2.2 Economic Projection

2.2.1 Economic Growth

A Road Network Development Master Plan, Final Report, 1995 made a forecast of GDP per capita growth rates up to 2010. This depicts the growth rates as growing gradually to 3.48% over the years 1995-2005 and dropping slightly to about 3.32% p.a. during 2010. With consideration of recent actual figures, they are adjusted to be lower. See **Table J.2-9**.

Table J.2-9 Projected Per Capita GDP

Unit: %

M/P	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Road	2.59	2.74	2.90	3.05	3.14	3.22	3.31	3.39	3.48	3.45	3.42	3.38
SWM	2.19	2.34	2.50	2.65	2.74	2.82	2.91	2.99	3.08	3.05	3.02	2.98

Source: *A Road Network Development Master Plan, Final Report, 1995* and *JICA Study Team*

According to the Central Bank of Kenya, the growth rates are expected to accelerate in 1998 as Kenya attract increased local and foreign investment thanks to the following advantages:

(1) political stability in a turbulent continent
(2) implemented irreversible economic reforms
(3) highly industrialised nation in the region
(4) tourist attractions: wildlife and scenic landscape
(5) developed infrastructure: communications, services

Implemented economic reforms include the following items:

(1) removal of price controls
(2) freeing of interest and exchange rates
(3) introduce universal banking for banking institutions
(4) abolition of import and exchange controls
(5) establishment Kenya Revenue Authority
(6) sale of semi-state companies

According to *Economic Survey, 1997*, although the real manufacturing growth output of 3.7% was well below the targeted 7.9% industrial growth of the Eighth National Development Plan 1997-2001, various macro-economic reform measures were announced late 1996 geared towards full industrial transformation of the economy, by the year 2020.

Recent Major Impacts on the Kenya's Economy: (1) *IMF loan lapse* and (2) *"El Niño" weather conditions* would be major impacts in the second half of 1997 on Kenya's economy. These impacts, however, are not incorporated in this economic projection because actual results from these impacts are unclear and have not yet been analysed officially at the time of the report making. In addition, the Bank of Kenya reported that such effects would be short-term on account of anticipated improvement in infrastructure and increased accessibility to the wider East African Co-operation market and the Common Market for Eastern and Southern Africa (COMESA).

2.2.2 Gross Regional Domestic Products (GRDP)

According to *Economic Survey, 1997*, per capita GDP is Kshs 16,861.21 in 1997 price. Gross Regional Domestic Products (GRDP) in Nairobi in future is projected as follows:

(1) GDP is multiplied with Nairobi's projected population.

(2) Item (1) is adjusted by the household income difference between Nairobi (16789.4 Kshs/month) and the national average (9,696.0 Kshs/month) in 1994 according to *Welfare Monitoring Survey II, Basic Report, 1996.*

Projection result is shown in **Table J.2-10.**

Table J.2-10 Projected GRDP of Nairobi

Unit: Kshs billion

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
65.1	69.7	74.5	79.6	85.5	92.0	99.0	107.1	115.3	124.5	134.6	145.5

Source: *JICA Study Team*

2.2.3 Household Income

(1) Income Distribution

Welfare Monitoring Survey II, Basic Report, 1996 presents the percentage distribution of households in Nairobi Province by yearly expenditure in 1994 and the distribution of annual per capita income and expenditure by quintiles in 1994. This report also presents mean monthly household expenditure, Kshs 15,075.8 and income, Kshs 16,789.4 in 1994. See **Table J.2-11.**

Table J.2-11 Household Income Distribution (Yearly), 1994

Income Level (Kshs/year)	Less than 26,827.6	Less than 45,214.4	Less than 68,029.2	Less than 109,732.8	More than 109,732.8	Total
Number of HH	40,204	50,506	71,547	85,430	231,479	479,166
Share	8.4%	10.5%	14.9%	17.8%	48.3%	100.0%
Accum. Share	8.4%	18.9%	33.9%	51.7%	100.0%	

Source: *Welfare Monitoring Survey II, Basic Report, 1996*

From these data on households, we estimated at three levels of household monthly income as shown in **Table J.2-12.**

Table J.2-12 Projected Monthly Household Income by Level

Unit: Kshs/month; 1997 Price

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Top 45% Level	14,499	14,817	15,164	15,542	15,954	16,390	16,853	17,343	17,862	18,412	18,974	19,546
Top 30% Level	18,830	19,242	19,693	20,184	20,719	21,286	21,887	22,523	23,197	23,912	24,641	25,384
Top 15% Level	23,161	23,667	24,222	24,826	25,484	26,181	26,920	27,703	28,532	29,411	30,308	31,222

Source: *JICA Study Team*

Since the population in informal settlements are estimated 55% of the total, remaining population can be divided into three same size income classes at the

Top 45%, 30% and 15% Levels. Households gaining more than each level income are deemed as low, middle and high income respectively.

(2) Affordability of Households for SWM Services

We assume that the affordability for the solid waste management by households is 1% of income, considering with those in other developing countries including Penang City, Malaysia (0.67%), Bangkok, Thailand (0.62%), Surabaya, Indonesia (0.5%) (Note: these figures are share of per capita GDP).

From the above assumption, if household charge is set at Kshs 155 in 2000, for example, all the low income class can afford. If the number of level setting is increased, charge revenue would increase. In this case, however, the charge system would be complicated. In order to keep the system simple, three levels are appropriate since these levels can be translated as low, middle and high. This is very intuitive. Estimation of affordability of households in the planning years are as follows:

Table J.2-13 Estimated Affordability of Households

Unit: Kshs/month; 1997 Price

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Top 45% Level	145	148	152	155	160	164	169	173	179	184	190	195
Top 30% Level	188	192	197	202	207	213	219	225	232	239	246	254
Top 15% Level	232	237	242	248	255	262	269	277	285	294	303	312

Source: *JICA Study Team*

According to the Public Awareness Survey conducted as a part of the Study, willingness-to-pay for SWM services is 400 Kshs for High Income, 350 Kshs for Middle Income and 106 Kshs for Low Income families. It should be noted that these figures are averages among those who are willing to pay and income level partitions are not necessarily coincide. If we consider those who are not willing to pay, namely 47% of High Income, 41% of Middle Income and 42% of Low Income, willingness-to-pay would be 212 Kshs for High Income, 207 Kshs and 61 Kshs for Low Income. Thus, estimated affordability can be safely employed with taking into consideration of adjustment and income level partitions especially for Middle and Low.

2.2.4 Projections on Water Supply

It is expected that the charges are billed though the water charges system will be continued in the Master Plan. It is also important to project future data on water supply of NCC.

(1) Water Account Number

According to NCC, water account numbers of households and commercials are 127,000 and 8,085 in 1996 respectively. Future account numbers are projected with the assumption that they will grow at the same rate of the population. See **Table J.2-14.**

Table J.2-14 Projected Number of Water Accounts

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Households	133,992	140,291	146,590	152,889	159,965	167,410	175,337	184,229	192,491	201,799	211,633	222,022
Commercials	8,530	8,931	9,332	9,733	10,184	10,658	11,162	11,728	12,254	12,847	13,473	14,134

Source: JICA Study Team

(2) Water Consumption by Households

According to NCC, average water consumption by a household in 1996 is 2.33 m^3/month. Future water consumption is projected with the assumption that water consumption will increase in accordance with per capita GDP growth rate. See **Table J.2-15.**

Table J.2-15 Projected Water Consumption per Household

Unit: m^3/month

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Top 45% Level	1.62	1.66	1.70	1.75	1.80	1.85	1.90	1.96	2.02	2.08	2.14	2.21
Top 30% Level	2.11	2.16	2.21	2.27	2.33	2.40	2.47	2.54	2.62	2.70	2.78	2.86
Top 15% Level	2.59	2.65	2.72	2.79	2.87	2.95	3.03	3.13	3.22	3.32	3.42	3.52
Average	2.35	2.41	2.47	2.53	2.60	2.67	2.75	2.83	2.92	3.01	3.10	3.19

Source: *JICA Study Team*

3. FINANCIAL IMPROVEMENT PLAN

3.1 Financial Constraint on Solid Waste Management

The overriding constraint of solid waste management (SWM) services is the financing of these services. NCC services are financed by NCC's General Fund and Services Charge Account. After salaries were paid, however, income is not enough to finance other expenditures except in 1993/94. See **Table J.3-1.**

Table J.3-1 Financial Constraint

Unit: K£

		1991/92	1992/93	1993/94	1994/95
(1)	Income from Services	16,169,343	22,633,586	24,732,276	42,099,696
(2)	Rates	30,780,764	37,745,764	50,148,642	56,126,041
(3)	Applied from Service Charge Account	6,175,237	5,134,331	8,098,956	7,558,134
(4)	Other Income	159,239	2,505,296	15,075,012	2,298,171
(5)	Income Total	53,284,583	68,018,977	98,054,886	108,082,042
(6)	Salaries	26,745,026	28,568,581	26,039,651	44,642,605
(7)	Other Expenditure	43,955,023	79,387,937	42,619,152	73,072,812
(8)	Expenditure Total	70,700,049	107,956,518	68,658,803	117,715,417
(9)	Surplus/Deficit of the Year (5)-(8)	-17,415,466	-39,937,541	29,396,083	-9,633,375
(10)	Income after Salary Payment (5)-(6)	26,539,557	39,450,396	72,015,235	63,439,437
(11)	Share of Salaries (6)/(5)	50.19%	42.00%	26.56%	41.30%

3.2 General Principles of SWM Finance

The majority of solid waste is generated by households. Thus, this subsection discusses SWM services mainly for the households.

SWM services which are consumed by Nairobi citizens in their daily lives are characterized as the public service especially in the minimum level of consumption because they contribute toward public goals such as improving urban environments

and maintaining public health. On the other hand, SWM services are also characterised as the private service because they are consumed by individual households in accordance with varieties of needs and the benefits belong to individuals in accordance with the degree of consumption. They can be identified as mixed goods which affects highly to public benefits.

It is not an easy matter to decided who should bear the costs of SWM services. It is an idea that the costs of SWM services for households are divided into two categories based on the above discussion; **capital investments** including vehicles and facilities as a part of improvement in social capital, which produce services continuously for their lives, are categorised as the public service; **operating costs** for services of individual households which is produced from the capital investments are the private service.

However, we should be careful when applying the above categorisation. Even though collection operation is the private services, results of failing to consume the service is not necessarily private because of its externality. For example, in case that someone dumps his/her waste in his/her backyard without consuming collection services, surrounding people will be suffered from the dumping by its odor or deterioration of scenery in the area.

Followings are general principles for financing SWM services based on the present financial situations of NCC.

Firstly, in principle, the public service (capital investments) should be financed by general taxation or by the funds from the General Fund. Based on the financial difficulties of NCC and the central government, this is a very part for the consideration of the possibility of subsidies from the central government or foreign aids.

Secondly, it is preferable particularly in situations where general taxation is severely constrained, that operating costs are recovered wherever possible through a waste charge rather than through general taxation. In addition, it is expected that cost recovery under charge revenues encourage financial discipline and cost efficiencies.

Thirdly, cost recovery should be improved by reforming the budget system and improving efficiency of SWM operation on step-by-step basis.

Fourthly, where operating costs cannot be fully recovered through a waste charge after improving cost efficiencies, deficits should be financed through general taxation.

3.3 Financial Reform for SWM

3.3.1 Consideration of Revenue Resources

Presently, the main revenue sources available for SWM are waste charges and tipping fees. In the future when the private sector involvement system be established, licensing fees for private collection companies may be counted in.

Imposing a new tax for SWM is not preferable on the following reasons:

(1) it would take a considerable time and costs to set up a new tax system in terms of billing and collection;

(2) it is expected that the revenue could not be improved considering the poor situation of other taxation of NCC;

(3) existing charging system should be abolished because imposing a new tax with keeping charges would not be approved. But this charging system, which utilises the water charge system, is preferable with the reasons to be discussed later; and

(4) a tax should be a special tax whose revenue is to be spent only for SWM services in order to establish financial autonomy. In this case, the new tax is very similar to a new charge.

However, creating a new charge for SWM is not preferable either because:

(a) billing and collection system would be complicated;

(b) some kinds of charges are invented to reduce solid waste production rather than increase revenue in developed countries. But these charges are not necessarily effective in Kenya because presently people in Kenya do not produce much marketable waste. People think charges are increased without service improvement; and

(c) high charges to be imposed to companies would in turn be transferred to the consumers by increasing prices.

Thus, existing charge system should be continued to be a main financial resource with some improvement.

3.3.2 Establishment of Financial Autonomy of SWM Services

Since the generation of general tax revenues by NCC is severely constrained and is likely to remain so for a considerable time, the SWM Division of the Department of Environment (DoE) must secure its own revenues to improve the financial conditions of its SWM services. The SWM Division needs the financial autonomy of SWM.

The SWM Division needs to be financially "ring fenced" by establishing an special account to ensure that these revenues are controlled and spent by the SWM Division for SWM only and are not used to finance other services in NCC. The special account should be designed to have co-signatories of the DoE Director and the City Treasurer.

Additionally, funds for replacement of equipment and facility should be accumulated as depreciation in the operation of system in order to sustain the operation after the equipment and facility initially introduced are finished.

3.3.3 Reform of Budgeting System of SWM Services

NCC's budgeting system has several problems. The budgeting system of SWM services' special account should be arranged to avoid such problems. The World Bank already proposed reforms of local government finance in 1992. Some of them still applicable to the budgeting of the special accounts with some minor adjustments. They are:

(a) revenues should not be accrued in the budget. Only cash receipts should be credited to the account;

(b) revenue estimates should be based on the previous calendar year's actual cash collections;

(c) recurrent expenditure should be estimated within revenue estimates based on the previous calendar year's actual revenue plus any approved charge increases. Expenditure ceilings should be established at the beginning of the budget process; and

(d) revenue in excess of the estimates should be appropriated to capital expenditure. It should not be released until the revenue has been realized.

3.3.4 Subsidization of SWM Services

Financial autonomy should not exclude the continued subsidisation of the SWM Division's SWM services by NCC's general taxation or the central government. This is because it is very difficult to recover operating costs fully through its own revenue sources, particularly in the early years of the Master Plan.

The principle of financing of SWM from general tax should be therefore be established.

However there is a great deal of uncertainty about when and how NCC's revenue generation will improve and therefore when and how much will be available to subsidise SWM. This will depend on the:

(a) fiscal restructuring of NCC currently being addressed under the joint reform program between the government of Kenya and UNDP;

(b) improvements in NCC's financial management, billing and collection - also being addressed under the joint reform program; and prioritisation of SWM services by NCC amongst its services.

3.4 Establishment of Charging Policies

Charging policies are needed to be established for each of the DoE's revenue sources.

Waste charges: the waste charge will be the largest source of the DoE's own revenues. A number of policies needed to be established.

Firstly, revenues from waste charges should be used to recover the operating costs of collection, haulage and disposal proportioned to households. "Proportion" means here the share of waste production by households.

Secondly, different charges should be set for different income groups. For the low income group the waste charge should be set at the lower level. For middle and high income groups higher charges should be set.

This would imply not only cross subsidisation of low income groups by higher income groups from the viewpoint of the public characterisation of the services. But also it means division of the market to increase the revenue with the assumption that the

higher income groups tend to indicate higher willingness to pay. However, the charging structure should be simple and efficient i.e. 2 or 3 charging bands.

Thirdly, households paying for services provided by private companies non-contracted out by NCC should bear the costs of dumpsite operation. These costs should be collected through adding some amount on tipping fees of such private companies, which means that such costs are indirectly collected from private collection households.

Fourthly, concerning households in the informal settlements which are currently not charged, a waste charge should be collected since they would receive a minimum SWM services from NCC in the new system. It should not be collected on one-by-one basis from the viewpoint of collection costs and efficiency.

Tipping Fees: currently tipping fees are collected by the DoE from companies who tip their waste at Dandora. These fees should be set at a level which recovers the apportioned costs of managing and operating NCC's disposal facilities as well as those of street cleansing.

Monitoring system should be established to prevent companies from illegal dump of their waste.

License Fees: currently private sector companies collecting waste in the city are unregulated. They need to be licensed and their collection and disposal activities monitored by NCC to maintain the service quality. The costs of licensing and monitoring them should be recovered through a license fee.

3.5 Billing and Collection of the Waste Charge

3.5.1 Billing and Collection Method

Currently the billing and collection of waste charge is carried out through the billing system of the Water and Sewerage Department. This should continue for the following reasons:

(1) currently collection rates for water charges are much higher than NCC's collection rates for general taxation;

(2) the Water and Sewerage Department's billing and collection systems are soon to be substantially upgraded under a World Bank technical assistance program which will include new hardware and software. This will substantially improve billing accuracy and collection rates;

(3) the Water and Sewerage Department has the ultimate sanction of disconnecting households which do not pay. The DoE does not have this sanction.

(4) the cost of establishing and operating a billing and collection capacity in the DoE would be very high. It would take considerable time to set up and require significant technical assistance.

3.5.2 Setting-up New Tariff System

New tariff system should be enforced after the implementation of new waste collection plan.

The new tariff employs a step up rate system. Household charge rate increases with three steps in accordance with the water consumption of the household with the assumption that the income and water consumption is closely related. Charge rate in each step should not exceed the affordability of the household in each income group.

If the excess water consumption of a high income household exceeds low level water consumption, extra charge is added to its high income charge in accordance with excess amount. In addition, each charge level should not exceeds the willingness to pay of each income group.

(1) Households in NCC Areas

Charges should be collected on monthly basis per family as with the present system. Charges should be decided by the affordability of households. Affordability of the households in each income group are estimated by forecasting the family income. Since households living in informal settlements are estimated at 55%, those in the formal settlements are 45% of the total, which can be divided into three groups. Namely, households earning 55-70% income level, 70-85% level and over 80% level.

(2) Households in Contract-out PSI Areas

Cost of contact-out services is combined with the operating cost of all other areas and charge revenues from all area users including households and commercial entities are used to finance the total cost. When the charge revenue is not enough, funds from the general account or subsidies from the central government are expected to finance the shortage.

Same billing system, namely the water charge billing system should be employed. Although contracted-out areas may be enjoying higher quality of services than other areas, same tariff system should be applied to both areas with the following reasons:

(a) Contracting-out is planned to be implemented in the high income areas where higher charges are expected to be applied by the new tariff system.

(b) If two kinds of tariff system is employed, it would be complicated to enforce the systems. In addition, since contracted-out areas are planned to increase in every two or three years, charging system has to be adjusted frequently.

(c) Since water charge areas are not necessarily coincide with the administrative areas where contracting-out schedule is based, it causes troubles to adjusting the water billing system.

