General Management Assistance Contract (GMAC)
Contract No: 674-C-00-01-10051-00

City of Cape Town
Solid Waste Management Services

Integrated Solid Waste Management Plan

Final Status Quo Report

March 2004

Prepared
By

Jeffares & Green
CONSULTING ENGINEERS

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Africa
consulting engineers and project managers

This report was prepared under Mega-Tech, Inc.'s prime contract with
USAID and addresses USAID/South Africa's Strategic Objective No. 6:
Increased Access to Shelter and Environmentally Sound Municipal Services

MTI Contact No.: 0098-0103-SUB-TA37

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EXECUTIVE SUMMARY

In terms of Contract No. 0098-0103-SUB-TA37, Mega-Tech Inc (MTI) has commissioned Jeffares & Green (Pty) Ltd, in joint venture with Ingeróp Africa (Pty) Ltd, to provide consulting services for the "DEVELOPMENT OF AN INTEGRATED WASTE MANAGEMENT PLAN (IWMP) FOR THE CITY OF CAPE TOWN".

The development of an IWMP is a requirement of the National Waste Management Strategy and the Draft National Integrated Waste Management Bill, due to be presented to Parliament for promulgation in 2004. The objective of this Contract is to develop an IWMP, using a cradle-to-grave approach that incorporates appropriate, affordable and an environment-friendly mix of solutions which will continually reduce the mass of waste requiring disposal and also serve to provide a dynamic framework to manage the City's waste stream effectively based on the waste hierarchy.

The Project Team together with officials from the Waste Department of the City of Cape Town and Department of Environmental Affairs and Development Planning have undertaken an extensive study to obtain and evaluate available "status quo" information covering solid waste relevant to the Cape Town Metropolitan Area. The status quo situational analysis is summarised and presented in this Final Status Quo Report.

The purpose of the Status Quo Report is to provide a platform for the formulation of the Integrated Waste Management Plan, to review documented work already done, including policies, strategies and by-laws already in place.

During the process of the development of the City's Integrated Waste Management Plan, and arising from the parallel public participation process that is taking place, further input and information or corrections to the Final Status Quo Report (March 2004) may come to light that will then be added as a revision to the report.

It was clearly evident during the period of the status quo study that the City of Cape Town is among the leading cities in South Africa in terms of its application of the strategies embodied in the Draft National Integrated Waste Management Bill. However, a number of shortcomings were found to exist in waste management practices and legacies inherited from the previous seven former Administrations, and these shortcomings are described in the Final Status Quo Report.

The main areas covered by the status quo study are as follows:

Institutional Arrangements: Restructuring of the institutional arrangements pertaining to the City's solid waste services is long overdue. It is envisaged that the Transformation Team initiative and the Internal Business Unit (IBU) review initiatives currently being undertaken by the City will in the near future lead to a final assessment and approval by Council of the internal service delivery mechanisms, agreement of the strategic objectives, determination of political and business priorities and agreement on a phased approach for the institutional arrangements with specific structural and delivery milestones.

The institutional status quo component of the report is thus limited and without much analytical substance. This lack of substance is a result of the current political scrutiny of all institutional arrangements pertaining to services. Furthermore the status quo study does not at this stage attempt to identify any [major] gaps in the organizational structure since an approved baseline is not yet determined.

Since 1995 there have been significant strides made in local government in metropolitan Cape Town, which includes the consolidation of local democracy, the extension of services, the completion of major restructuring and many other examples of innovation and good practice. Although these are formidable achievements the social and human development outcomes for Cape Town still fall way below what they should be, and the current arrangements of managing the City are not succeeding in turning the key socio-economic trends in a positive direction. This fact has to be recognised and taken into account in transforming the institutional and organisational shape of the Waste Department.

Financial Arrangements: The cost to the City over the past decade in transforming its solid waste management services into a socially and environmentally acceptable situation, has been considerable. The current annual operating expenditure amount of R726,3 million and current annual capital expenditure amount of R19,7 million is to be viewed against a projected revenue from solid waste functions of R376,0 million. Clearly there is a need to address the high cost of solid waste service provision while at the same time satisfying the basic human right for a clean and healthy environment.

Gaps in the financial arrangements identified during the study include an assessment of the completeness of property-based revenues, the possibilities for under recovery of revenue due to weighbridge system controls, the return on assets to ensure sustainability, the movements in budget items from year to year, the need to address funding shortfall for planned capital expenditure, the rebate system and indigent policies, a need to review the system of free-loads and drop-offs and the realignment of budget with corporate structures.

Policy and Legislation: Following the restructuring of local government, several municipalities and councils ceased to exist following their amalgamation with the newly established Administrations and their existing by-laws were not repealed by later by-laws. The net result is that even within one Administration there might be a number of by-laws dealing with the same or related municipal function (e.g. waste collection).

An example of this is the Tygerberg Administration which consists, among others, of the former municipalities of Goodwood, Tygerberg and Durbanville where some of the refuse related by-laws passed by the aforementioned municipalities still remain in force. The old municipal by-laws might therefore continue to be in force, albeit only partially and insofar as they relate to matters not covered in the new Administration by-law.

No publicly accessible compilation or database exists setting out which by-laws are in force, or to what extent they have been repealed. A list compiled by Province and used by the City's legal department was used for the purposes of the status quo study. Extensive engagement with the City's officials took place to identify and assess existing and relevant by-laws. The study covers an extensive range of existing legislation and by-laws covering international, national, provincial and local municipal policies and legislation.

An assessment of the by-laws and gap analysis is contained in the report that will provide the background information for preparing the City's draft by-law for solid waste management. The following key issues will be addressed in developing the new by-law:

- the new by-law should repeal or amend the existing by-laws in order to bring some sense and direction to the current plethora of local legislation;
- the principles and policies set out in the White Paper, National Waste Management Strategy, National Environmental Act, National Integrated Waste Management Bill etc should be incorporated into the new by-law;
- serious thought should be given to the City of Cape Town introducing economic instruments (eg incentives, taxes, levies) to help achieve integrated (solid) waste management;
- effect must be given to the requirements of the Municipal Systems Act and the devising of a tariff policy;
- law enforcement should be increased and stiffer fines and sentences should be implemented to act as deterrent.

Waste Collection and Area Cleaning: Waste collection and Area Cleaning constitute the core functions of the City's Waste Department. The two functions operate under separate departments, although resources are to some extent shared or integrated.

The Unicity has, as an interim arrangement, been partitioned into four distinct waste collection and area cleaning management areas, each managed by an Area Manager (Collection and Area Cleaning). These management areas comprise Atlantic (Blouberg/Steenberg/Twelve Apostles), Tierberg (Welgelegen/Valhalla/Klipheuwel), Impuma (Joostenberg/Blackheath/Maccassar) and Two Oceans (Wolfgat/Sandvlei/Cape Point). Fifty-seven former depots serve the four management areas. Collection beats have generally been determined according to historic boundaries of the former Administrations. A beat is defined as an activity that is covered by a specific collection vehicle per day. The Unicity is currently divided into 601 department refuse collection beats serving 473 400 erven and a population of approximately 2,5 million. Approximately 560 000 tonnes are collected annually from 744 000 formal (81%) and informal (19%) service points.

There are essentially three levels of collection service, i.e. a containerised service (240l "wheelie" bins), plastic bags (85l) and skips for rudimentary services. The City contracts out the skip collection services and certain other collection services. The City's collection vehicles account for approximately 33% of the total waste disposed of to the landfills.

The City adopted a new standardised tariff policy in July 2002, introducing different tariffs, levies and charges for vacant land, residential properties and non-residential properties. There are no charges levied for community-based collection services.

Area Cleaning comprises street sweeping, litter picking, beach cleaning, clearing of illegal dumping, animal carcass collection, provision and servicing of litter bins, clearing hawker waste and providing water tanker services for control of wind-blown litter. The Waste Department undertakes most of the area cleaning activities, although a number of other City departments also engage in area cleaning. The City has no policy currently in place that adequately addresses area cleaning.

The City's Collection and Area Cleaning departments still function to a significant extent within the structures and boundaries of the former seven Administrations, and cannot move forward in terms of efficient, integrated planning and restructuring until the institutional initiatives currently taking place have been finalised and adopted by the City Council. Given the financial and institutional constraints that hamper the functioning of the Waste Department, the Collection and Area Cleaning departments have nevertheless provided an effective service covering more than 95% of the City's inhabitants. Having won the prestigious "Cleanest City" award in 2003 is testimony to the success achieved by the City's Waste Department.

Waste Disposal: Since 1st July 1997, following restructuring of local government, the CMC Administration took over the responsibility for all municipal waste disposal in the CTMA. The Waste Disposal department has since brought waste disposal to levels of service that closely comply with the Minimum Requirements of the Department of Water Affairs and Forestry at all of the operating facilities in the metropole. Standards of public health and the state of the environment have consequently improved but the cost of waste disposal has risen significantly.

Given the situation that the City of Cape Town is currently engaged in a process of institutional restructuring and reform, the Waste Disposal department is unable to reach optimal levels in terms of its staffing, provision of infrastructure and financial resources due to constraints being applied.

Arising from the Feasibility Study towards an Integrated Waste Management Plan undertaken in 1999, the Waste Disposal department has adopted a strategic decision to develop a regional waste disposal facility for the future disposal of waste, to be serviced from a number of transfer stations to be established in the CTMA. This decision means that waste reduction will in future play a more vital role, given the high cost of transporting waste to a remote facility.

The role of the private sector in waste disposal must not be ignored. The disposal of hazardous wastes is largely undertaken by the private sector and a significant quantity of the waste stream, especially with regard to commercial and industrial wastes, is disposed of at privately-owned waste disposal facilities.

Waste Minimisation: There is currently no legislation in South Africa and no policy within the City explicitly requiring "Waste Minimisation" measures as part of day-to-day waste management. Given the high cost of transporting and disposing of waste, it is imperative that the City develops a policy to reduce waste through recycling, including composting and reuse of builders' waste. South Africa has made significant strides over the past decade in terms of waste minimisation and the City should be encouraged to pursue a bold approach in this regard.

The Project Team has undertaken a comprehensive study of the various activities that constitute waste prevention and waste reduction and has identified the principal gaps and needs that should be addressed if effective waste minimisation and recycling measures are to be implemented effectively throughout the City of Cape Town.

A key constraint that currently hinders the more widespread adoption of waste minimisation and recycling – at the domestic, commercial and industrial levels – is the lack of sufficient incentives due to an inappropriate regulatory and financial policy framework. The Final Status Quo Report provides essential background information to enable the IWMP process to identify appropriate strategies and measures for the City to develop waste minimisation plans that are meaningful and sustainable.

Waste Generation, Quantities and Characterisation: Due to the lack of an integrated waste information system, the acquisition of data proved to be a difficult task. The information collected provides a reliable reference for further assessment and decision-making.

A breakdown of waste generation quantities indicates that the City currently generates approximately 2,16 million tonnes of waste per annum, of which 1,87 T/annum (86%) are landfilled and 0,29 T/annum (14%) recycled. The average growth rate of waste generated in the CTMA between 1986 and 2003 is 7,6%, with the current growth rate calculated to be 4,3% (compared to the 2001 census population growth rate in Cape Town of 1,57%).

A detailed waste stream analysis and development of a waste generation model will be undertaken during the assessment stage of the IWMP.

Hazardous and Special Wastes: The Final Status Quo Report presents a detailed summary of the status of hazard waste management in the CTMA. The Project Team had the benefit of drawing on the extensive work that has been carried out by the Department of Environmental Affairs and Development Planning (DEAD&P) on the generation, collection, treatment and disposal of hazardous and medical wastes generated in the Western Cape Province. A number of gaps have been identified that will be taken forward to the "Assessment" stage of the development of the IWMP.

Waste Information System: The Waste Department has no centralised integrated Waste Information System (WIS). A number of specific systems have been devised by the Waste Department, some of which are linked to the City's SAP system. A centralised integrated WIS will consolidate and integrate data in a format that will lead to improved efficiency, can report on the progress and effectiveness of the strategies adopted in terms of the IWMP and can report to the WIS currently being developed by DEAD&P. The Waste Department has made provision for the procurement of a WIS in its 2004/2005 financial budget.

Waste Education and Special Projects: The Project Team highlights the importance of education and learning with respect to solid waste management and illustrates the power of education to shift perceptions towards litter and dumping and develop capacity to "reduce, reuse and recycle" waste in our daily lives. The major projects related to waste education within the CCT are described but it is beyond the scope of this study to list many smaller, independent education initiatives organised by civic groups, NGO's, CBO's, industries and schools.

The Waste Department places a high priority on waste education, training and awareness and the Final Status Quo Report describes the various initiatives that have recently been undertaken in the CTMA and identifies "gaps" to be taken forward to the "Assessment" stage of the development of the IWMP.

The Final Status Quo Report represents a comprehensive situational analysis of solid waste management in the Cape Town metropolitan area. It is recommended therefore that the Project Team proceed to the next stage of the process of developing the IWMP that entails the undertaking of an assessment of solid waste management functions and the determination of strategies and plans that will form the essence of the IWMP.

City of Cape Town

Solid Waste Management Services

Integrated Solid Waste Management Plan

Status Quo Report (Draft)

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ACRONYMS AND ABBREVIATIONS

1. ***Organisations***

BCRC: Basel Convention Regional Centre
BOTSOC: Botanical Society
CAIA: Chemical and Allied Industries Association
CID: City Improvement District
CISCO: Cape Iron Steel Works
CMA: Cape Metropolitan Area
CMC: Cape Metropolitan Council
CCT: City of Cape Town
CPMFI: Cleaner Metal Finishing Industry
CTMA: Cape Town Metropolitan Area
DEADP: Department of Environmental Affairs and Development Planning
DEAT: Department of Environmental Affairs and Tourism
DoE: Department of Education
DWAF: Department of Water Affairs and Forestry
EERU: Environmental and Education Resource Unit
EEU: Environmental Evaluation Unit
EJNF: Environmental Justice Network Forum
EMG: Environmental Monitoring Group
EU: European Union
FCA: Fairest Cape Association
IWMSA: Institute of Waste Management South Africa
KEAG: Kommetjie Environmental Action Group
LGWSETA: Local Government Water and Related Services, Sector Education, Training Authority
LRC: Legal Resources Centre
MLC's: Municipal Local Councils
NBI: National Botanical Institute
NCPC: National Cleaner Production Centre
NORAD: Norwegian Agency for Development
NRF: National Recycling Forum
PACSA: Packaging Corporation of South Africa
PFSA: Plastic Federation of South Africa
PwC: Price Waterhouse Coopers
RCMASA: Responsible Container Management Association of South Africa
ROSE: Recovery of Oil Saves the Environment
SAB: South African Breweries
SADC: South African Development Corporation
SANTREN: South African Network for Training on Environment
SMME: Small, Medium and Micro Enterprises
SWS: Solid Waste Services
TNS: The Natural Step
TSPC: Trade Services Portfolio Committee

UNEP: United Nations Environment Programme
UNIDO: United Nations International Development Organisation
USEPA: US Environmental Protection Agency
WCED: Western Cape Department of Education
WESSA: The Wildlife and Environment Society of South Africa
WHO: World Health Organisation
WMC: Waste Minimisation Club

2. *Abbreviations*

ARTS: Athlone Refuse Transfer Station
B^+: Water surplus climate, resulting in significant leachate generation
B^-: Water deficit climate, resulting in only sporadic leachate generation
BIO: Bioremediation
BWDS: Brackenfell Waste Disposal Site
BSWDS: Bellville South Waste Disposal Site
C: Communal Landfill
CBD: Central Business District
CDI: City Development Indicators
CDM: Cleaner Development Mechanisms
CFNR: Cape Flats Nature Reserve
COM: Composting
CP: Cleaner Production
CPWDS: Coastal Park Waste Disposal Site
CTR: Chemical Treatment then co disposal of Residues by landfill
DBI: Detonation, burning or incineration
DEADP – SA: Department of Environmental Affairs and Development Planning – Situational Analysis
DS: Development Strategy
DSW: Domestic Solid Waste
DWAF- BS: Department of Water Affairs and Forestry – Baseline Study
DTI: Department of Trade and Industry
ED: Executive Director
EET: Environmental Education and Training
EIA: Environmental Impact Assessment
EaMP: Earthship Mission Possible
EMP: Environmental Management Plan
ENC: Encapsulation
ESEMWM SGB: Environmental Science and Environmental Management and Waste Management Standards Generating Body.
ESF: Equity Strategy Framework
FFS: Fuel Firing Systems
FWDS: Faure Waste Disposal Site
G: General Waste or Landfill for General Waste
H: Hazardous Waste or Landfill for Hazardous Waste
H:h: Hazardous Waste Landfill that can receive wastes with hazard rating of 3 & 4
H:H: Hazardous Waste Landfill that can receive wastes with hazard rating of 1 & 2
HDPE: High Density Polyethylene

HNR: Hydrolyse & neutralise then co disposal of residues by landfill
IBU: International Business Unit
IDP: Integrated Development Plan
IMEMS: Integrated Metropolitan Environmental Management Strategy
IMEP: Integrated Metropolitan Environmental Plan
IML: Immobilisation then landfill
IMS: Integrated Manufacturing Strategy
INC: Incineration
ISLP: Integrated Serviced Lands Project
IWM: Integrated Waste Management
IP&WM: Integrated Pollution & Waste Management
ISLA: Internal Service Level Agreement
IWEX: Integrated Waste Exchange
L: Large Landfills
LDPE: Low Density Polyethylene
LFB: Landfill ash blend
LFC: Landfill co dispose
LFL: Landfilling not allowed
LWT: Landfilling without treatment
M: Medium Landfill
MAP: Mean Annual Precipitation
MIS: Management Information System
MRD: Maximum Rate of Deposition
MRF: Materials Recovery Facility
MSDF: Metropolitan Spatial Development Framework
MSW: Municipal Solid Waste
MTIEF: Medium Term Income and Expenditure Framework
NEMA: National Environmental Management Act 107 of 1998
NCR: Neutralise then co disposal of residues by landfill
NCR1: Neutralise in landfill trench
NTMS: New Top Management Structure
NWMS: National Waste Management Strategy
OCR: Oxidation then co disposal of residues by landfill
OD: Organizational Development
PCB: Polychlorinated Biphenyls
PET: Polyethylene Trichloride
PIC: Post Industrial Cullet
PRN: Precipitation then co disposal of residues by landfill
RAD: Radioactive treatment
RCR: Reduction then co disposal of residues by landfill
RCY: Recovery
RDP: Reconstruction and Development Programme
ROD: Record of Decision
ROI: Return on investment
RTA: Release to atmosphere
RTS: Refuse Transfer Station
S: Small Landfill
SANS:

SAP IS UM: SAP Information System Utility Module
SDA: Service Delivery Agreement
SDU: Service Delivery Unit
SEA: Sea Discharge
SEED: Sustainable Energy for Environment and Development
SEEDP: Schools Environmental Education and Development Programme
SG: Specific Gravity
SOER: State of Environment Report
SRTS: Swartklip Refuse Transfer Station
STO: Storage
SWEP: Solid Waste Enablement Project
Tremcard: Transport Emergency Card
USTDA: United States Trade and Development Agency
VCCT: Vissershok City of Cape Town
VWMF: Vissershok Waste Management Facility
WEEE: Waste Electrical and Electronic Equipment
WIS: Waste Information System
WM: Waste Minimisation
WTL: Weather then co disposal of residues by landfill

ACKNOWLEDGEMENTS

The Project Team for the development of an Integrated Waste Management Plan acknowledges support given, and the significant contributions made, by many officials of the City of Cape Town, members of the Cape Town community, companies engaged in the business of waste management, the Department of Environmental Affairs And Development Planning: Western Cape, the Fairest Cape Association, and many other interested and affected parties and stakeholders.

QUALITY VERIFICATION

Engineering Integrity	**TITLE:** Contract No. 0098-0103-SUB-TA37, to provide consulting services for the "DEVELOPMENT OF AN INTEGRATED WASTE MANAGEMENT PLAN (IWMP) FOR THE CITY OF CAPE TOWN".

JOB NO: 05-1300	**DATE:** 29-03-04	**REPORT STATUS:** Final (Draft)

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AUTHOR(S): **Jeffares & Green (Pty) Ltd** in joint venture with **Ingerop Africa (Pty) Ltd**	**CLIENT CONTACT PERSON(S):** Mr S Horn

QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO9001: 2000, which has been independently certified by Bureau Veritas Quality International (BVQi) under certificate number 72238.

VERIFICATION	CAPACITY	NAME	SIGNATURES	DATE
Authors:	Project Team	(Various)		
Checked by:	Project Reviewer	H Wiechers		
Authorised by:	Project Director	J Coetzee		

Chapter 1 - Introduction

Chapter 1 describes the terms of reference and scope of study for the project and sets out the approach and methodology for the preparation of the Status Quo Report for the Integrated Waste Management Plan for the City of Cape Town.

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Table 1.1: Project Team

Organisation	Team Member	Role
City of Cape Town: Solid Waste Management Services	W Loots P Novella S Haider C Hall R Josephs A van Vuuren M Kriel F Fourie S Morkel C McKinnon K Kaveney	Project Sponsor Co-Sponsor and Chairperson Alternate Project Leader: Support Services Alternate Project Leader: Support Services Alternate Project Leader: Collection Alternate Project Leader: Cleansing Trading Services: Corporate IBU Project Leader
USAID	N Ndlovu S Horn	USAID Project Manager Mega-Tech Inc: Project Manager
Department of Environmental Affairs and Development Planning (DEADP)	G Arendse	DEADP Representative
Consultant Team	Jeffares & Green Ingerop M Ncwadi M Dittke S Dittke J Hanks C Janisch A Naude Severn Trent Africa Ignis Financial Solutions Herman Wiechers	Project Leader Technical Leader Waste Environmentalist Environmental Lawyer Waste Specialist Waste Minimisation Specialist Waste Minimisation Specialist Hazardous Waste Specialist Institutional Specialist Financial Specialist Review Consultant

1.1 Terms of Reference

In terms of Contract No. 0098-0103-SUB-TA37, Mega-Tech Inc (MTI) has commissioned Jeffares & Green (Pty) Ltd, in joint venture with Ingeróp Africa (Pty) Ltd, to provide consulting services for the "DEVELOPMENT OF AN INTEGRATED WASTE MANAGEMENT PLAN (IWMP) FOR THE CITY OF CAPE TOWN".

MTI provides administrative, management, and logistical support to USAID/South Africa's Housing and Urban Development Team (SO6), USAID/South Africa's Economic Growth and Employment Team (SO5), and the Housing and Urban Development Office for Africa (RUDO/Pretoria). Through the General Management Assistance Contract (GMAC), MTI directly provides and also solicits from outside sources a broad range of services as requested by these offices to support USAID/South Africa's programming in the fields of technical assistance, training, monitoring/evaluation, and grants management. Through GMAC, MTI also serves as a USAID procuring agent and acts in this capacity for purposes of this Contract.

1.2 Project Team

The composition of the Project Team is shown in Table 1-1.

1.3 Introduction and Background

The City of Cape Town was formed in 2001 by the integration of seven former municipal local councils (MLC's) into a single "Type A" metropolitan council (Unicity). Solid waste services now provided by the new metropolitan council include the bulk services of the former Cape Metropolitan Council as well as the collection and cleaning functions of the six former MLC's. The City's solid waste management operations are currently fragmented, with some services and facilities in need of upgrading and modernisation. Certain shortcomings in waste management practices and legacies inherited from previous MLC's may have significant cost and service delivery implications in the future. These shortcomings include:

- The City of Cape Town disposes of some 1,7 million tons of waste per year. This quantity is growing by an estimated 5,5% per year. Landfill airspace is in critical short supply and disposal is becoming increasingly expensive as a result of new environmental and other legislative requirements.
- There is no Integrated Waste Management Plan (IWMP) in place that looks at the overall problem facing the city from a sustainable development and effective waste management point of view.
- There is no comprehensive database or overlying management information system in place to produce reliable data and management information. Decisions and policies are made making use of scant or no information. (This is presently being addressed through the introduction of a SAP information and business solution, which may include a waste module).
- The City faces large scale illegal dumping and littering.
- Waste reduction initiatives including reduction, minimisation and recycling are ad hoc and no policy guidelines or targets exist.
- Existing municipal by-laws relating to solid waste management are in need of review and reform. This is expanded on in Chapter 4.

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It is against the above background that the City of Cape Town identified the need to develop an IWMP that will drive future planning of the City's waste management. In terms of the Draft National Integrated Waste Management Bill, an IWMP must consider the following:

- Population and development profiles for the Municipality;
- An assessment of all significant sources and generators of waste within the Municipality;
- An assessment of the quantities and classes of waste within the Municipality;
- An assessment of the markets, waste management services and waste handling and waste disposal facilities for each waste category;
- An assessment of the options for waste reduction, management and disposal with the Municipality;
- An assessment of the levels of service and the number of persons within the metropolitan area who are not receiving waste collection services and proposed strategies and targets for providing a service to such persons;
- Proposed strategies and targets for managing and reducing waste in the Municipality and for the efficient disposal of waste that cannot be re used or recycled;
- Strategies for waste reduction and initiatives for separating waste at its source;
- Strategies for raising awareness of waste management issues;
- Strategies for establishing a waste-related information system;
- An implementation programme that identifies the required time-frames, resources and responsibilities for achieving these strategies and targets;
- A mechanism for monitoring performance in light of these targets and strategies; and
- Such other matters as may be required by any other legislation, regulation or guidelines;
- An affordable and sustainable waste tariff and a waste financial statement.

The Terms of Reference for the Contract makes reference to the following guidelines for preparing municipal waste plans in terms of the national legislation:

- In preparing the IWMP, the Municipality must take into consideration any Integrated Development Plan (IDP) or Land Development Objectives of the Municipality, and the requirements of any national or provincial legislation or policy.
- The Municipality must prepare the IWMP in consultation with the local community, as required by the Municipal Systems Act, 2000.
- The Municipality must take reasonable steps to bring its draft municipal waste management plan to the notice of the local community and must invite comments thereon from members of the local community. The Municipality must take any submissions it receives into consideration in finalising the IWMP.
- The Municipality shall send copies of the draft IWMP to the Minister of Environmental Affairs and the Minister of Water Affairs and Forestry, and neighbouring Municipalities for their information.

The development of an IWMP is a requirement of the National Waste Management Strategy and the Draft National Integrated Waste Management Bill, due to be presented to Parliament for promulgation in 2004. The objective of this Contract is to develop an IWMP, using a cradle-to-grave approach that incorporates appropriate, affordable and an environment-friendly mix of solutions which will continually reduce the mass of waste requiring disposal and also serve to provide a dynamic framework to manage the City's waste stream effectively based on the waste hierarchy (Figure 1.1).

1.4 Scope of Study

The scope of work for the development of IWMP is clearly set out in the Contract (between the Consultant Team and USAID) and includes:

Table 1.2: Scope of the IWMP Study

- Draft *Status Quo* Report, including review of by-laws
- Final *Status Quo* Report including Gap Analysis
- Draft Integrated Solid Waste Management By-law
- Draft Assessment Report
- Final Assessment Report
- Final Draft Integrated Solid Waste Management By-law
- Draft Integrated Waste Management Plan
- Final Draft Integrated Waste Management Plan (IWMP) and Stakeholder Communication Strategy

1.5 Approach and Methodology

The development of the IWMP is generally guided by the following principles:

1.5.1 Fundamental Principles

The IWMP will establish a dynamic system, which will aid decision making and ensure that waste is handled in such a way that does not cause harm to human health or well being or the environment (See Figure 1.1). It should acknowledge that:

a) Everyone has the right to have the environment protected through reasonable measures which prevent pollution and environmental degradation and which promote sustainable development;
b) Waste must be managed in a responsible manner, promoting avoidance, reduction, reuse, recycling and responsible disposal in terms of the waste hierarchy;
c) The achievement of equity will be pursued and no person or community shall be discriminated against in the provision of solid waste services;
d) There will be a thrust towards poverty alleviation through empowerment projects e.g. waste recovery, reuse and recycling;
e) There is integration between the different municipal functions in the provision of services.
f) Political and administrative structures will be capacitated to make appropriate and informed decisions.

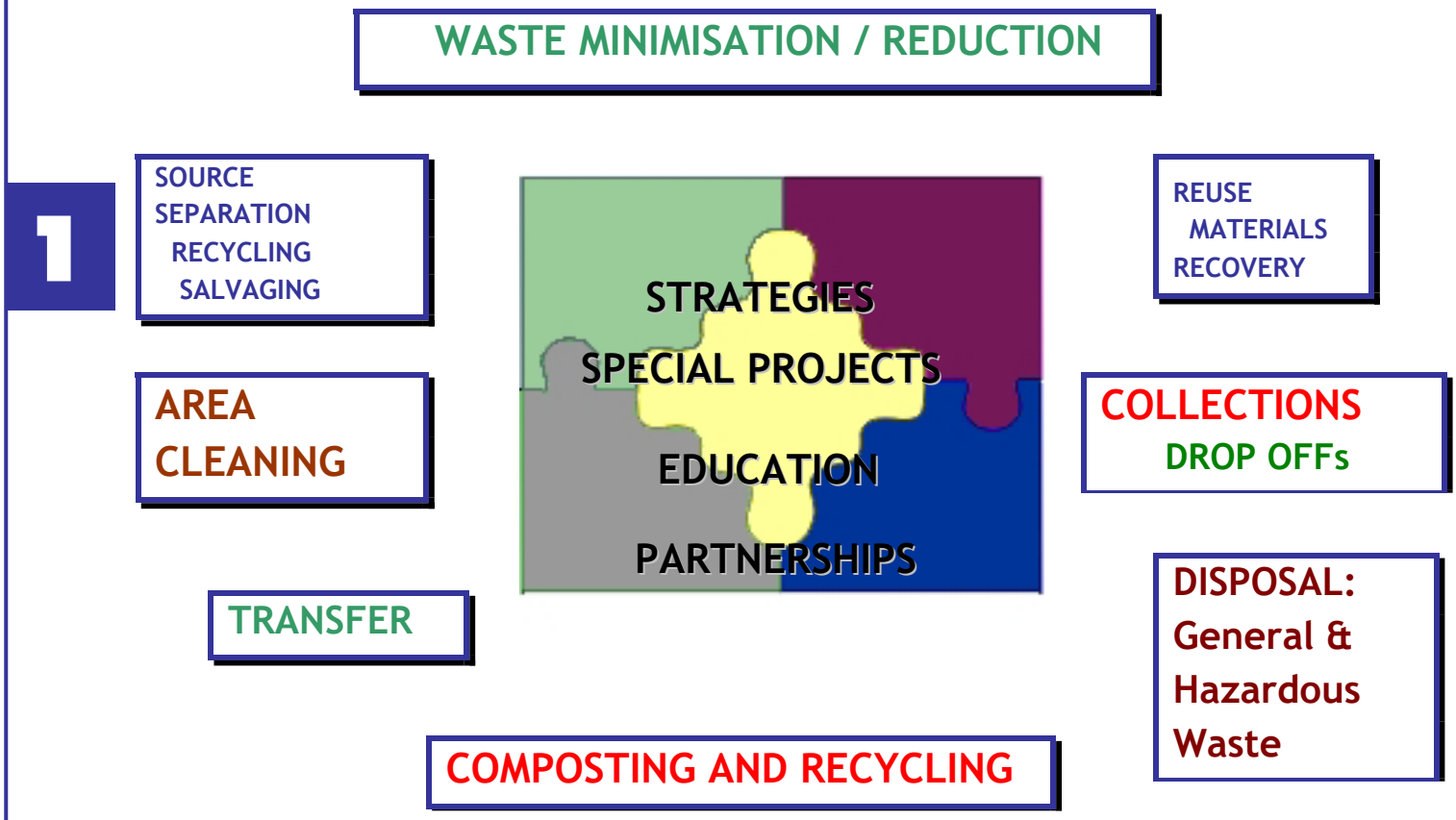

Figure 1.1: Building Blocks for an IWMP for the City of Cape Town

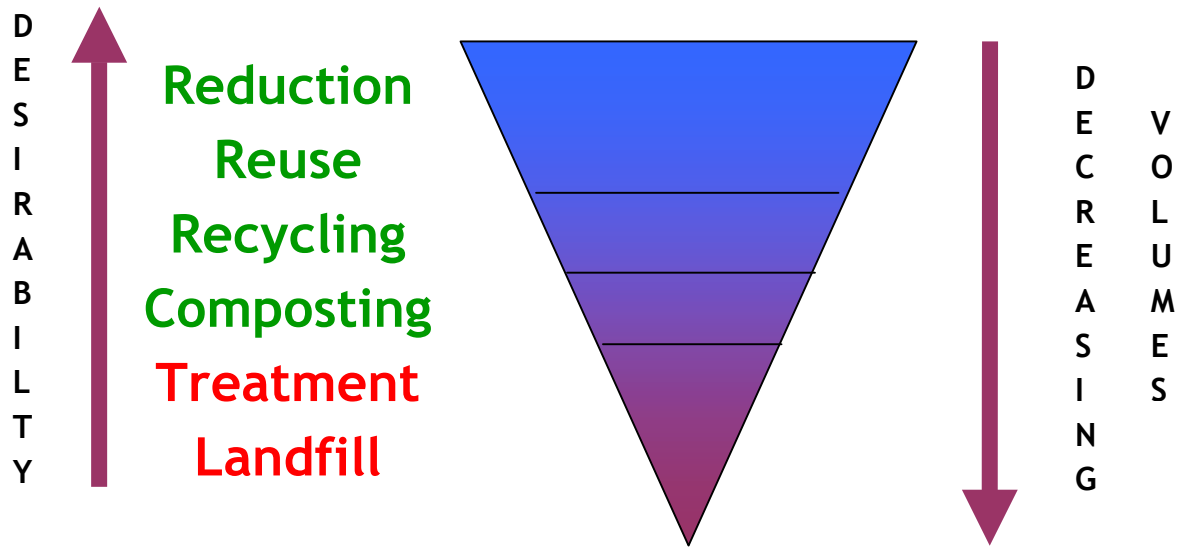

Figure 1.2: Waste Hierachy

1.5.2 Development of the Integrated Waste Management Plan

The overarching task is to develop an IWMP in accordance with the Draft National Integrated Waste Management Bill, taking into account Cape Town's waste management situation, the City's IDP (Integrated Development Plan), DS (Development Strategy), IMEP (Integrated Metropolitan Environmental Plan), the MTIEF (Medium Term Income and Expenditure Framework) as well as the Municipal Systems Act (Section 78).

The IWMP shall embrace the following:

- The plan shall identify problems and recommend solutions related to source reduction, recycling, composting, combustion processes, waste transfer and disposal.
- It shall also recommend waste management objectives and targets in accordance with waste hierarchy and the ultimate goal of waste reduction (see Figure 1.2).
- Findings, conclusions and recommendations shall be made which address general, hazardous and special solid and liquid wastes. This includes, but is not limited to *inter alia* animal carcasses, medical and healthcare waste, tyres, construction and demolition wastes as well as water and wastewater sludges.
- The IWMP will embrace the ISO 14000 series and include audits and review with the ultimate goal of ongoing review and assessment, which will lead, to continual improvement.
- National, Provincial and local environmental legislation and guidelines shall be used t o inform the IWMP.
- Drop-off and buy-back centres, school recycling projects, and community based contracts and partnerships shall be considered.
- Outputs from the Mayor's Listening Campaign will be reviewed and incorporated in the plan.
- The IWMP will be approached on the basis of a 20-30 year planning horizon.

1.5.3 IWMP Content

The process of developing and finalising the IWMP includes the following contributory analyses:

1.5.3(a) Status Quo study and Gap Analysis: As a preliminary step to the formulation of the Plan, the Project Team has reviewed and documented work already done, as well as policies, strategies and by-laws already in place. A list of References 1-1 to 1-134 is given in Section 1-7 at the end of this chapter. A gap analysis will be conducted to identify necessary actions, policies needing review and by-laws requiring upgrading. Strategies and/or action plans to address the gaps identified shall be developed as part of the planning process. This will include the preparation of a draft Integrated Solid Waste Management By-law ready for introduction into the legal approval process.

1.5.3(b) Assessment of existing Solid Waste functions: An on-the-ground assessment of existing solid waste functions shall be conducted including; *collections* (domestic and trade), *Residential drop-off service*, *cleaning* (street, area, beach cleaning) and *disposal* (composting, waste minimisation, *transfer* and disposal) as well as the *Wastewise Programme*. The assessment includes benchmarking current practices against both international and national best practice.

1

1.5.3(c) Financing and Revenue Plans: The Project Team shall develop financing and revenue plans for Solid Waste that includes a review of the MTIEF for Solid Waste.

1.5.3(d) Institutional Arrangements: Institutional arrangements shall be proposed to achieve the objectives of the IWMP. This will include interaction with the Service Delivery Definition and Boundaries Project, which is being undertaken as part of the Business Unit Establishment Project.

1.5.3(e) Review of Waste Information System: The City of Cape Town intends to procure a waste information system. The Project Team will review the Terms of Reference for the waste information system procurement. This system is to be implemented in order to inform decision-making and also to promote review of the effectiveness of new strategies. The system should ideally include weighbridge software and an interface with SAP. The system should furthermore serve as a tool to enable effective decision-making.

1.5.3 (f) Stakeholder Communication: The City of Cape Town has planned to appoint a Public Communications Consultant to communicate the IWMP to the public and relevant authorities and parties, as it develops. The Project Team shall provide technical inputs to, and participates in, monthly internal IWMP project management steering meetings with relevant City of Cape Town officials to incorporate feedback into appropriate technical deliverables. Where necessary, the Project Team shall provide technical inputs to, and participate in, special briefing sessions for Councillors. The Project Team will also recommend strategies for the City to communicate the Final Draft IWMP to the public.

The City of Cape Town is, in many respects, regarded as a leading city in South Africa in terms of waste management. The considerable wealth of experience and knowledge that already exists, the proven and successful waste management practices and the strategies currently in place, will collectively play an important role towards the development of the proposed final IWMP. The Project Team has strived to obtain a good understanding of the dynamics of waste management within the Cape Town Metropolitan Area (CMA) to be able to measure the City's waste management practices against national and international "best practices".

1.6 Preparation of the Status Quo Report

Understanding the City's waste management systems is critical in the development of the IWMP. Figure 1-3, page 1-10 shows the elements of a typical waste stream for a city such as Cape Town.

The initial step was to gather and review all available literature, reports and records (References 1-1 to 1-134), and analyse the waste stream to determine the different types of materials that comprise the total waste streams. Waste includes domestic, business, industrial, garden, building wastes, water and wastewater sludges, hazardous and medical wastes and wastes derived from illegal dumping.

Communities are being forced to look at different options for integration into a solid waste system due to social and political considerations and regulatory requirements. A detailed analysis of the City's demographics and socio-economic profiles was undertaken to feed into the waste modelling.

Procedures used for waste analyses included characterisation surveys of wastes from collection vehicles at disposal facilities and at the point of collection. These samplings reflect the socio-economic background of the sampled area.

Hazardous and special wastes such as municipal water and wastewater sludges, medical wastes, abattoir wastes, port wastes, etc were assessed. Upon completion of the gathering of data of the generation, collection and disposal of the waste stream, a waste generation model was developed for the various municipal, hazardous and special wastes.

A waste minimisation study was undertaken of waste reduction, reuse, exchange, recycling, recovery and composting as currently practiced within the metropolitan area.

In addition to analysing the City's waste stream, the Status Quo study reviews the City's institutional and financial arrangements as well as policy and legislation relevant to solid waste management.

Other components of the status quo study included a review of the City's planning with respect to the development of a waste information system (WIS), the monitoring and auditing of waste functions within the City and a review of waste education, awareness and special projects related thereto.

The Terms of Reference for the development of the IWMP requires that a gap analysis be conducted to identify areas of inadequate or insufficient information, to identify policies needing review and by-laws requiring upgrading.

"Gaps" are defined as follows:

- Gaps in the Final Status Quo report, where further information is still required to proceed with the preparation of the Assessment Report.
- Gaps in the City's policies, strategies and by-laws that require actions by the Waste Department. These gaps will be assessed and described in the Assessment Report, with the actions and strategies for closing the gaps carried forward to the IWMP.
- Gaps may also be considered to be the gap between the current "As-Is" situation and the future scenario with respect to waste management in the CTMA. The IWMP will determine the objectives, strategies, policies and goals to be implemented by the City to close the gaps.

Comments with respect to "gaps and needs" made by the public through a parallel public participation process will be recorded separately, to be read in conjunction with this report.

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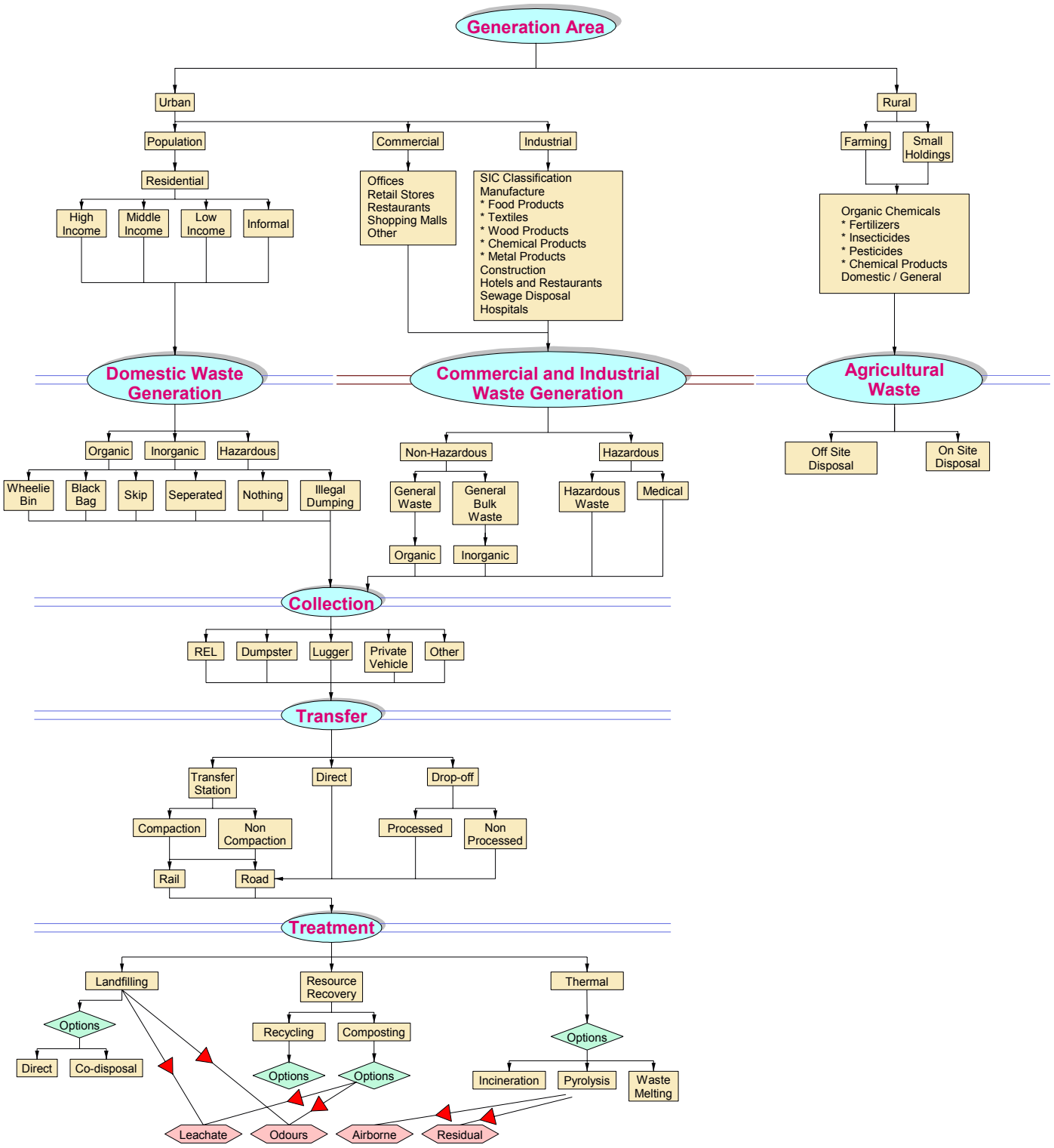

Figure 1.3 Waste Stream Flow Diagram

References

The references listed hereunder have served to provide general background information in preparing the Status Quo Report. Further references are included at the end of each chapter that are pertinent to the particular chapter.
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Chapter 2 – Institutional Arrangements

This chapter addresses the institutional dimension of Solid Waste Services by tracking the developmental theme of the City of Cape Town from a historical perspective through to the current day challenges as outlined in the City's Vision & Strategy.

2

2.1 Introduction

In considering the review and/or analysis of the institutional arrangements of Solid Waste Services, it is important to understand exactly what is meant by the term "Institutional". For the purposes of the IWMP project, the term *institutional* shall cover the strategies, policies, procedures and principles adopted by the organisation's leadership in the following key areas of business activity, i.e. asset management, people management and development, business systems, customer relations management, service delivery and the measurement of the level of return received on the asset base managed. This implies that the institutional arrangements of the City and Solid Waste Service (SWS) in particular, are multifaceted and complex and not just one dimensional, measured only in terms of its organisational design or structure. Institutional arrangements are strategic in nature and designed to give maximum effect to strategic objectives and targets. It also includes vital components such as leadership, communication and trust, which must be applied coherently and collectively to ensure that critical mass is achieved across the business.

Chapter 2 addresses the institutional dimension of Solid Waste Services (SWS) by tracking the developmental theme of the City of Cape Town (CCT) from a historical perspective through to the current day challenges as outlined in the City's Integrated Development Plan (IDP). It considers the preparatory work that has already been undertaken in the lead up to the establishment of Internal Business Units, and addresses these observations in the context of a status quo position. The status quo findings form an integral part of a future assessment and planning phase designed to ensure that there is both political and service delivery continuity between the Council, the New Top Management Structure of the CCT and the Institutional Design for Solid Waste Services, of which the Organisational Design (OD) in particular will be a key element. These interfaces must all be aligned in order for the City to meet the challenges set out in the City's Equity Service Framework.

2.2 Existing Institutional Arrangements

2.2.1 Introduction

The recent integration of the City's seven former Administrations into a single Metropolitan Council has impacted on the management and delivery of solid waste services provided by the City. There is currently no Integrated Waste Management Plan (IWMP) in place that addresses the overall challenges facing the City from a sustainable development point of view.

The purpose of this element of the project is essentially to provide specialist inputs to assist the CCT and in particular Solid Waste Services (SWS) with the Institutional Arrangements that will support the sustainable implementation of an IWMP in the long term, and which supports the City's Integrated Development Plan (IDP).

The Solid Waste Department of the CCT is, in many respects, amongst the leading cities in South Africa in terms of waste management. The considerable wealth of experience and knowledge that already exists, the proven and successful waste management practices and

the strategies currently in place will collectively play an important role informing the assessment and development of an appropriate structure for the IWMP implementation.

The investigation into and evaluation of the current Institutional Arrangements will be approached in an objective manner using a proven process methodology that will serve as a baseline for SWS going forward. This approach will ensure that the Institutional Arrangements are dynamic and responsive enough to aid decision-making and ensure that waste is handled in such a way that it does not cause harm to human health or well-being or the environment. It shall also acknowledge that:

a) Everyone has the right to have the environment protected through reasonable measures which prevent pollution and environmental degradation and which promote sustainable development;
b) Waste must be managed in a responsible manner, promoting avoidance, reduction, reuse, recycling and responsible disposal in terms of the waste hierarchy;
c) The achievement of equity will be pursued and no person or community shall be discriminated against in the provision of solid waste services;
d) There will be a thrust towards poverty alleviation through empowerment projects e.g. waste recovery, reuse and recycling;
e) There is integration between the different municipal functions in the provision of services.
f) Political and administrative structures will be capacitated to make appropriate and informed decisions.

2.2.2 Background

Only a decade ago Cape Town was regulated through legislation, which racially segregated the City. The City was governed through 69 municipalities and was managed by 17 separate administrations. This history of extreme institutional fragmentation left a legacy of inequities, which remain a major challenge to the City. In the period since the first democratic elections some progress has been made to address service equity by individual Metropolitan Local Councils (MLC's) and the Cape Metropolitan Council (CMC). Despite this progress, no common policy framework that applies uniformly across the CCT has as yet been formulated, leaving many differences between areas regarding access to, delivery of and payment for municipal services.

The establishment of a single municipal entity for the whole of metropolitan Cape Town now provides the platform from which to build a common citywide framework for the delivery of equitable services. It is within this context that the IWMP project will consider the current institutional arrangements for SWS. This consideration will encompass the status quo position and a limited analysis and the identification of preliminary gaps that will be aimed at providing an institutional focus to SWS for the equitable delivery in this service category. The final product will aim to deliver and integrated approach that will comply with key legislative requirements, the Integrated Development Plan (IDP) for the City, the Equity Service Framework (ESF) and the specific strategic objectives and targets of the City.

Figure 2.1 depicts the [institutional] transformation that has been taking place within the City structures over the last decade, making Cape Town 2004 very different from what it was ten years ago. Not only has the political system been transformed, but also the make-up

of provincial and city authorities. The component parts of this process are fundamental to understanding the basis for and the development of a new institutional paradigm.

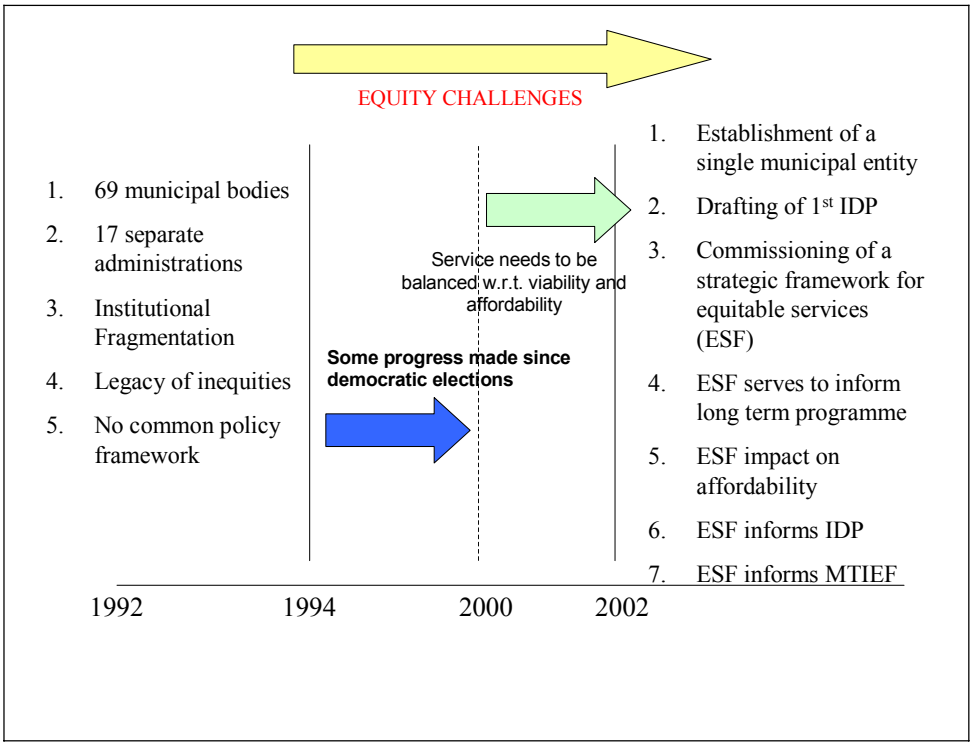

Figure 2.1 – Historical Perspective

The CCT adopted its strategic vision in December 2002, and this strategy was communicated via the Mayor's Listening Campaign. Following a 12-month "settling in" period and having reviewed its achievements with regards to the implementation of this strategy, the leadership resolved to make amendments to the City's IDP. The first IDP was adopted in May 2002. The IDP itself reflects a single, inclusive and strategic plan for the development of the municipality. It informs policy framework and the basis on which the budget is compiled, and in terms of section 34 of the Local Government Municipal Systems Act 2000 it is necessary for Council to review its IDP annually. Therefore a revised IDP was adopted in May 2003, which included public comment.

The amendments sought to address the observations made in relation to the four goals of the City's scorecard i.e. productivity, inclusivity, governance and sustainability, which despite significant public and private investment in the city, showed little evidence that a fundamental shift is taking place in Cape Town's developmental path. The final draft IDP (inclusive of public comments and council inputs) is scheduled for submission for Council adoption in May 2004, exactly two years after the 1st IDP was adopted. The draft IDP will build upon previous strategic planning produced over the past year, including the City of Cape Town Strategic Direction 2003-2005 document prepared in December 2002, a review of the 2003/04 IDP and the extensive work done in preparing a Restructuring Grant application to National Treasury.

2.3 Status Quo Information

It would be appropriate at this point to reflect on the institutional review methodology to be adopted as a basis for reporting on status quo information, and in order to highlight both the complexity of institutional arrangements and therefore alert the reader to the reasons why only *limited* [institutional] status quo information is presented at this point, including the high level "*situational analysis*" referred to in the introductory and background sections of this element. The following template is used to illustrate this methodology:

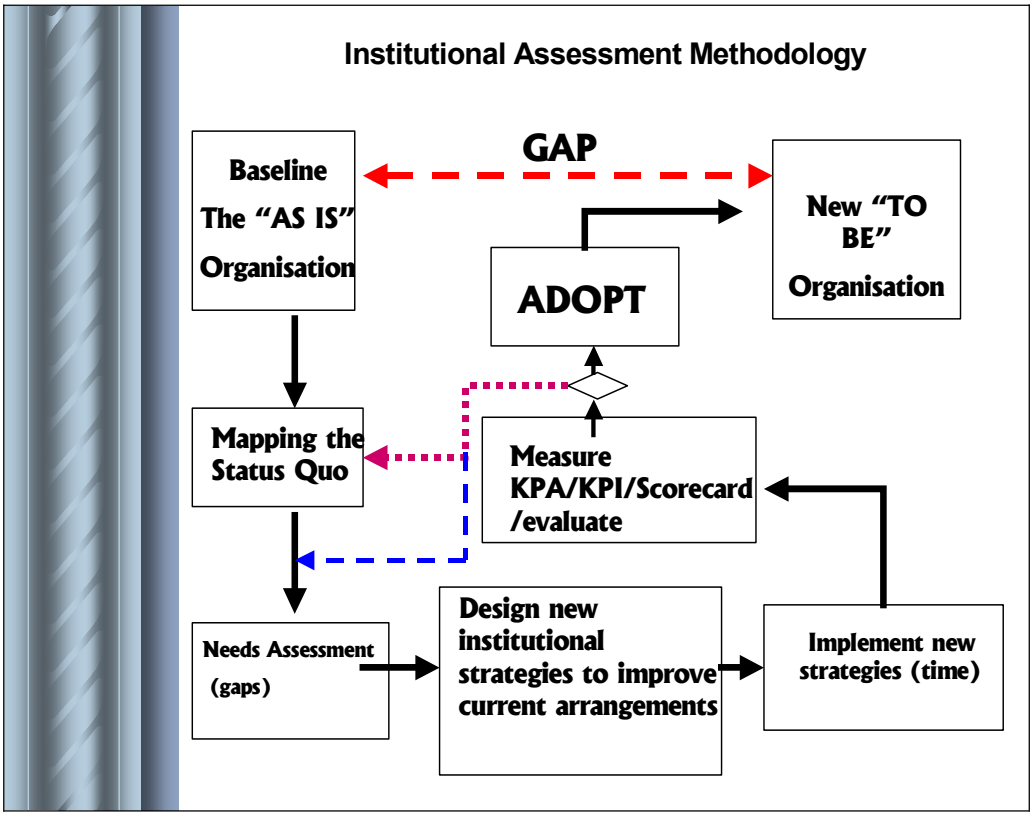

Figure 2.2 – Process Mapping for Institutional & OD Development

In fact the City's high-level approach to its strategic/IDP/developmental review process mimics the above model. However the critical step in following through with the above model lies in the design and implementation of new strategies and solutions that will indeed provide for an enabling framework for service delivery. This will not only apply to the City but also to Services (e.g. SWS).

Discussions with City officials revealed that various Organisational Design (OD) adjustments had been made to SWS following the approval of the "NEW TOP MANAGEMENT STRUCTURE" (NTMS). It was confirmed that the reporting levels in the NTMS for the Municipal Manager, the Executive Directors and the respective service directors had been agreed and approved. Furthermore the structure referred to as OD1 or "AS IS" was subject to minor adjustments, but had not been officially adopted in any form or shape. Further updates to the OD process is subject to inputs from a number of stakeholders including the work being undertaken by

the Transformation Implementation Team (TIT). From a structural point of view the NTMS is the only structure that carries an official status. For this reason only the [abridged] NTMS is presented in this report.

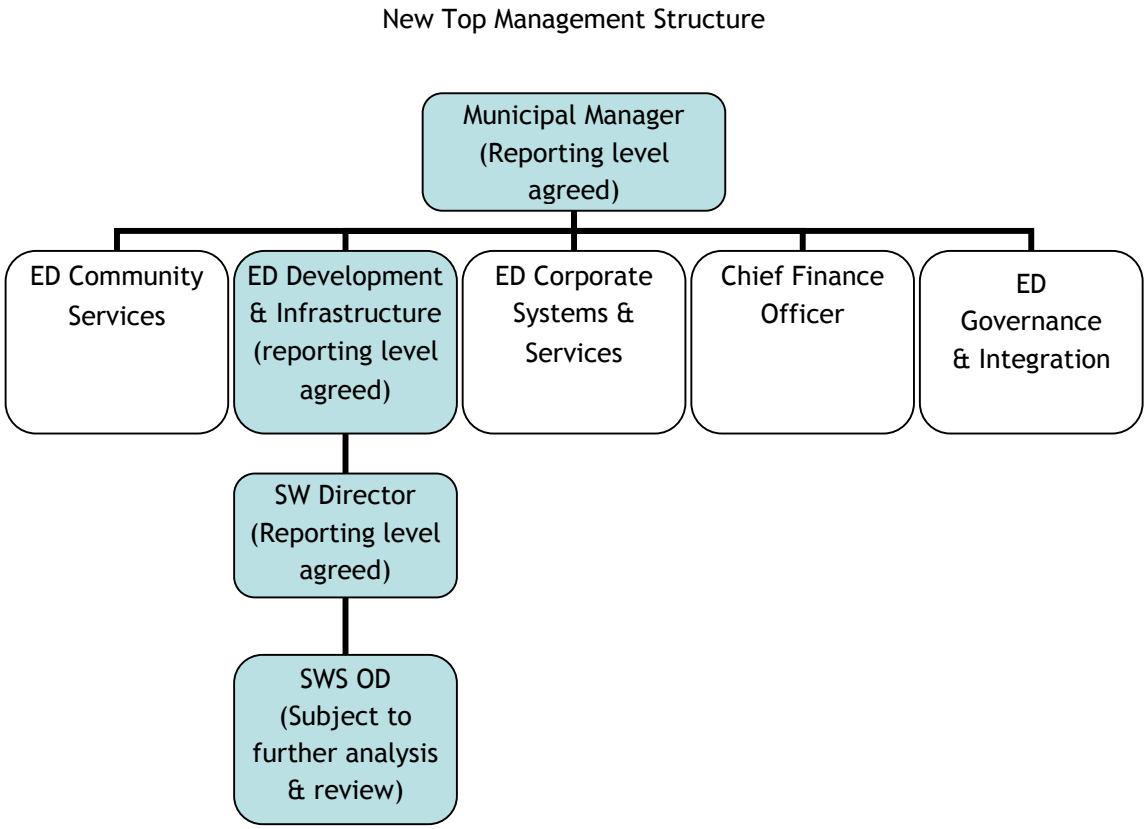

Figure 2.3 – The abridged version of the New Top Management Structure

In respect of the uncertainties surrounding the Institutional Arrangements and in particular the OD, Table *2.1* presents a "snap shot" of the current status quo for SWS:

Table 2.1 – Institutional Status Quo version 1.0

Steps	Organisational Structure and Institutional Arrangements	City Remarks
1	**Undertake an appropriate audit of the AS IS position within the City. This step will need to consider the existence of various key documents and guidelines e.g. IDP, SDA's, Business Plans, Strategies, etc**	**DONE**
2	**Map the AS IS position to determine the degree of business/strategic/operational alignment. This process will involve all the relevant stakeholders**	**DONE**
3	**Review the AS IS position against the future requirements of the business and determine the gaps. This process will require stakeholder participation**	**DONE**
4	**Design the new structure(s) and propose the necessary institutional arrangements that will meet the strategic business objectives for the TO BE position. This will be inclusive of defining appropriate measurement criteria for success (KPA's and KPI's). At this point continued stakeholder involvement will be required to design the appropriate change management process that would need to accompany the implementation process. The latter must address strategic guidance, communication and projects**	**Work in Progress**
5	**Implementation of the recommendations will be the responsibility of the City**	**Agreed**
6	**Performance measurement of the implementation process will be the responsibility of the City**	**Agreed**
7	**Any adjustment/fine tuning of the new design will be the responsibility of the City**	**Agreed**
8	**The new design can be adopted following the successful achievement of the performance targets.**	**Agreed**

It must be emphasized that the details presented in Table 2.1 represent the most realistic status quo "position statement" or data set when compared with the institutional review template. However a series of observations have been distilled from the relevant reports produced by other investigative initiatives (refer References). These observations have been translated into a preliminary but basic analysis of the Institutional Arrangements of SWS and a set of [initial] GAPS linked to particular City themes that do not resonate the anticipated developmental trend. These observations should be seen in the context of the broader institutional variables and not be confused with Organisational Design per se. These observations are however fundamental drivers to ensuring that the desired OD is realised.

2.4 Analysis of Information

The City of Cape Town's Solid Waste Services consists of the combined solid waste services of the seven administrations and has an annual Opex of R655m (staff budget is 32%) a revenue stream of R388m, a Fixed Asset value of R430m and a total labour compliment of +3000 people (*these figures represent best available information and are subject to adjustments*). SWS serve some 660,000 households with approximately 730,000 collection points. Based on these figures some very basic ratios can be derived (all of which are approximations at this point in time):

- Ratio – Revenue to Staff Unit = R 139,000 generated per staff member
- Ratio – Revenue to Households served = R 588 generated per household
- Ratio – Revenue to Fixed Asset Value = 0.9
- Bad debt provision is 5% of revenue and 3% of Opex

From an Institutional perspective it is important to recognise that SWS does not comprise only one category of assets e.g. fixed assets, but also people and business systems. It is therefore important to be able to measure a collective Return on the Assets Managed (ROAM) across these key categories and to be able to ascertain the quality of the service delivery. Hence the application of the City's scorecard at the SWS level will allow one to derive more pertinent information w.r.t. to predictive ratios for ascertaining the overall health of the organisation. From an analytical perspective one would consider the scorecard as presented in Table 2.2:

Table 2.2 – Comparative City to SWS Linkages

Scorecard Indicator -High Level City Directive	SWS Linkage
Productivity	**Systems & Processes** **Resource Deployment** **Skills Development** **Business & Service [Matching] Tools**
Inclusivity	**All stakeholders** **Labour & Industry** **Other services/directorates**
Governance	**Leadership** **Performance Measurement** **Accountability & Responsibility** **Change Management**
Sustainability	**Affordability** **Profitability** **Service quality** **Customer Relations**

The analysis must be contextualised in terms of the City's strategic framework, which in essence serves to inform the necessary service delivery mechanisms (*to be adopted by its services portfolio and directorates*) that will allow the City to achieve its strategic objectives and targets. Table 2.3 sets out the key imperatives for the City as dictated by the national legislative and developmental policies. In turn these inform the strategies and business imperatives of SWS. These were not available at the time of preparing the report.

Table 2.3 is a theme translation template that sets out the main drivers from a legislative policy dimension through to a strategic perspective for both the City (parent level) and SWS. It serves as an [auditable] policy-tracking tool for SWS that highlights the critical links with the parent and indeed the areas (City scorecard driven) in which particular strategies must be formulated for consistent and sustainable service delivery.

Table 2.3 – Strategic Imperatives linked to the City's Institutional Model

Key Legislative References	Integrated Development Plan (draft 1.4) 14/2/04	Equity Service Framework
1. Constitution of the RSA, 1996 2. Local Government Municipal Systems Act of 2000 3. The Local Government Transaction Act 209 of 1993 4. The Western Cape municipal Ordinance 20 of 1974 5. Local Government Property rates Bill (not yet Gazetted) 6. Environmental Conservation Act No 73 of 1989 7. The National Environmental Management Act No 117 of 1998 8. National Waste Management Strategy (version D 15/11/99) a policy document 9. Municipal Finance Management Bill (bill defines responsibility of officials of each service)	1. Geographical definition (areas, districts, depots) 2. Cleaning demand (formal & informal) 3. Collection format (containerisation) 4. Disposal (facilities) 5. Community Education (Waste wise)	1. Service Equity 2. Service provision balanced with viability principles 3. Service Delivery mechanisms 4. Stable Rates & Tariff structures 5. City's viability 6. Complexity of balance 7. Sustainability & affordability

Table 2.3 continued.

Vision for the City	Mission	The City's Fundamental Foundation
1. Sustainable city 2. Dignifies city 3. Accessible city 4. Credible City 5. Competent city 6. Prosperous city 7. Safe & caring city **Values of the City** 1. Clear sense of direction & purpose 2. Partnerships at all levels of city life 3. Openness, accountability & transparency 4. Belief that the city government must be close to the people 5. Decisions & actions that will take the needs & abilities of future generations into account 6. Efficiency, effectiveness and responsiveness 7. Promotion of multi-lingualism and cultural diversity	1. Responsible decision making 2. Viable, affordable & sustainable city services 3. Dignity & meaningful engagement with city structures 4. Fair access to the benefits of urban society & capacity building opportunities 5. Trustworthy, accountable, efficient and transparent city government 6. Contribute to global, regional, national & provincial and local economic growth & development 7. Part of shaping the future of the city 8. Opportunity to benefit from national & provincial partnerships	1. Provision of affordable, equitable and sustainable city services & maintenance of existing infrastructure and assets 2. Existence of strong mechanisms for inter-governmental & stakeholder co-ordination & commitment to a common city development agenda

Table 2.3 continued.

Strategy for the City	Business Drivers for SWS
1. Developing urban core 2. Improving existing settlements 3. Building competitive advantage 4. Sustainable job creation 5. Build cohesive self reliant communities 6. Improving access & mobility	1. Responsible management (promote avoidance, reduction, recycling, reuse). 2. Integration of municipal functions. 3. Capacitation of decision making through access to information management. 4. Poverty alleviation through empowerment projects/partnerships. 5. Achievement of equity. 6. The right of individuals to have the environment protected.

Forming an integral part of the IDP, the ESF is the second most important driver for service delivery and a fundamental point of departure for the [SWS] business. The framework set out in this document for achieving equity of services (Table 2.3) will determine the affordability for and sustainability of SWS in the long term, and will to a large extent dictate the Service Delivery Platform and hence the institutional arrangements required for SWS to give effect to this framework. A more detailed analysis is presented in Figure 2.4 for the ESF Model followed by appropriate descriptive text.

