MOHAPCLG is responsible for the implementation of policies, plans and programmes in respect of Provincial Councils and Local Authorities. The organization chart of the MOHAPCLG is presented in Figure E-5. Under the Secretary of the MOHAPCLG, there are three Additional Secretaries. The Additional Secretary for Provincial Councils (PCs) and Local Governments (LAs) is responsible for the administrative support of PCs and LAs in the whole country. The Senior Assistant Secretary (SAS) for LAs under him is responsible for LAs. There are 21 staff members under the SAS for LAs. The Additional Secretary (AS) for Development is in charge of the implementation of projects, especially those under foreign aid including JICA. There are 15 personnel under the AS for Development.

Under the Secretary of the Ministry, there are the Local Loans and Development Fund (LLDF) and the Sri Lanka Institute of Local Governance (SLILG). The LLDF was established in 1916 and since 1999 it has been under the responsibility of the MOHAPCLG. In 2001, three SWM projects were financed by the LLDF. The details of the LLDF are presented in the next section. The Chief Executive Officer/Accountant is the top of the LLDF and under him there are 11 staff members. The SLILG was established with the objective of enhancing the managerial capacities of PCs as well as LAs. The director is the top of the institute and under him there are 11 personnel.

The National Coordinating Committee for implementation of the National Strategy for SWM has been established and co-chaired by the Secretary of MOHAPCLG and Ministry of Environment and Natural Resources (MOENR). The MOHAPCLG, MOENR, Ministry of Housing and Plantation Infrastructure, Ministry of Enterprise Development, Industrial Policy and Investment Promotion, UDA and Ministry of Industry are the members of the Committee.

b. Ministry of Environment and Natural Resources (MOENR)

The MOENR is the executing agency for the Central Government for SWM planning and policy. Prior to February 2002, the executing agency was the Ministry of Transport and Environment and before September 2001, it was the Ministry of Forestry and Environment.

The MOENR has about 250 staff members. The Secretary is the top bureaucrat in the ministry and under him three Additional Secretaries manage seven departments, namely Pollution Management, Global Affairs, Policy Planning, Natural Resources, Human Resources Development, Bio-diversity and Environmental Preservation. The Department of Pollution Management is responsible for SWM and it

has six personnel including the director though a limit of 12 in the cadre. The department is preparing a Local Authority Marking Scheme in order to evaluate the performance of SWM done by each LA.

c. Central Environmental Authority (CEA)

The CEA is a government appointed agency to work on the National Environment Act (NEA) within the MOENR reporting to the President and the Government. It is responsible for regulatory control and management and for the setting of national guidelines and standards, with its funds being allocated by the Government.

The NEA defines the CEA as a “body corporate”, comprising three members appointed by the President, and with its own funding, derived from government allocations; other loans, donations, grants; and income earned through the exercising of its powers, functions and duties (e.g. licence fees).

The NEA also provided for the establishment of an Environmental Council, comprising 20 representatives from various government ministries, the Director General of the CEA, seven members representing the interests of voluntary agencies in the environmental field and two persons with adequate expertise or experience in environmental protection and management. The functions of this Council are to advise the CEA on matters relating to its responsibility, powers, duties and functions and any issues referred to it by the CEA.

The CEA shall appoint a District Environmental Agency for each administrative district.

Regarding SWM, the role of the CEA is to assist the PCs and LAs in formulating strategies and plans for PCs and LAs and to provide implementation support for these plans and monitor achievement. The CEA also has legal powers to approve SW sanitary landfill sites and to admonish or issue directives to any LA disposing of waste in a harmful or inappropriate manner.

The organization chart of the CEA is presented in Figure E-6. There are 225 staff members in the headquarters of the CEA and 345 divisional environmental officers (DEOs). In total, 570 staff members are working under the CEA. Out of the 345 DEOs working in the CEA, 23 are in the CEA headquarters and 322 in the regions. Most of the 322 are dispatched to MCs, UCs and district and divisional offices of the Government.

The CEA should not provide direct financial support to LAs by law. However, there is some that is indirect. The Environment Action One Project (EAOP) funded by the World Bank (WB), which the CEA is coordinating, provides the Community Environmental Initiative Facility (CEIF). This gives some financial support to LAs.

The programme of WB/EAOP includes:

- Training of officers in LAs; and
- Environmental education and awareness campaigns for the citizens.

Basically, the CEA does not provide technical support to LAs directly. However, sometimes the CEA directly assists citizens at their request. If LAs ask for assistance, the CEA will introduce registered consultants. There are 49 specialists /consultants registered.

d. Ministry of Health, Nutrition and Welfare (MOHNW)

The MOHNW is responsible for monitoring and inspection on sanitary aspects in the country and preparation of a legal system including guidelines. For the control and supervision of SWM, MOH (Medical Officer of Health) and PHI (Public Health Inspector) are assigned to the LAs. A PHI is responsible for providing technical support in SWM to LAs. The organisation of health services under provincial council is provided in Figure E-7.

e. Urban Development Authority (UDA)

The UDA is a national agency responsible for urban development in the country under the UDA Act. The UDA does not cover the whole country due to operational difficulties, but has full authority on all towns declared as UDA area. There are 150 UDA areas in the country. However, some UCs are not UDA areas while some PSs are. All seven target towns of the study are UDA areas. The coastal line of a 1 km width is also a UDA area. The Minister (UDA is under the Ministry of Western Region Development at present) designates the areas for UDA. These are stipulated in Section 3 of the UDA Act. The UDA shares its powers with LAs, i.e. mayors and chairmen of LAs. Mayors and chairmen of LAs operate the powers subject to UDA supervision.

The UDA neither receives budget allocation from the Central Government nor treasury grants or funds. The UDA is a self-sufficient organization like a private company. The UDA seems to be a private developer that plans and develops properties (estates), and sells them with/through partners and gets a certain profit from all these developing activities.

The UDA provides the following assistance to the LAs:

- Technical assistance in the development of town planning;
- Enforcement of standards and regulations for development projects;
- Assistance to LAs in coordinating with other government authorities; and
- Project planning for smaller scale projects (even free of charge) and large scale ones (may impose a charge).

f. Ministry of Housing and Plantation Infrastructure (MOHPI)

The organization chart of MOHPI is presented in Figure E-8. The MOHNI has been involved in the following two projects related to SWM. The Management and Information System Division of Plan and Monitoring Department is in charge of the projects.

i. Environmental Action One Project (EAOP) by World Bank Finance

The following seven ministries are concerned with the EAOP:

- Ministry of Environment and Natural Resources (Main Counterpart)
- MOHPI
- Ministry of Industry
- Ministry of Health, Nutrition and Welfare
- Ministry of Transport
- Ministry of Land
- Ministry of Agriculture

The EAOP commenced in 1998 and will end in December 2002. With a million Rupees allocated by the project, the MOHPI has been conducting a program for building the awareness of communities and schools on waste in Negombo and its vicinity.

ii. Sustainable City Programme (SCP) by UNDP

In order to conduct capacity building, training, and an awareness programme on waste, the MOHPI is doing the following demonstration projects in Colombo, Kotte and Derahia Mount Lavenia (DM) Municipal Councils.

- Kotte : Biogas plant for market waste and compost bin delivery
- DMMC: Beach clean-up and compost bin delivery
- CMC: Compost bin delivery

The SCP Phase 2 will be conducted in seven cities: Matale, Kandy, Nuwara Eliya, Negombo, Polonaruwa, Wattara, and Pathnapura.