(3) Commercials in NCC and Contract-out Areas

Charges should be collected through the water charge system. Charges should be decided by the share of waste collection. However, their charge is not differentiated because it is very difficult to capture their income within reasonable time and costs.

(4) Households and Commercials Receiving Services Non-contract-out

Charges should be collected on tonnage of waste collection basis thorough the private companies. Charges should be decided by the share of waste damp.

(5) Informal Settlement Areas

Charge is collected on monthly basis from the administrator of water kiosks. It should be decided considering the living standard of the people in the areas.

Thus, the charge is set to 5 Kshs/month for one person. Considering the waste charge is added to the water charge, the waste charge should be less than 10% of their expenses for the water. Since it is estimated that the average water expense for one person in one month is Kshs 60, the waste charge should be less than Kshs 6. As average number of family members is 5, the average charge for one family is 25 Kshs/month.

4. FINANCIAL ANALYSIS OF MASTER PLAN

4. 1 Conditions/Assumptions for Financial Analysis

4.1.1 General

(1) Objectives of Financial Evaluation

The principal objective of this financial evaluation is to examine the variability of the Master Plan from the viewpoint of a management body with the monetary inflow/outflow calculation. For this purpose, it is assumed that the SWM Division of the Department of Environment (DoE) is to operate and manage the proposed solid waste management (SWM) plan with facilities including vehicles, a final disposal site and others on the ground that a special account for the SWM is established.

(2) Methodology

This analysis is conducted based on an estimation in terms of revenues and costs on the proposed SWM plan. Additionally, sources of required funds are assumed as follows (see **Table J.4-1**):

Table J.4-1 Source of Funds for SWM

Case	Initial Investment	O&M Cost, Depreciation
1	Loan - 100%	• Average charge per household: 100, 200, 300, 400 and 500 Kshs/month • Charge for commercials: full cost cover • Deficits are covered by annual budgets or subsidies
2	Grant - 50% Loan - 50%	• Average charge per household: 100, 200, 300, 400 and 500 Kshs/month • Charge for commercials: full cost cover • Deficits are covered by annual budgets or subsidies
3	Grant - 100%	• Average charge per household: 100, 200, 300, 400 and 500 Kshs/month • Charge for commercials: full cost cover • Deficits are covered by annual budgets or subsidies

Financial viability of the project is examined here by checking how expenditures of the Master Plan can be financed with simulating revenues over the project year, 1998-2008. Especially an estimated cashflow table is constructed over the project years.

(3) Assumptions

The following assumptions are made for the financial analysis.

(a) Project Life (Calculation Period)

The master plan starts in 1998 and the target year when the proposed system is operated in full capacity is 2008. Since lives of some civil works proposed exceed over 2008, such longer lives are took into consideration in financial calculation carried out for the years of 1998-2008.

(b) Exchange Rates

Exchange rates applied are: US$ 1.00 = Kshs 58.8 = JPY 121.76 (1997 average).

(c) Inflation Factor

Inflation factor is excluded with applying 1997 constant prices for costs and revenues except for the cases mentioned otherwise.

(d) Life Expectancy of Facilities

The life expectancy or economic life of each item is assumed as follows:

Table J.4-2 Life Expectancy of Facilities

Item	Life Expectancy (year)
Vehicles/Equipment	8
Civil Works	30
Parking/Depot	30
Other Construction	10

(e) Operation and Management Body and Its Scope of Services

The SWM Division of Department of Environment (DoE) will carry out SWM services and revenues and expenses concerning the SWM are controlled solely in the special account. Thus, other services even produced by the DoE are not took into consideration in this analysis.

(f) Consideration of Private Sector Involvement

Some areas of waste collection is assumed to be privatised in the course of project years. Costs on the solid waste collection which are planned to be contracted out by NCC are included in the financial projection. It is assumed at 2,155 Kshs/ton from the financial model analysis of private companies.

Costs for licensing and monitoring of the private business are excluded that they are assumed to be covered by licensing fees from the companies.

4.1.2 Estimation of Cash Flow

(1) Estimation of Revenue

(a) Assumptions

Major revenues of SWM include (1) waste charges from households, commercial entities and markets, (2) tipping fees from private collection companies which are not contracted out by NCC. With an assumption that license fees are set at those just cover cost of licensing and monitoring private companies, they are not counted in this analysis.

(b) Waste Charge

Households: charges are set to cover the operating costs and depreciation of SWM services considering their affordability.

Charges are billed through the water and sewerage billing system. It is assumed that the account number of domestic increase with the population growth rate.

Commercial entities: charges are set to cover the operating costs and depreciation, and capital costs of SWM services considering those presently billed by private collection companies. Since charges include

capital costs, tariff rate is averaged over the project years for the purpose of calculation.

Informal Settlements: charge is set to 5 Kshs/month for one person.

(c) Tipping Fees

Households and commercial entities using private collection services which are not contracted out by NCC are also expected to share the disposal costs through the tipping fees paid by the private collection companies.

(2) Estimation of Administrative Costs for Services

(a) Personnel

Number of administrative staff is estimated 1.3 % of other staff including drivers, loaders, sweepers, supervisors and headmen based on the present situations of the Cleansing Section. Benefits are also estimated at 30 % of their salaries. Salaries and wages are increased with the same rate as per capita GDP growth rate. See **Table J.4-3.**

Table J.4-3 Salaries of Employees for Collection Services

Unit: Kshs/month

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Administrative	11,055	11,297	11,545	11,797	12,056	12,320	12,590	12,865	13,147	13,435	13,729	14,030
Drivers	7,610	7,777	7,947	8,121	8,299	8,481	8,666	8,856	9,050	9,248	9,451	9,658
Loaders	4,940	5,048	5,159	5,272	5,387	5,505	5,626	5,749	5,875	6,003	6,135	6,269
Sweepers	4,940	5,048	5,159	5,272	5,387	5,505	5,626	5,749	5,875	6,003	6,135	6,269
Supervisors	5,750	5,876	6,005	6,136	6,270	6,408	6,548	6,692	6,838	6,988	7,141	7,297
Headmen	5,750	5,876	6,005	6,136	6,270	6,408	6,548	6,692	6,838	6,988	7,141	7,297

Source: *NCC and JICA Study Team*

(b) Overhead Cost

Overhead cost is assumed at 60 % of the total personnel cost with the consideration of the examples of private companies, which is 90-100% of the salaries. The reasons for the lower percentage in NCC are as follows:

(i) Land rents are not necessary to pay.

(ii) Scale economy is expected since the operation size is larger as well as costs are shared with other Departments in NCC.

(3) Estimation of Operation-Maintenance Cost for Collection Services

(a) Personnel

Number of employees are estimated based on the collection and transportation plan. Such employees consist of drivers, loaders, sweepers, supervisors and headmen. Benefits are also estimated at 30 % of salaries. See **Table J.4-3.**

(b) Fuel/Oil Costs for Vehicles

Consumption of fuel and oil by collection vehicles are estimated based on the collection and transportation plan.

(c) Maintenance Cost for Vehicle/Equipment and Transfer Station

Annual maintenance cost of collection vehicles/equipment are estimated at 3 % of their purchase cost.

(d) Maintenance Cost for Parking Lots

Annual maintenance cost of parking lots are estimated at 1 % of their construction cost.

(e) Overhead Cost

Overhead costs are assumed at 70 % of the total of collection costs including personnel, fuel/oil, dustbin, vehicle maintenance and parking maintenance with the consideration of the examples of private companies, which is 90-100% of the salaries. The reasons for the lower percentage in NCC are as follows:

(i) Land rents are not necessarily to pay.
(ii) Scale economy is expected since the operation size is larger.

(4) Estimation of Initial Investment Cost for Collection Services

Number of necessary vehicles/equipment and parking lots and other facilities are estimated based on the collection and transportation plan. Engineering costs is estimated at 5% of construction costs. See **Table J.4-4** for unit cost of system components.

Table J.4-4 Unit Cost of Collection System Components

Item	Unit	Cost (Kshs)	Remarks
Compactor	Each	4,500,000	
Container Truck	Each	4,000,000	
Side Loader	Each	3,750,000	
Tipper	Each	3,250,000	
Trailer	Each	6,000,000	
Container	Each	250,000	
Wheel Loader	Each	10,000,000	
Water Sprinkler	Each	2,250,000	
Inspector Car	Each	2,500,000	
Tow Truck	Each	30,000,000	
Parking Lot	Each	9,000,000	Land acquisition not included
Workshop	LS	30,000,000	Land acquisition not included
Transfer Station	LS	1,500,000,000	Land acquisition not included

Source: *NCC and JICA Study Team*

(5) Depreciation of Vehicles/Equipment for Collection Services

Depreciation of vehicles, equipment, other works of the transfer station is counted in costs with a straight-line method. Scrap value is assumed to be zero.

(6) Estimation of Disposal Cost

(a) Design Cost

Design cost is estimated at 5 % of construction cost.

(b) Construction Cost

Construction cost is accrued in accordance with the construction schedule. Total construction cost is estimated with the target collection rate but not changed even if the collection rate is lower than the target collection rate in the course of the project.

(c) Heavy Equipment Cost

All the heavy equipment is prepared in the year before the starting year of services. Heavy equipment cost is changed if the collection rate is lower than the target collection rate in the course of the project.

(d) Operation and Maintenance Cost

Operation and maintenance cost is changed if the collection rate is lower than the target collection rate in the course of the project.

(e) Depreciation

Depreciation of heavy equipment is counted in costs with straight-line method. Scrap value is assumed to be zero.

(7) Costs for Capacity Building Assistance Program

Costs for the capacity building assistance program is estimated at Kshs 55.6 million including the public awareness program (Kshs 6.4 million).

(8) Costs for the Community Waste Management Project

The Community Waste Management Project is planned to execute and its cost, 12 million Kshs, is counted in.

(10) Cost Allocation among Households and Commercial Entities

Estimated costs are allocated among households and commercial entities in accordance with their waste collection.

Households and commercial entities using private collection companies are expected to share the disposal costs because they get extra benefit from disposal services operated by NCC.

(11) Construction/Investment Schedule

Construction and investment in vehicles and others are assumed to be carried out in accordance with the most effective procurement schedule. For example, vehicles are expected to be employed year-by-year in accordance with the waste collection amount.

(12) Long-Term Loan

(a) Conditions

The following long-term loan conditions (**Table J.4-5**) are assumed considering the existing loans. However, these loans were agreed in 1970's and 1980's and new loans were not pledged recently in the social sector in Nairobi. Thus, more severe conditions are expected on the ground that the recent financial conditions of NCC and Kenya.

Table J.4-5 Conditions for a Long-Term Loan

Interest Rate	Repayment Period	Grace Period
8%	10 years	5 years

(b) Loan and Repayment Schedule

The loan and repayment schedule based on the construction/investment schedule and loan conditions.

4.2 Consideration of Excess Personnel

Presently, staff numbers of Cleansing Section are 31 for Administrative, 111 for drivers, 339 for loaders, 1,640 for sweepers, 303 for Supervisors/Headmen and 17 for the final disposal site. Although the staff number in the final disposal site will increase for the new service, it is expected that number of existing staff exceeds the necessary personnel for the new collection/transportation system because the new system will be operated in a more effective way.

On the other hand, it is also expected that the number of staff can be reduced by more than 10 % every year by suspending new employment as well as improving effectiveness of the organisation. However, the number of existing staff would still exceed that for the new system for 60% waste collection case.

It is estimated that around 600 persons will be excess personnel in 2000 when the new systems are planned to start. Thus, such excess personnel needs to be absorbed by staff reallocation among Departments in NCC and/or work sharing.

An extra cost for the excess personnel is projected at 122 million Kshs for the years of 2000-2008. Especially, the extra cost would be 54 million Kshs in 2000, which is 4% of the total revenue in 1994/95. **The Financial Projection below is carried out with existing excess personnel.**

4.3 Projection Results

Examination of financial viability is carried out for the optimum plan selected in "*4.5 Evaluation of Technical Alternative Plans*," of the Main Report (Master Plan study), which employs station collection method, transfer wastes through the transfer station to one disposal site. We got the following examination results using the estimated cash flow by changing the target collection rate. Charges for commercial entities and tipping fees for private companies are examined after household charges are decided.

4.3.1 Financial Projection of Technical Options

(1) Revised Assumptions/conditions

Following are additional assumptions made just to examine the cost effectiveness of each option:

(a) Costs are estimated from 1999 to 2008 with 100% solid waste collection.

(b) Number of personnel is estimated in a way that is most effective to the system.

Following are brief descriptions of technical options of each sector to compose the alternative plans:

Technical Options of Collection

A-1 : Container System with Side Loader, Tippers and Wheel Loaders

A-2 : Dump Truck (Tipper) System with Wheel Loaders

A-3 : Dump Truck (Tipper) System with Manual Loading

A-4 : Compactor System with Side Loaders, Tippers and Wheel Loaders

Technical Options of Transportation

B-1 : Two (2) Final Disposal Sites (Ruai and Ngong Road Forest) with a Transfer Station

B-2 : One (1) Final Disposal Sites (Ruai) with a Transfer Station

B-3 : One (1) Final Disposal Sites (Ruai) without a Transfer Station

Technical Options of Disposal Plan

C-1 : Two (2) Final Disposal Sites (Ruai and Ngong Road Forest)

C-2 : One (1) Final Disposal Sites (Ruai)

Combined Options

D-1 : Two Final Disposal Sites (Ruai and Ngong Road Forest) with Transfer Station

D-2 : One Final Disposal Sites (Ruai) with Transfer Station

D-3 : One Final Disposal Sites (Ruai) without Transfer Station

(1) Collection Options

Projection result is as follows:

Table J.4-6 Projection Result of Collection Options

	Collection Options			
	Option A-1	Option A-2	Option A-3	Option A-4
Operating Cost (US$1,000)	175,671	184,097	209,336	210,465
Depreciation (US$1,000)	37,208	34,768	21,836	24,604
Capital Cost (yearly) (US$1,000)	37,713	35,273	22,341	25,109
Engineering Cost (US$1,000)	2,083	1,951	1,243	1,393
Total (yearly) (US$1,000)	252,675	256,088	254,756	261,572
Operating Cost (US$1,000/year)	15,970	16,736	19,031	19,133
Depreciation (US$1,000/year)	3,383	3,161	1,985	2,237
Capital Cost (yearly) (US$1,000/year)	3,428	3,207	2,031	2,283
Engineering Cost (US$1,000/year)	189	177	113	127
Total (yearly) (US$1,000/year)	22,970	23,281	23,160	23,779
Cost Total (yearly) (US$/ton)	46.25	46.87	46.63	47.88
Cost: Opr. + Depr. (US$/ton)	38.96	40.06	42.31	43.03

From the projection result, **Option A-1** is the most cost effective option.

(2) Transport System

In the simulation, **Option A-1** is assumed to be employed for the collection system. Projection result is as follows:

Table J.4-7 Projection Result of Transfer Options

	Transfer Options		
	Option B-1	Option B-2	Option B-3
Operating Cost (US$1,000)	110,294	153,273	175,671
Depreciation (US$1,000)	33,200	44,935	37,208
Capital Cost (yearly) (US$1,000)	33,705	50,414	37,713
Engineering Cost (US$1,000)	1,864	3,344	2,083
Total (yearly) (US$1,000)	179,063	251,966	252,675
Operating Cost (US$1,000/year)	10,027	13,934	15,970
Depreciation (US$1,000/year)	3,018	4,085	3,383
Capital Cost (yearly) (US$1,000/year)	3,064	4,583	3,428
Engineering Cost (US$1,000/year)	169	304	189
Total (yearly) (US$1,000/year)	16,278	22,906	22,970
Cost Total (yearly) (US$/ton)	32.78	46.12	46.25
Cost: Opr. + Depr. (US$/ton)	26.26	36.28	38.96

From the projection result, **Option B-1** is the most cost effective option.

(3) Final Disposal Options

Projection result is as follows:

Table J.4-8 Projection Result of Final Disposal Options

	Final Disposal Options	
	Option C-1	Option C-2
Operating Cost (US$1,000)	6,714	5,983
Depreciation (US$1,000)	5,680	4,997
Capital Cost (yearly) (US$1,000)	39,201	32,853
Engineering Cost (US$1,000)	2,806	1,200
Total (yearly) (US$1,000)	54,401	45,033
Operating Cost (US$1,000/year)	610	544
Depreciation (US$1,000/year)	516	454
Capital Cost (yearly) (US1,000/year)	3,564	2,987
Engineering Cost (US$1,000/year)	255	109
Total (yearly) (US$1,000/year)	4,946	4,094
Cost Total (yearly) (US$/ton)	8.67	7.17
Cost: Opr. + Depr. (US$/ton)	1.97	1.75

From the projection result, **Option C-2** is the most cost effective option.

(4) Combined Options

Projection result is as follows:

Table J.4-9 Projection Result of Final Disposal Options

	Final Disposal Options		
	Option D-1	Option D-2	Option D-3
Collection/Transportation			
Operating Cost (US$1,000)	110,294	153,273	175,671
Depreciation (US$1,000)	33,200	44,935	37,208
Capital Cost (yearly) (US$1,000)	33,705	50,414	37,713
Engineering Cost (US$1,000)	1,864	3,344	2,083
Total (yearly) (US$1,000)	179,063	251,966	252,675
Cost Total (yearly) (US$/ton)	32.78	46.12	46.25
Cost: Opr. + Depr. (US$/ton)	26.26	36.28	38.96
Final Disposal			
Operating Cost (US$1,000)	6,714	5,983	5,983
Depreciation (US$1,000)	5,680	4,997	4,997
Capital Cost (yearly) (US$1,000)	39,201	32,853	32,853
Engineering Cost (US$1,000)	2,806	1,200	1,200
Total (yearly) (US$1,000)	54,401	45,033	45,033
Cost Total (yearly) (US$/ton)	8.67	7.17	7.17
Cost: Opr. + Depr. (US$/ton)	1.97	1.75	1.75
Total			
Operating Cost (US$1,000)	117,008	159,257	181,654
Depreciation (US$1,000)	38,880	49,931	42,205
Capital Cost (yearly) (US$ 1,000)	72,906	83,267	70,566
Engineering Cost (US$1,000)	4,670	4,544	3,283
Total (yearly) (US$1,000)	233,465	296,999	297,708
Cost Total (yearly) (US$/ton)	41.44	53.29	53.42
Cost: Opr. + Depr. (US$/ton)	28.24	38.03	40.71

From the projection result, **Option D-1** is the most cost effective option.

4.3.2 Examination of Waste Collection Rates and Balances

Relations between waste collection rates and the balances are examined by setting up average household charge at 100, 200, ..., 500 Kshs/month while commercial charges and tipping fees are fixed at those just covering the cost share for each case of financing. It should be noted that surpluses or deficits examined here are those of single-year base.