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The ESF can be depicted as follows:

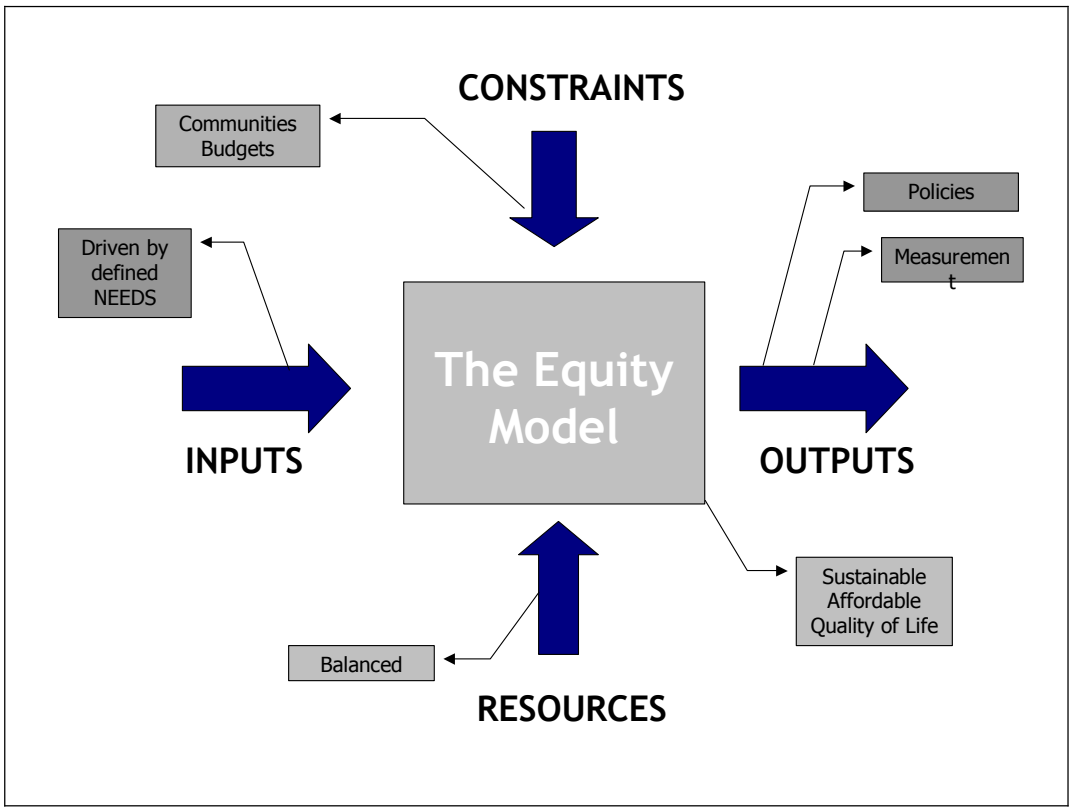

Figure 2.4 – The Equity Service Framework Model

Fig. 2.4 translates into the following interpretation:

Step 1: A *rudimentary service level* should be made available to all.
Step 2: Following step 1, the *service network* should be expanded.
Step 3: Following step 2 the *service package* should be expanded. Herein lie the challenge of cost recovery and the customization of requirements, where the latter is determined by the needs and demand and will be a function of income profiles, areas and individuals. This requires the development of an appropriate service delivery menu in accordance with the City's imperatives.
Step 4: Continue to *expand service access* while improving service quality.
Step 5: The service network should now be *maintained on an ongoing basis* with a specific focus on efficiencies and the measurement of unit costs.
Step 6: Steps 1-5 should translate into an *affordability* model that is sustainable.

The model also incorporates the linkages that must be created to give effect to the respective thrusts e.g. inputs, outputs, etc.

The key policy decisions that have to be made w.r.t. the above model include:

1. The comprehensive definition of service levels.
2. The comprehensive definition of quality and service standards.
3. Identify and address service level and quality gaps.
4. Establish an affordable and equitable tariff framework that is supported by the necessary legislation.

The ESF therefore requires an organisational alignment that:

a) Motivates the strengthening of area-based management, which is linked to the differentiation of services as a function of scale of delivery (*note* "benchmarking guideline" *statement under* Observations).
b) Informs macro and micro organisational transformation, where services must be organised and delivered on a corporate/metro wide scale.
c) Provides management information that can be used for decision-making purposes.

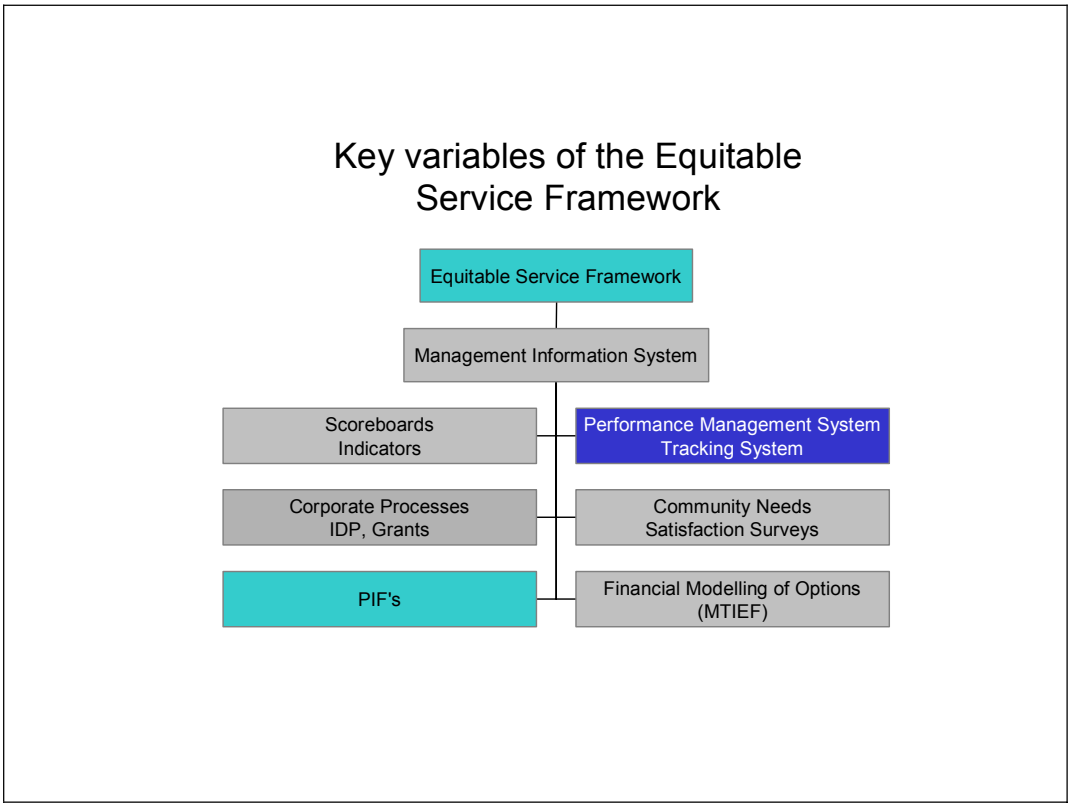

Figure 2.5 – The ESF linked to MIS inputs

The items detailed in Figure 2.5 highlight a number of observations made in reviewing the available literature.

Furthermore the Section 78(1) process undertaken by the City and adopted by Council concluded that:

1. There are direct and indirect cost benefits associated with an internal service delivery mechanism, including the expected effect on the environment and human health, well-being and safety.
2. The municipality's capacity and future capacity to furnish skills, expertise and resources necessary to provide services via an internal mechanism needed to be addressed and contextualised in terms of the outcome of the Excelsior results.
3. The selection of a specific internal option would have different consequences on the extent to which the City's administration could be utilised in each case. It was concluded that an Internal Business Unit (IBU) Structure would improve capacity utilisation. The preferred option is labelled OPTION 4 on page 62 of the PwC report titled *Development of a Framework for service Delivery, Service Levels & Funding Options*.
4. There would be no or little impact on job creation and employment patterns flowing from the provisions of an IBU. However the autonomy, customer orientation and accountability, which a BU provides can deliver, improved results.
5. Organised labour has to be engaged at all levels.
6. There would be significant cost avoidance benefits.
7. There would be improved levels of performance if the current constraints were removed. The overall Excelsior Score for SWS only stood at 175.3 compared with a score in excess of 550 for award winning organisations.
8. The realisation of the IBU benefits listed will only be realised if SWS implement the recommendations suggested in the PwC report titled *Assessment of the Internal Mechanisms for the Provision of Solid Waste, Water & Sanitation and Electricity Services – Executive summary*.

2.5 Observations

The development or formulation of an Institutional Arrangement is normally driven from the top. This structure must ultimately serve as an enabler or vehicle for achieving the strategic objectives of leadership. In the case of a normal [commercial] business these strategic objectives are quite clear. They would typically cover areas such as shareholder return, growth, profitability, customer satisfaction, local or international expansion, R&D and so on. These would be tangible measures by which the CEO would be able to gauge the performance of the company as well as the quality of his leadership.

Other than being aware of the macro economic developments within the country and complying with the various legislative requirements, the business would not necessarily take any cues from the political environment, and would not be dependent for its budget on National or Provincial processes. It would manage its cash flow on the basis of revenue generated from its customers, cost reductions programmes and efficiency drivers.

Considering that the City of Cape Town forms part of a larger political structure (national, provincial and local), and is not fundamentally driven by a commercial outcome as its sole objective, but rather by the objectives set out in Table 2.3, it is inevitable that the strategic imperatives for the City will be politically motivated. Although the commercial viability of these politically driven initiatives have specific business consequences, they will not feature prominently in the final analysis. Applying this as an explicit constraint, a viable organisational arrangement/structure has to be put in place that will ultimately make good on the political promises of leadership.

Figure 2.6 shows both the political and business complexities that have to be considered in running SWS.

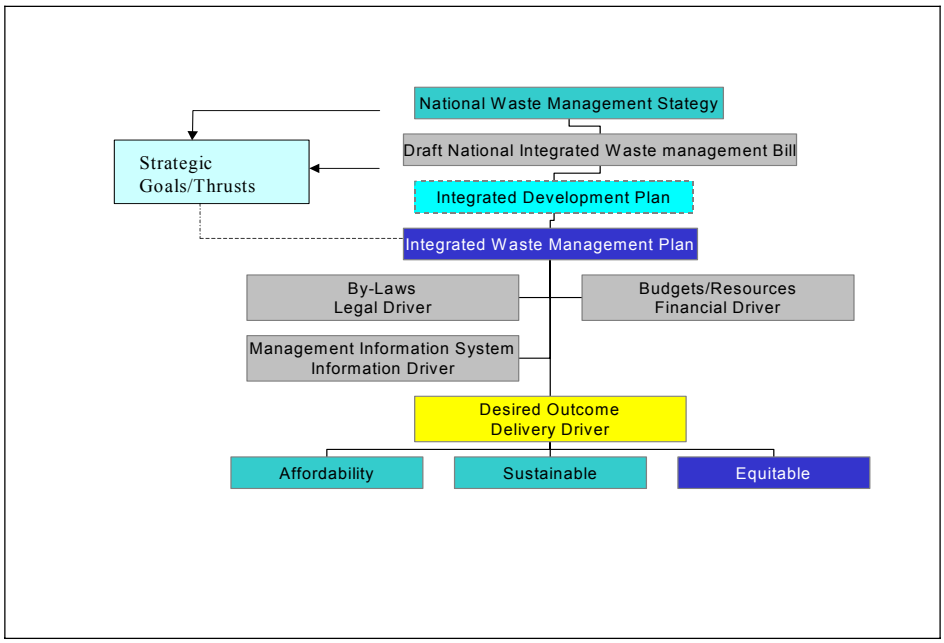

Figure 2.6 -Defining an Institutional Arrangement as a function of an integrated legislative and policy delivery chain

Accepting the need to adhere to the directives outlined in Figure 2.6, there should also be an equal recognition of the following realities:

- Waste generation is growing.
- Landfill airspace is diminishing.
- Disposal costs are escalating in view of new legislative requirements.
- The Business Architecture is fragmented.
- Illegal dumping is an on-going problem.
- Littering is an on-going problem.

Benchmarking Guideline:

Reflecting on the evolutionary pattern in the UK solid waste industry, profit centred organisational structures hinge around:

- collection and logistics for dry waste;
- municipal/local authority contracting;
- landfill disposal;
- special waste management infrastructures coupled to non-landfill technologies.

Over the years certain operators in the UK have placed an emphasis on strong regional infrastructures under which these 4 distinct operational activities were combined into a single management structure. This has rarely worked even though in many cases the companies developing these solutions span only 2 or 3 of the activity groupings. These failures represent a precedent for a focus on technical/informational knowledge based on the 4 distinct service offerings, which also closely reflect the natural divisions in the market segments.

Furthermore, the importance of a corporate brand should be reinforced through:

- advertising;
- the provision of a one-stop-shop across divisional services;
- brand focused publications of a cross sectoral and geographic nature;
- strong brand communication in the context of parliament, legislators, NGO's, voluntary groups and other industry bodies.

2.6 Gap Analysis

At the time of preparing the Status Quo Report for the Institutional Arrangements of SWS, no Organisational Design had been finalised and it was not possible in a position to identify any "structural gaps". Notwithstanding this constraint, the review of current and historical literature as well as discussions held with City Officials has resulted in the identification of a number of [preliminary] gaps that will be further assessed, using a meaningful "translation" process whereby appropriate strategies will be developed by the City and more specifically SWS. This process will be undertaken in consultation with City Officials and other relevant stakeholders.

The [preliminary] GAPS listed in Tables 2.4 and 2.5 is the *first cut* of a broader institutional assessment that will aim to draw on the linkages between the City and SWS and stimulate further strategic/political debate that will serve the follow-on phases of the project.

Table 2.4 -Performance inhibiting GAPS (preliminary) at City Level

Institutional Level	Gap Assessment	Key Pointers
CITY	Poverty and Inequality	33% of household incomes below R1600 pm
CITY	Unemployment rates	5 year increase has slowed but still above 18.5%
CITY	Service backlog	Growth in households exceeding pace of delivery
CITY	Housing backlog	Currently at 245,000 units
CITY	Skills Levels	Problematic in areas of comparative advantage
CITY	Investment outside of identified nodes & corridors by public and private sectors	Major spatial inefficiencies
CITY	Rising consumption patterns	Unsustainable use of resources, increased waste volumes and a decrease in quality of the urban environment
CITY	Cleaning public spaces	Ranked 5th on the Mayor's Listening Campaign
CITY	Increased littering	Ranked 5th on the Mayor's Listening Campaign
CITY	Environmental conservation	Problems with urban sprawl and urban growth and the decline in air an water quality
CITY	Arrangements for Managing the City	Centralised vs. Area Management
CITY	Internal Mechanisms for Service Delivery	IBU format needs to be revisited

Table 2.5 - Performance inhibiting GAPS (preliminary) at SWS Level

Institutional Level	Gap Assessment	Key Pointers
SWS	Internal communications Strategy/Charter	Aimed at employees across the board
SWS	External Communications Strategy/Charter	Aimed at the Council, business, the citizens and unions
SWS	Quantification and prioritisation of merger obstacles	Eliminate fragmentation of systems, support, policies and procedures and consolidate to critical mass

Table 2.5 continued

Institutional Level	Gap Assessment	Key Pointers
SWS	Optimisation of people resources and skills	Development of programmes for assessment, deployment, capacitation, training, conditions of service and job creation
SWS	People productivity enhancement	Develop programmes that will consolidate and focus efforts
SWS	Change management	Development of a pro-active change competency
SWS	Optimise service level standards with ESF requirements	Develop a "matching tool"
SWS	Responsibility and Accountability	Engage on the basis of a sound policy framework
SWS	Strategy and OD	Create auditable linkages
SWS	Funding Mechanisms	Conclude Rates vs. Tariffs debate
SWS	Service Delivery mechanism	Conclude BU vs. centralised vs. area management debate
SWS	Balanced score card	Integrate with revised IDP and City's scorecard (productivity, sustainability, Inclusivity and governance)
SWS	Policy driver for service level adherence at all levels of ESF	Develop matching tool and scorecard
SWS	Business Impact/Risk matrix	Integrate with SWS strategy and manage actively
SWS	Labour relations and Industrial Relations	Agree engagement mechanism that will develop absolute trust amongst all participants. Include the right people at the right place
SWS	Community performance measures	Introduce to celebrate success
SWS	Integrated Services Centre	Develop synergies and alignment with OD
SWS	Service Operation Centre for ESF implementation	Develop synergies and alignment with OD
SWS	ESF performance measurement	Install scorecard with accountability
SWS	ESF implementation budget	Secure grant funding
SWS	SAP -IU Waste Module ROI	Develop proper linkages, scorecard and accountability
SWS	Asset deployment	Prioritise according to ESF hierarchy and link to ROA measure
SWS	Services Standardisation across the metro as a function of tariff convergence and new tariff structure	Install scorecard and accountability

2.7 Conclusion

The items referred to in the analysis, observations and preliminary gaps will be carried forward to the assessment and planning phases in order to reach institutional closure for the IWMP. Furthermore it would be sound practice to accelerate and conclude the following activities where these have a specific impact on SWS:

- The Transformation Team initiative
- The IBU review initiative
- The final assessment and approval by council of the internal service delivery mechanisms.
- The finalisation and agreement of the strategic objectives pertaining to the ESF obligations.
- Determination of political and business priorities.
- Agreement on a phased approach for the institutional arrangements with specific structural and delivery milestones.

In conclusion the institutional status quo "data set" is limited and without much analytical substance. This lack of substance is a result of the current political scrutiny of all institutional arrangements pertaining to services. Furthermore this element does not attempt to identify any [major] gaps in the OD since an approved baseline is not yet determined. Its focus is more at a higher and integrative level.

Although much work still has to be done in all services and directorates recognition is given to the City for the excellent performance in areas of maintaining higher service levels, a significantly faster growth rate than the national average and preference as a worldwide tourist destination. Since 1995 there have been significant strides made in local government in metropolitan Cape Town, which includes the consolidation of local democracy, the extension of services, the completion of major restructuring and many other examples of innovation and good practice. Although these are formidable achievements the social and human development outcomes for Cape Town still fall way below what they should be, and the current arrangements of managing the City are not succeeding in turning the key socio-economic trends in a positive direction. This fact has to be observed and the impact on the long-term institutional performance of SWS recognised.

References

2-1. Price WaterhouseCoopers. (2001). *Assessment of the Internal Mechanisms for the Provision of Solid Waste, Water & Sanitation and Electricity Services* – Executive Summary Solid Waste Services Final Draft 29 October 2001.

2-2. PriceWaterhouseCoopers. *Development of a Framework for service Delivery, Service Levels & Funding Options* – City of Cape Town Solid Waste Services.

2-3. *Equitable Services Framework for the City of Cape Town* – Draft 1.7 20 December 2002. Refer Notes Appendix 5.

2-4. *Development of a Framework for Service Delivery, Service Levels & Funding Options* – 2002/2003 Tariff List Presentation to Sub-Councils June 2002.

2-5. *City of Cape Town Strategic Direction 2003-2005* – Addendum A (final), [superseded by IDP 2004/05 Draft 1.4].

2-6. *City of Cape Town Our City Our Future* – Integrated Development Plan 2004/05 Revision Draft 1.4, 14 February 2004.

2-7. *City of Cape Town* – Indigency Policy Documents

Chapter 3 – Financial Arrangements

This Chapter considers the financial status quo regarding the financial position of waste management of the City of Cape Town. It reviews the current cost structure, considers service and cost drivers, reviews the current funding for both operating and capital expenditure.

3.1 Introduction

The development of the Integrated Waste Management Plan ("IWMP") for the City of Cape Town includes the need to develop a financing and revenue plan for Solid Waste. In order to do so, it is necessary to first understand the current financial position of Solid Waste. In doing so it is necessary to review:

3

- The existing cost structure, considering direct and indirect costs;
- The sources of revenue for Solid Waste and the extent to which these are determined by the operations of Solid Waste or by other revenue drivers; and
- Sources of funding for operational as well as capital expenditure.

In considering the current financial position of Solid Waste a number of important issues and principles need to be remembered, namely:

- Firstly, the establishment of the City of Cape Town on 5 December 2000 resulted in the amalgamation of 7 different units. This has had financial implications such as duplication of costs, that are still being felt as the integration of the operational units is finalised:
- Secondly, the City is in the process of devolving financial responsibility down to the service units but this process is not yet complete. As a result, Solid Waste is responsible for the financial management of the division but is not yet responsible for independent budgeting, although the division does have input into the budgeting process. Similarly all accounting is done by Corporate Services although the division does have access to information directly from the accounting system. It is the intention that although accountability will devolve to the division, Corporate Services will continue to remain responsible for procurement, billing and sourcing of finance;
- As a result of the above certain costs are "given" to Solid Waste or expensed to the service divisions on a "cost-allocation" basis. These include costs for billing and debt collection;
- Similarly, the City has budgeted for a bad debt expense and passed this to each of the service divisions. The bad debt cost was estimated at 1 July 2003 on a 94% recovery assumption and resulted in an estimated R20 million charge for Solid Waste; (has since been revised to R50 million on 1 February 2004 based on collection experience by the Finance Department);
- Finally, significant analysis of the revenue model and expenditure model was undertaken in the study by Price/Waterhouse/Coopers and Ashira Consulting (Pty) Ltd entitled "**Development of a Framework for Service Delivery, Service Levels and Funding Options – City of Cape Town – Solid Waste Services**". It is not the intention to re-perform the work undertaken in this study and use will be made of the results thereof. The current financial analysis is intended to provide a brief overview of the status quo with the greater focus being on considering the funding structures to support the recommended IWMP developed later in the study.

3.2 Revenue Structure

Solid Waste at present derives its revenue in two main ways, namely Refuse Collection and Solid Waste Disposal.

3.2.1 Refuse Collection

In determining the revenue from refuse collection, two main classification criteria are applied. Once so classified, certain charges, levies and tariffs are levied and certain rebates granted to qualifying properties. The first classification is whether the property is vacant or occupied. The second classification, which only applies to occupied property, is whether the use is residential or non-residential.

3.2.2 Refuse Collection – Vacant Properties

Vacant properties are subject to the following two charges for refuse collection:

- Available charge – R25.15 per month; and
- Levy payable on property value – 0.0594 cents per Rand.

The only vacant properties exempt from these charges are Council-owned properties.

3.2.3 Refuse Collection – Residential Properties

Residential properties are subject to two charges for refuse collection, namely a levy and a tariff. The levy is a charge based on the rateable property value whereas the tariff is a "fee-for-service".

The "Valuation Derived" refuse charge is a value derived "Levy" and is a "public good" contribution. As a "public good", the levy is applicable to residential as well as commercial or industrial properties whether or not the property owner makes use of the municipal service (agricultural land is however excluded). For the council owned property, the levy is only payable if use is made of the municipal refuse service.

One of the difficulties at present is a lack of accuracy of classification of properties to ensure that the correct charge is being applied to a particular property. An exercise is currently being undertaken to review the system and check all tariffs and levies are being correctly charged. With the devolution of financial responsibility down to Solid Waste greater attention will be given to ensuring the accuracy of classification in future.

The determination of rates on property values is the function of the Council of the City of Cape Town, as is the decision regarding the allocation of the funds collected between various services. For residential properties the levy is payable at 0.0416 cents in the rand.

The tariffs, are based on the use of service and the level of service used. Various levels of service are provided depending on whether a container service or bagged service is provided and the number of bags or containers used and frequency of service. Residential users may be legally obliged to utilise the services of Solid Waste, whereas business and other users may select to use the local government service or may make use of private service providers.

There are four basic service products for residential collections, namely:

- Basic skip service;
- Township community based service;
- Plastic bag / bin service; and
- Container service.

The tariff is levied as a rate per month on a rate per use basis. The basic monthly residential tariff is R42.07 per month.

Occupied residential properties are not subject to an availability fee.

3.2.4 Refuse Collection – Non-residential Properties

Non-residential properties are also subject to the two charges, namely a levy and a tariff as follows:

- The levy is payable on the improved property value at 0.0594 cents per Rand. This levy is the same as for vacant properties, but higher than for residential properties;
- A tariff of R50.29 per month is charged for a 240 litre container service and the same per additional container. This tariff is approximately 20% higher than the tariff for the same service to residential properties.

Occupied non-residential properties are not subject to an availability charge.

3.2.5 Refuse Collection - Rebates

Various rebates on the basic tariffs are offered to deal with the issues of differences in service levels and affordability.

A service level rebate is offered to both residential and non-residential properties where a containerised service is not available. This rebate is R5.45 per month for residential properties, reducing the tariff from R42.07 to R36.62 per month. For non-residential properties the bagged service is charged depending on the frequency per week, starting at R21.28 for a once-a-week service.

Finally a tiered tariff rebate is offered to residential properties based on the value of the property. In the past the residential tariff rebate structure was as follows for the last financial year:

Table 3. 1 Solid Waste – Bulk Disposal Levy Rebates (Past)

Property Value:		% Rebate
From	To	
R 1	R 50 000	100%
R 50 001	R 100 000	50%
R 100 001	-	0%

A more stratified residential tariff rebate structure is has been implemented during the current financial year as follows:

Table 3. 2 Solid Waste – Bulk Disposal Levy Rebates (Current)

Property Value:		% Rebate
From	To	
R 0	R 50 000	100%
R 50 001	R 75 000	75%
R 75 001	R 100 000	50%
R 100 001	R 125 000	25%
R 125 001	-	0%

The second rebate is only applicable to residential properties and is a primary rebate of the first R50 000 of the value of the property in determining the levy.

Finally, a tiered tariff rebate is offered to residential properties based on the value of the property.

3.2.6 Refuse Collection – Free Services and Ad Hoc Charges

A number of refuse collection services are provided free of charge, including:

- Informal residential properties – rudimentary service;
- Informal residential properties – basic bagged service once per week;
- Informal traders – once a week service;
- Non-profit bodies – DIY container hire;
- Drop-off camps – garden, residential, garage and builders rubble free up to one ton; and
- Black bags for "Clean-Up" Campaigns.

In addition to the normal charges, a number of ad-hoc charges are levied for special services, including:

- Special events – container hire and removal; and
- Special garden waste removal.

3.2.7 Waste Disposal

The final category of revenue is "Refuse – Cleansing Fees" which is derived by Solid Waste for disposal income from sales of compost and contract collections, as well as waste disposal charges at landfill sites.

The following revenue categories are recognised with discounts available depending on volumes:

- Sifted compost – by bag or by ton;
- Unsifted compost – per ton or per cubic metre;
- Delivery charges;
- Waste disposal by weighbridge;
- Waste disposal by carrying capacity of vehicle; and
- Special waste.

Household or garden waste from residential properties is allowed free disposal up to one ton and is all clean builders' waste irrespective of mass.

3.2.8 Waste Summary

The following is a summary of the projected revenue from Solid Waste functions for five years extracted from the Medium Term Income & Expenditure Framework:

Table 3. 3 Solid Waste – Revenue Summary

Expenditure Element	2002/03 R'm	2003/04 R'm	2004/05 R'm	2005/06 R'm	2006/07 R'm
Refuse Charges	168	248	264	281	300
Refuse Charges - Valuation Derived	76	97	103	110	117
Refuse – Cleaning Fees	29	31	33	35	37
Total Revenue	**273**	**376**	**400**	**426**	**454**

3.3 Operating Cost Structure

The operating cost structure of the Waste Department is summarised in the following table:

Table 3. 4 Solid Waste - Expenditure

Expenditure Element	2000/01 R'm	2001/02 R'm	2002/03 R'm	2003/04 R'm	2004/05 R'm
Salaries, Wages & Advances	155.4	162.8	197.5	204.4	214.6
General Expenses	87.4	135.3	121.3	93.0	95.4
Bulk Costs	40.3	55.8	42.5	103.9	105.5
Allocated Costs	174.2	262.8	138.2	189.7	144.2
Repairs & Maintenance	31.8	34.0	31.8	44.3	55.6
Capital Charges	48.7	60.0	62.8	(10.4)	13.4
Contribution to Reserves	1.1	0.1	0.0	0.0	0.0
Contribution – Bad Debt	-	0.2	0.4	50.3	0.0
Contribution to Capital	-	0.1	0.0	50.9	0.0
Gross Expenditure	**538.9**	**711.1**	**594.5**	726.3	**628.7**
Cost Recoveries	(233.0)	(367.4)	(471.1)	(485.9)	(505.9)
Net Expenditure	**306.0**	**343.7**	**123.4**	**240.4**	**122.8**

Notes on costs:

- The staff costs budget for 2005 was not completed at the time of the status quo report. The 2004 figures have been inflated by 5%;
- The contribution to capital of R50.9 million in 2004 is a depreciation charge not shown in other years; and
- The 2002/03 general expenses includes R65 million in indigent relief which is not budgeted in subsequent years.

3.4 Capital Expenditure

The capital expenditure budget is largely a function of available funds within the City and a process of prioritisation of projects across all service and support functions. Whilst the IWMP will provide greater certainty as to the capital needs of Solid Waste, it is currently estimated that R1.8 billion is required for rehabilitation of existing landfills coming to the end of their lives and a further R9.0 billion life-cycle costs is required to establish and operate a new regional land fill site.

In contrast, the capital funding for the current financial year was approved at R40 million. Further cash-flow problems within the City resulted in a further 40% cut to R25 million. A further R7 million is to be received from CMIP.

The capital budget for 2003/04 as at 1 July 2003 was to be allocated to the major projects as follows:

- R10.6 m Specialised vehicles & equipment (Collections);
- R7.0 m Coastal Park landfill;
- R6.5 m Infrastructure & lined airspace (existing landfills) (Disposal);
- R1.5 m Drop-off Facilities – development & improvement (Collections);
- R1.0 m Progressive provision of lined waste cells (Disposal);
- R1,0 m Composting Facilities – permitting & development (Disposal); and
- R1.0 m Regional landfill – identification, permitting & development (Disposal).

Capital expenditure requirements for landfills, transfer stations and other disposal equipment for the next few years is estimated at R536 million. Table 10.5 summarises the planned capital expenditure for the financial years from 2002/03 to 2007/08 for disposal facilities only:

Table 3. 5 Solid Waste – Capital Expenditure Forecast

Capital Project	2003/04 R'000	2004/05 R'000	2005/06 R'000	2006/07 R'000	2007/08 R'000
Airspace Credits	0	500	0	0	0
SAP Waste Module	1 000	500	0	0	0
Regional landfill identification, permitting & development	1 000	3 500	100	500	21 500
Permitting, upgrading & development of composting facilities	1 000	500	6 000	5 500	10 000
Provision of infrastructure & lined airspace at existing facilities	16 587	22 900	29 850	19 350	16 800
Provision of infrastructure & lined airspace at new facilities	0	2 000	48 000	35 000	1 000
Closure & rehabilitation of existing facilities	120	16 000	35 750	29 200	28 500
Specialised Equipment	-	1 200	-	-	-
Sub-Total	**0**	**4 100**	**0**	**0**	**0**
Total	**19 707**	**50 000**	**120 600**	**89 550**	**77 800**

3.5 Gap Analysis

The following items need to be considered further in the study:

- Completeness of property-based revenues;
- Possibilities for under recovery of revenue due to weighbridge system controls;
- Return on assets to ensure sustainability;
- Movements in budget items from year to year;
- Funding shortfall for planned capital expenditure;
- Rebate system and indigent policy;
- Review system of free-loads and drop-offs;
- Realignment of budget with corporate structure; and
- Servicing

Chapter 4 – Policy and Legislation

This chapter discusses and analyses legislation and policies dealing with waste and waste management. It examines international, national, metropolitan and local legislation and policies. Furthermore it reviews existing by-laws currently applicable in the City of Cape Town and identifies some shortcomings.

4.1 International Policies and Legislation

4.1.1 Introduction

4

There is a vast body of international laws, regulations, policies and guidelines dealing not only with waste but also waste management. To cover these here would certainly far exceed the scope of this review. There is in any event a certain degree of danger of slavishly following legislation of other countries, particularly where they come from so-called first world countries. Any legal reforms to be introduced in South Africa have to primarily follow our existing legal system and as such must fit into the same. Moreover, by-laws, because of their very nature as subordinate legislation must first and foremost follow national legislation, and as such their potential scope is already limited.

Waste scenarios, streams and management may also differ substantially from those of developing or so-called third world countries. This does not, however, mean that guidance cannot be obtained from such a comparison.

Only a selection of foreign laws and policies will be mentioned here, and their discussion is purposefully brief. The European Union was taken as main comparative example since its Directives act as framework legislation, with the actual implementation and extent left to each member state. It was felt in this Review that referring to framework legislation was more appropriate and useful as it could serve as better indication where certain parts of the world are heading to. However, to also provide a contrast to developing countries legislation from India and the Philippines was briefly examined.

4.1.2 Selected examples – European Union

Only a selection of foreign laws and policies will be mentioned here, and their discussion is purposefully brief. The European Union (EU) was taken as comparative example since its Directives act as framework legislation, with the actual implementation and extent left to each member state. It was felt in this Review that referring to framework legislation was more appropriate and useful as it could serve as better indication where certain parts of the world are heading. Furthermore it helps to eliminate any possible ambiguities (because we are dealing with foreign legislation) since we are not restricted to the legal system of any particular country. What follows is certainly not intended to cover all Directives or recommendations passed by the EU as the list is quite extensive, nor will the selected Directives be discussed in depth.

a) EU Directive on Waste (75/442/EEC) (ref 4-41)
(as amended by Directive 91/156/EEC) (ref 4-39)

This is currently the key EU legislation dealing with waste. It was extensively changed, in particular by Directive 91/156/EEC. Member states are required to take appropriate steps to encourage (per article 3)

- Firstly, the prevention or reduction of waste production and its harmfulness, in particular by

  - the development of clean technologies more sparing in their use of natural resources
  - the technical development and marketing of products designed to make either no or the smallest contribution to increasing the amount or harmfulness of waste and pollution hazards
  - the development of appropriate techniques for the final disposal of dangerous substances contained in waste defined for recovery

- Secondly, the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials

Directive 91/156/EEC specifically refers to the polluter pays principle and requires that the cost of waste disposal must be borne by:

- the holder (or waste generator) who has waste handled by a waste collector or by an undertaking (ie organisation or entity)
- the previous holders or the producer of the product from which the waste came

b) EU Directive on the Landfill of Waste (99/31/EC) (ref 4-40)

Numerous principles and objectives are spelt out in this Directive's preamble, such as:

- that the prevention, recycling and recovery of waste should be encouraged as should the use of recovered materials and energy so as to safeguard natural resources and obviate wasteful use of land
- under the polluter pays principle it is necessary, *inter alia*, to take into account any damage to the environment resulting from landfilling

Member states are required to set up national strategies for the implementation of the reduction of biodegradable waste going to landfills not later than two years after the Directive enters into force. This strategy shall ensure that biodegradable municipal waste going to landfill (based on the total amount (by weight) produced in 1995) is reduced within

- five years to 75%
- eight years to 50%
- fifteen years to 35% (article 5(2)).

The following wastes may not be accepted in a landfill (article 5(3)):

- liquid waste

- waste which, in the conditions of landfill, is explosive, corrosive, oxidising, highly flammable or flammable
- medical and veterinary waste
- whole used tyres within two years of the date of entry in force of the Directive, excluding tyres used as engineering material, and shredded used tyres within five years
- any other waste listed in Annex II of the Directive

In addition the dilution of mixture of waste solely in order to meet the waste acceptance criteria is prohibited.

The Directive moreover sets out detailed requirements for permitting, controlling, monitoring of landfill sites, the recording of information, and criteria for acceptance (the criteria are further covered by a separate Council Decision of 19 December 2002).

c) Directive concerning Integrated Pollution Prevention and Control (96/61/EC)

(ref 4-27)

This Directive sets out a framework for integrated pollution prevention and control and identifies several activities in this regard, one of which is waste management. Measures are laid down designed to prevent, or where that is not practicable, to reduce emissions in the air, water and land from listed activities, including measures concerning waste, in order to achieve a high level of protection of the environment as a whole (see article 1).

d) Directive on Packaging and Packaging Waste (94/62/EC) (ref 4-30)

One of the general aims of this particular Directive is, firstly, to prevent packaging waste, and secondly the reuse, recycling and other forms of recovering packaging waste, and hence the reduction of final disposal of such waste. Member states must set up return, collection and recovery systems for packaging waste. In addition they may encourage reuse systems of packaging (article 5).

Various time frames are set within which member states must take measures required to attain the following targets (article 6):

- within five years between 50% as a minimum and 65% as a maximum by weight must be recovered
- within five years between 25% as a minimum and 45% as a maximum by weight will be recycled with a minimum of 15% by weight for each packaging material

Member states shall also encourage the use of materials obtained from recycled packaging waste for the manufacturing of packaging and other products (article 6(2)).

The obligation to set up return, collection and recovery systems extends to imported products as well (article 7). Only packaging material complying with the Directive may be placed on the market.

e) Directive on Batteries and Accumulators containing certain dangerous substances (91/157/EEC) (ref 4-28)

The aim of this Directive is to regulate the recovery and controlled disposal of certain spent batteries and accumulators containing listed dangerous substances. Member states are required to introduce programs designed at reducing the heavy metal content, the gradual reduction in household waste of spent batteries and accumulators and the separate disposal of same.

A proposed Directive has very recently been tabled by the Council dealing with Batteries and Accumulators and Spent Batteries and Accumulators (2003/0282 (COD)) (ref 4-68). Should it enter into force it will place further obligations on member states.

f) Directive on Waste Electrical and Electronic Equipment (2002/96/EC) (ref 4-31)

This Directive entered into force in August 2003. Its aim, as a first priority, is the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. It also seeks to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, e.g. producers, distributors and consumers and in particular those operators directly involved in the treatment of waste electrical and electronic equipment.

Member states are required to introduce treatment and separate collection systems. Producers or third parties acting on their behalf (eg shops) must also provide for the recovery of WEEE collected separately. Various recovery, reuse and recycling targets are spelt out in article 7.

This Directive is currently the subject of a proposed amendment (COM/2003/0219) (ref 4-67).

g) Directive on End of Life Vehicles (2000/53/EC) (ref 4-29)

This Directive lays down measures which aim, as first priority, at the prevention of waste from vehicles, and in addition at the reuse, recycling and other forms of recovery of end of life vehicles and their components so as to reduce the disposal of waste, as well as at the improvement in the environmental performance of all of the economic operators involved in the life cycle of vehicles and especially the operators directly involved in the treatment of end of life vehicles.

As with the other Directives, member states must implement collection, treatment, prevention, reuse and recovery systems, and various targets are set.

4.1.3 Selected examples – India

A) Municipal Wastes (Management and Handling) Rules, 1999 [3-11]

These Rules set out a guidelines and policies for local authorities. Municipalities are required to introduce awareness programs for so-called waste segregation, and must encourage recycling and reuse of segregated materials. Municipal waste volumes must be reduced and minimised by measures such as:

- Composting, vermicomposting, anaerobic digestion or any other appropriate biological processing for stabilisation of waste
- Recycling of waste containing recoverable material

4.1.4 Selected examples – Philippines

A) Ecological Solid Waste Management Act of 2000 [3-12]

This Act provides a very detailed and progressive waste management framework, and is comparable to South Africa's White Paper on Integrated Pollution and Waste Management, National Waste Management Strategy as well as the National Integrated Waste Management Bill (see 4.2.2, 4.2.3 and 4.2.18 below).

Some of the Act's policies are to

- Set guidelines and targets for solid waste avoidance and volume reduction through source reduction and waste minimization measures, including composting, recycling, re-use, recovery, green charcoal process, and others, before collection, treatment and disposal in appropriate and environmentally sound solid waste management facilities in accordance with ecologically sustainable development principles
- Ensure the proper segregation, collection, transport, storage, treatment and disposal of solid waste through the formulation and adoption of the best environmental practice in ecological waste management excluding incineration
- Encourage greater private sector participation in solid waste management
- Encourage cooperation and self-regulation among waste generators through the application of market-based instruments

A Commission is appointed which is responsible for overseeing the implementation of solid waste management plans and to prescribe policies to achieve the objectives of this Act. Some of its duties are the formulation of a (national) solid waste management framework, and the review and monitoring of the implementation of local solid waste management plans by local authorities. The Commission also has to develop a model provincial, city and municipal solid waste management plan that will establish prototypes of the content and format which provinces, cities and municipalities may use in meeting the requirements of the National Solid Waste Management Framework.

The Department of Environment and Natural Resources has to prepare a National Solid Waste Management Status Report. Local authorities are required to compile detailed Local Government Solid Waste Management Plans and which must focus, inter alia, on source reduction, recycling, processing etc.

Mandatory segregation of wastes primarily at source has to be investigated and must include household, institutional, industrial, commercial and agricultural sources. Reclamation/recycling programs, buy-back centres, eco-labelling and materials recovery facilities must also be explored and encouraged.

Finally, rewards, either monetary or otherwise, shall be provided to individuals, private organizations and entitles, including non-government organizations, that have undertaken outstanding and innovative projects, technologies, processes and techniques or activities in the re-use, recycling and reduction sectors. The rewards are sourced from a Fund created for this purpose. Financial assistance programs must also accord high priority to extend financial services to individuals, enterprises, or private entities engaged in solid waste management.

4.1.5 Concluding remarks

As could be seen from the above selection of foreign legislation the focus is on waste prevention and reduction followed by reuse, recycling and recovery. South Africa too has adopted this policy as will be seen below (see in general 4.2).

There is also a definite move to affirm extended producer liability and to hold manufacturers responsible for the waste created by their products. While the EU, and countries like Japan for instance, are far ahead of South Africa in that regard, this principle is nonetheless finding growing support here (see eg 4.2.2 and 4.2.7 below). It has been recognised as one of the specific economic instruments which may be used by national government. An example of this principle is the plastic bag regulation.

4.2 National and Provincial Policies and Legislation

4.2.1 Introduction

4

National legislation dealing with waste and waste management is currently fragmented and in many instances outdated. Moreover, waste management has traditionally been left to local authorities with the result that we find a plethora of by-laws and local regulations dealing with this topic (see in general 4.4 below for further details). In addition the national government is still in the process of formulating its waste management policy, although significant progress has been achieved in this regard. There is no single national or provincial Act governing waste per se, although numerous more focused legislation regulating certain waste streams or aspects does exist (eg National Water Act, Nuclear Energy Act, Atmospheric Pollution Prevention Act, etc). It is therefore necessary to examine a host of laws to find guidance.

The legislation, policies and documents discussed below are largely of relevance to solid waste and its management, although the list is not necessarily exhaustive (there is for instance also legislation governing waste from mining, nuclear energy, animals/abattoirs, but which is not really all that relevant for present purposes). Legislation dealing with, for instance, effluents, wastewater or other liquid waste will therefore not be mentioned here, or only in passing. In addition legislation regulating health care waste is currently being drafted by the Western Cape provincial government, and as such will not be discussed herein.

Similarly, when dealing with municipal services and other obligations this Review will be limited to that of solid waste services.

4.2.2 White Paper on Integrated Pollution and Waste Management (2000) (ref 4-23)

One of the fundamental approaches in terms of the White Paper's policy is to prevent pollution, minimise waste and to control and remediate impacts. Waste management is to be implemented in a holistic and integrated manner, extending over the entire waste cycle from cradle to grave.

The White Paper advocates a shift from the present focus on waste disposal and impact control (ie end of pipe) to integrated waste management and prevention as well as minimisation. In terms of legal changes this will entail national government drafting legislation requiring the prevention and minimisation of waste.

It defines "waste" (see Glossary to White Paper) as

> *an undesirable or superfluous by-product, emission, or residue of any process or activity which has been discarded, accumulated or been stored for the purpose of discharging or processing. It may be gaseous, liquid or solid or any combination*

thereof and may originate from a residential, commercial or industrial area. This definition includes industrial wastewater, sewage, radioactive substances, mining, metallurgical and power generation waste.

As is apparent from the above, the White Paper (quite correctly so) adopts a much broader and integrated definition of waste in that it does not limit itself to solid waste only. The focus of this Review is, however, legislation dealing with solid waste and its management. This was already pointed out in 4.2.1.

The following waste management hierarchy is to be followed in future legislation and policies (par 4.2.4) (See figure 1.2):.

- Waste avoidance, minimisation and prevention
- Recycling and reuse
- Treatment and handling
- Storage and final disposal

As can be seen, the avoidance, minimisation and prevention of waste are accorded priority.

A functional approach to integrated pollution and waste management is to be adopted by putting in place (par 4.2.5)

- Source-based controls
- Management of the receiving environment (impact management)
- Remediation

4.2.3 National Waste Management Strategies and Action Plans (NWMS) (1999) (ref 4-24)

The White Paper on Integrated Pollution and Waste Management is the result of the NWMS. As such the latter also advocates the above waste hierarchy and in this regard sets out numerous strategies and plans on how to manage and especially minimise or prevent waste. The present study is of course a direct result of the NWMS and White Paper.

According to the NWMS "*the primary objective of introducing an IWMP is to integrate and optimise waste management so that efficiency of the waste management system is maximised and the impacts and financial costs associated with waste management are minimised, thereby improving the quality of life of all South Africans*" (par 7).

As regards waste minimisation, national government, and more specifically the Department of Environmental Affairs and Tourism (DEAT), has been tasked to develop legislation and policies to either force or incentivize waste generators to introduce waste minimisation measures.

Unfortunately the majority of targets and deadlines set by the NWMS to develop and implement programs, policies and legislation have not been met, and as such the document

is still to a large extent only a strategy and not reality. Nonetheless it forms the basis of future waste management for this country and therefore remains important.

4.2.4 Polokwane Declaration on Waste Management (2001) (ref 4-66)

In 2001 representatives from all three government levels, civil society and business met at Polokwane to formulate a declaration on waste management.

In its preamble the declaration realises that there is a need for urgent action to reduce, reuse and recycle waste. Furthermore the represented sectors recommitted themselves to the objectives of an integrated pollution and waste management policy.

A goal was set to reduce waste generation and disposal by 50% and 25% respectively by 2012 and to develop a plan for zero waste by 2022.

4.2.5 Constitution (ref 4-22)

a) Environmental rights

Section 24 of the Constitution's Bill of Rights states that:

Everyone has the right-

- *(a) to an environment that is not harmful to their health or well-being; and*
- *(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-*
  - *(i) prevent pollution and ecological degradation;*
  - *(ii) promote conservation; and*
  - *(iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*

b) Local government provisions

Local government matters are dealt with in Chapter 7 of the Constitution, and the following provisions are worth pointing out.

Section 151 – Status of municipalities

- *(3) A municipality has the right to govern, on its own initiative, the local government affairs of its community, subject to national and provincial legislation, as provided for in the Constitution.*

Section 152 – Objects of local government

- *(1) The objects of local government are -*
  - *(b) to ensure the provision of services to communities in a sustainable manner;*
  - *(d) to promote a safe and healthy environment*

(2) A municipality must strive, within its financial and administrative capacity, to achieve the objects set out in subsection (1).

Section 156 – Powers and functions of municipalities

(1) A municipality has executive authority in respect of, and has the right to administer -

(a) the local government matters listed in Part B of Schedule 4 and Part B of Schedule 5; and

(b) any other matter assigned to it by national or provincial legislation.

(2) A municipality may make and administer by-laws for the effective administration of the matters which it has the right to administer.

(3) Subject to section 151(4), a by-law that conflicts with national or provincial legislation is invalid.

(5) A municipality has the right to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions.

Section 162 – Publication of municipal by-laws

(3) Municipal by-laws must be accessible to the public.

c) Schedules 4 and 5

Schedules 4 and 5 to the Constitution are highly relevant as they clearly set out the legislative, functional and executive competences of national, provincial and local government respectively.

The Schedules are reproduced in full in Appendix 1 to this chapter, but for ease of reference the provisions pertinent to environmental matters, waste and waste management are set out below. Schedules 4 and 5 are divided into Parts A and B respectively. Part B of both Schedules lists those areas over which local government has some executive authority.

Schedule 4 describes the functional areas of *concurrent national and provincial legislative competence*. Of importance are the following areas set out under Part A of Schedule 4:

- Environment
- Pollution control

Schedule 4 Part B contains amongst others these *functional areas of local government*:

- Air pollution

Schedule 5 lists *functional areas of exclusive provincial legislative competence*. *Schedule 5 Part B* contains, inter alia, these *functional areas of local government*:

- Cleansing
- Control of public nuisances
- Refuse removal, refuse dumps and solid waste disposal

Municipalities have executive authority over and the right to administer those local government matters listed in Part B of Schedules 4 and 5 or which were assigned to them in terms of national or provincial legislation. To this end municipalities may pass and administer by-laws for the effective administration of those matters. This is spelt out in section 156.

These functional distinctions are of vital importance, and any by-law or function of a municipality will always have to be evaluated against the provisions of Schedules 4 and 5. Should there be a conflict or contravention then such by-law or function may very well be unconstitutional (cf section 156(3)).

The potential legal problems surrounding Schedule 5B and municipal services in terms thereof in relation to section 78 of the Municipal Systems Act, (ref 4-44) and its applicability, are discussed below under 2.2.20 (B).

4.2.6 National Environmental Management Act (107 of 1998) (ref 4-61)

This Act (hereafter referred to as NEMA) is the framework legislation governing environmental matters and all other related legislation must be read subject to its provisions. Any functions and actions carried out by organs of state must follow the general principles (see section 2) and spirit of this law, and these organs are bound by the Act (section 48).

While NEMA does not deal much with waste management per se, it nonetheless sets out some important provisions. Thus sustainable development requires the consideration of, amongst other factors:

> *that waste is avoided, or where it cannot altogether be avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner (section 2(4)(a)(iv)).*

It also defines "pollution" as

> *any change in the environment caused by-*
>
> *(i) substances;*
> *(iii) noise, odours, dust or heat,*
>
> *emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future (section 1).*

There is a duty on persons to take reasonable measures to prevent pollution or degradation of the environment from occurring, continuing or recurring, or in so far as such harm is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment (section 28(1)). This duty rests on, amongst others, the land owner, person in control or user thereof (section 28(2)). Since all organs of state are bound by the Act this would therefore extend to the City of Cape Town and its staff.

The Act also requires the application of integrated environmental management principles and objectives set out in Chapter 5.

At the time of writing (December 2003) Chapter 5 is the subject of an extensive proposed amendment (known as the Second Amendment Bill) (ref 4-60), which has already been tabled to Parliament for approval and should very soon become law. It mainly deals with EIAs and related matters, and as such is not really relevant for present purposes.

In addition, a further proposed amendment (the First Amendment Bill) (ref 4-61) aims to introduce far reaching changes to the Act, many of which are of a more general nature. Of importance is, however, the creation of environmental management inspector posts. These inspectors will have extensive powers to inspect, seize, investigate, issue compliance notices etc. Moreover, any police officer will be given most of the powers held by these inspectors.

A further important proposed amendment is the delegation of powers, duties and authority by the national Minister to, inter alia, an MEC or any organ of state. The MEC in turn will be authorised to delegate to, among others, a municipality or provincial organ of state (by agreement with same).

The above proposed changes may thus result in greater environmental management and protection responsibilities and powers being given to local authorities at some future stage.

4.2.7 Environment Conservation Act (73 of 1989) (ref 4-37)

According to this Act

> *"waste" means any matter, whether gaseous, liquid or solid or any combination thereof, which is from time to time designated by the Minister by notice in the Gazette as an undesirable or superfluous by-product, emission, residue or remainder of any process or activity (section 1).*

This definition is supplemented by the *Identification of Matter as Waste* (ref 4-50) according to which "waste" is an "*undesirable or superfluous by-product, emission, residue or remainder of any process or activity, any matter, gaseous, liquid or solid or any combination thereof, originating from any residential, commercial or industrial area, which—*

> *(a) is discarded by any person; or*

(b) is accumulated and stored by any person with the purpose of eventually discarding it with or without prior treatment connected with the discarding thereof; or

(c) is stored by any person with the purpose of recycling, re-using or extracting a usable product from such matter…".

but excludes broadly speaking, wastewater, effluent, mining waste, radioactive waste, and ash resulting from electricity production processes. Sewage sludge would, however, be classified as waste (albeit hazardous) as it is not wastewater.

It is prohibited to discard, dump or leave any litter on any land or water surface, street, road or site, or any place to which the public has access except in specifically designated containers (section 19(1)).

"Litter" in turn is defined as any object or matter discarded or left behind by the person in whose possession or control it was (section 1).

An authority or person charged with maintaining a place to which the public has access shall within a reasonable time after any litter has been discarded, dumped or left behind at such place remove such litter or cause it to be removed (section 19A).

A "disposal site" means a site used for the accumulation of waste with the purpose of disposing or treatment of such waste (section 1).

A permit is required from the Minister of Water Affairs and Forestry to establish, provide or operate a disposal site, although the Minister may exempt any person or category of persons from obtaining a permit subject to such conditions as may be deemed fit (section 20(1)). Waste may only be discarded or disposed at permitted sites, or in a manner or by means of a facility or method and subject to any prescribed conditions (section 20(6)).

Directions (ref 4-26) were passed during 2002 dealing with communal and small waste disposal sites.

At the time of writing (December 2003) the aforegoing paragraph still represents the current law. An amendment to the Act (ref 4-36) has been tabled to Parliament for approval and should very soon become law. For present purposes the following imminent changes are of relevance.

The Minister of Environmental Affairs and Tourism would, in future, have the authority to issue and grant permits. The issuing of a permit will then be subject to the concurrence of the Minister of Water Affairs and Forestry as well as the inclusion therein of the conditions contained in a Record of Decision given by the latter Minister regarding any measures deemed necessary to protect a water resource.

Moreover, in terms of the Amendment it is envisaged that the Minister of Environmental Affairs and Tourism will be given the power to promulgate regulations for "the imposition of compulsory charging, deposits or related financial measures on waste types or specified items in waste types with the concurrence of the Minister of Finance (new section 24(l))".

Furthermore, it is planned that the Minister may make regulations

> *with regard to the prohibition, control, sale, distribution, import or export of products that may have a substantial detrimental effect on the environment or on human health (new section 24B).*

a) DWAF Minimum Requirement Guidelines

The Department of Water Affairs and Forestry has published detailed Minimum Guidelines dealing with

- Waste Disposal by Landfill (ref 4-34)
- Handling, Classification and Disposal of Hazardous Waste (ref 4-33)
- Water Monitoring at Waste Management Facilities (ref 4-35)

Waste is categorised into various groups (domestic, industrial, commercial), while hazardous waste falls into nine different classes. Landfill sites themselves are classified as being either H:H or H:h for hazardous waste disposal and general for domestic (general) waste disposal with sizes being determined according to the DWAF minimum requirements viz. Communal, Small, Medium or Large (e.g. G:C, G:S, G:M or G:L).

The Guidelines are in the process of being updated, although completion thereof will still take a few years.

4.2.8 National Water Act (36 of 1998) (ref 4-63)

This Act is very relevant as water (surface and ground) can easily be polluted through waste or waste related activities.

The Act defines "waste" as

> *any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted (section 1).*

The land owner, person in control, user or occupier must take all reasonable measures to prevent water pollution from occurring, continuing or recurring (section 19(1)). Since all organs of state are bound by the Act (section 156) this duty would therefore also extend to the City of Cape Town and its staff.

This Act lists a number of actions amounting to water use. For present purposes the following is of relevance:

> *Disposing of waste in a manner which may detrimentally impact on a water resource (section 21(g).*

From the above it is clear that water use has a wide definition and that solid waste disposal may also amount to such use.

4.2.9 Health Act (63 of 1977) (ref 4-48)

The administration of this Act (with the exception of a few provisions) has been assigned to the provinces during 1994.

It contains a fairly lengthy definition of "nuisance", which inter alia means:

> *(c) any accumulation of refuse, offal, manure or other matter which is offensive or is injurious or dangerous to health*
> *(h) any area of land kept or permitted to remain in such a state as to be offensive (section 1)*

While the Department of Health is obliged to take steps for the promotion of a safe and healthy environment (section 14(1)(c)), local authorities in turn must carry out all lawful, necessary and reasonably practicable measures to:

- maintain its district in a hygienic and clean condition (section 20(1)(a)
- prevent the occurrence of any nuisance, unhygienic or offensive condition, or any other condition which could be harmful or dangerous to the health of people (section 20(1)(b))
- prevent pollution of water intended for human use (section 20(1)(c))

In terms of the General Health Regulations (ref 4-42) the incorrect disposal and management of waste is prohibited unless

> *the dumping of any refuse, night-soil, litter, waste, manure, offensive matter or liquid [occurs in a] place specially set apart by the local authority for that purpose, in such an approved manner as not to be offensive, or a nuisance or injurious or dangerous to health (regulation 15(4)).*

4.2.10 Atmospheric Pollution Prevention Act (45 of 1965) (ref 4-4)

This Act is of importance since it classifies the incineration of waste as a scheduled process thus requiring a registration certificate.

In addition the Act obviously covers other aspects like smoke and diesel vehicle emissions, but as these do not relate to waste management it is not necessary to discuss them in this Review.

The Act is on the point of being repealed by the Air Quality Bill (ref 4-2) which is set to introduce some far reaching changes (and which are beyond the scope of this particular study). Suffice to say that it too will require the licencing of certain activities (and which, although not yet specifically stated, will most likely include waste incineration).

4.2.11 Hazardous Substances Act (15 of 1973) (ref 4-47)

This Act classifies certain types of hazardous substances into four groups and imposes detailed requirements (through the use of Regulations) dealing with the handling, selling, using, operating, applying and installation etc thereof. The disposal of hazardous substances is also regulated (see eg the disposal of empty containers for Group I hazardous substances - Regulation 10 of the Group I Hazardous Substances Regulations (ref 4-45).

4.2.12 Chapter VIII of the Regulations in terms of the National Road Traffic Act (Transportation of Dangerous Goods and Substances by Road) 2(ref 4-12)

The road transportation of dangerous goods and substances is now controlled by the above Regulations. Detailed requirements have been imposed in this regard relating to safety measures, driver training, documentation to be carried etc.

Various SABS codes are incorporated into the Regulations. Dangerous goods may only be transported if the vehicles are capable and allowed to convey same. Drivers must be duly qualified and experienced in transporting and handling dangerous goods and substances, and furthermore should know how to react in the case of an emergency or accident. The Regulations also provide for the appointment and powers of dangerous goods inspectors.

4.2.13 Sea-Shore Act (21 of 1935) (ref 4-70)

This Act has been delegated to the various coastal provinces, although the State President remains the owner of the sea-shore and sea within the territorial waters. While there is doubt regarding the constitutionality of this Act it nonetheless continues to remain in force.

In terms of section 10 thereof local authorities may, with the approval of the Minister, promulgate Regulations dealing, inter alia, with the prevention or regulation of the depositing or discharging upon the sea-shore or in the sea of offal, rubbish or anything liable to be a nuisance or danger to health. Numerous Regulations were passed by the former municipalities now falling within the jurisdiction of the City of Cape Town, all of which are still in force (this aspect is discussed below under 2.4.3.(B)).

The Sea-Shore Act, and therefore its Regulations, will probably be repealed, alternatively substantially amended, in the near future by coastal zone management legislation that is currently in the process of being drafted by DEAT.

4.2.14 Occupational Health and Safety Act (85 of 1993) (ref 4-64)

This Act has relevance for environmental matters as it governs and regulates the health and safety of employees and the public in general. Employers, self-employed persons and employees are broadly speaking under a duty not to endanger or risk the health of others and to maintain a safe (working) environment (see e.g. sections 8, 9 and 15).

In addition several Regulations promulgated in terms of the Act contain provisions dealing with the handling or disposal of hazardous substances/chemicals or waste in general. Examples are:

- Asbestos Regulations – disposal of asbestos (Regulation 20) (ref 2-3)
- Lead Regulations – disposal of lead waste (Regulation 17) (ref 2-52)
- Hazardous Chemical Substances Regulations - disposal of hazardous chemical substances (Regulation 15) (ref 2-46)
- Environmental Regulations for Workplaces – housekeeping (Regulation 6)(ref 2-38)

4.2.15 Regulations in terms of the National Building Regulations and Building Standards Act (103 of 1977) – (GN R 2378 of 12 October 1990) (ref 4-69)

As the name already implies these Regulations govern buildings, their standard and construction. Part U very briefly deals with refuse disposal and requires every building to have an adequate storage area.

4.2.16 Advertising on Roads and Ribbon Development Act (21 of 1940) (ref 4-1)

Section 8 of this Act prohibits the depositing or leaving within a distance of 200 meter of the center line of a public road, outside an urban area, so as to be visible from that road, a disused vehicle or machine or a disused part of a vehicle or machine or any rubbish or other refuse, except in accordance with the permission in writing granted by the controlling authority concerned.

4.2.17 South African National Roads Agency Limited and National Roads Act (7 of 1998) (ref 4-72)

This Act contains similar provisions as the Advertising on Roads and Ribbon Development Act in that it too prohibits, inter alia, the depositing or leaving of rubbish on a national road unless written permission has been obtained from the Agency (section 51).

4.2.18 National Integrated Waste Management Bill (ref 4-62)

a) Introduction

This document is still in the drafting stage, and as such it strictly speaking cannot be termed a Bill. Various versions and drafts have, however, been circulated with the result that this document is now unofficially referred to as the National Integrated Waste Management Bill, and in order to avoid confusion the same term will be adopted here. According to DEAT Version 9 (from November 2002) is the latest draft, and has consequently been used for purposes of this chapter. Future versions, we were told, are likely to only contain minor changes.

The Bill is based on the National Waste Management Strategy as well as the White Paper on Integrated Pollution and Waste Management (cf section 2). Once it becomes law it will set the framework for integrated waste management for the entire country and for all three

levels of government. Future policies and legislation will need to follow its provisions and as such it will become a key law.

Due to the length and extent of the Bill only some relevant provisions will be discussed or reproduced here.

b) Definitions

It defines "integrated waste management" as

> *a system and process of generation, collection, transport, storage, treatment, reprocessing, recycling, sorting and disposal of wastes, including decommissioning of disposal sites aimed at pollution prevention and waste minimisation at source, managing the impact of pollution and waste on the receiving environment and remediating damaged environments.*

"Waste" is described as

> *any matter whether solid, liquid or gaseous or any combination thereof which is emitted, discharged or deposited in the environment in such volume, composition or manner as to cause pollution and shall include –*
> *(a) refuse;*
> *(b) hazardous waste; and*
> *(c) any substance prescribed as waste by regulation under this Bill.*

c) Objectives

It sets out various objectives, which include:

that industry and the public share the responsibility for minimising and managing waste
to promote and ensure environmentally responsible waste management (section 2)

d) Provincial government obligations

Provincial governments are required to compile integrated waste management plans. In addition they must develop a provincial hazardous waste management plan (sections 6 and 25) and review municipal waste management plans (section 6). Hazardous waste includes the waste origins and components set out in Schedules 1 and 2 respectively. Furthermore they have to promote the development of voluntary partnerships with industry in respect of waste minimisation, re-use and recycling initiatives (section 6).

e) Local government obligations

The following section (incorrectly numbered as section 5) sets out local government obligations:

(1) Municipal government shall operate within the national framework of the integrated waste management as determined by the Department in accordance with this Bill.

(2) Municipal governments may make by-laws and may develop implementation strategies that are specifically aimed at managing waste in accordance with this Bill.

(3) Municipalities must be responsible for providing waste management services and the management of municipal waste disposal facilities.

(4) Municipalities must carry out the following specific functions:

- *(a) compilation and implementation of municipal waste management plans;*
- *(b) implementation of waste public awareness campaigns focussing on education and the role of civil society in managing, minimising and eliminating waste and pollution;*
- *(c) collection of data for the national waste information system;*
- *(d) provision of waste collection services and management of waste disposal facilities within that municipality's area of jurisdiction;*
- *(e) implementation and enforcement of appropriate waste minimisation and reuse and recycling initiatives, including the development of voluntary partnerships with industry; and*
- *(f) where possible, undertaking local planning, including spatial planning, for the establishment and management of landfill sites.*

f) National Waste Management Strategy and Waste Information System

National government is required to compile and implement a national waste management strategy, as well as a waste information system (chapters 3 and 4).

g) Municipality Waste Management Status Report

Section 17 sets out the essentials for a Municipality Waste Management Status Report:

(1) Each municipality shall report once a year on the implementation of its waste management plan to the provincial government.

(2) The report shall include -

- *(a) a description of activities and measures taken to achieve the objects of the plan;*
- *(b) an indication of whether the objects of the plan are being achieved, and if not, an explanation of problems which have undermined the achievement of the objects;*
- *(c) details of persons who have not complied with the by-laws and in respect of whom legal proceedings have been initiated; and*
- *(d) a description of incidents of illegal dumping.*

h) Municipal Waste Management Plans

Municipalities will have to compile Municipal Waste Management Plans within one year of the enactment of the Bill in their Integrated Development Plan, which plan must be implemented within four years of the commencement of this Bill. This Plan must be approved by the provincial government (section 20).

The ***purpose and object of the Municipal Waste Management Plan*** (section 21) is to:

(1) Give effect to the purpose and objects of the National Waste Management Strategy; and

(2) The objects of the municipal waste management plan shall include –

(a) encouraging the avoidance, minimisation or reduction of waste;

(b) promoting the recovery of waste by means of recycling or re-use through proven alternative technology; and

(c) establishing means of ensuring that waste is recovered or disposed of without causing harm to human health or to the environment and, in particular, without –

(i) risk to human beings, to water, air, soil, plants or animals;

(ii) causing nuisance through noise or odours; or

(iii) adversely affecting rural or urban areas and/or areas of special interest.

(d) establishing an integrated network of waste handling and waste disposal facilities to ensure that –

(i) comprehensive and adequate waste management services are established within the municipality;

(ii) waste is disposed of at accessible and proximate waste disposal facilities; and

(iii) the most appropriate methods and technologies are used in order to ensure a high level of protection for and prevention of damage to the environment and harm to human health.

(e) any other object which would further the principle of sustainable development.

Waste Management Plans must have the following ***contents*** (section 22):

(a) population and development profiles for the area of jurisdiction of the relevant organ of State;

(b) an assessment of all significant sources and generators of waste within the area of jurisdiction of the relevant organ of State;

(c) an assessment of the quantities and classes of waste within the area of jurisdiction of the relevant organ of State;

(d) an assessment of the markets, waste management services and waste handling and waste disposal facilities for each waste category;

(e) an assessment of the options for waste reduction, management and disposal within the municipality;

(f) an assessment of the number of persons in the municipality who are not receiving waste collection services and proposed strategies and targets for providing a service to such persons;

(g) proposed strategies and targets for managing and reducing waste in the municipality and for the efficient disposal of waste that cannot be re-used or recycled;

(h) strategies for waste education and initiatives for separating waste at its source;

(i) strategies for raising awareness of waste management issues;

(j) strategies for establishing a waste-related information system;

(k) an implementation programme that identifies the required time-frames, resources and responsibilities for achieving these strategies and targets;

(l) a mechanism for monitoring performance in light of these targets and strategies; and

(m) such other matters as may be required by any other legislation, regulation or guidelines;

(n) *a waste tariff and a waste financial statement.*

i) Municipal Waste Management Services

Section 28 sets out the duty to Provide Access to Municipal Waste Management Services:

(1) Every municipality must, as soon as reasonably practicable, ensure the establishment of efficient, affordable, economical and sustainable municipal waste management services within its municipal boundaries.

(2) This duty is subject to –

(a) the need for an equitable allocation of services to the local community;

(b) the duty of the local community to pay reasonable charges, which shall be in accordance with any prescribed norms and standards for tariffs set by the municipality for waste collection services;

(c) the right of the municipality to limit the provision of waste management services if there is a failure to comply with reasonable conditions set for the provision of such services: Provided that where the municipality takes action to limit the provision of services, the limitation must not pose a risk to human health or the environment.

(3) A municipality shall take the following factors, amongst other factors, into account in ensuring access to municipal waste management services –

(a) the waste management hierarchy set out in clause 2;

(b) the most effective manner and method of providing access to collection and disposal;

(c) the need for local efficiency;

(d) the need for affordable costs; and

(e) the requirements of equity.

(4) *Subject to sub-clause (2)(c), a municipality must not refuse or fail to provide access to municipal waste management services to a person within the municipality.*

j) By-laws regulating Municipal Waste Management Services (section 30):

(1) Every municipality must make by-laws which contains conditions for municipal waste management services and must provide for at least the –

(a) measures to encourage waste and hazardous waste separation to facilitate minimisation, re-use and recycling;
(b) standards of the municipal waste management services;
(c) payment and collection of money due for the services;
(d) circumstances under which the municipal waste management services may be limited or discontinued and the procedure for such limitation or discontinuation.

K) Summary of key obligations for municipalities

From the above points it is possible to summarise the following key obligations which will be imposed on municipalities in the near future:

- Adoption of waste hierarchy (as contained in the White Paper and respectively – see points 4.2.2 and 4.2.3 above) with waste minimisation and prevention having first priority
- Compilation of Municipality Waste Management Status Report
- Compilation of Municipal Waste Management Plan
- Providing access to Municipal Waste Management Services
- Compliance with local government obligations imposed by the Bill (see 2.2.18.(E))

4.2.19 Municipal Structures Act (117 of 1998) (ref 4-57)

According to section 15 of this Act a superseding municipality (like the City of Cape Town) must review and rationalise existing by-laws of disestablished municipalities in its area. The Draft Integrated Solid Waste Management By-law forming part of this project is of course a direct result of this particular provision.