**Organization Chart
Ministry of Home Affairs, Provincial Councils and Local Government**

E-15

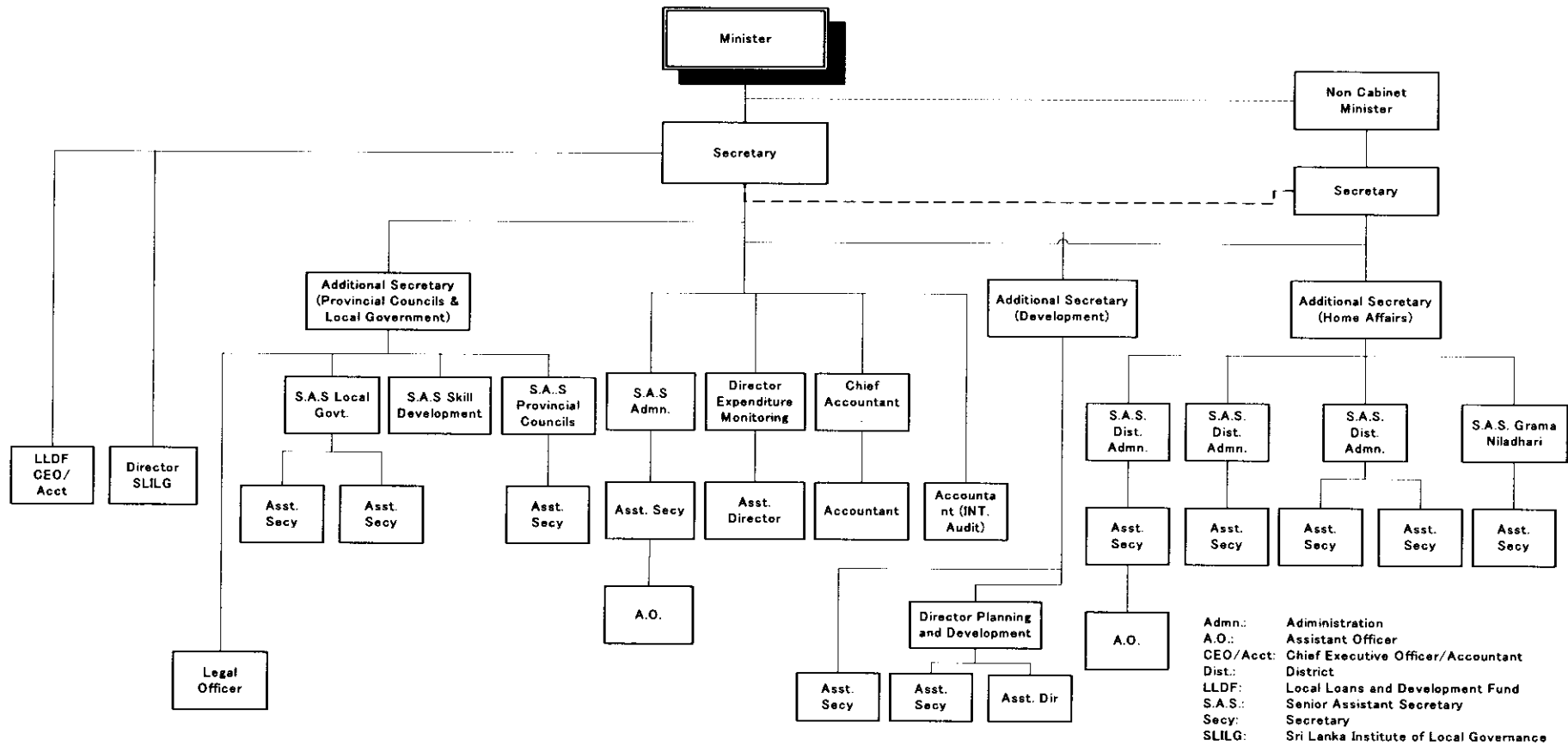
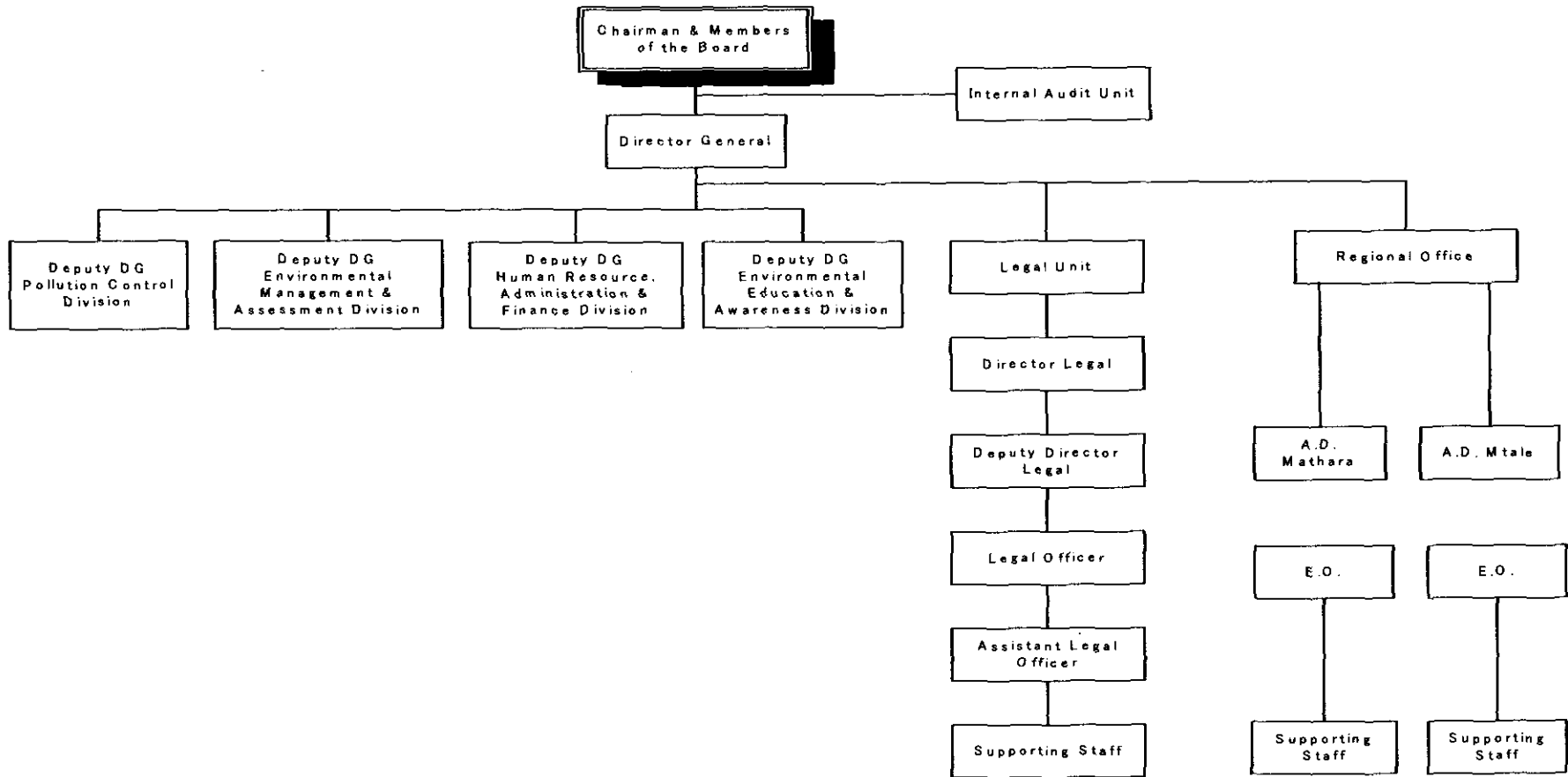