Projection results are shown in **Table J4-10**.

Table J.4-10 Waste Collection Rates and Balances

Sources of Finance	Waste Charge	Waste Collection	Balance (Kshs million) 2000	2001	2002	2003	2004	2005	2006	2007	2008
Loan 100%	100 Kshs	40%	-302	-382	-402	-412	-629	-676	-845	-856	-947
Loan 100%	100 Kshs	60%	-456	-562	-597	-624	-903	-997	-1,207	-1,260	-1,394
Loan 100%	100 Kshs	80%	-622	-761	-840	-908	-1,261	-1,382	-1,620	-1,696	-1,856
Loan 100%	100 Kshs	100%	-843	-1,035	-1,131	-1,220	-1,641	-1,787	-2,047	-2,159	-2,343
Loan 100%	200 Kshs	40%	-10	-77	-82	-77	-278	-309	-459	-452	-523
Loan 100%	200 Kshs	60%	-164	-256	-278	-289	-551	-630	-822	-856	-970
Loan 100%	200 Kshs	80%	-330	-456	-520	-573	-909	-1,015	-1,235	-1,292	-1,432
Loan 100%	200 Kshs	100%	-551	-730	-811	-885	-1,289	-1,420	-1,662	-1,746	-1,919
Loan 100%	300 Kshs	40%	282	229	237	258	74	59	-74	-48	-99
Loan 100%	300 Kshs	60%	128	49	42	45	-199	-262	-437	-452	-546
Loan 100%	300 Kshs	80%	-38	-150	-200	-238	-558	-647	-850	-888	-1,008
Loan 100%	300 Kshs	100%	-259	-424	-492	-550	-937	-1,052	-1,276	-1,342	-1,495
Loan 100%	400 Kshs	40%	574	534	557	593	426	426	311	356	324
Loan 100%	400 Kshs	60%	420	355	361	380	152	105	-52	-48	-122
Loan 100%	400 Kshs	80%	254	155	119	97	-206	-280	-465	-484	-584
Loan 100%	400 Kshs	100%	33	-119	-172	-215	-585	-685	-891	-938	-1,071
Loan 100%	500 Kshs	40%	866	839	876	927	777	794	696	760	748
Loan 100%	500 Kshs	60%	712	660	681	715	504	473	334	356	302
Loan 100%	500 Kshs	80%	546	461	439	431	146	88	-79	-80	-160
Loan 100%	500 Kshs	100%	325	187	147	119	-234	-317	-506	-534	-647
L 50%/G 50%	100 Kshs	40%	-191	-209	-229	-239	-301	-280	-472	-503	-614
L 50%/G 50%	100 Kshs	60%	-323	-356	-392	-420	-506	-528	-765	-841	-999
L 50%/G 50%	100 Kshs	80%	-469	-522	-601	-670	-795	-839	-1,107	-1,210	-1,397
L 50%/G 50%	100 Kshs	100%	-662	-760	-857	-946	-1,097	-1,162	-1,456	-1,591	-1,815
L 50%/G 50%	200 Kshs	40%	101	97	91	96	51	88	-87	-99	-191
L 50%/G 50%	200 Kshs	60%	-31	-50	-72	-85	-154	-161	-380	-437	-575
L 50%/G 50%	200 Kshs	80%	-177	-216	-281	-335	-443	-472	-721	-806	-973
L 50%/G 50%	200 Kshs	100%	-371	-454	-537	-612	-745	-795	-1,071	-1,187	-1,391
L 50%/G 50%	300 Kshs	40%	393	402	410	431	402	455	298	305	233
L 50%/G 50%	300 Kshs	60%	261	255	247	250	198	207	6	-33	-151
L 50%/G 50%	300 Kshs	80%	115	89	38	-0	-91	-104	-336	-402	-549
L 50%/G 50%	300 Kshs	100%	-79	-149	-217	-277	-394	-427	-685	-783	-967
L 50%/G 50%	400 Kshs	40%	685	708	730	765	754	823	684	709	657
L 50%/G 50%	400 Kshs	60%	553	561	567	585	549	574	391	371	273
L 50%/G 50%	400 Kshs	80%	407	395	358	334	260	263	49	2	-125
L 50%/G 50%	400 Kshs	100%	213	157	102	58	-42	-60	-300	-379	-543
L 50%/G 50%	500 Kshs	40%	977	1,013	1,050	1,100	1,106	1,190	1,069	1,113	1,081
L 50%/G 50%	500 Kshs	60%	844	866	886	919	901	942	776	775	697
L 50%/G 50%	500 Kshs	80%	699	700	677	669	612	631	434	406	298
L 50%/G 50%	500 Kshs	100%	505	462	422	393	310	308	85	25	-119
Grant 100%	100 Kshs	40%	-191	-210	-187	-165	-192	-172	-311	-306	-349
Grant 100%	100 Kshs	60%	-323	-361	-352	-346	-395	-414	-589	-622	-705
Grant 100%	100 Kshs	80%	-464	-532	-561	-593	-676	-715	-914	-970	-1,076
Grant 100%	100 Kshs	100%	-662	-771	-816	-867	-972	-1,030	-1,250	-1,332	-1,466
Grant 100%	200 Kshs	40%	101	95	133	169	159	195	74	98	75
Grant 100%	200 Kshs	60%	-31	-55	-32	-11	-43	-46	-204	-218	-281
Grant 100%	200 Kshs	80%	-172	-226	-242	-259	-325	-347	-529	-566	-652
Grant 100%	200 Kshs	100%	-371	-465	-497	-532	-620	-662	-865	-928	-1,042
Grant 100%	300 Kshs	40%	393	401	452	504	511	563	459	502	499
Grant 100%	300 Kshs	60%	261	250	287	324	309	321	191	186	143
Grant 100%	300 Kshs	80%	120	79	78	76	27	20	-144	-162	-226
Grant 100%	300 Kshs	100%	-79	-160	-177	-198	-269	-295	-480	-524	-618
Grant 100%	400 Kshs	40%	685	706	772	839	863	930	844	906	923
Grant 100%	400 Kshs	60%	553	555	607	658	661	689	567	590	567
Grant 100%	400 Kshs	80%	411	385	397	411	379	388	242	242	196
Grant 100%	400 Kshs	100%	213	145	142	137	83	73	-95	-120	-195
Grant 100%	500 Kshs	40%	977	1,012	1,092	1,174	1,215	1,298	1,230	1,310	1,347
Grant 100%	500 Kshs	60%	844	861	927	993	1,012	1,056	952	994	991
Grant 100%	500 Kshs	80%	703	690	717	746	730	755	627	646	620
Grant 100%	500 Kshs	100%	505	451	462	472	435	440	291	284	229

4.3.3 Examination of Relation between Collection Rates and Charges

In this subsection, household charge which just balance the O&M costs and depreciation for each year is examined. In this case the total balances which are deficit because capital cost and loan interest are not paid by households in accordance with **Section 3.2, General Principles of SWM Finance**. The charge is the same whatever the financing source is. On the other hand, balances differ depending on the finance sources. Thus, charge is Kshs 327 in 2000, Kshs 376 in 2004 and Kshs 446 in 2008 for 100% waste collection.

In the case where the initial investment costs are financed by loan 100%, balances are Kshs 180 million deficit in 2000, Kshs 669 million deficit in 2004 and Kshs 876 million deficit in 2008 respectively.

In the case where the initial investment costs are financed by loan 50%/grant 50%, balances are just zero in 2000, Kshs 125 million deficit in 2004 and Kshs 349 million deficit in 2008, respectively.

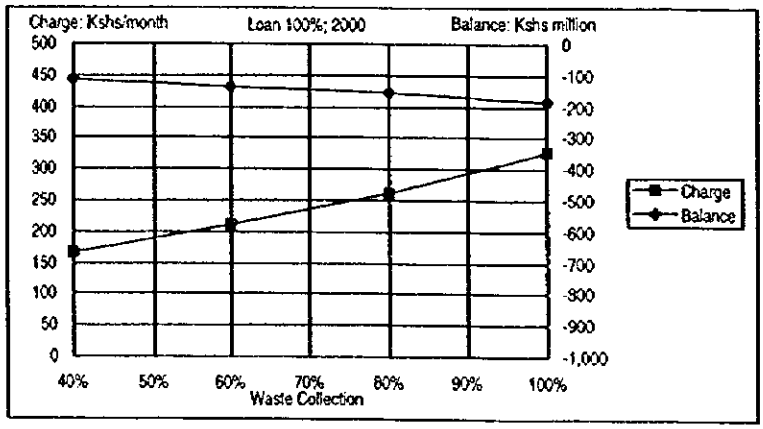

Figure J.4-1 Household Charges and Balances (2000); Loan 100%

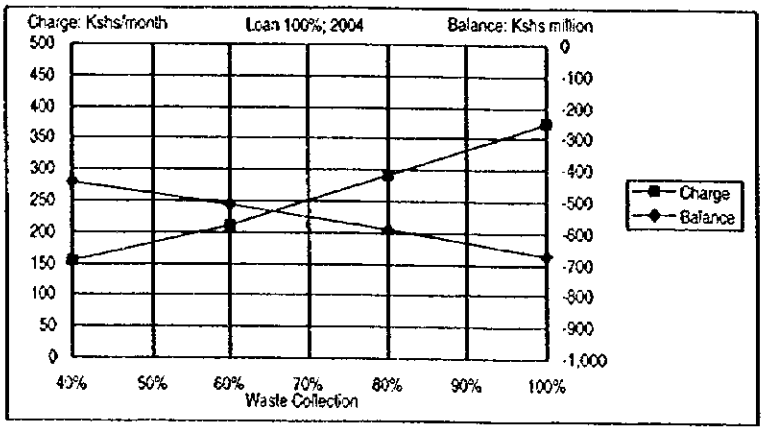

Figure J.4-2 Household Charges and Balances (2004); Loan 100%

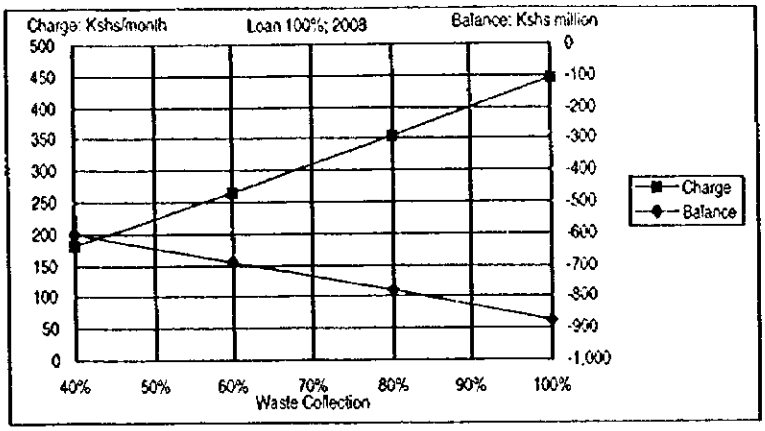

Figure J.4-3 Household Charges and Balances (2008); Loan 100%

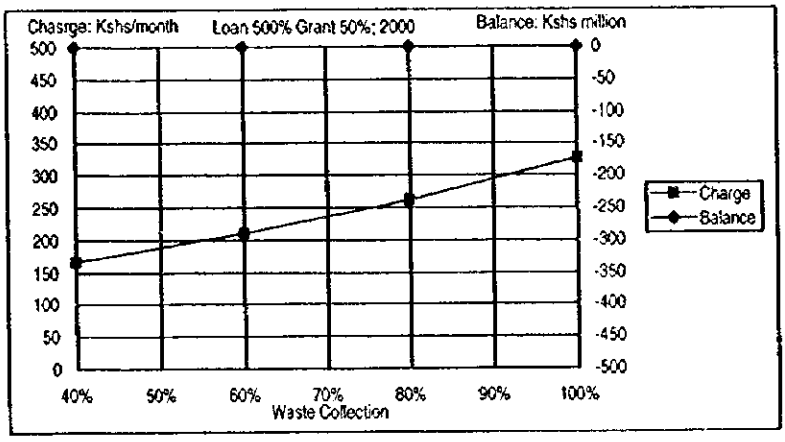

Figure J.4-4 Household Charges and Balances (2000); Loan 50%/Grant 50%

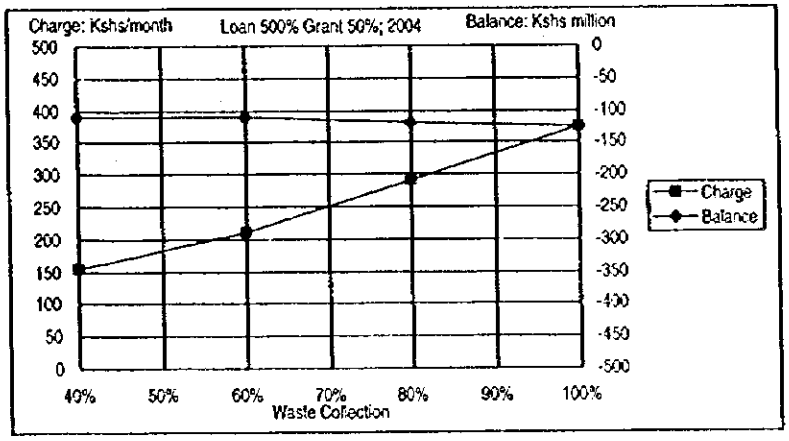

Figure J.4-5 Household Charges and Balances (2004); Loan 50%/Grant 50%

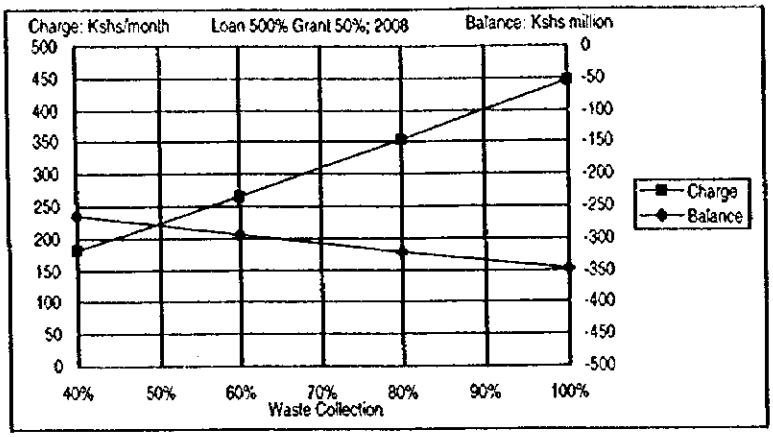

Figure J.4-6 Household Charges and Balances (2008) ; Loan 50%/Grant 50%

4.3.4 Step-up of Waste Collection Rate

Considering present low rate of waste collection and smooth transformation to the new system, it is better to increase the collection rate from the lower level to the target level in 2008. However frequent enhancement of the system is troublesome and intricate. So, three step enhancement is applied for the implementation of the Master Plan, namely, the first step target 60% in 2000, the second step target 80% in 2004 and the third step or final step target 100% in 2008.

4.3.5 Projection Result of Master Plan

Assuming the increase of collection rate with step-up wise, namely 60-80-100% as mentioned above, financial projection is made for the three cases of financing, Loan 100%, Loan 50%/Grant 50% and Grant 100%. Derailed figures are shown in **Data Book (1), Economic and Financial Aspect**.

4.4 Calculation of Financial Internal Rate of Return, NPV and B/C

FIRR, NPV and B/C of the Master Plan are calculated. Detailed figuras are shown in **Data Book (1), Economic and Financial Aspect.**

4.5 Sensitivity Analysis

Sensitivity analysis of the above-mentioned projection results is carried out on the cases of increasing in the project cost. Analysis for the change of revenues are already examined above. So, it is examined here that how average household charge which just balance the O&M costs and depreciation will change as well as the balance if the project costs of the collection/transportation system and the final disposal site are increased by 10% in 1997 price. Detailed figuras are shown in **Data Book (1), Economic and Financial Aspect**.

4.6 Consideration of Inflation Factor

It should be noted that the financial analysis and results so far exclude the inflation factor and described in 1997 fixed prices as mentioned in the assumptions. When such

results are applied in an actual operation, inflation should be took into consideration. Detailed figuras are shown in **Data Book (1), Economic and Financial Aspect**.

4.7 Examination of Service Level

In case that the revenues which are necessary to achieve 100% waste collection ratio in 2008 are not attained, reduction of service level should be took into consideration. Thus, the target levels are decided as follows: 40% in 2000, 50% in 2004 and 60% in 2008 which include services contracted out to private companies. Detailed figuras are shown in **Data Book (1), Economic and Financial Aspect.**

5. FINANCIAL ANALYSIS OF PRIORITY PROJECTS

5.1 Projection Results of Priority Projects

Financial analysis is carried out for the following priority projects for the First Implementation Stage (1998-2003):

(1) Institutional Restructuring and Financial Reform

(2) Promotion of Private Sector Involvement

(3) Construction of the Final Disposal Site

(4) Improvement of the Collection and Transportation System

Detailed figures are shown in **Data Book (1), Economic and Financial Aspect**.

5.2 Consideration of Service Level & Initial Investment

In case that the revenue necessary to achieve 60% waste collection ratio is not attained, reduction of service level and the initial investment may be taken into consideration.

Firstly, reduction of service level is considered not only from the viewpoint of revenue but on how the new system can be started without difficulty. Thus, the target levels are decided as 40% in 2000-2003, as mentioned in the Master Plan Study.

Secondly, reduction of the initial investment is introduced as follows:

(a) the construction of transfer station is delayed to the Second Implementation Stage and direct transportation system is employed in the First Implementation Stage; and

(b) the sanitary level of landfill system for the new disposal site is reduced to Level 2+.

Detailed figures are shown in **Data Book (1), Economic and Financial Aspect**.

6. FINANCIAL STATEMENTS

In the financial projection, charge revenues, O&M cost, depreciation, initial investment are estimated. Grant aid is assumed to be extended just to cover the initial investment costs including engineering. In usual financial analysis, a cashflow table is made because it is necessary to calculate IRR. Here the process of making the profit/loss statement and the balance sheet is explained in detail. In this case, calculation period is assumed to be 1998-2000 since each year base calculation can be made instantly from this result.

6.1 Making Revenue/Expenditure Table and Cash Flow Table

At first, a revenue/expenditure table should be made to record all revenues and expenditures in each year as usual. In this process, a cashflow table also made since it is just reformation of the revenue/expenditure table without additional information.