4.2.20 Municipal Systems Act (32 of 2000) (ref 4-58)

a) Municipal services and general obligations

Various environmental obligations and principles are prescribed by this Act. Thus section 4 states that

(2) The council of a municipality, within the municipality's financial and administrative capacity and having regard to practical considerations, has the duty to-

(d) strive to ensure that municipal services are provided to the local community in a financially and environmentally sustainable manner; …
(i) promote a safe and healthy environment in the municipality; and
(j) contribute, together with other organs of state, to the

progressive realisation of the fundamental rights contained in sections 24 [ie environmental rights]…of the Constitution.

Furthermore, an obligation is imposed on a municipality to:

- give effect to the Constitution
- prioritise the basic needs of the local community
- ensure that its members have access to at least the minimum level of basic municipal services (section 73(1))

A "municipal service" means

a service that a municipality in terms of its powers and functions provides or may provide to or for the benefit of he local community irrespective of whether-

(a) such a service is provided, or to be provided, by the municipality through an internal mechanism contemplated in section 76 or by engaging an external mechanism contemplated in section 76; and
(b) fees, charges or tariffs are levied in respect of such a service or not.

Municipal services must, inter alia be:

- equitable and accessible
- environmentally sustainable (section 73(2))

A municipality may provide services either through an internal or external mechanism (section 76).

The Act sets out various circumstances when a municipality must review and decide on a mechanism to provide services, such as when, for instance –

- it is preparing or reviewing its integrated development plan (as set out in Chapter V of the Act)
- a new municipal service is to be provided
- an existing municipal service it to be significantly upgraded, extended or improved
- the municipality is restructured or reorganised in terms of the Act

Sections 78 to 81 state in detail the procedure and requirements to be followed when deciding on whether to opt for an internal or external service delivery mechanism. Prior to deciding on an external mechanism a municipality must assess the direct and indirect costs and benefits associated with such a move, including amongst others, the expected effect on the environment, human health, well-being and safety.

b) Constitutional Application of section 78 to Schedule 5B Functions

During 2001 the City of Cape Town obtained a legal opinion regarding the applicability of chapter 8 of the Municipal Systems Act, and more particularly the municipal services to be

performed. While we were not privy to this opinion and as such have not read it, we are unable to make any constructive comments about it. We are only in possession of the summarised conclusion, which essentially reasons as follows.

Schedule 4 of the Constitution (see 4.2.5.(C) above) deals with concurrent national and provincial competences, while Schedule 5 sets out exclusive provincial competences. Schedule 5B lists the following relevant (waste related) local government matters:

- Cleansing
- Control of public nuisances
- Refuse removal, refuse dumps and solid waste disposal

The legal opinion seemed to conclude that since Schedule 5 pertains to exclusive provincial competences, a national Act, like the Municipal Systems Act, is not competent to intervene in matters and services listed in Schedule 5B. This would furthermore mean that those services would not be governed by the section 78 procedures and requirements of the Act.

We are not certain whether this legal opinion is indeed correct, and our brief does not cover a separate investigation into this specific potential problem. Be that as it may we do not believe that the opinion's conclusion is correct. It must also be added that to the best of our knowledge this particular question has never been tested in a court of law, and as such great care should be taken in relying on a single opinion only. However, without having read the actual opinion and conducting separate research the aforegoing represents our personal opinion only. It is suggested that should the City want further clarity on this point that senior counsel be instructed to furnish a second opinion.

c) Tariff policy

Municipal councils are required to adopt and implement a tariff policy which must reflect at least the following principles, namely that, inter alia

- the economical, efficient and effective use of resources, the recycling of waste, and other appropriate environmental objectives must be encouraged (section 74(2)(h)).

In addition, a municipal council must adopt by-laws to give effect to the implementation and enforcement of its tariff policy. Such by-laws may differentiate between different categories of users, debtors, service providers, services, service standards and geographical areas as long as such differentiation does not amount to unfair discrimination (section 75).

The Minister (responsible for local government) may make regulations or guidelines in terms of section 94, which, amongst others, impose incentives and penalties to encourage the efficient use of resources when providing services, the recycling of waste and other environmental objectives.

These incentives and penalties may, however, only be implemented after consultation with the Minister of Finance. To date no such regulations were passed. See also the proposed amendments to the Environment Conservation Act concerning financial instruments to regulate certain waste aspects and types (see 4.2.7 above).

Section 94, read together with sections 74 and 75 (power and duty of municipalities to develop tariff policy) seems to imply that if the *Minister* (as opposed to the municipal council) has not passed regulations or guidelines, then the municipality has a fairly wide discretion to set tariffs, in particular with regard to incentives or levies for enforcing the economical, efficient and effective use of resources, the recycling of waste, and other appropriate environmental objectives (cf section 74(2)(h)).

Furthermore, in terms of section 11(3) a municipality exercises its legislative and executive authority by, for instance:

- developing and adopting policies, plans, strategies and programmes, including setting targets for delivery
- providing municipal services to the local community, or appointing appropriate service providers in accordance with the criteria and process set out in section 78
- imposing and recovering rates, taxes, levies, service fees etc
- monitoring the impact and effectiveness of any services, policies, programmes or plans;
- promoting a safe and healthy environment
- passing by-laws and taking decisions on any of the matters set out generally in section 11

Lastly, as already pointed out above (at 4.2.5.(C)) a municipality has executive authority as well as the right to administer Schedule 5 Part B matters, and which also includes refuse removal, refuse dumps and solid waste disposal.

It is therefore submitted that the City of Cape Town can introduce a tariff policy that promotes and enforces waste minimisation and recycling initiatives.

The only proviso to such policy is that care must be taken that it does not amount to *pollution control*, or is perceived as same, since this is a functional area reserved for national and provincial governments.

4.2.21 Development Facilitation Act (67 of 1995) (ref 4-25)

This Act has application insofar as it broadly speaking governs land use and development. Detailed provisions are contained in this legislation, and which are beyond the scope of this review, but suffice to say that it encourages environmentally sustainable land development practices and processes (see e.g. section 3(1)(c)(viii) – General principles for land development).

4.2.22 Western Cape Planning and Development Act (7 of 1999) (ref 4-75)

This Act promotes the principles of, inter alia, sustainable development and environmental protection (see eg Schedule IV) and requires these to be taken into consideration during planning, development and zoning matters.

4.2.23 Cape Nature Conservation Ordinance (19 of 1974) (ref 4-9)

This Ordinance, as its name suggests, deals with conservation issues, and therefore has negligible relevance for waste, with the exception of section 48 which provides that

> *No person shall deposit or cause or allow to be deposited –*
> *(a) in any inland waters, or*
> *(b) in any place from where it is likely to percolate into or in any other manner enter any inland waters,*
>
> *anything, whether solid, liquid or gaseous, which is or is likely to be injurious to any fish or fish food or which, if it were so deposited in large quantities or numbers, would be so injurious.*

4.2.24 Municipal Ordinance (20 of 1974) (ref 4-55)

There is serious doubt to what extent this Ordinance is still valid following the 1996 Constitution (and the introduction of new government structures, powers and responsibilities). Separate legal opinions were obtained from counsels by the Blaauwberg and South Peninsula Municipalities about the continued validity of the Ordinance, and both opinions (quite correctly so in our view) concluded that the provisions of this particular legislation must be closely analysed and contrasted to the 1996 Constitution, the Municipal Systems Act and other relevant new local government legislation.

4.3 Metropolitan Policies and Legislation

Only those policies and strategies pertaining to solid waste and its management will be discussed in this section.

The local legislation is discussed in detail below under 2.4.

4

4.3.1 Integrated Metropolitan Environmental Policy (IMEP) (ref 4-16)

The City of Cape Town compiled IMEP in 2001. For present purposes the following provisions are salient.

By the year 2020:

- Environmental poverty will no longer exist and all communities will live in an environment that is not detrimental to their health or well-being
- Waste management will be efficient, and recycling efforts will be supported and sustained by the population

One of the policy principles is a commitment to adopting and implementing the principles and underlying approaches to sustainable development, and ensuring the integration of environmental issues into local government decision-making at all levels.

Furthermore a commitment was made for an integrated waste management strategy that addresses both the production and disposal of solid and liquid wastes, as well as the safe collection, transport and disposal, and the reduction of illegal dumping. This commitment includes:

- the reduction and prevention of waste
- supporting and promoting waste recycling initiatives
- recognising that combating illegal dumping and littering in the City of Cape Town is a priority
- safe managing of all hazardous wastes

4.3.2 State of Environment Report (ref 4-17)

This Report is published annually with the latest one being for 2001 (year four). As far as waste is concerned it identifies the following priority issues:

- the need for an integrated waste management strategy prioritising the reduction, re-use and recycling of waste
- licencing and safe operation of solid waste disposal facilities
- the safe transport and disposal of hazardous waste
- the safe transport and disposal of medical waste
- the management and reduction of litter and illegal dumping

4.3.3 Waste Wise Campaign

The Waste Wise Campaign consists of several components and aims, some of which are:

- environmental education
- control of illegal dumping and littering
- increased law enforcement
- promulgation of legislation to combat illegal dumping and littering (this was achieved in 2002 through the Dumping and Littering By-law [ref 4-19] - see 4.4.3 below)

Various projects were initiated or continued either directly or indirectly through Waste Wise such as:

- Yellow Bag project
- Waste Minimisation Clubs
- Integrated Waste Exchange (IWEX) website

The above (with the exception of the Dumping and Littering By-law) will not be discussed in this Review, but will be covered elsewhere.

4.3.4 Coastal Zone Management Strategy [ref 4-13]

This strategy is the result of IMEP, and while the focus of this particular strategy is on managing the coastal zone, it nonetheless deals with waste.

Presently one of the key national legislation governing this topic is the Sea-Shore Act (discussed above at 4.2.13) and enforced further through local regulations (discussed below at 4.4.3.(B)), although both are the subject of repeal alternatively extensive amendment due to pending new legislation.

The strategy recognises that the Solid Waste Management Department is a key player. Waste management (litter and dumping) therefore is one of the coastal zone management features, while beach cleansing and law enforcement form part of envisaged sustainable coastal management plans.

4.3.5 Environmental Education and Training Strategy [ref 4-14]

This too stems from IMEP. Its aim is to further environmental education and awareness and thereby help reduce waste volumes, littering and dumping (along with of course other environmental objectives).

4.3.6 Biodiversity Strategy [ref 4-15]

This strategy also resulted from IMEP. Broadly speaking its focus is to preserve and further biodiversity by giving effect to international and pending national legislation. Since waste

can directly and negatively impact on biodiversity the strategy has identified the Solid Waste Management Department as key partner.

4.3.7 Metropolitan Spatial Development Framework (ref 4-6)

Some of the goals of this framework policy are to regulate urban growth and development in a structured fashion and to establish a well-defined compact urban form for the long-term sustainability of urban areas. It further aims to ensure the preservation and protection of natural areas.

One of the key elements of this framework is the establishment of a Metropolitan Open Space System which seeks to complement the built fabric by providing visual relief and open space enjoyment, and at the same time to protect biodiversity in towns and cities.

4.4 Existing City of Cape Town By-laws

4.4.1 By-laws Uncertainties

The City of Cape Town currently consists of six former municipalities and the Cape Metropolitan Council (CMC), all of which are now referred to as Administrations. These seven local authorities were in turn made up of numerous other smaller municipalities or councils, many of which passed their own by-laws dealing with a multitude of issues, including waste. In addition the seven local authorities had their own waste collection/management departments. At the time these local authorities were formed little or no attention was paid to rectifying the tremendous legal confusion this created as far as by-laws are concerned.

Thus even though several municipalities and councils ceased to exist following their amalgamation with the newly established local authorities/Administrations their existing by-laws were not repealed by later by-laws. The net result is that even within one Administration there might be a number of by-laws dealing with the same or related topic (eg waste collection).

An example of this is the Tygerberg Administration which consists, among others, of the following former municipalities: Goodwood, Tygerberg, Durbanville. As can be seen below from paragraph 4.4.3.(a) some of the refuse related by-laws passed by the aforementioned municipalities still remain in force.

The legal situation is further complicated by the fact that some of the Administrations repealed certain by-laws passed by former municipalities by replacing them with an Administration wide by-law. While in principle this is, of course, the correct route to follow, a decision was often taken to only promulgate a by-law dealing with selective issues (e.g. waste collection) without addressing wider and related aspects (eg disposal of medical or hazardous waste). The old municipal by-laws might therefore continue to be in force, albeit only partially and insofar as they relate to matters not covered in the new Administration by-law. Therefore even if an Administration by-law exists it cannot be taken for granted that all older by-laws were repealed. An example of this is the Solid Wastes By-law (PN 228/1999) passed by the South Peninsula Municipality (now South Peninsula Administration).

If the situation is examined one step higher, i.e. at the City of Cape Town level, various by-laws were promulgated which in turn replaced older by-laws (passed either by the disestablished municipalities or even the present Administrations, when the latter were still municipalities). The City of Cape Town's Dumping and Littering By-law (PG 5894/2002) may be taken to illustrate this point. As its name already suggests it deals only with dumping and littering (on a city wide scale), and as such does not focus on refuse collection, disposal, waste management etc. Thus when confronted with one these issues the applicable by-laws within the jurisdictional area of the Administration in question need to be consulted. As could be seen above this might involve having to also examine by-laws of no longer existing municipalities.

To help clarify the above discussion the following fictitious scenario might be used (it is admittedly but purposely overstated). A dispute has arisen between a property owner and the authorities over a waste related issue and the City wants to examine the legal situation governing the dispute. In order to do so one might have to ask the following questions:

- Is there a by-law promulgated by the City of Cape Town
- If so, does it fully cover the aspects that need to be examined
- If not, which Administration has jurisdiction (ie. in which Administration is the owner situated)
- Which by-laws are applicable in that Administration
- If there is an Administration wide by-law, does it fully cover the aspects that need to be examined
- If not, then where exactly within that Administration is the owner situated
- Based on the last answer it might be necessary to then examine which former municipality or council existed in that area
- The by-laws passed by such former municipality or council will have to be looked at to establish if they are still applicable (either in total or partially)

This process of elimination and geographic focus is, of course, unsatisfactory and extremely wasteful.

4.4.2 Absence of By-laws Compilation

To the best of the team's knowledge no publicly accessible compilation or database seems to exist setting out which by-laws are in force, or to what extent they have been repealed, although there appears to be a list compiled by Province and used by the City's legal department. In many instances, especially insofar as it relates to older by-laws (and their amendments) copies are not readily available, although it is possible to obtain copies through reference libraries (at own cost and effort). The list is also not entirely correct and as such its accuracy and completeness cannot always be taken for granted.

At this point it should be mentioned that in terms of section 162(3) of the Constitution "municipal by-laws must be accessible to the public". It is submitted that the City does not necessarily satisfy that obligation.

Therefore unlike with national or provincial legislation, the consultants were faced with a cumbersome and mostly arduous process when tracking down any existing by-laws. Essentially this involved initially having to contact every single Administration for information on which by-laws are still applicable in their respective area. This task was further complicated by the fact that several of them do not have a legal department (eg Helderberg and Oostenberg, the latter referred us to an attorneys' practice), and enforcement and control are often shared by several departments (eg law enforcement, water/wastewater department and environmental health), who do not always work together closely. It must also be mentioned that some Administrations unfortunately never responded to our requests.

Because of the absence of a by-law compilation the consultants were to a large measure dependent on the cooperation of the legal department and information supplied by same. In this regard the Tygerberg Administration's legal department were most helpful in answering numerous queries.

4.4.3 Applicable By-laws In Force

Solid waste is governed through various categories of by-laws. What follows below is a list of applicable by-laws having a bearing on this aspect, although it is not necessarily exhaustive, the reason being that the field is very extensive, uncertain and often difficult to analyse (for the reasons set out in 4.4.1 and 4.4.2 above).

a) Refuse and Waste By-laws

The following is a list of by-laws still in force in the City of Cape Town, although it is uncertain whether it is entirely correct. Having said that it is fully acknowledged that the task of ascertaining and compiling a complete list of applicable legislation is daunting, and as such no blame is laid on the City's legal department or Province. (The information was kindly furnished by the Tygerberg Administration's legal department).

- *Milnerton Municipality:*
  Sanitary By-law (PN 705/1993) (ref 4-53)

- *Brackenfell Municipality:*
  Additional Regulations relating to the Removal and Disposal of Refuse (PN 538/1968)(ref 4-5)
  as amended by
  PN 610/1968
  PN 610/1969
  PN 130/1973
  PN 287/1974
  PN 183/1975
  PN 528/1975
  PN 290/1978
  PN 488/1980
  PN. 342/1981

- *Cape Town Municipality:*
  Regulations relating to Refuse Bins (PN 733/1961) (ref 4-10)
  Solid Wastes By-law (PN 127/1984) 2 (ref 4-11)

- *Durbanville Municipality:*
  Regulations relating to the Removal of Domestic Refuse (PN 708/161) (ref 4-32)

- *Goodwood Municipality:*
  By-laws relating to the Removal of Domestic and Garden Refuse (PN 19/1975) (ref 4-43)
  as amended by

PN 1312/1975
PN 10/1982
PN 431/1990
PN 502/1991
PN 513/1993

- *Helderberg Municipality:*
  Refuse Removal By-law (PN 656/2000) (ref 4-49)

- *Kuilsriver Municipality:*
  Additional Regulations relating to the Removal and Disposal of Refuse (PN 287/1964) (ref 4-51)

  as amended by
  PN 842/1970
  PN 1015/1975
  PN 219/1980
  PN 456/1989

- *Pinelands Municipality:*
  By-law for the Removal of Refuse (PN 34/1982) (ref 4-65)
  as amended by
  PN 541/1983
  PN 714/1986
  PN 430/1990
  PN 589/1992

- *City of Tygerberg:*
  By-law relating to Refuse Removal (PN 89/1999) (ref 4-21)

- *South Peninsula Municipality:*
  By-law relating to Refuse Removal (PN 228/1999) (ref 4-73)

- *West Coast Peninsula Municipality:*
  By-law relating to Refuse Removal (PN 123/1997) (ref 4-74)

- *Cape Metropolitan Council:*
  Solid Waste By-law (PN 353/1985) (passed by former Cape Divisional Council) (ref 4-7)
  Waste Management By-law (PN 467/2000) (ref 4-8)

- *City of Cape Town:*
  Dumping and Littering By-law (PG 5894/2002) (ref 4-19)

b) Sea-Shore Regulations

As mentioned above (see 4.2.13) the Sea-Shore Act gave local authorities the power to promulgate Regulations in terms of section 10. Several Regulations were indeed passed and which continue to remain in force in the City's jurisdictional area. The Regulations give the

local authority the power to control the depositing or discharging upon the sea-shore or in the sea of offal, rubbish or anything liable to be a nuisance or danger to health.

The following Regulations are still in force:

- Simons Town Municipality Sea-Shore Regulations (ref 4-71)
- Municipality of Cape Town Sea-Shore Regulations (ref 4-54)
- Western Cape Regional Services Council Sea-Shore Regulations (ref 4-76)
- Municipality Strand Sea-Shore Regulations (ref 4-56)
- Gordons Bay Sea-Shore Regulations (ref 4-44)

As already stated, this Act, and therefore also the Regulations, is in the process of either being repealed or substantially amended in terms of proposed coastal zone management legislation which is currently still in a drafting stage.

c) City of Cape Town Dumping and Littering By-law (ref 4-19)

This by-law concentrates on dumping and littering. It is not restricted to solid waste only as the act of dumping includes depositing, discharging, spilling or releasing of waste.

"Waste" is defined as

> *any matter, whether liquid or solid or a combination thereof, which is a by-product, emission, residue or remainder of any product, process or activity and which has been discarded, but excludes radioactive waste.*

A wide list of persons may be held jointly or severally responsible for dumping and littering, namely the:

- person committing the act
- the generator (irrespective of whether he/she is responsible for the act)
- the owner of the land or premises
- person in control
- person having a right to use the land or premises
- person who negligently failed to prevent the contravention

"Person" includes a natural and legal person. In addition the employer may be held liable for acts or omissions of managers, agents or employees.

Strict penalties and sentences are imposed for contraventions. Thus a person found guilty of littering is liable to be either imprisoned for up to 60 days, or fined (up to R 3333.33), or to receive both.

First time dumping offenders are liable to be either imprisoned for up to one year, or fined (up to R20 000.00), or to receive both. Subsequent offenders face a minimum fine and/or sentence of R20 000.00 or one year prison term, unless the court is satisfied that substantial and compelling circumstance exist which justify the imposition of a lesser fine or sentence.

When sentencing the offender (be it for dumping or littering) the court may further investigate any financial advantage gained by the offender in consequence of the offence, as well as the potential or actual threat posed to public health, safety or the environment.

Moreover, if damage was caused to the environment or property the court may order the offender to repair the damage or to pay compensation for same. The court may further direct that the offender rehabilitates the environment.

4

d) City of Cape Town Air Pollution Control By-law (ref 4-18)

The by-law imposes a duty of care to prevent or mitigate air pollution (section 3). Part VI prohibits the open burning of material unless prior written authorisation has been obtained from Council. Before Council permits such open burning several requirements must be adequately addressed or fulfilled, such as that the person has investigated and assessed:

- every reasonable alternative for reducing, reusing or recycling the material in order to minimize the amount of material to be open burned, to the satisfaction of the Council
- the impact that the open burning will have on the environment

These provisions are of course also aimed at the burning of waste and garden refuse. The burning of waste (through incinerators) is further governed by means of the Atmospheric Pollution Prevention Act and a registration certificate is required for such process (see 2.2.10 above).

e) City of Cape Town Environmental Health By-law (ref 4-20)

Various provisions can be found in this by-law pertaining to waste. Thus refuse and waste form part of the definition of "nuisance", while garden litter, rubbish, waste material, rubble, scrap metal, machinery and vehicles parts, building materials are included under the definition of "objectionable material".

Part 1 (prevention and suppression of health nuisances) is important for present purposes. It requires owners or occupiers of any shop or business premises or vacant land adjoining such not to let such shop, premises or land to be used for the purpose of storing, stacking or keeping any waste material, refuse, crates, cartons, containers or any other articles of like nature in such way as to cause a health nuisance (section 1). The duty resting on the owner or occupier is of a strict nature and it is irrelevant whether or not he/she knew about the offending act.

In addition no person may commit or cause any act, which may pollute any water to which inhabitants have the right of use or access (section 2(8)). Finally, no person may keep, cause or suffer to be kept on any premises any accumulation or deposit of filth, rubbish, refuse, manure, other offensive matter, or objectionable material or thing so as to be a health nuisance (section 8).

The by-law also contains an extensive definition of "medical waste" whose management is widely regulated through Part 3. Broadly speaking generators of medical waste must separate same from other waste and store it separately. It may only be transported and disposed of by a registered medical waste transporter, although arrangements may be made with Council for alternative handling and disposal by the generator himself (ie incineration, provided a valid registration certificate is in place). Generators are required to maintain written records of medical waste removed from their premises.

4.4.4 By-laws Analysis

Generally speaking the by-laws do not differ too much in content and scope, and essentially have the following common provisions and principles (the wording and scope obviously vary):

- they prohibit the storing and/or accumulation of refuse or waste (regardless of the class or type)
- they make it an offence to dump, deposit, throw, abandon or burn refuse or waste except in a manner, place or container specifically designated by the authorities for this purpose
- the fines and penalties are generally very low and do not act as deterrent (in some cases, in very old by-laws, they were as low as R 4.00, and remained unchanged!). As regards the more recent by-laws the fines and penalties are higher.
- builders' rubble, special, hazardous, medical and bulky waste is mostly dealt with separately and the disposal thereof is generally prohibited, except under certain conditions and in a certain manner
- the general aim of the by-laws is to regulate the disposal of refuse and waste, and to ensure that it is removed by the authorities, or an approved waste contractor, for final disposal and/or treatment
- in instances where the authorities do not remove waste (eg builders' rubble or bulky materials) the onus rests on the waste generator to dispose of same at specifically designated sites
- none of the by-laws deals with general waste separation, waste minimisation, recycling, reuse, integrated waste management etc
- there is no incentive or initiative to sort and separate waste
- there is no requirement to sort and separate waste, except to ensure that certain waste types are not mixed or co-disposed (eg builders' rubble is to remain clean; hazardous and special waste may not be thrown away; garden refuse should not be mixed with other waste or refuse)
- there is no encouragement or reward for reducing the volume of waste
- some by-laws, like for instance those from Tygerberg and Helderberg, specifically state that no person will be entitled to an exemption from or reduction of charges merely on the grounds that limited use is made of the council provided service
- most of the by-laws state that the waste becomes the property (dominium) of the City once collected

- where the by-laws also address access to and conduct at landfills or disposal sites this is more of a general nature
- the by-laws have not kept up with more recent legislation and policies and thus reflect the 'traditional' approach
- the duty of care, polluter pays principle, duty to rehabilitate the environment following pollution, as well as the principles set out in the National Environmental Management Act (especially section 4) are mostly not reflected (the only exception being more recent by-laws, like for instance the City of Cape Town's Dumping and Littering By-law of 2002)

The only by-law which seems to go slightly further, in terms of waste management, is the CMC Waste Management By-law (2000). It differentiates between a "depot", "disposal site" and "mini refuse site".

"Depot" is defined as a council owned, operated or controlled premises to which waste is transported for initial treatment, storage, separation, transfer, processing, recycling, reducing, recovering or treating. A "mini refuse site" is described as a council owned, operated or controlled residential waste drop off point.

4.4.5 Reform Recommendations

Based on the aforegoing, as well as section 4.2 in general, the following brief recommendations may be made:

- the new by-law should repeal or amend the existing by-laws in order to bring some sense and direction to the current plethora of local legislation
- the principles and policies set out in the White Paper, National Waste Management Strategy, National Environmental Act, National Integrated Waste Management Bill etc should be incorporated into the new by-law
- serious thought should be given to the City of Cape Town introducing economic instruments (eg incentives, taxes, levies) to help achieve integrated (solid) waste management
- effect must be given to the requirements of the Municipal Systems Act and the devising of a tariff policy (subject to the possibility of wishing to obtain a second legal opinion regarding the applicability of Schedule 5 Part B to section 78 procedures – see 4.2.20.(B) above)
- law enforcement should be increased and stiffer fines and sentences should be implemented to act as deterrent

4.5 Gap Analysis

A number of "gaps" identified during the course of preparing the status quo of the policies and legislation relating to solid waste management, are set out hereunder:

4.5.1(i) Development / Environmental Levies

The City of Johannesburg, together with Pikitup, is strongly considering the introduction of a solid waste levy system covering new building developments (housing, commercial, industrial). This would be similar to the levies imposed to cover the introduction of or making provision for new roads, sewage, stormwater etc).

The suggestion was made that the City of Cape Town should look into a similar system. This is certainly an option worth exploring, particularly having regard to Cape Town's current growth rate, especially on the housing side. It is therefore suggested that the Johannesburg 'model' be studied to ascertain to what extent it can be applied to Cape Town.

Legally speaking the City would be entitled to introduce such levy system (see e.g. Municipal Systems Act, 32 of 2000, and Land Use Planning Ordinance 15 of 1985).

The levy should preferably be based on expected resource consumption and waste generation. These figures can easily be calculated by means of benchmarks available from existing information. One central component should thus be 'pay as you use/throw/consume'.

Instead of only concentrating on a development levy to cover waste related costs, a broader approach may be considered. Thus other aspects should be considered as well like water, electricity, environmental centre/building design, environmental technology, green building technology, environmental footprint etc. The levy should therefore rather be called an environmental levy, and this would be in line with integrated resource management. It must, after all, be remembered that integrated waste management is only one facet of integrated resource management.

4.5.1(ii) New Developments and Integrated Resource Management

Coupled to the possibility of a development/environmental levy, or independent thereof, a further option is proposed to examine the introduction of a mandatory or voluntary integrated resource management concept (covering not only solid waste, but also water, electricity, building design, green technology etc) for any new developments, irrespective of whether they are residential, commercial or industrial. New developments have the distinct advantage that any new measures or approaches can fairly easily be incorporated either during the design or construction phase.

The approval of building plans could therefore be made dependent on the incorporation of such measures. The department responsible for approving building plans could draft guidelines (or even by-laws) regulating this. DEA&DP have EIA guidelines incorporating integrated waste management; these could, for instance, be used as a model or starting point.

Since it is often the case that the developer and owner/facilitator are not the same there is generally little incentive or perceived necessity on the part of the developer to include such management steps. To counter this it is proposed that the above development/environmental levy should take cognisance of any management system in place. If this is the case then a rebate or reduction should be offered, or some other incentive. The owner/facilitator will most certainly benefit since their long term operational and overhead costs will be reduced even if the construction costs may be higher.

The savings, particularly in the long run, for the City in terms of resource management and environmental savings should also not be forgotten.

It was considered by the City's Waste and Legal Departments that the issue of a development / environmental levy should rather be addressed by policies and not through the legal process. The City was also of the opinion that section 42 of the Land Use Planning Ordinance theoretically already provides for this.

4.5.1(iii) Trade Waste

Valid concerns were raised by City officials that there is insufficient control over waste generated by shops, formal traders and offices (so-called trade waste) particularly those not forming part of a centre or building having its own management. It is especially the small shops and traders who represent a larger problem.

Many shops and offices simply put their waste out for collection and have no or insufficient agreements either with the City or private waste contractors for removal and disposal. Due to this, and also because volumes are often too large or the waste is not properly binned/packaged it is not always removed with the result that it is often dumped illegally. It was further advised that the City attempted to assist various businesses in formalising agreements or coming to an arrangement but that this proved quite unsuccessful, and that officials were at times verbally abused and ordered off the premises.

From the information we received we are unsure if restaurants and pubs fall under the trade waste category as well (presumably they do), but if not then these should certainly be included as well, as they generate significant volumes, a large part of which poses a real environmental health threat (i.e. food waste). It is a common fact that used food oil is often simply poured down the drain or given to staff. In addition many restaurants sell their used oil to third parties who in turn offer it in the townships. Needless to say these practices should be curtailed and forbidden.

The wish was expressed by City officials that agreements should be in place in terms of which trade waste is governed, and that these contracts be captured, for instance, on the City's SAP system. This is in principle the correct approach to adopt, although the following potential (administrative and enforcement) problems are foreseen:

- what if trade waste is already removed by private waste contractors, or the business removes the waste itself
- what if a portion (or all) of the waste is removed by or given to recyclers or re-users
- what if the business forms part of a centre and as such is controlled by a body corporate/centre management who have an agreement either with the City or a private waste contractor
- what if a new business/owner moves in, or the nature of the business conducted also changes

It is conceded that it will never be possible to introduce and maintain a fault-free system, and the aim is therefore to find a balanced solution.

It is thus recommended that a differentiation be made between large/medium shops and centres, and small shops/traders. The large and medium businesses almost always either form part of a shopping centre (and as such are subject to some management control), alternatively they generate such volumes of waste that an agreement for removal is required (be it with the City or a private waste contractor). Ultimately the owner/tenant of each business is responsible for their own waste. However, if the centre management/body corporate is also responsible for furnishing the City with proof of their arrangements there will be a direct trickle down effect. From an administrative point it is far easier to control what the management is doing instead of checking up on a few dozen or perhaps hundred businesses within one complex or building. It appears that there is currently nothing in the City's building management scenario covering contracts with centre management. The above could be introduced and enforced either through the new by-law or in terms of administrative powers the City may exercise, or both.

Another problem is that the electricity, water, rates and other costs are generally bundled together and appear on a single statement. This does not represent much incentive for shop owners or tenants to conserve resources, as often they do not know what they are all paying for.

As regards small shops and businesses a provision could, for instance, be built into the new by-law requiring them to furnish proof of a disposal arrangement (be it with the City or a private waste contractor). The City's SAP system can capture these details and that this can be followed up as part of the monthly invoicing cycle. Coupled to this should be offences/penalties provisions in the event of no agreement being in place or if it is contravened.

In areas where trade waste dumping is a problem we agree that inspectors should follow this up, and that educational/informational programs be implemented. Once again fines or prosecution should also be used as one of the enforcement mechanisms.

A difference can be drawn between offices and trading businesses if this is desired either from a billing or waste collection aspect. Office waste mostly does not pose a health threat as it consists mainly of paper, cardboard, stationery, cartridges, plastic etc, although some food waste or food packaging waste may be found in it. Generally speaking office waste has a high waste minimisation, re-use and recycling value, and it might be worth introducing some incentive or (waste) rates reduction scheme to encourage the introduction of waste minimisation, re-use and recycling measures.

The waste generated by other businesses may be more problematic, depending on what is disposed of (e.g. food waste from restaurants, pubs and grocery stores), thus perhaps requiring greater control and enforcement.

4.5.1(iv) Economic Instruments for Waste Prevention, Minimisation, etc

As already pointed out in this chapter, the City (as well as national government) is empowered, and in fact obliged to give effect to environmental considerations. In this regard see, for instance, the Municipal Systems Act and the National Integrated Waste Management Bill, both of which require and/or allow local authorities to:

- encourage the avoidance, minimisation, or reduction of waste
- promote the recovery of waste by means of recycling or re-use

The aforegoing are components of the proposed Municipal Waste Management Plans.

Attention is also drawn to the Bill's definitions of 'waste' and 'waste management' (see section 4.2.18).

The Municipal Systems Act requires a local authority to adopt and implement a tariff policy which must, inter alia, reflect and encourage the economical, efficient and effective use of resources, the recycling of waste, and other appropriate environmental objectives (section 74(2)). The local authority furthermore has the power to introduce economic instruments as part of its tariff policy. These instruments could take on various forms, like fines, penalties, rates and taxes (positive or negative), levies, deposits etc, or any combination thereof.

Any arguments pertaining to revenue loss for the City can, in our opinion, probably be countered by calculating the resulting saving for the City in terms of, eg:

- air space
- infrastructure required
- labour costs
- overheads and maintenance
- administrative costs

By reducing waste (in the broader sense) the City will ultimately be able to free or reallocate some resources currently needed or planned for waste management. Moreover, the air space saved could be significant, thus prolonging the life span of the existing landfill sites. This in turn will help keep disposal and waste management costs lower. In addition the resulting positive environmental impacts should not be disregarded as the City becomes cleaner. Encouraging reuse and recycling will further help to boost that industry, thus creating new jobs and businesses.

> The 'pay as you throw' system has proved extremely useful in other countries as a means of reducing waste volumes, although this system may admittedly be problematic in the South African context with its already high incidence of illegal dumping.

City officials pointed out that economic instruments were being addressed in the current tariff policy, and furthermore that the details and implementation thereof should form part of such policy. Broad enabling or empowering provisions should be inserted into the new by-law authorising the City to introduce such measures.

4.5.1(v) Waste Prevention, Minimisation, Reuse, Recycling, etc

The extent to which these should be covered in the new by-law was discussed with City officials and, as stated in 4.5.1(iv) above, considered to be more a tariff policy matter.

4.5.1(vi) Secure Refuse Areas

A further concern raised was that refuse areas (for residential, commercial and industrial complexes) should be more secure as they attract vagrants and informal collectors. It is agreed that something should be done in this regard in order to control litter and dumping.

As regards existing developments this might be problematic as the infrastructure or building design might not allow for this, or the building alteration costs could be too high. This might lead to opposition from property owners or centre management. Legal cover and control is strictly speaking in place by virtue of by-laws like the Dumping and Littering By-law (2002) which require owners and tenants to prevent and control littering and dumping, also in areas adjacent to their premises. The problem, however, comes down (once again) to enforcement. It is therefore suggested, that the new by-law contains a provision requiring owners, tenants and users of premises to prevent unauthorised persons from entering their refuse storage area or going through their waste, and possibly also holding them responsible for littering. Having said that, in terms of enforcement and practicalities this is difficult, and also bound to face opposition from the public.

Storage of waste in-house should in general be encouraged, and a body corporate or centre management could very easily enter into an agreement with one or more waste contractors. In addition a basic dry/wet waste separation system can be introduced without any real problems (see e.g. Canal Walk). This would even result in the generation of extra income, in some cases quite significant, and could also create employment.

Turning to new developments, this is easy to implement, and could form part of building plan approval. All that would be required is an amendment to existing building by-laws.

4.5.1(vii) Waste Inspectors

It is considered vital to either appoint waste inspectors, alternatively to extend the power and authority of existing inspectors (e.g. environmental health inspectors or the municipal law enforcement). The actual name and terminology for these inspectors can of course still be changed.

The inspectors should be given powers of inspection and access so that they may enter any premises or waste storage areas in order to determine compliance. Moreover they should be given the power to inspect (and possibly seize) documents etc should this be necessary. Similar provisions are found in many other Acts, Regulations and by-laws, especially the National Integrated Waste Management Bill, and there is no reason why waste inspectors should not be granted the same power and authority. Ideally these inspectors should have a cooperation or working agreement with other inspectors and officials. A good starting point would, for instance, be the environmental health inspectors.

Appendices

APPENDIX 1

[The items relevant for waste and waste management are highlighted.]

Schedule 4

Functional Areas of Concurrent National and Provincial Legislative Competence

Part A

Administration of indigenous forests
Agriculture
Airports other than international and national airports
Animal control and diseases
Casinos, racing, gambling and wagering, excluding lotteries and sports pools
Consumer protection
Cultural matters
Disaster management
Education at all levels, excluding tertiary education
Environment
Health services
Housing
Indigenous law and customary law, subject to Chapter 12 of the Constitution
Industrial promotion
Language policy and the regulation of official languages to the extent that the provisions of section 6 of the Constitution expressly confer upon the provincial legislatures legislative competence
Media services directly controlled or provided by the provincial government, subject to section 192
Nature conservation, excluding national parks, national botanical gardens and marine resources
Police to the extent that the provisions of Chapter 11 of the Constitution confer upon the provincial legislatures legislative competence
Pollution control
Population development
Property transfer fees
Provincial public enterprises in respect of the functional areas in this Schedule and Schedule 5
Public transport
Public works only in respect of the needs of provincial government departments in the discharge of their responsibilities to administer functions specifically assigned to them in terms of the Constitution or any other law
Regional planning and development
Road traffic regulation
Soil conservation

Tourism
Trade
Traditional leadership, subject to Chapter 12 of the Constitution
Urban and rural development
Vehicle licensing
Welfare services

Part B

4

*The following **local government matters** to the extent set out in section 155(6)(a) and (7):*

Air pollution
Building regulations
Child care facilities
Electricity and gas reticulation
Fire fighting services
Local tourism
Municipal airports
Municipal planning
Municipal health services
Municipal public transport
Municipal public works only in respect of the needs of municipalities in the discharge of their responsibilities to administer functions specifically assigned to them under this Constitution or any other law
Pontoons, ferries, jetties, piers and harbours, excluding the regulation of international and national shipping and matters related thereto
Stormwater management systems in built-up areas
Trading regulations
Water and sanitation services limited to potable water supply systems and domestic wastewater and sewage disposal systems

Schedule 5

Functional Areas of Exclusive Provincial Legislative Competence

Part A

Abattoirs
Ambulance services
Archives other than national archives
Libraries other than national libraries
Liquor licences
Museums other than national museums
Provincial planning
Provincial cultural matters
Provincial recreation and amenities

Provincial sport
Provincial roads and traffic
Veterinary services, excluding regulation of the profession

Part B

*The following **local government matters** to the extent set out for provinces in section 155(6)(a) and (7):*

Beaches and amusement facilities
Billboards and the display of advertisements in public places
Cemeteries, funeral parlours and crematoria
Cleansing
Control of public nuisances
Control of undertakings that sell liquor to the public
Facilities for the accommodation, care and burial of animals
Fencing and fences
Licensing of dogs
Licensing and control of undertakings that sell food to the public
Local amenities
Local sport facilities
Markets
Municipal abattoirs
Municipal parks and recreation
Municipal roads
Noise pollution
Pounds
Public places
Refuse removal, refuse dumps and solid waste disposal
Street trading
Street lighting
Traffic and parking

References

4-1. Advertising on Roads and Ribbon Development Act, 21 of 1940

4-2. Air Quality Bill, GN 1109 of 1 August 2003

4-3. Asbestos Regulations, GN R 155 of 10 February 2002

4-4. Atmospheric Pollution Prevention Act, 45 of 1965

4-5. Brackenfell Municipality - Additional Regulations relating to the Removal and Disposal of Refuse (P.N.538/1968)

4-6. Cape Metropolitan Council. *Metropolitan Spatial Development Framework*

4-7. Cape Metropolitan Council - Solid Waste By-law (PN 353/1985) (passed by former Cape Divisional Council)

4-8. Cape Metropolitan Council - Waste Management By-law (PN 467/2000)

4-9. Cape Nature Conservation Ordinance, 19 of 1974

4-10. Cape Town Municipality - Regulations relating to Refuse Bins (PN 733/1961)

4-11. Cape Town Municipality - Solid Wastes By-law (PN 127/1984)

4-12. Chapter VIII of the Regulations in terms of the National Road Traffic Act (Transportation of Dangerous Goods and Substances by Road), GN R 225 of 17 March 2000

4-13. City of Cape Town (2003). *Coastal Zone Management Strategy*

4-14. City of Cape Town (2003). *Environmental Education and Training Strategy*

4-15. City of Cape Town (2003). *Biodiversity Strategy*

4-16. City of Cape Town (2001). *Integrated Metropolitan Environmental Policy (IMEP)*

4-17. City of Cape Town (2001). *State of Environment Report – Year 4*

4-18. City of Cape Town Air Pollution Control By-law (PG 5979/2003)

4-19. City of Cape Town - Dumping and Littering By-law (PG 5894/2002)

4-20. City of Cape Town Environmental Health By-law (PG 6041/2003)

4-21. City of Tygerberg - By-law relating to Refuse Removal (PN 89/1999)

4-22. Constitution of the Republic of South Africa Act, 108 of 1996

4-23. DEAT (2000). *White Paper on Integrated Pollution and Waste Management*

4-24. DEAT (1999). *National Waste Management Strategies and Action Plans*

4-25. Development Facilitation Act, 67 of 1995

4-26. Directions in terms of section 20(5)(b) of the Environment Conservation Act with regard to the control and management of general communal and general small waste disposal sites, GN R 91 of 1 February 2002

4-27. Directive concerning Integrated Pollution Prevention and Control (96/61/EC)

4-28. Directive on Batteries and Accumulators containing certain dangerous substances (91/157/EEC)

4-29. Directive on End of Life Vehicles (2000/53/EC)

4-30. Directive on Packaging and Packaging Waste (94/62/EC)

4-31. Directive on Waste Electrical and Electronic Equipment (2002/96/EC)

4-32. Durbanville Municipality - Regulations relating to the Removal of Domestic Refuse (PN 708/161)

4-33. DWAF (1998). *Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste*, 2nd edition

4-34. DWAF (1998). *Minimum Requirements for Waste Disposal by Landfill*, 2nd edition

4-35. DWAF (1998). *Minimum Requirements for Water Monitoring at Waste Management Facilities*, 2nd edition

4-36. Environment Conservation Act: Amendment Bill, GN 1111 of 1 August 2003

4-37. Environment Conservation Act, 73 of 1989

4-38. Environmental Regulations for Workplaces, GN R 2281 of 16 October 1987

4-39. EU Directive (91/156/EEC) amending EU Directive on Waste (75/442/EEC)

4-40. EU Directive on the Landfill of Waste (99/31/EC)

4-41. EU Directive on Waste (75/442/EEC)

4-42. General Health Regulations, GN R 180 of 10 February 1967

4-43. Goodwood Municipality - By-laws relating to the Removal of Domestic and Garden Refuse (PN 19/1975)

4-44. Gordons Bay Municipality - Sea-Shore Regulations (GG 13239/1991)

4-45. Group I Hazardous Substances Regulations, GN R 453 of 25 March 1977

4-46. Hazardous Chemical Substances Regulations, GN R 1179 of 25 August 1995

4-47. Hazardous Substances Act, 15 of 1973

4-48. Health Act, 63 of 1977

4-49. Helderberg Municipality - Refuse Removal By-law (PN 656/2000)

4-50. Identification of Matter as Waste, GN 1986 of 24 August 1990

4-51. Kuilsriver Municipality - Additional Regulations relating to the Removal and Disposal of Refuse (PN 287/1964)

4-52. Lead Regulations, GN R 236 of 28 February 2003

4-53. Milnerton Municipality - Sanitary By-law (PN 705/1993)

4-54. Municipality of Cape Town - Sea-Shore Regulations (GG 15636/1994)

4-55. Municipal Ordinance, 20 of 1974

4-56. Municipality Strand - Sea-Shore Regulations (GG 5752/1977)

4-57. Municipal Structures Act, 117 of 1998

4-58. Municipal Systems Act, 32 of 2000

4-59. National Environmental Management Act: Second Amendment Bill, GN 1110 of 1 August 2003

4-60. National Environmental Management Act: First Amendment Bill, GN 752 of 3 June 2003

4-61. National Environmental Management Act, 107 of 1998

4-62. National Integrated Waste Management Bill (Version 9, November 2002)

4-63. National Water Act, 36 of 1998

4-64. Occupational Health and Safety Act, 85 of 1993

4-65. Pinelands Municipality - By-law for the Removal of Refuse (PN 34/1982)

4-66. Polokwane Declaration on Waste Management (2001)

4-67. Proposed Amendment of Directive on Waste Electrical and Electronic Equipment (COM/2003/0219)

4-68. Proposed Directive on Batteries and Accumulators and Spent Batteries and Accumulators (2003/0282 (COD))

4-69. Regulations in terms of the National Building Regulations and Building Standards Act, GN R 2378 of 12 October 1990

4-70. Sea-Shore Act, 21 of 1935

4-71. Simons Town Municipality - Sea-Shore Regulations (GG 8176/1982)

4-72. South African National Roads Agency Limited and National Roads Act, 7 of 1998

4-73. South Peninsula Municipality - By-law relating to Refuse Removal (PN 228/1999)

4-74. West Coast Peninsula Municipality - By-law relating to Refuse Removal (PN 123/1997)

4-75. Western Cape Planning and Development Act, 7 of 1999

4-76. Western Cape Regional Services Council - Sea-Shore Regulations (GG 13018/1991)

Chapter 5 - Context

A brief overview of the City of Cape Town is presented in order to provide the reader with a context for the Integrated Waste Management Plan. The current and projected future situation of the City's environment, people and development are described.

5

Topography and City Layout

Map 5.1

5.1 Topography and City Layout

Cape Town, which is located in the Western Cape, covers an area of 2456 km^2 and is South Africa's second largest city. It is greatly influenced by its topography, dominated by Table Mountain and the range of mountains to its south. This range of mountains, which rises to approximately 1000m above sea level, stretches in a north-south direction across the peninsula and limits development and transportation within the city. There are in fact only 3 passes linking the northern part of the peninsula to the southern part, which limits the development in the south as can be seen on the map.

The CBD of the city is located around the harbour between Table Mountain, Lions head and the sea. Development in the city began in this area in the 1650's and progressed outward as forced by the topography.

East of Table Mountain is a large flat plain, known as the Cape Flats characterised by very flat stretches of shifting dune sand. This area accommodates the majority of Cape Town's population (see Map 3.2).

Figure 5. 1 Aerial view of Cape Town

The City is bounded in the east by the Cape Fold mountain range and to the north are the relatively low Tygerberg hills. There is very little topographical restriction on development in this area, known as the northern suburbs, and consequently future expansion of the city is likely to occur in the north around the Tygerberg Hills and the West Coast north of Milnerton.

Prior to Cape Town becoming a unicity, it was divided into 6 local municipalities, which are shown on Map 5.1. Although the boundaries between areas have officially been done away with, they are useful to refer to and are termed municipal areas in this report.

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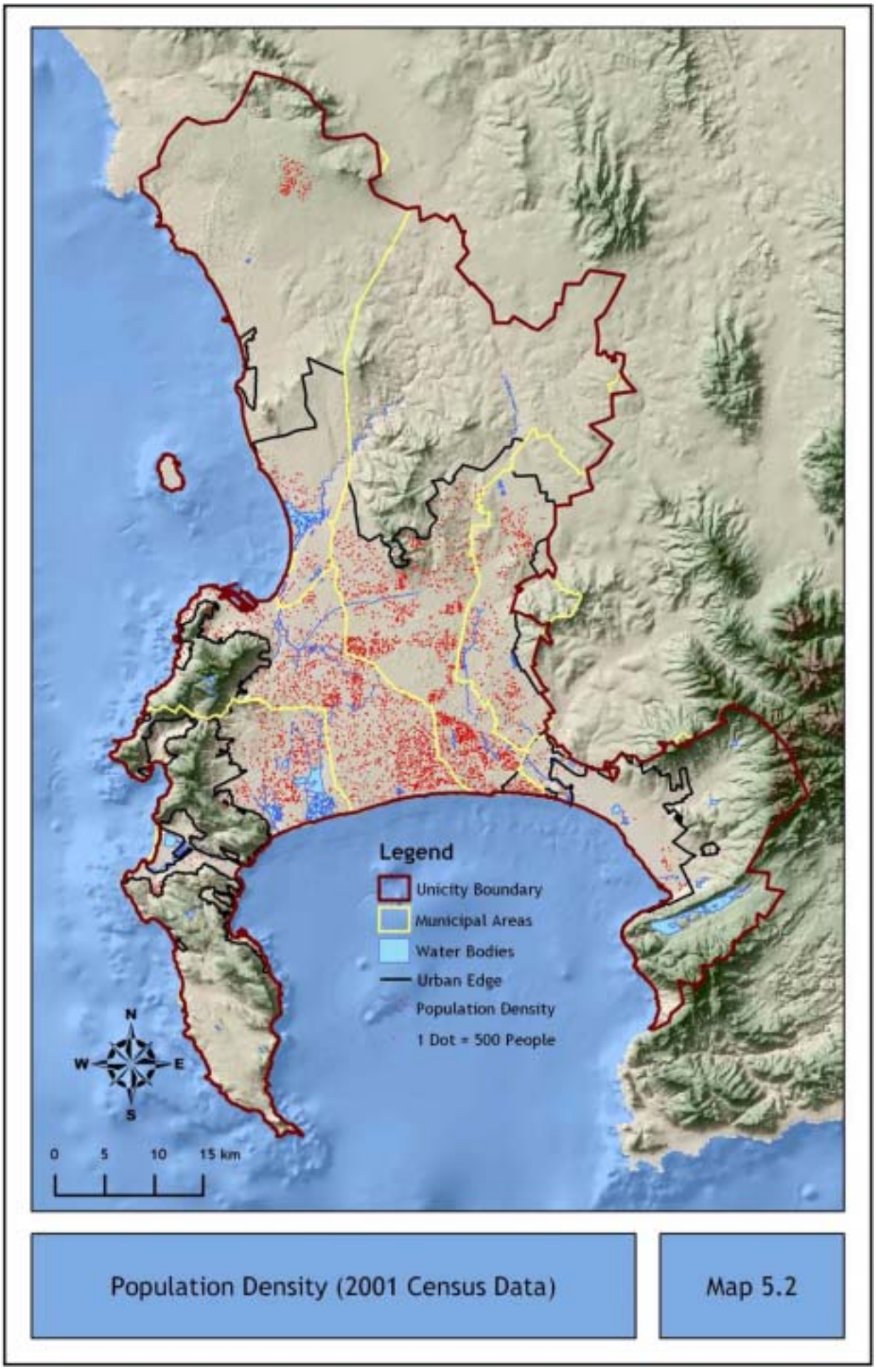


Population Density (2001 Census Data)

Map 5.2

5.2 Population and Demographics

5.2.1 Population distribution

The 2001 census indicated that Cape Town has a total population of approximately 2.89 million residents[ref 5-13]. This is up from 2.68 million[ref 5-9] recorded in the 1996 census (with the estimated undercount), which represents an average year-on-year growth rate of 1.57%. This is significantly lower than the average year-on-year growth for the Western Cape Province of 2.7%[ref 5-14].

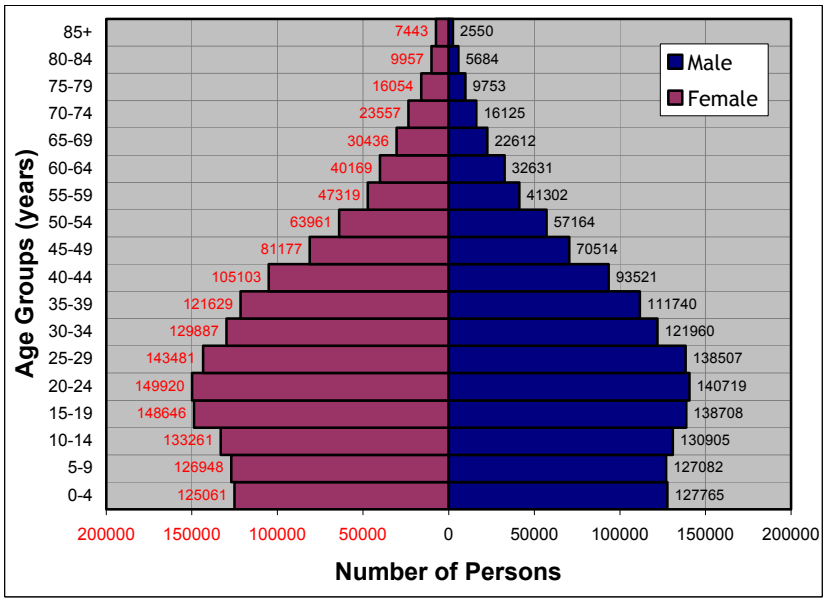
The distribution of the population in Cape Town is shown on Map 5.2 on the opposite page and as can be seen, the population is primarily concentrated in the southern parts of the Tygerberg and old City municipal areas, in the area known as the Eastern Suburbs.

Table 5.1 Population and households in the Cape Town Metropolitan Area[ref 5-13, 5-14]

	1996		2001	
Municipal Area	Persons	Households	Persons	Households
Blaauwberg	131379	28,977	125,531	30,623
City (Old)	987007	203,094	920,378	215,999
South Peninsula	356730	77,578	377,213	87,728
Tygerberg	827945	167,270	1,168,841	275,795
Oostenberg	250846	53,749	245,415	54,989
Helderberg	128959	31,188	55,873	12,887
TOTAL	**2,682,866**	**561,856**	**2,893,251**	**678,021**

5.2.2 Age-Gender Profile

The population pyramid for the City based on the 2001 census data is shown in *Figure 5. 2*. It shows that the population of Cape Town is growing moderately and has an increasing economically active sector of the population.



	2001	1996
Median age	25.7	26
Youth (<15)	26.7%	28.2%
Potential labour	68.4%	65.7%
Elderly (65+)	5.0%	6.1%
Dependency ratio	46.3	52
Index of Aging	18.7	22

Figure 5. 2 Population Pyramid for Cape Town [ref 5-14]

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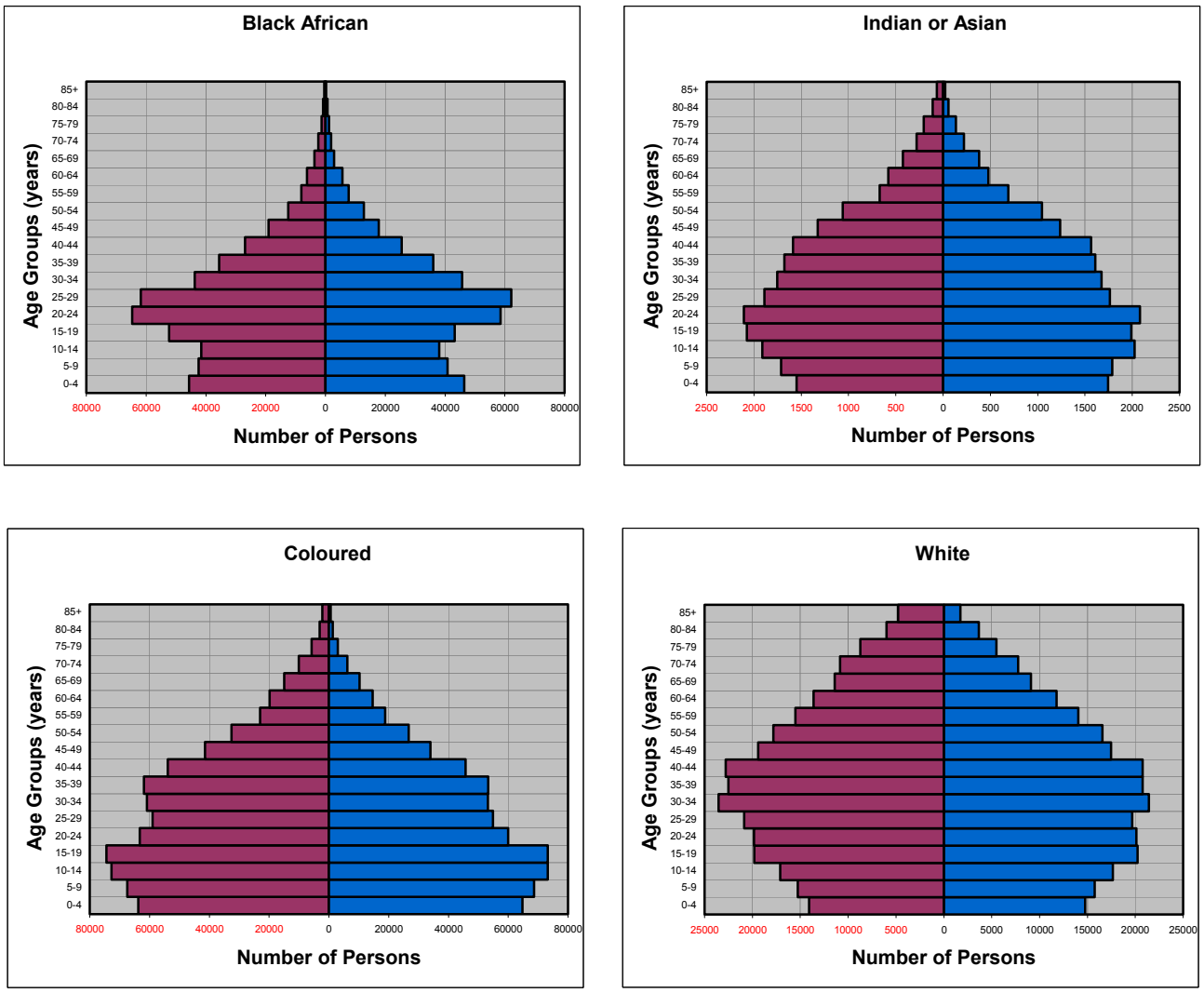

Figure 5. 3 Population Pyramid for Ethnic Groups (ref 5-14)

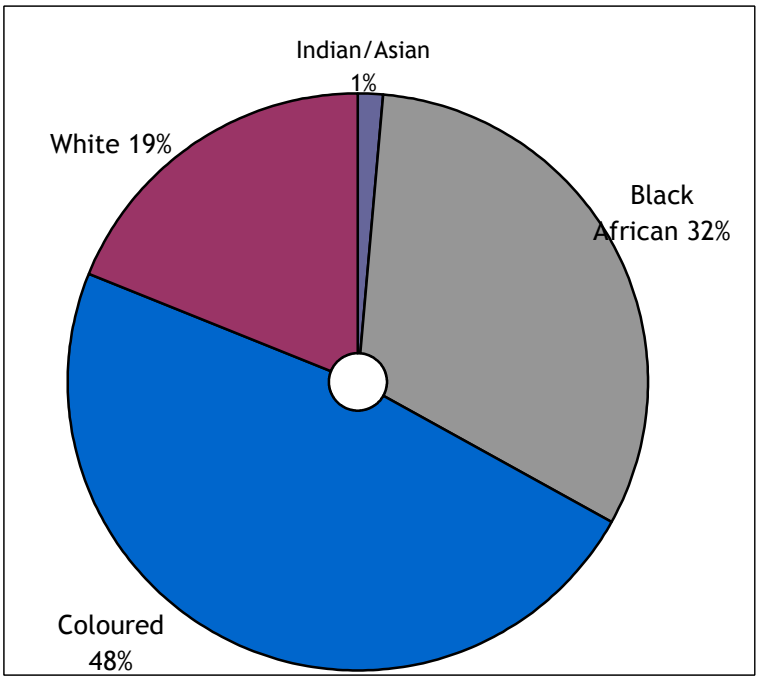

Figure 5. 4 Ethnic distribution of Cape Town (ref 5-14)

5.2.3 Ethnicity

There is a significant cultural and ethnic diversity within Cape Town's population. The cultural diversity of the City is important in planning as different cultures generally have different views on issues such as waste management.

Ethnically, the people of Cape Town are predominantly coloured (48%) and black (32%). The Indian/Asian population is very small [ref 5-14].

The charts on the opposite page reveal the marked difference in the population structure of the various ethnic groups and reflect varied the social and cultural conditions under which people in Cape Town live.

- The Black population is generally young with a large percentage of young people entering the workforce, largely as a result of migration into the City. There is a low percentage of people older than 65 indicating a lower life expectancy.
- The Coloured and Asian population are similar, being very young with decreasing birth rate and a slightly greater life expectancy.
- The White population is aging with a low birth and greater life expectancy.

It is thus important to note that any planning for the city has to take into account the diversity of the culture and ethnicity of the people of Cape Town. The concept of an urban centre being a "melting pot" is not applicable here and the City cannot be viewed as a homogenous mass, but as a culturally diverse population.

Respondents of the 1996 and 2001 census were asked to indicate the population group into which they classify themselves. The classification in this report are as given by Statistics South Africa and since the data used here is from the 1996 and 2001 census, the figures are based on self description by the respondents.

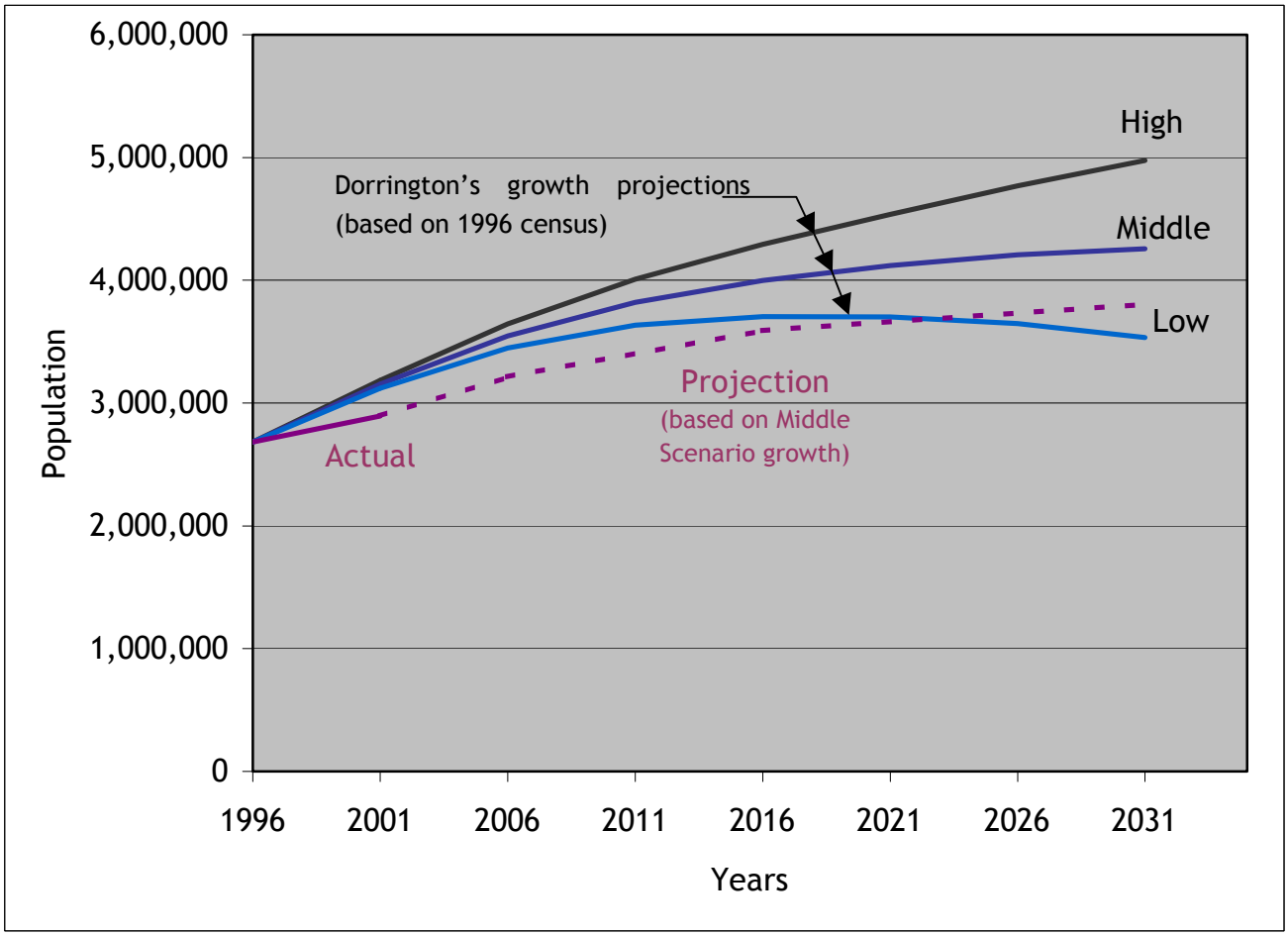

Figure 5.5 Population projections [ref 5-14, 5-9]

HIV/Aids in South Africa and the Western Cape

It is difficult to make population growth predations for future waste management planning as the ultimate effect of HIV/Aids is a significant variable and is largely dependant on the effectiveness of the current HIV/Aids programs.

There are thus many scenarios for the effect of HIV/Aids on the population of South Africa, most of which predict a negative average growth rate in South Africa sometime between 2005 and 2008 based on the current effectiveness of HIV/Aids programs [ref 5-8, 5-11, 5-15]. According to the ASSA2000 aids model [ref 5-1], the Western Cape will not be as greatly affected as he rest of the country and the year-on-year growth rate is expected to drop to around 0.4%. Thus, it is expected, assuming no change in the growth of the pandemic, that Cape Town's growth will follow that of the province and will slow down significantly, but not drop to a negative growth scenario.

For planning purposes, a more optimistic assumption of the effectiveness of HIV/Aids programs should be assumed and it is on this basis that the population projections reported here have been based.

5.3 Population Growth Projections

In 2000, Professor Rob Dorrington prepared 3 population projections for the CCT[ref 5-9] based on various assumptions on the impact of HIV/Aids and migration into the City. These are shown on Figure 5.5 as the high, middle and low growth projections and are based on the 1996 census data. Planning for the City has generally been done using the middle scenario.

However, the 2001 census data revealed that the population of Cape Town is growing significantly slower than even the low projection. The middle scenario population growth projection was thus adjusted for the recently published 2001 census figures using the middle scenario year-on-year growth rates. Future planning for the IWMP will be based on this projection, which is shown in Table 5. 2. The low and middle scenario projections prepared by Dorrington are also shown [ref 5-9].

Table 5. 2 Population projections derived from ref 5-7

Municipal Area	1996	2001	2006	2016	2031	Growth*
Blaauwberg	131379	141,680	219,048	299,800	346,348	4.68%
City (Old)	987007	1,064,406	1,117,516	1,179,194	1,201,947	0.62%
South Peninsula	356730	384,705	414,184	455,520	491,141	1.08%
Tygerberg	827945	892,871	964,767	1,042,456	1,072,975	0.85%
Oostenberg	250846	270,516	322,848	384,210	425,877	2.00%
Helderberg	128959	139,071	174,525	228,702	266,322	3.04%
TOTAL	2,682,866	2,893,251	3,212,888	3,589,882	3,804,610	1.19%
* Growth is defined as average annual year-on-year growth factor presented as a %						
2000 Projection[ref 5-9] (Low Scenario)	2,682,866	3,121,532	3,447,946	3,702,990	3,534,371	0.91%
2000 Projection [ref 5-9] (Middle Scenario)	2,682,866	3,154,238	3,547,055	3,997,718	4,255,857	1.68%

It is evident that more rapid growth in the City is expected to take place on the outer edges of the urban area in the Blaauwberg and Helderberg areas. However, in terms of absolute numbers, the largest growth is expected to be in the Tygerberg area.