Figure E-5: Organization Chart of MOHAPCLG

Organization Chart Central Environmental Authority



E-16

Figure E-6: Organization Chart of the CEA

ORGANIZATION OF HEALTH SERVICES UNDER PROVINCIAL COUNCIL

E-17

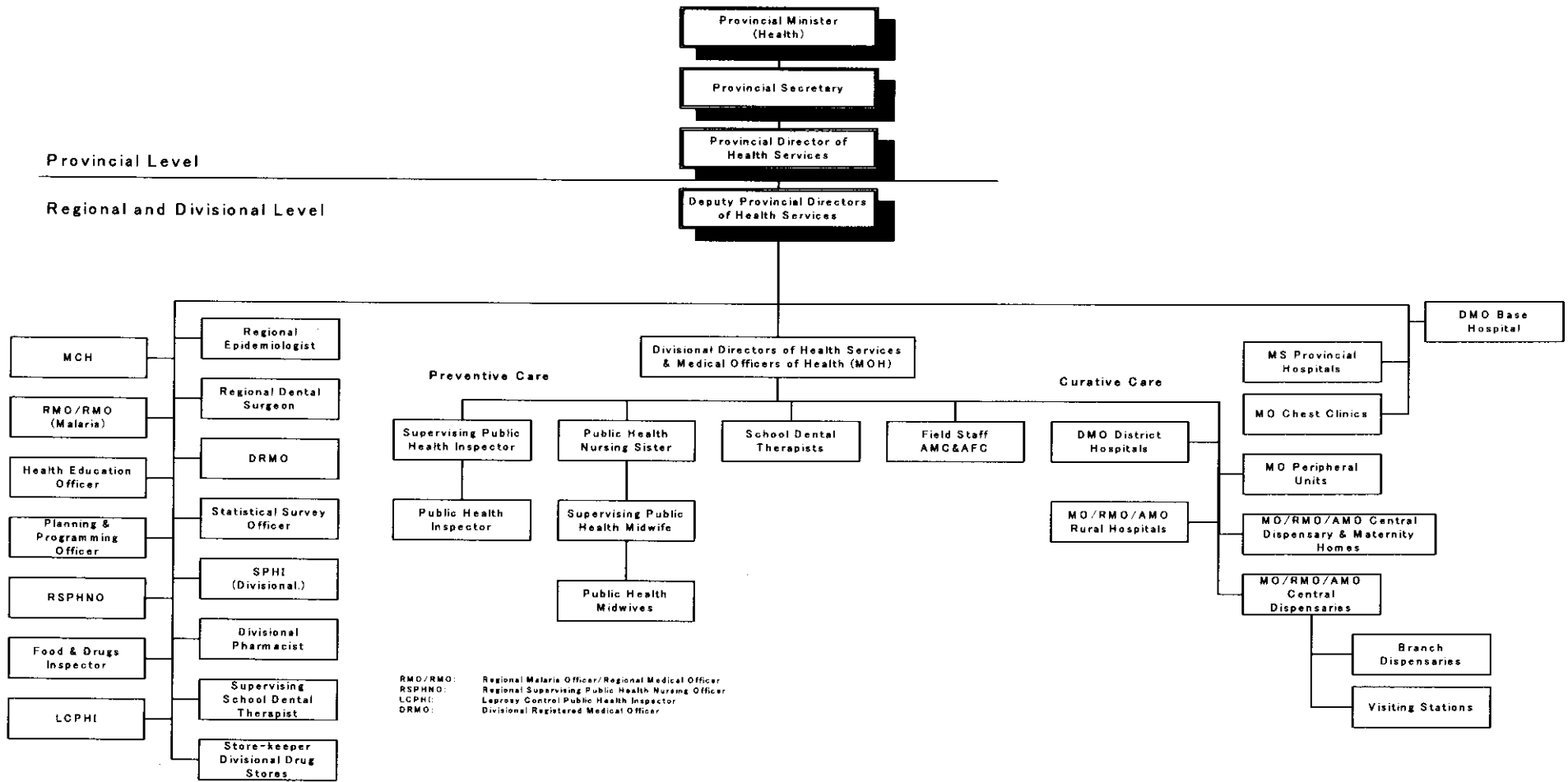


Figure E-7: Organization of Health Services Under Provincial Council

Organization Chart Ministry of Housing & Plantation Infrastructure

E-18

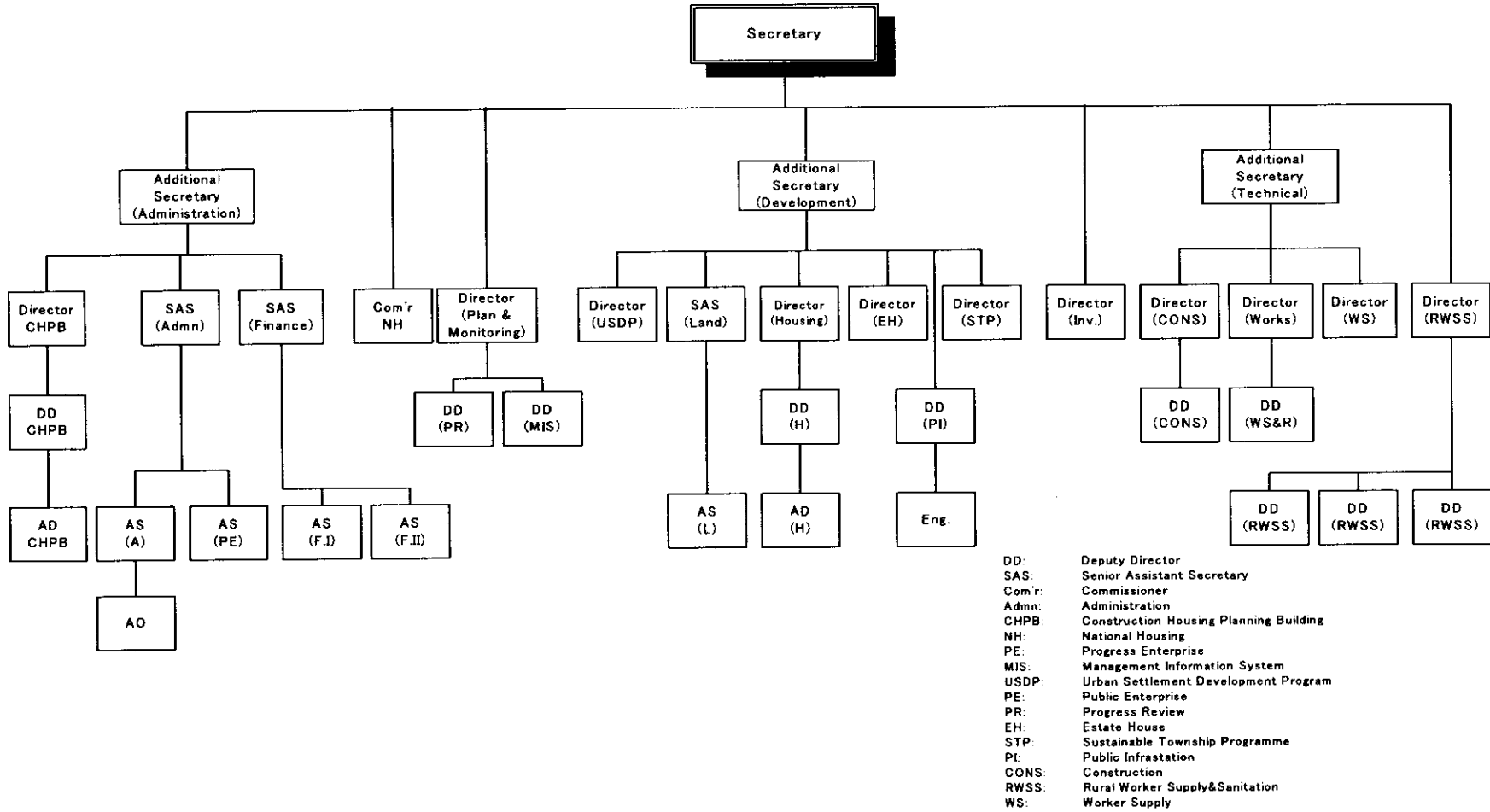


Figure E-8: Organization Chart of MOHPI

E.2.2 Provincial Council

In a Provincial Council the Senior Assistant Secretary (SAS) and Commissioner of Local Government, under the Chief Minister's Secretary, is responsible for the affairs of LAs including SWM.

For technical matters, since SWM is one of the major responsibilities of an LA and a serious issue in the Province, the Western Province Provincial Council (WPPC) established the Waste Management Authority (WMA) in 1999 to assist LAs in the management and control of all categories (municipal, hazardous and healthcare) of their waste collection, transportation, treatment and disposal needs. The Board of WMA consists of seven ex-officio members and eight appointed members including an officer from the MOENR (Ministry of Environment and Natural Resources). However, the WMA is not functioning well due to lack of full-time officers. This is due to the government restriction to increase the number in a cadre. The WMA is conducting the following projects in cooperation with other relevant organizations:

- Waste minimization project with community participation;
- Semi-engineered landfill at an abandoned mining quarry;
- Recycling programme;
- Bio-gas project for five LAs including Gampaha MC (market waste is used) with the support of NERD (National Engineering Research and Development Centre);
- Composting plant in Horana, Kalutara and Katana.

As for the inter-municipal landfills, the WMA identified several candidate sites. However, for the project promotion a political decision is necessary.

E.3 Legislation on SWM

E.3.1 Waste Classification

In Sri Lanka, solid waste is categorized into the following three types:

1. Municipal solid waste (MSW);
2. Health-care waste; and
3. Hazardous waste.

Health-care waste (HCW) is further categorised into the following:

- Non-risk HCW (considered as MSW)
- Hazardous HCW (HHCW)
- Highly hazardous HCW (HHHCW)

Hazardous waste (HW) is classified into:

- Hazardous HCW and highly hazardous HCW;
- Industrial HW; and
- Domestic HW.

MSWM is under the responsibility of LAs. MOENR set up the National Strategy for SWM in 2000 and asked LAs to formulate their SWM master plans. The CEA issues various directives to improve landfills of LAs.

The disposal and treatment of HW is the responsibility of the discharger, i.e. PPP: polluter-pay-principal, following the Basel Convention. The CEA is responsible for HWM.

E.3.2 Legislation

a. The National Environmental Act (NEA)

Legislation relating to SWM is embodied in the National Environmental Act (NEA), which was enacted in 1980 and subsequently amended in 1988 (Amendment Act No.56). The Act (including the amendment) provided for the establishment of the CEA and defined the powers, functions and duties of it, which in general terms related to providing for:

- Protection, management and enhancement of the environment;
- Regulation, maintenance and control of the quality on the environment;
- Prevention, abatement and control of pollution; and
- Other related matters.

The powers and role of the CEA are clearly spelt out in the Act. Under it, the CEA has wide reaching responsibilities for environmental safeguarding and broad discretionary powers relating to SWM and the management of other forms of pollution.

b. CEA Directives

In the last quarter of 2000, an NGO in Sri Lanka took the CEA to court for not taking action against LAs who failed to provide adequate SWM collection and disposal services. The CEA, in response to the court case against them, issued a directive in July 2001 to all LAs to notify the CEA of any proposed landfill site in their areas. The CEA would then inspect the site, and approve or reject its use for landfilling. The official closing date for receipt of responses was 31 October 2001.

At a meeting on 10 October 2001, an attorney-at-law of the CEA informed the project team that responses to this directive had been received from approximately 50 of the 276 LAs in Sri Lanka. If the remaining LAs do not respond, the CEA can take them to court, filing a writ of mandamus, requiring them to respond. Some financial assistance is available from the World Bank to pay the costs incurred by LAs in meeting the directive requirements. However, this funding is very limited, and would only

meet the costs of about four or five LAs. The attorney-at-law considered it unlikely that responses would be obtained from many other LAs, the main reason being a lack of resources to obtain the necessary planning approvals and develop any potential landfill site, meaning they would consider such an exercise to be pointless.

As for the MSW (Non-HW), the CEA asks LAs to obtain site clearance of MSW facilities including landfills. A facility that receives over 100 tons/day needs EIA approval while one that receives less than 100 tons/day needs an environmental recommendation from the CEA. The CEA has prepared some site identification guidelines for a MSW landfill, but has still not done so for MSW disposal.

c. Hazardous Waste Regulations

The government of Sri Lanka developed regulations for the Management of Hazardous Waste in 1996 as an amendment to the National Environmental Regulations No.1 of 1990. This was done by publishing a new Part II in the Gazette Extraordinary No. 924/13 dated 23 May 1996, as an extension of the environmental protection licensing procedure. Part II sets specific regulations on the licence application procedures, fees, licence conditions, reporting and monitoring requirements for hazardous wastes.

In 1999, the CEA and the then Ministry of Forestry & Environment, published "Guidelines for the Implementation of Hazardous Waste Management Regulations". The guidelines are indicative only and intended to meet the needs of a wide range of government officials, industry managers and environmental protection associations, by providing information on the issues and methods of hazardous waste management (HWM) relevant to various industrial sectors. They include guidelines for HW generators, the collection and transportation of HW, the operation of HW storage, recovery, recycling, treatment and disposal facilities, and the establishment of HW disposal facilities. However, the effective enforcement of HW regulations awaits the development of HW treatment and disposal facilities in Sri Lanka, which do not currently exist.

d. Environmental Protection Licence

The Amendment to the National Environmental Act (NEA) contained amendments designed to target high polluting industries, enhance the implementation of environmental laws and introduce a proper procedure for obtaining environmental protection licences. These amendments classify the activities requiring an environmental protection licence into two categories, "A" and "B". Category "A" refers to 80 high polluting activities, while category "B" refers to 45 small and medium polluting activities. The functions of issuing environmental protection licences, environmental pollution control monitoring and enforcement and dealing with public complaints are assumed by the CEA for category "A" activities and by LAs for category "B" activities.

Environmental protection licence fees have also been revised, with 15,000 Rs and 3,000 Rs being charged for a new environmental protection licence for category "A" and "B" activities respectively,

while 15,000 Rs is required for renewal of an environmental protection licence. The duration of an environmental protection licence has also been extended to a period of three years.

At present, solid waste and healthcare waste are not included in the list of activities requiring an environmental protection licence. This is primarily due to the lack of facilities for adequate disposal of such wastes and the absence of soil standards, enabling site contamination criteria/standards to be developed. It is hoped that solid waste and healthcare waste will be added to the list of new activities requiring an environmental protection licence.

E.4 National Policy on SWM

The policies, strategies and legal provisions for solid waste management (SWM) currently in place in Sri Lanka provide the necessary basis for action leading to effective and sustainable improvement in the sector. The NEA of 1980 provides the enabling legislation for the regulation and control of SWM activities, the National Strategy for Solid Waste Management (NSSWM) provides guidance for tackling the problem on several different fronts, the National Agenda for Sustainable Development addresses broader policy and guidance issues relating to environmental improvement and economic development, and a number of regulations and directives set out standards and appropriate provisions for different aspects of SWM. While there is room for improvement, the main challenges of the sector are the development of the resources necessary for implementation.