6.2 Journal Entry

All the revenues and expenditures are entered in a **journal**. In this process, each revenue/expenditure item is entered as follows (**Table J.6-1**):

Table J.6-1 Revenue and Expenditure Journal

Charge Revenue	Cash Account-Debit	Charge Account-Credit
O&M Cost	O&M Account-Debit	Cash Account-Credit
Depreciation	Depreciation Account-Debit	Initial Investment Account-Credit
Grant Aid	Cash Account-Debit	Grant Aid Account-Credit
Initial Investment	Initial Investment Account-Debit	Initial Investment Account-Credit

Result of journal entry is shown in **Table J.6-2**.

6.3 Trial Balance of Totals

After journal entry, a trial balance of totals is made. It summarises the total of debit side and the total of credit side in each account. See **Table J.6-3**.

6.4 Trial Balance of Balances (T/B)

After making a trial balance of balances, a trial balance of balances (T/B) is made. It summarises the balance of each account. See **Table J.6-4**.

6.5 Work Sheet (6 Columns)

Profit/Loss Statement (P/L) can be made by calculating a net income with revenue items (Charge Account and Grant Aid Account) and expense items (O&M Account and Depreciation Account) in the T/B. On the other hand, Balance Sheet (B/S) can be made with asset items (Cash Account and Initial Investment Account), liability items (no accounts in this case) in T/B, initial equity (assumed to be zero) and the net income calculated in the P/L. A work sheet (in six columns) consists of such T/B, P/L and B/S. See **Table J.6-5**.

Table J.6-2 Journal Entry

Unit: Kshs million

Year	Item	Account	Account	Debit	Credit
1998	Charge	(Cash)		0.0	
			(Charge)		0.0
	O&M	(O&M)		0.0	
			(Cash)		0.0
	Depr	(Depr)		0.0	
			(Init Inv)		0.0
	Grant	(Cash)		0.0	
			(Grant)		0.0
	Init Inv	(Init Inv)		0.0	
			(Cash)		0.0
1999	Charge	(Cash)		0.0	
			(Charge)		0.0
	O&M	(O&M)		0.0	
			(Cash)		0.0
	Depr	(Depr)		0.0	
			(Init Inv)		0.0
	Grant	(Cash)		185.5	
			(Grant)		185.5
	Init Inv	(Init Inv)		185.5	
			(Cash)		185.5
2000	Charge	(Cash)		416.1	
			(Charge)		416.1
	O&M	(O&M)		328.2	
			(Cash)		328.2
	Depr	(Depr)		93.1	
			(Init Inv)		93.1
	Grant	(Cash)		2,620.1	
			(Grant)		2,620.1
	Init Inv	(Init Inv)		2,620.1	
			(Cash)		2,620.1
2001	Charge	(Cash)		787.1	
			(Charge)		787.1
	O&M	(O&M)		663.6	
			(Cash)		663.6
	Depr	(Depr)		180.0	
			(Init Inv)		180.0
	Grant	(Cash)		597.4	
			(Grant)		597.4
	Init Inv	(Init Inv)		597.4	
			(Cash)		597.4
2002	Charge	(Cash)		820.9	
			(Charge)		820.9
	O&M	(O&M)		669.4	
			(Cash)		669.4
	Depr	(Depr)		159.9	
			(Init Inv)		159.9
	Grant	(Cash)		448.3	
			(Grant)		448.3
	Init Inv	(Init Inv)		448.3	
			(Cash)		448.3
2003	Charge	(Cash)		857.3	
			(Charge)		857.3
	O&M	(O&M)		679.4	
			(Cash)		679.4
	Depr	(Depr)		165.4	
			(Init Inv)		165.4
	Grant	(Cash)		2.4	
			(Grant)		2.4
	Init Inv	(Init Inv)		2.4	
			(Cash)		2.4

Table J.6-3 Trial Balance of Totals as of 2003

Unit: Kshs million

Debit	Account	Credit
6,735.1	Cash	6,194.2
3,853.7	Initial Investment	598.3
	Charge	2,881.4
	Grant Aid	3,853.7
2,340.5	O&M	
598.3	Depreciation	
13,527.6	Total	13,527.6

Table J.6-4 Trial Balance of Balances (T/B) as of 2003

Unit: Kshs million

Debit	Account	Credit
540.9	Cash	
3,255.4	Initial Investment	
	Charge	2,881.4
	Grant Aid	3,853.7
2,340.5	O&M	
598.3	Depreciation	
6,735.1	Total	6,735.1

Table J.6-5 Work Sheet (6 Columns) as of 2003

Unit: Kshs million

Account	T/B		P/L		B/S	
	Debit	Credit	Debit	Credit	Debit	Credit
Cash	540.9				540.9	
Initial Investment	3,255.4				3,255.4	
Liabilities*						
Equity*						
Charge		2,881.4		2,881.4		
Grant Aid		3,853.7		3,853.7		
O&M	2,340.5		2,340.5			
Depreciation	598.3		598.3			
	6,735.1	6,735.1				
Net Income			3,796.3			3,796.3
			6,735.1	6,735.1	3,796.3	3,796.3

* "Liabilities" and "Equity" are listed in order to formalize the worksheet.

SECTION K

PUBLIC EDUCATION AND SOCIAL CONSIDERATIONS

THE STUDY ON SOLID WASTE MANAGEMENT IN NAIROBI CITY IN THE REPUBLIC OF KENYA

FINAL REPORT

SECTION K

PUBLIC EDUCATION AND SOCIAL CONSIDERATIONS

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SECTION K

PUBLIC EDUCATION AND SOCIAL CONSIDERATIONS

1. INTRODUCTION

This **Supporting Report Section K** considers the aspects of public education and awareness and the social issue on scavengers, particularly, those living at the Dandora Dumpsite. It is divided into the following five sections, as discussed below:

(1) Existing Level of Public Education and Awareness, in Section 1.1;

(2) Public Awareness Survey, in **Section 1.2**;

(3) Social Aspects of Scavenging, in **Section 1.3**;

(4) Survey of the Dandora Scavenging Community, in **Section 1.4**; and

(5) Discussion and Evaluation of Public Education and Social Considerations, in **Section 1.5**.

1.1 Existing Level of Public Education and Awareness

Strict resource constraints currently prevent any NCC department (including the Department of the Environment) from taking the initiative with respect to solid waste management (SWM) education and awareness promotion, although all relevant departments expressed a willingness to collaborate with the JICA Study Team in the development and dissemination of programmes in this area.

1.1.1 The NCC in General

Significant points are as follows:

(1) Neither the Cleansing Department nor the newly-created Department of the Environment has any current proposal or policy towards public education and awareness promotion with respect to solid waste management.

(2) Generally, there appears to be a lack of awareness about the scale of the solid waste management problems facing the city and, particularly, about the possible ways of addressing them.

(3) It is felt that the NCC would itself benefit from being targeted by such an awareness promotion programme, and a recommendation of the study is the introduction of a programme of measures to inform elected council officers and staff about these issues.

Nevertheless, some individuals and groups within the NCC are aware of the problems of solid waste management - NCC's membership and active participation in the Clean and Green Towns (CGT) Award Group (discussed in **Section 1.1.5** below) is an example of this.

In addition to its role as a member of the CGT Award Group, the NCC is active in promoting the involvement and participation of both the local NGOs and CBOs. This is done to a limited extent by:

(a) encouraging communities to set up their own primary collection systems;

(b) providing secondary collection/storage facilities in strategic locations;

(c) providing equipment, including shovels, wheelbarrows, rakes, brooms etc., for clean-up activities;

(d) providing supervisory personnel and labour, particularly during organised clean-up activities; and

(e) providing secondary collection services to collect and transport waste to disposal sites.

The resources of the NCC are extremely limited. If the NCC is to play this facilitating role more effectively in the future, then the resources needed to do this must be expanded. Significant aspects of current activities - and particularly those relating to communities setting up their own primary collection systems - are proposed to be developed further under the proposed strategy.

In doing this, the principle that the NCC will work in a participatory manner with other organisations to improve the quality of solid waste management services in Nairobi is one which needs to be built on firmly, both during the development of an overall strategy for the city, and in the formulation of public awareness and education programmes.

1.1.2 The Public Relations Section (PRS) of the NCC

Significant points are:

(a) The PRS is responsible for all public relations activities of the council. The public relations requirements of all NCC departments are required to be routed through the PRS for approval by the chief executive (town clerk).

(b) The PRS is under-staffed, currently having only two officers to cover the requirements of the NCC.

(c) The work of these officials includes writing speeches for the mayor and town clerk; attending to public enquiries; reviewing all council publications; coordinating council relations with external agencies and the public; attending to presidential functions, state visits and national celebrations; and information dissemination.

(d) The PRS uses all the media for information dissemination and has produced documents on individual projects (e.g., the Nairobi Water Project).

(e) No programmes have been initiated recently by the NCC to improve public education and awareness of domestic solid waste management issues, and there are no proposals for any at the present time.

(f) The PRS would want to be kept informed of any activities in this area, and would be willing to participate in their dissemination.

1.1.3 The Department of City Education

Significant points are:

(a) Parents have a major input into the primary school system in Nairobi through cost sharing, being responsible for the provision of many of the physical facilities and materials used in the schools.

(b) Education is therefore expensive, resulting in the development of many non-formal schools established to meet the needs of families unable to afford school fees in the formal sector.

(c) The national curriculum is followed, leading to a Kenyan Certificate of Primary Education (KCPC). The curriculum leaves little opportunity for introducing new subject areas - such as environmental protection and awareness - although these issues are covered generally within the syllabus.

(d) For example, the Department introduced a 'let's make it green and plant trees' initiative in the core-subject area of 'Agriculture', thereby stimulating interest and involvement in the issue.

(e) This is a participatory programme - involving schools, parents, the NCC and the Forestry Commission - through which wider communities are made aware of the issues and participate in the scheme. Awareness is thereby created in children.

(f) The department supports such initiatives, firmly believing that social attitudes are (and can be) strongly influenced during primary school years. It is very supportive of the JICA project and would be willing to participate in public education programmes implemented through the school system.

(g) It would participate in providing guidance on aspects such as poster design, and would support activities in which the children are involved. For example, drama is a core-curriculum subject and this, together with prose and creative writing, could be used to introduce concepts and ideas to the wider school population.

1.1.4 The Department of Social Services and Housing

Significant points are:

(a) The Department has overall responsibility for maintaining conditions in the city markets to which it provides sweepers.

(b) The Department has authority to produce training programmes directed mainly at school leavers to introduce skills needed in employment and self-employment. The Department currently has few resources with which to offer such programmes.

(c) The Department has a family welfare function which could be used to promote awareness of solid waste management issues, although staff shortages and funding constraints again would prevent this under current conditions.

1.1.5 Groups Involved in Public Awareness Promotion and Education

A number of groups are actively involved in the process of improving public awareness of SWM and related issues by Nairobi citizens. Mobilising the resources of these groups is considered to be of the highest priority if workable solutions are to be found to the waste management problems of the city. Public education and awareness raising should be designed to complement and reinforce the activities of these groups.

Although responsibility for waste management has been seen as a responsibility of the NCC, it is now recognised that NCC does not have the capacity to do this without public assistance. The Council is aware of this, and is supportive of participatory arrangements to address the city's problems.

Groups which are involved - to a greater or lesser extent - in issues relating to SWM include:

(a) Non-governmental organisations (NGOs)
(b) Community-based voluntary organisations (CBOs)
(c) Other voluntary groups
(d) Private sector waste collectors
(e) The Clean and Green Towns Award Group

(1) Non-Governmental Organisations (NGOs)

NGOs play an important role in social mobilisation, awareness promotion, and the provision of technical and financial support. They frequently work closely with one another and with CBOs. Groups known to be operating in this field are listed in **Section 11.1 of Data Book (1)**.

Most view SWM problems in the peri-urban areas as being symptomatic of the wider social problems created by poverty, and stress that SWM issues in these areas should be addressed by integrated programmes of measures designed to tackle the wider problems or causes.

They stress the following:

(a) That such programmes should be designed and implemented via a participatory approach, in which NGOs work in close collaboration with CBOs and the NCC;

(b) That these problems can be addressed only through a large number of small scale projects and that there is no single master strategy through which this can be done; and

(c) That tackling the problems of the urban poor (including improving sanitary conditions) is a slow process involving a high level of long-term commitment on the part of dedicated individuals and organisations.

The following points are made by NGOs with respect to public awareness promotion of SWM issues in the peri-urban areas:

(a) That community awareness is most effectively promoted through demonstration projects.

(b) That programmes for promoting awareness through public education programmes must be carefully targeted at specific communities. General awareness campaigns targeted towards low, middle and high income groups are likely to be fundamentally different from those aimed at the very poor.

(c) That solutions to SWM problems faced by the urban poor are unlikely to come from looking at these in isolation from the wider problem of which they are part. An axiom of the approaches taken by NGOs and CBOs working in these areas is to find integrated solutions to the wider social problems faced by communities.

(d) In particular, measures designed to alleviate poverty are taken to be the main objective.

Improvements in waste management practices are viewed as a desirable outcome of implementing wider and more comprehensive programmes aimed at reducing poverty. Public education and public awareness programmes targeted towards these areas should therefore be designed to complement and reinforce this approach.

(2) Community Based Organisations (CBOs)

These groups work primarily with low income settlements and slum communities. They assist by mobilising resources within the communities to provide activities related to primary waste collection and disposal services (including recycling and composting). They work closely with NGOs and the NCC during both the initial establishment and the implementation phases of self-help initiatives. The NCC is strongly supportive of their activities. Groups known to be operating in this field are listed in **Section 11.2 of Data Book (1)**.

These groups are involved in the day-to-day implementation of self-help initiatives. They are therefore extremely well aware of the issues of concern to the communities they represent, and of the scope for and approaches to mobilising community resources.

(3) Other Voluntary Groups

Other environmentally oriented voluntary groups are those motivated largely by a desire to live in a clean and healthy environment. They work within

communities to clean up areas not otherwise serviced by the NCC, such as the Nairobi River, the Kenyatta Hospital and the Machatos Bus Station.

Such groups are diverse, and include school children; consumer and industrial organisations; boy scouts and guides; Coca-Cola Bottlers; community, youth and women's groups; National Christian Churches of Kenya; Lions Club International; and the Bamaco Community Initiative Programme.

(4) Private Sector Waste Collectors

This group falls under two categories:

(a) Primary collectors (scavengers) who collect re-useable and recyclable materials from source of generation (either through door-to-door collection or from scavenging at formal and informal dumping sites) for sale within the waste recycling industry; and

(b) Private companies which collect combined wastes from source of generation for transport and final disposal at disposal sites.

Members of the first group are generally referred to as scavengers, a slightly pejorative term. However, as discussed in **Section 1.5**, scavengers play a fundamental role in the Kenyan recycling industry. Not only does this result in high levels of resource recovery (sustainability), but also generates significant income for the urban poor and substantially reduces the amount of waste required to be taken for ultimate disposal.

Policy towards scavengers should therefore be formulated on the basis of an understanding of the role of materials recycling in the waste management process, and of the scavengers within it.

The role of private waste collectors is discussed elsewhere in this report.

(5) The Clean and Green Towns Award Group (CGT)

The CGT is a coalition of several organisations constituted with the aim of improving environmental conditions in Kenya. It consists of:

(a) Private-sector companies;
(b) Local NGOs;
(c) International organisations;
(d) Public sector agencies; and
(e) Individuals and voluntary groups.

The goals and objectives of the Group are to raise public awareness and to encourage actions which sustain sound environmental conditions in Nairobi City. The approach is to raise public awareness in citizens, and to encourage groups of citizens to establish partnerships between themselves and private and public agencies participating in the Group. The NCC is a member of the CGT.

A CGT Working Group has been established, its members consisting of:

(a) Foundation for Sustainable Development in Africa (FSDA);
(b) Nairobi City Council (NCC);
(c) National Environment Secretariat (NES);
(d) Society for Protection of the Environment in Kenya (SPEK);
(e) Undugu Society;
(f) The Green Towns Project;
(g) Sarova Hotels;
(h) Bins (Nairobi) Ltd.;
(i) United Nations Environment Programme (UNEP); and
(j) Mathare Youth Sports Organisation (MYSA).

1.2 Public Awareness Survey

1.2.1 Survey Outline

A Public Awareness Survey was undertaken specifically to understand and ascertain the following:

(a) Citizens' attitudes of and awareness towards SWM;
(b) The level of citizens' satisfaction with current SWM services;
(c) Citizens' affordability and willingness-to-pay for these services;
(d) The SWM needs of citizens; and
(e) Citizens' approach to removing, recycling and re-using solid waste.

The Nairobi firm of Multi-Consult was appointed to assist with the survey, and was involved in the development of the questionnaire, the selection of the survey sample, and survey administration and evaluation. A copy of the survey questionnaire is contained in **Section 11.5 of Data Book (1).**

A sample size of 500 respondents was used as specified in the TOR, and a stratified sample was chosen to represent high (49 households), middle (100 households), low income (197 households) and the surrounding slum areas (158 households). Locations of sampling households for the survey are as shown in **Figure K.1-1.**

The survey questionnaire was prepared with the full participation of the Kenyan authorities. The range of questions was comprehensive, and it is clear that respondents found some easier to answer than others. For most questions the overall response rate was good, but for some it was poor. Where response rates are low caution is necessary when interpreting the representativeness of responses. Reference is made on the following overall analysis of the survey results whenever the availability of data is poor.