5.3.1 HIV/Aids

The growth of the City will be strongly affected by the pandemic and the impact of HIV/Aids was included in the Professor Dorrington's projections[ref 5-9]. However the level to which it will affect the projections is unknown.

The low growth scenario assumed that the growth would be significantly limited by the spread of HIV/Aids. The predicted population of Cape Town in 2001, based on the 1996 census data using this low growth scenario, was 3.1 million. The actual figure from the 2001 census is approximately 220 000 (7,9%) less than what was projected. This significantly slower than predicted growth may indicate that the HIV/Aids pandemic is having a greater affect than anticipated.

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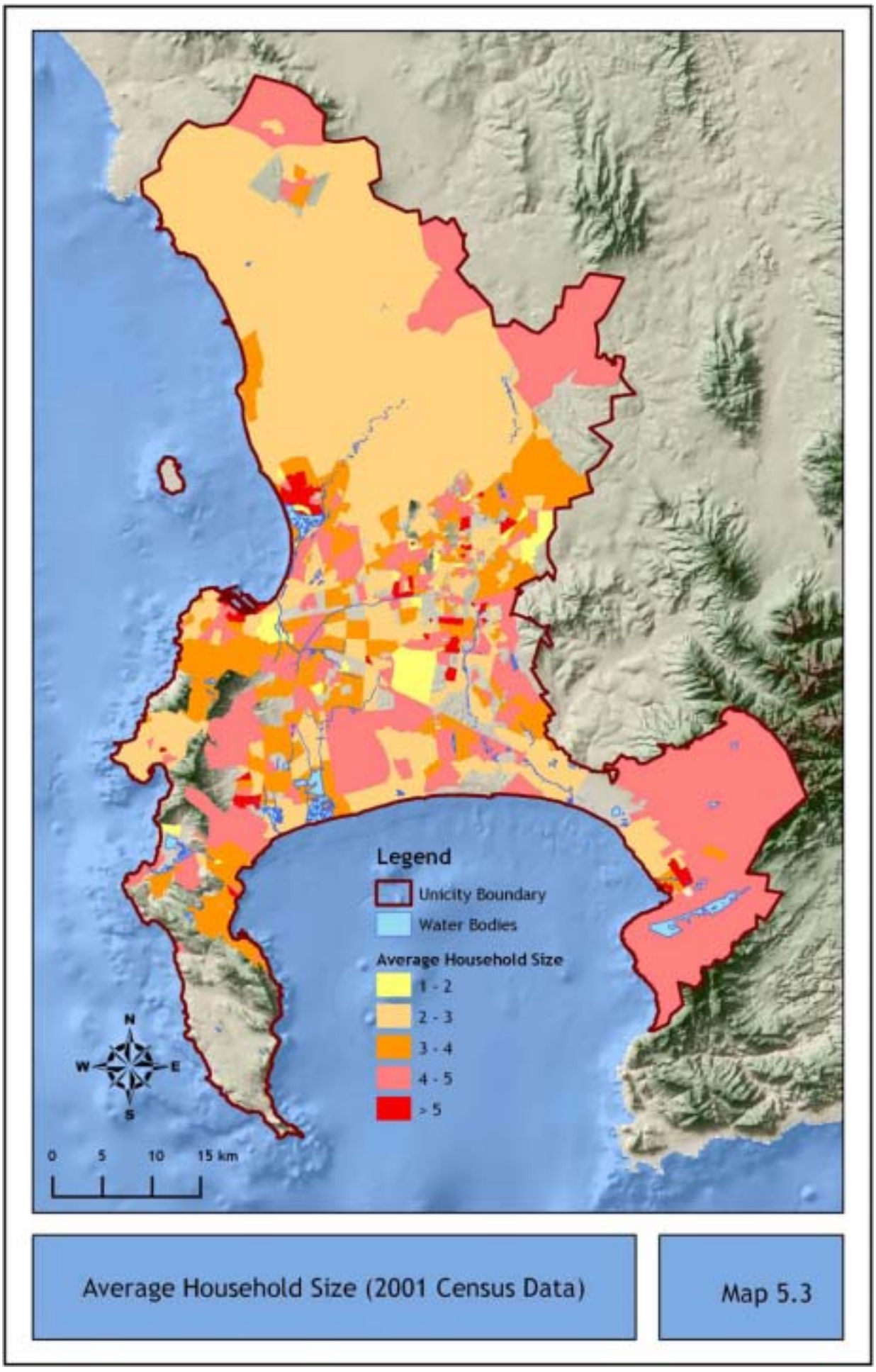


Average Household Size (2001 Census Data)

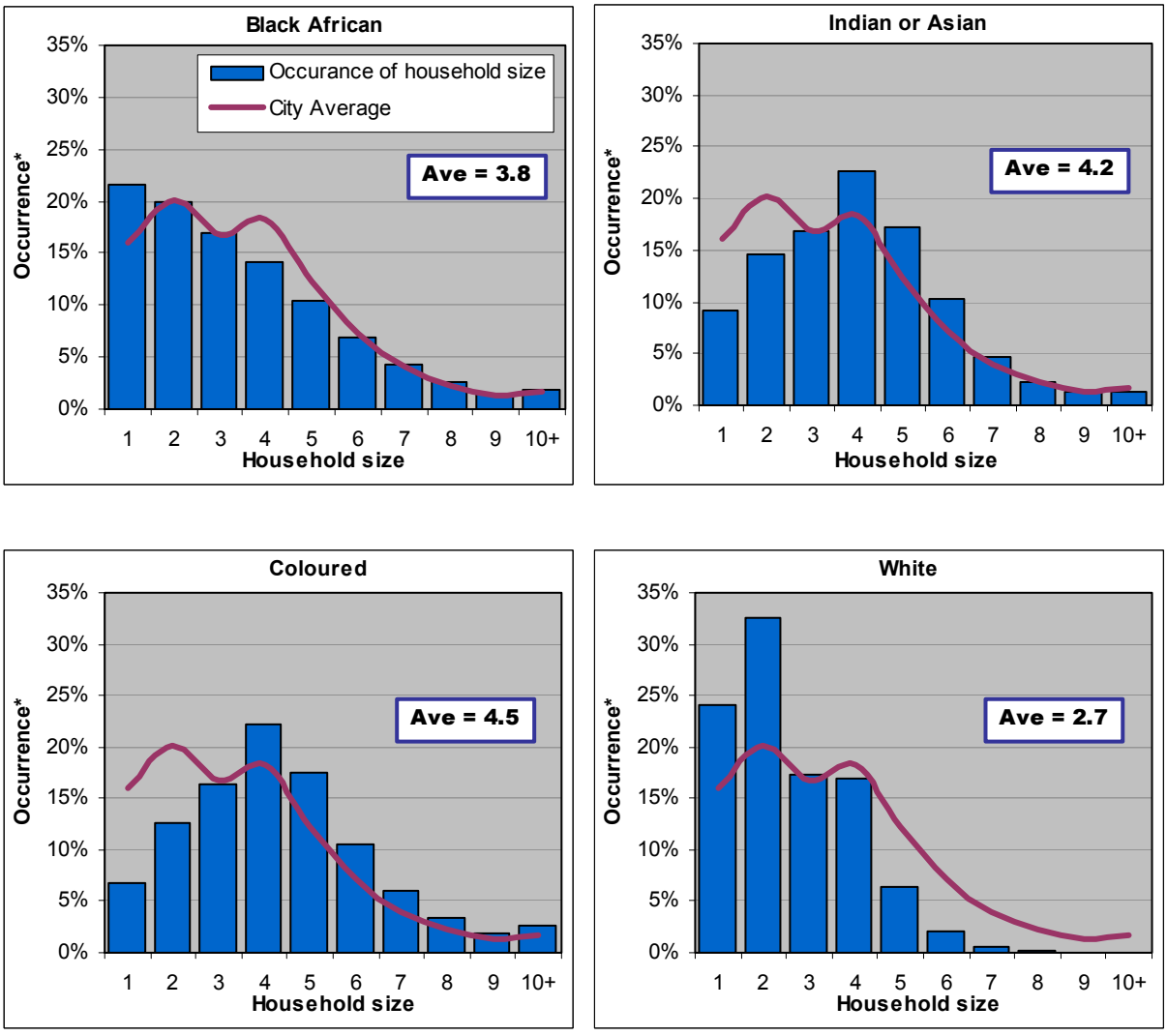
Map 5.3

5.4 Socio-Economic Conditions

There is a vast variability in the socio-economic conditions under which the people of Cape Town live. Various socio-economic factors affecting Cape Town's population are presented here.

5.4.1 Household size

The household size in Cape Town varies significantly for the various ethnic groups, which re-emphasises that the cities population cannot be viewed as a homogeneous group. The profile of household sizes for the various ethnic groups as obtained from the 2001 census data is shown in Figure 5.6 below.



* Occurrence calculated as % of the total number of households for the particular ethnic group

Figure 5. 6 Household size distribution for various ethnic groups (ref 5-14)

As can be seen, the coloured and Indian/Asian ethnic groups tend to have larger households than the Black or White ethnic groups. This is attributed to both cultural differences and differing economic conditions. The average household size for Cape Town is 3.8 persons per household.

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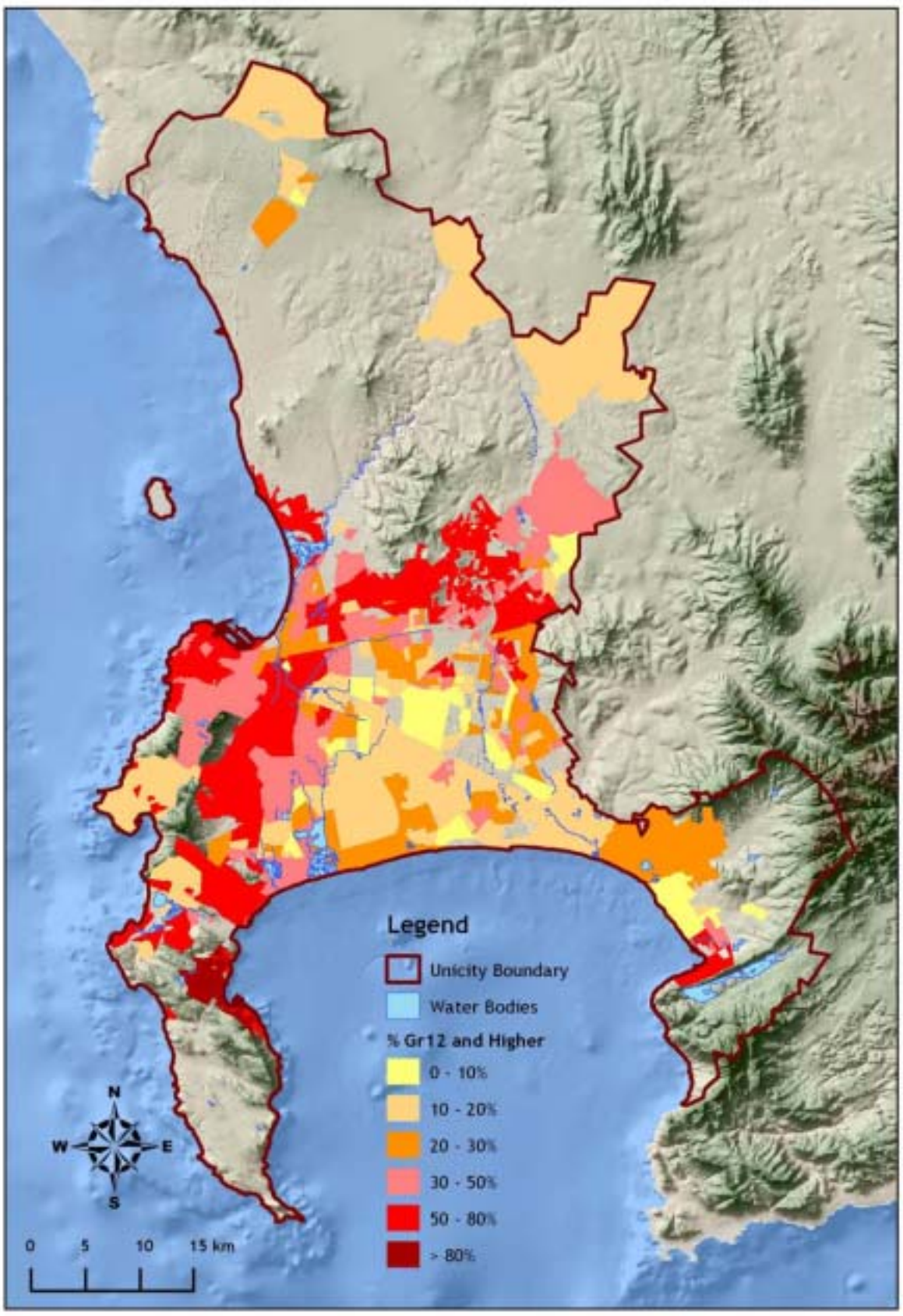

Education Levels (2001 Census Data)

Map 5.4

5.4.2 Education Levels

The majority of the City's population above the age of 20 have a grade 10 (Standard 8) or higher (61%), but only 13% have a tertiary education [ref 5-14].

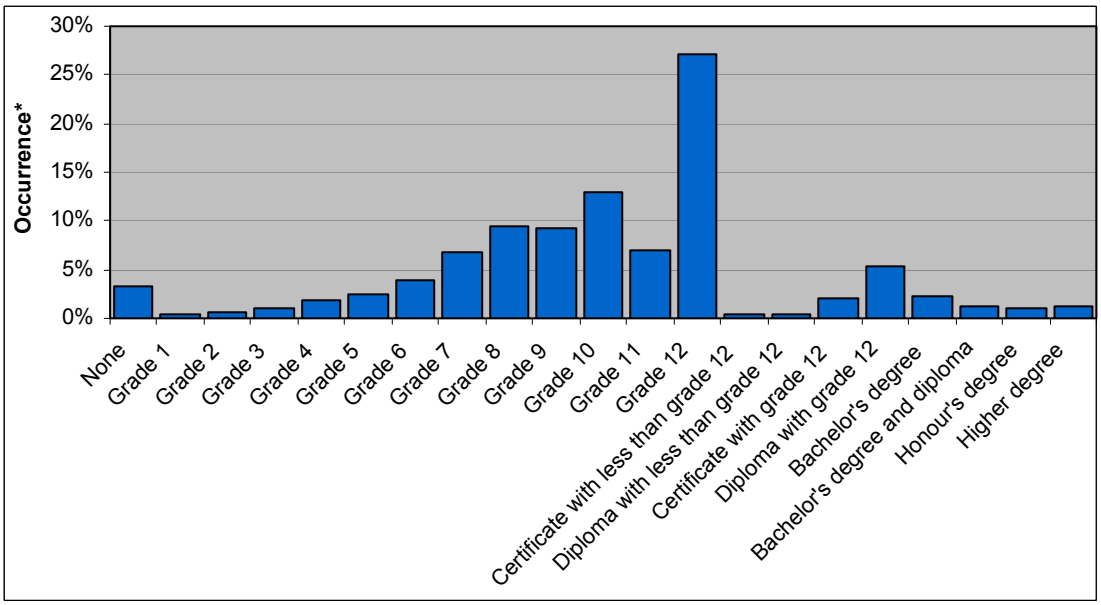

Figure 5. 7 Education profile for Cape Town [ref 5-14]

As with the household size, there is a marked variation in the levels of education across the City's population, and the affects of the previous education system are still evident.

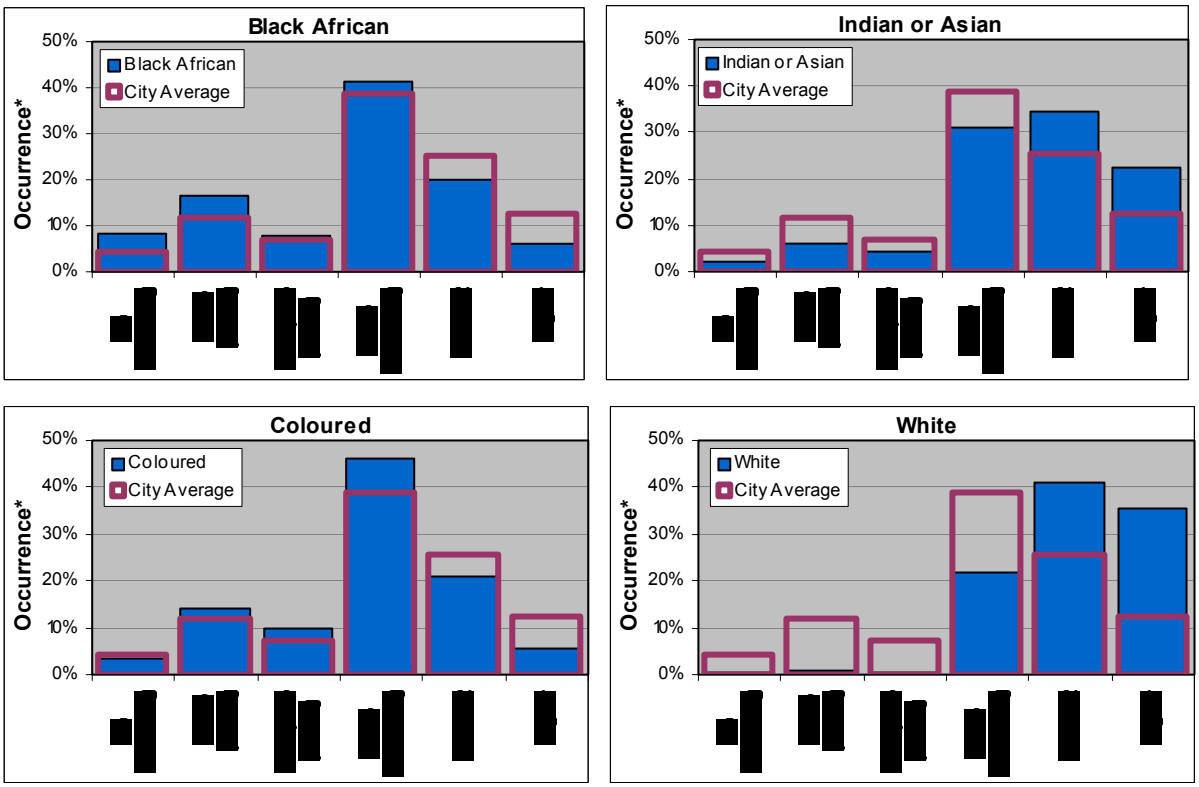

Figure 5. 8 Education profiles for various ethnic groups [ref 5-14]

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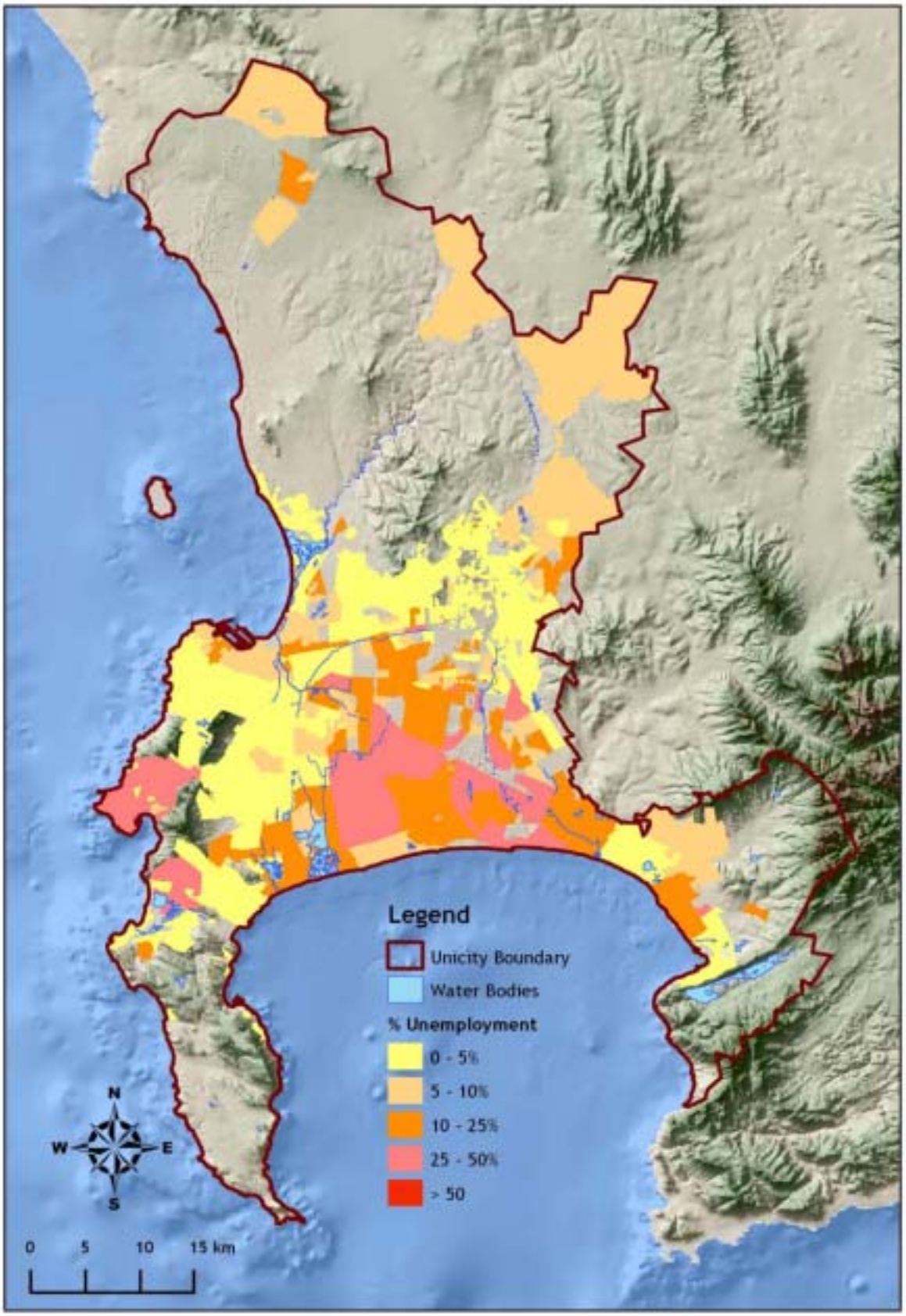

Unemployment Levels (2001 Census Data)

Map 5.5

5.4.3 Employment

The employment statistics from the 2001 census data is given in Figure 5.9. The official definition of unemployment was used, as defined but Statistics South Africa. This definition defines as unemployed those people within the economically active population (15-65 years old), who did not work during the seven days prior to census night and *wanted* to work[ref 5-14]. This is a rather narrow definition and if it were to include everyone who *can* work and is not working, the unemployment figures would be significantly higher.

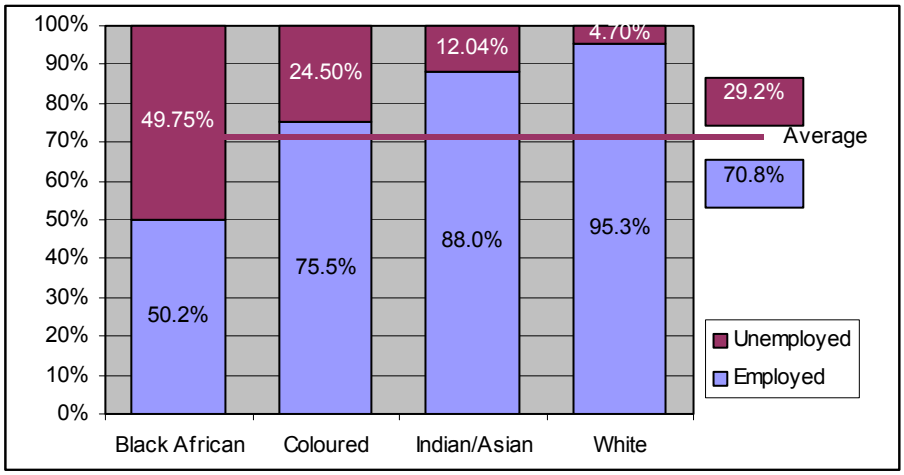

Figure 5.9 Unemployment figures for Cape Town [ref 5-14]

The level of involvement in various occupations in the City is shown in Figure 5.10 below.

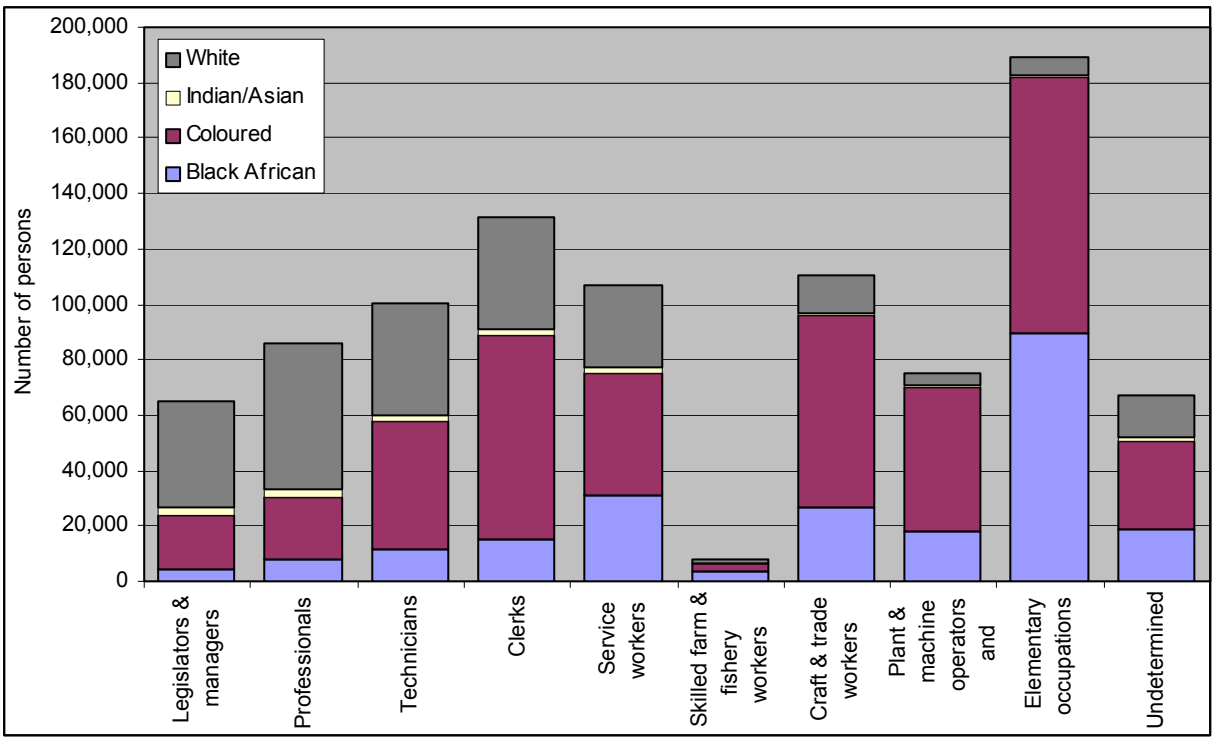

Figure 5.10 Occupation profile for Cape Town [ref 5-14]

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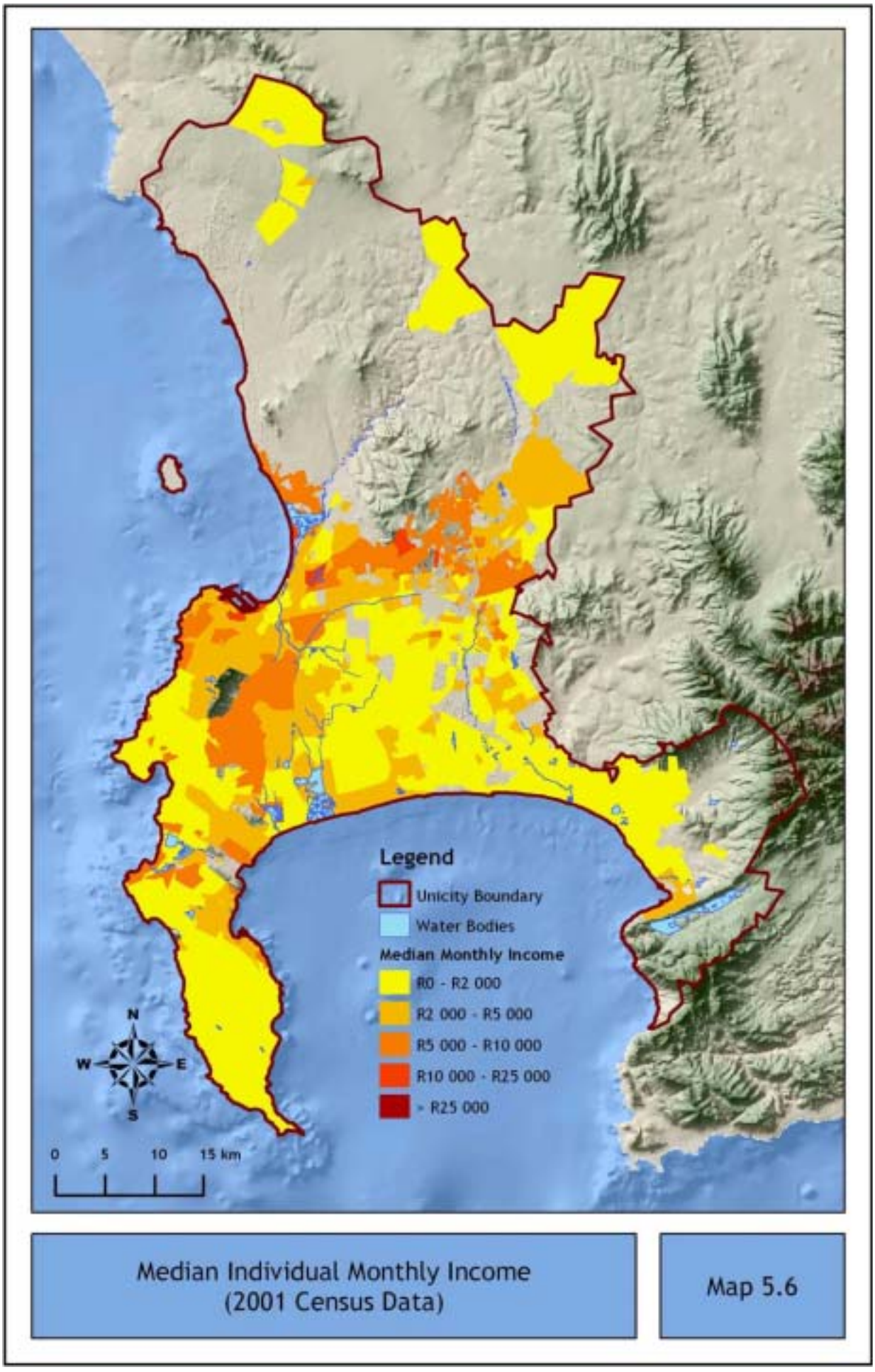

Median Individual Monthly Income
(2001 Census Data)

Map 5.6

5.4.4 Personal Income

The monthly income varies significantly across the City. The map on the opposite page shows the distribution of personal income (ref 5-14) spatially across the City. Generally the average monthly income decreases as one moves eastwards from the mountain and southwards from Durbanville hills. The median monthly income for the 6 municipal areas is given in Table 5. 3.

Table 5. 3 Median Income for municipal areas(ref 5-14)

Municipal Area	Median Monthly Individual Income	% of City Average *
Blaauwberg	R 4,081	190.4%
City (Old)	R 2,327	108.5%
South Peninsula	R 3,042	142.0%
Tygerberg	R 3,799	177.3%
Oostenberg	R 2,654	123.8%
Helderberg	R 1,455	67.9%

* Percentage of City Average based on Median values in table 5.4 below.

Due to the previous political situation, the income levels also vary significantly across the ethnic groupings. The median monthly income derived from the 2001 census data is shown in Table 5. 4 and the distribution of income in Figure 5.11.

Table 5. 4 Median Income for various ethnic groups (ref 5-14)

Ethnic Group	Median Monthly Income	% of City Average
Black African	R 1,122	52.3%
Coloured	R 1,916	89.4%
Indian or Asian	R 3,712	173.2%
White	R 5,858	273.3%
AVERAGE	**R 2,143**	

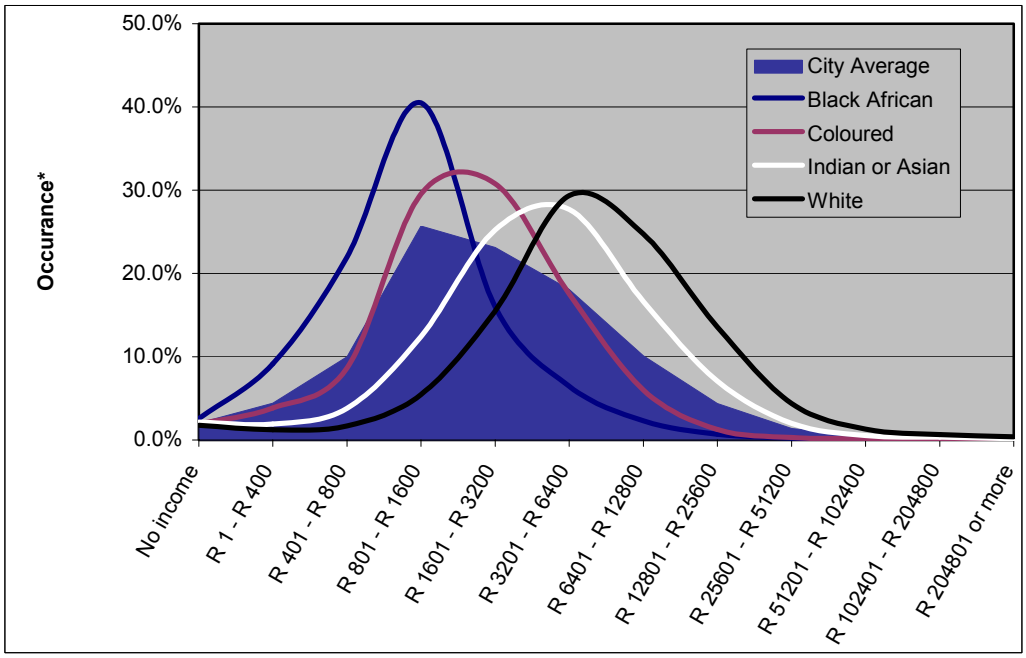

Figure 5. 11 Income profiles for Cape Town(ref 5-14)

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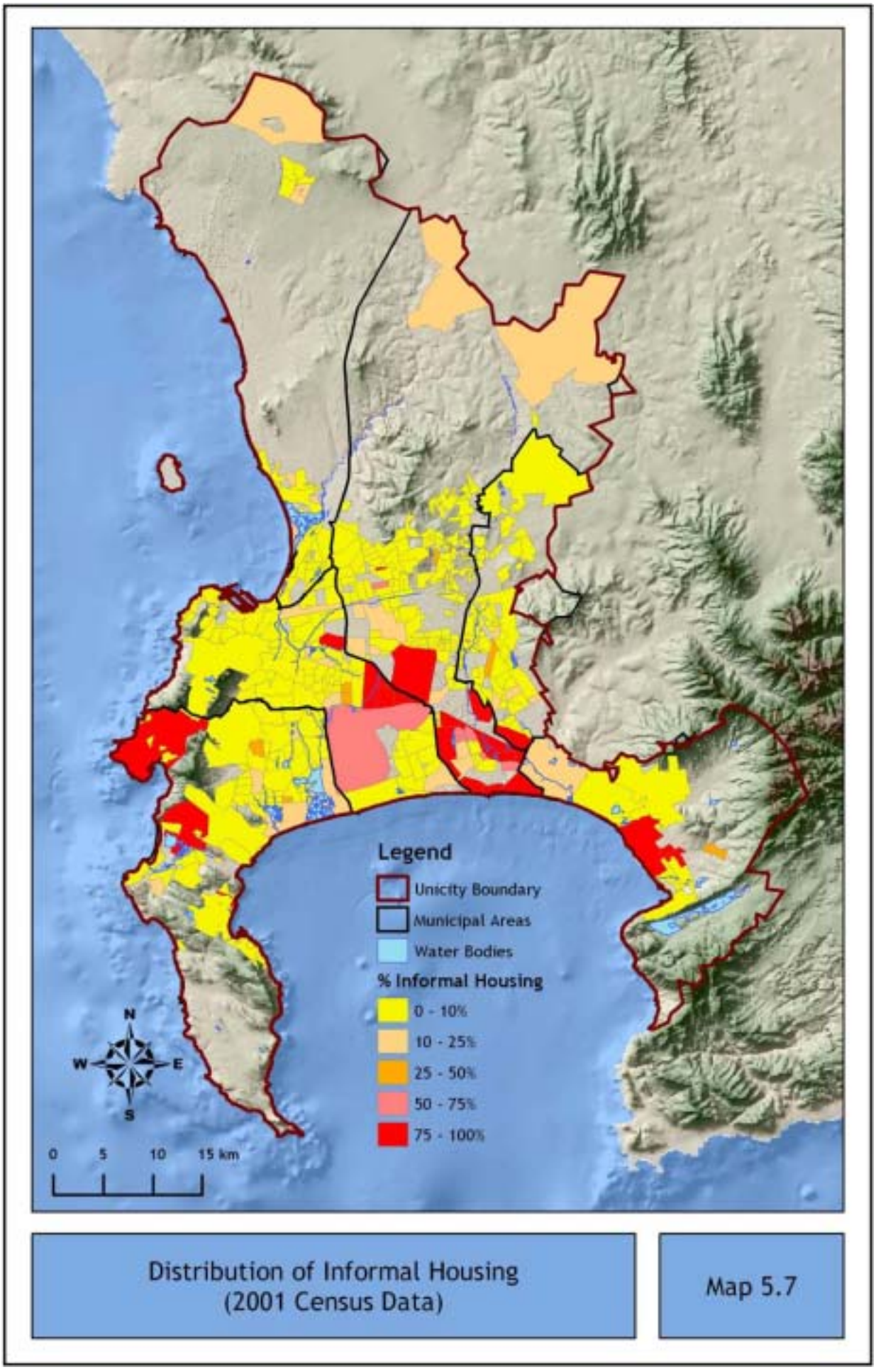
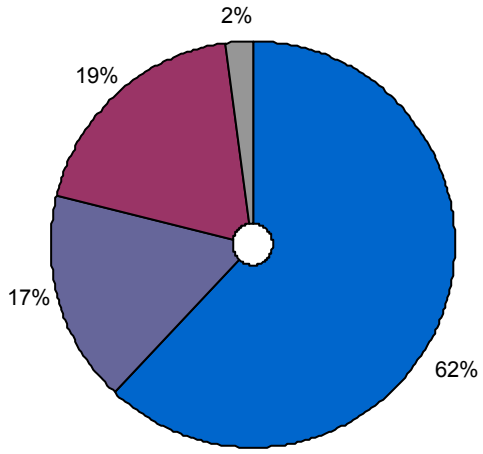


Distribution of Informal Housing
(2001 Census Data)

Map 5.7

5.4.5 Housing

The majority of households in Cape Town live in either a brick structure or flat/townhouse/cluster home complex [ref 5-14]. However, there is still a large percentage of households (19%) that are living in informal dwellings, commonly known as shacks. This is shown in Map 5.7 on the opposite page. As can be seen from the map, the majority of shacks are located in the South Eastern areas of Cape Town. There are also significant informal settlements in Hout Bay and Noordhoek.



Type of dwelling	Households
House or brick structure	470 844
Flat / Townhouse etc.	128 902
Informal dwelling	142 982
Other (e.g. Tent, traditional hut etc.)	17 037
Total Households	759 765

Figure 5.12 Distribution of household type in Cape Town [ref 5-14]

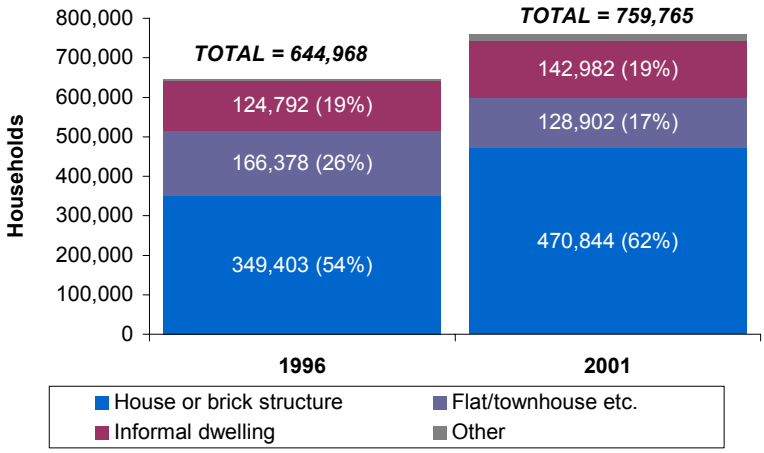
Over-crowded living conditions in these shacks are shown in Figure 5.13. During the Mayor's Listening Campaign[ref 5-2] housing was identified as the highest concern for the residents in Cape Town. As such, the Metropolitan Spatial Development Framework[ref 5-3] has identified the need for the provision of some 220 000 houses to accommodate those living in informal dwellings as well as to alleviate overcrowding in other areas.

Figure 5. 13 Wallacedene Informal Settlement

Added to this, the number of households in Cape Town increases by approximately 16 000 [ref 5-3] per year due to natural growth and since some of these new households are being formed in informal dwellings and other inadequate housing, the housing backlog is continually increasing.

Figure 5. 14 Change in housing type since 1996 [ref5-13,5-14]

Comparing the 1996 and 2001 census data, it is noticed that the percentage of households living in informal dwellings has remained the same, but the absolute number of people requiring formal housing has increased by approximately 18 000. There also appears to be a general shift away from flats to houses.



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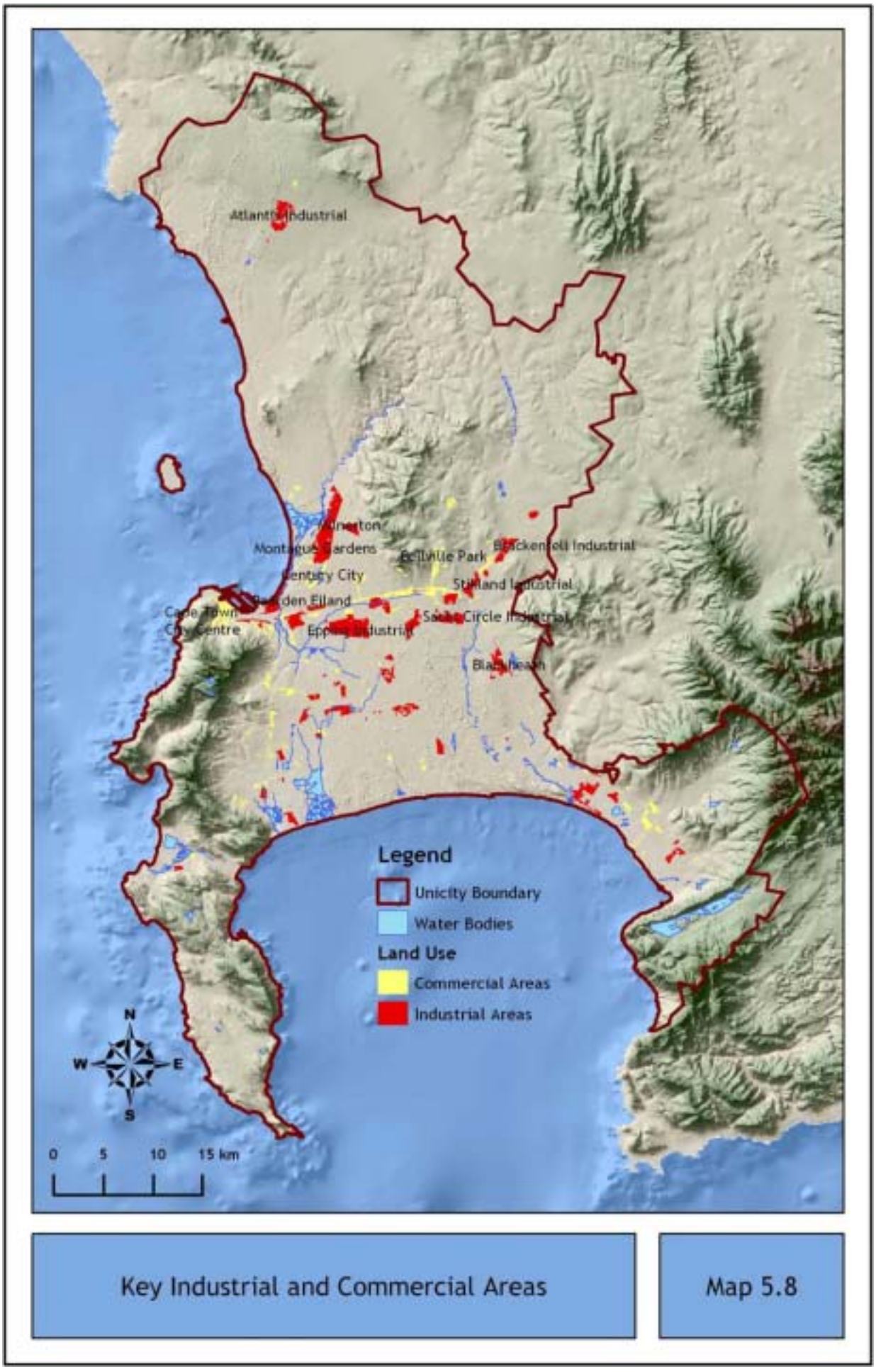

Key Industrial and Commercial Areas

Map 5.8

5.5 Industry and Commerce

Cape Town's economy employs approximately 1.1 million people and produces approximately R86 billion in goods and services[ref 5-4], which amounts to 11% of South Africa's economy and 75% of the Western Cape's economy. This makes Cape Town the second largest economic area in South Africa [ref 5-4].

The location of the major industrial and commercial areas in Cape Town are shown on Map 5.8.

5.5.1 Sector Production and Employment

The total output from the various sectors of the economy, in relation to employment for that sector is given in Figure 5. 15. Manufacturing is the largest component of Cape Town's economy in both monetary output and employment terms, followed by the trade industry (which includes retail, wholesale, hotels and restaurants).

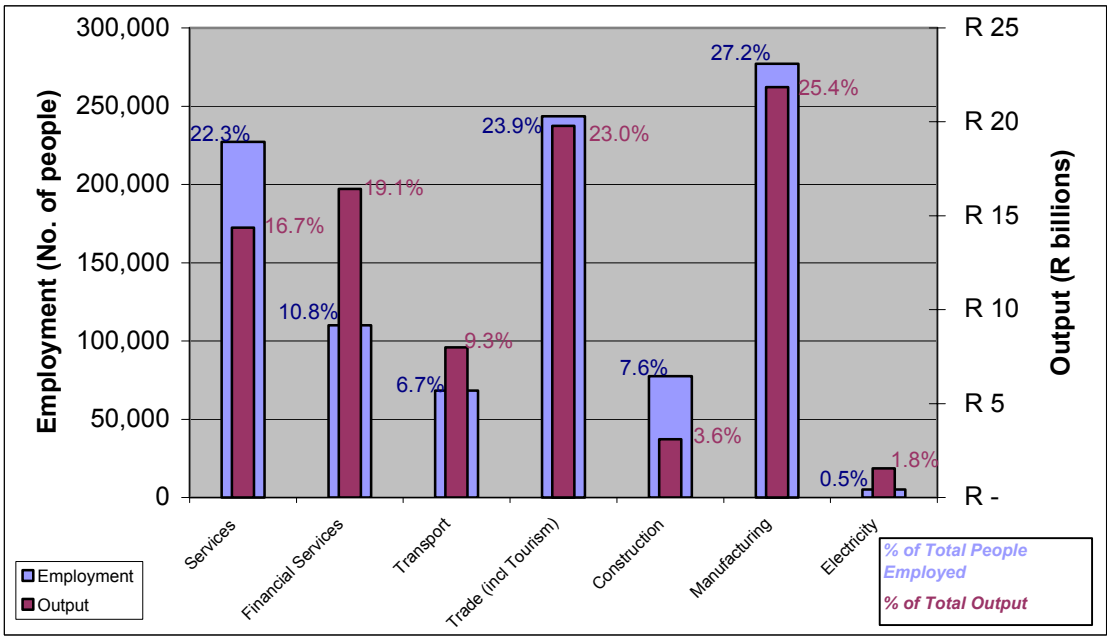

Figure 5. 15 Sector distribution of output and employment (2000) [ref 5-4]

Tourism

Tourism is expected to grow internationally at 4.1% per annum, but the development of niche tourist markets could cause South Africa (and Cape Town) to experience growth in tourism of up to 8% per annum in the next 10 years [ref 5-5]. The Western Cape receives 28% of the South African tourism income[ref 5-5]. It is estimated that tourism directly contributes between 4,5% and 7% to the City's turnover[ref 5-5] depending on the definition of the sectors involved in the tourist industry.

Besides addressing the issue of security in the City, if tourism is going to increase in Cape Town and contribute a significant percentage of the GDP, the cleanliness of the City has to be maintained and perhaps there should be a priority to ensure that areas frequented by tourists are kept in a clean condition.

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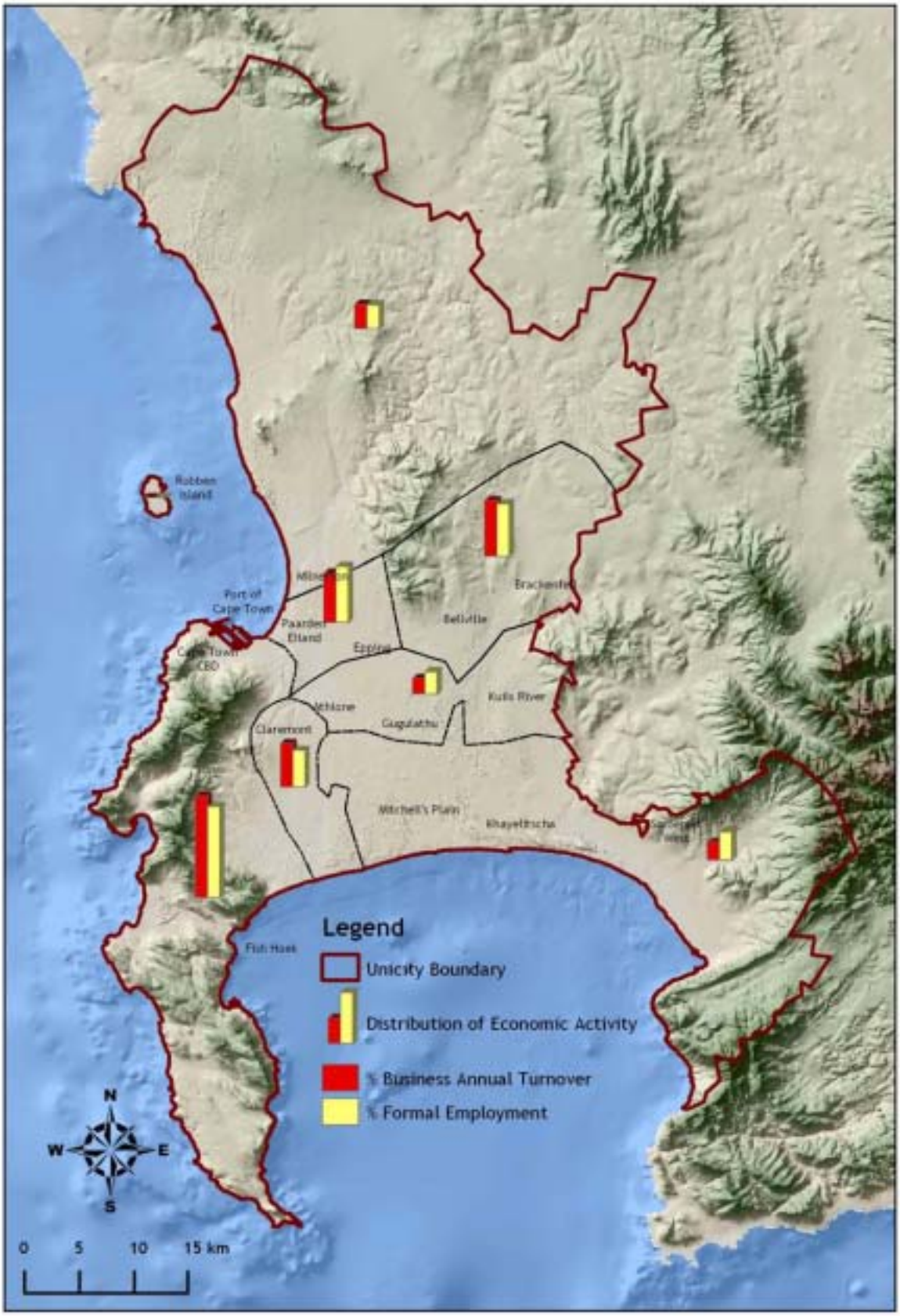

Distribution of Economic Activity ref 5-4

Map 5.9

5.5.2 Distribution of economic activity

The distribution of the economic activity in Cape Town is shown in Table 5. 5 and on Map 5.9. As would be expected, the majority of economic activity occurs in the Cape Town CBD area. However, the economic activity in the Northern Suburbs is growing and there is a general trend for businesses to move to the Northern Suburbs away from the traditional CBD. Very little economic activity occurs in the Eastern Suburbs.

Table 5. 5 Distribution of Economic Activity in Cape Town (ref 5-4)

Areas of Economic Activity	% of Business Annual Turnover	% of Formal Employment	Annual Turnover / Employee
Cape Town CBD, Observatory, Camps Bays, Simonstown	33.0%	29.5%	R 87,881.05
Parow, Bellville, Durbanville, Brakenfell	18.2%	17.0%	R 84,105.77
Maitland, Paarden Eiland, Goodwood, Epping	16.0%	18.0%	R 69,831.41
Claremont, Mowbray, Wynberg, Ottery	14.0%	11.7%	R 94,003.82
Milnerton, Melkbosstrand, Table View, Atlantis	8.0%	7.7%	R 81,621.13
Somerset West, Mitchells Plain, Khayelitsha	5.8%	9.0%	R 50,627.77
Gugulathu, Athlone, Airport Industia, Kuils River	5.0%	7.1%	R 55,324.18

5.5.3 Economic growth trends

Since 1980, Cape Town's economic growth has generally been greater than average growth of the South African market (ref 5-4). The average real GGP growth for Cape Town between 1990 and 2000 was 2.6% per annum, compared with 1.8% for the whole of South Africa (ref 5-4). However, during the last 2 to 3 years it has fallen somewhat behind the average South African growth rate as is seen in Figure 5. 16.

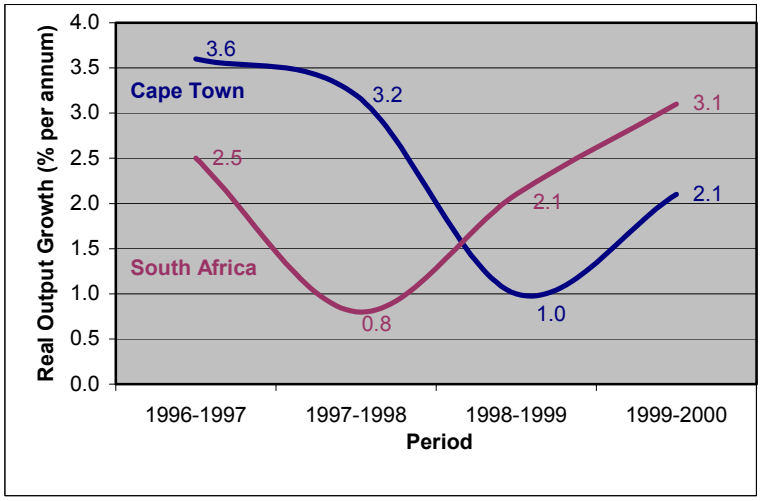

Figure 5. 16 Real GGP growth for Cape Town compared with South Africa, 1996 - 2000 (ref 5-5)

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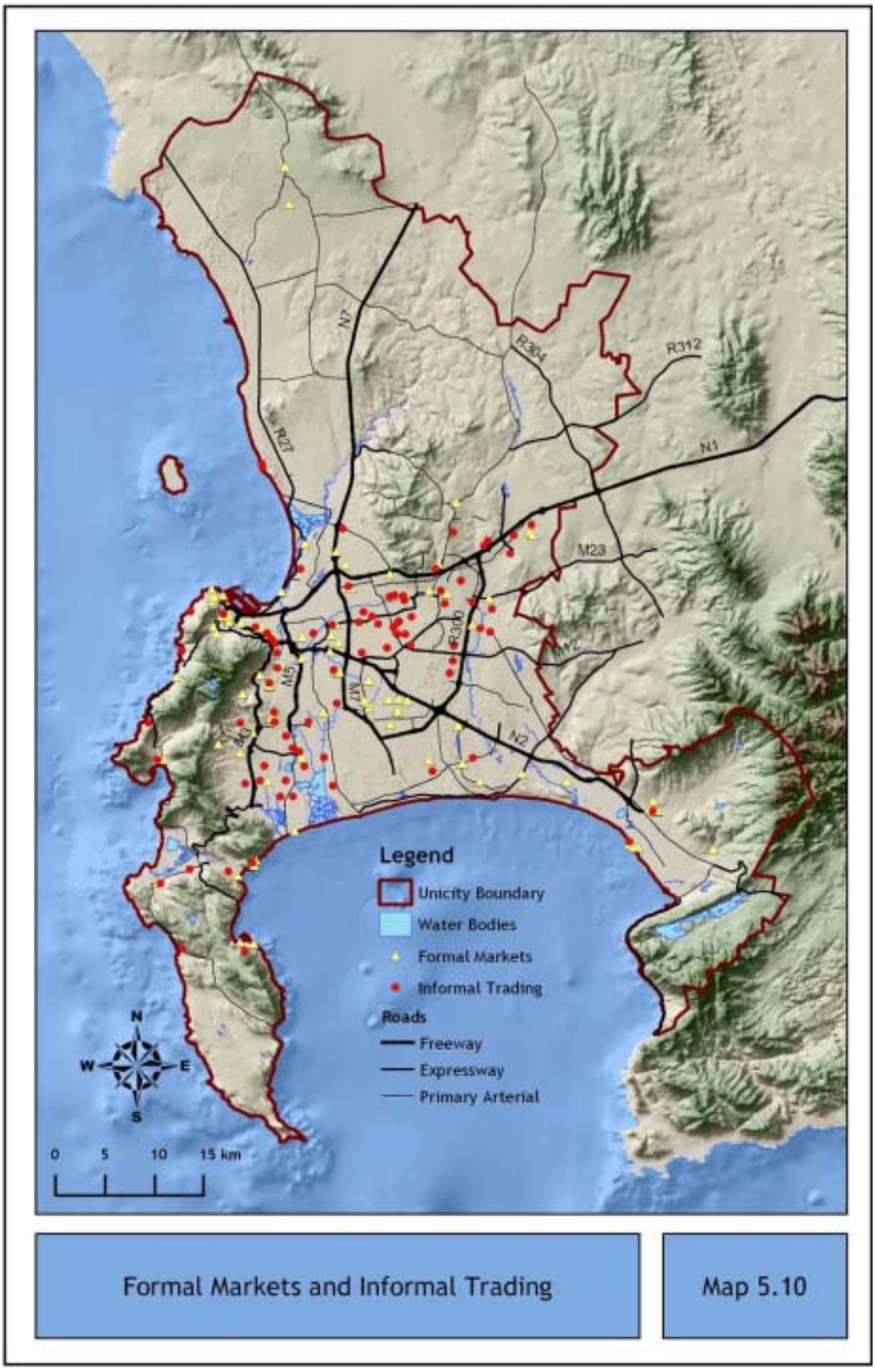

Formal Markets and Informal Trading

Map 5.10

This growth in Cape Town's economy has primarily been in the Manufacturing, Construction and Trade industries which all have growth at rates significantly greater than the South African Average as can be seen in Table 5. 6.

Table 5. 6 Average Annual real growth rates per sector[ref 5-4]

Annual Average Real Growth Rate:	1991-1998	
Sector	Cape Town	South Africa
Services	-0.1	0
Financial Services	2.6	5.3
Transport	4.6	7.1
Trade (incl. Tourism)	***4.2***	1.3
Construction	***3.6***	-0.2
Manufacturing	***3.8***	1.1
Electricity	2.5	2.9
Total Average	**2.5**	**2.1**

5.5.4 Economic growth forecasts

The growth trend forecast (shown in Table 5. 7), which are based on the national economic forecasts indicate that Cape Town is expected to experience a significant growth in its economy over the next 10 years [ref 5-4] and is expected to out perform the average South African economy by 1.2%.

Table 5. 7 Average Annual GGP Trends and Forecasts for Cape Town

Period	Average Annual GGP
1996-2000	**2.4% p.a.**
2000-2005	**4.1% p.a.**
2005-2010	**4.4% p.a.**

The sectors responsible for the high growth are likely to be: Trade and Catering (incl. Tourism), Manufacturing, Transport and Communications and the Construction industries

5.5.5 Formal and Informal sector employment

The informal sector of Cape Town's economy is experiencing a growth as can be seen in Figure 5.17. It employs 22% of the employed population and contributes 12% to the economic output. The location of informal markets in is shown on Map 5.10.

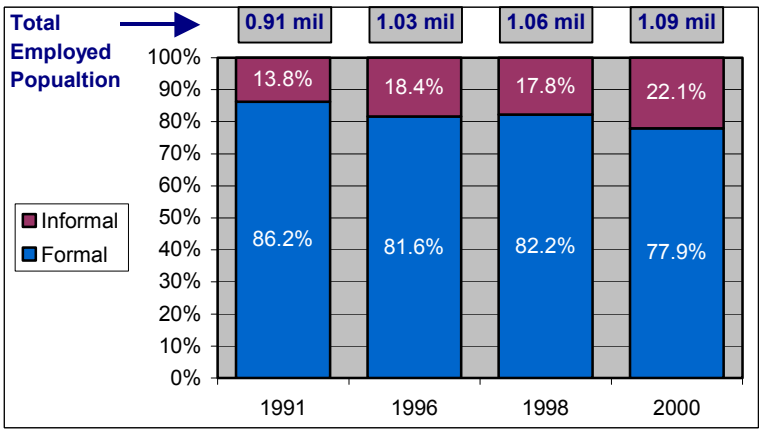

Figure 5.17 Comparison of the Formal and Informal sectors of Cape Town's Economy[ref 5-4]

5

Major Roads and Railways

Map 5.11

5.6 Transportation

5.6.1 Road Infrastructure

The City has a well developed road network as is shown on Map 5.11. It is essentially designed radially around the CBD. The two main freeways, the N1 and N2 run from the CBD in a northeast and south-east direction respectively. The speed limits along these roads are generally 120 km/h. Four other freeways, which act as link roads, run in a north-south direction, namely the M3, M5, N7/Vanguard Drive and the R300. Speed limits on these roads vary from 80 km/h to 120 km/h. The R27 (Marine drive) along the Atlantic coast is becoming an important and heavily used road as it links the CBD with the rapidly growing Table View area.

The condition of the roads in the network is acceptable, but in a deteriorating condition and is in need of increased maintenance. However, due to various recent budget cuts the general road condition is likely to deteriorate further.

5.6.2 Rail Infrastructure

As with the road network, Cape Town has a strong, well structured rail network, which is designed radially from the CBD. The two commuter lines running in an easterly and southerly direction from the CBD are well developed and are two lines most used as public transport. However, the rolling stock is in poor and deteriorating condition. The operation of the service is also erratic and security problems on the trains has resulted in a general shift away from rail transport to minibus taxi transport for commuting.

There is also a well-developed industrial rail network across Cape Town that links with the rest of South African network. Epping industrial area excellently supplied with a rail network within the industrial area that is connected to the main network. Also, the commuter lines generally do not run at night and can be used for industrial freight after hours.

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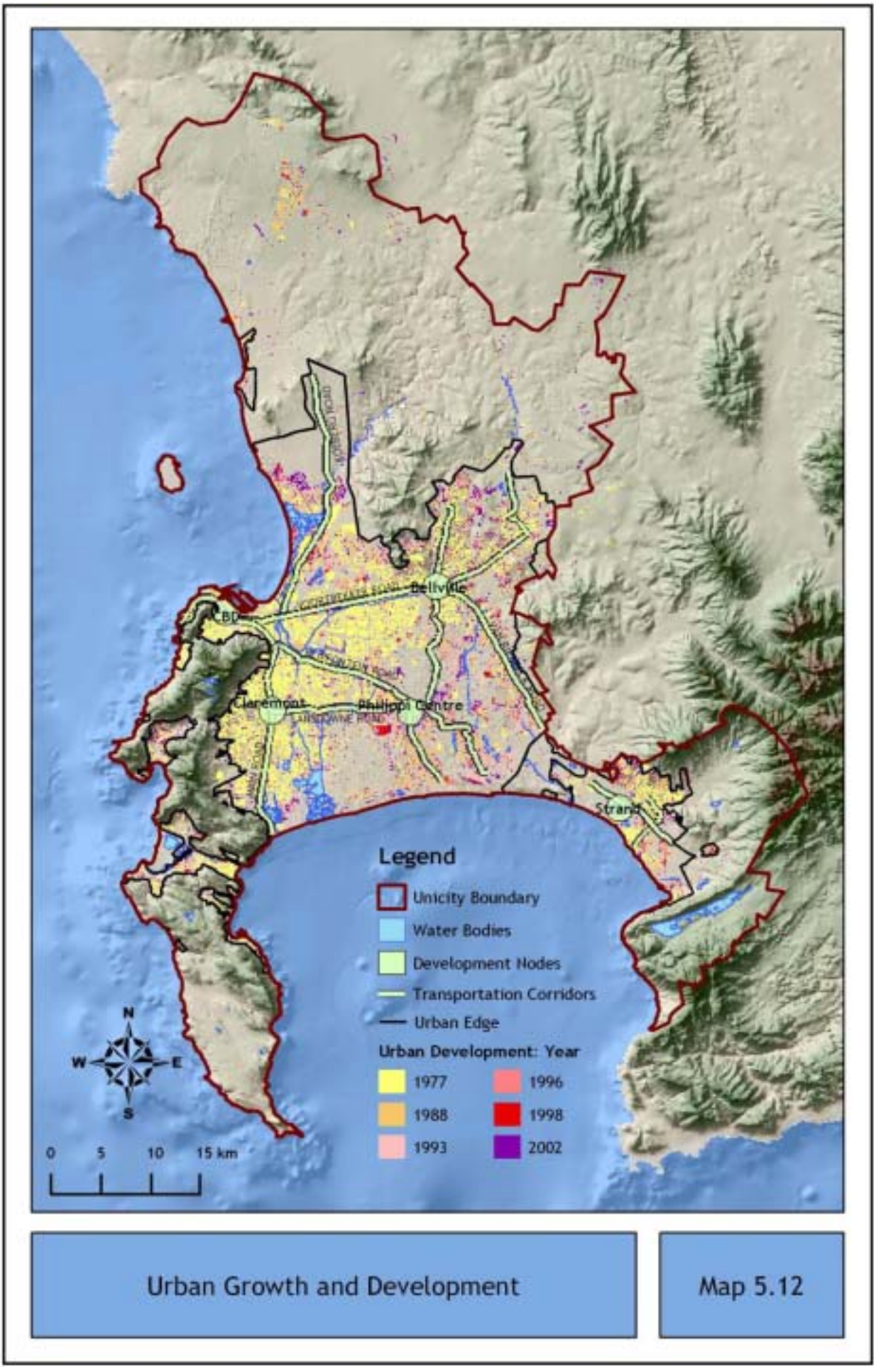

Urban Growth and Development

Map 5.12

5.7 Urban Development and Planning

5.7.1 Urban growth

Map 5.12 shows the recent development with the Cape Town area with the darker colours representing the more recent development. It is evident that the growth in the City is generally occurring in the north on either side of Tygerberg Hills, in the east and to a lesser extent, in a southeasterly direction towards the Strand.

The Metropolitan Spatial Development Framework identified an Urban Edge which is shown on Map 5.12. It has been developed in principle to protect the areas of natural and agricultural importance and essentially no new urban developments outside of this boundary (ref 5-3) are supported by the city officials. This edge has however still to be approved by the Provincial Government and some development outside of this boundary is likely until the MSDF is approved at a provincial level and is legislated.