E.4.1 National Agenda for Sustainable Development (NASD)

The National Agenda for Sustainable Development (NASD) incorporates environmental policy statements and specific action plans for a number of different sectors covering the period 2002 – 2006. The NASD sets out to strengthen the linkages between policy and action planning and is intended primarily as a guiding document for the Ministry of Environment and Natural Resource. SWM issues are addressed under the sector entitled Health, Sanitation and Urban Development, although recommendations for other sectors also have direct implications for SWM.

E.4.2 National Strategy for Solid Waste Management (NSSWM)

In May 2000, the Government of Sri Lanka passed the National Strategy for Solid Waste Management (NSSWM). This recognised the need to manage SW from generation to final disposal through a broad range of strategies targeting waste minimisation at first, i.e. the 3Rs (reduction, reuse and recycling), and appropriate final disposal. Besides advocating responses by individual urban LAs, the strategy provided for central level actions, such as developing the market conditions for sale of recyclable waste and of the products made from recyclable materials. The important issues of the strategies are set out below.

i. Reduction of Waste

The strategy recognises that although waste is an inevitable by-product of production and consumption, waste generation rates can be reduced by encouraging producers and consumers via education and awareness raising to follow good housekeeping practices, particularly avoiding excessive packaging and using alternative biodegradable packaging materials.

The strategy highlights the reduction of plastic waste in the packaging sector. Presently, the haphazard disposal of plastic wastes is a serious environmental and health problem in Sri Lanka. The strategy also requires priority to be given to the production of long-life products and multi-use packaging instead of disposable packaging. Waste reduction at the household and neighbourhood level through the composting of organic waste and similar practices is also encouraged.

ii. Reuse of Waste

The strategy recognises that the reuse of waste also helps to minimise the final disposal amount. As a product only becomes waste when it no longer has a use, consumers are encouraged, under the strategy, to consider products that have a multiple and continuing use.

iii. Recycling of Waste

Recycling of waste can substantially reduce solid waste volumes discarded for disposal. Recycling also offers almost unbounded opportunity for innovative enterprise for jobs and income creation for lower income households in each area. The strategy, however, acknowledges that market arrangements for the sale and reuse of recycled products need to be developed, as well as systems for sustainable waste management and collection.

iv. Proper Disposal of Waste

Even after every effort is paid for the 3Rs, a certain amount of waste will exist. Such waste shall be properly treated and disposed of in order not to affect the environment.

E.4.3 Urban Sector Policy Action Plan (USPAP)

Developed in response to a national policy framework of decentralisation and devolution, the USPAP was last updated by the Government in 1996, and currently covers the period 1996 – 2015. It is aimed primarily at developing the capacity of urban LAs to acquire finance and manage the development of urban infrastructure and services. The USPAP also places an emphasis on environmental issues through ensuring such issues are addressed in project preparation and by encouraging community involvement in the protection of the environment.

Chapter F

Healthcare Waste Management Study

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F.1 Introduction

F.1.1 Healthcare Waste Background

In Sri Lanka, healthcare waste (HCW) is divided into three categories:

- Non-risk HCW (considered as MSW).
- Hazardous HCW (HHCW).
- Highly hazardous HCW (HHHCW).

Every hospital is legally responsible for the proper management of waste that it generates until its final disposal in accordance with the National Environmental Act No47 of 1980 and National Environmental Amendment Act, No53 of 2000. National HCW Guidelines direct medical institutions to set up HCW management plans that include waste minimisation, segregation, safe handling, on-site storage and transportation, safe treatment and disposal and efficient monitoring of waste production and destination. Non-risk HCW is normally collected by LAs and transported to the LA disposal site, while hazardous HCW should be treated to render it non-hazardous before final disposal either on or off-site by the hospital authorities, local authority or private contractor.

Regarding a national HCW policy, the MOHNW has drafted the following two documents:

- Draft National Policy for the Management of HCW.
- Draft Guidelines for the Management of HCW.

The MOHNW has submitted these to the Cabinet for approval but this has not yet been granted, as of the end of August, 2003. The National Steering Committee on Clinical Waste Management is responsible for overall monitoring and evaluation of HCW policies and associated initiatives.

F.1.2 Objectives of the HCWM Study

Although the scope of the study requires only policy suggestions to be made for medical waste (i.e. HCW), interview surveys of medical institutions were conducted in all seven towns as it was found that most non-risk HCW and sometimes HHCW or even HHHCW is collected by LAs and taken to the final disposal site. In addition, often HHCW and some HHHCW (mainly sharps) is sometimes mixed in with the non-risk HCW collected by the LAs. Hence, it was considered important to obtain a good understanding of the present HCWM system, so that appropriate policy suggestions could be made, including proposing mitigation measures to counter such practices and avoid HHCW and HHHCW being collected and disposed of with municipal waste.

F.2 Surveyed Medical Institutions

The Study team conducted an interview survey of 28 medical institutions, as tabulated below, in the seven model towns in order to understand the HCW generation amounts and current waste management practices in relation to segregation, storage, discharge, collection, recycling, treatment and final disposal. These medical institutions were selected on the advice of LA Health department staff in each

town. They are believed to cover all medical institutions within each town providing both in-patient and out-patient services.

Table F-1: Surveyed Medical Institutions

Institution	Type	No of Beds	Bed Occupancy (%)	Out-patients (no/day)	Clinical patients (no/day)	Staff
Kandy						
Kandy General Hospital	Govt	2,003	93	879	1,426	2,700
Peradeniya Teaching Hospital	Govt	830	80	782	580	1,400
Peradeniya Dental Hosp.	Govt	36	100	150	60	130
Katugastota District Hosp.	Govt	45	96	450	450	48
Kandy Nursing Home	Private	24	100	55	0	80
Lakeside Adventist Hosp.	Private	35	80	150	0	82
Kandy Private Hosp.	Private	35	100	25	0	100
Suwasevana Hosp.	Private	100	90	75	0	250
Total		3,108	89.5	2,566	2,516	4,790
Matale						
Base Hospital	Govt	520	90	704	292	632
Majan Medical Centre	Private	6	100	1	0	3
KMP Nursing Home	Private	9	100	1	0	6
Total		535	90	706	292	641
Negombo						
Base Hospital	Govt	437	89	804	325	355
Central Dispensary	Govt	4	0	70	100	4
Ave Maria Hospital	Private	40	90	87	30	40
Dissanayake Hosp.	Private	20	90	12	0	50
Manthri Nursing Home	Private	9	98	120	1.7	25
Total		510	89	1,093	457	474
Chilaw						
Base Hospital	Govt	460	77	774	418	531
Chilaw Clinic	Private	8	100	60	10	6
St Mary's Nursing Home	Private	20	100	100	10	32
Total		488	78	934	438	569
Gampaha						
Base Hospital	Govt	501	79	985	334	595
Arogya Hospital	Private	42	100	60	40	54
Cooperative Hospital	Private	27	95	80	45	60
Total		570	81	1,125	419	709
Nuwara Eliya						
Base Hospital	Govt	265	129	431	460	304
Cooperative Hospital	Semi-govt	24	100	12	45	14
Ideal Hospital	Private	0	0	55	0	10
Total		289	127	366	505	328
Badulla						
General Hospital	Govt	1,004	115	916	757	1,061
Central Hospital	Private	29	40	5	25	34
Lanka Nursing Home	Private	20	100	20	10	40
Total		1,053	113	941	792	1,135

Note: Ideal Hospital was surveyed on the understanding that it also included bed facilities. However, this was found to not be the case.

F.3 Survey Methodology

The survey methodology was based on interviews with relevant staff, based on a standard questionnaire (see next section) and inspecting the hospital facilities, particularly its waste management systems. Efforts were made to talk to the relevant people when trying to find out about the types and quantities of wastes produced by the institution (e.g. cleaning staff, Infectious Control Nurse or hospital PHI for all types of wastes; theatre staff for clinical waste and body parts; laboratory staff for highly infectious wastes, etc.). For garbage collected by the LA, a cross-check was made on the accuracy of the supplied data with LA staff, with survey data being amended as required.

F.4 Questionnaire Survey

This is set out in Annex A to Chapter 6.

F.5 Survey Results

These are set out in Annex B to Chapter 6.

F.6 Analysis of HCW Waste Generation Data

F.6.1 HCW Generation – Original Data –

The basic survey results presented in the previous section were used to calculate the following HCW generation rates:

- HCW generation rate per bed per day (kg/bed/day), which is calculated by dividing the daily HCW generation amount by the average number of beds occupied a day.
- HCW generation rate per (patients + staff) per day (kg/(patients + staff)/day), which is calculated by dividing the daily HCW generation amount by the average number of (patients + staff) per day.

The results of these calculations are presented in the following tables, while detailed calculations are set out in the attached spreadsheet.

Table F-2: HCW Generation Rate per Bed per Day (kg/bed/day)

HCW LAs	Non-risk HCW	Hazardous HCW	Highly HHCW	HHCW & HHHCW Total	HCW Total
Kandy	1.7010	0.0301	0.0184	0.0485	1.7495
Matale	1.3975	min. 0.0077	0.0081	min. 0.0158	1.4133
Negombo	1.6779	Max. 0.1372	Max. 0.0846	Max. 0.2218	1.8997
Chilaw	Max. 1.8786	0.1246	0.0258	0.1504	Max. 2.0290
Gampaha	1.7694	0.0464	0.0347	0.0811	1.8505
Nuwara Eliya	1.3516	0.0083	0.0185	0.0268	1.3784
Badulla	min. 1.1867	0.0449	min. 0.0018	0.0467	min. 1.2335

Table F-3: HCW Generation Rate per (Patients + Staff) per Day (kg/(patients + staff)/day)

LAs	HCW	Non-risk HCW	Hazardous HCW	Highly Hazardous HCW	HHCW & HHHCW Total	HCW Total
Kandy		max. 0.3741	0.0067	0.0044	0.0111	Max. 0.3852
Matale		0.3181	min. 0.0017	0.0018	min. 0.0035	0.3217
Negombo		0.3062	Max. 0.0250	Max. 0.0154	0.0404	0.3466
Chilaw		0.3091	0.0201	0.0047	Max. 0.0248	0.3339
Gampaha		0.3019	0.0079	0.0059	0.0138	0.3157
Nuwara Eliya		min. 0.2914	0.0018	0.0040	0.0058	min. 0.2972
Badulla		0.3472	0.0132	min. 0.0005	0.0137	0.3609

Notes:

1. Non-risk HCW = normal MSW; Hazardous HCW = clinical waste, body parts and placentas; Highly hazardous HCW = sharps and highly infectious wastes.
2. When data in any category was incomplete for any medical institution, this was recorded as no data, unless reasonable assumptions could be made for the missing waste quantity.
3. When data was given in the form of "no of boxes" or "small", this was converted to an actual quantity, based on 1 sharp box = 5kg (as per Matale data), 1 highly infectious waste box = 2kg and small = 1.5kg.
4. Minimum and maximum values are shown in bold in the above tables.