1.2.2 Key Survey Findings

The results of the survey are presented in **Section 11.6 of Data Book (1),** and some important findings are summarised in **Table K.1-1.**

Table K.1-1 General Findings from the Social Awareness Survey

Housing Area / Item	High Income Area		Medium Income Area		Low Income Area		Surrounding Areas	
Existence of waste collection service	Yes; 74%	No: 26%	Yes: 84%	No: 16%	Yes: 25%	No: 75%	Yes: 26%	No: 74%
Collection by:								
- NCC	27%		83%		64%		-	
- private company	73%		17%		36%		-	
Satisfaction with the waste collection service	Yes: 76%	No: 24%	Yes: 78%	No: 22%	Yes: 39%	No: 61%	-	-
Willingness to pay for improved services	Yes: 53%	No: 47%	Yes: 59%	No: 41%	Yes: 58%	No: 42%	Yes: 67%	No: 33%
Point of waste disposal from the house:								
- own bin	48%		16%		13%		6%	
- communal collection	10%		58%		55%		56%	
- around the premises	17%		8%		23%		15%	
- other	25%		18%		8%		23%	
Person dealing with the waste:								
- housekeeper	85%		30%		9%		15%	
- wife	6%		13%		43%		46%	
- head of household	-		5%		8%		5%	
- child	-		4%		9%		25%	
- other	4%		48%		31%		9%	
Sweeping of road shoulder	Good: 85%	Poor: 15%	Good: 60%	Poor: 40%	Good: 37%	Poor: 63%	Good: 29%	Poor: 71%
Cleanliness of the drains	Good: 85%	Poor: 15%	Good: 61%	Poor: 39%	Good: 37%	Poor: 63%	Good: 48%	Poor: 52%
Awareness of health risks from solid waste	Yes: 31%	No: 69%	Yes: 89%	No: 11%	Yes: 86%	No: 14%	Yes: 69%	No: 31%

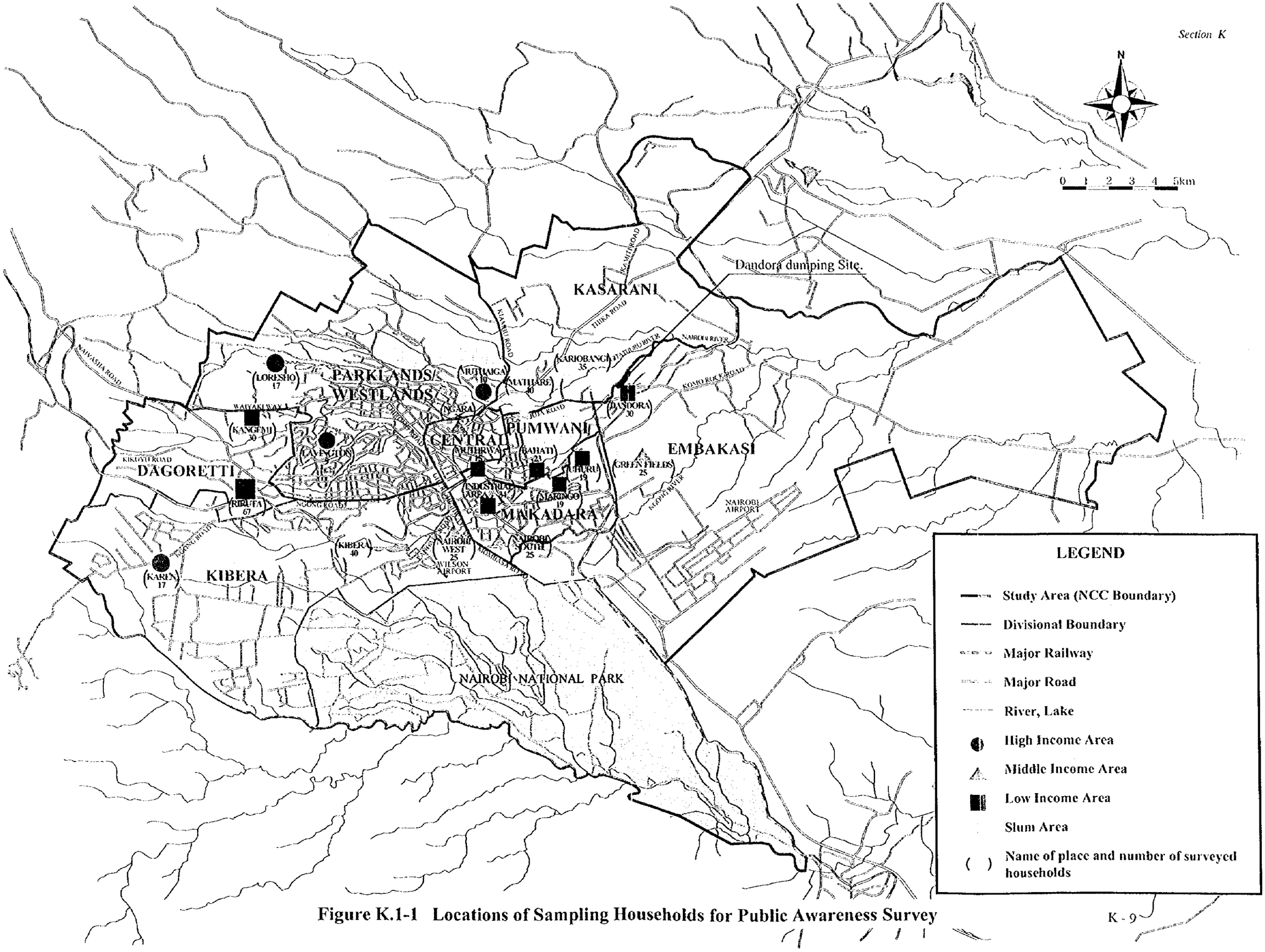

Figure K.1-1 Locations of Sampling Households for Public Awareness Survey

(1) General Findings

(a) Considerable variation exists between the different income areas for average household size. This ranges from 5 to 6 persons for high, medium and low income areas, and falls sharply to 2.5 for surrounding areas.

(b) Ownership of consumer durables reflects the different income areas. A high proportion of respondents in high and middle-income areas reported having a fridge, TV, radio and VCR. A significant number of respondents in low income and surrounding areas reported having TVs and radios, but only a small fraction had fridges or VCRs.

(c) The general tidiness of an area, measured by the cleanliness of the road shoulder and drains is found to be generally high in high and middle income areas and low in low income and surrounding areas.

(d) Most respondents (94%) stated that there were no particular customs or habits which influenced their attitudes towards household waste management. In all areas it was found to be the wife, rather than the head of household, who was responsible for making decisions regarding household waste disposal. Given that the head of household in many areas - and particularly the surrounding areas - is a woman, it follows that the majority of decisions about waste management are probably made by women.

(2) Community Participation and Awareness

(a) Slightly less than 50% of all respondents reported having had advice on the safe handling of domestic waste, although the percentage was highest in the surrounding areas, where70% reported having received advice. The lowest percentage was in low income areas, with only one-third of respondents having received advice.

(b) All areas reported a high level of awareness (76%) of the risks associated with domestic solid waste. Awareness was highest in medium and low income groups (88%), although 69% of respondents in surrounding areas were also aware.

(c) Sixty-five percent of respondents from surrounding areas reported having participated in activities intended to improve sanitary conditions in their areas, the figure falling to 35% in low-income areas and to 20% in high and medium income areas.

(d) A high proportion of respondents in high, middle and low income areas (70%) would be interested in participating in such activities, although only 35% of respondents from surrounding areas expressed such an interest.

(3) Storage and Discharge Conditions

(a) A plastic bucket is the main means of waste storage in the house, with 45% of respondents reporting its use. The next most common receptacle

is a plastic bag, with 21% using this means. The most common means in medium income areas is a plastic bag provided by a collection company (over 50%).

(b) The person primarily responsible for removing waste from households is the housekeeper in upper and middle-income areas, and the wife in low income and surrounding areas. Children also have a major responsibility for this in the poorer areas.

(c) Of 471 respondents, one-third reported having no communal container or collection point, for one-third the collection point was further than 30 metres away, and for another third it was within 30 metres.

(d) Apart from high income areas, in which householders use their own bins for collection by the collection service, all other areas show communal collection points to be the most frequent form of disposal point (50%). Significant amounts of waste are also disposed of around the premises (20%) and by other (undefined) means (20%).

(e) Reasons given for disposing of waste around the premises are the absence of a communal discharge point (74%) and too far to the discharge point (9%).

(f) The majority of households (75%) do not dispose of waste at a particular time of the day, and 45% do this once a day and 20% twice a day.

(4) Collection Services

(a) A high proportion of respondents in high (74%) and medium (84%) income areas report having a collection service. This is provided predominantly by the private sector in high income areas (73%) and by the NCC in medium income areas (83%). There is a high level of satisfaction with existing services (greater than 75%) in these areas. A majority of respondents in both areas would be willing to pay for improved services.

(b) A high proportion of respondents in low income and surrounding areas report not having a collection service (75%). Where services exist, these are provided primarily by the NCC. There is a high level of dissatisfaction with existing services (60%). A majority of respondents in both areas would be willing to pay for improved services.

(c) The costs paid by existing users for SWM services are summarised in **Table K.1-2** below. Note that the number of respondents to this question from the high income areas was low, and the cost range wide. This accounts for the high standard deviation. The number of respondents from low income areas was very low, and this result is perhaps best ignored (particularly since these users are likely to pay no more than the current statutory charge of Kshs 10/month).

(d) It can be seen that average costs reportedly paid in high income areas range from Kshs 200-2,500, with an average value of Kshs 520. The range reported from medium income areas is Kshs 100-1,000, with an average of about Kshs 250.

(e) Respondents in middle income areas reported a high frequency of collection services per week, and mostly at a fixed time of day. Only a small number of respondents from the poorer areas were able to answer questions about the frequency and timing of collection services.

(f) Of 210 respondents to the question asking the type of collection service wanted, almost 50% (103) wanted waste to be collected from a common discharge point and the neighbourhood kept clean. Thirty percent wanted their waste collected from the house and taken to a common discharge point, and 22% wanted a household collection service and the waste to be removed from the communal disposal point.

Table K.1-2 Amounts Currently Paid for Collection Services

Housing Area	Average Cost per month	Standard Deviation	Total Number	Range (Kshs.)
High income	518	502	20/52	200 - 2,500
Medium income	247	163	70/106	100 - 1000
Low income	79	47	9/159	20 - 150
Surrounding area	-	-	-	-

(5) Willingness-to-Pay

(a) Response to the question about willingness-to-pay for improved collection services by the NCC was high, and more than 50% of all groups expressed a willingness-to-pay (refer to **Table K.1-3** below). Interestingly, two-thirds of respondents in surrounding areas expressed a willingness to pay.

(b) The willingness-to-pay for improved SWM collection services by respondents in the three formal sectors is summarised in **Table K.1-4**. The survey elicited a wide range of replies within each group, and this accounts for the high standard deviations attached to the mean values.

(c) Average willingness-to-pay varies in response to income area, being Kshs 400/month in high income areas, Kshs 350 in medium income areas, and about Kshs 100/month in low income areas.

(d) Respondents from surrounding areas were largely not prepared to answer questions about the amount they would be willing to pay for improved waste management services. Possible explanations for this are discussed later in **Chapter 2**.

Table K.1-3 Percentage of Respondents Willingness to Pay for Collection Services

Housing Area	Willing to Pay	Not Willing to Pay	Number of Respondents
High income	53%	47%	49
Medium income	59%	41%	100
Low income	58%	42%	197
Surrounding area	67%	33%	157

Table K.1-4 Average Cost Respondents are Willingness to Pay for Collection Services

Housing Area	Average Cost per month	Standard Deviation	Total Number	Range
High income	400	536	15/52	20 - 2000
Medium income	350	325	60/106	150 - 1500
Low income	106	104	71/159	2 - 500
Surrounding area	-	-	-	-

(6) Recycling

(a) A very high proportion of respondents (90%) showed an awareness of recycling, although there was a general reluctance to separate kitchen wastes from other wastes (with 57% overall being reluctant to do this). This was highest in low income areas, where 68% were reluctant.

(b) Slightly under 50% of households reported recycling collectors coming to their premises to salvage waste. Low income areas however reported a very high incidence of visits by collectors, with 78% answering in the affirmative. This can be compared with the surrounding areas, where only 26% replied in the affirmative.

(c) Over 80% of respondents visited by collectors reported a collector calling once a week, with the majority using a handcart, and the remainder a bicycle.

1.2.3 Summary and Discussion of Survey Findings

Average household size in the formal (high, middle and low income) areas are found to be approximately double those in the surrounding areas. Ownership of TVs and radios is common in all areas, but very few households in low income or surrounding areas own a refrigerator.

Almost 50% of respondents reported having received advice on the safe handling of domestic wastes (70% in the surrounding areas), and all areas reported a high level of awareness of the risks involved. There was a high level of interest in participating in activities to improve sanitary conditions.

A plastic bucket is the principal means of storing waste in the house, the next most common being a plastic bag. The housekeeper is mainly responsible for disposing of waste in upper and middle-income households, and the housewife in low income and surrounding areas.

One-third of respondents reported not having a communal container or collection point, and another third reported the closest point was farther than 30 metres from the house. The communal collection point is the most common place of disposal, with disposal of waste around the premises being the next. The main reason for this is the lack of a designated disposal point.

A significant majority of residents in high and middle income areas reported having a collection service, this commonly being provided by the private sector in high income

areas and by the NCC in middle income areas. However, a significant majority of residents in low income and surrounding areas reported not having a collection service, and a high level of dissatisfaction was expressed by those having a service.

Indicative average costs paid for services are about Kshs 520 per month in high income areas and Kshs 250 per month in middle income areas. Given that the legal requirement is for all households to pay Kshs 10 per month to the NCC, these figures presumably reflect the additional costs incurred in using private contractors.

The average cost reported by low income areas of Kshs 80 per month is difficult to reconcile with the obligation to pay the statutory charge of Kshs 10 only and that residents in these areas do not use privately provided services to any great extent.

Almost 50% of residents would be satisfied with collection from a common discharge point and the neighbourhood kept clean. Another 50% would prefer a door-to-door collection service. More than 50% of all areas expressed a willingness-to-pay for improved services. Although there was high variability among the groups, the average willingness to pay was Kshs 400/month in high income areas, Kshs 350 in medium income areas and Kshs 106 in low income areas.

Residents in surrounding areas were not prepared to comment on the amount they would be willing to pay. A possible explanation for this is that these people can be extremely poor with little capacity to pay for formally provided services. The dynamics of these communities are also complex - driven largely by the pressures of poverty - and it is for this reason that NGOs and CBOs working with the communities have adopted integrated approaches to improving the overall quality of life of the residents. As mentioned above, single-issue objectives are unlikely to meet with any success in these areas.

A very high proportion of residents was aware of recycling, although there was some reluctance to separate kitchen wastes, particularly in low income areas. A possible reason for this is the small amount of space available to keep more than one container. Almost 50% of residents reported having a collector call about once a week, this figure being almost 80% in low income areas.

1.3 Social Aspects of Scavenging

1.3.1 General

The objective of the study on scavenging is to propose methods which will enable NCC to manage and eventually eliminate scavenging. The scope of the study is to consider the social and economic issues of scavenging in Nairobi City. The main task is to evaluate the existing situation of scavenging on landfill sites in the city. In particular, the tasks are:

(a) to evaluate the social, economic, public health and environmental impacts of scavenging in the collection and recycling of waste;

(b) to evaluate NCC's current plans and policies towards scavenging; and

(c) to formulate methods for managing and controlling scavenging which foster social and economic benefits and minimise the risks to public health and the environment.

1.3.2 Existing Policies and Plans of the NCC

Discussions with representatives of the NCC revealed that the Council currently has no specific policy towards the control and management of the scavenging community, especially the large community based at the Dandora dump site, and has no plans for addressing the issue specifically in the future.

It is also clear that the Council has little awareness of the important role played by the scavenging community in the materials recycling industry. This is understandable - given the lack of documented information on the significance of scavenging to the economic well-being of a large number of households in Nairobi - but it could lead to the introduction of inappropriate policies if not modified. In particular, it is considered unrealistic (as well as inappropriate) to talk about the elimination of scavengers from Nairobi.

Scavenging is an economic response to poverty, and will therefore be part of the economic and social fabric of Nairobi for many years to come. It is therefore necessary to look upon scavenging as an economic "good", to be managed and controlled in a socially acceptable manner, rather that as a social "bad" to be eliminated. Heightening the awareness of the NCC and the wider population to the importance, directly and indirectly, of scavenging to the livelihoods of a large number of households in Nairobi should be a part of any programme to improve the social and economic conditions of scavengers.

1.3.3 Physical Inspection of Scavenging Sites

A number of inspections were made to scavenging sites, both within the city centre and at the Dandora dump site. There was evidence of disease, poverty, malnutrition and hunger in the communities visited. The Dandora Scavenger Survey, described below, found the average income of 80% of survey respondents to be Kshs 120/day.

There are significant socio-cultural differences between different groups within the scavenging community. There are three distinct groups:

(a) Those who collect directly from households, moving from door-to-door either on foot, with a wheeled cart or bicycle, and normally specialising in the collection of a particular material;

(b) Those operating at the main (Dandora) dump site, where the scavenging community is characterised by social organisation and strict entry conditions - groups also tend to specialise in the collection of specific materials; and

(c) Those operating at unofficial dump sites located throughout Nairobi City and at designated sites (including school waste disposal areas) - these groups tend to be non-specific in the types of material collected.

As has been established in the public awareness survey, most of the population are aware of recycling, and almost 50% of households surveyed reported recycling collectors coming to their premises. This was particularly the case in low income areas which reported a very high incidence of (mainly weekly) visits.

These collectors represent an important component of the materials recycling industry in Nairobi and, to the extent that they reduce demand on public collection and disposal services, are a valuable community resource. The NCC and the public generally need to be made more aware of the important role played by these people, and the public should be encouraged to participate more in their activities by separating waste products for recycling and preventing them from becoming contaminated.

There is, understandably, concern by members of the community about groups of scavengers locating in central city areas. This reflects concern about health and the overall quality of life. Groups of scavengers send uncomfortable signals to other city users. But not only is this a response to poverty - which characterises all those at this level in the recycling industry - it is also a response to the failure of the NCC to provide effective waste collection services in public areas of the city.

In a city which cannot provide effective waste collection and disposal services scavenging not only provides an important source of income - directly and indirectly - for many, it also provides a de facto waste collection and disposal service. Although the actual volumes of waste utilised through re-use, recycling or composting are not reliably known, the amounts involved are clearly significant relative to the total amount of waste generated.

Scavenging is an inevitable response to economic conditions in Nairobi which provides a valuable service to the community through:

(a) generating incomes (to the scavengers themselves, to those involved in the materials recycling industry, and to those who benefit from the incomes spent by these groups); and

(b) providing a de facto waste collection and disposal service.

It is recommended later in this report that technical assistance should be made available for a study to establish the overall significance of scavenging to Nairobi, in terms of its contribution to household incomes, the materials recycling industry and to waste collection and disposal.

If it is accepted that scavenging is an inevitable response to economic conditions then the issue to be addressed is how this process should be managed to protect the health and safety of the scavengers themselves and of the wider community. This is addressed in the concluding part of this section.

1.4 Survey of the Dandora Scavenging Community

1.4.1 Survey Outline

Mr. Harrison Kwach of the Foundation for Sustainable Development in Africa (FSDA) was commissioned to undertake a survey of scavengers at the Dandora dump site. Mr. Kwach was chosen because of his wide understanding of the issues involved through his current work with the scavenger community at the site.

A survey questionnaire was drawn up by the consultant and administered by Mr. Kwach. A total of 505 scavengers was interviewed over a three-day survey period. A copy of the survey questionnaire is contained in **Section 11.3 of Data Book (1).**

Responses to questions on matters relating to recycling are contained in the recycling section of this report, and are not repeated here.