5.7.2 MSDF Strategies

The Metropolitan Spatial Development Framework identified 5 key development nodes, namely, CBD, Claremont, Bellville, Philippi Centre and Strand. Key transportation corridors, linking these development nodes were also identified. The MSDF strategies are aimed at encouraging commercial development and higher density housing at the nodes and along the corridors in order to facilitate the creation of a more efficient public transport system(ref 5-3).

The established nodes of the CBD, Claremont and Bellville are attracting investment and development, but the Philippi node is not. Also, established corridors such as Koeberg and Durban road are attracting investment, while others such as Main and Voortrekker road are tending to change function to one of serving local convenience. Also, certain planned corridors are showing signs of potential growth (e.g. Klipfontein corridor) and some are experiencing nodal growth along the corridor (Mitchell's Plain).

Assuming the success of this strategy, it would thus be expected that there will be a focus of commercial and industrial investment at the 5 identified nodes and an increase in population along the corridors.

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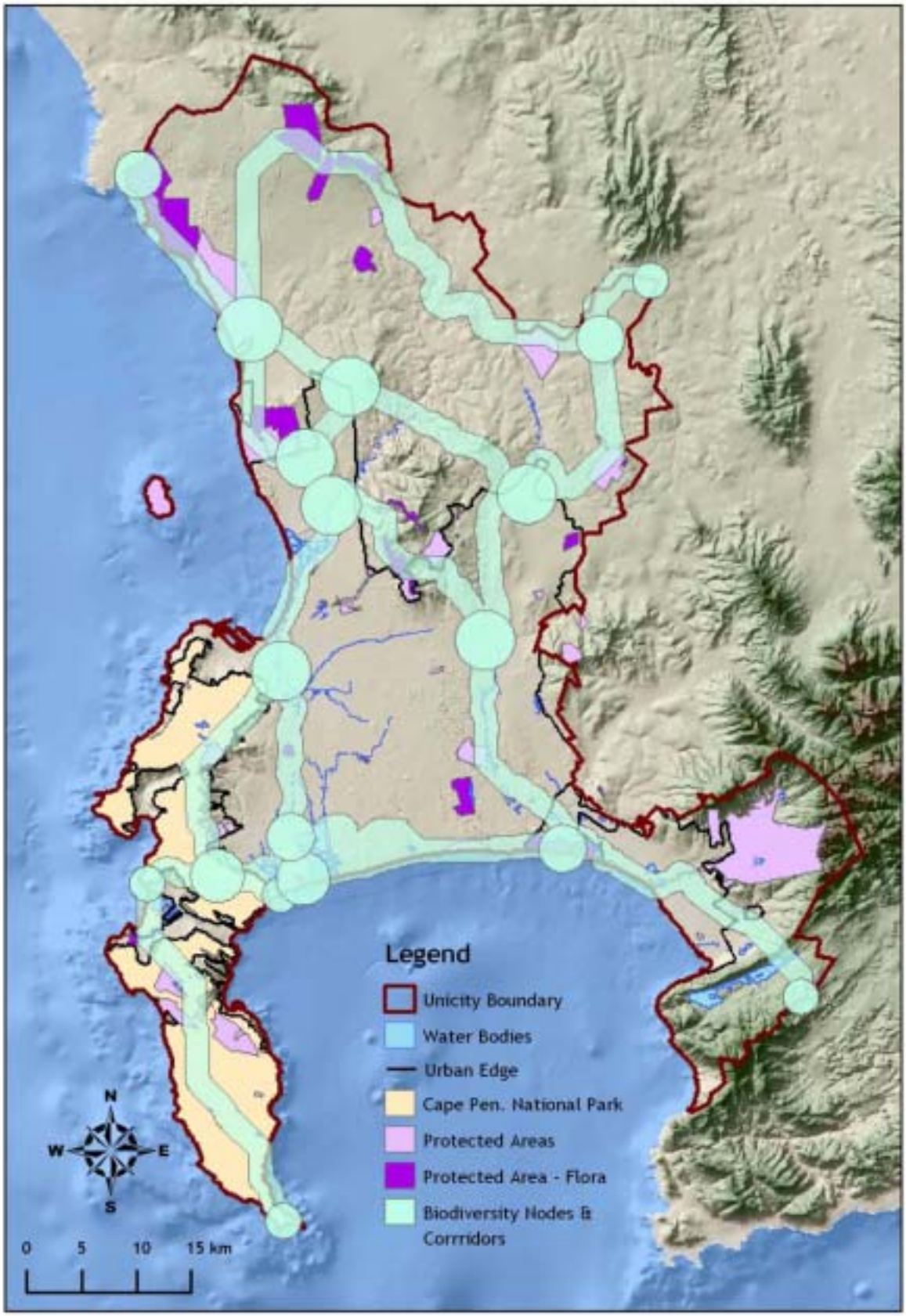

Parks, Protected Areas and Biodiversity Network

Map 5.13

5.8 Natural Environment

Cape Town is known around the world for its natural beauty and has a tremendous amount of natural resources that should be protected. There are thus many formal conservation areas within the City covering 476 km^2, which makes up 19% of the City's land mass [ref 5-6]. The largest of these is the Cape Peninsula National Park, which stretches from Table Mountain above the CBD to Cape Point. This is a protected reserve managed and operated by South African National Parks and covers 238 km^2 [ref 5-6], 50% of Cape Town's proclaimed conservation area.

The Cape Province has such a rich and large variety of flora that it is one of the six Floral Kingdoms of the World and is known as the Cape Floral Kingdom. The Cape Floral Kingdom is the smallest of the floral kingdoms, but has the highest known concentration of plant species : 1 300 per 10 000km^2. Conservation of the Cape Floral Kingdom with its distinctive vegetation, known as fynbos, is therefore of utmost importance.

The fynbos environment supports smaller mammals such as baboons, grysbok, klipspringers, dassies, mongooses, and the striped mouse. There are six bird species endemic to the south-west Cape. One of the world's rarest species of tortoise, the geometric tortoise, is endemic to the Cape and is also supported by fynbos. More than half of South Africa's frog species are found in the Cape and half of these are endemic to the Cape.

Cape Town is also well known for its beaches and is another significant natural resource. The City is surrounded by the cold Atlantic Ocean on the West and the warmer Indian Ocean on the East.

Cape Town's natural environment has a special biodiversity and conservation value and as such, a Biodiversity Strategy has been developed for its protection. The strategy involves protecting the biodiversity within certain biodiversity hotspots (nodes) and corridors linking the hotspots. These are shown on Map 5.13.

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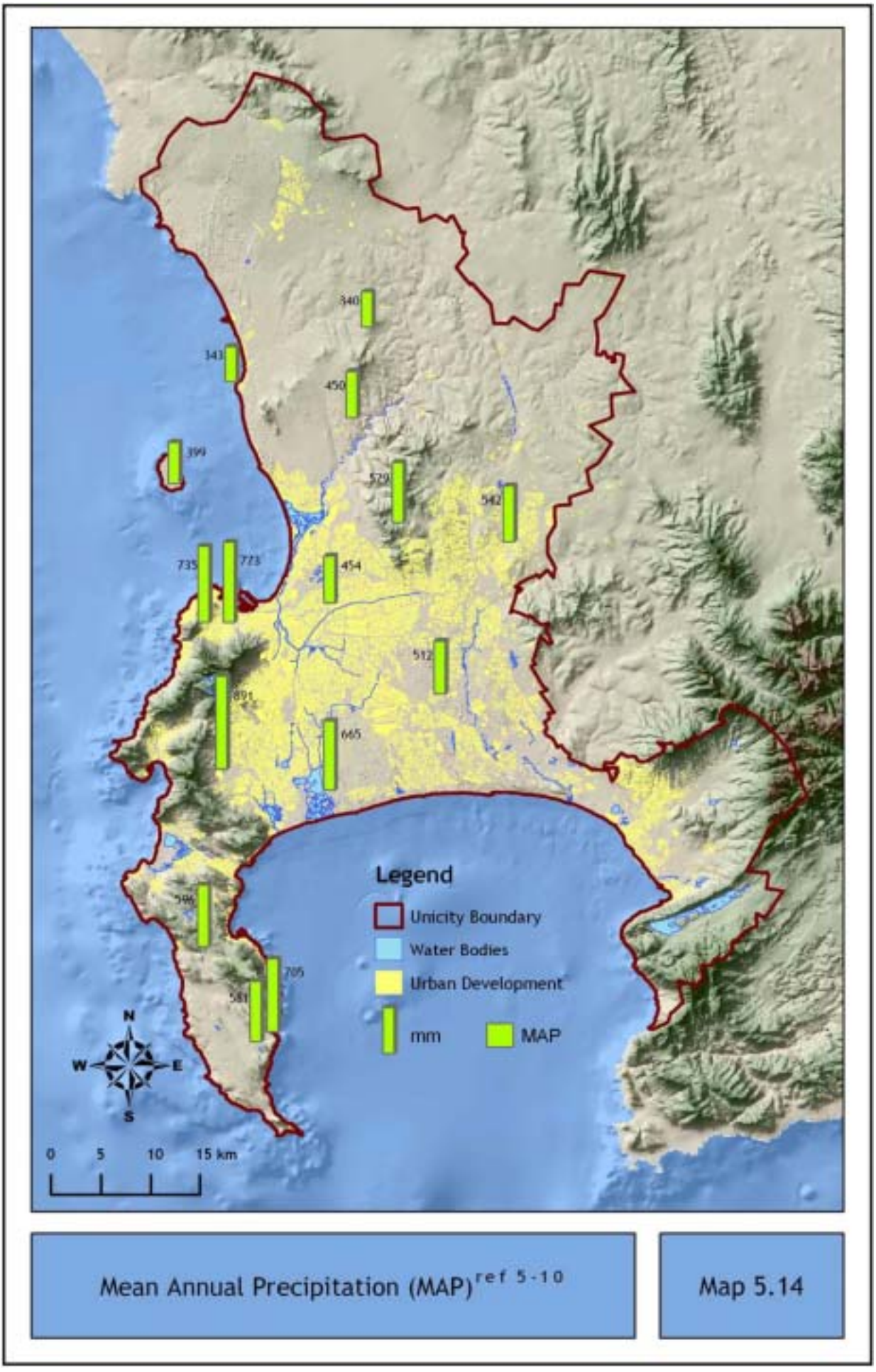

Mean Annual Precipitation (MAP)[ref 5-10]

Map 5.14

5.9 Climate

Cape Town experiences a Mediterranean climate with long dry summers in January with daytime temperatures averaging around 28°C. The prevailing wind in summer is from the SSE to SSW and is known as the "South Easter". There is very little rain during the summer months.

The winter rains begin in April/May and peak in June/July. The daytime temperatures during the middle of winter average around 18°C. The prevailing wind in winter is from the northeast and precedes the cold fronts that bring rain to Cape Town.

The average climatological figures for Cape Town, as measured at the Cape Town International Airport are given in Table 5. 8.

Table 5. 8 Average climatological figures for Cape Town International Airport

Mean Annual Precipitation	mm/year	554.8
Rainfall Max in 24hrs	mm	93.7
Sunshine Daily Mean	hours	8.5
Temp Mean	Deg C	16.6
Temp Mean Max	Deg C	21.9
Temp Mean Min	Deg C	11.3

The topography of Cape Town, in particular Table Mountain, causes considerable variability in the weather conditions across Cape Town on any given day. This can be seen in Map 5.14, which shows the Mean Annual Precipitation (MAP) at various weather stations across Cape Town. As can be seen the MAP can vary from 512 mm on the Cape Flats to 891mm near the mountain. The wind speed can also vary significantly throughout the city due to the interference of the mountains.

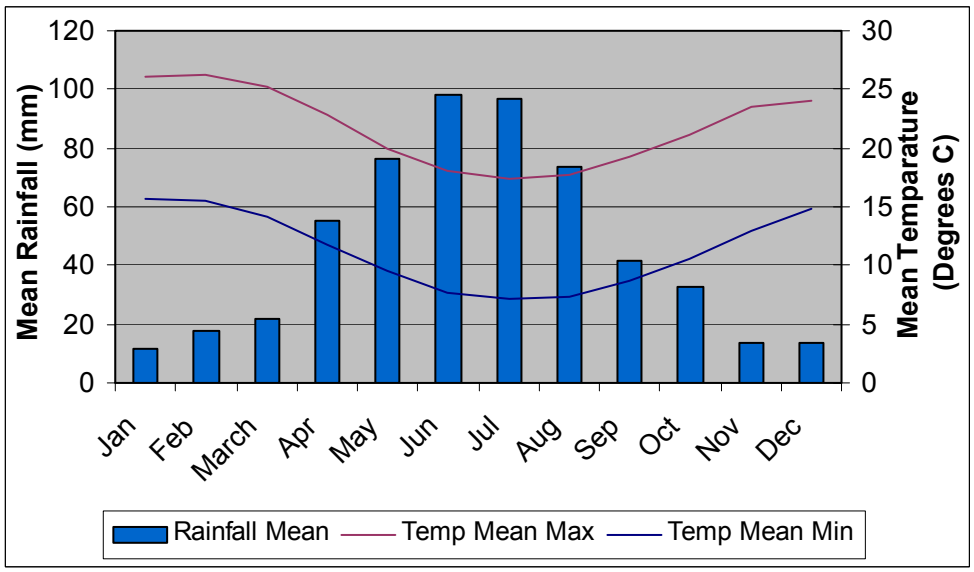

Figure 5.18: Monthly variation in precipitation and temperature for Cape Town International Airport

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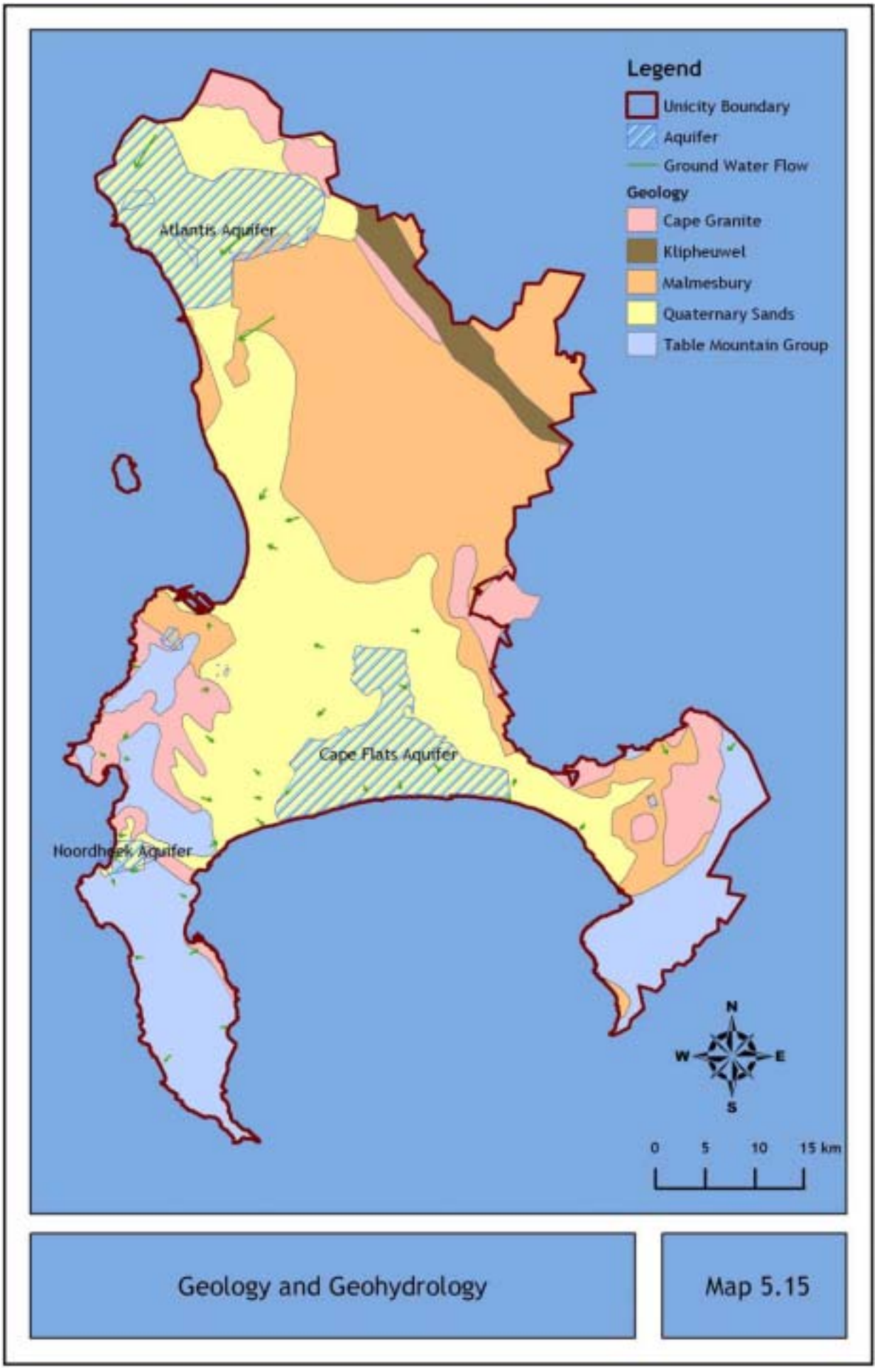
Legend
Unicity Boundary
Aquifer
Ground Water Flow
Geology
Cape Granite
Klipheuwel
Malmesbury
Quaternary Sands
Table Mountain Group
Atlantis Aquifer
Cape Flats Aquifer
Noordhoek Aquifer
N
W
E
S
0
5
10
15 km
Geology and Geohydrology
Map 5.15

5.10 Geology and Geohydrology

Cape Town is dominated by rocks of the Table Mountain Group, which make up all the high ground of the Cape Peninsula as well as most of the lower ground on the southern Peninsula. This group also makes up the mountains to the east of Cape Town. Underlying the mountains and the whole region are two older groups of rocks. The Malmesbury Group, which is shale dominated and forms the Tygerberg and Bottelary Hills as well as underlying the CBD, and the Cape Granite which intrudes the Malmesbury Group and forms the Darling Hills, Paarl Mountain and Perdeberg. A simplified geological map of the City is given in Map 5.15, which shows the Cape Flats to be covered by Quaternary sands.

Groundwater is considered a potential future water source by the City's Bulk water department and as such needs to be protected. There are 2 major aquifers in the City, namely the Atlantis and Cape Flats aquifer. There are already production boreholes abstracting water for potable use in the city from the Atlantis aquifer. The Cape Flats aquifer is currently only used informally by local residents.

Other minor aquifers of significance are located in Noordhoek, Helderberg and in Newlands, where there is limited groundwater extraction by the brewery industry.

The groundwater quality is shown in Figure 5. 19, measured in Electrical Conductivity. As can be seen, groundwater quality of the Cape Flats and Atlantis aquifer region is generally good. There are however pockets of pollution in the Blaauwberg and Helderberg areas.

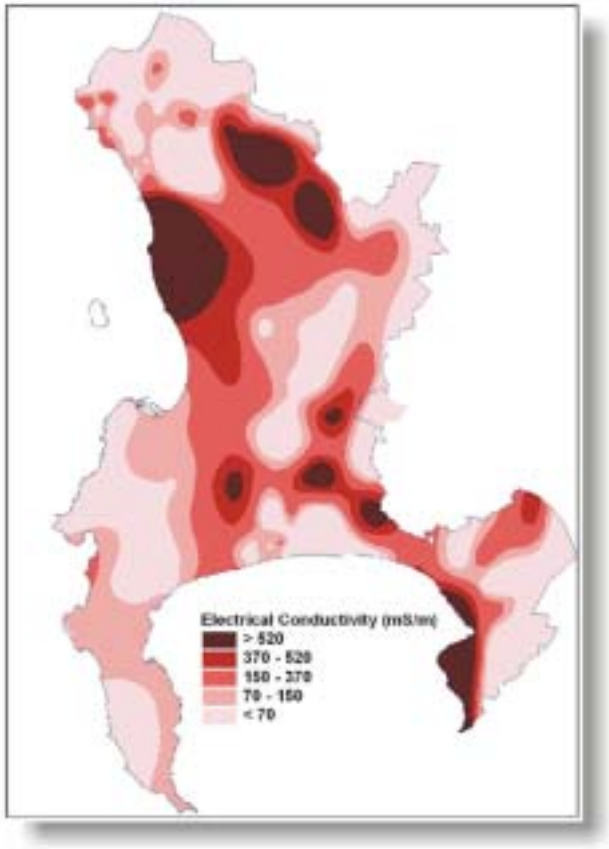

Figure 5. 19: Groundwater Quality (Electrical Conductivity)

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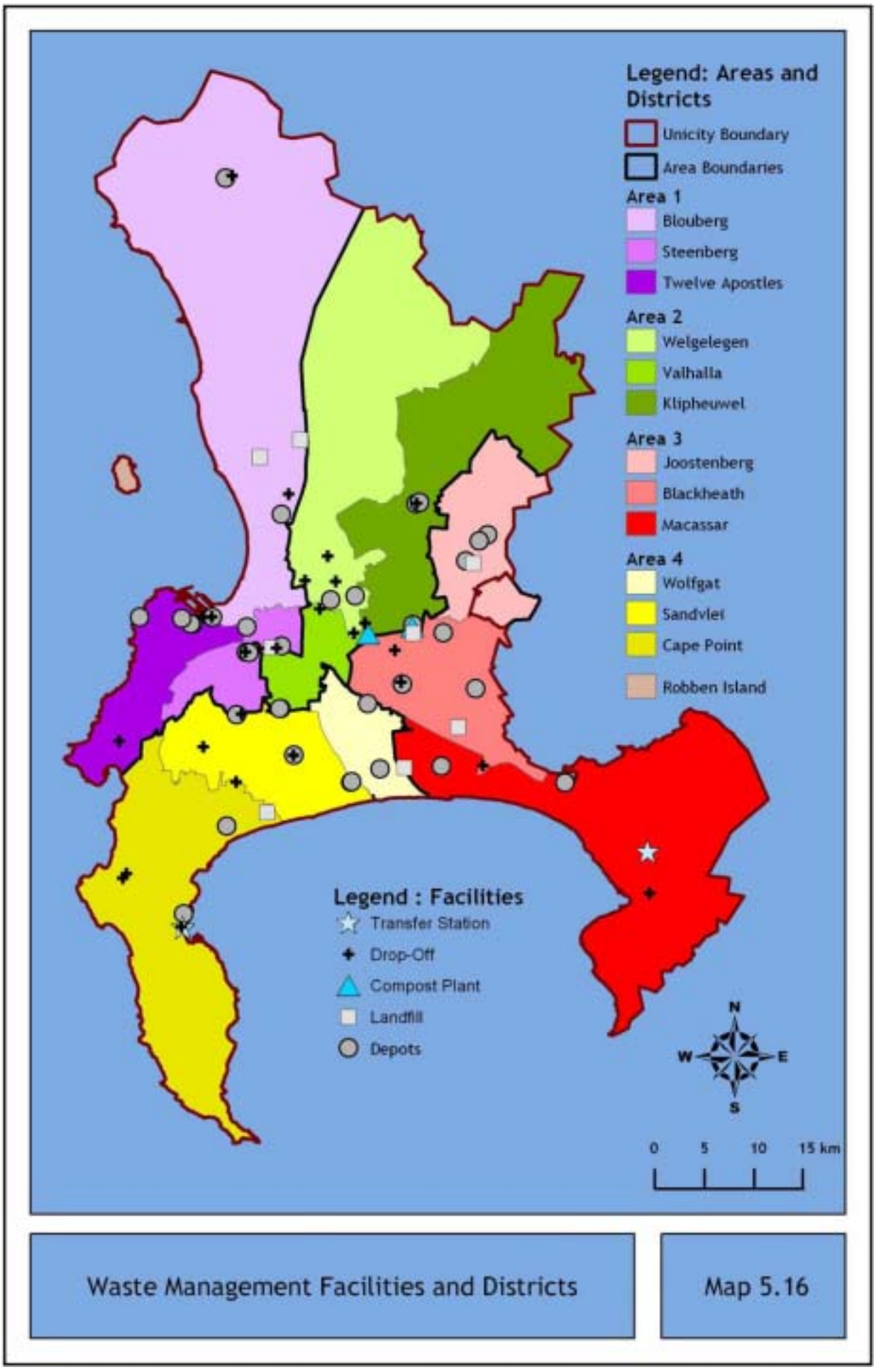

Waste Management Facilities and Districts

Map 5.16

5.11 Existing Waste Management Facilities

A brief summary of the existing solid waste management facilities in the CCT is given here. A more detailed description is given in the relevant chapters dealing with the type of facility.

5.11.1 Refuse removal

The existing refuse removal division is broken up into 4 management areas with 3 districts per area, making 12 districts. These districts are shown on Map 5.16. There are between 1 and 3 depots in each district. A summary of each management area is given in Table 5. 9.

Table 5. 9 Refuse removal management areas

Area Name	Land Area	Number of Vehicles	Approximate Population Served	Approximate number of erven
Area 1	726 km^2	138	326 359	108 150
Area 2	654 km^2	119	703 657	127 854
Area 3	615 km^2	191	717 416	184 708
Area 4	479 km^2	138	749 178	167 690

5.11.2 Landfill Sites

There are 6 municipal landfill sites in Cape Town, all with a varying status and capacity. A summary is given in the table below. The majority are nearing closure. There is also a privately owned landfill site at Vissershok.

Table 5. 10: Landfill Sites in Cape Town

Name	Status	*Classification	Available Airspace
Bellville South	Closing in 2006	GLB^+	650 000
Coastal Park	Closing in 2016	GLB^+	2 000 000
Vissershok (CCT)	Closing in 2015	H:H, H:h, GLB^+	800 000
Brackenfell	Closing in 2005	GMB^+	240 000
Faure	Closing in 2007	GLB^+	750 000
Swartklip	Closed	GLB^+	0
Vissershok (WMF)	Closing in 2014	H:H, H:h, GLB^+	3 500 000

*See list of abbreviations

5.11.3 Transfer Stations and Drop Off centres

There are 4 operating transfer stations that transport compacted and baled waste to Vissershok Landfill site. These are located in Athlone, Brakenfell Landfill Site, Swartklip Landfill site and Wasterkloof near Sir Lowry's Pass.

There are 20 drop-off facilities fairly evenly spread throughout the city, which generally receive garden waste. Two however are planned to be closed shortly.

5.11.4 Composting plants

There are two composting plants at Radnor and Bellville South, which are very near to one another.

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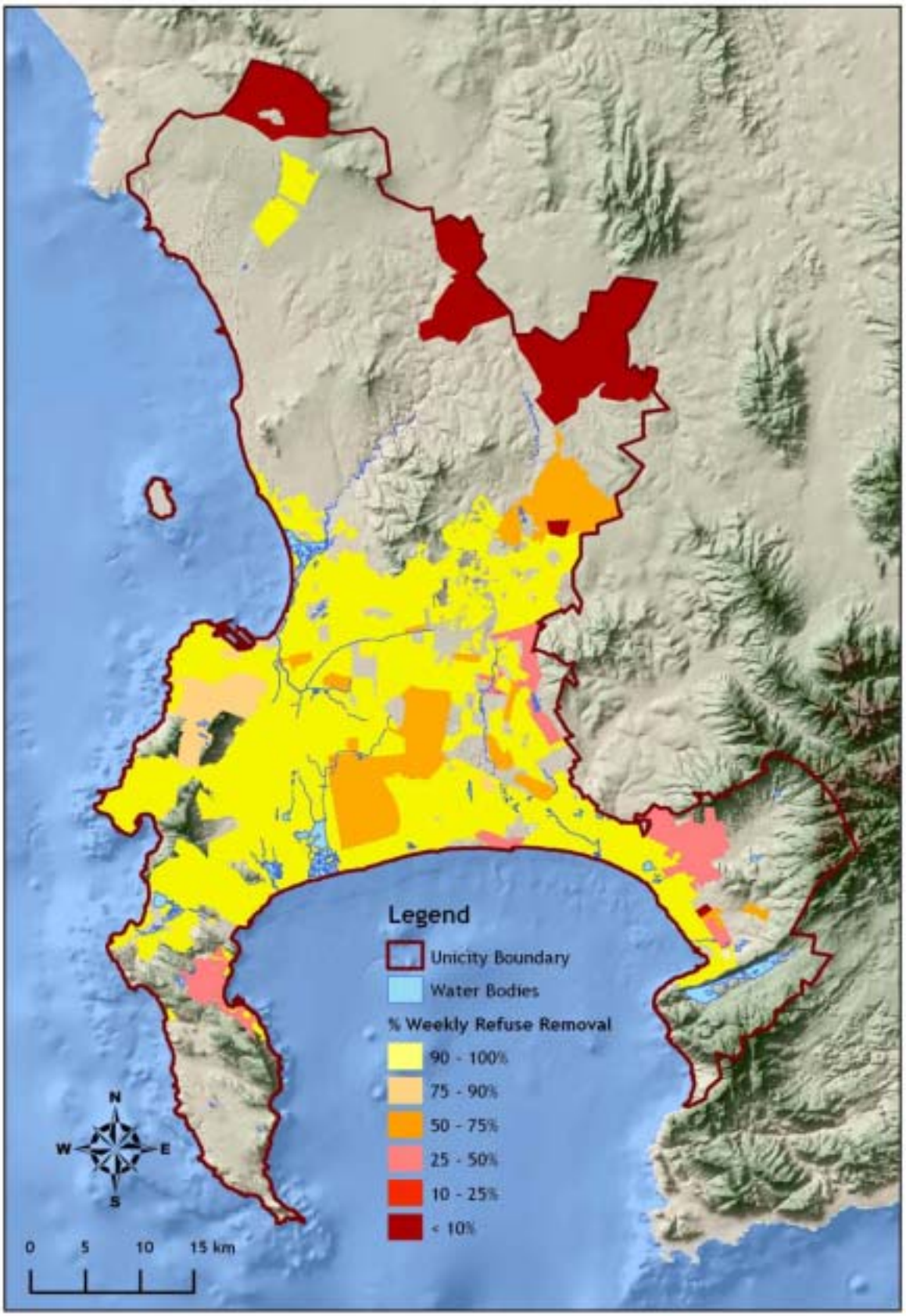

Refuse Removal Services (2001 Census Data)

Map 5.17

5.12 Waste Management services

According to the 2001 Census Data, the vast majority (95%) of the approximately 760 000 households in Cape Town receive a refuse removal service from the City once a week. This is shown in Figure 5.20. Only 4,5% of the households surveyed did not receive a solid waste removal service from the municipality.

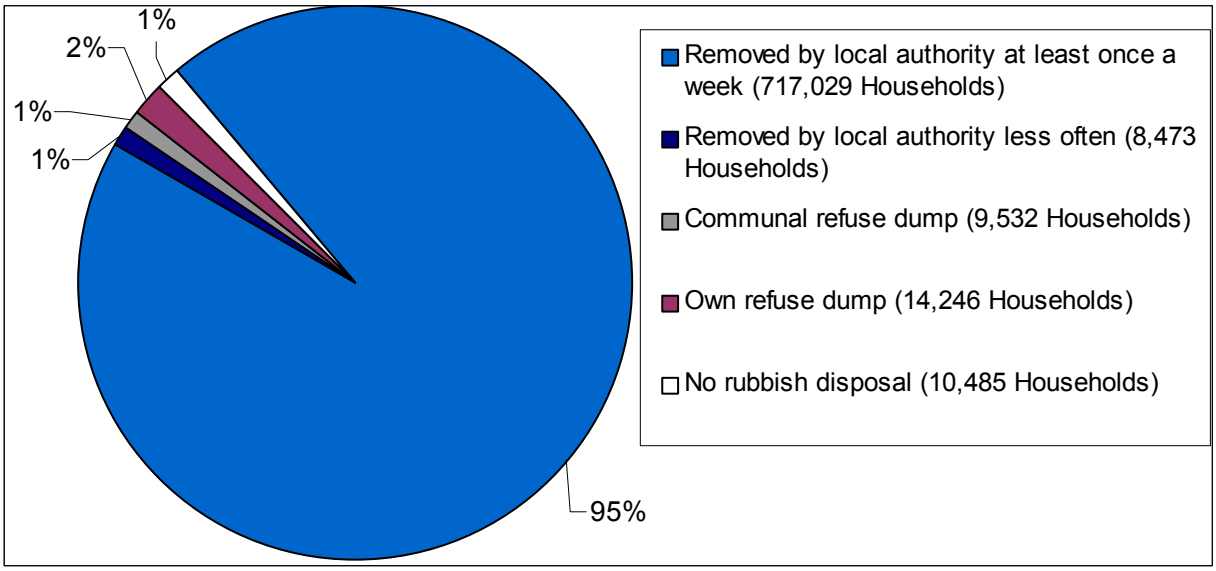

Figure 5.20: Levels of refuse removal service in Cape Town (2001) (ref 5-14)

The areas that are reported to receive with lowest level of refuse removal service appear to be in the extreme east and south of the Unitcity.

The majority of the refuse removal is done by means of wheelie bins, and based on the data received from the city's refuse collections division, there are approximately 210 000 households still using a black bag service. The breakdown is given in Table 5. 11.

Table 5. 11: Summary of type of refuse removal service for management areas

Management Area	No of Wheelie Bins	No of Black Bags
Area 1	140 653	2 154
Area 2	154 117	1 100
Area 3	27 837	187 949
Area 4	160 746	18 651
TOTAL	**483 353**	**209 854**

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Chapter 6 – Waste Collection & Area Cleaning

In this chapter a broad range of waste collection and area cleaning related issues emanating from the activities of both the Council of the Cape Town Unicity and the private contractors operating within the Cape Town Metropolitan Area (CTMA) are identified and analysed.

6

6.1 General Context

6.1.1 Introduction

In response to the emergent South African social and economic environment in the aftermath of the 1994 democratic national order, the Cape Town Unicity has experienced significant population growth, as well as expansion within the business and industrial sectors. One of the results of this parallel growth is a consequential increase in the amount of solid waste generated within the Cape Town Metropolitan Area (CTMA). In turn, an increase in waste generation leads to a higher demand for waste collection services from the waste generating sources and transportation to the final disposal sites.

The Cape Town Unicity's solid waste department has initiated a process of developing an Integrated Waste Management Plan (IWMP) to provide short-medium-long term plans to reduce waste volumes, reduce the cost of delivering waste management services, develop mechanisms to provide a more equitable service and provide an effective and efficient service delivery.

In this chapter a broad range of waste collection and area cleaning related issues are identified and analysed, with the view to provide the necessary recommendations for knowledge based decision-making and strategic forward planning.

6.1.2 Definition of Municipal Solid Waste

Municipal solid waste generally comprises domestic, industrial, and commercial wastes. Primarily households generate the bulk of municipal solid waste. The broad definitions of the different waste stream are as follows:

- Household waste means any solid waste (including garbage, refuse) derived from households;
- Commercial solid waste means all types of solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes;
- Institutional solid waste means solid waste originating from educational, health care (excluding medical waste), correctional and other institutional facilities;
- Non-processing waste generated at industrial facilities such as office and packaging wastes.

6.1.3 Methodology and Data Collection

The data that is presented in this report is derived from comprehensive reviews of various Council Reports, meetings with various stakeholders (city officials, private contractors etc.) and questionnaires that were distributed to these stakeholders. Where further clarity was required on the information provided, follow-up meetings were arranged.

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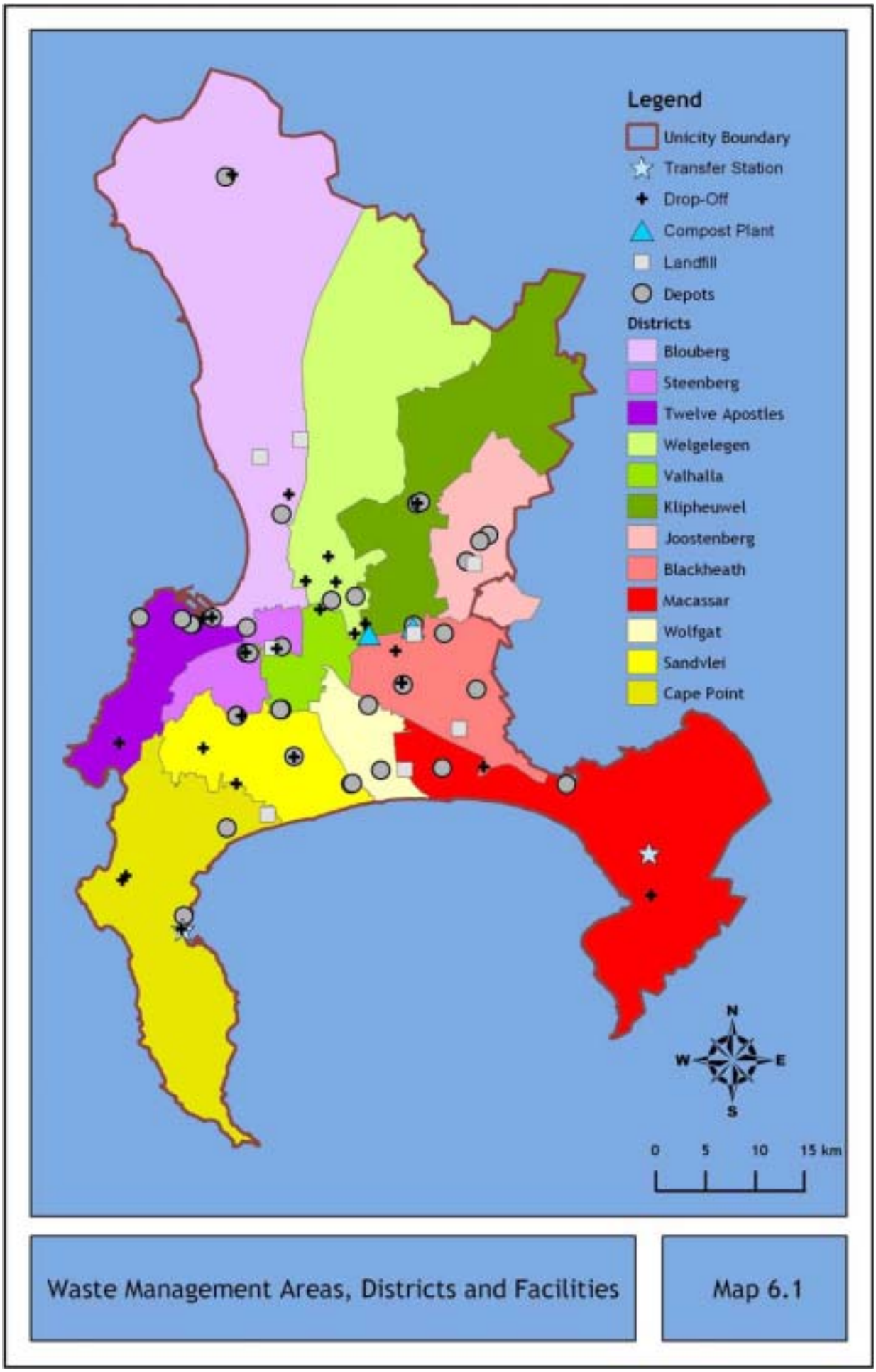

Waste Management Areas, Districts and Facilities

Map 6.1

During the course of engaging some of the stakeholders it became evident that certain waste collection and area cleaning activities are in some instances undertaken by various departments within the Unicity (outside of the Solid Waste Department). Where this happened to be the case, the stakeholders within the Departments concerned were introduced to the IWMP process and engaged to the extent that they can provide insights and information to assist this process of determining the current status quo, with respect to waste collection and area cleaning. Where the necessary information is still outstanding, the information is indicated as a "Gap" to be carried over to the Gap and Needs Assessment in Section 6.6.

6.1.4 Service Delivery Approach

The South African Constitution places the responsibility to provide municipal solid waste collection and area cleaning services within the ambit of the local authorities, including the Cape Town Unicity. Due to inherent existing infrastructure and financial resource limitations of the old administrations, the City Council currently focusses mainly on the collection of domestic waste. Moreover, the Solid Waste Department is currently working closely with the private contractors to ensure that all households and businesses receive some form of waste collection services. The activities of the private contractors involved are subject to and governed by formal waste management contracts with the City Council. These contracts currently form the basis for existing co-operation and public-private partnerships in the Unicity's waste management sector. The current levels of service range from containerised service in formal residential areas to rudimentary service in the informal settlements.

Private contractors presently have the dominant market share of hazardous, commercial and industrial waste collection. The Council currently provides no formalized domestic refuse collection to households of informal settlements that are located within private land. Instead, skips are placed, where possible, on the periphery of that private land. The reason for this approach is to circumvent a situation where the Council, by virtue of its service provision, might be held liable for compensation to the landowners for encouraging illegal squatting on such private land without the owners' permission.

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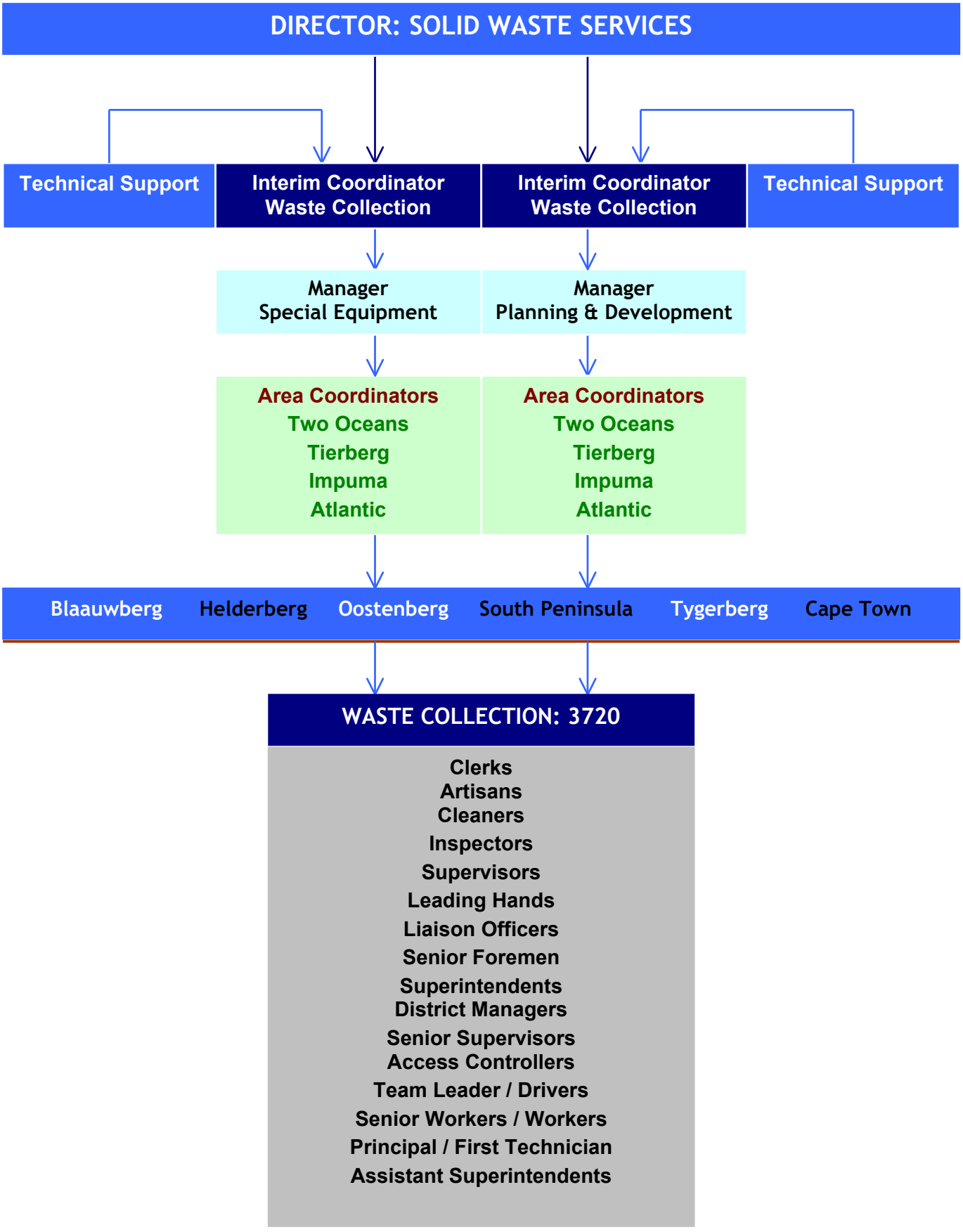

Figure 6.1: Organogram of Staff Structure of Waste Collection Department

6.2 Waste Collection by Solid Waste Services

6.2.1 Refuse Removal and Area Cleaning Management Areas

Subsequent to the amalgamation of the six previously self-administered municipalities into the Cape Town Unicity, the Unicity has, as an interim measure, been partitioned into four distinct waste collection and area cleaning management areas, each managed by an Area Manager (Collection and Area Cleaning). These management areas comprise Atlantic, Tierberg, Impuma and Two Oceans. In Map 6.1 these management areas are depicted as shades of purple, green, red and yellow respectively. Further differentiation based on aspects such as land area, infrastructure, population size etc. is presented in Table 6.1.

Fifty-seven former depots serve the four management areas. Collection beats have generally been determined according to historic boundaries of the former Administrations. A beat is defined as an activity that is covered by a specific collection vehicle per day. The Unicity is currently divided into 601 department refuse collection beats. This present demarcation is used for the purposes of delivering both waste collection and area cleaning services. The observed difference is that solid waste collection and area-cleaning activities are mostly executed from separate depots within the management areas. Moreover, each section has its own infrastructure and human capital. Although the Unicity has been demarcated as such into management areas, districts and beats, the "As Is" scenario that the city inherited from the old municipalities, with respect to operational management, still largely applies. In essence this means that the process of rationalisation of depots, staff and the operation of service delivery is still to take place.

Table 6.1: Refuse removal and area cleaning management areas

Area Name	Land Area	Number of Vehicles	Approximate Population Served	Approximate number of erven
Area 1 (Atlantic)	726 km^2	138	326 359	108 150
Area 2 (Tierberg)	654 km^2	119	703 657	127 854
Area 3 (Impuma)	615 km^2	191	717 416	184 708
Area 4 (Two Oceans)	479 km^2	138	749 178	167 690

6.2.2 Staffing and Budget for the Solid Waste Collection Section

Arising out of the restructuring of six former municipalities into a single Unicity, the Waste Department of the City of Cape Town has put in place a "macro" senior management structure, with "Collection" and "Area Cleaning" forming two separate departments. The Collection Department is headed by the "Interim Manager: Collections".

Each operational area (Atlantic / Tierberg / Impuma / Two Oceans) has an Interim Area Co-ordinator reporting directly to the Interim Co-ordinator: Collections. The functions and the responsibilities of the solid waste collection services staff below the level of the Interim Area Co-ordinators generally follow the structure inherited from the six former municipalities ("As-Is" Organisational Structure). The former boundaries, locations of depots, levels of staffing, etc, influences the planning of collection beats and deployment of

Table 6.2: Summary of the Annual Waste Department Budget

CITY OF CAPE TOWN: SOLID WASTE SERVICES: 2003/2004 OPERATING BUDGET	
Department	**Amount (R million)**
Waste Collection Services	379.18
Area Cleaning	231.55
Waste (Bulk) Disposal	127.82
Fleet / Workshops	2.25
Strategy/Planning	9.72
Finance	1.61
Director's Office	6.57
Communications	2.24
Human Resources	5.99
TOTAL	**766.73**
Expected Income (2003/2004)	
Rates and Charges	376.85
Bulk Disposal (Landfills)	31.00
TOTAL	**407.85**

Table 6.3: Domestic Refuse Collection Service Levels and Delivery Mechanisms

DOMESTIC REFUSE COLLECTION SERVICE LEVELS & DELIVERY MECHANISMS				
NO	SERVICE LEVEL & TYPE	SERVICE POINTS		TOTAL
		FORMAL	INFORMAL	
1.0	CONTAINERISED BASIC (240 L Bins)			
1.1	Departmental	408500	0	408500
1.2	Contracts	45000	0	45000
1.3	One community based contract - Not in accordance with policy (To be addressed/rectified on expiry of contract 30 June 04)	13500	0	13500
	Sub Total	467000	0	467000
2.0	BASIC BAGGED (85 L)			
2.1	Departmental	52000	75600	127600
2.2	Contracts	30000	0	30000
2.3	Community based contracts	51000	49400	100400
	Sub Total	133000	125000	258000
3.0	RUDIMENTARY SERVICE (Skips)	0	19000	19000
TOTAL		600000	144000	744000

resources. Furthermore, by-laws of the six former municipalities affecting waste collection differ from area to area, and currently impact on the management and planning of collection and area cleaning services delivery. The levels of service, efficiencies and cost of services are therefore not evenly distributed across the CTMA. The City of Cape Town is currently planning to restructure the entire Trading Services departments, including the Waste Department, in order to bring about greater rationalisation and transformation within the City. An organogram showing the present structure of Solid Waste Services is shown in Figure 6.1.

The organogram (Figure 6.1) represents a summary of the "As-Is" staffing structure, as taken from the City's records (ref 6-1). The different former municipalities often used different titles and descriptions of the various staffing functions, making it difficult to categorize into the tables shown in the organogram. Furthermore, in certain instances, the records of the staff structures do not always differentiate between collection, area cleaning or shared functions. The organogram also includes staff from the workshops and maintenance depots.

Solid Waste Services has an estimated departmental staff complement of 3720 (ref 6-4)) and an annual operating budget of R766.73 million, of which an amount of R379.18 million is spent on solid waste collection services. A summary of the departmental budget is presented in Table 6.2. It should be noted that the budget excludes any funds allocated by the Council to other departments to cover the costs of providing area-cleaning services, which currently do not fall under the ambit of the Solid Waste Department.

6.2.3 Waste Collection and Service Levels

The Solid Waste Services of the Cape Town Unicity currently collects approximately 557,180 tonnes of domestic waste per annum from the CMA. This figure accounts for 32.5% of the total quantity of 1 719 000 tonnes of general waste per annum and disposed of by the local authority in the Unicity landfills, which means that the private contractors and the area cleaning activities together handle the other 67% of the solid waste generated.

According to the Unicity's domestic refuse collection service levels and delivery mechanisms, the 557,180 tonnes is collected from approximately 744,000 service points, of which 81% are formal and 19% informal. A service point is defined as a point where the collection vehicle stops to lift the waste bins and plastic bags. A lift refers to the actual activity of raising the bins/bags into the truck. Depending on the nature of the area that is being serviced, the level of service includes containerised service (240 L bins), plastic bags (85 L) and skips for rudimentary service. The summary of service levels by the number of both formal and informal service points is depicted in Table 6.3.

6.2.4 Waste Collection Infrastructure

Solid Waste Services uses a combination of automated and manually loaded waste collection compactors and customised standard trucks. According to the departmental asset register, Solid Waste Services currently own 586 waste collection vehicles and spares. The estimated

6

Table 6.4: General Waste Collection Statistics from Wasteman

WASTE COLLECTION BY WASTEMAN	
Collection Area	**Noordhoek, Fishhoek, Kommetjie, Strand, Gordon's Bay, Kraaifontein**
Number of service points	**+/- 55000**
Tonnages collected per month	**3417 tons/month**
Level of service	**1 container / house / week**
Method of collection	**Plastic Bags, 240 L Bins & Bulk Containers**
Equipment or Vehicle types	**Refuse compactors**
Capacity of vehicles	**19 m^3**
Number of rounds	**50 rounds per week**
Landfill site	**Vissershok, Coastal Park, Faure and Brackenfell**
Weighbridge onsite	**Some and not others**
Balancing: collection routes	**Weekly**
Round trip to the landfill	**Between 10 and 25 km**
Waste types handled	**General refuse and garden waste**
Average (Kg/SP/w)	**14.34 Kg/SP/w**

Table 6.5: General Waste Collection Statistics from Tedcor

WASTE COLLECTION BY THE TEDCOR		
Collection Area	**Khayelitsha**	**Cross Roads & Philippi**
Number of service points	**47862**	**13866**
Tonnages collected per week	**1680 tons/month**	**492 tons/month**
Level of service	**Once per week + SW + LP**	**Once per week + SW + LP**
Method of collection	**85 L Bins + Plastic Bags**	**240 L Bins + Plastic Bags**
Equipment or Vehicle types	**Purpose Built Rolon Container Truck**	**Rear & Side Loader Semi Compaction**
Capacity of vehicles	**30 m^3**	**30 m^3**
Number of beats	**2 – 5 days**	**2 – 5 days**
Landfill site	**Swartklip**	**Swartklip**
Weighbridge onsite	**Yes**	**Yes**
Balancing: collection routes	**Monthly**	**Monthly**
Round trip to the landfill	**5 kilometres**	**15 kilometres**
Kilogram per Service Point per Week (Kg/SP/w)	**8.10**	**8.19**

Table 6.6: General Waste Collection Statistics from EnviroServ and Millennium Waste

WASTE COLLECTION BY ENVIROSERV AND MILLENIUM WASTE			
Collection Area	**Blaauwberg/Atlantis**	**Pinelands**	**Delft**
Number of service points	**15000**	**4400**	**20000**
Tonnages collected per month	**1023 tons/month**	**365 tons/month**	**535 tons/month**
Level of service	**1 container / house / week**	**1 container / house / week**	**2 bags / house / per week**
Method of collection	**240 L Bins**	**240 L Bins**	**Plastic bags**
Equipment or Vehicle types	**Rear end loader with lifters or side loader**	**Rear end loader with high lifters**	**Rear end loader**
Capacity of vehicles	**19 m^3**	**19 m^3**	**19 m^3**
Number of beats	**10 per week**	**5 per week**	**10 per week**
Landfill site	**Vissershok**	**Bellville**	**Bellville**
Weighbridge onsite	**Yes**	**Yes**	**Yes**
Balancing: collection routes	**Monthly**	**Monthly**	**Monthly**
Round trip to the landfill	**70 kilometres**	**55 kilometres**	**20 kilometres**
Waste types handled	**Garden waste: 40% General waste 60%**	**Garden waste: 60% General waste 40%**	**Garden waste: 40% General waste 60%**
Kg/Service Point/ Week (Kg/SP/W)	**15.74**	**19.14**	**6.17**
Average (Kg/SP/W)	**Tons: 1923 tons/month**	**Service Points: 39400**	**Average: 11.26**

age of the current compactors is 8.2 years while the rest of the fleet is more that 10 years. It has not yet been established whether the Council had a fleet replacement policy but such information will be included in the Gap Analysis Report. Approximately 201 of the total number of vehicles are compactor trucks. Although the department owns this number of compactors the four collection areas are presently made up of 601 beats. If the latter was optimised for a five-day week, it would imply the utilisation of a maximum of 120 compactors, but this is not the case. This is understandable considering the situation that the Council is yet to undertake the exercise of rationalising both the depots and infrastructure that it inherited from the previous municipalities which now constitute the Cape Town Unicity. Additional trucks (over and above the required 120 on a continuous basis) are required to replace vehicles being repaired or serviced, and for emergency purposes and collection outside of planned beats.

A beat is defined as an activity that is covered by a specific truck per day. The Unicity is currently divided into 601 departmental beats and each truck covers approximately 2 - 3 trips per beat. In recent years waste management has become a sophisticated industry in which technology and information systems play a critical role in service delivery. The lack of waste information system for data collection, analysis and storage is considered a handicap.

6.3. Waste Collection by Private Contractors

It has already been alluded to in 6.2.3 of this chapter that the Council removes 557 180 tonnes (approximately 33%) of the waste collected (excluding area cleaning). The private contractors, operating either independently or under contract from the Council or both, provide for the remainder of the bulk disposed of at the Unicity's landfills. Major contractors that have been included in this study, at least for the purpose of generating reliable data, included EnviroServ, Millennium Waste, Wasteman, Interwaste and Waste Control. Although these private contractors demonstrated willingness to provide the requested information with respect to the collection of domestic waste, strong reluctance to provide information pertaining other waste stream was encountered. No information was received from the community-based entrepreneurs and smaller operators. Their position is that Wasteman, the company with whom these operators are aligned with, should provide the information.

6.3.1 EnviroServ & Millennium Waste

EnviroServ, together with its subsidiary Millennium Waste, is currently one of nine private operators and community based entrepreneurs, which are contracted to assist the City of Cape Town with the execution of the waste collection function in Delft Township and the suburban areas of Pinelands and Blaauwberg. Like all other private contractors, EnviroServ was provided with a questionnaire containing a comprehensive list of questions pertaining to its approach towards effective execution of the function.

Noteworthy from the summary are the following observations. Under the present contracts for Delft, Pinelands and Blaauwberg / Atlantis areas, EnviroServ covers a total of 39,400 service points and collects 1923 tons/month. Roughly 50% of the refuse collected by

EnviroServ is currently disposed of at the Bellville South Landfill, which is approximately 10 and 28 kilometres from Delft and Pinelands respectively. With the Bellville South Landfill due for closure in 2006, the City of Cape Town will soon be grappling with the challenge of finding an alternative disposal site for the 1027 tons/month of waste emanating from Delft and Pinelands. A significant observation from the data presented in Table 6.6 is the fact that Blaauwberg and Pinelands together account for 19,400 service points and 1388 tons/month. Delft on the other hand accounts for 535 tons/month with more or less the same number of service points as the other two locations combined.

6.3.2 Wasteman

Wasteman is by far the largest private firm that is contracted to collect and transport waste from the areas shown in Table 6.5. According to the data that has been received, 41000 tonnes of waste are collected annually from approximately 55000 service points. Due to the diverse nature of the service points various collection mechanisms are used to collect the waste. These mechanisms include plastic bags, 240 litre bins and skips. The level of income and the infrastructure mainly dictates the selection of the waste storage and collection method.

6.3.3 Other Contractors

Over and above EnviroServ and Wasteman, there are also other small and larger private contractors that operate within the Unicity. The larger operators, including Waste Control and Interwaste, are mainly involved in commercial and industrial waste, whereas the smaller operators focus on domestic waste and builders rubble. There are also many one-man operated tipper trucks providing rubble removal services. A selected number of smaller operators have been designated by the City Council as community based entrepreneurs and they work in close co-operation with Wasteman on the transportation of the waste to the landfill. According to Wasteman, the waste quantities originating from these contractors have been incorporated into the Wasteman collection quantities. The biggest challenge facing the city regarding the activities of smaller operators is to develop an effective strategy on how to educate contractors about the cost implications of illegal dumping, especially the illegal dumping of builders' rubble.

Amongst the community-based entrepreneurs, Tedcor is the only company that has its own infrastructure to provide the service from the point of waste generation to the disposal site. In its three main areas of operation Tedcor is also responsible for street sweeping and litter picking. The waste collection statistics that have been furnished have been included in Table 6.6 on the opposite page.

6.4 Area Cleaning by the Solid Waste Department

With respect to Area Cleaning this report seeks to answer the following five linked questions:

1. What constitutes area cleaning and does the Unicity have a policy?
2. Within which department(s) of the Unicity does the responsibility to provide the service rest?
3. How is the function currently being executed?
4. Which areas are presently covered by the function and what are the quantities of waste collected?
5. Who presides over the budget for the area cleaning activities?

6.4.1 What constitutes area cleaning and does the Unicity have a policy?

The PricewaterhouseCoopers (PwC) Report (April 2002) entitled "Development of a Framework for the Service Delivery, Service Levels and Funding Options" provided direction to the Waste Department towards its interim policy document with respect to Area Cleaning [ref 6-4]. Area Cleaning comprises of the following activities:

- Street sweeping
- Litter picking
- Beach cleaning
- Illegal dumping
- Animal carcass collection
- Provision and servicing of litter bins
- Hawker waste
- Water Tanker Services

The current and proposed future division of waste generating areas and districts is presented in Table 6.7.

Street sweeping: The current manner in which street sweeping is provided lacks both equitability and consistency across various administrations. This service is presently performed on both a programmed and *ad hoc* basis.

The Central Business Districts are currently swept at least 6 days a week, through either mechanical or manual means or a combination of both. Present challenges include the following. Firstly, cleaning the CBDs often requires working outside the normal hours when the streets and pavements are accessible. Secondly, since the definition of the term "central business district" does not include residential areas, which have been converted into business areas, the areas concerned do not normally receive the same level of service as the general CBDs.

Table 6.7: The current management areas for area cleaning

FUTURE DIVISION	AREAS	ATLANTIC	TIERBERG	IMPUMA	TWO OCEANS
	DISTRICTS	Blouberg	Klipheuwel	Blackheath	Cape Point
		Steenberg	Valhalla	Joostenberg	Sandvlei
		Twelve Apostle	Welgelegen	Macassar	Wolfgat
CURRENT DIVISION	WASTE GENERATING AREAS	**Blaauwberg**	**Tygerberg**	**Helderberg**	**South Peninsula**
		Atlantis	North	Gordons Bay	Muizenberg
		Killarney	East	Vaalfontein	Schaapskraal
		Cape Town	South	**Oostenberg**	Simonstown
		CBD	West	Kraaifontein	Wynberg
		Claremont	Central	Scottsdene	**Cape Town**
		Langa	Coastal	Brackenfell	Athlone
		Maitland		Kuilsrivier	Bonteheuwel
		Mowbray		Melton Rose	Browns Farm
		Sea Point			Eastridge
		Woodstock			Gugulethu North
					Gugulethu South
					Nyanga
					West Ridge

Litter picking: According to the PwC Report the litter picking function is spread across various departments from the old administrations of the Unicity, including Parks, Roads, Amenities and the Solid Waste Department. The provision of the service is largely reactionary [ref 6-2] as opposed to proactive. Due to jurisdictional matters the schedule for litter picking remains unconsolidated. These jurisdictional issues involve other departments such Parks, Roads, Amenities, Housing and Amenities etc. The report proposed that the Solid Waste Department undertakes regular and scheduled litter picking in all unfenced areas. Fenced areas will still be the responsibility of the landlord. Moreover, the litter picking of the verges and island takes place on the same schedule as street sweeping.

Illegal dumping: Typically the three major waste streams of illegally dumped waste include garden refuse, general waste and builders' rubble. These are the waste streams that are most likely handled by the Solid Waste Services as part of its mandate to manage illegal dumping. Another waste stream is carcass removal, which is discussed elsewhere in this chapter.

Provision and Servicing of the Street Bins: The service forms part of the street cleaning except where the service is offered by contractors. The service differs from area to area.

Hawkers' waste: The service is provided to hawkers within certain business areas. The city provides the hawkers with 660 and 1100 litre bins that are strategically placed in various areas where there are informal business activities. The hawkers currently receive this service "free of charge" but they are expected to pay a nominal fee to City of Cape Town for rental of the trading space.

Beach cleaning: Various departments within the Council currently undertake beach cleaning which includes kelp and shell removal, litterbin servicing, litter picking and deep sand cleaning. The greater portion of the shoreline currently falls under the responsibility of the Amenities Department. This clearly hampers the Solid Waste Department efforts to provide the service on programmed basis and in an effective and efficient manner. Beach cleaning, like litter picking, is currently fragmented. The Solid Waste Department is currently responsible for the beaches contained within the Cape Town Administration area (The Atlantic seaboard and a short stretch of Strandfontein). Refer again to Price Waterhouse. Beach cleaning currently has a full festive season (starting November until after Easter weekend) scheduled programme but is done on an ad hoc basis for the remainder of the year.

Water tanker services: The water tanker service is used to dampen the litter so that it does not blow around so that it can be swept. The service is also used to sanitise identified areas where vagrants sleep and abolute.

Animal carcass collection: In-house resources are used to perform animal carcass collection in some areas of the Unicity, but in other areas the function is outsourced. Different municipal areas have different policies regarding carcass collection.

Gathering of Information

In September 2003, the Solid Waste Department conducted a review of the current level of services with respect to the above-mentioned area cleaning activities within the four management areas. The response received to the questionnaire was poor, and the exercise should be repeated in order to obtain reliable data for purposes of undertaking a proper assessment.

City Improvement Districts (CIDs):

City Improvement Districts (CIDs) have been formed in certain major business centres and precincts around the city. The CIDs form part of the Cape Town Central City Partnership - a co-operative public/private sector Section 21 Company, which was formed in June 1999. The CIDs provide a top-up services, mainly in cleaning and security in their operational areas.

6.4.2 Staffing and Budget for the Area Cleaning Section

Arising out of the restructuring of six former municipalities into a single Unicity, the Waste Department of the City of Cape Town has put in place a "macro" senior management interim structure, with "Collection" and "Area Cleaning" forming two separate departments.

Each operational area (Atlantic / Tierberg / Impuma / Two Oceans) has an Interim Area Manager reporting directly to the Interim Area Cleaning Co-ordinator. The functions and the responsibilities of the area cleaning services staff below the level of the Area Managers

Table 6.8: Area Cleaning: The Division of Responsibilities

LOCATION AND NATURE OF WASTE		DIVISION RESPONSIBLE FOR BUDGET, WASTE REMOVAL AND DISPOSAL						RECOMMENDATION
		HISTORICAL PRACTICE						
		BLA	CTN	HLD	OOS	SPM	TYG	
1.0	National Roads	Sanral	Sanral	-	-	-	Sanral	
2.0	Provincial MR	PAWC	PAWC	-	-	-	PAWC	
3.0	Roads & Streets							
3.1	Kerb to Kerb	CL	CL	CL	CL	CL/Rds	CL	
3.2	Vegetation paved verges	Pks	Pks	Pks	Pks	Pks	Pks	"Fence to fence[1]" cleaning by Solid Waste Services
3.3	Sidewalks	CL	CL	CL	CL	CL/Rds	CL	
3.4	Other verges	Pks	CL	Pks Sw	CL	Pks	Pks	
3.5	Residential street frontage cleaning	CL	CL	No service	No service	No service	No service	Sweeping by the residents
3.6	Weeding of unpaved sidewalks	---	---	Pks	---			Pks
3.7	Gulleys	Sw	Sw	Sw	CL	CL/Rds	Sw	
3.8	Under stormwater branch	Sw	Sw	Sw				Sw
4.0	Parks	Pks	CL	Pks/CL	CL	Pks	Pks	Pks: Enclosed spaces[2] & amenities
5.0	Public Open Spaces							SWS
6.0	Natural rivers, lakes & ponds							
6.1	Hydraulic silts/debris	Sw	Sw	Sw	Pks	Rds	CMC Sw	Sw: Hydraulic & out of reach areas
6.2	Vegetation on banks	Pks	Pks	Pks	Pks	Pks	CMC Sw	SWS: Reachable areas
6.3	Bank litter	Pks	CL	CL	CL	Pks	CMC Sw	
6.4	Dumped rubble out of water	Pks	CL	CL	CL	Pks	Pks	Sw: Hydraulic & out of reach areas
6.5	Dumped rubble in water	Pks	Sw	CL	CL	Pks	Pks	
7.0	Canals							
7.1	Verges in the former iKapa	Sw	Sw	Sw	Pks	Rds	CMC Sw	Sw: Hydraulic & out of reach areas
7.2	Verges elsewhere	---	Rds	---	---	---	---	
7.3		Sw	CL	Pks	CL	Pks	CL	
7.4	Illegal rubble out of water	Sw	CL	Sw	CL		CL	SWS: Reachable areas
7.5	Illegal rubble in water	Sw	Sw	Sw	CL		CL	
8.0	Ponds (man-made)							
8.1	Hydraulic Structures	Sw	Sw	Sw	Pks	Rds	CMC Sw	Sw: Hydraulic & out of reach areas
8.2	Floor/banks vegetation	Pks	Pks	Pks	Pks	Rds	Sw Pks	Pks
8.3	Floor/banks litter	Sw		CL	Pks	Pks	CL Pks	SWS

CL: Cleansing Pks: Parks Rds: Roads Sw: Stormwater

Source: PricewaterhouseCoopers Report: *"Development of the Framework for Service Delivery, Service Levels and Funding Options."*

[1] Council owned open areas
[2] Council owned fully enclosed or protected area

generally follow the structure inherited from the six former municipalities ("As-Is" Organisational Structure). The former boundaries, locations of depots, levels of staffing, etc, influences the planning of area cleaning beats and deployment of resources. The levels of service, efficiencies and cost of services are therefore not evenly distributed across the CTMA. The City of Cape Town is currently engaged in a restructuring process that includes the Waste Department, in order to bring about greater rationalisation and transformation within the City.