The above tables clearly show that there is a big variation in HHCW and HHHCW generation rates, while the non-risk HCW generation rates are much more similar, particularly when expressed in terms of per (patients + staff) per day. Possible reasons for this are:

- Relatively large quantities of non-risk HCWs are generated daily, while more hospital and LA staff handle such wastes, making it easier to estimate the daily quantities and to cross-check the answers given by different people.
- Although efforts were made to try and talk to the appropriate people in each medical institution, interviewees were not as sure of HHCW and HHHCW waste quantities, as such wastes are produced in much smaller quantities, often from quite different sections of the hospital and are handled and disposed of by different people. In addition, their generation rates are not as stable, varying from day to day and there was often no means of cross-checking the accuracy of the data given.

F.6.2 HCW Generation – Amendment of Original Data –

Due to the variations in HHCW and HHHCW generation rates, the following approach was taken to decide on what generation rates should be used for each waste category:

- Calculation of weighted average waste generation rates for each waste category in terms of kg/(occupied bed.day) and kg/(patients+staff)/day, as set out in the following two tables.

Table F-4: HCW Generation Amount in Seven LAs and Average Generation Rate per Bed per Day

LAs	HCW	No of Beds Occupied a Day	Non-risk HCW	Hazardous HCW	Highly HHCW	HHCW & HHCW Total	HCW Total
Unit		bed	kg/day	kg/day	kg/day	kg/day	kg/day
Kandy		2,783	4,734.0	83.7	51.1	134.8	4,868.9
Matale		483	675.0	3.7	3.9	7.6	682.6
Negombo		452	758.4	62.0	38.3	100.3	858.7
Chilaw		382	717.6	47.6	9.9	57.5	775.1
Gampaha		463	819.2	21.5	16.1	37.6	856.8
Nuwara Eliya		366	494.7	3.0	6.8	9.8	504.5
Badulla		1,186	1,407.5	53.3	2.2	55.5	1,463.0
Total		6,115	9,606.4	274.9	128.2	403.1	10,009.7
Average		Kg/bed.d	1.5710	0.0449	0.0210	0.0659	1.6369

Notes:

1. For each town, waste generation amount = no of beds occupied per day x corresponding waste generation rate from earlier table.
2. Weighted average waste generation rate = total waste generation in all seven towns divided by total number of beds occupied per day.

Table F-5: HCW Generation Amount in Seven LAs and Average Generation Rate per (Patients + Staff) per Day

LAs	HCW	No of (Patients + Staff) a Day	Non-risk HCW	Hazardous HCW	Highly HHCW	HHCW & HHCW Total	HCW Total
Unit		person	kg/day	kg/day	kg/day	kg/day	kg/day
Kandy		12,655	4,734.0	84.6	55.5	140.2	4,874.2
Matale		2,122	675.0	3.7	3.9	7.6	682.6
Negombo		2,475	757.9	61.8	38.2	100.0	857.9
Chilaw		2,323	717.9	46.7	10.9	57.6	775.6
Gampaha		2,716	819.9	21.5	16.1	37.6	857.5
Nuwara Eliya		1,697	494.5	3.0	6.8	9.8	504.3
Badulla		4,054	1,407.6	53.3	2.2	55.5	1,463.1
Total		28,042	9,606.8	274.7	133.6	408.3	10,015.2
Average		Kg/(pat+staff).d	0.3426	0.0098	0.0048	0.0146	0.3571

Notes:

1. For each town, waste generation amount = no of patients+staff per day x corresponding waste generation rate from earlier table.
2. Weighted average waste generation rate = total waste generation in all seven towns divided by total number of patients+staff per day.

- Comparison of these weighted average generation rates with corresponding data from other countries (refer following table). This table clearly shows that the weighted average rates obtained for HHCW+HHHCW are very small compared with those in other countries, including Cambodia. However, the average rate of the highest two towns is still low but much more consistent with other international data.

Table F-6: Comparison with HCW Generation Rates in Other Countries

Country (City)	Type of Institution	Generation of Non-risk HCW	Generation of HHCW + HHHCW
Latin America ¹⁾		3 kg/bed/day	0.60 kg/bed/day (=20%)
Chile (Santiago) ²⁾	Hospitals	2.74 kg/bed/day	1.25 kg/bed/day
	Clinics	2.83 kg/bed/day	1.55 kg/bed/day
	Rural health centres	12.0 kg/centre/day	3.0 kg/centre/day
Turkey (Adana) ³⁾	Hospitalising institution	1.67 kg/bed/day	0.82 kg/bed/day
	Non-hospitalising institution	42.2 kg/institution/day	10.6 kg/institution/day
Turkey (Mersin) ³⁾	Hospitalising institution	2.62 kg/bed/day	0.59 kg/bed/day
	Non-hospitalising institution	25.5 kg/institution/day	9.25 kg/institution/day
El Salvador (San Salvador) ⁴⁾	More than 200 beds	2.83 kg/bed/day	0.55 kg/bed/day
	50 to 200 beds	3.87 kg/bed/day	0.68 kg/bed/day
	Less than 50 beds	2.96 kg/bed/day	0.33 kg/bed/day
Azerbaijan (Baku) ⁵⁾	General Hospital	0.58 kg/bed/day	0.42 kg/bed/day
	Hospital	1.14 kg/bed/day	0.34 kg/bed/day
	Clinic	27.50 kg/institution/day	14.0 kg/institution/day
	Others	0.73 kg/bed/day	0.69 kg/bed/day
Cambodia (Phnom Penh) ⁶⁾	Hospital	5.17 kg/bed/day	0.26 kg/bed/day
	Poly-clinic	1.06 kg/bed/day	0.31 kg/bed/day
	Clinic	1.31 kg/bed/day	0.26 kg/bed/day
	Health Centre	5.07 kg/bed/day	0.95 kg/bed/day
Sri Lanka (Seven Model Towns)	Weighted average	1.57 kg/bed/day	0.07 kg/bed/day
	Average of highest two	1.82 ⁷⁾ kg/bed/day	0.19 ⁸⁾ kg/bed/day
	Average of lowest two	1.27 ⁹⁾ kg/bed/day	0.01 ¹⁰⁾ kg/bed/day

Notes:

1. Average assumed generation for Latin America according to *Pan American Health Organization and World Health Organization (NK3)*.
2. *Final Report of The Master Plan Study on Industrial Solid Waste Management in the Metropolitan Region of the Republic of Chile, March 1996, JICA*
3. *Final Report of The Study on Regional Solid Waste Management for Adana-Mersin in the Republic of Turkey, January 2000, JICA*
4. *Final Report of The Study on Regional Solid Waste Management for San Salvador Metropolitan Area in the Republic of El Salvador, September 2000, JICA*
5. *Final Report of The Master Plan Study on Integrated Environmental Management in Baku City in Azerbaijan Republic, March 2001, JICA*
6. *Interim Report of The Study on Solid Waste Management in the Municipality of Phnom Penh, September 2003, JICA*
7. Rates of Chilaw (1.8786) and Gampaha (1.7694) are used.
8. Rates of Negombo (0.1372) and Chilaw (0.1246) are used for HHWCW and those of Negombo (0.0846) and Gampaha (0.0347) are used for HHHCW.
9. Rates of Badulla (1.1867) and Nuwara Eliya (1.3516) are used.
10. Rates of Matale (0.0077) and Nuwara Eliya (0.0083) are used for HHWCW and those of Badulla (0.0018) and Matale (0.0081) are used for HHHCW.

Hence, the weighted average generation rates were revised as follows:

- The generation rate of non-risk HCW for each LA can be used for estimation of the total non-risk HCW generation amount.

- The average rate of the highest two towns (Negombo and Chilaw for HHCW and Negombo and Gampaha for HHHCW) was adopted for estimation of the total HHCW and HHHCW generation amount in all towns with generation rates lower than this.
- Consequently, for LAs other than Negombo, generation rates of 0.1309 kg/bed/day for HHCW and 0.0597 kg/bed/day for HHHCW were applied.
- For Negombo the rates obtained in the survey were used for the estimation of HHCW and HHHCW generation amounts.

Then, the HCW generation amount in each LA is calculated as shown in the table below.

Table F-7: Generation Amount of HCW in Seven LAs

LAs	HCW	No of Beds Occupied per day	Gen. Rate of Non-risk HCW	Gen. Amount of Non-risk HCW	Gen. Rate of HHCW	Gen. Amount of HHCW	Gen. Rate of HHHCW	Gen. Amount of HHHCW	Gen. Amount of HHCW+H HHCW	HCW Total
Unit	bed	kg/bed/day	kg/day	kg/bed/day	kg/day	kg/bed/day	kg/day	kg/day	kg/day	kg/day
Kandy	2,783	1.7010	4,734.0	0.1309	364.3	0.0597	166.1	530.4	5,264.5	
Matale	483	1.3975	675.0	0.1309	63.2	0.0597	28.8	92.1	767.1	
Negombo	452	1.6779	758.4	0.1372	62.0	0.0846	38.2	100.3	858.7	
Chilaw	382	1.8786	717.6	0.1309	50.0	0.0597	22.8	72.8	790.4	
Gampaha	463	1.7694	819.2	0.1309	60.6	0.0597	27.6	88.2	907.5	
Nuwara Eliya	366	1.3516	494.7	0.1309	47.9	0.0597	21.9	69.8	564.5	
Badulla	1,186	1.1867	1,407.5	0.1309	155.2	0.0597	70.8	226.1	1,633.5	
Total	6,115		9,606.3		803.2		376.3	1,179.4	10,786.1	

F.7 Current HCWM System

HCWM has previously been described in each town in this report. Hence, this section combines the data for all seven towns, summarising key points.