1.4.2 General Remarks

A large community of scavengers normally live at the dump site - a total of over 2,000 has been estimated by NGOs working at the site. Heavy rains immediately prior to the survey had displaced many of the site population, and the majority of those interviewed (80%) were living in neighbouring slum areas, and only 20% at the site itself. The population living on the site rises in the dry season since those displaced to neighbouring areas return.

Strong social pressures lead to the favouring of some groups and the exclusion of others. People must be acceptable to the existing community and cannot simply choose to become scavengers at the site.

Scavengers operate in groups (eight such groups are estimated to exist at the present time), each operating from a different part of the site and concentrating on the collection and sale of specific materials, including plastics, packing nets, glass, paper, and metals. Each group operates across the site. Groups include young children (the Black Angels) and criminals/thugs (the PLO), although the latter do not collect but use the dump as a base for criminal activities concentrated on surrounding slums. Competition exists between groups.

Moves towards organising collection and selling activities on-site have been encouraged recently by the Catholic Church and NGOs working with a group of (mainly women) scavengers, known as the Mukuru Self Help Project. This project has established arrangements for sorting, storing and selling collected materials directly to recycling firms, thereby avoiding middlemen.

The Project has been given temporary occupancy by the provincial administration of a piece of land at the site, on which it has built binding and material holding sheds and community facilities. The project has been a success and, combined with the development of urban agriculture, has strengthened the negotiating position of the scavengers with recycling firms, and has raised the dignity of members of the project (discussed further in **Section 1.5** below).

1.4.3 Survey Findings

The data tables on which this section is based are contained in **Section 11.4** of **Data Book (1).**

(1) Demographic Structure

(a) Seventy-five percent of those interviewed were male, and 25% female.

(b) The average age of scavengers is 28, with a standard deviation of 13 years. **Figure K.1-2** shows average ages in population quintiles, each of 100 respondents. The average age of the first decile is 15 years, of the second 20, of the third 25, of the fourth 31 and of the fifth 48. It follows that the average age is low, but that the site also supports a population of significantly older people.

(c) The mother tongue of the scavengers is predominantly Kikuyu (**Figure K.1-3**). Educational attainment is shown in **Figure K.1-4**, with educational levels being perhaps higher than would be expected.

(d) **Figure K.1-5** shows that 55% of all scavengers interviewed live at the Korogocho slum, and a further 30% at Mukuru.

(2) Economic Activity

(a) The nature of the recycling activities undertaken at the dump site are described in a separate section. From **Figure K.1-6** it can be seen that almost 80% of recyclable material collected by survey respondents is sold through the Mukuru Self Help (Recycling) Project (located at the dump site itself).

(b) This shows that there is a considerable amount of organisation of selling activities, and a willingness by scavengers to participate in the scheme. This has possible implications for the management of scavengers on the proposed sanitary landfill and is discussed further in **Section 1.5** below.

(c) An average income of Kshs 120 per day is calculated, with a standard deviation of Kshs 111. **Figure K.1-7** shows the average income earned by population quintile.

(d) An average income of Kshs 30/day is calculated for the first quintile, Kshs 60 for the second, Kshs 80 for the third and Kshs 120 for the fourth. The fifth quintile has an average income of Kshs 300/day. The high standard deviation is largely attributable to skew introduced by the high income levels reported in this quintile.

(e) The average income of respondents in the first four quintiles is calculated to be Kshs 72/day.

1.4.4 Discussion of Survey Findings

The surveyed population of scavengers at Dandora dump site are predominantly male, young, Kikuyu speaking and relatively well educated. Most live at the Korogocho slum, although a significant percentage live at Mukuru. There is a group of young

children and a similarly sized group of relatively elderly people which depend on the site.

The overall average income per scavenger per day is Kshs 120, although this figure is skewed on account of a relatively small group reporting high incomes. If this quintile is excluded, average income of the remaining 80% is Kshs 72.

The community exhibits a high level of organisation, particularly with respect to the sale of product through the Mukuru recycling project, a project built by predominantly female scavengers with the help of the Catholic Church and NGOs to generally improve the status and authority of Dandora scavengers. This is a significant achievement, and one which deserves to be given serious consideration during deliberations about closure of the site and the development of its replacement.

Scavenging will inevitably continue at the new dump site, and any arrangements which can improve the overall welfare and dignity of the scavenging community should be encouraged. In addition, the Mukuru project represents a vehicle through which scavenging can be properly managed at the new site, in order to protect the health and safety of the scavengers themselves, site employees and the wider public. This is discussed further in **Section 1.5** below.

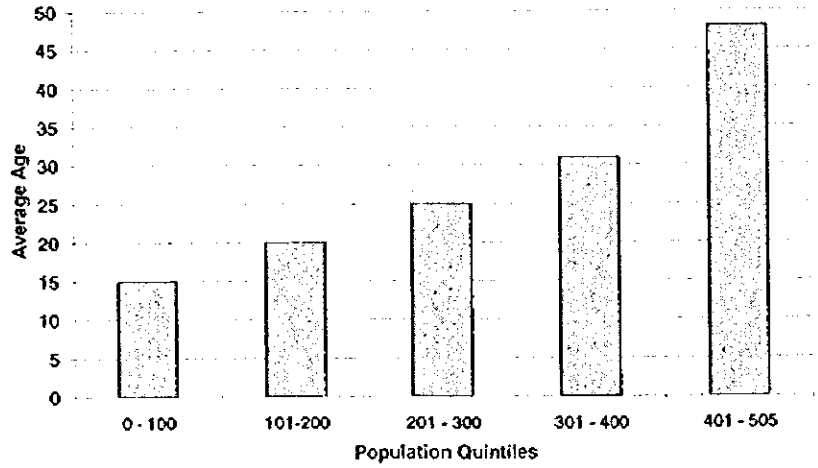

Figure K.1-2 Age Profile of Scavengers at Dandora Dumpsite

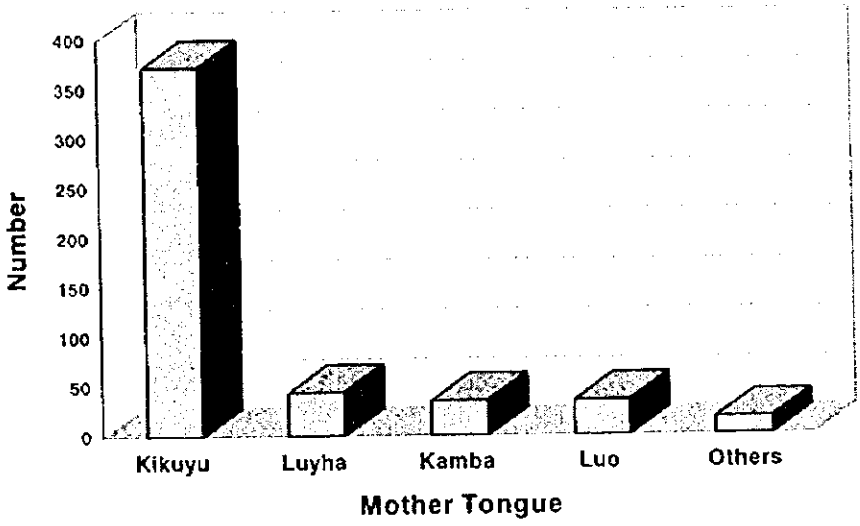

Figure K.1-3 Mother Tongue of Scavengers at Dandora Dumpsite

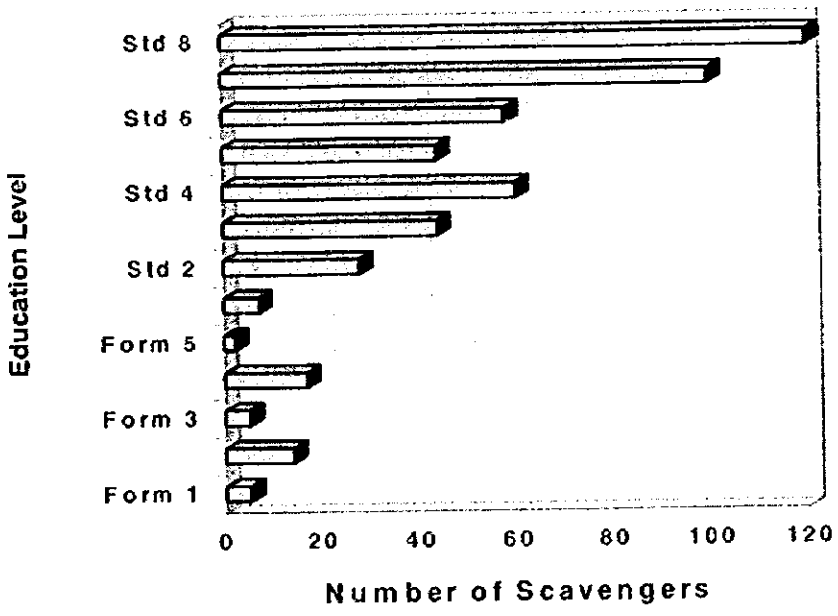

Figure K.1-4 Educational Attainment of Scavengers at Dandora Dumpsite

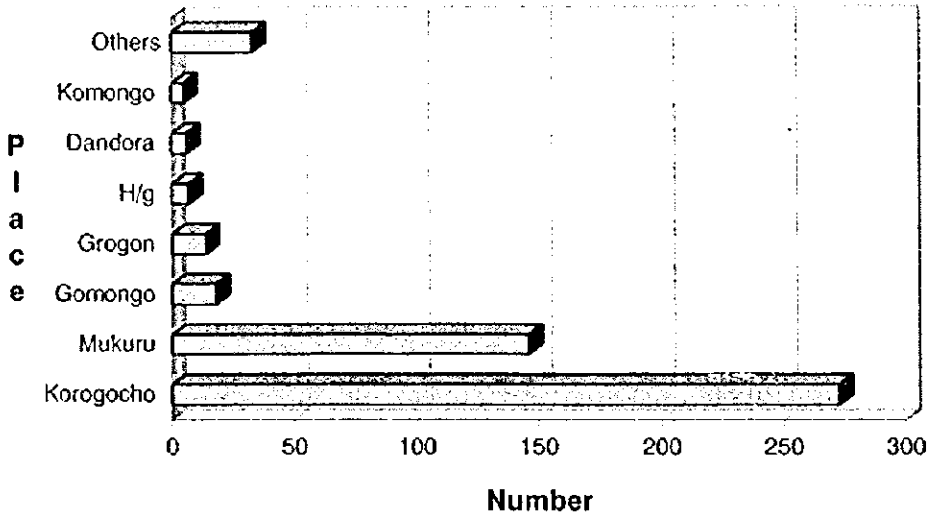

Figure K.1-5 Place of Residence of Scavengers at Dandora Dumpsite

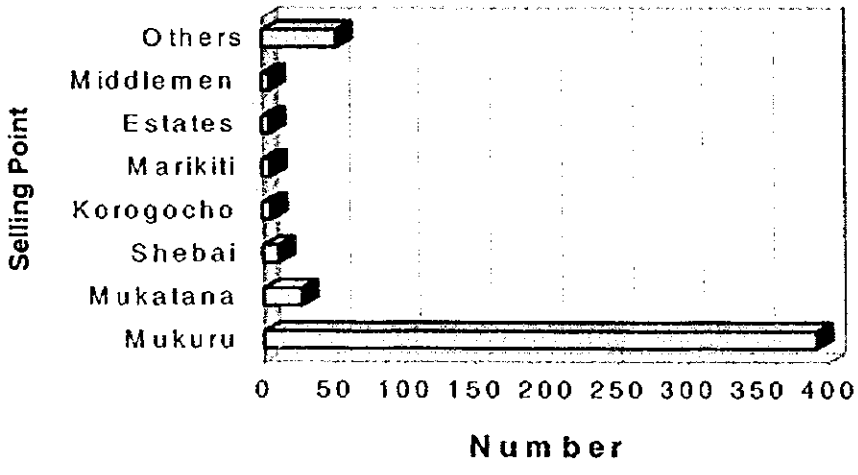

Figure K.1-6 Place of Sale of Materials Collected at Dandora Dumpsite

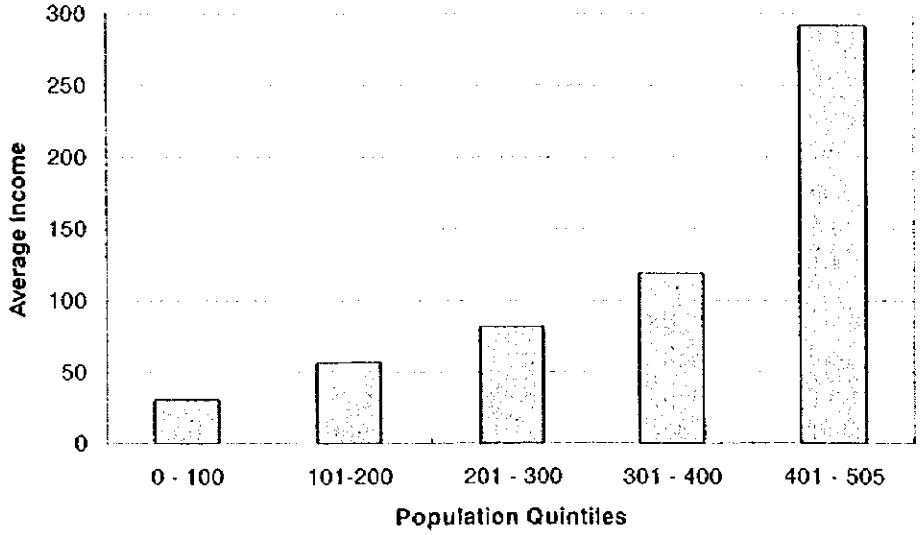

Figure K.1-7 Average Daily Income of Scavengers at Dandora Dumpsite

1.5 Discussion and Evaluation of Public Education and Social Considerations

This section presents a discussion and evaluation of issues identified from the analysis of the existing situation. It is subdivided as follows:

(1) Issues relating generally to the strategy formulation process
(2) Issues relating to waste collection services
(3) Issues relating to the informal (or surrounding) areas
(4) Issues relating to scavengers
(5) Issues relating to recycling
(6) Issues relating to public education and awareness

Proposals for technical assistance are contained in **Sections 2.6 and 3.7.**

1.5.1 General

The level of NCC-provided SWM services in Nairobi is currently low; 75% of respondents to the public awareness survey reported not having a collection service. Private sector firms have moved into the vacuum created by the absence of council services, and now offer services to households in affluent areas (based on the 'cherry picking' strategy of providing services to those willing and able to pay for them). These door-to-door services are likely to be unaffordable to most Nairobi households.

A principal reason why the NCC fails to provide adequate SWM services is a lack of financial resources. The amount of the SWM charge currently levied on households via the water bill is inadequate to provide even the most basic of service levels. Charge levels will need to be increased even if the NCC is to provide a minimum

level of service only throughout Nairobi. Political commitment will be required to provide such a level of service and to increase charge levels commensurately.

It is necessary to distinguish between the formal and informal (or surrounding) areas when planning a SWM strategy for Nairobi. Although it is not always possible to define the boundary between formal and informal areas, it is clear that residents of formal areas usually receive publicly provided services, such as water and electricity supply, for which they are charged by the utility company. Residents of informal areas do not normally receive these services.

1.5.2 Waste Collection

An important finding of the public awareness survey is that almost 50% of residents would be satisfied with collection from a common discharge point and the neighbourhood kept clean. More than 50% also expressed a willingness to pay an amount for appropriate services considerably higher (even in the low-income areas) than the current charge. These factors have considerable implications for the design of the collection strategy.

The strategy should aim to provide a minimum level of service throughout Nairobi consistent with the survey findings; that is, one based on providing secondary collection services only from designated communal disposal points (CDPs). A simple basic SWM charge would then be levied on all users (a surcharge could possibly be paid by residents having a higher level service - such as one based on door-to-door collections).

Such a strategy would open up the opportunity for private sector involvement in the provision of primary collection services (if residents wanted these and were prepared to pay for them). This could be done in two different ways (although note that under both approaches residents would still be required to pay the basic NCC charge).

One way would be for private firms to provide full collection and disposal services (as is currently done by 'cherry picking' firms in the more affluent areas). The other way would be for residents' associations to be formed to organise locally-based primary collection services (with encouragement from the NCC).

1.5.3 Informal (Surrounding) Areas

Strategies for providing SWM services to people in the peri-urban areas of Nairobi need to be structured differently to those for the formal areas. Not only do conventional approaches to delivering public services in these areas frequently fail, but subsidised services also fail to generate a sense of community responsibility or to engage or strengthen community organisations.

An alternative approach is to understand environmental health practices in peri-urban communities and to act on the priorities residents themselves identify and are willing to pay for. This usually involves redefining existing relationships between community organisations, NGOs and municipal agencies, a process which can stimulate partnerships between a community's organisations and can help shift the attitudes of municipal staff towards building closer relationships with the communities they serve.

It was shown in the public awareness survey that people living in the peri-urban areas were reluctant to specify an amount they would be willing to pay for improved solid waste management services (even though they expressed a willingnes to pay for such services). This result was not wholly unexpected.

The ability of poor people or communities to pay for a service often reflects the judgment of others about the maximum percentage of income a family should be required to pay. Not only is this a broad generalisation - and one which is made across what is a very diverse population in most peri-urban areas - but it also fails to recognise that spending decisions are based on a wide range of priorities, and that a clean environment may not, of itself, rank high among the priorities of an individual household struggling to survive.

The link between a cleaner environment and improved economic conditions does, however, have important implications for overall community income, and it is for this reason that NGOs stress the need for an integrated approach to community development. Such an approach might combine waste management (including re-use, recycling and composting), sanitation, community health, urban agriculture, income generation activities and business development.

As this approach has been evolved gradually by NGOs and CBOs working with the urban poor in Nairobi, the starting point for strategies to improve solid waste conditions should therefore be a good understanding of the current programmes and activities of the municipal authorities, CBOs and NGOs working in these areas.

An example is the Kitui Pumwani Integrated Project, an initiative of two NGOs (the Undugu Society and the Urban Agriculture Project) working together with the NCC. The project integrates low cost housing, urban agriculture, appropriate technology, waste management, and community health and business advisory services. It involves community groups working together (including youth groups and women's groups) and is integrated within the three villages of Kitui, Kanuku and Kanyago.

Poverty is the link between garbage, composting and recycling.

The composting programme is being assisted by the FSDA, providing support, advice and equipment (including the free supply of household containers and equipment such as wheelbarrows and spades) and by the local council, which has set aside an area of land for the composting plant.