An organogram showing the present structure of solid waste services is shown in Figure 6.1. The organogram represents a summary of the "As-Is" staffing structure, as taken from the City's records [ref 6-1]. The different former municipalities often used different titles and descriptions of the various staffing functions, making it difficult to categorize into the tables shown in the organogram. Furthermore, in certain instances, the records of the staff structures do not always differentiate between collection, area cleaning or shared functions. The organogram also includes staff from the workshops and maintenance depots. The area cleaning services are delivered through the efforts of staff, which forms part of the total departmental staff of 3720. Area cleaning has an estimated annual operating budget of R231.55 million. Table 6.2 presents the summary of the departmental operating and projected income budget.

Staff required for the various area cleaning activities are generally drawn from the depots. Staff is shared with the waste collection department, where the priority usually goes to waste collection. This situation often results in a shortage of staff for area cleaning activities, the problem being compounded in that staff is not moved between depots or former municipal district areas, resulting in the City having to outsource additional labour on a temporary employment basis.

6.4.3 Area Cleaning Infrastructure

The area cleaning section is divided into four management areas, but operates according to the former municipal districts out of the former depots. The current area-cleaning infrastructure includes, inter alia, street sweepers, water tanks etc. A graph representing the number of units that are currently at the disposal of the area cleaning section are presented below. Approximately 41% of the current infrastructure is more than 10 years old, while the bulk of the newer units were purchased between 1996 and 2000.

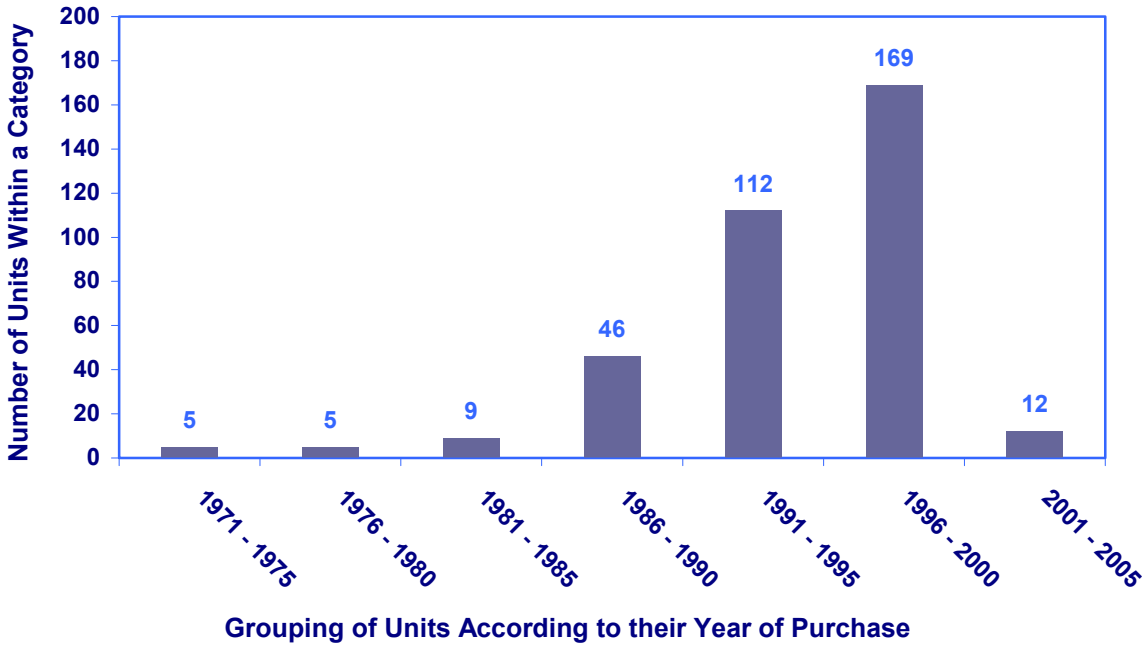

Figure 6.2: Global Perspective of the Current Area Cleaning Infrastructure

6.4.4 Review of the PricewaterhouseCoopers (PwC)

In 2002, the Solid Waste Services of the City of Cape Town retained the services of PricewaterhouseCoopers and Ashira to develop a framework for service delivery, service levels and funding mechanisms (ref 6-6). In view of the fact this process produced a comprehensive report containing a detailed ***"matrix of responsibilities for cleaning and cleaning open spaces in City of Cape Town."*** The matrix clearly shows the departments that controlled the budget for certain aspects of area cleaning services before the amalgamation of the seven administration centres which now constitute the Cape Town Unicity. By virtue of their control of the budget, these departments were directly responsible for the execution of the waste removal and disposal functions.

The status quo study involved the verification and cross-referencing of the information through meetings with the officials and questionnaires. The information collection and verification mechanisms revealed that after the amalgamation process there has been unofficial administrational reconstruction within various departments, although few of these changes have resulted in budget consolidation and the reduction on the duplication of the functions. After the creation of the Unicity, various departments including solid waste and

the parks and recreation divisions have now four administration districts covering services delivery within clearly defined sections of the Unicity. In the absence of a guiding policy and a standard practice, it is in some instances a difficult task to define the departmental boundaries and the division of duties with respect to the area cleaning services. Although the logical cost saving approach would be to consolidate all area cleaning functions under the ambit of the Solid Waste Services, as per the recommendations of the PwC report, very little has been effected by way of implementation of the aforesaid recommendations.

6.4.5 General Management of Area Cleaning Activities

In our discussions with the Solid Waste Division, it emerged that the function of area cleaning is amongst various departments and divisions including housing, water, roads and the parks and recreation. It has been noted for instance that in Simonstown almost all the Area Cleaning activities are performed by the Roads Department, with the exception of beach cleaning (Amenities) and illegal dumping (SWS). This section of our report will focus only on area cleaning as a function of solid waste services. Four major issues, including the activities that constitute area cleaning, service delivery methods, availability of infrastructure and the perceived future challenges are discussed in finer detail. The information that is presented here represents a summary of various discussions with the city officials during the course of our data collection.

6.4.5 (a) Service Delivery: Area Cleaning

Depending on the nature of the service required the service is provided either manually or mechanically. The functions are performed either in-house or currently outsourced. The Area Cleaning section of the Solid Waste Department has its own infrastructure and shares staff with waste collection. The efficient replacement of staff where operationally required is hampered by the pending staff placement situation.

6.4.5 (b) Perceived Future Challenges

In order for the Unicity to provide and manage the delivery of area cleaning, the following aspects may require further scrutiny:

- The proposals to consolidate the currently fragmented area cleaning functions in one department, preferably within the ambit of the Solid Waste Department;
- Unbundling of the budget for area cleaning service delivery;
- Movement of the unionised staff from their current departments into the consolidated division;
- Redesign a uniform approach on how the function should be delivered and performance measured;
- Provide a GIS mapping of all area cleaning functions;
- Fill the existing policy gap in the current bylaws, which allows private businesses to negate their responsibility to sign up with the Council or a probate contractor to provide for the waste collection service. The current waste management practices of certain businesses are tantamount to illegal dumping which result in a huge expenditure and loss of income for the Council;
- Within the Unicity, there are currently a number of communities residing on private land. Because of the legal implications of either removing the communities in questions or providing them with waste collection services at these current locations, the best that the Council has been able to do is to place a skips across the road from these sites. Although this approach to waste collection provides a relief, it is nevertheless an unsustainable solution. There is therefore a need to deal more effectively with the issue of communities residing illegally on private land because

informal dwelling does affect the manner in which the Council delivers basic services to these communities.

6.5 Other Categories of Area Cleaning

6.5.1 Department of Housing

As alluded to above, housing was identified as one of the departments, which handle certain responsibilities of the area cleaning function, including cleaning of hostels, courtyards etc. There is currently some confusion between the Housing and Solid Waste Departments regarding both the ownership of the responsibility and what the function entails. In spite of the fact there is awareness and concerns regarding the distribution of the function between various departments, there is a perceived lack of communication to reduce the potential duplication and spread of the available budget.

6.5.2 Parks, Recreation and Amenities

In keeping with the emerging trend within the Unicity, the Parks Department is divided into four separately functional areas. According to city officials the primary responsibilities of the department include grass cutting and trimming of the verges. The nature and quantities of waste that is currently handled include organics, recyclables and general waste. In terms of the type of infrastructure that is needed and available/not available for effective execution of the functions, the necessary infrastructure is available and in a working condition.

The separate departments of Recreation and Amenities also undertake area cleaning functions separately to the Waste Department, each with their own resources and annual budgets.

The various area cleaning activities undertaken separately by the Parks, Recreation and Amenities departments are seldom co-ordinated with the Waste Department, often resulting in inefficiencies and inequalities in service delivery and frequency of cleaning from area to area.

6.5.3 Roads and Stormwater Division

The road and stormwater division of the Cape Town Unicity performs various activities pertaining to the road and stormwater maintenance of area cleaning function. For the purpose of execution of the activities involved, the Unicity has been divided into four districts. These functions include river cleaning/dredging, pipe cleaning, road millings and catchpit/gully cleaning and street sweeping in the case of South Peninsula Administration (SPA).

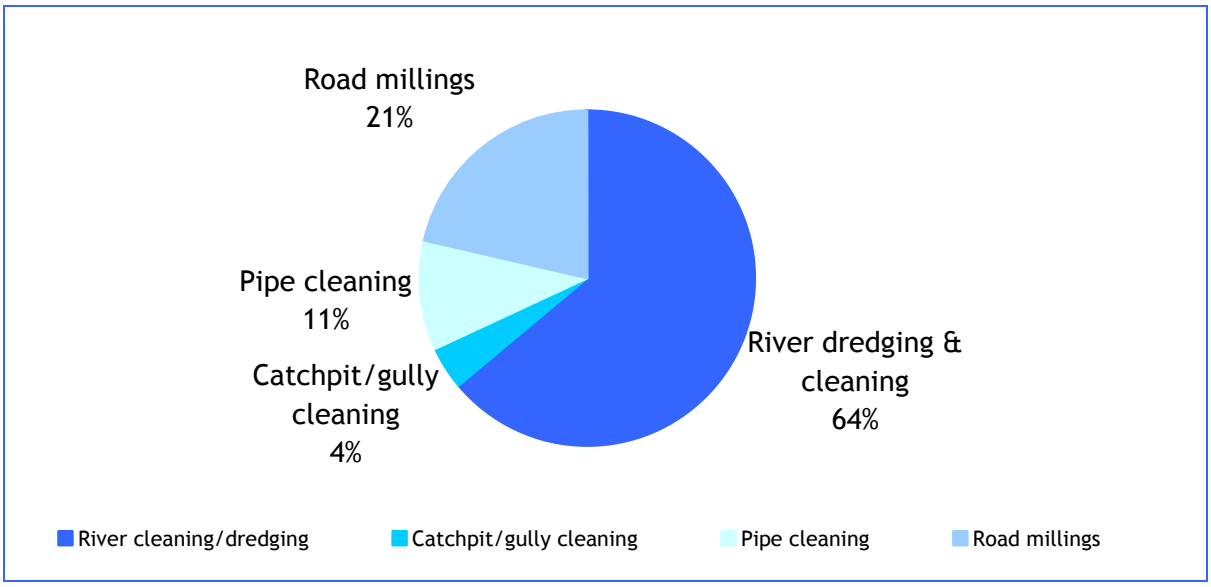

Figure 6.3: Typical Waste Stream and Quantities Generated by Roads and Stormwater

Typical quantities of waste that are derived from the abovementioned activities are presented in Figure 6.5. Note should be taken that the data does not include the quantities for street sweeping from the SPA. The approximate total quantity of solid waste that emanates from these activities within the Unicity is 200,000 tonnes per annum, which represents a significant volume of waste. The waste derived from catchpit/gully and pipe cleaning is disposed of as hazardous waste. The road millings are stockpiled for reuse and the rest of the waste is managed as general waste.

6.6 Gaps and Needs Assessment

GAPS	NEEDS
Refuse Collection Services Policy	• To finalise the adoption of the policy document that was presented to the Executive Committee for its consideration on 22 May 2003.
Area Cleaning Services Policy	• The Pricewaterhouse Coopers report entitled "Development of a Framework for Service Delivery, service levels and funding options,' was previously recommended for adoption as a formal policy. As with the Refuse Collection Services Policy, an Area Cleaning Services Policy will assist the City deal more effectively with the pertinent issues of intra and inter-departmental division of labour and resources. • Consolidation of the various services under one department • The policy is necessary should inform Solid Waste Services on how to proceed in standardising the delivery of area cleaning services across the various administration in the manner that has previously been proposed by the department. • Policy on community based cleaning in informal areas
Fleet Replacement Policy	• The Unicity has a fleet replacement policy, which stipulates that trucks should be replaced after 8 years in operation. The highest number of the collection trucks within the current fleet is on the 4 - 6 year category. There is a need for a budget for the

	replacement of these trucks within the next four years.
Service Levels	• Various areas within the City receive different levels of services but there is no set written and accepted standard criteria for deciding the required level of service for different areas
Private Operators	• The City needs a formal registration system for all its private operators to effect the necessary process of creating awareness about the issues such as illegal dumping
Garden Waste	• Develop a uniform strategy for managing the garden waste stream
Complete the Rationalisation Process	• Various former administrations have now been successfully amalgamated to form the Unicity but in a number of instances the City's services delivery structures continue to operate on the basis of their previous operating procedures and service delivery mechanisms. This affects both the efficacy and the quality of the service provided because there are not similar standard operating procedures; Uniform service delivery mechanism to be devised for all administrations. • Defining the district boundaries; • Reduce the number of depots; • Allocation of manpower and resources; • Balancing of beats (service point & collection routes)
Formalising Management Structures	• In order to bring about the requisite effectiveness and commitment towards waste management service delivery, there is a need for certainty on the management structures and leadership around the City's endeavours. • To a large extent, effectiveness hinges on the availability of the right human capital with the necessary skills. The City should find a way to rationalise the available manpower to ensure that there is a fair distribution of staff and skills.
Illegal Squatting on Private Land	• The City has a Constitutional mandate to provide equitable waste management services to all its residents. In order to deliver on that mandate a strategy is needed to deal effectively with the matter of providing services to individuals and communities residing illegally on private land.
Communication	• Both intra and inter-departmental communication is necessary to avoid duplication of function and to provide the services in a cost-effective manner; • Effective communication between the City and its private contractors is necessary to foster co-operative approaches to service delivery and the generation of waste collection statistics.
Data Collection / Information	• There is currently very limited reliable data to inform the decision-making processes on waste collection and area cleaning activities. Require effective, centralised system for data gathering and verification. • Information was received from various Area Cleaning Co-ordinators regarding activities within their respective areas of responsibility. Although this information is useful, the format in which the information was provided and presented lacks consistency. If the information is intended for inclusion in the proposed information system there is a need to establish uniformity and consistency regarding the type and quality of

	information, units etc.
Performance Indicators	• The City needs reliable performance indicators to measure effectiveness of its service delivery mechanisms for the purpose of effecting improvements where they may be necessary.
Performance Monitoring	• Procedures to monitor performance at all levels
Development of an updated matrix of departmental activities i.r.o area cleaning	• The PwC Report provided a framework of some but not all area cleaning activities, which are undertaken by various departments. Since the matrix does not cover all the previous administration and departments, an updated matrix still need to be developed.
Other Dependencies	• Budget for administrative support to enable scheduling and planning to take place • Successful unbundling of budget and staff from other departments historically involved in area cleaning functions • Improve middle management and supervisory staff capacity

References

6-1. City of Cape Town (July 2003): *Present and Proposed Restructuring – Trading Services: Staffing Structure (Organisational Design – ODI).*

6-2. City of Cape Town (2003): *Background Document on Area Cleaning*

6-3. City of Cape Town (2003): *Report to Executive Committee on Refuse Collections Services Policy*

6-4. City of Cape Town (2003): *Solid Waste Business Unit: Proposed Description.* Pricewaterhouse Coopers

6-5. *Internet website of the Cape Town Central City Partnership (http://www.capetownpartnership.co.za/CID.asp)*

6-6. Price/Waterhouse/Coopers Report: *Development of the Framework for Service Delivery, Service Levels and Funding Options*

Chapter 7 – Waste Disposal

A situational analysis is presented in Chapter 7 of the waste disposal functions undertaken by the Solid Waste Management Services Department of the City of Cape Town and by private contractors operating within the Cape Town Metropolitan area.

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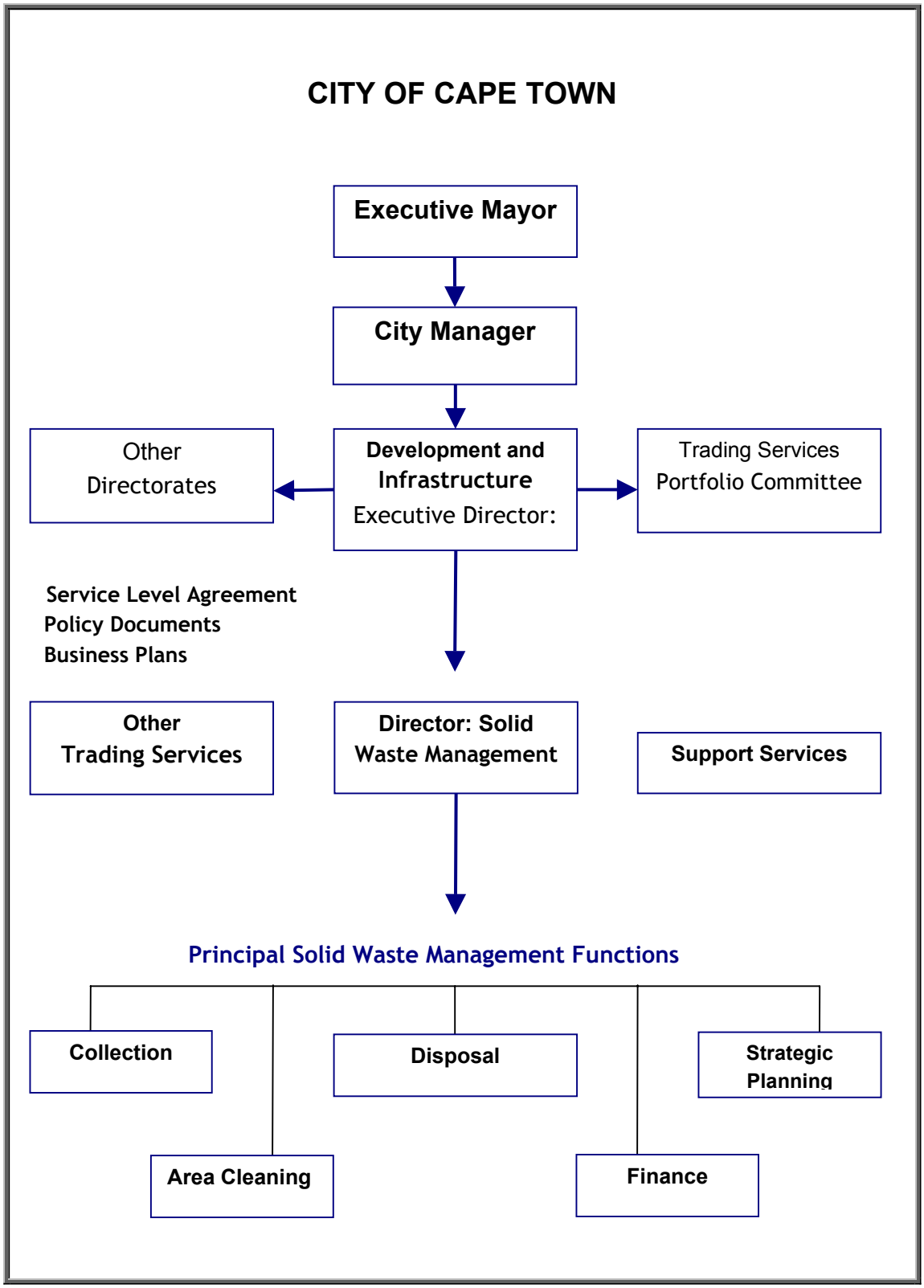

*Figure 7.1: Organogram illustrating the **Interim Holding Structure** of the Solid Waste Management Services within the institutional structure of the City of Cape Town:*

7.1 Introduction

The disposal of waste within the CTMA is undertaken principally by the Solid Waste Department of the CCT at engineered waste disposal sites that have been permitted by DWAF and DEADP for the purpose of waste disposal. Whereas this chapter describes waste disposal mainly in the context of the formal waste disposal facilities owned and operated by the CCT, it must be borne in mind that the private sector also participates in waste disposal, with the privately-owned Vissershok Waste Management Facility (VWMF) currently being the only existing waste disposal facility of significant size.

7.2 Waste Disposal: Management Structure (CCT)

7.2.1 Background

Solid Waste Management is a trading service of the City of Cape Town. An organogram (Figure 7.1) is shown on page 7-2 that depicts the institutional structure of the Solid Waste Management trading service within the overall City management structure. Waste Disposal is one of five management functions that report directly to the Director of Solid Waste Management Services.

The Waste Disposal function is managed by the Manager, responsible for all municipal waste disposal, including:

- landfill disposal
- transfer stations
- drop-off facilities (those located at landfill sites)
- disposal of garden refuse
- composting (currently managed by the Tygerberg Administration)
- disposal of builder's rubble
- hazardous wastes.

Responsibility for the disposal of water and wastewater treatment sludges falls under the water and wastewater treatment departments of the trading services, except where sludge is disposed onto landfill sites owned and operated by the City of Cape Town (CCT).

7.2.2 Staffing Structure

The Waste Disposal Department is estimated to employ 160 persons, including temporary "contract" staff and excluding new identified posts not yet filled. An organogram (Figure 7.2) of the existing staff structure of the Waste Disposal department is shown on page 7-4, overleaf. The staffing requirements identified in terms of an organisational design exercise developed in 2002 recommended a complement of 217 staff, including new posts.

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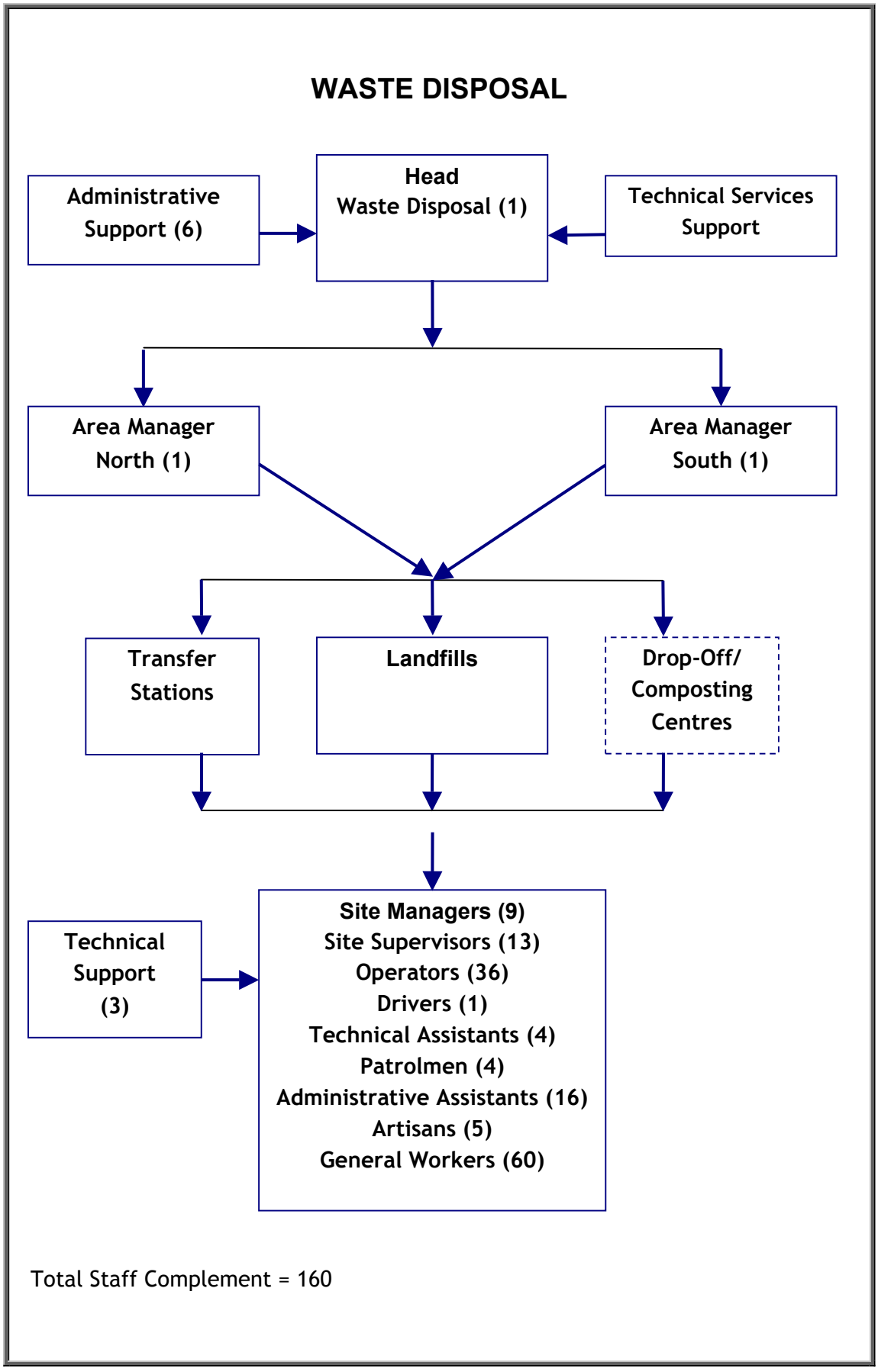

Figure 7.2: Organogram showing the current interim holding structure of the Waste Disposal Department

The staff complement and management structure is in the process of being restructured. This process is being implemented by the CCT to bring about further rationalisation (with the merger of the six former Municipal Local Councils (MLC's) and transformation. The "status quo" situation should therefore be viewed on the basis that changes to the management structure are likely to take place over the short to medium term.

The institutional arrangements of the Solid Waste Management Services department are described in further detail in Chapter 11 of this Report.

7.2.3Financial Management

The financial management of the Solid Waste Disposal Services department is integrated with the overall CCT's financial management systems, and functions within an operating and capital development budget approved annually by the Cape Town City Council.

7.2.3 (a) Operating Budget:

The 2003/2004 Operating Budget for the Waste Disposal Department is R127,82 million. A summary of the current Operating Budget of the Solid Waste Disposal Department is given in Table 7-1 below (ref 7-2). The Operating Budget is broken down per disposal facility, with the overheads and administrative costs summarised separately. The cost of operating drop-off facilities is included in the operating costs of the disposal facilities they serve.

Table 7.1: Summary of the annual waste disposal operating costs :

2003 / 2004 OPERATING COST ELEMENT	OPERATING COST R million
a) Overheads and Administrative costs	33.05
b) Bellville South Composting Facility	3.80
c) Radnor Composting Facility	8.69
d) Athlone RTS	13.34
e) Bellville South Landfill	13.45
f) Vissershok Landfill	21.53
g) Coastal Park Landfill	10.14
h) Swartklip RTS and Landfill	16.48
i) Faure Landfill	5.06
j) Brackenfell Landfill	2.25
TOTAL	**127.82**

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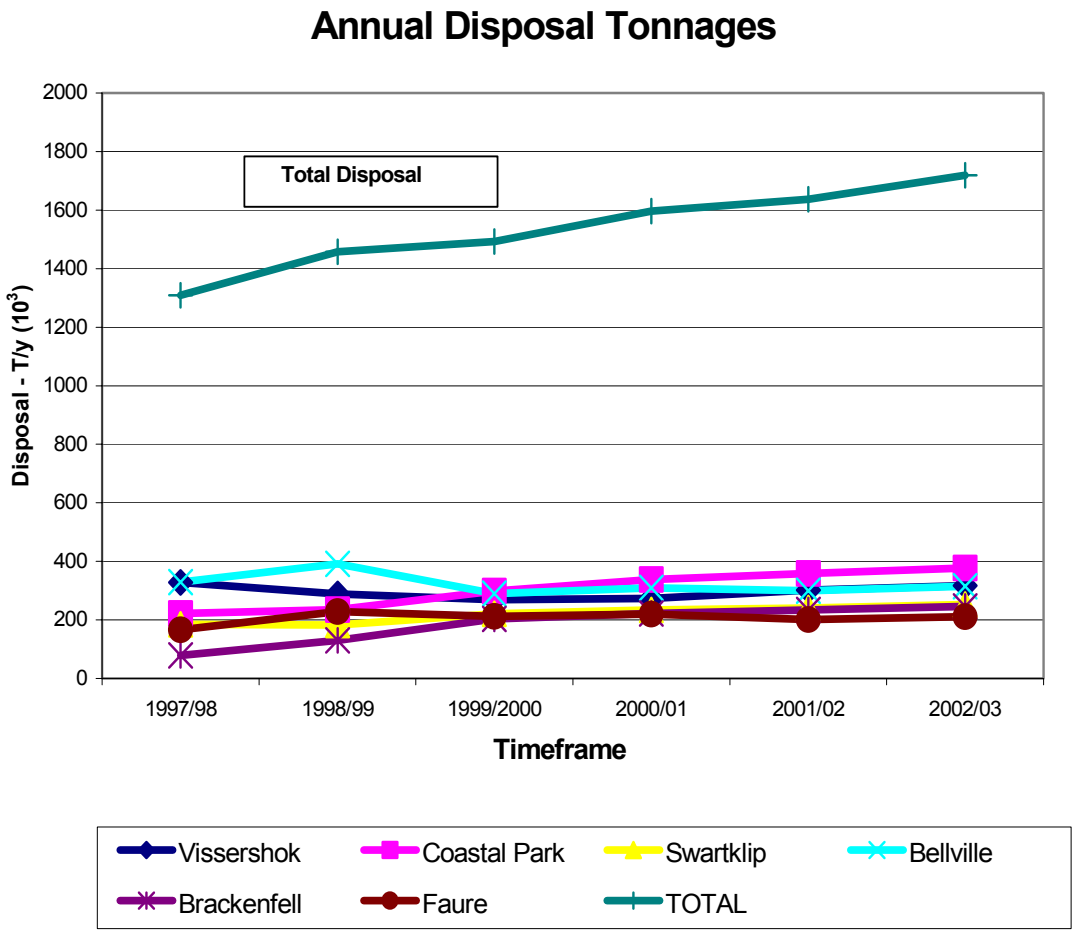

Figure 7.3: Municipal Solid Waste Disposal – Annual Disposal Tonnages

Table 7.2: Municipal Solid Waste Disposal – Annual Disposal Tonnages

Annual Tonnages (x1000) T / Annum						
	1997/98	1998/99	1999/2000	2000/01	2001/02	2002/03
Vissershok	328	289	269	273	302	317
Coastal Park	222	235	298	338	359	377
Swartklip	185	183	221	234	241	253
Bellville	329	392	290	309	300	315
Brackenfell	79	130	203	222	234	246
Faure	166	229	212	220	201	211
TOTAL	1 309	1 458	1 493	1 596	1 637	1 719
% Annual Increase		11.2%	2.4%	6.9%	2.6%	5.0%

7.2.3 (b) Capital Budget:

A summary of the current and projected Capital Budget (July 2003) of the Solid Waste Disposal Department is given in Table 7.3 below [ref 7-10].

Table 7.3: Summary of the current and projected waste disposal capital budget (Nov 2003):

CAPITAL COST ELEMENT	2002/03 R million	2003/04 R million	2004/05 R million	2005/06 R million	2006/07 R million
a) Radnor / Sacks Circle	**0.00**	**1.00**	**0.50**	**6.00**	**5.50**
b) Regional Site Development	**3.00**	**1.00**	**3.50**	**1.00**	**0.50**
c) Athlone RTS	**1.35**	**0.89**	**0.75**	**0.25**	**0.25**
d) Bellville South Landfill	**11.48**	**3.00**	**0.11**	**17.50**	**9.20**
e) Vissershok Landfill	**21.53**	**3.11**	**18.10**	**10.30**	**20.70**
f) Coastal Park Landfill	**1.51**	**9.59**	**8.40**	**12.70**	**8.20**
g) Swartklip RTS and Landfill	**1.95**	**0.00**	**4.15**	**15.70**	**10.00**
i) Faure Landfill	**1.85**	**0.00**	**0.00**	**2.65**	**0.5**
j) Brackenfell Landfill/ RTS	**1.58**	**0.12**	**0.00**	**6.30**	**5.20**
k) New Transfer Stations	**0.00**	**0.00**	**2.00**	**48.00**	**35.00**
l) Drop-Off facilities & Containers	**0.00**	**0.00**	**1.30**	**0.00**	**0.00**
m) SAP Waste Module	**0.00**	**1.00**	**0.50**	**0.00**	**0.00**
n) Closures / Plant & Equipment	**3.45**	**0.00**	**7.60**	**0.50**	**0.50**
TOTAL	37.88	19.71	50.00	120.60	89.55

7.2.3 (c) Disposal Charges:

The CCT charges a disposal fee for the bulk disposal of wastes at a waste disposal facility (current charge (December 2003) = R77.37/tonne including VAT for general waste and R121.11/tonne including VAT for hazardous waste). Clean builder's rubble that can be used as landfill cover material is accepted of free of charge. Public disposal of general waste for quantities up to 1,0 tons (LDV or Bakkie load) is accepted at drop-off facilities at the various landfill sites free of charge. Garden refuse is accepted free of charge at the various drop-off centres. The disposal fees are calculated annually on the basis of meeting the total annual operating costs of the Waste Disposal Department, as summarised in Table 7.4.

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Table 7.4: Summary of Annual Waste Disposal Operating Costs [Ref 7-3].

2003 / 2004 OPERATING COST ELEMENT	OPERATING COST R million	WASTE DISPOSED Tonnes	COST / Tonne (a)
a) Overheads and Administrative costs	33.05	-	-
b) Bellville South Composting Facility	3.80	-	-
c) Radnor Composting Facility	8.69	-	-
d) Athlone RTS	13.34	-	-
e) Bellville South Landfill	13.45	315 000	(42.70)
f) Vissershok Landfill	21.53	317 000	(67.92)
g) Coastal Park Landfill	10.14	377 000	(26.90)
h) Swartklip RTS and Landfill	16.48	253 000 (b)	(65.14)
i) Faure Landfill	5.06	211 000	(23.98)
j) Brackenfell Landfill	2.25	246 000	(9.15)
TOTAL	127.82	1 719 000	74.36

Note: a) Cost/ton shown in brackets represent individual facilities and exclude overhead costs.
b) Swartklip RTS now transfers domestic waste to the Vissershok landfill

Table 7.5: Projected Waste Disposal Volumes

Estimated Projected Annual Tonnages (x1000) T / Annum						
	2002/03	**2003/04**	**2004/05**	**2005/06**	**2006/07**	**2007/08**
Vissershok	317	460(1)	600(2)	940(3)	1225(4)	1325(5)
Coastal Park	377	395	415	430	445	455
Swartklip	253	120	30(6)	30	30	30
Bellville	315	330	350	365	100	0
Brackenfell	246	290	275	0	0	0
Faure	211	220	230	237	250	275
TotalAirspace Requirement (Note 7)	1 719	1 815	1 900	2 000	2 050	2 080
% Annual Increase (Estimated)		5.5%	5%	4%	3%	2%

Note (1): Assumes that the Vissershok WD site will receive waste from the Swartklip RTS.

Note (2): Assumes that the Vissershok WD site will receive the full portion of waste from the Swartklip RTS.

Note (3): Assumes that the Vissershok WD site will receive the full portion of waste from the Swartklip RTS plus waste from the Brackenfell WD site.

Note (4): Assumes that the Vissershok WD site will receive the full portion of waste from the Swartklip RTS plus waste from the Brackenfell WD site plus some waste from the Bellville South WD site.

Note (5): Assumes that the Vissershok WD site will receive the full portion of waste from the Swartklip RTS plus waste from the Brackenfell WD site plus all the waste from the Bellville South WD site. It is furthermore assumed that the Faure landfill site will be in its last year of operation.

Note (6) Assumes that the Swartklip WD site will continue to dispose of builders' rubble

Note (7): The projected growth of waste disposal assumes that the IWMP strategy to reduce waste generation and disposal will have started to take effect. It is also assumed that a planned regional Waste Disposal Facility will not have been commissioned before the end of the year 2007/08 and that the Vissershok WD site can accommodate the increased disposal (Note that the Bellville South WD site may have some capacity during 2004 to 2006 to alleviate the pressure on the Vissershok WD site). The above assumptions are also made on the basis that the City will have the financial capacity to fund the airspace required in terms of the above tabled figures.

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Figure 7.4: Photograph showing an aerial view of the Bellville South (CCT) waste disposal site

Figure7.5: Photograph showing an aerial view of the Brackenfell (CCT) waste disposal site.

7.3 Landfills

There are currently seven landfills in operation in the Cape Town Metropolitan area (CTMA) accepting approximately 76% [Ref 7-2] of the total residential, commercial and industrial waste stream generated within the CTMA (the remainder being recycled).

Of the seven landfills, six are owned and operated by the CCT and the seventh is privately owned and operated. One of the municipal-owned landfills, Swartklip, has ceased to accept municipal wastes, except for builder's rubble and garden refuse. It is expected that three of the remaining five municipal landfills will be closed within the next four years. Planning has commenced for the development of a regional landfill site that will provide the shortfall of airspace as the existing landfills reach their full capacity prior to their eventual final closure.

While the types of waste that individual landfill accept vary depending on their location and permit requirements, the landfills generally accept solid waste from residential, commercial and industrial sources. Hazardous wastes are accepted at the Vissershok H:H and H:h landfill sites. Some water and wastewater treatment dewatered sludges (regarded in terms of DWAF's Minimum Requirements (1998) as hazardous wastes) are co-disposed onto municipal landfills, but this practice has largely ceased due to the potential instability problems associated with dewatered sludge, the large volumes of sludges produced by the city and the high cost of hazardous waste airspace.

Figure 3.16 shows the geographical location of the existing waste disposal facilities within the CTMA.

An overview of the existing landfill sites is presented below:

7.3.1 Bellville South (CCT) GLB+

The Bellville South waste disposal site (BSWD site), approximately 72 ha in extent, is one of the city's largest facilities receiving domestic and commercial general wastes and is strategically situated in the central metropolitan area.

The BSWD site (see Figure 7.4) is located in the industrial area of the Tygerberg Municipal Area, south of the Sacks Circle industrial area, with Belhar residential areas on the western and southern boundaries and the R300 freeway on the eastern boundary. The site was permitted in 2003 for GLB+ disposal, with closure to take place by September 2006. The BSWD site was used in the early 1930's for sewage disposal and has been in operation as a waste disposal site since the 1960's, receiving general domestic and commercial onto an unlined landfill. The close proximity to residential areas and the risk of contamination to the underlying Cape Flats aquifer were the main reasons for the decision taken to prematurely close the site.

Following reconstruction of local government in 1997, the CMC Administration took over the responsibility for operating the site from the former Bellville Municipality and extended the

catchment area from which general and commercial wastes, garden refuse and builders' rubble are received.

Prior to 1997 the volume of waste received at the site was approximately 60 000 t/annum. After 1997, when the CMC Administration took over the responsibility of the site and increased the catchment area serving the site, the volume of waste received has remained fairly constant. A disposal rate of 329 000 t/annum was estimated in 1998 and 315 000 t/annum in 2002/2003 – (see Table 7.2). The annual growth rate of disposal is therefore not consistent with the City's average annual disposal growth rate of 5,5%. This can be ascribed to the upgrading of the Athlone Transfer Station (which resulted in decanting waste from the Bellville South catchment area) and the installation of a weigh-bridge at the BSWD site which has resulted in a more accurate measurement of the in-coming waste.

The footprint of the unlined landfill is approximately 29,0 ha. The landfill is approximately 30,0m above the western boundary (Belhar Road Extension), at its highest point.

Two lined cells of approximately 5,0 ha in total extent were constructed in 2003, which will provide airspace for a further two years (650 000 tonnes), i.e. until the end of 2005. The Bellville South waste disposal site has been in operation since the 1960's, where general waste was disposed of onto an unlined landfill. The close proximity to residential areas and the risk of contamination to the underlying Cape Flats aquifer were the main reasons for the decision taken to prematurely close the site.

The site facilities include a lined leachate dam, from which the leachate generated from the lined landfill is to be pumped to the adjacent Bellville wastewater treatment site for treatment. A leachate pumpstation and rising main are planned for construction in 2004. Progressive remediation of the unlined landfill has commenced, with capping of the western side and portion of the southern side completed in 2002. Extensive landfill gas testing has been undertaken to determine the quantities and characteristics of the landfill gases. Gas monitoring wells have been installed around the perimeter of the site to measure migration of landfill gas. The BSWD site facilities include a mini public drop-off station for after-hours disposal where loads of less than 1 ton are accepted free of charge. Clean builders' rubble and fill material suitable for use as daily cover material is also accepted free of charge at the site.

A future cell of approximately 2,0ha will be required to provide additional airspace for disposal of waste until closure in September 2006. The CCT has appealed against the closure date decided by DEADP in terms of their Record of Decision (June 2001), and is awaiting a response. A further requirement of the abovementioned Record of Decision is that a transfer station serving the central CTM area be operational by September 2006.

The site is externally audited three times a year for compliance with the operating permit. A Landfill Monitoring Committee meets regularly.

The BSWD site allows recycling of waste by informal salvagers managed by a private contractor. The following quantities of materials are estimated to be recycled annually at

Figure 7.6: Photograph showing an aerial view of the Coastal Park (CCT) Waste/ disposal site

Figure 7.7: Photograph showing an aerial view of the Faure (CCT) waste disposal site.

the BSWD site [Ref 7-10] – see Table 7.6. The total annual quantity of materials recycled is 542.9 t/annum (1,7%).

Table 7.6: Quantities of materials recycled at the BSWD site

Material	Plastic (Soft)	Plastic (Hard)	Paper	Cardboard	Metal	Glass
Tons/annum	129.6	32.4	309.6	23.3	37.1	10.9

7.3.2 Brackenfell (CCT) GMB+

The Brackenfell waste disposal site (BWD site), approximately 4,5 ha in extent, is located in the Oostenberg Administration area. The site is an elevated disused rock quarry located off Reservoir Road in the Bracken Nature Reserve. There is pressure to close the landfill as it is located near to a residential area and the original excavation pit will soon be filled to the original ground surface level.

The BWD site (see Figure 7.5) was permitted in 1995 for GMB+ disposal, with closure to take place by the end of 2004. The volume of waste received at the site has increased from a disposal rate of 79 000 t/annum in 1998 to an amount of 246 000 t/annum in 2002/2003 – (see Table 7.2). The site is externally audited three times a year.

7.3.3 Coastal Park (CCT) GLB+

The Coastal Park waste disposal site (CPWD site) (see Figure 7.6) is situated on Baden Powell Drive, west of Muizenberg in the South Peninsula Administration area and was permitted in July 2002 for GLB+ disposal.

The site occupies approximately 62 ha and currently receives general municipal waste, garden refuse and builders' rubble which is compacted in place. The volume of waste received at the site has increased from 222 000 T/annum in 1998 to a current disposal rate of approximately 377 000 T/annum, representing an average annual growth rate of more than 11% (the most significant growth rate of the City's landfills). The Coastal Park landfill is expected to serve a major role in the future disposal of the CCT's waste because of its strategic geographical location and relatively long lifespan. Planned expansion of the landfill will allow it to remain open until approximately 2025.

The construction of linings for a new cell (Phase 2B) commenced at Coastal Park during 2003, to be completed by June 2004. The CPWD site facilities include a mini public drop-off station for after-hours disposal.

The CPWD site allows recycling of waste by informal salvagers managed by a private contractor. The following quantities of materials are estimated to be recycled annually at the CPWD site (Ref 7-10) – see Table 7.7. The total annual quantity of materials recycled is 374.2 t/annum (1,0%). Garden waste is regularly chipped by a private contractor (Interwaste) and removed from the site.

Table 7.7: Quantities of materials recycled at the CPWD site

Material	Plastic (Soft)	Plastic (Hard)	Paper	Cardboard	Metal	Glass
Tons/annum	40.0	-	226.0	4.6	77.1	26.5

The site is externally audited three times a year for compliance with the operating permit. A Landfill Monitoring Committee meets regularly.

7.3.4 Faure (CCT) GLB+

The Faure waste disposal site (FWD site) (see Figure 7.7), situated on the Old Faure Road, Eersteriver, is in the extreme southern portion of the Oostenberg Administration area near the border of Helderberg and Blue Downs. A permit to operate the site (until closure) has been applied for.

It is envisaged that the FWD site will operate for a possible period of approximately five years. The potential threat of groundwater contamination and increased urban development in the area has led to the decision to close and rehabilitate the site in the short-term. A waste transfer station may be required once the site closes.

The site occupies approximately 36 ha and currently receives general municipal waste, garden refuse and builders' rubble which is compacted in place. The landfill is approximately 34,5m high at its highest point. The volume of waste received at the site has increased from 166 000 T/annum in 1998 to a current disposal rate of approximately 211 000 T/annum, representing an average annual growth rate of more than 5%. The FWD site receives the least waste of the City's landfills.

The FWD site has an informal mini public drop-off station for after-hours disposal. The site is externally audited three times a year.

7.3.5 Swartklip (CCT) – GLB+

The Swartklip waste disposal site (SWD site), approximately 103 ha in extent, is located approximately a kilometre from the False Bay coast in the Cape Town Administration

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Figure 7.8: Photograph showing an aerial view of the Swartklip (CCT) waste disposal site

Figure 7.9: Photograph showing an aerial view of Vissershok (CCT) waste disposal site.

area, on the outskirts of Mitchell's plain. The site, serving mainly Mitchell's Plain and Khayalitsha, was closed in 2003 as a result of it's location near to a residential area and its potential for contamination of the Cape Flats aquifer, considered to be a future source of potable water.

The SWD site (see Figure 7.8) was not permitted, but prior to 2003 used for GLB+ disposal, with only selected builders' rubble currently being disposed of onto the site. The volume of waste received at the site increased from a disposal rate of 166 000 t/annum in 1998 to an amount of 211 000 t/annum in 2002/2003 – (see Figure 7.3), representing a growth rate of 6% per annum. A transfer station has been built on the site which was commissioned in 2003, with all wastes transported to the Vissershok waste disposal site, except for builders' rubble that is disposed of on the site, and garden refuse that is composted. The site is externally audited three times a year.

7.3.6 Vissershok (CCT) GLB+, Hh

The Vissershok waste disposal site, see Figure 7-9, approximately 210 ha in extent, is situated 25km north of Cape Town in the Blaauwberg Administration area, off the N7 and Frankdale roads. The site was permitted in 1998 for H:h and GLB+ disposal. The volume of waste received at the site has remained fairly constant, with 328 000 T/annum disposed of in 1998 and having a current disposal volume of approximately 317 000 T/annum. The disposal volume is, however, expected to increase significantly over the next five years as waste is received as a result of the closure of the Bellville South, Brackenfell, Swartklip and Faure landfills.

Disposal operations at the site include landfilling of containerised waste from the Athlone and Swartklip RTF's, co-disposal of liquid hazardous waste and solid waste in trenches (H:h) and landfilling of mixed domestic and industrial wastes (H:h).

The site is underlain by 0,4 to 5,0m of Cape Flats sand, overlying a 10 to 20m layer of clay, resulting in the site being located in one of the few areas within reasonably close proximity to the CTMA suitable for the disposal of hazardous wastes. The Vissershok site is made up of the following areas:

- Cell (0): Currently unused unlined landfill adjacent to Frankdale Road: Permit Status is H:h
- Cell (1): Current lined landfill receiving selected general waste.
- Cell (2): In use since January 2003.
- Cell (G): Used as a previous balefill operation, as a GLB+ facility. Currently in use for containerised and selected general waste.
- Pan Area: Existing area with discontinued H:H disposal.
- Encapsulation Area: Existing concrete encapsulation blocks, discontinued H:H disposal.

The present height of Cell (0) is approximately 50,0m. A further lined cell is planned for construction in 2004/05. A leachate treatment works was commissioned in June 2003.

The volumes of liquid wastes, sludges, fuel fired systems (FFS), foodstuff and sanitary wastes received annually at the site are shown in Table 7.8 below.

Table 7.8: Quantities of Liquid Wastes, Sludges, Contaminated Foodstuff, Sanitary and FFS Wastes

Waste	Liquid Waste	Contaminated Foodstuff and Sanitary Waste	Wastewater Sludge	FFS Waste
Tons/annum	22 200	3 300	53 000	1 380

The Vissershok site allows recycling of waste by informal salvagers managed by a private contractor. The following quantities of materials are estimated to be recycled annually at the BSWD site [(Ref 7-10)] – see Table 7.9. The total annual quantity of materials recycled is 652.1 t/annum (2,1%).

Table 7.9: Quantities of materials recycled at the Vissershok site

Material	Plastic	Paper	Cardboard	Metal
Tons/annum	59.9	277.7	60.0	154.5

The Vissershok landfill is expected to serve a major role in the future disposal of the CCT's waste because it is one of only two existing landfills that are expected to be in operation after 2007; it can accept high and low hazard wastes; it has good road and rail access; it has the infrastructure to receive and dispose of containerised waste and has a projected closure date of 2015. Furthermore, the site has potential expansion to remain open until 2031.

The site is externally audited three times a year for compliance with the operating permit. A Residents' Monitoring Committee meets regularly. The site is permitted in accordance with Permit No. 16/2/7/G203/D29/Y1/P300 dated April 1998, as amended in June 2003.

7.3.7 Vissershok Waste Management Facility(VWMF) - (Private Company) - HH

The Vissershok Waste Management Facility (VWMF) is the only privately owned and operated facility in the CTMA (owned by Enviroserve / Wasteman), and is located adjacent to the CCT waste disposal site at Vissershok. The VWMF is permitted for HH disposal and accepts, treats and disposes of low and high hazard waste and general waste. In 1997/98 the site disposed of approximately 295 000 t/annum [(ref 7-1)] and is estimated to currently receive in the order of 320 416 t/annum.

Co-disposal of wastewater sludge has previously taken place at the Vissershok site, but this practice has now ceased, with the sludge being disposed of onto agricultural lands at controlled and environmentally acceptable application rates (see Section 7.8).

The VWMF is expected to play a significant role in future waste management in the CTMA because it is the only site in the CTMA able to accept high hazard wastes (HH), and one of two sites in the CTMA able to accept low hazard wastes (Hh). The site is expected to remain open until 2014.

7.3.8 Future Regional Waste Disposal Facility (Hh, GLB+)

The US Trade and Development Agency (USTDA) report of June 1999 recommended that the CCT identify a regional landfill to serve the CTMA for the next 30 years. Technical and environmental consultants were appointed in 2001 to identify, investigate and permit a regional landfill for GLB+ and Hh disposal.

Some 75 sites were considered. Using economic, physical, environmental and social landfill siting criteria, three sites were finally short-listed. An extensive public consultation process took place, resulting in all three communities resisting having a landfill in their respective areas. Areas further distant from the CMA were then subject to reconsideration, resulting in a fourth site (Eendekuil) being added to the shortlist i.e.

- An area to the to the west of Vissershok (25 km away)
- An area to the south of Atlantis (35 km away)
- An area between Kalbaskraal and Klipheuwel (45 km away)
- An area to the south of Eendekuil (150 km away)

In order to take into account community concerns and potential legal implications, a special ranking model was developed, based on international guidelines and methodologies. Based on this, the short-listed sites ranked as follows:

- **Kalbaskraal** (best)
- Atlantis
- Vissershok
- Eendekuil (worst)

Based on the study, it was recommended that in terms of the Department of Water Affairs and Forestry's Minimum Requirements for landfill disposal [ref 7-4], the top ranking site, i.e. Kalbaskraal, be motivated for an Environmental Impact Assessment (EIA). DEADP subsequently required that an EIA also be undertaken for a second site (Atlantis). The EIA studies are currently taking place.

7.3.9 Old Landfill Sites No longer In Operation

Over the past centuries, waste was disposed of at numerous "dump-sites" scattered throughout the CTMA. A study is currently being undertaken by DEADP to identify and record details of old, abandoned landfill sites in the Cape Province. A study was undertaken in 1997 by Parsons and Associates [ref 7-11], that identified 26 old, closed sites within the CTMA. No

studies have been undertaken to date of their environmental impacts. Consequently, no rehabilitation or closure plans have been prepared. A study was undertaken in 1985 (ref 7-8) for the previous Ikapa Administration to investigate potential development options for the Guguletu landfill, situated adjacent to the N2 freeway.

The Waste Department has budgeted for the rehabilitation and closure of old landfills as well as existing landfills to be closed in the future (see Table 7.3). Capital costs shown in the table for individual landfills include capping and rehabilitation.

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7.3.10 Landfill Gas Management Facilities

None of the City's existing landfills currently extracts landfill gas for beneficial utilisation. It is estimated that, in the United Kingdom for example, approximately 0,5% of electricity within the national grid is supplied by 15 municipal solid waste disposal sites, with a goal of increasing this figure to 5% by the year 2010 (ref 7-1).

A greenhouse gas inventory for the CCT was prepared in 2003 that estimated approximately 38% of the total city's emissions (tonnes CO^2 equivalents) emanate from landfill sites (ref 7-3). A pre-feasibility study was completed by the South-South-North (SSN) Project Team in 2003 (an international project which assists in identifying, developing and transacting CDM projects under the Kyoto Protocol) to determine whether the Bellville South landfill would be feasible for landfill gas exploitation. A detailed feasibility study, undertaken by the SSN Project Team, is currently in progress.

The Bellville South landfill has three gas wells (not in production) which were installed in 2002 to determine the quantities of methane gas being generated. Tests revealed that the landfill will generate approximately 16,0 million m^3 of landfill gas per annum over the next 15-20 years.

The City is currently developing a "Cleaner Development Mechanism (CDM) policy. It is envisaged that this policy will identify a strategy and guidelines for seeking international funding based on carbon credit exchange.

7.3.11 Landfill Operations: Equipment and Infrastructure

All of the CCT's waste disposal facilities are staffed and equipped to ensure that the sanitary disposal of waste takes place in compliance with the respective permits. Staffing and staff management is dealt with in Chapter 2 (Institutional Arrangements) and will be affected by the restructuring process which is currently taking place.

Generally, each site is adequately equipped with its own plant and equipment, or at times, moved from site to site as the situation demands.

Typically, the BSWD site has the following equipment and operating staff maintained on site:

- 2 x Compactors (30 tonne Bornag and 20 tonne Rex) + operator
- 1 x Mercedes Benz tipper + operator
- 1 x CAT D6 R dozer + operator
- 1 x LDV + operator
- 1 x Hired loader + operator
- 2 x Permanent water tankers (one hired) + operator
- 1 x Kawasaki 4 wheel motorcycle + operator
- 1 x CAT vercatool (FEL or forklift) + operator
- 2 x Hired tipper trucks + operator

The operating costs and operating cost per ton of waste disposed for each of the City's landfill sites, is given in tables 7.1 and 7.2.

7.4 Refuse Transfer Stations

7.4.1 Athlone Refuse Transfer Station (ARTS) – 800 tons/day - GLB-

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The Athlone Refuse Transfer Station (ARTS), situated along the N2 (Settlers Way – Athlone), next to the Athlone Power Station, plays a significant role in terms of waste management in the CTMA. This facility serves to dispose of municipal solid waste from the central metropolitan areas of the city. Waste is brought to ARTS where it is currently compacted into containers and transported to the Vissershok waste disposal site by rail. ARTS currently handles between 600 – 800 tons of waste per day (approximately 15 200 tons/month).

ARTS has been in operation since 1978 when general municipal waste was delivered to the site by collection vehicles and discharged into large bunkers. This waste was then pulverised and transferred by means of overhead clamshell cranes onto inclined slat conveyors and carried to four static compactors which compacted the waste into 40m^3 box trailers. These trailers were then hauled to the Swartklip waste disposal site where the waste was ejected from the trailers and compacted as an integral part of the normal landfilling operation.

After 16 years of operation as described above, the aged plant and mobile units were no longer able to cope with the increased volumes of incoming waste and, together with environmental problems such as foul odours, required expansion and modernising of the facility. This modernisation resulted in the conversion of the plant to a baling process with the bales being transported to the Vissershok landfill by rail. This process was commissioned in August 1995.

A number of operational problems were experienced with the baling system, including high wear rates of equipment, odours, litter and fly nuisance. With the restructuring of local government in 1997, the CMC Administration assumed responsibility for waste disposal and transfer in the CMA and commissioned a study to investigate the upgrading of ARTS. The investigation led to the enclosing of the receiving apron with air treatment and extraction (Phase 1). The upgrading was commissioned in July 1999. Phase (2) of the upgrading, commissioned in 2001, resulted in the replacement of the baling and balefill process with compactable general waste being compacted into sealed containers which are transported to the Vissershok landfill for disposal. The containers are 30m^2 in volume and accommodate approximately 20 tons per container. Odour control at the site is effected by means of odour spray nozzles and dust extraction.

A Record of Decision (ROD) was received from DEADP (formerly DECAS) in July 2001 giving authorisation for the operation of ARTS as a waste disposal facility.

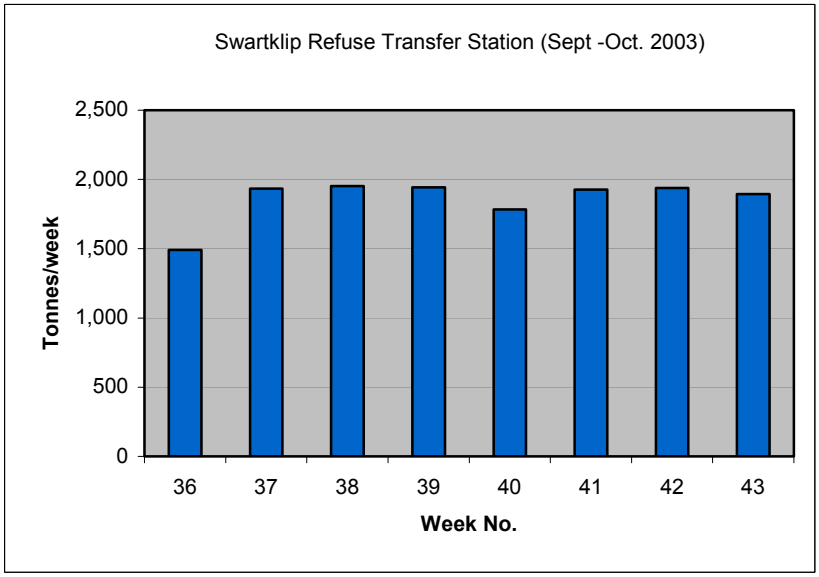
ARTS receives waste 24 hours a day and operates 5 days a week. The facility includes a Resource Centre to educate children and adults in waste management. A mini drop-off station was commissioned in 2003 for after-hours public disposal of rubble into 18m^2 and 22m^2 open containers.
A permit (Permit No. 16/2/7/G203/D29/Z10/P487) for the operation of the GLB- waste transfer station facility was issued by DWAF in July 2003. ARTS is audited externally three times a year.

7.4.2 Swartklip Refuse Transfer Station (SRTS) – 800 tons/day - GLB+:

The Swartklip Refuse Transfer Station (SRTS) is situated at the Swartklip waste disposal facility, described in Section 7.2.5. This facility serves to dispose of municipal solid waste from the eastern metropolitan areas of the Mitchell's Plain and Khayalitsha. Waste is brought to SRTS where it is currently compacted into containers and transported to the Vissershok regional waste disposal site in sealed containers. SRTS currently handles approximately 400 tons of waste per day (2000 tons/week).

SRWTS has been in operation since June 2003. After a scooping exercise was completed, a Record of Decision (ROD) was received from DEADP (formerly DECAS) in June 2001 giving authorisation for the operation of ARTS as a waste disposal facility. A permit (Permit No. 16/2/7/G203/D29/Z13/P437 for the operation of the GLB+ waste transfer station facility was issued by DWAF in October 2001.

Figure 7.10: Quantity of Waste Removed Weekly from SRTS to Vissershok by Road (5 day-week)(since commissioning of RTS)



7.4.3 Oostenberg Refuse Transfer Station (ORTS)

The City's Waste Department wishes to establish a refuse transfer station in the Oostenberg Administration area as the Brackenfell Landfill Site, which currently serves the area, is almost full and will be closed in the near future. Entech Consultants have been appointed to undertake the technical engineering consulting services and Knight, Hall, Hendry (KHH) have been appointed to as independent environmental consultants. KHH carried out a Scoping Exercise in 2002. An Environmental Impact Assessment (EIA), the next step in the process to identify a suitable site for a RTS, has not yet commenced.

7.4.4 Helderberg Refuse Transfer Station

A scoping process was initiated, but subsequently shelved, for a RTS to serve the Somerset West Administration area.

7.4.5 Somerset West Transfer Station

A refuse transfer station, privately owned by Wastec, is situated in Somerset West. The RTS is an open facility with a single compactor.

7.4.6 Closed Refuse Transfer Stations

A refuse transfer station at Simon's Town and two refuse transfer stations at Khayalitsha have been closed down.

Table 7.10: Council Charges at Drop-Off Facilities

Waste Type	User	Quantity	Charge	Containment
Garden Refuse	Household	-Car boot	Free	
	Household -	LDV/bakkie	Free	Bags/ Bundles
	Gardening Services	LDV/bakkie	Free	Bags/ Bundles
Household Refuse	Household	LDV/bakkie	Free	Bagged
Garage Waste	Household	LDV/bakkie	Free	Sorted and contained
Recyclables	All	LDV/bakkie	Free	Sorted and contained
Unsorted Waste	Commercial	LDV/bakkie	Free	
Builders Rubble	Commercial	LDV/bakkie	Free	Clean

Note: The LDV / bakkie load referred to in Table 7.10 is limited to a 1,0 ton load.

Table 7.11: Quantity of Waste Disposed off at -Off Facilities

Area/Suburbs	Annual Tonnage
Morningstar	14,750
Ladies Mile	20,400
Delft	750
Ruyterswacht	1,875
Tygerdal	3,800
5th Ave.	1,400
Ravensmead	1,300
Welgelegen	4,300
Belhar	570
Gordons Bay Drop-Off	10,000
Mowbray	1,400
Table View (now closed)	2,500
Total	**75,645**

7.5 Drop-Off Facilities

The City has a well-established network of community drop-off facilities throughout the metro. The City has adopted a policy of providing an equitable level of service to all households throughout the CTMA and previous areas served by a dedicated kerbside collection system for garden waste has been terminated.

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Households have a number of choices for the collection of garden waste including, topping up of existing household refuse bin, acquiring an additional container at a cost, using drop-off centres or employing private collectors. The drop-off facilities are at present principally made use of for the collection of garden waste and a to a limited extent, recyclables. Waste collected at the drop-off facilities is taken to recycling centres or composting facilities.

Consultants Ingerop Africa undertook a study into drop-offs in the Metro in October 2002 (ref 7-7). The study report presents the results of an investigation to quantify and evaluate the technical aspects and environmental and social costs and benefits of existing and future major drop-off centres in order that a strategy for drop-off centres can be developed and includes the following:

- An overview of current metro community waste drop-off system
- A market study for recycled material
- A market study for garden waste compost
- A green waste generation survey
- A stakeholder investigation
- Proposed improvements to seven existing drop-off centres
- An economic assessment
- Proposed strategic aspects for drop-off centres

7.5.1 Infrastructure

Drop-off centres are defined as formal facilities for the disposal of garden and garage waste by the public. The facility is generally conveniently close to the community with proper access control and provides for the diversion of green waste and recycable items into separate containers. The Ingerop Africa study reported that a "convenience" distance to a drop-off facility, generally a function of the surrounding road network, should be in the order of 5 and 7kms, with the shorter distance being more appropriate in denser residential areas.

At present the total number of dedicated drop-off centres in the CMA is 17, which are managed by the Waste Collection Department, with exception of the Culemborg and Ocean View drop-off centres. In addition to these 4 landfills have drop-off areas for public use, and these fall under the responsibility of the Waste Disposal department. On-site management generally comprises a gateman and depending on size, an assistant. Their responsibilities include access control, checking waste type and directing to disposal areas. In addition they are responsible for the general maintenance and tidiness of the site.

The Gordons Bay drop-off has recently been constructed and commenced operating in November 2003. Four new drop-offs are currently being planned, Kenilworth, Killarney, Kommetjie and Woodstock, and are expected to be in operation by July 2004. The Mowbray drop-off will shortly be closed down to make way for commercial development and investigations are in progress to identify a suitable site in the area to replace it.

It is noted that significant differences exist between garden drop-off centres in terms of layout, ease of use and control and management. A number of drop-offs also make provision for collection of separated wastes, builders rubble and general household refuse by providing skips or bins.

A list of existing facilities that provide drop-off facilities for segregated garden waste and garage waste is shown in Table 7.11. The location of these sites is also shown on Map 3.16.

The charges applied for dropped off material have recently been amended so that a uniform rate is used throughout the metro. The current charges are presented Table 7.10.

Figure 7.11: New Drop-Off Facility at Gordons Bay

7.5.2 Quantities Received at Drop-off Centres

An estimate of the quantities of waste disposed of at the current drop-off centres is based on information received from Council and their private contractors for 2002. It is estimated that some 80% of the quantities received comprises green waste. Quantities and approximate areas of generation are presented in Table 7.11.

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Table 7. 12 : Existing and Proposed Garden Waste Drop-Off Facilities

Area	Facility Name	Location	Facility Operation	Comments
South Peninsula	Coastal Park		Landfilling	Public Drop-Off
Tygerberg	Bellville		Landfilling	Accepts Garden Waste / No. Drop-Off
Blaauwberg	Vissershok		Landfilling	New Public Drop-Off Proposed
Oostenberg	Faure			Accepts Garden Waste / No Drop Off - Closure in Progress
Cape Town	ARTS		Transfer Station	No Public Drop-Off
Tygerberg	Swartklip		Landfilling	Accepts Garden Waste / No Drop Off - Closure in Progress and new transfer station built.
Oostenberg	Brackenfell		Landfilling	Accepts Garden Waste / No Drop Off - Closure in Progress
Tygerberg	Morningstar	De Villiers Road	Pre-processing	Contractor managed
Helderberg	Macassar	Zandvliet Road		
South Peninsula	Hout Bay	Main Road		
South Peninsula	Ladies Mile	Ladies Mile Road	Pre-processing	Contractor managed
Cape Town	Schaapkraal	Vlei Road		
Tygerberg	Delft	Fabriek Street		
South Peninsula	Retreat	10th Avenue		
Tygerberg	Ruyterwacht	Drommedaris Street		
Tygerberg	Tygerdal	Orange Street		
Tygerberg	5th Avenue	Frans Conradie Road		
Tygerberg	Ravensmead	Industrial Ring Road		
Tygerberg	Welgelegen	Malmesbury Road		
Tygerberg	Belhar	Adam Tas Road		
Blaauwberg	Atlantis	Dassenberg Road		
Helderberg	Gordons Bay	Firlands Road	Pre-processing	Contractor Managed
South Peninsula	Simons Town	Main Road		
South Peninsula	Kenilworth	Wetton Road		Currently being Permitted
Blaauwberg	Killarney	Potsdam Road		Currently being Permitted
South Peninsula	Kommetjie	Kommetjie Road		Currently being Permitted
Cape Town	Woodstock	Beach Road		Currently being Permitted
Cape Town	Athlone	Settlers Way		Proposed
Cape Town	Mowbray	Klipfontein Road	Pre-processing	To be Closed

The operation of the Morningstar, Mowbray and Ladies Mile sites has been contracted out to a private contractor. In the case of the Morningstar site a private contractor is responsible for the collection of containers from seven smaller drop-off centres and disposing of them to landfill. Four of the sites generate garden waste, which is brought to Morningstar for pre-processing. Processed garden waste is then sold on to Biocircle at Klapmuts. At the Mowbray site a private contractor is responsible for chipping the garden waste and removing it. At Ladies Mile, a private contractor is responsible for managing the entire site, disposing of general waste to landfill and pre-processing of garden waste. Likewise the processed garden waste is sold on to Biocircle at Klapmuts and Master Organics in Ottery. There has been a noticeable improvement in the operation of the site since being taken over by Interwaste.