F.7.1 HCW Composition

HCW composition is highly organic, with food/kitchen waste being the most common waste type in surveyed medical institutions in five LAs. Paper and plastic waste are also very common. HHCW is produced by all surveyed medical institutions.

F.7.2 HCW Management

F.7.2.1 Source Segregation of HCW

None of the medical institutions surveyed are following the colour code garbage discharge system recommended by the MOHNW. However, most are segregating their non-risk HCW and HHCW at source and storing and disposing of them separately. For example, cardboard boxes are commonly used as sharps storage containers in most places. Only Badulla General hospital has implemented a two colour polythene bag system for the discharge and storage of HCW – black for non-risk HCW and yellow for HHCW.

F.7.2.2 HCW Collection and Disposal

In all seven towns, most non-risk HCW is collected by the LA or a private contractor (Kandy General hospital only) except for relatively small quantities of various materials that are recycled, as described further below. Some medical institutions dispose of some or all of their non-risk HCW on-site for a variety of reasons including no LA collection service (Dissanayake private hospital, Central dispensary (Negombo)), unreliability of the LA collection service (Gampaha Base hospital) or choice (Cooperative Hospital, Nuwara Eliya).

Inadequate collection and disposal of HHCW is a serious problem. Currently, most medical institutions dispose of such wastes by open burning and/or burial on-site, except for:

- Nuwara Eliya Base Hospital which discharges its clinical wastes for LA collection.
- Some of the smaller medical institutions producing small quantities of HHCW who tend to discharge some or all of these with their non-risk HCW for LA collection (Manthri Nursing Home and Ave Maria hospital (Negombo), Chilaw Clinic and St Mary's Nursing Home (Chilaw), Ideal Hospital (Nuwara Eliya), Central Hospital (Badulla).
- Some places (Matale Base, Gampaha Base, Badulla General hospitals) take body parts and placentas for burial in the local cemetery.
- Arogya Hospital (Gampaha) usually transports the small quantities of HHCW it produces to a private "local" incinerator in Kochchikade, Negombo for disposal.

Only five medical institutions surveyed have incinerators, four¹ of which are used for HHCW treatment, followed by on-site disposal of the ash residue. Of these four, one has too short a chimney (Peradeniya Dental hospital), two are relatively old (Suwasevana hospital, Kandy, Chilaw Base hospital), while the fourth is in relatively poor condition (Badulla General hospital). In addition, most of these incinerators are believed to be single chamber systems. Two hospitals in Kandy and the Nuwara Eliya Base hospital have autoclaves for the treatment of specimens and cultures prior to disposal, while some have needle burners for sterilising sharps before disposal.

F.7.2.3 HCW Reuse

Many medical institutions reuse waste containers. For example:

- Saline and penicillin bottles are reused, by cutting off the top and using as a container for collecting sputum, blood and urine samples.
- Cardboard boxes are used as sharps storage containers.
- Plaster of paris tins are used as carbon dioxide jars.
- Savlon bottles are collected and return to suppliers for refilling.
- In addition, Badulla general hospital uses coconut shells as fuel for its incinerator.

¹ Nuwara Eliya Base hospital has a relatively new incinerator but this is not used due to its inappropriate location, proximity to staff quarters and inadequate chimney height.

F.7.2.4 HCW Recycling

Recycling of non-risk HCW is also very common, including:

- Most used plastic, glass and metal bottles/containers/tins/cans – many places.
- Patient records and x-rays – many places (after storage for five years).
- Newspaper/cardboard - Kandy General, Gampaha and Nuwara Eliya base hospitals.
- Saline bottles - Negombo and Gampaha base and Badualla general hospitals).
- Coconut shells - Peradeniya Teaching, Negombo, Chilaw, Gampaha and Nuwara base hospitals).
- Food/kitchen waste for animal feed – Kandy General and Peradeniya Teaching hospitals.

Generally, these items (other than food/kitchen waste) are stored and then advertised for sale by tender at intervals ranging from three months to five years. For example, Peradeniya Teaching hospital sold 67,750 containers (plastic, glass and metal containers of various sizes), 605 kg of tins and 91 kg of cardboard by tender over a seven month period in 2002. Sale prices range from 0.10-70Rs each for small tins, plastic containers and glass bottles, 0.30Rs ea. for coconut shells, 0.75Rs/kg for cardboard to 5-20Rs each for large metal tins/cans and plastic containers.

F.7.2.5 Informal Collection Fees

Many private medical institutions (10 out of 17) pay garbage collection workers an unofficial collection fee ranging from 75-6,000Rs/yr.

F.7.2.6 Attitudes towards Current HCWM

16 (57%) of medical institutions are not happy with the current HCW collection and disposal service, the main reasons being:

- | | |
|---|----|
| • Garbage collection/sweeping is not properly done: | 10 |
| • Irregular garbage collection/sweeping: | 8 |
| • Poor discharge system: | 6 |
| • Problems of handling healthcare hazardous waste: | 5 |
| • Garbage collection/sweeping frequency is too low: | 5 |

F.7.2.7 Desired Improvements to HCWM

Desired SWM improvements ranked in descending order are:	WAR ²
• Improved garbage discharge system	24.0
• Greater recycling/composting of garbage	23.0
• Improved collection and disposal of hospital hazardous waste	21.5
• Improve collection frequency:	17.0
• Education to change peoples' bad habits	14.5

² WAR = weighted average rank

- More reliable garbage collection service 13.5

Eight medical institutions specifically requested the provision of proper incineration facilities.

Other specific proposals included:

- Financial assistance to implement the colour coded garbage discharge system recommended by the Ministry of Health (Chilaw and Gampaha base hospitals).
- Financial assistance to provide hospital labourers with appropriate garbage collection equipment (e.g. gloves) (Chilaw and Gampaha base hospitals).
- A covered trailer for the transportation of non-risk HCW transport to final disposal (Nuwara Eliya Base and Badulla General hospitals)
- A new secure, covered concrete bin for non-risk HCW (Nuwara Eliya Base hospital).
- Financial and technical assistance to start an on-site composting project (Badulla General hospital).

F.7.2.8 Willingness to Pay for improved HCWM

10 medical institutions (9 private, 1 government) are willing to pay for improved SWM, ranging from 200-2,500Rs/month. Some government hospitals said this question should be referred to the Provincial Deputy Director of Health Services for an answer.

Table F-8: Medical Institution Survey Summary

	Kandy	Matale	Negombo	Chilaw	Gampaha	Nuwara Eliya	Badulla
No of places surveyed:							
Government	4	1	2	1	1	1	1
Semi-government	0	0	0	0	1	1	0
Private	4	2	3	2	1	1	2
Statistics							
No of beds	3,108	535	510	488	570	289	1,053
Bed occupancy (%)	89.5%	90.3	88.6	78.3	81.3	126.6	112.6
No of occupied beds/day	2,783	483	452	382	463	366	1,186
No of outpatients/day	2,566	706	1,093	934	1,125	498	941
No of clinical patients/day	2,516	292	457	438	419	505	792
No of staff	4,790	641	474	569	709	328	1,135
Waste Generation (survey data) (tonnes/d)	4.9	0.70	0.88	0.79	0.86	0.51	1.47
Waste Composition	F/K > Pa > Ga > HHCW	F/K > Pa > Ga > PI > HHCW	Pa > PI > F/K > Ga > HHCW	F/K > Pa > PI > Ot > Ga	F/K > Pa > PI > Ga > HHCW	F/K > Pa > HHCW > PI	Pa > F/K > PI > Ga/GI
Waste Stream Breakdown:							
On-site disposal	1.9%	0.9%	19.5%	7.1%	57.2%	1.7%	1.7%
LA collection	96.3%	97.1%	76.7%	91.1%	35.7%	96.8%	95.5%
Recycling	1.4%	2.0%	3.8%	1.8%	6.0%	1.5%	0.7%
Illegal disposal	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Direct haulage	0.0%	0.0%	0.0%	0.0%	1.1%	0.0%	2.0%
HHCW Treatment:							
Incinerators (working)	2 (Yes)	0	0	1 (Yes)	0	1 (No)	1 (Yes)
Autoclaves	2	0	0	0	0	1	0
Needle burners	1	0	1	0	0	0	0
Modified waste generation data (kg/d)							
Non-risk HCW	4,734	675	758	718	819	495	1,408
HHCW	364	63	62	50	61	48	155
HHHCW	166	29	38	23	28	22	71
Total HCW	5,265	767	859	790	908	565	1,634
HHCW generation (% of Total HCW)	Large (10.1%)	Small (12.0%)	Small (11.8%)	Small (9.1%)	Small (9.8%)	Small (12.4%)	Medium (13.8%)

Notes:

1. Waste Types: F/K = food/kitchen, Ga = garden, HHCW = hazardous healthcare, Ot = other, Pa = paper/cardboard, PI = plastic.
2. Survey results for an ayurvedic university and hospital in Yakkala within the Gampaha municipal area are not included in the above table.
3. Direct haulage relates to medical institutions taking body parts and placentas to the local cemetery for burial.

F.8 Recommendations

F.8.1 Current HCWM

The results of the medical institution survey undertaken as part of this study are consistent with the picture of medical waste management given in the “State of the Environment – Sri Lanka 2001” report produced by UNEP.