The recycling programme started after the UAP was approached by members of the community wanting help in creating employment and income earning opportunities out of waste. Funds were made available through the Foundation Fund for Urban Agriculture and the Waste Recycling Project, and links were made with Waste Consultants (a Netherlands firm) and the Green Towns Project.

This was followed by an assessment process, looking at opportunities for integrating environmental, health, business and shelter improvement opportunities, combining youth activities and the work of scavengers. A survey of the waste recycling sector identified that 10-20% of slum populations in Nairobi depend in one way or another on recycling, and that some 60,000 street children in Nairobi depend on waste.

These initiatives have resulted in the creation of income and employment both through the sale of recyclable materials and compost, and through other opportunities (such as woodworking and carpentry) made possible by improved environmental conditions. This has been achieved by asking the community to be involved in all aspects of waste management - not to create a cleaner environment - but to create the social conditions necessary to allow economic activity to take place. A cleaner environment is an outcome - rather than an objective - of the process.

It follows that waste provides the basis for the livelihoods of many in Nairobi. This should be duly recognised when planning strategies for improving solid waste conditions in peri-urban areas. A principal role of government should be to facilitate the creation of community-based schemes.

A capacity building approach will be needed to improve the awareness of all parties - and particularly NCC officials - involved in this process.

In addition, assistance with the development of micro-enterprises through the provision of seed capital - possibly through the use of revolving credit or other financial arrangements - has a potentially important role to play in improving economic and environmental conditions in these areas.

A recurring theme of all NGOs contacted was that programmes of civic education in these areas are not required, and that such programmes can lead to public conflict.

1.5.4 Scavenging

Scavenging is a response to poverty, and is one of the measures taken by the very poor to provide a livelihood for their families and themselves. Health and safety issues - for the scavengers and general public alike - are the major areas of concern about scavengers operating from informal city dumps, as door-to-door collectors and on the landfill site.

The significant concentrations of scavengers in city areas are largely a consequence of the failure to provide adequate collection services. Although proper collection services will not entirely eliminate the problem of scavenging in these areas - because there will always be volumes of waste waiting to be collected - reducing the long-term build-up of waste would result in a reduction in the numbers of scavengers which can be sustained by it.

There is no evidence that door-to-door collectors are perceived to be a problem although, as noted below, this is an area in which the public benefits of scavenging (materials recycling) could usefully be made better known.

A large population of scavengers is sustained by the Dandora dump site, and real concern is expressed for their health and safety and of those who come in contact with them. Scavenging activities at the site appear to be governed by a level of social organisation and cohesion which, properly managed, could possibly be mobilised to provide a level of management and control over these activities at the new landfill site (see comments below with respect to the Mukuru Recycling Project).

Considerable relocation problems may result from closure of the Dandora site unless these are properly managed. The following points are notable:

(1) Many scavengers expect to relocate to the new site (wherever it is located) once it becomes operational.

(2) Some, and particularly the elderly, are extremely reluctant to move.

(3) Some will stay in the Dandora area, possibly turning to criminal activities in the neighbouring slums, thereby exacerbating social tensions.

(4) Members of the Mukuru Recycling Project want rights to continue to occupy the land they are on and to be able to continue trading and practising urban agriculture.

The last is an important point which is considered further, in connection with establishing a management programme for site-based scavengers. In particular, the possibility of establishing a cooperative society by building on the success of the Mukuru project is raised.

An indicative management programme, taking account of the importance of scavenging to the objectives of income generation, waste minimisation and a sustainable recycling industry is proposed in a further section. This should directly involve and take account of the views, objectives and programmes of NGOs and CBOs working in this area. In particular, a management programme should complement and reinforce the work of these bodies.

1.5.5 Recycling

The public awareness survey has demonstrated a high level of awareness of issues related to recycling, with 50% of all respondents (78% in low income areas) reporting being visited by a collector at an average frequency of once a week. Scavenging is a fundamental component of the Kenyan recycling industry, is a major generator of income for poorer households, and significantly reduces the amount of waste to be disposed of by society.

It is proposed that these important aspects should be positively reinforced through the public awareness campaign.

1.5.6 Communications Strategy

The NCC itself seems to be unaware of the fundamental issues facing the implementation of an effective SWM strategy, of its own limitations and of the need to work closely with other groups (including NGOs and CBOs) if the different sectors of society are to receive cost-effective services that they want and are prepared to pay for.

Before a public awareness and education programme is implemented it will be necessary to improve the NCC's own awareness of the requirements of a new solid waste management strategy. This will involve developing an awareness promotion programme specifically directed at the departments and staff of the NCC with an involvement in the provision of SWM services.

This is a key element of the strategy development and implementation process. Without a high level of awareness of the problems associated with SWM in Nairobi, of its own limitations, and of the nature of possible solutions, it is unlikely that the NCC will have the political will and commitment needed to create the conditions through which a sustainable strategy can be implemented.

Once these conditions have been created it will be necessary for the NCC to persuade the public not only that the measures it proposes taking to improve SWM services will be effective, but also that they will involve the introduction of higher charges. A properly structured communications strategy is needed for this purpose, an outline of which is contained in a further section.

The should include details about the need for and location of the next landfill site. Experience shows that a properly constructed and managed communications programme can reduce significantly the public opposition which inevitably accompanies proposals of this kind.

1.5.7 Public Education and Awareness

People's attitudes to SWM are, to some extent at least, shaped by the poor level of service currently provided by the NCC (it is noted, for example, that in some parts of Nairobi residents have taken to using central roundabouts as refuse disposal points - this is evidence that they would be willing to use NCC-provided communal discharge points if these were to be provided).

Without a major shift in the political willingness and ability of the NCC to provide services that people want and are prepared to pay for, it is unlikely that a public awareness and education programme will, of itself, be successful in shaping peoples attitudes towards SWM.

A public education and awareness programme should therefore be introduced at the time of the NCC's announcement on the new strategy. Any attempt to introduce such a programme before the NCC has spelt out the steps it is to take to improve solid waste management conditions in the city would be futile. It should be one part of an integrated package of measures.

2. SOCIAL CONSIDERATIONS

This section identifies the specific policy implications and recommendations which arise out of the social analysis presented in **Chapter 1**.

2.1 Overview

The following significant points are summarised from **Section 1.5**:

(1) Since door-to-door collection services are unlikely to be affordable to most Nairobi households, a minimum level service based on communal collection points is likely to be a more appropriate and affordable solid waste collection strategy for the city;

(2) The current level of SWM charges is too low to fund the provision of an effective service and will need to be increased before the NCC can provide even a minimum level of service;

(3) It is necessary to distinguish between the formal and informal areas when planning a SWM strategy for Nairobi and to recognise that direct or indirect charging schemes are unlikely to be workable in the informal areas;

(4) It follows that the objectives of providing SWM services to these areas have to be identified separately from those for the formal areas;

(5) Strategies for improving SWM conditions in informal areas and for managing scavengers should be formulated in close association with NGOs and CBOs already working in these areas;

(6) Scavenging is a response to poverty, and is one of the measures taken by the very poor to provide a livelihood for their families and themselves;

(7) Scavenging is a fundamental component of the Kenyan recycling industry, a major generator of income for poorer households, and a key factor in reducing the amount of waste to be disposed of by society.

The strategic implications of these points are outlined below. **Section 2.3** discusses the creation of a Community Development Section (CDS) within the SWM Division to formulate and implement NCC policy towards them. **Section 2.4** identifies areas of specific technical assistance which would assist in the development of the CDS. The section ends with a summary of recommendations.

2.2 Strategic Assessment

This section is divided into three parts:

(1) Strategy implications for waste collection in the formal areas
(2) Strategy implications for waste management in the informal areas
(3) Strategy implications for the management and control of scavengers

2.2.1 Waste Collection in the Formal Areas

The poor coverage and quality of existing services combined with the understandable reluctance of the NCC to impose high SWM service charges suggest that a key strategic objective should be to provide a minimum level of service to the formal areas of Nairobi. This would be consistent with the findings of the public awareness survey; in which it was found that a large proportion of the population would be satisfied with the NCC providing secondary collection services from designated communal disposal points.

Such an approach has a number of advantages, as follows:

(1) It allows the NCC to concentrate specifically on the provision of basic services necessary to improve sanitary conditions throughout Nairobi;

(2) It allows charge levels to be kept to a minimum, and for a single basic charge to be levied on all users;

(3) It allows the implementation of a simple charging system based on existing charging arrangements;

(4) It allows for the introduction of private sector involvement in the provision of secondary collection services with a view to stimulating competition, reducing costs and improving service quality; this can be achieved by the NCC contracting out provision of the minimum-level service by the private sector in discrete collection areas (where a collection area is taken to be a contiguous part of a collection district);

(5) It leaves open the option for householders to contract independently with the private sector for the provision of primary collection services (although all users would be required to pay the basic charge).

There are two ways in which the private sector can be involved in the provision of primary collection services. One is for private firms to provide door-to-door collection services as is currently done by 'cherry picking' firms in the more affluent areas of Nairobi today. Market forces should be allowed to dictate the extent to which such services are provided, although effective regulation and control is necessary to ensure that waste is disposed of properly.

Another way - which is probably more appropriate for middle and low income areas - is for local residents' associations to be formed to organise the provision of locally-based primary collection services. This approach - which is used elsewhere (Madras is an example) - involves the residents' association letting a contract for the collection and removal of waste from residents' premises to a communal discharge point.

The scale of these operations is small, often involving no more than a sole trader purchasing a tricycle or pushcart. The advantages are that a public service is provided, incomes are generated (often for the very poor) and neighborhoods are kept clean. Although there are no specific disadvantages of such arrangements, they can be difficult to organise. Facilitating the formation of residents' associations and encouraging primary collection services is a key function envisaged for the Community Development Section.

2.2.2 Strategy Implications for Waste Management in the Informal Areas

Strategies for providing SWM services to people in the peri-urban areas of Nairobi need to be structured differently to those for the formal areas. Not only are conventional approaches to delivering public services in these areas likely to fail, they also fail to generate a sense of community responsibility or complement existing community activities.

An alternative approach is to gain a better understanding of the environmental health practices in peri-urban communities and to act on the priorities residents themselves identify and are willing to pay for. This usually involves redefining relationships between the municipal council, community organisations and NGOs in order to stimulate partnerships between them, and shifting municipal attitudes away from centralised solutions and towards building closer relationships with the communities they serve.

CBOs and NGOs point out that single-issue objectives (such as improved waste management) and centralised solutions are inappropriate to these communities, and stress the need for integrated approaches aimed generally at improving community development. Integrated approaches currently being introduced by community organisations in Nairobi typically combine waste management (including re-use, recycling and composting), sanitation, community health, urban agriculture, income generation and business development activities.

Community organisations conclude that it is only through initiatives such as these - in which economic, social and environmental conditions are improved concurrently - that the communities themselves become engaged in community activities.

This approach has been evolved gradually by NGOs and CBOs working with the urban poor in Nairobi, and it is for this reason that the starting point for planning strategies to improve solid waste conditions in the informal areas is a thorough understanding of the current programmes and activities of these organisations. A function of the Community Development Section is to formalise relationships between the NCC and these groups, and to help develop strategies for the urban poor in partnership with them.

Although waste is an environmental problem for these communities, it is also a principal source of income. This factor needs to be clearly understood when planning solid waste strategies, and especially those which might compete with existing community self-help activities. In particular, it is strongly recommended that the NCC should not intervene directly in the waste recycling and composting industry. The principal role of government should be to facilitate the creation of community-based schemes, and not to support centralised projects in direct competition with them.

A principal role of government should therefore be to establish integrated waste management arrangements through which materials recovery - which is what recycling is - can be best accommodated.

The development of micro-enterprises is a potentially important way of improving the effectiveness of community-based initiatives, and the provision of seed capital for such enterprises - possibly through the use of revolving credit or other financial arrangements - is an area which deserves to be addressed in detail. Technical assistance for identifying the scope for implementing a programme of micro-enterprise funding - to be undertaken in collaboration with existing NGOs - is proposed below.

2.2.3 Policy Towards Scavengers

Scavenging is a response to poverty. It is fundamental to the Kenyan recycling industry, a major generator of income for poorer households, and an important factor in reducing the amount of waste to be disposed of by society. It therefore fulfills many important functions for society. Although its exact importance to the Kenyan economy - and particularly to the incomes of poorer households - has not been documented, it is known to be significant. A study is recommended to be funded out of technical assistance to establish this.

Scavengers can be classified as door-to-door collectors, those operating at city formal and informal waste collection points, and those operating at final disposal sites.

Door-to-door collectors are not perceived to be a nuisance, and no formal policy actions are proposed to be taken with respect to this group. It is proposed that the role and importance of door-to-door collections to the recycling industry should be stressed as part of the public education and awareness programme outlined in **Chapter 3.**

Open city waste sites and groups of scavengers operating on them are perceived to be a nuisance, although it is hard to establish whether it is the dumps or the scavengers which is the major cause for concern. It is probably a combination of both. It is not proposed that any particular policy measures should be introduced to control this group. Effective collection services throughout the city combined with controls confining the dumping of waste to licensed sites can be expected to result in significant reductions in this problem.

The forcible removal of scavengers from these sites is not recommended. The most likely outcome of any such action would be the creation of social tensions elsewhere in the city. The removal of the livelihood of one group is likely to increase pressures on the limited resources available to others, leading to an increased incidence of violence and criminal activity.

In the absence of other social security policy measures to protect the very poor scavenging will continue (even if incomes are very low). As such, its importance needs to be recognised in the formulation of SWM strategies.

(1) Scavenging and the Waste Management Process

Scavenging is part of the waste management process. If this fails to operate efficiently, then scavenging can become a nuisance - evidence of which can be seen at informal city dump sites and at the Dandora dump site itself. It follows that the waste management process must be planned and operated in a manner in which resource recovery - which is what scavenging is - is integrated into the process.

The key to properly managing scavengers is proper management of the overall waste collection and disposal process. The main components of this process can involve source separation, primary collection, community disposal sites, secondary collection, transfer via transfer station and final disposal at sanitary landfill. The availability and effective management of each of these components can strongly influence the extent to which scavenging is a nuisance or a danger to efficient operations.

The objective should be to facilitate recyclable products being removed from the waste stream at the earliest opportunity. This serves three purposes:

(a) It minimises the degree of contamination of the recovered materials (thereby enhancing their value);

(b) It saves costs in transporting and disposing of material unnecessarily; and

(c) It reduces significantly the number of scavengers operating at the final disposal point.

Each element is described briefly below.

(a) Source separation can usefully be encouraged through public awareness campaigns. Since itinerant buyers (or *mali-kwa-mali*) are an established feature of city life, households can act knowing that there is likely to be an outlet for the separated materials.

(b) Primary collection systems also provide a point at which to encourage waste separation and materials recycling. In this case, the primary collector can also operate a materials collection business. Such community-based systems can be encouraged through public awareness campaigns.

(c) Local community disposal sites can provide an important opportunity for separating and collecting recyclable materials before they become part of the formal waste stream.

(d) The next point of separation is at the transfer station. Transfer stations provide probably the most significant opportunity for separating recyclable material out of the waste stream before it is transported via bulk haulage vehicles to the waste disposal site. However, the proposed sites of transfer stations, i.e., Madaraka and Kariobangi, are located near the city centre or residential area, and a careful consideration for the surrounding environment is thus required. In addition, there is no experience in the operation and management of transfer stations in Nairobi. Therefore, transfer stations are not recommended.

(e) Combined with community disposal sites and the more traditional *mali-kwa-mali*, this can result in a significant reduction in the waste stream, saving on transport costs and valuable landfill void space.

(f) By planning for the requirements of scavengers at every stage in the waste management process the amount of recyclable material which finally arrives at the waste disposal site can be significantly reduced. The residual problem of scavenging at the landfill site can be reduced still further by operating the site according to international practice, wherein the volume of waste left exposed each day is relatively small (it follows that the accessible waste will be capable of supporting a smaller number of scavengers than does the existing unplanned tipping at, say, Dandora). There will, nevertheless, be efforts made to get to the waste before it can be bulldozed into a landfill cell. This will require careful management and control of operations and of scavengers on site.

A properly coordinated approach therefore recognises the value of resource recovery and builds this into the overall management process. By this means many of the social problems traditionally associated with scavenging can be avoided.

(2) Scavenging at the Waste Disposal Site and Other Facilities

Even if scavenging is more tightly integrated into the overall waste management process, and the volume of recyclable material reaching the dump sites is reduced, there will continue to be pressure for access by scavengers to the official waste disposal site. This has to be planned for in the management process.

There are estimated to be some 2,000 scavengers operating on the Dandora dump site, many of whom reside there permanently, living in makeshift homes. Closure of the site will remove the sole source of income from these people. It is inevitable that those able to do so will want to shift to the new landfill site, wherever this is located. The policy issue is therefore whether or not scavenging should be permitted at the new site.

This raises two related questions: is it practically possible to deny scavengers access to the new site and, if it is, is it socially desirable to do so? Clearly, it is technically possible to deny access to the site, but the resource costs involved in fencing and policing access would make this a prohibitively expensive exercise.

Also, although scavenging at the site may not be socially desirable, current economic conditions suggest that the alternative of depriving people of their livelihoods is likely to lead to a deterioration in social conditions elsewhere as pressure increases on limited resources. As with city dump scavengers, their exclusion from the site is likely to be translated into an increase in the level of violence and criminal activity.

At the moment, the presence of scavengers at landfill sites is tolerated but not sanctioned. They are therefore afforded no amenities, such as shelter or facilities for personal hygiene, and work under appalling conditions. Many children work as scavengers. In time, scavenging at public waste management sites will need to be phased out, in the interests of public health and safety, both for the scavengers themselves and for those who come in contact with them.

In the immediate term, however, scavenging at public disposal sites will need to be more tightly controlled. Policy should be directed towards managing the activities of scavengers rather than towards trying to deny them access to it. This has important implications for the design and management of operations, and for the attitude of site management towards the scavengers.

One approach is to establish contractual relationships between the NCC (or its agent) and organisations representing the scavengers. The Makuru Project located at the Dandora site is an example of the kind of organisation which might be able to fill this role, possibly through the formation of cooperative society. The organisation would be required to operate in accordance with clearly defined conditions, which could include requirements for:

(a) a register of all members/employees working on site;

(b) the banning of children from working in such activities;

(c) the provision of basic amenities on site;

(d) for all members/employees to have periodic health checks; and

(e) that under no circumstances should permanent residence be taken up on site.

The requirement that scavengers should not be permitted to reside at the new site is based on the following considerations:

(a) the scope for contracting infectious disease is heightened in scavengers living permanently in the unsanitary conditions of the site, a factor which has significant health and safety implications for other scavengers, site workers and neighbouring communities;

(b) unplanned occupation of sites can significantly reduce the efficiency of site operations, and can destroy the goodwill of site workers towards the scavenging community; and

(c) unplanned occupancy raises significant security problems for plant personnel and equipment, and reduces the degree to which the site manager can be held accountable for performance.