In general the management of the drop-offs under the control of Council was between poor and acceptable, the main problem identified being the screening of incoming waste and tidiness.

7.6 Composting Facilities

7.6.1 Introduction

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One of the main focus areas for the National Waste Management Strategy (NWMS) is waste minimisation and recycling and in line with this, composting is encouraged. The composting of garden waste and domestic waste (organics) can help decrease the amount of solid waste that must be sent to a landfill thereby reducing disposal costs and conserving valuable airspace. At the same time, composting can yield a valuable product for use by farmers, landscapers, horticulturists, local authorities and property owners as a soil amendment or mulch.

Composting is the process of controlled biological conversion of organic material into stable cured humus-like products. It can be undertaken either aerobically (in the presence of oxygen) or anaerobically (in the absence of oxygen).

Anaerobic decomposition generates a number of odorous by-products, and it is normally undertaken in-vessel - within enclosed units - with careful control and treatment of the gases generated from the process.

Current composting operations in the CMA and elsewhere are aerobic composting operations using the windrow method operated outside. Typically, aerobic composting procedures involve stacking and turning material in outdoor, elongated windrows. The processing and composting of organic waste is a six stage process, which involves:

(a) Receipt of Raw Material/Feedstock

The first step in the process is acquisition of raw materials. Depending on the final products a range of organic materials can be composted and these may include;

- Garden and landscaping material (grass, leaves, plants, loppings, branches, tree trunks and stumps)
- Untreated wood waste (sawdust, shavings, timber off cuts, crates, pallets, wood packaging)
- Natural fibrous material (seed hulls/husks, straw, grape marc, other natural fibrous material)
- Processed fibrous material (paper, cardboard, paper processing sludge, non-synthetic textiles)
- Biosolids and manures (sewage biosolids and animal manure)
- Food waste

(b) Primary Treatment (Mixing and/or Size Reduction)

The majority of raw feedstock is unsuitable for direct incorporation into composting without size reduction. This can be undertaken via a number of means but most commonly using industrial tub grinders/shredders. Large grinders are also an effective means of mixing different raw waste streams prior to composting.

(c) Composting

There are a number of different types of aerobic composting systems.

Table 7. 13: Types of Composting Systems

Type	Odour Control	Establishment Costs
Static windrows	Lowest Odour Control	Low set-up costs
Turned windrows		
Forced aerated static pile		
Aerated covered windrows		
Rotating drums		
Agitated bed or channel		
Full in vessel composting	Highest Odour Control	High set-up costs

Aerobic composting comprises 2 stages - the thermophilic stage (so called due to the high temperatures generated during decomposition) and the curing stage. As the thermophilic stage of the composting process depends on a number of variables, mainly the availability of oxygen, water and nitrogen, the duration required can vary from a few days for in-vessel methods to a number of months for static piles.

For windrows and static pile methods of composting, large areas are required compared too more automated methods such as in-vessel. However all methods generally require large areas for static piles for the subsequent curing process.

(d) Curing

The curing stage of the composting process is a period of declining microbial activity and decomposition where the compost becomes more stable. Curing normally occurs in static windrows and could last anywhere from 1 to 12 weeks depending on the nature of the material.

(e) Screening/Final Product Preparation

The preparation of the compost for final sale and distribution often involves a process of quality control whereby the cured and stabilised product is screened and segmented into different streams. Additives such as sands, loams, limes etc. can also be added at this point to enhance the compost product and tailor it for certain market sectors.

Composting reduces the weight of the waste by approximately 40 to 50 percent. The finished product is humus, a dark-brown material referred to as compost together with heat, water, and carbon dioxide. In addition to reducing waste volume, compost is a valuable commodity in itself. Compost has found widespread use in agriculture as well as in the horticulture and silviculture industries. As a soil amendment, compost can increase plant growth and suppress weed growth and increase soil fertility, improve soil structure and aeration and its ability to retain water and nutrients.

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(f) Packaging, Storage and Sales

Once the compost products have passed the quality control stage and are segmented into different product streams, they are suitable for sale either via distribution to retail outlets or direct sale at the facility. Products are normally sold in both bulk form and in a variety of bagged sizes for the retail market.

Market development depends upon the quality of the compost produced. The horticultural market requires high quality compost whereas in agriculture or as a restoration material it may be of lower quality. However to produce good quality compost a stream of high quality compostable material is required which implies that collection and separation systems need to be developed to ensure that undesirable materials are kept out of the feedstock.

7.6.2 Existing Composting Facilities

A number of composting facilities have been identified within and adjacent to the CTMA which process organic materials including garden waste and supply end products to the local market. Two of the facilities are owned by the City Council and predominantly process mixed household waste.

The facilities use a variety of feedstock of which garden waste is currently a small proportion. The current input tonnage of garden waste received at existing compost facilities is estimated to be in the order of 30,000 tonnes per annum. This quantity consists of approximately:

- 20,000 t from the Morningstar Drop-Off Centre
- 9,000 t from the Ladies Mile DOC
- 2,000 t from the Culemborg Depot

Facilities currently accepting garden waste for composting are listed below:

- Biocircle Composting, Klapmuts
- Master Organics, Ottery
- Reliance, Klipheuwel

Existing large composting facilities in the region were identified and information obtained on their process, capacities and products. A summary of the existing facilities is given in Table 7.14.

The total output of all composting facilities listed is in the order of 150,000 t/annum. Of this total only some 15% has been derived from garden waste. In addition to the listed composting facilities there are a number of smaller concerns in the CTMA, which are producing on average 400 – 500t per annum.

7.6.2 (a) Radnor Composting Plant

The Radnor Composting Plant is situated in Radnor Road, in the industrial area of Bellville South. The facility is currently not permitted with no EIA having been undertaken. A study is planned to commence in 2004 to permit the site and recommend upgrading and extensions to the plant.

The site generally receives approximately 3000 tons per month of general waste of which approximately 50% is returned to landfill disposal. The cost per ton of producing compost at Radnor (based on the current operating costs, excluding administrative costs and overheads) is R482.00/ton. The facility employs a staff of 19 persons.

Process:

The plant, consisting of the imported "Buhler System" is considered to be very old (age unknown) and comprises two identical processing units, housed in the same facility and fed from a front, roofed-over apron.

The apron consists of two bunker areas (total capacity of 200 tons) into which the waste is deposited from the collection vehicles (ref 7-10). An overhead crane and grab feeds waste from the bunkers onto two 45° inclined slatted conveyors, each feeding one of the processing units.

Waste is first loosened by means of a "shaker" prior to entering the primary underground horizontal hammer mill, which sizes the waste into 200mm x 200mm particles (coarse ground). An inclined conveyor transports the waste from the hammer mill to a vibrating conveyor where metal is removed by an electro-magnet. The waste is then conveyed to a "Dano" drum, a 30,0m long x 4,0m diameter slow (1rpm) fermentation drum, where the waste is aerobically fermented at an operating temperature of 65^0C for 10 to 14 hours using induced aeration. The tumbling action of the drum thoroughly mixes the waste and advances the waste to a screen where the waste is passed through a 70mm and then a 20mm sieve. The rejected waste is fed to a $28m^3$ RORO (on tracks) which transports the rejected waste to the landfill. The sieved waste (compost) then enters a secondary hammer-mill which further reduces the particle size prior to placement into external windrows where the compost is cured prior to disposal. The windrows are turned every 10 days. Compost is sold mainly to farmers, either in bulk or $40dm^3$ bags.

7.6.2 (b) The Sacks Circle Composting Plant

The Sacks Circle Composting Plant is adjacent to the Bellville South Wastewater Treatment Works, off Sacks Circle, in the industrial area of Bellville South. The facility is currently not permitted with no EIA or EMP having been undertaken. As with the Radnor composting site, a study is planned to commence in 2004 to permit the site and recommend upgrading and extensions to the plant.

The site generally receives approximately 2200 tons per month of general waste of which approximately 50% is returned to landfill disposal. The cost per ton of producing compost at the Sacks Circle plant (based on the current operating costs, excluding administrative costs and overheads) is R288.00/ton. The facility employs a staff of 18 persons. This cost is significantly less than the Radnor composting works, although it must be taken into account that the compost produced at the Sacks Circle plant is significantly inferior in quality.

Process:

Generally mixed municipal waste is brought to the site and dumped onto a concrete apron and pushed directly onto a slatted conveyor by a front-end loader. Workers sort waste from recycling posts alongside the conveyor belt where metal, wire, plastics, paper, glass and bulky waste are removed. The waste then passes an overhead electro-magnetic separator. No cardboard, paper or glass is removed.

The waste is fed into a horizontal-shaft primary mill. An inclined conveyor transports the pre-milled waste to a secondary mill, from where the waste particles pass through a coarse drum sieve with 30mm openings. The sieved waste particles are transferred via three angled horizontal conveyors to a mobile drum sieve, shear-shredding the particles into a 5mm fraction size prior to transfer to external open windrows. The windrowed waste matures for a period of approximately 4 months, with the windrows turned monthly. Moisture is added when required by using treated wastewater.

The matured compost is sold to farmers either in bulk or 40dm^3 bags. In the past, treated sewage sludge was used to supplement nutrients in the compost. This practice was stopped at the request of the farmers.

7.6.3 End Users of Compost

The following broad classifications of potential markets for compost have been identified for the CTMA market:

(a) Intensive Agriculture

Recycled organic composts and mulches are used to enhance soils, for water conservation, suppression of weeds in horticulture and viticulture applications, e.g. for cut flowers, fruit trees, vegetables, grapes and turf grass growers.

Various bodies such as the Elsenberg Agricultural College, the Department of Agriculture at the University of Stellenbosch and compost producers could not provide any definitive figures for demand however they all agreed that there was a growing trend towards organic farming and that the demand for compost would increase significantly in time. In addition the sandy soils of the Phillippi and Joostenberg Vlakte farming area require significant enhancement for improved water retention and production, for which compost is most suitable.

A supplier of fertilizer to the Phillippi farming community indicated that the demand for chemical fertilizer was in the region of 50t/hectare per annum. The Phillipi farming area is estimated to be some 2,600 ha which would indicate that the fertiliser requirement is of the order of 130,000 t per annum. A constraint on the demand for compost is inevitably the cost, being double that of fertiliser at some R45/t.

(b) Rehabilitation

Compost and mulches are used as landfill cover, to stabilise eroded land, and for land reclamation and re-vegetation. The requirements for high quality compost can be relaxed in this instance. Currently Coastal Park, Bellville and Vissershok still have a finite lifespan and cover material will continue to be required. The remaining landfills are in the process of being closed and will require final capping.

(c) Urban Amenities

The material is used by landscape gardeners, local government (for parks and gardens) and nurseries (retail sales). Composts, mulches and manures compete with other chemical soil conditioners on the market but processors are blending organic material with a range of products to meet market specifications. The value of organic materials varies from R100/tonne to R500/tonne for bagged and blended products.

A number of the large nurseries were approached for an indication of annual sales of compost to the public and landscaping services however many were unwilling to give this information. Those that did the quantities ranged from 800 to 1,700t per annum. It is estimated that there are some 30 large nurseries in the CTMA, which would indicate an average demand of some 38,000 t per annum. In addition large supermarket outlets also stock compost and it is estimated that this demand could be some 10,000t per annum[(ref 7-7)].

The Department of Parks and Forest indicated that their demand for compost was not high. They procured most of their compost and required in the region of 50t per depot of which there were 20 giving an annual demand of 1,000t.

7

Table 7. 14: Existing Composting Facilities in the CTMA

Company	Location	Ownership	Processing Type	Feedstock	Annual Output	Market
Reliance Compost Trust	Joostenberg Vlakte	Private	Turned Windrows	Fruit waste, winery waste, kraal manure, garden waste	23,000t	Agriculture
Brunig Compost Processors	Vissershok	Private	Forced Aerated Static Piles	Woodchips, garden refuse, kraal manure, sewage sludge (Potsdam STW)	26,000t	Agriculture, landscaping, general public
Biocircle	Klapmuts	Private	Forced Aerated Static Piles	Vineyard waste, woodchips, cattle manure, garden waste	24,000t	Agriculture, landscaping
Master Organics	Ottery/Phillipi	Private	Turned windrows	Woodchips, poultry manure, garden waste	14,000t	Agriculture, nurseries, retail
Cape Compost Sales	Bloubergstrand	Private	Turned windrows	Mushroom waste	15,000t	Agriculture, landscaping, nurseries, retail
Stanler Farms	Fisantekraal	Private	Turned windrows	Mushroom waste, straw, chicken manure	24,000t	Landscaping, general public
Radnor	Parow	Council	Rotating Drums	Household waste	19,000t	Uncertain due to poor quality
Bellville	Bellville South	Council	Static windrows	Household waste	9,500t	Uncertain due to poor quality

7.7 Rubble Disposal Facilities

Builders' rubble can be disposed of in small quantities (LDV/bakkie up to 1,0tonnes capacity) at Drop-Off facilities at no charge. Alternatively, clean builders' rubble is accepted free of charge at the various City's landfill facilities for on-site use.

Due to the increasing cost and scarcity of airspace at the City's landfills and due to the predicted high cost of transportation once the City's future regional site is commissioned, greater pressure will arise to dispose of builders' rubble at selected, dedicated sites within the CTMA area.

There are a number of privately-owned sites that accept builders' rubble.

7.8 Incineration Facilities

Incineration is used on a small scale in the CTMA to mainly dispose of medical, pharmaceutical, abattoir and veterinary wastes (regarded as hazardous wastes – see Chapter 5). The CCT does not own or operate any incineration facilities. Incineration is undertaken by specialist private contractors at permitted sites and by the Provincial Administration at various hospital sites.

Abattoir wastes, butchers' waste and animal carcasses are currently disposed of at the Vissershok waste disposal site by trenching and co-disposal with general waste.

7.9 Alternative Waste Disposal Technologies

In an endeavour to provide the City with the most cost-effective and environmentally acceptable waste disposal system, the Waste Department has considered many alternative technologies that have come to light in recent years (i.e. alternative to disposal by landfill). These technologies include incineration, pyrolysis and digestion, or a combination of these. Many private companies have presented proposals to the City, offering systems that are claimed will benefit the City in terms of cost and environmental improvements. Few, if any, of these alternative technologies can be demonstrated elsewhere that they will be suitable for the disposal of Cape Towns' waste.

Given the Polokwane Declaration (2001), which calls for a plan to be developed for zero waste disposal in South Africa by 2022, alternative disposal technologies may well prove to be a solution, and this issue will be taken up in the development of the City's IWMP.

7

Table 7.15: Summary of Existing Landfills in the CTMA

Landfill	Vissershok (CCT)	Coastal Park	Bellville South	Bracken-fell	Faure	Swartklip	Vissershok (VWMF)
Classification	H:h	GLB+	GLB+	GMB+	GLB+	GLB+	H:H
Permit Status	Permitted 1998	Permitted 2000	Permitted 2003	Permitted 1995	None	(Landfill Closed)	Permitted 1997
Permit No.	16/2/7/G203/ D29/Y1/P300	6/2/7/G203D 29/Z4/P377	6/2/7/G203D 29/Z6/P490	B33/2/720/ 211/S/P203	-	-	
Expected Closure Date	2015	2016	2006	2005	2007	Closed	2014
Catchment Area	CTMA	South Peninsula	Tygerberg	Brackenfell	Kuils River	Mitchell's Plain	CTMA
Volume Waste Received (T/a)	317 000	377 000	320 000	78 743	211 000	30 000 (a)	295 440
Remaining Air Space m^3 (b)	9 000 000 (800 000)	6 800 000 (2 000 000)	1 500 000 (650 000)	240 000 (240 000)	750 000 (750 000)	0	3 500 000
Soil Type	Clayey	Sandy	Sandy	Granite Rock	Sandy	Sandy	Clayey

Notes:

Note (a): Only builders' rubble is now disposed of at the Swartklip landfill .

Note (b): Figures in brackets are the estimates of the airspace currently available prior to new linings being required. New linings at Coastal Park landfill are currently being installed which will increase the available airspace once completed.

7.10 Gap Analysis

Restructuring of local government in June 1997 led to the Waste Department of the CMC Administration being given the responsibility for the disposal of all municipal solid waste generated within the CTMA. Since then, the function of waste disposal has been transformed to a situation where all waste received at the various existing waste disposal facilities is disposed of in an environmentally safe and sanitary manner that complies with the minimum requirements of DWAF and DEADP guidelines and permit conditions. The Faure Waste Disposal Site is the only landfill facility that does not have a permit to operate, but a permit application has been applied for. An external auditing system is in place to ensure that waste disposal is compliant with permit requirements. The City of Cape Town is furthermore regarded as a leading South African

Whereas there appears to be few "gaps" regarding waste disposal, the main issue of concern is that of sustainability. The imminent closure of four of the city's seven landfills, the Waste Department's declining human and financial resources, the rising cost of landfill airspace, the difficulty of finding public acceptance for the siting of a future regional waste disposal facility, the envisaged costs required to build and operate future transfer stations, the substantial costs of capping and rehabilitating old and closed landfills, the stringent national requirements for developing waste disposal facilities and the increasing quantities of waste being generated within the CTMA are key areas that will need to be assessed and taken forward to the strategies of the IWMP.

The Gaps and Needs are summarised as follows:

GAPS	NEEDS
❑ Closure of existing landfills and consequent declining available landfill airspace.	❑ Need to optimise lifespan of existing landfills ❑ Need to develop a regional waste disposal facility ❑ Need to develop waste transfer facilities ❑ Need to reduce the quantities of waste requiring land-filling.
❑ Declining human and financial resources	❑ Need to develop a optimal organisational staffing and management structure ❑ Need increase the City's budget allocation for capital and operating expenditure ❑ Need to review the extent of private sector involvement in waste disposal ❑ Need to review the policy regarding "free loads" disposed of at landfill and drop-off facilities
❑ Development of a regional landfill site	❑ Need to win public acceptance for a preferred site ❑ Need for financial and human resources to develop and operate a regional facility
❑ Capping and rehabilitation of closed landfills	❑ Need for financial allocation of funds to address the environmental rehabilitation of old and closed waste facilities. ❑ Need to determine appropriate technical solutions

	for capping and rehabilitation
❑ Reduction of waste disposed of at landfills	❑ Need to determine appropriate and affordable solutions for waste reduction, e.g. composting of garden waste, recycling builders' rubble. ❑ Need to review alternative technologies for waste disposal, e.g. waste digestion, landfill gas extraction, recycling, etc.
❑ The City has no integrated waste information system	❑ Need to develop an integrated waste information system (WIS)
❑ Development of Drop-off facilities	❑ Need to integrate planning of drop-off facilities with planning of landfill disposal and other waste disposal facilities such as composting plants
❑ Integration of waste disposal with other waste management functions	❑ Need to develop an integrated approach in the planning of waste disposal in conjunction with waste collection, area cleaning, waste minimisation, and other waste management functions

7.11 Summary and Conclusions

Since 1st July 1997, following restructuring of local government, the CMC Administration took over the responsibility for all municipal waste disposal in the CTMA. The Waste Disposal department has since brought waste disposal to levels of service that closely comply with the Minimum Requirements of the Department of Water Affairs and Forestry at all of the operating facilities in the metropole. Standards of public health and the state of the environment have consequently improved but the cost of waste disposal has risen significantly.

Given the situation that the City of Cape Town is currently engaged in a process of institutional restructuring and reform, the Waste Disposal department is unable to reach optimal levels in terms of its staffing, provision of infrastructure and financial resources due to constraints being applied.

Arising from the Feasibility Study towards an Integrated Waste Management Plan undertaken in 1999 (ref 7-2), the Waste Disposal department has adopted a strategic decision to develop a regional waste disposal facility for the future disposal of waste, to be serviced from a number of transfer stations to be established in the CTMA. This decision means that waste reduction will play an more vital role, given the high cost of transporting waste to a remote facility.

A summary of the existing waste disposal facilities (landfills) is given in table 7.15. This table furthermore summarises the remaining airspace and life-spans of the city's landfills.

The role of the private sector in waste disposal must not be ignored. The disposal of hazardous wastes is largely undertaken by the private sector and a significant quantity of the waste stream, especially with regard to commercial and industrial wastes, is disposed of at privately-owned waste disposal facilities.

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Chapter 8 – Waste Minimisation

This Chapter presents the Status Quo of Waste Minimisation Activities that have taken place within the City of Cape Town in the recent years. All projects and activities described have either been the result of the City Council's Integrated Waste Management Planning, or were started independently through private initiatives from industries, commerce, residential community groups or NGOs

8.1. Waste Minimisation

8.1.1. Introduction

There is currently no legislation in South Africa explicitly requiring "Waste Minimisation" measures as part of day-to-day waste management. There are however some policies and planning documents such as the White Paper on Integrated Pollution and Waste Management (2000)[ref 8-6] and the National Waste Management Strategy (NWMS) Action Plans (1999)[ref 8-7] that provide some strong guidelines, practical recommendations and targets in this regard. A framework for future legislation to implement waste minimisation projects mandatory at all strategic levels (see also hierarchy below as Figure 8.1) is given by the Integrated Waste Management Bill [ref 8-5] (see also Chapter 4 for a more detailed discussion on legislation and policies).

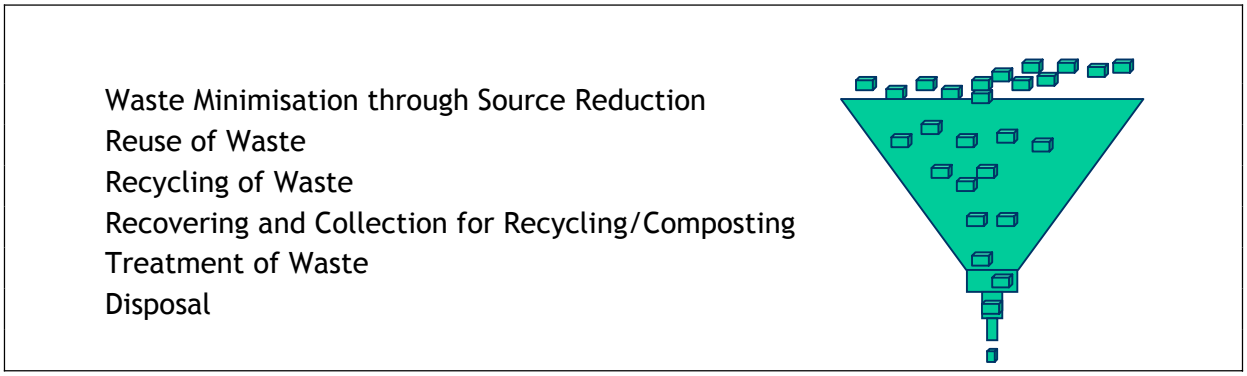

Figure 8. 1 The Hierarchy of Waste Minimisation

8.1.2. Various Definitions of Waste Minimisation:

Internationally there have been several definitions proposed for the term "Waste Minimisation" (WM) as it is a broad term that has different meanings for a variety of stakeholders. This fact continues to create confusion among waste management professionals in South Africa who do not have a common understanding/opinion of the definition of WM. For many South African authorities "waste minimisation" is considered to be inclusive, comprising ALL elements of the integrated waste management (IWM) hierarchy (as listed above). There is however also a school of thought that (following the European definition outlined below) reserves the use of the term only for one specific aspect of the IWM strategy, namely the "Source Reduction" component.

In the context of local industrial and commercial source reduction, "Waste Minimisation" in Europe is described as 'a preventative approach to environmental management through which goods and services are produced with the minimum environmental impact under present technological and economic limits'. The terms "waste minimisation", "cleaner production", "pollution prevention" and "source reduction" mean essentially the same and

are aimed at the optimisation of the integrated resource management (including the reduction of water and energy consumption, raw materials and all wastes and emissions).

According to DEAT's NWMS (ref 8.7) however "Waste minimization comprises any activity to prevent or reduce the volume and/or environmental impact of waste that is generated, treated, stored or disposed of".

According to the Institute of Waste Management South Africa (IWMSA) Policy Statement on Waste Minimisation (ref 8-10) World Health Organisation (WHO) and United Nations Environment Programme (UNEP) describe the term "Waste Minimisation" as the 'reduction, to the extent feasible, of waste that is generated or subsequently treated, stored or disposed of. It includes any source reduction or recycling activity undertaken by a generator that results in either (1) the reduction of total volume or quantity of waste, or (2) the reduction of toxicity of hazardous waste, or both, so the goal of minimising present and future threats to human health and the environment.'

IWMSA (ref 8-10) describes WM as any activity that has the target to minimize waste generation and pollution at source and to promote a hierarchy of waste management practices, namely reduction of waste at source, re-use, recycling (and safe disposal as the last resort). Safe disposal will not be subject to this Chapter but has been discussed separately in Chapter 7.

For the continuation of this chapter the following inclusive definition of "Waste Minimisation" will be used: **'Waste minimization comprises any activity to prevent or reduce the volume and/or environmental impact of waste that is generated, treated, stored or disposed of".**

8.2. Chapter Structure, Methodology and Definitions

Due to the complexity of the term "Waste Minimisation" with its many components a detailed description of how this chapter is structured, and the way and logic applied for accessing information for this chapter, as well as spelling out any terms and definitions that are used is so as to avoid misunderstandings on the items discussed.

8.2.1. Chapter Structure and Layout

With regards to the Chapter layout, the subsections have been described in accordance to the waste management hierarchy, starting with a status quo on all known Source Reduction activities then moving along to Waste Reuse and Exchange Initiatives, followed by Waste Recycling to Waste Recovery and Collection for Recycling. Composting activities were discussed separately and in detail in Chapter 7 since this is a service delivery item that is currently managed by the Disposal section of the Solid Waste Management Department. The description of composting and green waste recovery is therefore not within the scope of this Chapter despite the fact that composting makes a significant contribution to reducing the amount of waste going to landfill.

Throughout the Chapter any aspect of Waste Minimisation discussed comprises of Cape Town based/linked activities that take place on ALL levels within the community including the industrial and commercial sectors, the Government sphere, residential households, community structure, NGOs and schools etc.

Definitions and terms are clearly allocated and reserved for specific roles, activities and functions of a certain segment of the Cape Town community who all form part of a symbiotic and interactive net of individuals and groups that are somehow interlinked, and who provide (in)direct input to Waste Minimisation activities in Cape Town (see also 8.2.3 for a structure of the main stakeholders and related definitions).

8.2.2. Data Collection Methodology

As the collection of accurate, reliable and reproducible data forms the vital backbone of a study that ultimately seeks to develop policies and strategies for better waste management and decision-making, a thorough data collection programme was undertaken. Unfortunately, due to the size and complexity of the waste minimisation segment in Cape Town, not all stakeholders could be consulted.

Certain activities, such Waste Minimisation through Source Reduction, or Industrial Waste Recycling, are only practiced by a limited amount of individuals or companies and can therefore be easily identified and evaluated. This is also the case for structures such as Community or NGO driven "Drop Offs for Recyclables" where the key players are well known and most of them could be interviewed to establish their performance as well as their current needs.

It was not possible to assess all the "commercial buy back centres" and/or mobile commercial collectors of all sizes (ranging from micro collectors to small, medium and large collectors - see also 8.2.3)[1], and the total amount of waste they collect and transport to the end users (the recyclers). In that case a representative random survey of a total of 10 interviews was made (see also 8.6 for more information).

Questionnaires were compiled with all questions relevant to a certain stakeholder group. All questionnaires were either faxed/mailed to the relevant parties or the given answers were filled in directly on the basis of a telephonic interview. All interviews were undertaken by the consultant with support of four staff members from the Fairest Cape Association. (See Appendix A for a complete set of questionnaires used).

The following parties were contacted and questionnaires submitted:

- *A total of 24 recyclers - **all** end users of paper, glass and plastic in Cape Town were interviewed and a total of 16 questionnaires were filled in and received by the IWMP team for evaluation*

[1] See also 8.2.3 for Terms and Definitions

- *Industrial forums including Packaging Council of South Africa (PACSA), Plastic Federation of South Africa (PFSA), the Glass Recycling Association and Collect-a-Can and the Rose Foundation received questionnaires to supply Cape Town specific data and 3 completed questionnaires were received back.*
- *Collectors - a survey of 10 individual collection businesses was undertaken (from 21 questionnaires 10 collectors supplied information).*
- *Community/NGO collection, reuse and recycling initiatives - all known community initiatives (20) received questionnaires and 13 interviews/filled in questionnaires were received.*

The results, trends and outcomes of the individual questionnaire evaluation sheets are summarized and discussed under the respective Waste Minimisation sub-sections.

8.2.3. Terms and Definitions

The following terms and definitions are used throughout this chapter.

Waste Recycling: Term for the **physical product manufacturing** from waste materials which is **only** done by local businesses who are technically equipped to be able to change the properties of a former waste material into a new product (e.g. making plastic pellets out of plastic waste, melting waste glass for new bottles and melting beverage cans for new steel appliances.

There is a distinction between close loop and open loop recycling. Close loop recycling happens either within the same company where waste materials from one process is "internally recycled" for another process step or it is a situation where companies exchange each others waste materials for recycling without any other outside waste streams incorporated. (This is for example the case for some closed loop plastic recyclers who's sole purpose is only to process and add value to a waste stream (transferring it from waste into a sellable commodity) that is received from specific large industries (such as Sans Fibres). For this chapter only *open loop* recycling dynamics in Cape Town will be investigated where recyclers receive their materials from different and varying sources.

Note: In this report the limited examples of true "resident" based recycling initiatives (such as community projects/NGO initiatives who make clocks out of old CD ROMs, run Waste to Arts projects etc) are all grouped under "residential reuse activities".

The term "recycling" is therefore exclusively reserved for industrial waste-to-product manufacturing only.

Waste Recovery and Collection for Recycling: Term for any activity that is aimed at retrieving recyclables out of the waste stream (either post-consumer or pre-consumer) so that they can be ultimately passed on to the respective recycler (i.e. end-user). Waste recovery and collection (plus in some cases sorting and/or pre-processing for recycling) is typically done by any individual or group further described below or the recyclers themselves.

Micro Scale Collector: Term for any otherwise unemployed (often homeless) individual who collects waste with the help of a trolley or bag. Recyclable materials collected by micro-collectors are either coming directly out of factories and businesses in industrial areas or commercial hubs such as shopping centres (all termed Pre-consumer wastes) or are received from post-consumer sources such as household waste bins and landfill sites. Due to their transport limitations micro scale collectors are predominantly selling their recovered materials to buy-back centres and depots (the latter are often established through respective recycling (end-user) firms) who act as a "middle man"). Unless micro-collectors are situated closely to end-users for recyclables (who in fact might not accept the type and quality of their materials unless better sorted or pre-processed (e.g. by baling) they have mostly to sell to "middle men" and therefore receive only a fraction of the actual value of the recyclables from the recycler.

The social position, educational levels and public acknowledgement for micro-collectors is low and there is hardly any recognition or support for the important work they do. In many cases communities try to actively discourage micro-collector driven waste recovery as they consider them a crime and security risk.

Small Scale Collector: Term used for any (otherwise unemployed) independent individuals that are in the position of a motorised vehicle (typically a bakkie), which enables them to collect waste from factory outlets. According to statements from various plastic recyclers this type of collection mechanism has experienced a significant growth over the last few years. Due to their mobility and better flexibility, small scale collectors are mainly targeting pre-consumer waste sources and establish close working relationship with some of the recyclers as well as the businesses that supply them with waste materials. There are many cases where small-scale collectors have been trained by recyclers on how to sort waste into different grades and types (e.g. for plastic and paper) and provide apart from collection also some kind of pre-sorting service. Small-scale collectors are able to react very quickly to the price fluctuation of the local recycling markets, which strongly determines the type of materials they collect and to whom they sell their recyclables.

Large Scale Collector: Term for a collector that typically manages a whole fleet of collection vehicles (large trucks) and has premises where collected waste is sorted and often to some degree processed (e.g. pre-sorting and granulating of plastic waste). In such cases they act as an *intermediate processor*. An average size of a large-scale collection business would be at least 5 people. Typically the large-scale collectors supply the largest amount of recyclables to the end users. Some large-scale collectors are highly specialised (e.g. one type of plastic only) whereas other large-scale collectors are taking in any type of recyclable. The premises of a large-scale collector also often serve similarly as a buy-back centre/commercial depot (see also next definition)

Buy-Back Centre/Depot: Term for a location where mostly post-consumer but also pre-consumer waste materials are bought and collected. Those centres/depots are positioned throughout the City (preferably in waste catchment areas and industrial and commercial nodes) and act as satellite stations for the recycling industry who receives a large amount of their materials from there. Buy-backs are often directly supported by a respective recycling firm who offers start up finance, a location and infrastructure for an individual to get started and to collect waste for them. Most Buy-backs accept all types of materials that are

sorted on the premises and then sold to the respective recyclers. A Buy-back receives most of its materials from the micro-collectors but also from individuals churches, NGOs etc. who want to raise some money. To some degree waste materials are also donated from private (voluntary) household waste recovery and collection initiatives.

Community/NGO Drop Off: Term for a location where mostly post-consumer but also Pre-consumer waste materials are collected. Community driven drop-off sites are often started in a response of a certain community/NGO financial need. Waste received is typically donated from surrounding households, offices and factories and the proceedings from selling the (sorted) and collected recycling materials are used to cover all costs (paying for required infrastructure and labour to sort material). Profits from community driven drop off sites are typically used to fundraise the community group's/NGO's core business such as caring for the disabled (see also Oasis case study in section 8.6.3), supporting school funds (like Bergvliet and Kronendal School – see also section 8.6.5), Nature Conservation projects (WESSA) or community forums (Noordhoek Environmental Action Group). Community/NGO drop-off sites are either directly serviced by recycling firms (such as Consol Glass, or Mondi supply collection banks and service them regularly) or recyclables are sold to a local collector unless the materials are not delivered straight to the recycling end-user to cut out the "middle man" and get the best price for the recyclables.

8.3. Waste Minimisation through Source Reduction

"Reduction at source" means to track back the life-cycle of a waste material to its point of origin - the production or generation process (typically in an industrial or commercial environment). This is the point where intervention takes place such as implementation of cleaner production technologies, a process redesign (for less waste) or training of staff for more resource efficient work practice. The aim of source reduction is to promote sustainable development by PREVENTING the generation of wastes and the unnecessary and wasteful utilisation of resources such as water, energy and raw materials. The first and most important element of any waste management strategy is therefore waste prevention through source reduction and this is the main aim of all the activities described below under section 8.3.1).

8.3.1. Waste Minimisation Clubs (WMCs)

The White Paper on Integrated Pollution and Waste Management (ref 8-6) for South Africa clearly views the formation and the widespread establishment of WMCs as a short-term deliverable in order to achieve the National Governments strategic goal of more applied "Pollution Prevention, Waste Minimisation, Impact Management and Remediation"

Waste Minimisation Clubs are voluntary partnerships that have been devised to promote the exchange of experience and information in the implementation of waste minimisation measures between geographically close manufacturers and/or service providers. They focus on promoting a preventative approach to environmental management by, for example, emphasising the reduction of waste generation at source, and/or water and energy conservation, while improving the economic efficiency of their businesses. This creates a win-win scenario for the companies' bottom line as well as for the surrounding environment. Benefits to the broader Cape Town community include less waste being produced, efficient use of raw materials, energy and water, thus setting the City of Cape Town on the road towards sustainable development.

Regional and Sectoral Specific

As of July 2003 there are approximately 30 waste minimisation clubs in South Africa. Some of these are sector-based, with a group of firms from the same industry, while others are geographically-based, with cross-sectoral composition of neighbouring firms. Club members meet on a regular basis to exchange information and experiences related to waste minimisation, and in this way, encourage each other to make improvements in their operation. See also Table 8.1 for the general features of Waste Minimisation Clubs

Table 8. 1: Key Features

Key Features of Existing Waste Minimisation Clubs in South Africa

Most of the existing waste minimisation clubs in South Africa and Cape Town Area share the following characteristics:

- Comprise between 6-12 co-operating companies
- Hold regular meetings (typically every two months) to share information and experiences, and to encourage others to implement measures
- Every member has access to 4-5 days of consultant time, usually used in undertaking a waste minimisation assessment.
- Members also often have access to students for about 4 months per company, at no cost, to assist in identifying and implementing opportunities; these students are supervised by the local consultancy
- Regular club newsletter published, typically on a quarterly basis
- Members sign a declaration of commitment
- Each member pays an annual membership fee (these vary from R1000 to R30 000)
- Most receive a subsidy of some sort (e.g. from local and/or national government, DANIDA, WRC)
- Each club has a separate constitution and bank account

A website of the Waste Minimisation Clubs of South Africa may be found at: http://www.nu.ac.za/wasteminclubs

For a period of two years (April 2002-September 2003) the City Council's Waste Wise campaign supported the inception and facilitation of six Waste Minimisation Club (from a total of ten Clubs located within the Greater Cape Metropolitan Area) whose core business and products were closely linked to the existing littering and dumping problem in Cape Town. These clubs, comprising a combined membership of over 45 business entities, are located in the:

- Plastics industry
- Abattoirs
- Civic Centre
- Blue Route Shopping Mall
- Retail motor industry
- Atlantis Industria .

A recent evaluation of all existing WMC activities[2] in Cape Town revealed the identified potential financial savings of each local WMC and the environmental benefits associated to it. Figure 8.2 and Table 8.2 show the relevant data. It can be seen that the summarized combined potential annual savings made are close to R 70 million. More than 50% of these savings will have payback times of less than 12 months, and almost all of them have payback times of less than three years. According to the recent evaluation of all WMCs (undertaken by the WMC facilitating consultancy BECO ISB) in excess of 2000 improvement options were identified for the combined WMC member clientele for possible implementation [3].

[2] The evaluation did not include any findings from the Parow Industria WMC since this Club is relatively new and its eight business members are still in the process of finalising their baseline assessments.
[3] Note that not all results from WMC member companies on the financial savings, environmental benefits and WM options identified and implemented was readily available and in some instances estimates were made.

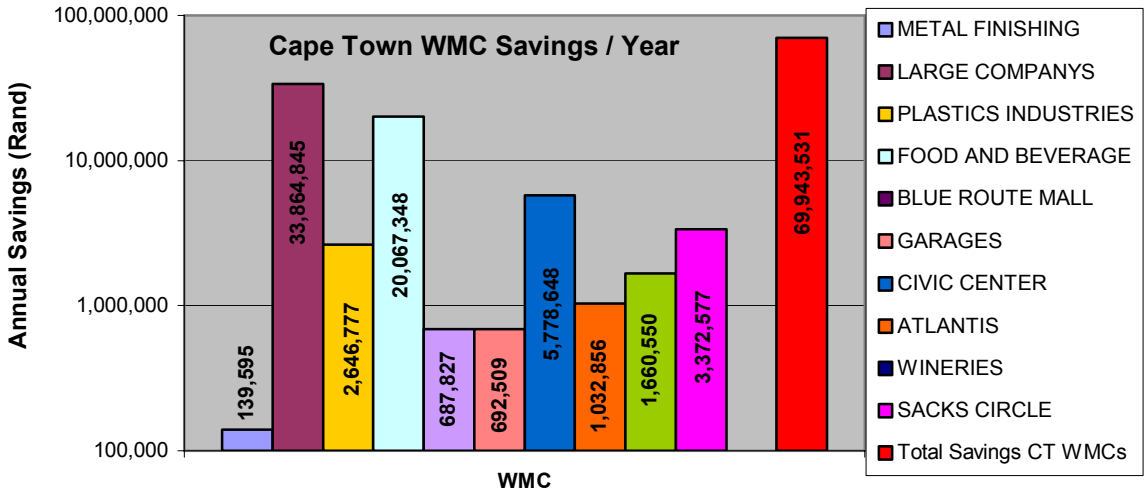

Figure 8. 2: Potential Financial Savings from the Cape Town Waste Minimisation Club

Table 8-2: Achieved Environmental Savings

Environmental Savings made by CT based Waste Minimisation Clubs	
Energy (kWh)	**328 5407**
Air Pollution (kg dust)	**9600**
Raw Material Savings (tons)	**2822**
Waste (tons)	**1652**
Water (m^3)	**1577837**
Effluent (m^3)	**474006**
Chemicals (kg)	**63030**

It is interesting to note that more than R 15 million of all annual savings made came from the Waste Wise initiated Waste Minimisation Clubs who have been essentially only operating for 18 months (and due to budget constraints under less than perfect conditions). This shows the outstanding potential to find and implement financially attractive improvement options with virtually no investment cost required after a baseline assessment reveals the resource consumption rate of a WMC member with regards to raw material usage, waste production, energy consumption and water usage and effluent generation. For example, the Civic Centre saving opportunities to the tune of R 5.8 million did not require any upfront capital investments and were mostly based on raising awareness for better housekeeping practices in the office environment, and in some cases included product redesign. (A summary of all WMC success stories including the raw data on savings and savings options collected for each member of a Cape Town Waste Minimisation Club can be obtained from the team [ref 8 -3]).

8.3.2 Other National Cleaner Production (CP) Initiatives

8.3.2.1 Polokwane Declaration

The Polokwane Declaration, formulated in 2001 by members of Government (at National, Provincial and Local level), selected industrial representatives and civil society, states that there is a need for urgent action to reduce, reuse and recycle more waste. Furthermore the represented sectors recommitted themselves to the objectives of integrated pollution prevention and waste minimisation. The goals agreed on was a 50% reduction of waste generation and a 25% reduction in disposal by 2012 as well as the development of a plan for Zero Waste by 2022.

With this clear national goal setting Municipalities nationwide are realizing that CP can not be only seen as an "add on" to existing waste management strategies but provide in fact the driving force to ensure that the Polokwane Declaration targets can be met at all. The following is a summary of the key national CP initiatives in South Africa that have also some impact on Cape Town as they include local activities:

8.3.2.2 DANIDA Funded Projects

Several key projects have been supported by the Danish Government (through DANIDA) aimed at promoting cleaner production (CP) practices in South Africa. These projects were developed in response to a request from the South African government's Department of Environment and Tourism (DEAT) and Department of Trade and Industry (DTI), for assistance in the transfer of cleaner production knowledge from Denmark to South Africa. The underlying approach of these projects is to support identified industrial sectors through capacity building, practical demonstration and dissemination of information. The projects involve three main partners: individual companies, sector service bodies and industry associations. Three key projects have been supported by the Danish Government aimed at promoting CP practices in South Africa: the cleaner textile production project, the cleaner metal finishing project and the cleaner fishing project.

(i) The Cleaner Textile Production Project (http://www.nu.ac.za/cleanerproduction):

The Cleaner Textile Production Project (CTPP) was a demonstration project promoted as an industry-led initiative. It adopted a life-cycle approach, focussing on each stage of production from the growing of cotton to the retail sector. The project's objectives were split between initiatives that could be successfully introduced into the cotton growing phase of the cycle, and those that could address environmental issues in the manufacturing of textile products themselves. The project partners are the Pollution Research Group (University of Natal), Cotton South Africa and Darudec, Denmark.

Staff from the CCT Water Treatment and Environmental Management Departments have participated in the project. A number of textile companies and organisations in and around Cape Town have participated directly in knowledge and technology transfer activities related to Cleaner Production and Waste Minimisation.

Companies from Cape Town have participated in Study Tours, Waste Minimisation Audit training programs, CP demonstration projects as well as seminars and dissemination activities. Some Cape Town companies have achieved significant reductions in water and energy use as well as solid waste and effluent generation, as a result of their participation in the project (e.g. Team Puma, Finitex).

The formulation of a new component within the existing CTP Project has been the establishment of the *Clothing, Textile and Environment Linkage Centre* (CTELC)(www.ctelc.co.za) based in Cape Town. The centre will broadly aim to strengthen the linkage between the Clothing Industry and Retailers and key stakeholders engaged in Cleaner Textile Production in South Africa.

(ii) Cleaner Metal Finishing Project:

The three year Cleaner Metal Finishing Industry (CPMFI) Production project started in June 2000 and is due to run until December 2003. The project has focused much of its activities on industry associations in the electroplating industry that can foster the cleaner production approach, as well as supporting demonstration projects and developing and implementing appropriate training techniques to all employees within the sector. The overall objective of the project is to achieve "A significant reduction in the environmental impact of the South African metal finishing industry, within the electroplating and galvanising sub-sectors, largely due to a preventative approach."

The Project's partners include:

- The three regional Metal Finishing Associations (KwaZulu Natal Metal Finishing Association, Cape Metal Finishing Association & Gauteng Metal Finishing Association)
- The Hot Dip Galvanising Association of SA (www.hdgasa.org.za)
- Waste minimisation clubs in Cape Town, Gauteng and KZN.
- Cleaner Production consultants
- Chemical suppliers of the metal finishing industry
- Research institutions
- National donors (Water Research Commission and DWAF)

A website has been developed by the project: www.enviroplating.co.za. A number of Cape Town metal finishing companies have participated in the project through the Cape Metal Finishing Association and the related Waste Minimisation Club.

(iii) Cleaner SA Fishing Project

As with the other two Danida-funded interventions, the CP in the South African Fishing Industry project was introduced in an industrial climate not conducive to the introduction of new and alternative production methodologies. However, certain key drivers including the desire to meet international (particularly EU) standards and markets; community uproar around perceived pollution; and the imminent increase in resource costs such as water, provided the project with the required "carrot and stick" to promote CP. The project

focussed on the White Fish Industry and the Canning Industry in the Western Cape. This included two key players in the White Fish Industry": I&J and Sea Harvest.

A number of the companies that were involved in this CP project are continuing their activities through their participation in relevant local waste minimisation clubs. The methodologies that were developed and implemented during this project are currently being extended into other food processing industries in the Western Cape, under the auspices of the Food Industries Research Institute (FIRI).

8.3.2.3 National CP Organisations/Initiatives relevant to Waste Minimisation in Cape Town

(i) UNIDO National Cleaner Production Centre

As a national programme established by the DTI, CSIR, UNIDO and the Austrian and Swiss governments, the NCPC will promote the application of cleaner production and sustainable industrial development in South Africa.

To promote the implementation of CP measures and technologies, the Centre will offer services related to the internal financial systems of companies, such as direct costing techniques and the development of eco-efficiency indicators for the company management. The NCPC programme focuses initially on the textile, food and chemical sectors in the three most industrialised regions of the country, Gauteng, Western Cape and KwaZulu-Natal. The three sectors are identified by DTI in the Integrated Manufacturing Strategy (IMS) of the Department of Trade and Industry.

(ii) Basel Convention Regional Centre – Pretoria

The Basel Convention Regional Centre (BCRC) based in Pretoria has been in operation from July 2000. Its main objective is to assist in building the legal, institutional and technological capacity in the twenty-one English speaking African countries to be able to manage hazardous waste in an environmentally sound manner in line with the Basel Convention provisions. DANIDA, the South African Government and the CSIR have agreed to provide initial support to establish a centre for English-speaking African countries.

The BCRC has a large amount of information on improved methods of hazardous waste management that can be shared and accessed by companies and projects. In particular, they have developed a course for middle management government on Hazardous Waste Management including a section on Cleaner production and Waste Minimisation. This course has been delivered to English speaking African countries, including South Africa.

Since it is a national and regional initiative, it allows for City of Cape Town to be included in any training activities or other relevant initiatives of the BCRC. (Website: http://www.baselpretoria.org.za).

(iii) Southern Africa Network for Training on the Environment

SANTREN, with the assistance of DANIDA, has developed a number of Cleaner Production-related training courses. SANTREN has launched various Internet-based commercial courses, including:

- Course 1: Air Pollution - Issues, control and monitoring
- Course 2: Environmental Management in the Mining Industry
- Course 3: Sustainable Environmental Management through Appropriate Waste Management Technologies
- Course 4: Water Quality Monitoring and Management

Course announcements can be obtained from: www.santren.com/live/santren/content/e938/. These courses can be used by City of Cape Town where necessary in any Waste Minimisation initiatives.

(iv) NORAD / DEAT CP Initiative

The Norwegian Agency for Development, NORAD, has been liasing with the South African government in examining possible opportunities for supporting CP-related initiatives in South Africa. A business plan was signed in March 2003 between the Department of Environmental Affairs and Tourism (DEAT) and NORAD, with the aim of delivering three main outputs through the DEAT over the next fourteen months:

- Developing a National Strategy for Cleaner Production that streamlines existing policies and strategies, building in particular on the requirements of the National Waste Management Plan and the existing Waste Minimisation Action Plan.
- Highlighting opportunities for CP in the Paper and Pulp industry through a demonstration project. The project intends to work closely with the two main players (Sappi and Mondi) with the aim of co-ordinating activities and hopefully identifying opportunities for sharing information, before undertaking demonstration CP Audits.
- Developing Guidelines on Enforcement and Compliance aimed at assisting local authorities to enforce CP, focusing in particular on the new Air Quality Management Bill and building on Norwegian experience in this regard.

Certain elements of these national activities are of specific potential relevance to the promotion of CP in Cape Town, and will be considered in the development of the IWMP.

8.3.2.4 Local Government CP Initiatives

(i) Western Cape Department of Environmental Affairs & Development Planning

The WC DEA&DP has developed a Waste Minimisation Guideline document for use in Environmental Impact Assessment (EIA) reviews. The Guideline documents comprise of general waste minimisation guidelines for all industrial sectors, and a second part dealing with sector-specific waste minimisation guidelines to address issues arising from specific

activities prioritised by DEA&DP officials. The Guidelines are to be updated at regular intervals to reflect the changing legal, policy, planning and political context in which they are being used. In addition, guidelines for additional sectors where waste minimisation is increasingly becoming an issue from the perspective of DEA&DP officials will be added to these Guidelines as and when appropriate.

(ii) City of Cape Town – WasteWise Campaign

The Waste Wise education component for industry included the establishment of Waste Minimisation Clubs (for more information on Waste Wise see also Chapter 13). Given the success of previously established WMCs, and the fact that Cape Town's industrial-commercial sector produces 50% of the area's waste, the City of Cape Town has commissioned the establishment of six WMCs. For more information see also section 8.3.1 or visit the website: http://www.wastewise.org.za.

8.3.2.5 Local Research Institutes CP Initiatives

A number of the Cape Town-based research institutes have been involved in the promotion of CP in the region. These include in particular:

(i) Peninsula Technikon, Faculty of Engineering:

The Peninsula Technikon's Faculty of Engineering has participated in the DANIDA Cleaner Textile Production Project (in particular the Department of Clothing & Textile Technology). More recently, students have been part of skills transfer training in CP for the NCPC's activities in the Western Cape. (http://www.pentech.ac.za//facengineering/index.asp)

(ii).University of Cape Town's, Department of Chemical Engineering, Environmental & Process Systems Engineering Research Group:

The Research group undertakes research in a number of CP-related fields. In particular:

- Assesses resource processing technologies, and improve them by the application of process systems engineering techniques.
- Develops tools to help with the environmental, social and economic assessment of technologies.
- Develops the ideas and software for tools needed to make resource processing technologies maximally efficient.
- Assesses how the concept of clean technology is used by design teams and design houses in our industries.
- Trains graduates and postgraduates, and endeavour to make known research findings, so as to enhance expertise in the fields of waste management and resource processing within South Africa.
- Provides service facilities for the testing solid waste (assessing their potential to generate leachates), and for optimising reaction conditions for bio diesel production.

See http://www.chemeng.uct.ac.za/groups/enviro/

8.3.2.6 CP Initiatives of Industry Associations, Special Interest Groups and NGOs

The following NGO's and industry associations have undertaken various activities relating to CP. The potential for possible collaborative efforts with these bodies should be explored in finalising the IWMP for Cape Town.

(i) CAIA An important sectoral association is the Chemical and Allied Industries' Association (CAIA), an organisation that has played an important role in the development of environmental policy in the country, and in the promotion of voluntary industry initiatives such as the Responsible Care programme. Such organisations should be a first point of contact when investigating new industry sectors for CP projects. Further information can found on their website: http://www.caia.co.za

(ii) RCMASA The Responsible Container Management Association of South Africa (RCMASA). The Association holds regular workshops around the country on responsible container management for those industries that produce containers, and those that use and/or manage them as waste. The approach of the RCMASA is to reduce, reuse, and recycle before disposal. Since members already show interest in taking responsibility for reducing waste and related environmental problems it is likely that industries linked to this association would be interested in pursuing CP initiatives. The RCMASA hold regular periodic workshops throughout the country (including in Cape Town) aimed at sharing best practice with its members. Further information can be found on their website: http://rcmasa.org.za

(iii) IWM: The Institute of Waste Management is a non-aligned body committed to protecting the environment and people of Southern Africa from adverse effects of poor waste management. It does this by promoting environmentally acceptable , cost effective waste management and by promoting the science and practice of professional waste management. (http://www.iwmsa.co.za/)

(iv) The Natural Step (TNS): The Natural Step process is licensed to NGOs worldwide, including one in RSA. TNS uses a model as an effective tool for turning the concept of sustainable development into a practical reality for any organisation. TNS South Africa has had experience with using this framework in obtaining management commitment to CP projects as well as obtaining organisation-wide understanding of the concept of and need for CP. (http://www.naturalstep.org/about/international.php#SouthAfrica)

(v) The Environmental Monitoring Group: is a not-for-profit NGO based in Cape Town, that seeks to promote broad engagement of civil society in the debate on South Africa's environmental policy. EMG has played a key role in raising awareness and facilitating civil society engagement in a range of policy processes relevant to environmental management and sustainable development, including policies on mining, desertification, environmental management, environmental impact assessment, nuclear energy and waste. In the mid 90's they undertook a detailed review of various CP projects in South Africa.

(vi) The Legal Resources Centre is an independent, client-based, non-profit public interest law centre that provides legal services for the vulnerable and marginalised, including the poor, homeless, and landless people and communities of South Africa. The LRC runs an Environmental Justice Project (EJP) that seeks to address the unfair and discriminatory distribution of the adverse environmental impacts of development activities on poor and vulnerable communities and to enhance environmental decision making by promoting effective and informed public participation and access to information. In the past two years they have assisted clients to take part in environmental impact assessments on a variety of projects which could affect the health and well being of nearby communities. These included new developments in the South Durban Industrial basin, numerous proposed incinerators and a number of proposed new mining projects. In Cape Town, they have undertaken projects relating for example to the Caltex refinery. They could be a potentially useful resource in the development and implementation of effective CP policies.

8.4. Waste Reuse and Waste Exchange

REUSE must not be confused with RECYCLING. Reuse of a product does not constitute a change in its physical or chemical properties. Reused waste materials (in their original state) are often assigned a new purpose and "lease of life" e.g. by using an empty ice tub as a storage container or by increasing their values (e.g. through a restoration and/or repair).

8.4.1. Residential Waste Reuse

The magnitude of waste reuse activities in Cape Town is difficult to assess but by interviewing three dedicated community reuse initiatives some interesting trends emerged. The items which are sold for reuse through those initiatives range from items such as yoghurt containers and expanded polystyrene boxes for soup kitchens, to furniture and electrical appliances, clothes to books and any bric-a-brac. Second hand charity shops are firmly established in Cape Town and they are typically financially feasible as they act as fundraisers to support the institution's work for and with old people, disabled people, sick people, child protection, field work in poor communities etc. Charity shops are normally run through volunteers (so they have only limited "job creation" potential) and materials to sell are either dropped off by residents, churches etc or get collected by the charity. From the fact that one charity (selling reused books) reported a annual turnover of R 100 000 and that another runs 38 outlets in Cape Town it can be concluded that the reuse of materials (especially amongst the poor) is thriving and fulfils an important role in reducing the amount of waste going to landfill. According to the DEA&DP Recycling Directory (refer to ref 8-17 obtainable from the team) four second hand charity shops and two community initiatives that reuse packaging are officially listed. This might however just be the "tip of the iceberg" and an increasing number of community waste reuse activities are started (e.g. waste to art projects undertaken by Shawco or in the Haven Shelter Organisation)

8.4.2. Governmental Waste Reuse/Exchange through IWEX

An **Integrated Waste Exchange (IWEX)** website has been developed and launched by the City of Cape in May 2000 in a bid to reduce hazardous and general waste material going to landfill. The website service at http://www.capetown.gov.za/IWEX, provides an "electronic market place" for unwanted and wanted waste resource materials.

IWEX forms the information interface between companies and communities willing to trade waste according to the motto: 'Your trash is your neighbour's treasure.' The IWEX site lists all nationally available and requested waste materials where special emphasis is placed on reducing hazardous waste volumes and expanding traditional recycling markets in and around Cape Town.

Operational experience has shown that impoverished communities can benefit from the IWEX service as the free supply of unwanted, non-hazardous company waste often provides valuable resource input for community job creation and skills empowerment projects.
Community organisations on the IWEX listing include: community drop-offs, buy-back centres, shelters, havens, community upliftment and job creation centres. NGOs such as

Oasis (see also 8.6.3), which care for mentally and physically challenged people, have been frequently receiving useful materials from IWEX listed companies such as glue (Pfizer) or textile off-cuts (Brits Textiles) that have been used for job creation and occupational programs. The Waste Exchange programme is in its third year and new company listings have been regularly made. A review is being conducted at present to determine the future of the programme.

In 2002 IWEX received an "Impumelelo Star Award" for its contribution to community upliftment and job creation. From over 300 National entries the Waste Exchange program was short-listed in the top 20 category of best projects.

From a German Diploma Thesis study in 2002 (ref 8-12) it was revealed that out of nearly 200 listings at that time, 16% of materials was shown to be exchanged, with a maximum of 28% estimated to have been possibly exchanged, (although not proven (see also figure 8.3below)).

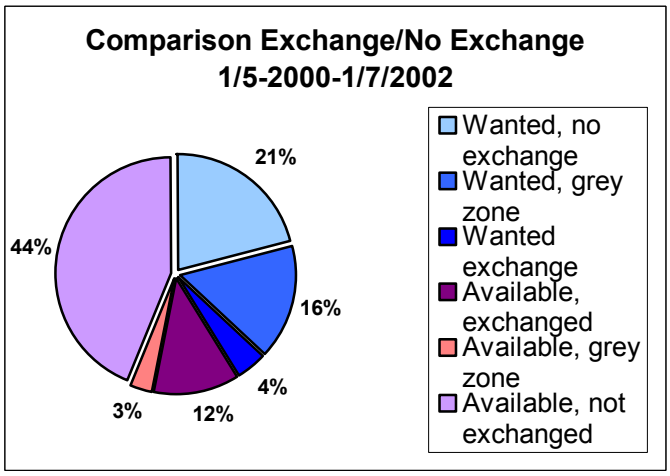

Figure 8. 3

The last evaluation of IWEX for a Waste Information System workshop run by DEADP in August 2003 resulted in 87 different business entities entered with total of 159 listings whereas listings were received as follows:

- about 56 % listings from larger CT
- about 8% larger Durban
- about 14 % larger JHB
- about 4 % Others
- about 8 % National
- about 10 % International

With regards to the type of listings some interesting trends emerged:

- Materials were mostly listed/requested from the non-hazardous, recyclable waste section and items such as paper, cardboard but also plastics were among the most popular and frequent listings

- The supply of textile waste (including leather and carpets) was quite large (21 listings) but the demand for such items very limited (2 listings)
- Low hazardous waste materials such as solvents and spent oil were only sporadically listed but some major waste exchanges did happen in those areas (e.g. exchanging 1 ton of solvents/month (ongoing !) to a recycler instead of landfilling it)
- High hazardous waste is rarely listed on IWEX and some of the few listings received had to be treated confidentially (by not listing the company's name on the website). Not a single demand was made from any recycler/reuser in Cape Town to receive Acid Waste, Metal Sludges, Lab Chemicals, Inorganic Chemicals or Organic Chemicals

8.4.3. Industrial/Commercial Waste Reuse/Exchange

8.4.3.1 Waste Reuse

Many examples of commercial waste reuse exist. Printer cartridges are now collected and refilled by at least five local businesses. Rags, overalls and gloves soiled with oils and solvents (coming from the printing business as well as garages) are washed and returned to the companies in volumes of about 15-20 tons per month. A company in Cape Town has a thriving business by collecting cardboard boxes (all sources outside of Cape Town since local cardboard waste gets scarce and is mostly recycled locally). These boxes are repaired, sorted by size and re-graded so that they can be sold to retailers and other local businesses. About 50 tons of cardboard waste are reused and resold every month in that manner and the re-sell value is as high as R 3.50 /kg sorted cardboard.

Other items reused are batteries, which are actually "refurbished" meaning that the casing is reused and only the actual cells are replaced (ref 8-16). There are also now two well known local computer and electronic waste refurbishers who are also reusing certain components such as casings from old computers and retrofit them with new software and hardware components whereas metals in scrap electronics are recovered through physical/chemical processes.

8.4.3.2 Commercial Waste Exchange:

From international examples it can be seen that the most successful and up-to-date waste exchanges are often driven by a business (rather than a Governmental institution) that acts actively as a waste broker among company, sells website space or gets paid by companies by providing the information platform and network.

One waste exchange website was actually discovered by the IWMP team at www.africa.recycle.net which is apparently run and linked up in tandem with an American Exchange program. From the fairly large amount of listings (and web advertising) of South African (and Cape Town based) companies interested in the facilitation of an *international* waste exchange it can be concluded that this is a situation which requires further exploration. At this stage it was not possible (since the webmaster did not respond to a request for more information) to establish the current scope and impact of this website on the South African waste situation. The legal implication will also need to be thoroughly investigated.

8.5. Waste Recycling

RECYCLING is a term reserved for the physical product manufacturing of waste materials The recyclers referred to below are those industries receiving (and processing) the collected materials into a final product or raw material i.e. plastic companies granulise or pelletise materials recycled whereas Consol Glass melts the recycled glass and manufactures a final product. This can be only done by local businesses who are technically equipped to change the physical/chemical properties of a former waste material into a new product.

8.5.1. Study Methodology

An approach was chosen to first identify key industrial stakeholders in the recycling of paper, plastics, glass, beverage cans (bi-metal and aluminium), ferrous and non ferrous metals and to record their current achievements and strategies. This was done in order to assess all types and volumes of waste recycled within the boundaries of Cape Town but also to identify areas where a demand for recycling from the public is not met yet by industry or where recycling infrastructure is lacking. An important aim of the process was to identify reasons for any under-performing or malfunctioning of certain segments in the local recycling industry. The information was obtained by liasing with respective recycling managers and by conducting selective interviews using a specially designed questionnaire.

By establishing the current status quo on recycling performance, and by comparing the existing policies and legal frameworks (that act as the current economic drivers/barriers) to international recycling benchmarks, this section strives to establish a baseline that can be used for the future formulation of policies, strategies and bylaws. The physical boundaries that were chosen to establish the status quo in Cape Town exclude any recycling initiatives in the Boland, Overberg and/or Winelands regions. .

Since the number of established industrial recyclers is much smaller than the large and volatile number of collectors who supply them with recyclables (in addition to the recycler's own collection support systems such as bottle banks and paper igloos), it is submitted that the status quo on waste streams processed by recycling should be established from the perspective of the recycling industry rather than from the collector's perspective. To assess how accurately the situation has been evaluated on the collectors side thus far, especially as regards the needs established from both sides, some collectors have been analysed in terms of recyclable throughput as well as their collection specific business dynamics.

8.5.2. Structure of the Recyclables Market

The recycling of glass, ferrous and non-ferrous metals, paper, plastics and beverage cans within the boundaries of the City of Cape Town is dominated either by a specific company or group of companies (glass, paper, ferrous and non ferrous metals and beverage cans), or by many smaller recycling companies (the plastics industry). Some of the key players in these industries are identified below.

8.5.3. Recycling Industry (Current Buyers)

The following major recycling companies or current buyers were identified in the market survey (as part of the Bergman Ingérop Community Waste Drop-Off Centres Investigation) (ref 8-1) and combined with a recent update conducted by the IWMP consultants. The key players of recycling in Cape Town but also the buyers for material end use in other parts of South Africa are tabulated below. Often a local recycler does not recycle all the materials collected in Cape Town but sends them to other branches or even sells them to its competitor (as it is regularly the case among Mondi, Sappi and Nampak)

Table 8.3: Current Recyclers/End use buyers

Recyclable	Local Recycler or End Use Buyer
Glass	**Consol**
Beverage Cans	**Collect-a-can**
Paper	**Mondi, Sappi, Nampak**
Plastics (list given by Plastics Federation SA)	**Afriplast cc , Atlantic Plastic Recycling cc, Econo Recycling, Hangerman (Pty) Ltd , Hanrite div of Premier Hangers, Kamming Recycling SA cc, Malta Recycling, Pelmanco Recycling cc, Plastibottle, Plasticycle, Polyrecycling, Pro-Plas, Supa-Plas cc, TS Plastics cc, Uniplastics div of Tuffy Holdings, Van der Schyff Plastics cc, Vinaco PVC Processors (Pty) Ltd, WS Plastics Pelletizing cc**
Ferrous and non- ferrous metal	**SA Metal and Cape Iron and Steel Works (CISCO)**

8.5.4. The Role of the Industrial/Recycling Forums

Many local recyclers are members of their respective industrial forums to ensure that their specific business interests and needs are equally addressed next to issues from the raw material producers, product designers and marketing industry.

Industry driven forums in South Africa (most are based in Johannesburg) that serve our local recyclers are the Packaging Council of South Africa (packagec@cis.co.za), the Plastic Federation of South Africa as well as the Rose Foundations (used oil recycling), Collect-a-can and the Glass Recycling Association.

Non industry driven recycling forums include the National Recycling Forum (NRF) and the recently initiated Local Recycling Network forum that attempts to develop waste recovery partnership projects with the City of Cape Town.

8.5.5. Categories of Recyclables

8.5.5.1 Plastics

The vast difference in the types of plastic materials that can be recycled is the largest barrier to the recycler. While all plastic can in general be recycled, the degree of contamination and the receipt of mixed plastic types at the washing and processing plants is an important complicating factor. Pre-consumer material is sourced from the manufacturing

and industrial sector and post-consumer waste from the municipal solid waste stream or waste generators. It is therefore natural that the bulk of recyclers are based near the source of their input materials (namely converters and consumers).

Plastic waste is normally recycled by melting it down and extruding it into strings that are eventually cut up in pellets that are bought and used (in combination with virgin plastic pellets) by the local plastic converter industry. In some cases, local plastic waste materials are also recycled (by injection moulding) into items such as plastic pegs and cloth hangers. One local recycler uses about 20% of the mixed plastic waste he recycles for manufacturing plastic planks to store goods in a beverage company. (Table A in Appendix B lists the main sources of plastic materials for recycling).

8.5.5.2 Paper

The grading of paper in the Western Cape and probably the entire country irrespective of the company involved is based on a generic benchmark. Table B in Appendix B gives a broad breakdown of the grades and specifications. For more details on paper recycling see also section 8.5.6.

8.5.5.3 Glass

Glass is collected either as Post Industrial Cullet (PIC) or Post-consumer Cullet (PCC). To ensure that the recycled glass returned to the furnaces is not contaminated, all glass is screened for impurities such as metals, stones, ceramics, plastics and paper.

8.5.5.4 Beverage Cans

In discussions with Collect-a-can it was emphasised that cans dropped off at the Cape Town depot are screened primarily for oil contamination, presence of flammable containers such as aerosols and food waste. The oil and aerosols can cause explosions and would be an occupational health hazard if not properly managed.

8.5.5.5 Ferrous and Non ferrous metals

The selection of these materials for recycling is mostly based purely on visual identification and hand or bulk sorting.

8.5.6. Economic Review – Tonnages recycled and related market prices

The prices paid for recyclables fluctuates based on market demand. The prices shown in tabular format under the relevant sections below reflect the current 2003 prices for glass, paper in general and plastics. Due to the competitive nature of the recycling industry, recycling companies are very reluctant to release figures regarding volumes and turnover.

8.5.6.1 Plastics

The team has undertaken a survey of all established plastic recyclers in Cape Town, amounting to a total of 18 businesses. The plastic recycling specific questionnaire was faxed to all plastic recyclers; 11 businesses returned the questionnaire with most of the questions filled in. The original questionnaire forwarded can be found in Appendix A. At the request of some recyclers, for reasons of competitiveness selected figures and answers (e.g. the name of the main collectors supplying them or the price paid for recyclables) will not be

disclosed to the public in this report. The IWMP team will only evaluate them to establish general trends in the plastic recycling market.