As discussed in the UNEP report and found by this survey, medical institutions may be divided into two categories: those that segregate their non-risk HCW and hazardous health-care waste (HHCW + HHCW) and those that don't. The majority of medical institutions do segregate their wastes. They usually dispose of sharps by burning them either in a pit or on open ground within their premises. A few medical institutions are equipped with incinerators where all HHCW is burnt. Body tissues and parts are generally buried or cremated by the authorities of medical institutions, undertakers or the LA. Placentas may also be buried or sold to private vendors. For those medical institutions that do not separate their wastes, sharps and the rest of the HHCW are generally mixed with other MSW and disposed of by the LA. Even, when the HHCW is segregated, it still may be mixed with non-risk HCW during transportation and eventually reach an open dump site.

F.8.2 Hazardous HCW and Highly Hazardous HCW

The amounts of HHCW and HHCW generated are very small, relative to non—risk HCW and MSW as shown in the following table.

Table F-9: Generation of HHCW

Items	Generation Amount of MSW	Generation Amount of Non-risk HCW	Generation Amount of HHCW	Generation Amount of HHCW	Generation Amount of HHCW + HHCW
Unit	kg/day	kg/day	kg/day	kg/day	kg/day
Kandy	131,000	4,734	364	166	530
Matale	32,000	675	63	29	92
Negombo	136,000	758	62	38	100
Chilaw	22,000	718	50	23	73
Gampaha	54,000	819	61	28	88
Nuwara Eliya	29,000	495	48	22	70
Badulla	41,000	1,408	155	71	226
Total	445,000	9,607	803	376	1,180

This survey identified inadequate collection and disposal of HHCW as a serious problem, with the vast majority of medical institutions desiring much improved HCWM, many specifically requesting the provision of incineration facilities. These requests could possibly be addressed by constructing an incinerator at the major government hospital in each town or another suitable location for use by all hospitals within the LA limits for the incineration of HHCW. Private hospitals would be expected to

pay a fee for use of this incinerator. This matter is beyond LA's jurisdiction, but LAs can recommend such a proposal to the Ministry of Health for further consideration.

Annex A

Health Waste Management Study

Healthcare Waste Generation Survey

Introduction and Explanation to Waste Generators

This survey is being carried out by the JICA (Japan International Cooperation Agency) Study Team on Solid Waste Management with the cooperation of your Municipal/Urban Council. The purpose of this survey is to find out about the solid waste management provision within your town/city and public awareness towards solid waste.

“Solid waste” in this context refers to kitchen, garden, paper, plastic, glass, metal and other wastes which your premises gets rid of each day as they are no longer of use or value to you. We would like to hear your honest opinions on what you think of solid waste management provision in your area. The results of this survey, together with other engineering investigations, will assist the Municipal/Urban Council to improve their service.

Your premises has been randomly selected to participate in this survey. The questionnaire should be answered by a senior person on the premises. It should take about 20-30min to complete. All answers are confidential and your help is greatly appreciated.

Interviewee:

Position:

Medical Institution Details:

Name:

Street address:

No of beds:

Average bed occupancy rate:

Average no of outpatients:

Average no of clinical patients:

No of permanent staff:

Healthcare Waste Generation Survey

1. Present garbage generation and discharge system

a. General

1.1.1. How much garbage do you produce on average each day?

Answer: kg or m³ or ft³

If you are not sure of the weight or volume, please estimate the number of garbage loads (e.g. handcarts, tractors) collected from your premises per day:

1.2. Which of the following types of garbage do you produce?

(tick all that apply and estimate the approximate percentages of the five main types. If you do not know this, just rank the five main types, 1 = highest, 2 = 2nd highest, etc.)

	Tick	% or rank
a. Food/kitchen waste	[]	[]
b. Garden waste	[]	[]
c. Paper	[]	[]
d. Cardboard	[]	[]
e. Glass	[]	[]
f. Plastics	[]	[]
g. Metals	[]	[]
h. Other non-hazardous waste (e.g. textiles, rubber, dust, soil, etc.)	[]	[]
i. Hazardous health care waste (described below)	[]	[]

1.3. Please describe what types of hazardous health care wastes you produce and the approximate quantities of such wastes. If you don't know the quantity, please state whether the amount is small (S), medium (M) or large (L).

Category	Types	Yes/No	Quantity (units)	S or M or L
Hazardous	Clinical waste			
	Body parts			
	Placentas			
	Other (e.g. discarded medicines, mercury thermometers, paint, aerosol containers)			
Highly hazardous	Sharps			
	Highly infectious wastes			
	Genotoxic wastes			
	Cytotoxic or radioactive wastes			

Notes:

- Hazardous health care waste = all waste produced within a medical institution that has been contaminated with a potential infectious agent or toxic product. It includes pathological, anatomical, pharmaceutical and chemical wastes, waste with a high heavy metal content and pressurized containers (e.g. most clinical waste and body parts, discarded medicines, mercury thermometers, paint, aerosol containers)
- Highly hazardous health care waste includes sharps, highly infectious wastes, genotoxic and cytotoxic/radioactive wastes.

1.4. How do you store your garbage within your premises? (fill in the following table)

- a. Plastic bag
- b. Open container
- c. Container with lid
- d. Cardboard box
- e. Direct disposal (i.e. no storage)
- f. Own large concrete bin
- g. Other – specify:

Waste type	Main method	Other method, if any
Normal waste		
Clinical waste		
Body parts		
Placentas		
Sharps		
Highly infectious wastes		
Genotoxic, cytotoxic or radioactive wastes		
Other:		

1.5. What do you do with your garbage? (fill in first two columns of following table)

- a. Place outside for collection by Local Authority/contractor
- b. Directly carry garbage to a garbage collection vehicle
- c. Take to Local Authority/contractor waste collection point
- d. Local authority/contractor collects from premises (including own bin)
- e. Bury on site
- f. Burn on site
- g. Recycle
- h. Compost on site
- i. Incinerate on site
- j. Open dumping outside property
- k. Other –specify:

Waste type	Main method	Other method, if any	Disposal by local authority
Normal waste			
Clinical waste			
Body parts			
Placentas			
Sharps			
Highly infectious wastes			
Genotoxic, cytotoxic or radioactive wastes			
Other:			

1.6. For any hazardous health care wastes collected by the local authority/private contractor, how are they disposed of? (fill in final column of above table)

- a. Disposed of to LA landfill together with other garbage
- b. Buried in a special pit at the landfill
- c. Burned at the landfill
- d. Incinerated at the town/city crematorium
- e. Other – specify:

- 1.7. If you chose A in Q1.5, how do you do this? Tick
- a. Place garbage directly on ground (i.e. no container) []
 - b. Put out plastic bag containing garbage []
 - c. Put out open container and collect it after being emptied []
 - d. Put out container with lid and collect it after being emptied []
 - e. Other – specify: []

- 1.8. If you chose C in Q1.5, how far do you have to walk to reach this point? (*tick one*)
- a. 0 - 25m []
 - b. 25 - 50m []
 - c. 50 - 100m []
 - d. 100 – 250m []
 - e. Over 250m []

1.9. If you chose G in Q1.5, go to section 6.

1.10. If you chose H in Q1.5, go to section 7.

1.11. If you chose I in Q1.5, please provide the following information for the incinerator:

- a. Location:
- b. Capacity (furnace volume (m³) and waste burning capacity (kg/h):
- c. Description (e.g. no of chambers, operating principle):
- d. Combustion fuel:
- e. Height of chimney:
- f. Normal wind direction:
- g. Proximity of living/working spaces to incinerator:
- h. Scrubbing/filtering of exhaust gases: Yes/No
- i. Normal operating hours:
- j. Ash disposal (amount and frequency):
- k. Age:
- l. Reliability (no of days out of service per yr; average outage time):
- m. Problems:

1.12. If you ticked J in Q1.5, where do you dump your garbage outside your premises?

- a. On banks of stream/river, or in stream/river []
- b. On vacant land []
- c. In a gully []
- d. In the sea []
- e. Other – specify: []

b. Collection

1.13. Are you provided with a garbage collection service? (either direct collection or nearby garbage collection points or direct pickup from premises – items A, B, C or D in Q1.5)

- a. Yes []
- b. No [] – Do you want to receive a garbage collection service?

Answer: Yes/No – then go to Section 2

1.14. Do you use this garbage collection service?

- a. Yes []
- b. No []

If you answered no, please explain why below – then go to Section 2

.....

1.15. How often do you discharge your garbage and how often is it collected? (*tick one*)

	Discharge	Collection
a. More than once daily	[]	[]
b. Once daily	[]	[]
c. Every 2-3 days	[]	[]
d. Every 4-5 days	[]	[]
e. Weekly	[]	[]
f. Less than weekly	[]	[]
g. Irregularly – specify:	[]	[]
h. Other – specify:	[]	[]

1.16. Do you pay the local authority/private contractor an official garbage collection fee?

Answer: **Yes/No**

If Yes, how much is this fee? And what type of wastes does it cover?

Answer:	<i>Waste Types</i>	<i>Payment (Rs/mth)</i>

If necessary, calculate as Rs/vehicle x loads per mth

1.17. Have you ever given a direct unofficial payment to garbage collection workers for collection of your garbage? Answer: **Yes/No**

1.18. What is the total amount of the unofficial payment you have given to garbage collection workers over the last 12 months? Answer: Rs

1.19. Are you satisfied with the existing garbage collection and disposal service? Answer: **Yes/No**

If NO, why? (*tick one or more*)

- | | |
|--|-----|
| a. Discharge system is poor (e.g. no bins, bins are broken or too small) | [] |
| b. Garbage collection point is too far away | [] |
| c. Garbage collection/sweeping is not properly done | [] |
| d. Garbage collection service/sweeping is irregular | [] |
| e. Garbage collection/sweeping frequency is too low | [] |
| f. Collection time is too early or too late | [] |
| g. Garbage collection workers behave badly | [] |
| h. Garbage collection workers demand payment for garbage collection | [] |
| i. Local authority/contractor garbage collection fee is too high | [] |
| j. Lack of recycling | [] |
| k. Problems with handling hazardous health care waste | [] |
| l. Other - specify: | [] |

1.20. How many times have you complained about the garbage collection service in the last three years?

- | | |
|-------------------------|-----|
| a. None | [] |
| b. Once only | [] |
| c. Several times | [] |
| d. More than five times | [] |

1.21. Is any medical institution staff member responsible for ensuring that hazardous waste is collected and disposed of properly? Answer: **Yes/No**

Name and position of person:

Please describe their duties:

.....