(3) The Dandora Disposal Site

The analysis of the existing situation showed that a level of social organisation exists at the Dandora site, exemplified by the success of the Mukuru Project in mobilising the scavenging community with respect to the sale of recovered materials.

It is strongly recommended that every effort should be made to enable the Mukura Project to continue to operate at the new site (if it is willing to relocate there). Similar opportunities should also be provided for other similarly organised groups. Reasons for this are:

(a) The Mukuru Project is a powerful example of a sustainable, self-help community project created in impossibly bleak social and economic conditions which, as such, has invaluable demonstration potential for similar projects which should not be lost;

(b) The social organisation this has created among the scavenger community has the potential to be developed further at the new site given proper encouragement and support from the NCC;

(c) In particular, the opportunity to create a cooperative society of scavengers out of the Mukuru Project is one which is recommended to be examined in detail;

(d) This would give members a stake in the management and control of scavenging on site; it would improve their ability to deal directly with final users, and would raise their dignity.

It is recommended that members of the Mukuru Project and of the NGOs assisting them should be consulted by the NCC to establish ways by which the project can be accommodated at the new site. This should include an assessment of the basic sanitary and other infrastructure facilities needed if such arrangements are to become a reality, and of the scope for forming a cooperative society.

2.3 Creation of a Community Development Section (CDS)

A significant recommendation of the social analysis is for the creation of a Community Development Section (CDS) within the Department of Environment headed by a Community Development Manager reporting directly to the Deputy Director of the SWM Division.

Creation of the CDS and the seniority of its manager gives recognition to the fact that some 50% of the population of Nairobi live in informal settlements which are largely beyond the reach of conventional centralised SWM services, and that a key role of the NCC in these circumstances can be to help facilitate the development of demand-based self-help community services in these areas.

Operation of the Unit will depend upon establishing strong links with NGOs, CBOs and community groups working in the poorer areas of Nairobi (but not confined to the informal areas) to help mobilise community involvement in the provision of self-help community services. It is proposed also that the CDS should collaborate closely with the Department of Social Services and Housing.

It is proposed that technical assistance should be provided to help establish the CDS and its relationships with community-based organizations.

The following areas of work have been identified by the analysis which form the core activities of the Unit during its initial years. These are:

(a) to establish links with NGOs and CBOs to facilitate the extension of self-help community schemes throughout the informal areas to improve sanitary conditions;

(b) to facilitate the formation of local residents' associations through which to establish community-based primary collection schemes to complement minimum level secondary collection services provided by the NCC;

(c) to work with NGOs and CBOs to help facilitate the improvement of the conditions of scavengers, especially those operating at the landfill site; and

(d) to work towards promoting public awareness generally about solid waste management issues, including waste reduction, recycling and intermediate treatment; and to help facilitate materials recycling activities by community groups and private firms.

Each of these roles is discussed briefly below.

(1) Self-Help Community Projects in the Informal Areas

A key role of the CDS will be to establish links and close working relationships with existing community organisations working in the informal areas. The objective will be to understand the fundamental requirements and approaches needed to provide improved SWM services in these areas and to help facilitate their provision in association with the community groups.

The nature of the support is likely to be low cost, focused primarily on mobilising community support, facilitating development of self-help activities (e.g., identifying and providing land on which a small-scale composting plant can be established) and providing basic support facilities (such as secondary collection points and secondary collection services).

A fundamental premise on which the CDS operates will be to use demonstration projects as the vehicle for extending the provision of successful schemes elsewhere in the community. In this regard, it is proposed that technical assistance should be provided for making two films to document existing self-help schemes in Nairobi to be used for demonstration purposes. This would be done in collaboration with the NGOs and CBOs responsible for the schemes.

(2) Creation of Local Residents' Associations

Although potential exists for the provision of community-based primary collection services in the formal areas operated in tandem with centralised secondary collection services provided by the NCC, there is little experience of such services in Nairobi.

It is proposed that the CDS should review how services of this kind are provided in other developing cities and facilitate their development in Nairobi. The approach should again be to work with existing groups to identify the scope for such services and to facilitate the creation of a pilot project which can be used for demonstration purposes elsewhere in Nairobi. It is recommended that technical assistance should be used to help undertake this work.

(3) Scavenging Activities and the Final Disposal Site

The following points are summarised from above:

(a) Since scavenging at the new final disposal site is considered to be inevitable, is it recommended that the NCC should plan and manage site operations in a way which recognises and accommodates scavenging activities.

(b) It is recommended that efforts should be made (reflected in the success of the Mukuru Recycling project).

A potentially important role for the CDS is to assist in establishing arrangements under which scavengers can be permitted to operate at the waste disposal site.

It is recommended that technical assistance should be used to help undertake this work.

(4) Public Awareness and Resource Recovery

The CDS will be expected, generally, to become the Department's principal vehicle for promoting public awareness about solid waste management issues. This will include formulating the Department's policy and involvement in all matters relating to materials recovery and recycling. It is envisaged that the CDS will play a facilitating role, helping to establish the conditions through which community and private initiatives in this area can have the greatest opportunity to succeed in generating sustainable employment and incomes.

2.4 Proposals for Technical Assistance

There are three areas for which technical assistance is proposed:

(1) Specialist Assistance to the CDS

The short-term appointment of a social analyst to the Department of Environment to assist with the development and management of the CDS during its first year of operation is envisaged. The appointment would be for a period of five (5) months, in which the analyst would help establish and manage the CDS; help establish relationships between the NCC and relevant NGOs/CBOs; and the assistance would be conditional upon the creation and appropriate staffing of the CDS.

(2) Structure and Significance of the Nairobi Waste Recycling Industry

The significance of the Nairobi waste recycling industry to the livelihoods of large numbers of households has been recognised for many years by NGOs working in this field, although the actual scale and importance of the industry is not reliably known. Information on the overall importance of the industry to the Nairobi economy would be of benefit:

(a) for establishing policy towards proposals for government intervention in the industry (such as proposals to introduce centralised composting facilities);

(b) for planning solid waste management collection services (taking account of the need to provide opportunities for recycling activities);

(c) for providing a basis for proposals aimed at segregating waste; and

(d) for improving general public awareness of the issues involved.

A programme of technical assistance is recommended to investigate the structure and size of the Nairobi waste recycling industry, to establish its

importance for household income generation, and to assess the implications of the industry for reducing the potential waste load.

2.5 Summary of Recommendations

(1) That a Community Development Section (CDS) be created within the Cleansing Section headed by a Community Development Manager reporting directly to the Deputy Director of the SWM Division.

(2) That a set of two documentary films be produced to document the principles and processes involved in achieving successful self-help initiatives within the informal areas of Nairobi, providing examples from elsewhere in Kenya and, if necessary, from around the World.

(3) That funds be provided for a study to establish the structure and size of the Nairobi waste recycling industry (with specific reference to the role of scavengers), to establish its importance for household income generation, and to assess the implications of the industry for reducing the potential waste load.

2.6 Summary of Proposals for Technical Assistance

Technical assistance required to implement the above recommendations is summarised below.

(1) The appointment for five (5) months of a social analyst to the Department of the Environment to assist with the development and management of the Community Development Section (CDS) during its first year of operations. The assistance is to be provided in a single visit by the analyst. Implementation is to be at the time of creation of the CDS and on the appointment of its manager.

(2) The preparation of a study into the size and structure of the Nairobi waste recycling industry, with specific reference to the significance of scavengers to the industry. The study would look specifically at the importance of the industry to household incomes, and particularly those of the poorer sectors of society. It would also establish the effect the industry has on Nairobi's total waste stream. Implementation is to be at the time of creation of the CDS and on the appointment of the international social analyst.

3. PUBLIC EDUCATION AND AWARENESS

This section identifies specific proposals for improving public education and awareness of waste management issues in Nairobi.

3.1 Overview

The following points relevant to the formulation of the proposals are summarised:

(1) A political commitment to provide improved waste management services is a fundamental requirement of the strategy.

(2) The NCC appears to be insufficiently aware of the nature and complexity of SWM issues facing Nairobi or of its need to work with community groups to provide services that people want and are prepared to pay for.

(3) A capacity building approach is required to improve the awareness of all parties involved in the provision of solid waste management services.

(4) An important role of the NCC is to facilitate the involvement of community-based organisations in the provision of appropriate solid waste management arrangements.

(5) User-charges have to be increased significantly to provide even a minimum level of service.

(6) The planning of SWM strategies needs to recognise that waste is an important source of income for many Nairobi households.

(7) There is no evidence that door-to-door collectors are perceived by the public to be a problem, although public awareness of the social benefits of scavenging could be improved.

(8) Programmes of civic education aimed at the very poor can be a source of public conflict and are not required.

The remainder of the section considers specific proposals for improving public education and awareness of waste management issues in Nairobi:

(1) Promotion of Awareness within the NCC
(2) NCC Communications Strategy
(3) Public Education and Awareness Strategy

Technical assistance needed to implement these measures is outlined at the end of the section.

3.2 Promotion of Awareness within the NCC

Before a public awareness and education programme is implemented it will be necessary to improve the NCC's own awareness of the requirements of a new solid waste management strategy. This will involve developing an awareness promotion programme specifically directed at key public office holders and staff of central and local government agencies.

This is a significant element of the strategy development and implementation process. Without a high level of awareness of the problems associated with SWM in Nairobi, of its own limitations, and of the nature of possible solutions, it is unlikely that government officials will have the political will and commitment needed to create the conditions through which a sustainable strategy can be implemented.

It is proposed that a programme of seminars and workshops directed at offce holders and officials should be undertaken prior to a public announcement being made on implementation of the new strategy. This might involve the preparation of fact sheets and the use of videos prepared as part of this project. In addition, a participatory approach involving NGOs and CBOs in the programme should be encouraged. This can be a very cost-effective approach to awareness promotion within the NCC itself.

It is recommended that technical assistance should be provided (following completion and acceptance by the Kenyan authorities of the JICA Study Team's findings and recommendations) for the appointment of an external consultant to prepare the relevant materials and to organise a programme of workshops and seminars. This would involve a four-month appointment, in which the consultant would also be responsible for preparing the communications strategy (see **Section 3.4**).

3.3 Raising the Credibility of the NCC

The principal problem faced by many people in Nairobi today is that the facilities are not available to properly dispose of household waste. They are aware that it must be removed from the house and, in the absence of organised collection and disposal services, dump their waste at unplanned and uncontrolled dump sites.

There is clearly a role for promoting public awareness of specific waste management issues, but only to the extent that the new awareness can be translated into concrete action. For example, a public awareness campaign may encourage people to keep their city tidy by not littering, but unless there are facilities available in the city to deposit litter then the awareness campaign will be largely non-productive. Public awareness promotion is only one part of the process known by the AIDA principle: raise Awareness - stimulate Interest - create Desire - initiate Action.

Promoting awareness raises expectations. If people are encouraged to keep their city tidy, and if the facilities necessary to do this are not available, then expectations are falsely raised. Promoting public awareness without real action is futile and, by raising false hopes, can breed resentment. Promoting awareness therefore involves political commitment.

Public awareness has to form part of an overall package of measures which together comprise a strategy. But even once a package of measures has been formulated and agreed to be implemented, problems of public awareness, possibly reflected in public scepticism about the Council's commitment and ability to implement its proposals, must be addressed. The issues of paying for services is crucial here; currently, people refuse to pay the refuse collection component of their water bills if they do not receive a service. If people are to be encouraged to pay refuse charges (at rates significantly higher than the existing charge) then they must be confident that the service will be provided reliably and efficiently, and that it represents value-for-money.

The NCC faces a credibility gap - neither high nor low income communities believe any more that it can carry out its policies and promises. Without a tangible demonstration of the actions it proposes taking, there will be little scope for promoting public awareness about solid waste management issues or confidence in the NCC's ability to provide services. Promoting awareness and rebuilding public confidence can be achieved (in part) by demonstrating a visible difference.

By this is meant implementing a significant project (or projects) in advance of implementing the overall strategy as a demonstration of the NCC's commitment and ability to provide the kinds of services it is proposing. That is, to show a visible and sustainable improvement in environmental conditions in one part of the city. One opportunity for doing this lies in the private sector contract recently let by the NCC to

provide waste management services within the city centre. This has already created a visible difference which can be built upon, and out of which pubic awareness can be created.

However, before this can be done it is recommended that a number of modifications should first be made to the overall scope of the contract, and to the Council's own involvement in it to ensure that the greatest benefit can be gained from the project in the near term. It is proposed that the contract should be used as a vehicle through which all elements involved in good solid waste management practice can be combined to provide a good example of best SWM practice in a major city.

Consideration should be given to the following:

(1) The length of the contract;
(2) The enforcement of relevant by-laws; and
(3) Payment for the services.

3.3.1 Length of Contract

Limitations in the scope of the contract should be addressed. To make the most efficient use of the private sector, it is necessary to provide incentives to encourage it to invest in long-term improvements. In a short-term contract of one year (with no guarantee of renewal) there is barely time to establish proper operating procedures, let alone to identify, analyse, and make investments which can enable services to be provided more efficiently, or which can provide the capacity necessary to improve conditions even further.

For example, the current contractor can only keep the city centre partly clean because there are no basic facilities available to the public for disposing of litter. If it were operating under a longer-term contract (say, 3-5 years) then the private sector firm could make a tangible difference by providing roadside receptacles (as found in many other parts of the world) and mounting a public awareness campaign to encourage their use and to discourage littering.

Similarly, efficient service provision involves investing in plant and equipment appropriate to the task. Conditions in Nairobi, as in any other major city, are diverse, calling for a range of equipment if the collection task is to be carried out cost-effectively. Again, only security of contract over a reasonable time frame can allow these kinds of investment decisions to be taken. Faced with insecurity, private firms become strongly risk-averse.

Investments of this kind can only be made by the private sector if it is secure in the knowledge that (if it meets its contractual obligations) it has sufficient time to recover its costs and make a reasonable return on its investments consistent with the levels of risk involved.

So, one way to improve public awareness and confidence would be to build upon the current contract and develop it into a good example of efficient solid waste management in a developing country. Through this process the NCC will also be able to develop and improve its own contract management capacity.

3.3.2 Enforcement of Existing By-laws

The NCC has a major contribution to make in ensuring that the objectives of the private contract are met. One example of this is a commitment to enforcing the existing bye-laws governing waste disposal in the city area. Households, industries and commercial operations benefiting from the private sector service should be informed that the council intends to strictly enforce the existing waste disposal bye-laws, and that those found illegally dumping within the Central Business District (CBD) will be prosecuted. This will provide further demonstration of the Council's commitment to improve environmental conditions in the city.

3.3.3 Payment for Services

This principle should also be extended to the payment for service. In the absence of a service it is understandable that people resent and therefore avoid paying charges for non-existent services. When an efficient service is however being provided there can be no excuse for not paying charges established fairly and equitably (covering both collection and disposal costs). Those benefiting directly from the service should therefore be informed that the NCC intends to impose and collect cost-covering charges.

The success of this measure (the charge collection ratio) will depend on the Council's commitment to enforce payment and (importantly) on the quality and reliability of the waste collection service. This will depend in great measure on the Council's commitment to ensuring its success, and working with the private sector operator to ensure that this is achieved. This approach can also be used for demonstrating the Council's commitment to providing good quality services throughout the remainder of Nairobi.

However, fundamental to the success of policies such as these is the success of the contract itself.

3.4 Communications Strategy

Following a decision on strategy implementation, the NCC has to inform the public of the measures it proposes taking to improve SWM services and of how it proposes to fund these by increasing the existing low level of charges. A properly structured communications strategy is needed for this purpose.

The should include details about the need for and location of the next landfill site. Experience shows that a properly structured and managed communications programme can reduce significantly the public opposition which inevitably accompanies proposals of this kind.

3.5 Primary Education

Awareness is created through teaching and demonstrating, and the place to begin this is at school. In order to force commitment by the NCC, and to make school children more aware of solid waste issues, it is proposed that the NCC should commit itself to implementing a "Children's Charter".

The "Children's Charter" would involve the NCC publicly pledging to providing high quality, reliable collection services to all schools and to maintaining school collection points in good condition. In return, school children would undertake to keep their school compounds tidy and free from waste.

The 'Charter' would be signed jointly by the Town Clerk and individual school headmasters, it would be prominently displayed on school notice boards, and arrangements would be available for children to register (through the school) their dissatisfaction in the event of the council failing to meet its commitments.

A highly visible public commitment such as this would heighten children's awareness of the issues involved and place a duty on the NCC to meet its publicly declared obligations. Although this may appear to be a small initiative, it involves a binding commitment by the NCC to keep faith with children. Promoting awareness is best achieved by demonstration, and such a demonstration could create a lasting impression into children's adult years.

To be able to play its part in promoting public awareness the City Education Department must have the resources to do so. The Department currently has a resource centre where it can prepare materials and undertake activities, but has access to neither video camera, VCR nor TV.

It is recommended that technical assistance should be used to provide two each of these items to the Department, subject to the NCC implementing the "Children's Charter".

3.6 Summary of Recommendations

The following is a summary of recommendations for improving public education and awareness:

(1) That a programme of workshops and seminars be prepared, with accompanying fact sheets, to improve the general awareness of NCC officers of the issues involved in the delivery of appropriate SWM services to the people of Nairobi.

(2) That the NCC should work to ensure the success of the existing NCC-CBD private sector contract as a way of demonstrating its commitment and capacity to provide good quality solid waste management services in the capital.

(3) That a communication strategy be prepared to inform the public of the measures NCC proposes taking to improve SWM services and of how these are to be funded by increasing existing charge levels.

(4) That the NCC should implement a "Children's Charter" in which the NCC pledges to provide a good quality collection service and the schools to maintain tidy conditions within school compounds.

3.7 Summary of Proposals for Technical Assistance

Technical assistance required to implement the above recommendations is summarised below.

(1) That a communications specialist be appointed for a period of two (2) months (following completion and acceptance by the Kenyan authorities of the JICA Study Team's findings and recommendations) to prepare relevant materials and organise a programme of workshops and seminars directed at council officers prior to a public announcement of the strategy being made, and to prepare a communications strategy to accompany the NCC's public announcement of the measures it is to take to improve SWM conditions in Nairobi. The social analyst who will assist with the new CDS will hold the position of communications specialist concurrently.

(2) That communications equipment be provided to the Department of City Education (subject to the NCC implementing the "Children's Charter"). Implementation is to follow the implementation by the NCC of the "Children's Charter".