2. Improvements to garbage collection and disposal

a. General

2.1. What improvements would you like to see to garbage collection and disposal? (Please tick one or more and prioritise the top three improvements you would like to see (1 = first priority, 2 = second priority, 3 = third priority))

	Tick	Priority
a. Improved garbage discharge system	[]	[]
b. Shorter distance to garbage collection point	[]	[]
c. More reliable garbage collection service	[]	[]
d. Improved collection frequency	[]	[]
e. Greater recycling/composting of garbage	[]	[]
f. Improved collection and disposal of healthcare hazardous waste	[]	[]
g. Improvement of landfill operation	[]	[]
h. Education to change people's bad habits	[]	[]
i. Other - specify:	[]	[]

2.2. Improved garbage collection and disposal will cost additional money. Who do you think should pay these costs? (tick one or more)

a. Central Government (e.g. Ministry of Health)	[]
b. Provincial Council	[]
c. Local Authority	[]
d. Individual medical institutions	[]
e. Other: specify:	[]

2.3. Suppose that you are satisfied with the municipal solid waste management service, either as is or as a result of improvement.

(a) Do you think that your medical institution would be willing to pay 1,200Rs. per month as a garbage collection fee?

- [] 1. Yes Go to (b)
[] 2. No Go to (c)

(b) Do you think that your medical institution would be willing to pay 2,000Rs. per month as a garbage collection fee?

- [] 1. Yes Go to (f)
[] 2. No Go to (d)

(c) Do you think that your medical institution would be willing to pay 200Rs. per month as a garbage collection fee?

- [] 1. Yes Go to (e)
[] 2. No Go to (f)

(d) Do you think that your medical institution would be willing to pay 800Rs. per month as a garbage collection fee?

- [] 1. Yes Go to (f)
[] 2. No Go to (f)

(e) Do you think that your medical institution would be willing to pay 400Rs. per month as a garbage collection fee?

- [] 1. Yes Go to (f)
[] 2. No Go to (f)

(f) Think for a moment about the largest amount of money that your medical institution would be willing to pay each month as a garbage collection fee.

Amount of money: _____ Rs/month

Important:

- If the garbage collection fee is more than this amount, your medical institution will not be able to afford to pay and will not be able to use the garbage collection service.
- If you are still not willing to pay anything, put "nothing" and explain why below:

Reasons for "nothing":

b. Recycling of non-hazardous wastes

- 2.4. Do you consider that recycling of non-hazardous waste such as paper, plastics, glass, and metals is necessary? Answer: Yes/No
- 2.5. Recycling of waste is most effective if the waste can be sorted into different categories by the waste producer (i.e. at source) such as compostable waste (e.g. kitchen, paper and garden waste), recyclable waste (e.g. paper, plastics, glass, metals) and other wastes. Are you willing to co-operate with this type of system? (tick one)
- a. Very willing to co-operate []
 - b. Somewhat willing to co-operate []
 - c. Less willing/somewhat unwilling to co-operate []
 - d. Not willing at all to co-operate []
 - e. We already sort waste into different categories []
- 2.6. If you chose C or D in Q2.5, please indicate why below (tick one or more – then go to Q2.11):
- a. Increased financial burden (e.g. several containers required) []
 - b. It is inconvenient or difficult []
 - c. It would take too much time []
 - d. The needs/benefits of recycling are not clear []
 - e. Other - specify below []
-
-

If you chose A or B in Q2.5, please answer Q2.7 – 2.10 below

- 2.7. Why would you be willing to co-operate? (tick one or more):
- a. Recycling would reduce the amount of waste to landfill []
 - b. Recycling would help to protect the environment []
 - c. Recycling would earn you some extra money []
 - d. Other [] Specify below:
-
- 2.8. How many different categories would you be willing to sort your waste into? (tick one)
- a. Two []
 - b. Three []
 - c. More than three []
- 2.9. What type of collection system would you favour for source separated wastes? (rank up to 3 preferred options, 1 = most preferred, 2 = second preferred, 3 = third preferred)
- | | |
|---|-------------|
| | Rank |
| a. Coloured plastic bags collected by local authority from outside premises | [] |
| b. Permanent coloured containers emptied by local authority from outside premises | [] |
| c. Own bags/containers collected/emptied by local authority from outside premises | [] |
| d. Own bags/containers taken to nearby community collection point | [] |
| e. Other - specify: | [] |
- 2.10. What would you be willing to pay for permanent containers for waste storage? (this would be a single, one-off cost; tick one)
- a. Nothing [] Please explain why below
 - b. 1 - 500 Rs []
 - c. 501 – 1,000 Rs []
 - d. 1,001 – 2,000 Rs []
 - e. 2,001 – 5,000 Rs []
 - f. Over 5,000 Rs []

Reasons for "nothing":

c. Composting of non-hazardous waste

2.11. Would you be willing to compost kitchen, garden and possibly paper waste onsite? (*tick one or more and specify the type of waste to which they apply*)

- | | Tick | Waste types |
|---------------------------|------|-------------|
| a. Already compost | [] | |
| b. Willing to compost | [] | |
| c. Not willing to compost | [] | |

2.12. If organic wastes were to be collected separately for large scale composting at another place, how long would you be willing to store such wastes between collections? (*tick one*)

- | | |
|-------------------------|-----|
| a. Half a day | [] |
| b. One day only | [] |
| c. Two days | [] |
| d. Three days | [] |
| e. More than three days | [] |

3. Environmental education and general cleanliness

3.1. Has anyone on these premises received any health and environmental education or information relating to solid waste? Yes/No If YES, no of people:

And where did this information come from?

- | | |
|--|-----|
| a. School | [] |
| b. Leaflets/posters, etc. | [] |
| c. Medical worker/centre/hospital | [] |
| d. Community organisation/NGO (name =) | [] |
| e. Newspaper | [] |
| f. Radio programme | [] |
| g. TV programme | [] |
| h. LA | [] |
| i. LA contractor | [] |
| j. Ministry of Health | [] |
| k. Central government (e.g. Central Environmental Authority) | [] |
| l. Other – specify: | [] |

3.2. Do you think that a campaign to raise the awareness of people for maintaining a cleaner city and environment is necessary? (*tick one*)

- | | |
|-------------------------|-----|
| a. Very necessary | [] |
| b. Somewhat necessary | [] |
| c. Not very necessary | [] |
| d. Not necessary at all | [] |

4. Sewerage

4.1. Where does the toilet waste from your premises go? (*tick one*)

- | | |
|------------------------------------|-----|
| a. Into septic tank | [] |
| b. Into pit | [] |
| c. Into pond, river, canal | [] |
| d. Into stormwater drain | [] |
| e. Into wastewater treatment plant | [] |
| f. Don't know | [] |

- 4.2. If you chose E in Q4.1, please provide some information on your WWTP:
- a. Location:
 - b. Age:
 - c. No of operators (full-time and part-time):
 - d. Description:
 - e. Tank capacities (m³):
 - f. Plant capacity (m³/d):
 - g. Testing – parameters and frequency, who does?
 - h. Final effluent receiving environment
 - i. Final effluent quality
 - j. Sludge removal and disposal
 - k. Problems
- 4.3. If you chose A, B or E in Q4.1, is wastewater and/or sludge removed from your premises by gully sucker? **Yes / No / Don't know**

5. Other

- 5.1. If there any additional comments you would like to make about solid waste management provision and your needs, please comment below:

.....
.....
.....

Thank-you very much for your co-operation

Additional Sections

6. Recycling

ONLY answer this section if you ticked Q1.6 (g).

Write your answers to the following questions in the table below:

- What items do you recycle? (*specify any other materials in the blank cells*)
- How much do you recycle per month?
- What price do you sell these items for?
- Who do you sell/give these materials to? (e.g. individual collector, shop, middleman, industry)
- How does this recycling system work? (*put 1, 2, etc. in method column*)
 1. Take directly to shop for refund
 2. Give to collector who comes to premises
 3. Take directly to middlemen for sale
 4. Take directly to community group/NGO for sale
 5. Take directly to industry for sale
 6. Other – specify in table
- How often are these materials collected/taken for recycling? (daily, 2-3 times per week, weekly, monthly, other, irregularly)

Item	Quantity (kg/mth)	Price (Rs/kg)	Buyer	Method	Collection frequency
Paper					
Cardboard					
Glass bottles					
Polythene bags					
Saline bottles					
Other plastic					
Metal					
Organic waste for animal feed					

Additional space for answers:

.....

- Are there any problems with this recycling system? Answer: **Yes/No**
If YES, please explain why below:

.....

Contact details (address/telephone numbers for buyers):

.....

7. Composting on site

ONLY answer this section if you ticked Q1.6 (h).

Write your answers to the following questions in the table below:

- What items do you compost? (*specify any other materials in the blank cells*)
- How much compost do you produce per month?
- What do you do with the compost you produce? (sell, own use - specify)
- If you sell the compost, how much do you sell it for?
- If you sell the compost, who do you sell it to? (individuals, nurseries, shops, other –specify)

Item	Quantity (kg/mth)	Use	Price (Rs/kg)	Buyer
Food/kitchen waste				
Garden waste				
Paper				

Additional space for answers:

.....

- Are there any problems with this composting system? Answer: **Yes/No**
 If YES, please explain why below:

.....

Survey Notes:

1. National Healthcare Waste Policy categories:

- non-risk health care waste: all waste produced by medical institution that has not been contaminated with potential infectious agents or toxic products (organic waste, plastics (including saline bottles), paper, glass, etc. – similar to domestic waste)
- Hazardous health care waste: includes all waste produced by medical institution that has been contaminated with a potential infectious agent or toxic product. It includes pathological, anatomical, pharmaceutical and chemical waste, waste with high heavy metal content and pressurized containers (e.g. most clinical waste and body parts, discarded medicines, mercury thermometers, paint, aerosol containers).
- Highly hazardous health care waste includes sharps, highly infectious waste, genotoxic and radioactive waste.

2. Inspect any onsite garbage storage areas, incinerators and onsite disposal areas.