Polystyrene take-a-way boxes and packaging is currently (in terms of sheer volume occupying valuable landfill airspace) one of the most problematic post-consumer waste materials so it would be vital to gain some insight in the existing recycling business possibly with the Provincial Government recent plans to establish a local waste information system that captures all information on the life-cycle of waste materials and recyclables.

The vast majority of Cape Town's plastic recyclers are highly specialised and process only one or two types of plastics due to technical constraints. They might accept other plastic types too as they receive them from a collector but those items are then sold by the recycler to a "competitor" who deals with this type of material.

The most successful recycled type of plastic is LDPE (such as film plastics and bags) (ref 8-17), which ten Cape Town recyclers are currently processing. The interview revealed that among eight recyclers in Cape Town a total of about 1150 tons of LDPE is recycled in Cape Town per month. To a much lesser degree (in volumes) HDPE plastics (e.g. milk bottles) are still accepted by nearly 40% of the local recyclers and among seven (out of nine in total) recyclers a total of about 200 tons HDPE is processed in Cape Town per month.

Since the National plastic bag regulation came into force in May 2003 recyclers of HDPE plastics (which most retail bags are made of) reported a decline in approximately 60% of their business linked to HDPE which has resulted in short work and in some instances lead to retrenchments. This is matched by a claim from the Plastic Conversion sector that some business lost about 80% of their total HDPE business volume.

Polyethylene terephthalate (PET) bottle recovery for local recycling is currently a strong growing market and there is high (inter)national demand (and very good prices paid) by the plastics industry but also textile business who make fibres (e.g. for fleece) so currently 4 recyclers in Cape Town are processing PET. Three out of four PET recyclers process at total of about 150 tons PET per month. Polypropylene (PP) based products are according to the recyclers also a growing business since their superior physiochemical properties and their good recycling potential and a total of six recyclers in Cape Town currently recycles PP waste to a volume of about 180 tons per month.

Other types of waste recycled are generally marginal and come from special sources. These include for example Polyvinyl chloride (PVC) irrigations piping from agricultural farms, cloth of hangers from most of the clothing stores which are recycled by two companies in Cape Town, and waste materials received from very specific industrial applications that are hardly ever recoverable from the domestic waste stream. According to the Plastics Industry it is the intention to phase out any halogenated plastics such as PVC products in the domestic waste stream as soon as possible due to their potential to form and release dioxins and furans when this type of plastic waste is combusted at low temperatures. One of the items where PVC is still be used in the domestic environment is cling wrap film and blister packaging.

Table 8.4 below lists prices that are currently paid for the most common plastic types recovered and recycled in Cape Town

Table 8. 4 Prices paid for common plastic types

Plastic material targeted	Main sources	Price paid per kg (Dependent on and volumes) and sources (dirty post-consumer or clean industrial).
PE – LD (soft plastic)	**Industry and retail sector. Also post-consumer from landfills, depots etc**	**60c – R 2.00/kg.**
PE – HD containers	**Post-consumer, mostly from landfill contracts**	**60c – R 3.95/kg**
PE - HD film (plastic packets Shopping bags)	**Post-consumer sources such as Kronendal,Tsoga. Specialised onsite waste recovery in shopping malls**	**50c-R 2.00/kg**
PP (e.g. bottles)	**Post-consumer and industrial**	**R1,00 – R 2.50/kg**
PET	**Industry, buy back, schools, landfill contracts**	**R1, 00 – R1, 50**
Polystyrene	**All industrial PS, could take post-consumer PS.**	**?**

8.5.6.2 Glass

The Cape Town Glass recycling figures were provided by Consol Glass.

The current production volume of the Consol Glass plant in Cape Town stand currently at about 1400 tons per month. As this is the only glass smelter situated in Cape Town and since the transport or shipping of glass to another smelter is not economically viable it can be safely assumed that all the glass recovered and collected in Cape Town is actually processed in that smelter (in fact 70% of all the glass waste in the Western Cape gets recycled at the Consol plant in Cape Town). About 40 % of the glass recycled comes straight from bottle filling companies such as Coca Cola, South African Breweries etc. with the remaining 60% coming from post-consumer sources. Consol is currently significantly expanding the recycling of glass bottles in Cape Town and according to Consol the glass recycling volumes in Cape Town increased by about 50% in the last 8 months.

Consol is in the process of expanding the current maximum capacity of the plant (currently approximately 1700 tons per month) to about 6000 tons per month. This will be achieved with the purchase of a waste glass processing facility that will be in operation by April 2004 and that will be able to sort huge amounts of mixed glass automatically (using infra-red eye technology) into all the colour fractions.

Prices paid by Consol to collectors for a ton of mixed glass have increased dramatically last year from about R 70 per ton to about R 180-R 220 per ton. If glass (clean and pre-sorted) is delivered to Consol directly the company pays up to R 350/ton (2003).

8.5.6.3 Paper

According to a recent study (done for the year 2002 by the Packaging Council of South Africa (PACSA) [ref 8-7]) 922 000 tons of paper are reprocessed each year, giving South Africa a 52% recovery rate. This compares favourably with a world average of 47%. In Germany, where there is recovery legislation, the rate is more than 70%. The rates in the UK and US are about 45%. Mondi estimates that there are about 11 000 people employed informally in paper recovery, working with about 300 collection centres.

The Bergman Ingérop Drop Off study [ref 8-1] estimated tonnages (market size) of paper, cardboard recovered for recycling per annum at present within the **Cape Town Metropolitan area (CTMA)** is a total of 180-200 000 tons. The relative breakdown as evaluated from the IWMP team for 2003 is Sappi 78 000 tons per annum and Mondi about 65 000 tons per year. The IWMP team did unfortunately not receive any of the information requested by from the local Nampak Paper Recycling branch but according to the Bergman-Ingerop study [ref 8-1] Mondi and Nampak showed a combined annual tonnage of 100 000 tons in 2001/2002.

In the survey Sappi confirmed that they recover about 6500 tons of paper waste monthly within the Cape Town area alone. According to the Bergman-Ingerop study [ref 8-1] these recovered volumes are then either sent to the Cape Craft Mill (approximately 5 000 tons per month) or the remaining 1 500 tons per month is sold to a number of customers based also in Johannesburg and/or Durban such as Nampak, Mondi, Unicell, Van Leer Packaging and Sealed Air. Mondi does not recycle any of the recovered paper waste materials in Cape Town but everything gets transported to one of their paper mills based in KwaZulu Natal. (For more information on the collection aspect of those recyclers please refer to section 8.6).

8.5.6.4 Economics of Paper Recycling

Due to the considerable competition amongst the three paper recyclers (dominating entirely the Cape Town paper recycling market) buy in prices for the various waste paper types were not disclosed readily. One company was prepared to disclose part of their pricing structure.

Table 8.5: Paper – Market Prices Baled (2003)

Types	Price paid per ton at recycler
K4	**R 600,00**
K3	**R 700,00**
Newspaper	**R 500,00**
SBM***	**R 320,00**
CMW	**R 500.00**
MW `A`***	**R 600,00**
MW `B***	**R 220,00**
Supermix***	**R 750,00**
HL1 and HL2	**R 1300,00**
Telephone Books***	**R 50,00**

**** Prices as stated in Bergman-Ingerop study 2001-2002 [ref 8-6]*

8.5.6.5 Beverage Cans

The success of Collect-A-Can's recycling strategy in the country in general, as well as specifically in the City of Cape Town has been the decision to avoid the establishment of banks/igloos and rely instead on the free market (by creating a strong financial incentive) to collect beverage cans and deliver the materials to the Central Collection and Storage facility in Epping.

According to the Bergman-Ingerop 2001-2002 study (ref 8-1) statistics obtained from Collect-A-Can showed that approximately 4 879 tons of beverage cans have been recycled in the Western Cape over a 12 month period. It was estimated that 10% (450 to 500 tons) of this figure was received from outside the City of Cape Town.

The prices paid for the recycled beverage cans are largely dependent on whether or not the collector has the transport to drop off the cans at the depot.

In the last year materials that needed to be collected within a 50 km radius received R 0,20 per kg or R 200,00 per ton. Materials that were dropped off at the depot received R0,30 per kg or R 300,00 per ton. Materials that were dropped of at SA Metals receive R 0,16 per kg. SA Metals is assisting Collect-a-can with the collection of beverage cans. Unfortunately the IWMP team did not receive any updated recycling/collection information.

8.5.6.6 Oil Recycling

There are two main collectors of spent oil in Cape Town: Oilkol and Fuel Firing Systems (FFS) Refiners. Oilkol collects used oil on behalf of the Rose Foundation. This Foundation was formed by 12 national members from the lubricating industry who, on a voluntary basis, donate 9c for each litre of oil sold in order to finance the work of the Oilkol. The Rose Foundation, Oilkol collects about six million litres of used motor oil in Cape Town alone. All oil is sold to FFS who reprocess this oil waste to industrial fuel oil that is utilized for example as an energy source for cement kilns. Currently the oil recycling business in Cape Town provides about 20-30 jobs.

8.5.6.7 Recycling of Hazardous Waste

A study conducted by DEAD&P on the hazardous waste situation in Cape Town (ref 8-4), confirmed that apart from the recycling of oils (waste lubricating and other oils) at FFS Refiners (Cape Town), only silver, some solvents and High Voltage Transformer oils are recycled in the Western Cape. It would also appear that a large quantity of solvents is still being disposed of by landfilling at Vissershok.

Key Observations Relating to Hazardous Waste Recycling

- It was concluded from the DEAD&P study that the oil and solvent recycling industries have an extremely positive attitude towards establishing a high standard of environmental management.

- The Rose Foundation plays a pivotal role in the oil recycling industry by facilitating the transfer of waste lube oil from the generators to the collection company Oilkol (Pty) Ltd.
- The Spin Street recycling facility has a capacity to process 120m^3 per annum of waste solvent at present. The study confirmed that the company had visions of expanding the plant to have a 240m^3 capacity. This is an indication of the size of the market for solvent recycling.

Table 8.6 summarises the industries/contractors which are involved with hazardous waste recycling in the Western Cape Province.

8.5.6.8 Electronic Waste:

Present electronic waste types and volumes disposed of in Cape Town are largely unknown as no quantitative or qualitative research studies have ever been done on that subject. In a recent local workshop that was run by the Swiss Government organisation EMPA a first attempt was made to get local stakeholders together in order to assess the possible magnitude of the local e-waste problem. Types of e-waste identified through representatives from industry, commerce, private waste companies and local e-waste recyclers included predominantly items such as obsolete, broken or redundant: computer and other IT equipment, consumer electronics (such as cell phones, TVs, video players, stereo hifi systems etc and white goods (e.g. kitchen appliances -stoves, microwaves etc). Sources of e-waste are coming either directly from industries (e.g. stock of outdated appliance designs) or to a smaller degrees from the households. The full lifecycle of most e-waste items is unknown but it is estimated that the large majority of e-waste items ends up at general waste landfill sites and to some degree (mostly from large industrial waste sources) at Vissershok where they are co-disposed. The origin of most e-waste items comes from outside of South Africa as most electronic products are imported by South Africa (mostly from Asian sources).

From the expert statements received at the workshop it can be assumed that the formal and (unregulated) informal e-waste recovery and recycling sector is currently quickly expanding in response to a globally exponentially growing e-waste problem (and as shown in case studies shown by EMPA for India and China). Environmentally very unsound and health hazardous e-waste recovery practice has been confirmed to happen at some backyard operation places. Precious metals and electronic components are recovered e.g. by acid leaching, chemical digestion, heat treatment of soldered components and cable burning.
EMPA has allocated some funding to conduct a qualitative study on e-waste in Gauteng and it is the intention to utilise the lessons learnt there for developing a similar e-waste information system in Cape Town.

Table 8.6. Summary of industries/contractors involved in Hazardous Waste Recycling in Cape Town

Type of Hazardous Waste	Recycler	Quantity Received	Quantity Recycled	Quantity and Destination of Effluent or 2° Waste
Waste Lubricating and Other Oil	**FFS Refiners**	**6500t per annum**	**2150t per annum (brick making asphalt plants, smelting, laundries and blending)**	**40t per annum (VCoCT) Remainder of tonnage (waste water)**
Solvents	**Spin Street Solvent Recyclers**	**67m^3 (Jun 02 - Mar 03)**	**≈54m^3 from Jun 02 – Mar 03**	**13m^3 from Jun 02 – Mar 03 (VWMF)**
High Voltage Transformer Oil (HVTO)	**Castrol**	**20kl per month**	**≈20kl per month**	
Silver	**Cape Precious Metals**	**Capacity = 1kl fixer solutions per day; 3kl bleach solutions per day**	**Capacity = 3kg silver per day from fixer; 4,5kg silver per day from bleach**	

8.5.7. Recycling Options – Future markets and strategies

South Africa is regarded as one of the world's leading recyclers and has in the past decade increased the quantity of reprocessed materials by 168% (ref 8-14). Recyclists within the CTMA can also claim a measure of success in terms of increased volumes of reprocessed materials but there remains a great potential for further capture and processing of recyclables, especially with regard to organic wastes and builder's waste. It was reported in 1999 that 24% of the total solid waste stream in the CTMA is recycled (485 000 tons per year), and of the recycled or reused materials, 60% is recycled industrial waste, 18% of recycled residential and commercial waste, 14% if beneficially reused wastewater sludge and 8% is composted domestic solid waste (ref 8-17). Many private companies and individuals have expressed their view that the catalyst required for meaningful expansion of the recycling industry lies in public-private-partnering. Incentives such as air-space credits, the development of materials recovering facilities at landfill and transfer station sites, etc, are some of the options that may be considered in developing a strategy for increasing recycling of waste materials in the CTMA.

Any recent expansion of the local recycling sector (such as in the glass industry) and the increase of recycling rates in Cape Town has been driven by the respective industries, with limited support from the Council in terms of financial incentives (e.g. airspace credits), rebates on taxes or levies, infra structure co-financing etc. An overwhelming number of recyclers interviewed expressed a strong desire to break aggressively into the post-consumer waste market and to look for options to recover the wanted commodities there.

With hardly any exception the local recycling situation currently displays a much stronger demand than supply situation, with all major recyclers seeking to expand existing plants and

to extend their operations to new types of currently non-recycled recyclables (e.g. such as cling film and expanded polystyrene). The principal request is for a better local waste management policy that **requires** domestic as well as industrial source separation by law.

Many recyclers are in the process of significantly increasing the number of company owned depots and collection points throughout the City to make it more convenient and attractive to private households to separate their materials, and to seek the support of City Council to provide suitable space for new depots. Many recyclers offer some hands-on training programs for collectors and entrepreneurs willing to improve their sorting and collection skills. The motor oil industry intends to formalise and train at least 150 currently unemployed individuals that will be encouraged to collect oil on behalf of the Rose Foundation with the very high environmental standards requested by the industry) and get paid directly through the Rose Foundation [ref 8-15].

8.5.8. National Recycling Statistics

In an article published by the Sunday Times (30 November 2003) [ref 8-14] key players of South Africa's Packaging industry made the following statements with regards to National "reprocess" rates:

- In the last 20 years the amount of materials reprocessed increased from 486 000 tons to 1.3 million tons while the amount of virgin material used to produce packaging increased from 1.4 million tons in 1984 to 2.4 million tons in 2003.
- The national packaging waste recovery and recycling industry is worth a combined R 1.3 billions per year and employs approximately 40 000 people (mostly micro collectors).

Paper

- South African reprocessing rates for paper are 922 000 tons in total (but not all is recycled in South Africa). The national paper recovery and collection provides jobs for 11 000 collectors working in about 300 collection centres.

Cans

- About 48 000 tons of cans are recovered for recycling nationwide paying collectors a total of about R 23 million.

Glass

- National glass recycling tonnage rates have not been given but the business is worth about R 60 million per year providing jobs for at least 1500 to 3000 people.

Plastics

- The plastic industry claims to recycle about 114 000 tons per year through 124 nationwide recyclers. The business is worth an estimated R 300 million a year and provides jobs for a total of about 20 000 people

8.5.9. Summary of Findings of Waste Quantities Recycled in Cape Town

The following Table gives a summary of the various types and quantities of materials recycled in Cape Town by local industry.

8

Table 8.7. Waste Quantities Recycled in Cape Town

Type of Recyclable	Quantity Known to be Annually Recycled in Cape Town
PLASTIC	
LDPE	**13 800 tons (total from 8 large recyclers)**
HDPE	**2400 tons (total from 7 recyclers)**
PET	**1800 tons (total given from 3 recyclers)**
PP	**2160 tons (total given from 6 recyclers)**
PS-E	**? (only one local recycle operating)**
Other plastics	**?**
Plastic recycled in CT (known total):	20 160 tons
GLASS	
Mixed glass	**16 800tons**
PAPER	
Total paper	**180-200 000 tons**
CANS	
Total cans	**4400 tons**
LUBRICATION OIL	
Oilkol in CT	**6 million litres**

8.6. Waste Recovery and Collection for Recycling

Waste recovery and collection describes any activity that is aimed at retrieving recyclables out of the waste stream (either post-consumer or pre-consumer) so that the 'product' can be ultimately passed on to the respective recycler (i.e. end-user). Waste recovery and collection (plus in some cases sorting and/or pre-processing for recycling) is typically done by any individual or group further described below or the recyclers themselves.

8.6.1. Commercial Collectors of Recyclables

The market survey has shown that the approach adopted by most of the recycling companies in their efforts to capture a greater tonnage of recyclables is to establish or support buy back centres in addition to equipping community or Council operated drop off sites and school grounds with collection containers such as igloos (for glass), paper banks (paper and cardboard).

The buy back (see also section 8.2.3) are strategically placed and managed by smaller companies or individuals and materials are recovered using the free market approach. Most of the buy back centres are located in low income/high density areas or in commercial/industrial nodes where informal collectors are paid out on an adhoc basis for collecting and delivering certain types and grades of recyclables to the centre manager.

Physical collection of recyclables is not dominated by any particular consortium of companies but rather is an opportunity that any individual or community group can exploit and which is entirely driven by market forces. This makes the sector of Intermediate Processors and Commercial Collectors, very volatile and fast changing, with new key players emerging all the time. The spectrum of a typical collectors' infrastructure includes anything from a large and established business such as Cape Waste to a fast growing number of one person businesses where individuals collect waste from industrial outlets with a bakkie and deliver it to the respective recyclers (e.g. in the plastics industry) or to the micro collectors who look for recoverables from both industrial and domestic sources.

8.6.1.1 Plastic Collection

In the **plastics industry** due to 7 different basic types of plastic materials and the values thereof that can be collected at any one time, the number of collectors (large, small and micro) varies extensively. Plastic waste (in particular Low Density Polyethylene (LDPE) and High Density Polyethylene (HDPE)) is either collected directly from plastic converting or packaging factories and to some lesser degrees some plastic recyclers also buy from plastic scrap collectors and buyers who themselves retrieve plastic materials from landfill contracts or are supplied on a daily base by micro collectors. The largest recycler of LDPE in the Western Cape is Atlantic Plastic Recycling who processes about 450-500 tons per month. They do not accept any post-consumer LDPE, or HDPE waste (due to the contamination potential of "wet wastes") unless there has been source separation on household level like with the Yellow Bag (see also 8.6.6), or the waste is properly pre-sorted and baled as is the case for community/NGO collection initiatives (see also 8.6) such as Kronendal or Oasis. Plastic waste retrieved from onsite source separation in shopping malls, hotels and offices

(see also 8.6.2) provides significant amounts of waste plastics for a range of recyclers. The majority of recyclers accept to some degree post-consumer waste which mostly reaches them through micro collectors or buy backs. The job creation potential the collection of plastics provides is apparently quite big and typically 20%-40% of a recycler's business (accepting post-consumer waste) comes straight from the plastic sources micro collectors provide. There is one recyclers who is directly supplied by 30-40 informal people every day. An increasing amount of small collectors (as described in 8.2.2) are currently breaking into the plastic collection market and retrieve materials straight from factories which they transport and sell directly to the respective recyclers. According to one recycler, attempts by the Plastic Federation in the last few years to encourage the collection of post-consumer plastics by erecting "Green Cages" failed dismally and not a single one is in operation any more in the whole of Cape Town. From the 11 recyclers interviewed school collection infrastructure does not exist at all in the plastic recovery and recycling business.

(i) HDPE, LDPE

According to the Bergman-Ingerop study [ref 8-1] in 2001-2002 soft plastic (LDPE and HDPE) was collected by at least 70 large to medium sized collectors due to its attractive market value R 1000-2000 per ton (sorted and baled). The names of the larger collectors of LDPE and HDPE are available from ref 8-17. The Study found that that the collection industry for LDPE and HDPE from the commercial, industrial and retail sector is very well established and forms about 90% of the total business volume.

From the waste characterisation study as part of the Yellow Bag Household Waste Recovery initiative (see also 8.6.6) it has been found that HDPE and LDPE waste account for about 40% (in weight) of the total post-consumer plastics recovered for recycling with the Yellow Bag. The latter resulted in a collection of about 3400 tons of combined LDPE/HDPE waste from about 600 participating households in over a period of about 8 months.

(ii) PET collectors

PET collection and resale to local converters (intermediates) has recently become very competitive with many collection companies 'climbing on the bandwagon' and vast improvements being made in the collection infrastructure. Econo Recycling is one of the oldest established collectors of PET. They currently collect a total of about 1100 tons per annum (up from 600-700 tons in 2001-2002) from schools (59 schools), 16 buy-back centres and about 150 drop offs, sorting and collection depots, as well as from previously unemployed individuals acting as micro collectors within their community.

There is now a high demand for PET in the larger metro areas of SA. Most of the granulised PET processed in the Western Cape is sold to the Polyethylene Recyclers Association of South Africa, who have a converting plant in Gauteng and also supply a plant in Nigeria which produces fleece and fibres for the textile industry. Due to their very large bulk volume of occupying about 40 m^3 per ton of PET and the near impossibility to compact those bottles in a landfill site the systematic removal of post-consumer PET is an indispensable strategy to conserve future landfill airspace.

(iii) Others:

Other plastic wastes collected to a much lesser degree include Polypropylene and Polystyrene (as found in cloth hangers) and very little in PVC, Nylon, ABS and HIPS. Those more "exotic" plastic types came normally from a very specialised industrial/commercial application and/or source like PVC irrigation piping from the agricultural industry or nylon waste as a "non product output" from a large nylon spinner company.

8.6.1.2 Paper and Cardboard

In the **paper collection industry** (driven by Mondi, Nampak or Sappi) the emphasis is on the establishment of buy back centres and paper banks. Mondi and Nampak receive largely loose waste with a small amount of baled waste, whereas Sappi only receives baled waste due to the outsourcing of the collection and baling of waste paper and cardboard and supports school collection programmes.

According to the 2001-2002 Bergman-Ingerop study [ref 8-1] *Nampak* indicated that there could be in excess of 300 individual persons supplying pre-sorted cardboard, paper etc. (i.e. intermediate processors). (The names and locations of all the 60 Nampak serviced buy back centres in and around Cape Town are listed in Appendix C).

In the interview with the IWMP team, *Mondi* confirmed that they have a total of about 80 buy-back centres (up from 34 in the Bergman-Ingerop study) within the immediate area of Cape Town, providing about 40 % of the total paper recovery business in Cape Town. (The name and location of some Mondi serviced buy-back centres in and around Cape Town is listed in Appendix C). In addition to the buy back centres (and according to the statistics received by the Fairest Cape Association (FCA)) approximately 160 paper banks are placed directly on school grounds which contribute about 5% to the Mondi paper recovery business. Top primary schools for paper collection with Mondi are currently Kronendal, Kenridge, Bergvliet and Monte Vista. Another 40 locations of banks are found at churches, charities and at community/NGO driven drop off sites. From the total amount of paper that ends up at Mondi Recycling about 70% is collected by Mondi itself (via their depots) and only 30% gets delivered directly to Mondi's doors by collectors.

From the 30% that is directly delivered to Mondi large-scale (established) collectors deliver about 90% and only about 10% of the small and micro collectors are servicing Mondi directly.

Sappi confirmed that most of their waste received is initially collected by small shops, supermarkets, small containerised areas, and partners in the metal and steel industry before being transferred to specific agents who process and bale the waste prior to transporting to Sappi. In addition, Sappi currently services 150 local schools with paper banks. However, according to the Regional Manager only 50 of those schools are really effective with collecting paper and cardboard. About 35 Sappi (co)-financed depots exist throughout Cape Town where individuals who approached Sappi to become regular deliverers to them are equipped with the necessary infrastructure to start a depot. Sappi gets its paper waste supplied through about 200 buy back centres/major collectors in Cape Town which forms about 35% of the total business for Sappi. Large collectors provide about 65% to Sappi's business whereas small and micro collectors are accounting together for about 35% . 90 % of

all paper received at Sappi gets recycled in the local Cape Craft Mill where about the remaining 10% are sold to either Mondi or Nampak.

8.6.1.3 Glass

In the **glass recycling industry** the strategy to recover waste glass is focussed primarily towards providing igloos and glass banks in specific areas such as in schools and in community or Council operated sorting stations and drop off sites.

Enviroglass & Waste is the sole intermediate and receives glass from many collectors located primarily within the City, but also from other centres within the Western Cape. It has been confirmed by the glass industry that 70% of the glass recycled in the Western Cape is recycled in Cape Town.

According to statistics received by the Fairest Cape Association Enviroglass & Waste provides a total of about 300 locations (mostly comprising of schools but also crèches, shopping centres, community drop offs, churches and havens with bottle banks).

Enviroglass is responsible for screening, sorting, cleaning/washing and crushing of all glass prior to selling to Consol for final processing. Consol is the only company in Cape Town that recycles glass, giving them a monopoly situation where they can dictate the price. Recently the value for recovered glass was dramatically increased by the glass industry from typically R 65-70 per ton to up to R 340/ton (glass must be clean and colour sorted) in response to the intention of Consol to expand the glass recycling plant in Bellville and increase the process volumes from currently 1700 tons/month to 6000 tons per month. There are no other companies in Cape Town who have a pre-processing facility that can compete with Enviroglass & Waste.

Alternatively there are two companies operating in Cape Town who collect glass for the purposes of reusing specific wine and liquor bottles namely Cape Bottle Wash and Cape Bottle Recyclers. (For more information on the reuse of glass please refer to section 8.4).

Other items commercially reused are certain glass bottles (wine and water bottles) that get washed and therefore reused (about 35% of the glass bottles produced in South Africa are reused) and not melted down (recycled), and drum reconditioning.

8.6.1.4 Construction and Demolition (C&D) Waste

One of the largest amounts and most significant type of waste recovered for recycling is clean builders rubble. In the past, builder's rubble has shown to be the major contributor of the local dumping problem in Cape Town. About 240 000 tons of construction waste per year (estimated to be between 15-30 of the total municipal waste) are disposed off at Cape Town's landfill sites(ref 8-11)) since there seems no demand for it.[4] In response some individuals seized the opportunity for starting a business by collecting, processing (crushing and grading) and reselling those building materials. One of the largest rubble processors is Malan's Quarry with a plant production capacity of about 800-1000 tons/day.

This provides a valuable system of supplementing the efforts of the City to reduce the dumping of rubble by offering a free (up to one ton) service for any private individual who needs to dispose of waste at a Council operated landfill site.

8.6.1.5 Metals

According to the Bergman-Ingerop Study (ref 8-1) Chicks National is the only company on the intermediary level in the Cape Town metal recycling business. There are currently 16 metal waste collectors that sell materials directly to SA Metal for recycling. Chicks National and one other company are the only companies who are allowed to sell metal directly to Cape Iron and Steel Works (CISCO). A questionnaire was sent to SA Metal as well as to Collect-a-can to establish the total amount of metal collected and recycled in Cape Town. Unfortunately no reply was given by either of the companies.

8.6.2. Special Commercial Collection Services

Apart from the large number of collectors who receive most of their materials from industries and factory outlets there has been a new generation of collectors thriving in the last few years who target additionally the commercial business sector of Cape Town. The main focus lies here on the provision of an "in-house" one-stop, waste collection, sorting for recycling and waste removal service. Don't Waste Services commenced business in Cape Town in October 2000 when the company was awarded the waste contract with the newly built shopping centre "Canal Walk", the first of its kind to offer an integrated waste management service in Cape Town.

Initially the waste was collected, sorted and baled onsite (in the Canal Walk Basement) and recyclers came directly to the centre to pick up their materials such as paper, glass, cans etc. Now most of the waste from Canal Walk and other shopping centres is sorted and baled off-site on premises near the airport which serves as a central location for all the incoming recyclables. Any waste streams coming from commercial developments (such as local shopping centres, hotels, conference centres, large residential developments, commercial buildings, office blocks, and airports) display large amounts of recyclables that can be recovered for recycling (typically around 60%-70% for shopping centres if a source separation of wet waste and dry waste is performed).

Waste removal and sorting from special events such as J&B Met and the Cape Argus Tour has also shown to work extremely well and such services are equally supplied by Don't Waste Services. As part of the Wastewise Campaign (see also Chapter 13) a Special Event Waste Management Guideline document was developed by the FCA in teamwork with Don't Waste who did the required baseline assessment on the amount and types of waste that were generated at such events in order to be able to measure the impact of various organisational waste minimisation interventions.

[4]This public assumption is not correct since Cape Town has a shortage of cover material for its landfill

Case Study Don't Waste Services: A Dairy company (outside of Cape Town) was dumping 260 tons of waste product to landfill but with the introduction of a waste separation system it was intended, over 2 years, to reduce this to 130 tons. This target has been achieved after 5 months already and with a new recycler of HD Plastic opening in that area another 20 tons could be reduced a month later- Total waste reduction to landfill after only 6 month: 58%

The second service provider who specialised in the field of commercial waste recovery is a company called On-Site Waste whose performance is summarised below:

Case Study Onsite Waste: Six local hotels, two branches of a National Electrical Appliance store, a small shopping centre complex, one branch of a large National stationary franchise, a dairy manufacturer and four hospitals manage (through education on the need of source separation and the provision of the required infrastructure such as bins, balers etc) to divert a combined: 63 tons of recyclables/month

8.6.3. Community/NGO driven Drop Offs for Collection of Recyclables

The IWMP research team identified a total of 21 established Community/NGO driven waste drop off and/or sorting sites (as listed in CoCT Environmental Resource Directory [ref 8-9] and FCA Recycling Directory [ref 8-9]). All 21 community initiatives were sent a questionnaire (see Appendix A) and 13 questionnaires were filled in and returned to the IWMP team for evaluation. The names of all the community initiatives are listed in Table 8. 2 where the community groups that provide information are indicated.

Table 8. 2: List of all established community/NGO driven drop off and collection sites

NEAG*	Inkqubela*
WESSA*	**Mary Harding**
Scarborough*	**Oasis***
Warmth*	**Kalk Bay Recycling**
CAFDA*	**Grassroots Network**
WC APD*	**Haven Night Shelter**
Aanhouwen*	**KEAG**
Footprint*	**Helderberg**
Tsoga*	**Village Works**
Kronendal*	**Bergvliet***
Friends of Childrens Hospital	

It is beyond the scope of this chapter to list all the detailed findings of this survey. An Excel spreadsheet has been developed by the IWM team where all the individual answers to the questions have been positioned for the various groups next to each other so that a direct comparative study was possible and trends and recommendations from this stakeholder group could be extracted as a result.

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sites thus depending on clean rubble as cover material and basically competing against recyclers.

Two case studies are presented to highlight the specific dynamics in certain parts of Cape Towni.e. the Inkqubela Waste Recovery project in Khayelitsha and the dynamics of the Oasis project.

Inkqubela Case Study

The Inkqubela community centre has been in operation since 1995 and acts predominantly as a Buy-Back centre, as well as encouraging (voluntary) community collection of recyclables. This centre collects on a **monthly** base approximately:

35 tons of Cardboard
23 tons of Bottles
10 tons of White Paper
20 tons of Newspaper
15 tons of Scrap Metal
25 tons of Plastics

Sources for the recyclables are coming predominantly from schools and spaza shops but also from micro collectors who get paid for the materials they bring to the Buy Back. Sappi and Mondi provide the centre with bins and infrastructure for paper collection.

Inkqubela sells all materials collected on to the respective recyclers and currently receives the prices for the materials as indicated in Table 8.8.
According to Inkqunbela the operation is currently NOT financially self-sustaining but with the proceedings of the waste they manage to employ 17 permanent staff and 8 part-time workers. In addition they estimate the their buy-back is frequented regularly by at least 150 micro collectors who derive income from them.

Table 8.8 Prices paid by recycler

Name of Recycler	Material bought	Price paid by Recycler
Sappi Wastepaper	**Cardboard**	**40c/kg**
Mondi	**White Paper**	**90c/kg**
Poly Recycling	**Plastics**	**R 1.20/kg**
Plastibottle	**Enviroglass/Cape Bottle Wash**	**12c/kg**
Metal Scrap	**SA Metal**	**25c/kg**

Best practice strategies from the Inkqubela initiative are aimed at proper education, training and environmental awareness raising. A "waste to arts" community project was started to train people in the making of beads for traditional jewellery. The initiative ensures community support by regular advertising in local newspapers and by word of mouth.

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Oasis Case Study

BACKGROUND

The aims of the Oasis Workshops are:

- provide work opportunity for over 336 men and women with intellectual disabilities.
- Income generation and self sustainability
- Positive Environmental impact on Cape Town's landfills which are in crisis
- Environmental education

Oasis does not pay for waste materials, as buy back centres usually do, in order to avoid conflicts with the residential neighbours who oppose a high influx of micro collectors.

The sorting centre serves local residents, collecting voluntarily paper, cardboard, glass and some plastic (although the project makes its money from paper). Claremont branch provides an after-hours receptacle.

The Oasis Recycling project is currently recycling over 40 tons of paper every month, thereby making a substantial contribution towards the saving of landfill in Cape Town.

EDUCATION ON WASTE & POLLUTION – SCHOOLS PROGRAMME

The Oasis Association introduced a Schools Education Recycling programme during the latter half of 2002. It visits schools to introduce the "Green Bag" campaign which is aimed at educating learners and their families on recycling and encouraging them to bring recyclables to their schools for collections on predetermined days. The learners are taught about the value of recycling and are also shown different recyclable materials.

The "Green Bag" campaign has also been introduced at businesses in the Western Cape, encouraging employees to bring recyclables from home and also to recycle in the workplace.

8.6.4. School Drop Offs for Recyclables

Many school drop off sites are available in Cape Town and for the Paper Industry (as well to an increasing degree by the glass recycling industry) schools are a key element in their strategy to recovery post-consumer waste for recycling. A large number of schools is directly supported and equipped through the local recycling industry with bins, banks but also educational materials. Educational support for school recycling projects has been given in many cases by the Fairest Cape Association (see also Chapter 13) including research on best practice models and top performers such as Kronendal Schools Recycling and Bergvliet High School (see also case studies) which are monitored regularly.

It has been found that outstanding school based waste recovery performances are always driven by a dedicated individual who keeps up the momentum of the initiative. In most cases this is a school teacher or the principal him/herself but parents from scholars have

also shown to play a pivotal role in supporting school drop offs and to ensure that the school drop off is a money spinner to finance school infrastructure. A summary table of all schools involved in recycling support has been compiled by FCA team cross-reference.

Some of the current top school performers were identified to be (in no specific order):

- Kronendal Recycling
- Kenridge Primary
- Bergvliet High
- Monte Vista Primary
- Grassy Park High
- Edgemead Primary
- SACS
- Tamboerskloof Primary

Bergvliet High Case Study:

The Bergvliet High School Drop Off is now already in its 14th year and undoubtedly on of the most successful initiatives of its kind. :
Bergvliet High pupils, parents and extensive base of voluntary local community supporters manage to recover (from private households but also from neighbouring sport clubs, restaurants and offices) on a **monthly** base about:

10.5 tons of Paper
1.25 tons of Cardboard
8.54 tons of Glass
0.7 tons of Plastics
1.5 ton of Cans
8000 reusable bottles
500 reusable glass jars
20 tons of Newspaper
15 tons of Scrap Metal

Kronendal Case Study
Since Sheila Hoffmeyer took over as coordinator in 1997, the program has raised nearly R 165,000 for the school and saved 2,800 tons of paper, plastic, glass and cans from the landfill (this is about 15.7 tons weekly recovered). Half the money comes from recycling competition prizes, and the other half from profits made by sorting and selling the raw materials they collect.

At Kronendal Primary School, students are encouraged to bring recycling to school by having inter-class competitions. Interest in Kronendal successful recycling program grew, and soon other communities were seeking Hoffmeyr's advice on starting similar programs.

The school co-ordinator Sheila Hoffmeyer began collecting recycling from businesses as well. Interest in recycling grew as people realized it saved money in refuse removal costs, sometimes by as much as 50%. Soon she was collecting from more than 75 businesses and 7 housing estates. As the recycling program grew, Hoffmeyer had to hire people to sort the materials. Currently, the program provides permanent jobs for 13 people.

8.6.5. Local Government Initiatives

Yellow Bag

The Yellow Bag program in Marina da Gama is the first and only household source recovery and collection project that has been directly initiated by the City of Cape Town. Extensive research and data evaluation has taken place throughout the various development stages (phases of the project). A paper on the "Cost /Benefit Analysis of the Yellow Bag" has been prepared and is available in the Appendix D for a full overview of the project up to September 2003 and a detailed description of the first two project phases.

A current update on collection was provided by Enviroglass and Waste (the company who runs the Yellow Bag in partnership with the City of Cape Town) and future plans and outcomes were discussed as follows:

In a period of eight months (April 2003-December 2003) the following recyclables could be recovered from about 600 participating households (out of a total of about 1000 households) with the "Yellow Bag"

Newspaper: 15.2 tons
Magazines: 5.3 tons
Cardboard: 9.2 tons
White/office paper: 4.8 tons
Tins: 3.3 tons
Glass: 21 tons
PET: 2.4 tons
HDPE:1.8 tons
LDPE: 1.7 tons

Due to better and faster sorting and streamlined collection the current financial loss per bag (as stated in the Yellow Bag paper) for Enviroglass has decreased from R 1.00 to R 0.45. Any losses currently incurred to Enviroglass as part of the project are actually covered by the City Council.

Phase 3 of the Yellow Bag project is due to be started by January 2004. It is the aim to replace the current collection mode (one Council truck for the rubbish and one truck from Enviroglass for the recyclables operating at the same time and date) by using a side way lifting and compaction waste truck. This will enable the project team to add a trailer on the back of the collection vehicle and thereby save an extra transport beat to pick up the recyclables.

The Yellow Bag task team is very positive that this alteration will be an important step to make the project eventually financially feasible, which is the ultimate aim before any similar projects are rolled out anywhere in the City.

Local Council Drop Off Sites

Refer to Chapter 7.3

Local Council Composting Sites

Refer to Chapter 7.4

8.7. Gap Analysis

On the basis of the *status quo* review of waste minimisation and recycling initiatives, undertaken in Chapter 8, this section identifies the principal gaps and needs that should be addressed if effective waste minimisation and recycling measures are to be implemented effectively throughout the City of Cape Town.

The GAP analysis and needs assessment has been informed by the underlying strategic objective relating to waste minimisation and recycling, namely the desire to reduce the overall volume of all wastes (including wastes for recycling), with the principal focus being on preventing the generation of waste at source. In achieving this strategic objective, the Gap Analysis has also been guided by recent studies that have identified the principal barriers that have hindered the more widespread adoption of potential "win-win" waste minimisation measures. These barriers include inappropriate or insufficient regulatory and financial incentives to encourage a demand driven desire to minimise waste, frequent misunderstanding of the concept of waste minimisation, and a general lack of awareness of the benefits and techniques for implementing waste minimisation and recycling. (See Box 1; which refers specifically to measures at the level of industry and commerce but where many findings are equally applicable for the individual household).
With the aim of meeting the above strategic objective – and addressing the identified barriers – it is suggested that the following general needs must be addressed, and that these should form core elements of any policy efforts for promoting waste minimisation and recycling in the City of Cape Town:

1. There needs to be accurate and sufficiently detailed ***background information for policy-makers***, including on such issues as the volume and source of different waste streams, their toxicity , and the costs and benefits associated with minimisation and recycling. It is suggested that a document similar to the recently compiled local "State of Energy Report" is required which benchmarks and assesses our current waste loads and identifies "the low hanging fruits" to obtain a drastic cut in waste loads. This annual "State of Waste Report" should also outline the short, medium and long-term goals with regards to future strategies required and projects for implementation.

2. An appropriate ***regulatory and financial policy framework*** needs to be in place to ensure that generators of waste have sufficient *incentive* to implement waste minimisation and recycling measures;

3. There needs to be effective ***communication, awareness and training programmes*** aimed at building *technical capacity* amongst regulators, and *increasing awareness and understanding* amongst regulators and the public on the techniques, opportunities and benefits associated with waste minimisation and recycling;

4. The opportunities for implementing waste minimisation and recycling measures need to be facilitated through the ***availability of appropriate infrastructure***.

The above four sets of general issues form the basis of the following GAPS and Needs Analysis,

Potential Constraints to Adopting Waste Minimisation Practices in South Africa

Despite the fact that waste minimisation often pays, businesses (both locally and internationally) often fail to implement the cost-saving opportunities associated with cleaner production. The different reasons for this are generally well known, and have been identified by observers throughout the world. These barriers include:

Regulatory and incentive constraints:

- Lack of appropriate regulatory pressure
- Tradition of poor enforcement of environmental regulations
- Continuing shortage of capacity and budget constraints in key governmental departments
- Low resource and waste disposal costs
- Lack of consumer and shareholder pressure

Awareness constraints:

- Lack of knowledge and belief in the payback periods
- Lack of technical knowledge and awareness of waste minimisation options
- Perception of high risk involved in adopting unproven waste minimisation options
- Lack of awareness of the available financing options
- Lack of knowledge on environmental effects
- Prevalent perception that waste management is a cost factor, rather than an opportunity for savings;

Operational constraints at the enterprise level:

- Lack of management commitment and political will
- Low literacy rates amongst the workforce.
- Low business confidence
- Low business profitability
- Payback periods exceeding the investment frame of the company
- Close competitiveness resulting in a reluctance to share information
- Management structures that impact on internal information

8.7.1 Background Information for Policy-Makers

The development of a sound waste management policy – and the implementation of effective waste management planning, monitoring and enforcement procedures – is dependent upon the availability of accurate and reliable background economic, social and environmental data. As is identified below, a significant underlying gap that was identified during the *Status Quo* review relates to the lack of readily available information to inform sound policy-making. Such information is essential for prioritising the most appropriate waste streams and the most effective opportunities for minimisation and recycling, both upstream (e.g. amongst packaging producers) and downstream (e.g. within households and amongst recycling entrepreneurs).

This gap in information is further compounded by a frequently evident misunderstanding amongst certain policy-makers and administrators regarding the exact scope and meaning of terms such as "waste minimisation", "reuse" and "recycling." This includes in particular, for example, insufficient appreciation of the fact that recycling is not always an economically or environmentally appropriate solution, as well as a tendency to equate elements of re-use and recycling with waste minimisation and prevention.

Following is a brief review of some of the principal gaps and associated needs relating to the availability of background information:

(i) Principal Gaps relating to Background Information

At a general level, the *Status Quo* review has underlined that there are some significant areas where there is insufficient available information to inform the development of effective policy; these include gaps relating to:

- The volume and source of most current waste streams, including in particular data gaps relating to the volume and nature of a number of potentially recyclable waste streams, the percentage of these streams that are currently being recycled, and the nature of the market for recyclables;
- The availability of quantified data on the environmental, economic and social costs and benefits (particularly for the CCT) of implementing waste minimisation and recycling initiatives – over both the long-term and the short-term. Although there have been some important achievements, it is generally difficult to obtain data on these achievements, which could be otherwise be used to assist in motivating and guiding further activity. IN this regard there is seen to be particular scope for improving understanding and practical application of Full Cost Accounting practices relating to environmental issues; and
- The volume and nature of waste streams that may have been reduced as a result of successful waste minimisation initiatives.
- The City does not have a complete and unified database of all recyclers that buy used materials from buy back centres but some information is available (though fragmented and incomplete). The Fairest Cape Association Recycling Directory lists most of the major key players and DEAD&P started a similar collection of information as part of their WIS. Lack of funding does however not allow the FCA to update their Directory as regular as it would be required (at least every six months). Since waste recovery and recycling is a volatile industry key players change and (dis)appear quickly. In order to pick up the latest trends and assess the quickly changing market forces that drive recycling it is of utmost importance to provide regular updates of the local recovery, collection and recycling industry and how they interact.

(ii) Key Needs relating to Background Information

There is an underlying need for the development and implementation of a structured and legally enforceable Waste Information System (WIS). It is evident that many businesses are currently unwilling to share production-related information with authorities unless they are compelled to do so (for example as part of a mandatory WIS). This reluctance was evidenced for example in the difficulties associated with administering a waste exchange (IWEX) in the Cape and the clear prevalence of companies only to list general and non hazardous types of waste with a high recycling potential.

In developing this WIS, specific provision must be made for the gathering of data that can assist in promoting waste minimisation and recycling. While the exact nature of these data needs, and their implications for the development of the IWMP, will be explored in more detail in the next phase of this study, it is suggested that the following broad monitoring and research needs should be considered in the design of the WIS:

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- Establishing the quantity, type and quality of materials currently being recycled and describe the operating recycling facilities. Established recycling facilities should be described for each factory/industry, local authority, region or province, as follows:
  - Commodities recycled (e.g. waste paper, metal cans and glass);
  - Existing recycling facilities (location, capacity, treatment, age, etc.);
  - Organised collection of reusable materials (area served, waste type, quantity, collection method, frequency of collection);
  - Role and scope of informal collection of reusable materials (e.g. through micro collectors with trolleys and/or landfill pickers);
  - Processing of collected material (at source or at the recycling company);
  - Nature of market for recycled materials and compost;
  - Recycling costs;
  - Logistical and infrastructural requirements required to recover and recycle waste materials;
- Providing data to inform a waste generation model, which should include a projection of how waste generation would change if waste minimisation becomes more widespread;
- Undertaking a socio-economic analysis of the potential markets for recycling different waste categories;
- Assessing the options for poverty alleviation through community upliftment projects (including waste recovery, reuse and recycling projects);
- Undertaking a feasibility analysis of alternative waste minimisation options, including a comparative economic analysis of current practices compared to proposed alternatives;
- Promoting improved analysis of options by using Full Cost Accounting methods.

Ideally the information generated in the WIS should inform the implementation of integrated resource management plans for different industries and/or sectors, covering waste minimisation, and energy and water usage.

The Waste Exchange (IWEX) – Key Challenges

During the three years of the IWEX – prior to it being put on hold in November 2003 due to budget and staff constraints – the following challenges emerged regarding its implementation on a daily basis:

- It is very time consuming to facilitate the IWEX database and provide up-to-date listings (remove obsolete or exchanged listings)
- It is difficult to have a full overview on the website activities and actually impossible to track all the exchanges going on
- Due to the set-up of the website virtually no feedback from companies is given. Therefore regular telephonic "interviews" are required to follow up possible exchange opportunities
- As mentioned above the full potential and role IWEX could provide as part of a IWMP strategy has not been reached at all since the vast majority of business shows no interest in IWEX due to the lack of any legal waste minimisation requirement.
- The question of the ideal "ownership" for IWEX needs to be discussed since there is a lot of mistrust between companies and any services that is provided to them by Local Authorities.
- DEAT clearly sees IWEX as a tool for its WIS (as stipulated as one of the three major targets in the NWMS) and DANIDA has recently indicated the possible availability of funding to roll out the IWEX model to other cities with the aim to boost the frequency of exchanges by 30% and meetings between Danida, Provincial and Local Authorities took already place in this regard.

External auditing of the IWEX performance should be implemented if Dandida/DEAT proceed with their plans to pilot IWEX for other cities.

8.7.2 Regulatory and Financial Policy Framework

A key constraint that currently hinders the more widespread adoption of waste minimisation and recycling – at the domestic, commercial and industrial levels – is the lack of sufficient incentives due to an inappropriate regulatory and financial policy framework. Recognising the importance of regulatory and financial incentives, the following broad gaps and associated needs have been identified from the *Status Quo* review.

(i) Key Gaps in the Regulatory and Financial Policy Framework

At a general level, a principal concern relates to the lack of sufficient legislative requirements or policy incentives relating specifically to waste minimisation or recycling. This is further compounded by the insufficient monitoring or enforcement of waste-related legislation that currently does exist, the fragmentation of responsibility, a general lack of administrative capacity, and a lack of awareness on the legislative requirements. The following specific gaps and concerns were identified during the review:

- Lack of genuine political interest and support in the long-term due to fluctuating political powers and political agendas.
- Insufficient policy instruments and incentives that: more accurately reflect the true environmental and social costs of waste disposal; encourage waste generators to separate waste at source; or focus on upstream generators of waste, including in particular amongst packaging manufacturers and retailers;
- Insufficient integration of policies relating to waste management in general (and waste minimisation and recycling in particular) within the CoCT; this includes for example a lack of a co-ordinated effort amongst law enforcers to address concerns relating to illegal dumping and littering;
- Insufficient financial, technical and human resources within local government relating specifically to waste prevention, minimisation and recycling.

(ii) Key Needs in the Regulatory and Financial Policy Framework

At a general level there is a recognised need to implement more focussed policy measures aimed at encouraging waste minimisation and recycling, as well as a need to improve the technical capacity of regulatory and enforcement officials. More specifically, the following regulatory and policy needs have been identified on the basis of the *Status Quo* review. The implications of these – and other policy options – will be explored in more detail in the next phase of this study:

- In finalising the regulatory and policy framework for waste minimisation and recycling in the City of Cape Town, the following general needs and options should be considered:
  - Setting clear targets for waste reduction to landfill, based on accurate data, to prioritise the policy activities and to comply with national target such as stipulated in DEAT's NWMS and the Polokwane Declaration;
  - Requiring domestic, commercial and industrial waste generators by law to separate waste at source;

- Increasing the financial incentive for waste generators to reduce or recycle waste, for example through "pay-as-you-throw" policy measures;
- Supplement (sometimes difficult to conduct) domestic waste at source programs with policy measures that focus efforts further up the supply chain. This may be achieved for example by measures relating to extended producer responsibility that focus for instance on minimising packaging waste directly at the level of the packaging manufacturers and/or retailers;
- Requiring and/or encouraging industry and households to use recycled products rather than those made from virgin plastics (e.g. refuse bags);
- Banning the disposal of certain recyclables such as PS-E or PET bottles (with a bulk factor of 25-40) to landfill (implemented over time period) or potentially toxic materials (PVC) as this would force the producers to either stimulate drastically their recovery and recycling rates or replace those materials altogether;
- Specifying a minimum recycled content for example in public procurement activities;
- Focus on material-specific recycling targets, focussing on those materials where recycling offers greatest environmental (and socio-economic) benefit.

- Investigate the feasibility for introducing appropriate economic policy instruments, including for example: a landfill tax, product taxes, deposit refund schemes, and the provision of financial incentives (such as airspace credits) for waste collectors; these measures should be accompanied by the provision of available alternative disposal options.

- Identify and address the potential for existing disincentives (e.g. within the current rates structure) against implementing waste minimisation or recycling;

- The development, implementation and enforcement of relevant legal requirements should be enhanced by expanding the human, financial and technical resources available to the City of Cape Town; in this regard there is seen to be scope for closer co-operation with other enforcement officials;

- International experience has highlighted the scope – under the right circumstances – for using information-based policy instruments, as well as voluntary industry initiatives, as a means of prompting a more proactive response within industry and business

The effective implementation of regulatory measures is often undermined by the failure to communicate within and between local authorities, poor levels of internal co-ordination between municipal departments, and insufficient systems of consultation with local stakeholder groups. Some of these concerns are addressed in the following section.

8.7.3 Communication, Awareness and Training Initiatives

International and local studies have consistently highlighted the extent to which a lack of information and understanding on the benefits and opportunities associated with waste minimisation – as well as, conversely, the potential limitations associated with recycling – have constrained the achievement of more effective waste management outcomes. While

the recent *Status Quo* review has identified some valuable communication and awareness initiatives within the CoCT, it is evident that there are some important gaps to be addressed.

(i) Key Gaps relating to Communication, Awareness and Training Initiatives

The following key gaps relating to communication, awareness and training were identified:

- There is scope for more effective dissemination of the results and lessons learned from the existing waste minimisation and recycling achievements within the CoCT, with the aim of encouraging more widespread implementation of similar initiatives;
- There is insufficient awareness amongst ordinary citizens of the benefits and opportunities associated with waste minimisation and recycling; and
- There is insufficient capacity of local authorities to monitor and enforce waste minimisation options.

(ii) Key Needs relating to Communication, Awareness and Training Initiatives

There is a need to improve the general understanding and awareness – amongst regulatory officials and the general public – of the benefits, opportunities and techniques associated with waste minimisation and recycling. The nature of the mechanisms for increasing awareness will be examined in more detail in the next phase. Possible activities (for commercial, industrial and domestic users) include for example:

- More widespread and effective dissemination of waste minimisation successes combined with training on how to emulate these successes;
- Providing information on technical opportunities to waste generators for example through a web-page of case studies and checklists;
- Providing technical training to build capacity amongst local authorities on the techniques and opportunities for waste minimisation, and to facilitate greater exchange of information between local authorities on best practice approaches;
- Encouraging the establishment of new waste minimisation clubs, extending them to other sectors, and ensuring as far as possible that they are independently commercially viable; the appropriate involvement of local authorities in these clubs and related projects is critical, preferably with a focus on co-operation rather than command-and-control; there is a need also to encourage the development of a greater number of service providers to manage these clubs;
- Increasing provision of practical training within tertiary institutions, not only within engineering departments, but also at a multi-disciplinary level, including for example in product design, policy-making, and finance; this training should be accompanied by sharing success stories and linking these to practical in-house training for students
- Using opportunities relating to SETA accreditation to build capacity amongst company employees, managers and regulatory officials;
- Encouraging demonstration projects in key sectors and on key issues – this could include for example a project amongst packaging manufacturers and/or retailers, focusing on design for recyclability and linking this to extended producer responsibility policy;
- Increasing awareness and activity on waste minimisation within the domestic sector, especially in especially in upmarket communities (where more waste per capita is generated), building on the successes of previous related initiatives;

- Supporting hands-on training programmes for collectors and entrepreneurs willing to improve their sorting and collection skills.

8.7.4 Ensuring availability of Appropriate Infrastructure

Finally, there is a need to ensure that appropriate infrastructure is in place for waste minimisation and recycling activities; this is necessary not only to meet any increase in demand that may result from the above initiatives, but also as a means of further stimulating that demand. At a general level there is seen to be a need to make the opportunities for recycling and waste segregation more convenient and accessible to domestic users. This includes for example:

- Increasing the number of drop-off points throughout the City, making it more convenient and attractive to private households to separate their wastes; as well as the establishment of collection and composting facilities for food and garden waste
- Specific provision should be made for RECOVERY facilities in new housing / office developments
- There is scope for the council to assist in establishing approved collection sites, for example by providing land for drop-off points and waste recovery centres
- There is evident demand for establishing a wash plant to facilitate plastic recycling

Appendices

Appendix A List of Questionnaires Used For Interviews

The Fairest Cape Association
Tel: 021 462 2040
Fax: 021 461 9519

FCA Interviewer: _____ Date:

This information gathering is part of an Integrated Waste Management Plan (IWMP) initiative for the City of Cape Town.

RECYCLING/ RE-USE Questionnaire

1. Name of person interviewed and position and contact details ?

NAME	POSITION	CONTACT DETAILS

2. Name of the Organization, location and how long in existence

ORG. NAME	LOCATION	HOW LONG IN EXISTENCE

3. What type of waste materials is being collected for recycling or re-use? Please add how much kilograms monthly per category is collected.
4.

RECYCLED	WEIGHT	FINAL TOTAL

5. Which collectors provide you with the largest waste streams? Total amount of collectors in CT supplying you.

_____

_____

_____

6. From how many schools in CT do you collect from, what and how much? What Percentage does this account for of the monthly tonnage in that category?

_____

7. From how many community groups do you collect your materials? Specify what and how much? And the percentage.

_____

_____

8. Do you transport (collect/ deliver) materials yourself? Explain.

_____

_____

_____

_____

9. Do you create jobs through your operation? If so how many?

YES	JOBS	NO

10. Do you service informal collectors (trolley brigade). Approximately how many per day?

YES	HOW MANY?	NO

11. Does your organization offer any other services? (e.g. drop off, buy back centre, sorting, collection of waste, educational programmes, training programmes ?…….)

OTHER SERVICES!

12. Identify your needs e.g. current infrastructure that needs to be improved ?

_____

_____

_____

_____

13. In an ideal world - what mechanisms, policies, incentives should be in place (from Council, Industry, Collectors etc) to boost your waste operation?

14. Best Practice Strategies you apply to boost your operation ?

15. Are there other waste initiatives that you are aware of in CT ? Please list some.

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Zeekoevlei
7945
South Africa
Tel: 021- 706 9829
Fax: 021-706 6622
envirosense@xsinet.co.za

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Industrial Forum Questionnaire

Name of person interviewed and position and contact details ?

Name of the Organisation, location and how long in existence

The following **Business/Industrial Forums** have been established to boost the recovery of recyclables in South Africa :

National Recycling Forum
Glass Recycling Association
Plastic Federation South Africa (PFSA)
Packaging Council South Africa (PACSA)
Collect-a-can
Rose Foundation

Total amount of company members from Cape Town

Please specify and name (incl contact details) any other **Business/Industrial** Forum you are aware of:

Types and amounts of recyclables recovered and/or recycled in CAPE TOWN? …….% post-consumer and …….% post industrial, prices paid (average) for various material types

---

Please name the main geographical locations **in Cape Town** where most of the materials are recovered and recycled. Where do you lack infrastructure in Cape Town ?

Which are the main recyclers (end users) in Cape Town within your industrial sector.

Which are the main collectors in Cape Town within your industrial sector

---

What waste recovery/recycling services does your organisation offers ? (e.g. Training and education, financial start up support for buy backs etc. Please specify your top projects you support in Cape Town and the stakeholders thereof

---

How much of the waste materials recovered get currently locally (in CAPE TOWN) recycled?

Needs identified e.g. for current Waste Management infrastructure ----------
---

In an ideal world- what mechanisms, policies, incentives should be in place (from Council, Industry, Collectors etc) to boost your waste recovery and recycling activities in your industrial sector ? Future plans to expand your recovery/recycling rates in Cape Town ?

ANYTHING ELSE ????

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Plastic RECYCLER's Questionnaire

1. Name of person interviewed and position and contact details ?

---

2. Name of the Organisation, location and how long in existence

---
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3. The following **Cape Town based** recycling end users for Plastic have been identified so far:

Afriplast cc , Amican cc, Atlantic Plastic Recycling cc, Cape Town Recycling cc, Econo Recycling, Hangerman (Pty) Ltd , Hanrite div of Premier Hangers, Kamming Recycling SA cc, Malta Recycling, Pelmanco Recycling cc, Plastibottle Plasticycle, Polyrecycling, Proplas, Rhino Plastics, Supa-Plas cc, TS Plastics cc, Uniplastics div of Tuffy Holdings, Van der Schyff Plastics cc, Vinaco PVC Processors (Pty) Ltd, WS Plastics Pelletizing cc

Please specify and name (incl contact details) any other CT based Plastic RECYCLER you are aware of:

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4. Types and amounts of plastic recycled, prices paid (average) for materials? …….% post-consumer and …….% post industrial,

--Types: Amount: Price pd

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5. From total amounts of materials received –how much goes to "waste"

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6. Please name the main geographical locations in CT from where you receive your materials and what percentage of your total business comes from there

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7. Which established and formal collectors provide you with the largest waste streams ? List largest formal collectors in CT supplying you. Total amount of informal collectors (small enterprises with 1-3 people who collect ad hok with a bakkie or street people with trolley collection) in CT supplying you directly ?

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8. Approximate percentage of your business coming from those large scale/established collectors:----------% opposed to informal (street) collectors

Any other services your organisation offers ? (e.g. infrastructure support for drop offs at schools, in communities, at retailers, Green Cage), equipping buy back centres, , sorting of waste, waste education and training ? Please specify

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9. Do you recycle all the plastic waste you received yourself? -any selling to other processors within CT or (inter)nationally ? If so please specify.

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10. In an ideal world- what mechanisms, policies, incentives should be in place (from Council, Industry, Collectors etc) to boost your waste recycling activities ? Future plans to expand your recycling rates ?

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11. ANYTHING ELSE ????

Appendix B: Description of Plastic and Paper Grades

Table A: Plastic Material Sources

Polymer	Typical product applications being recycled in South Africa
PE-LD & PE-LLD Low and Linear low density polyethylene	**Packaging films, cling film, stretch wrapping, shrink wrapping, bags, peelable lids, tubes, irrigation piping, squeezable bottles, cable insulation, mattress covers, clothing store shopping bags, protective cladding films, agricultural films**
PE-HD High density polyethylene	**Crates, milk bottles, fruit juice bottles, drums, packaging films, vest type carrier shopping bags, tubs, closures, cosmetic bottles (only if not heavily soiled), drums, irrigation piping, pallets, shade-cloth, netting**
PP Polypropylene	**Yogurt tubs, margarine tubs, ice cream containers, coat hangers, sweet wrappers, packaging films, bottles, closures, battery cases, bobbins and reels, automotive components, outdoor furniture, buckets, bowls, carpeting, non-woven fibres, bristles, woven tapes, crates, hair extensions and wig pieces, automotive bumpers**
PVC-U Rigid or unplasticised polyvinyl chloride	**Sewage pipes, electrical conduit, clear bottles, rigid profiles, wood cladding, stationery foils, blister packing, plumbing pipes, building and construction profiles e.g. skirting, cladding, cornices, fascia, trunking, etc, calendered foils, food packaging, inserts, e.g. chocolate box trays**
PVC-P Flexible or plasticised poly(vinyl chloride)	**Cable insulation, footwear, flooring, matting, pre-consumer medical cloth and tubing, rain cloth, tarpaulins, cling film, pouches, beading, safety gloves, gum boots, hot water bottles, soft toys**
PET Poly(ethylene terephthalate)	**Clear bottles, carbonated cool drink bottles, mineral water bottles, carpeting, hair extensions, coat hangers, food packaging, non-woven fibers, woven fibers**
PS Polystyrene	**Packaging, dairy containers, yogurt containers, clothing store hangers, take-away cutlery and crockery, toys, cups, plates, audio and video cassette housings, CD covers, housings**

A substantial number of polymers are not listed as they are more likely to be used for longer working lifetimes in engineering type applications, e.g. sky lights, gutters, washing machines and optical fibre cables.

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Table B: Paper Recycling Specifications

Used Kraft (K4) –	**any kraft (brown) paper or board reasonably free from water insoluble matter. This grade would include the following paper grades – used corrugating containers Kraft wrapping papers Kraft envelopes**
Common Mixed Waste (CMW) - Flat News	**This grade may contain any type of repulpable paper. This grade must be free from water insoluble matter** **Used or over used newspaper. White pages from telephone directories May be included in this grade.**
Heavy Letter One (HL1)	**White paper, printed or written upon with all non-white covers removed. Excessive printing should be used as HL2. This grade may not contain any separate mechanical paper. This grade must be free from water insoluble matter.**
Heavy Letter Two (HL2)	**White and pastel coloured paper, printed or written on. This grade may contain up to 10% separate mechanical paper. All dark colour covers to be removed and paper must be free from water soluble matter**
Shavings, Books and Magazines	**Books and Magazines (staple backed) printed on wood free or mechanical paper. Telephone books are excluded from this grade. Slightly printed edge trimmings from magazines, catalogues and other similar printed papers. Trimmings from label paper are excluded from this grade. Latex and cloth backings must be removed from this grade. Paper must be free from water insoluble matter.-**

Appendix C: List of Collectors and Buy Backs

Table C : Nampak deals with following Buy Back Centres

AREA	DEPOT
Athlone	D J Waste
Athlone	Erfren Waste
Athlone	Industrial Scrap
Athlone	Paper King
Beaconvale	Mondi Recycling
Bellville	Dumpit Waste
Blackheath	Blackheath Recycling
Blackheath	Pro Sort Recycling
Blue Downs	Simon Scrap
Brackenfell	TWS
Brackenfell	Anchor Recycling
Cape Town	Paper King
Claremont	Paper King
Eerste Rive	E M C Waste
Eerste Rive	Simon Scrap
Eerste River	Bernies Scrap
Elsies River	Sterotex

Elsies River	**T W S**
Epping	**Snyders Waste**
Epping	**Nampak Recycling**
Epping	**AT Waste**
Faure	**Basil Scrap**
Firgrove	**Firgrove Recycling**
Grassy Park	**Eben Recycling**
Khayelitsha	**Mrs Roro**
Killarney Gardens	**Potsdam Scrap**
Kuilsriver	**Van Zyl Scrap**
Kuilsriver	**G & L Waste**
Langa	**Tsoga Recycling**
Lansdowne	**Paper King**
Maitland/Kensington	**Boeties Scrap**
Maitland/Kensington	**Dumpit Waste**
Maitland/Kensington	**Atlantic Waste**
Maitland/Kensington	**Paper King**
Mitchells Plain	**Southern Recycling**
Montagu Gardens	**B & O Metals**
Observatory	**Scrap Mania**
Paarden Eiland	**Atlantic Waste**
Paarden Eiland	**Paper King**
Paarden Eiland	**B & O Metals**
Parow	**Peninsula Scrap**
Parow	**Cape Waste Paper**
Parow	**Marko Metals**
Parow	**Beaconvale Recycling**
Parow	**Golden Metals**
Philippi	**AEP Waste**
Retreat	**K & C Recycling**
Rylands	**Express Waste**
Simonstown	**Da Gama Park Community**
Somerset West	**Strand Waste**
Somerset West	**Tony Martin**
Somerset West	**Captain Waste**
Stellenbosch	**CL Scrap**
Stellenbosch	**Captain Waste**
Stikland	**Stikland Scrap**
Stikland	**J B Waste**
Strand	**Strand Waste**
Table View	**Waste World**
Woodstock/Salt River	**L & B Scrap**
Wynberg	**Paper King**

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Table D: Location of Local Mondi supported Buy Back Centres

Suburb	Area
Airport Industria	Northern Suburbs
Athlone	Southern Suburbs
Athlone	Southern Suburbs
Beaconvale	Northern Suburbs
Beaconvale	Northern Suburbs
Beaconvale	Northern Suburbs
Beaconvale	Parow
Bellville	Northern Suburbs
Blue Downs	Oostenberg
Brooklyn	Northern Suburbs
Eerste Rivier	Oostenberg
Elsies River	Northern Suburbs
Elsies River	Northern Suburbs
Epping 2	Northern Suburbs
Grassy Park	Southern Suburbs
Killarney Gardens	Blouberg
Langa	Southern Suburbs
Milnerton	Northern Suburbs
Mitchells Plain	Oostenberg
Montaque Gardens	Blouberg
Nyanga	Oostenberg
Parow	Northern Suburbs
Rylands	Southern Suburbs
Somerset West	Helderberg
Stikland	Northern Suburbs
Strand	Helderberg
Table View	Blouberg
Woodstock	Central Metropolitan

Appendix D: Cost/Benefit Analysis of Yellow Bag

THE MARINA DA GAMA YELLOW BAG HOUSEHOLD SOURCE SEPARATION AND RECYCLING PROJECT

Author: Susanne Dittke, EnviroSense CC

Project Facilitators: Deon McDillon, Susanne Dittke

Overview:

Within the next 5 years, 4 out of the 6 currently operating landfill sites servicing the wider Cape Metropolitan Area will be closing for various reasons leaving only 2 landfill sites to accept more than 1.6 million tons of refuse per annum. The overall landfill capacity for Cape Town as it currently stands (not including any extensions and designs for new landfills in the near future) is just about 8 years. In view of the tremendous volumes of waste generated, the operational cost to collect and landfill the waste and the limited available air space, it has become essential to develop strategies aimed at waste reduction. This paper gives a description about the Yellow Bag initiative and shows the development, findings and challenges the project underwent in various phases since its inception in 2003. Special emphasis is thereby given to the evaluation of the weight to volume ratio of the various recyclables found in the Yellow bag and the consequences with regards to the amount of airspace various materials occupy. The general costs/benefit scenario for the source recovery of recyclables in medium to high waste volume generating households is also discussed.

Project Description:

General:

The *Yellow Bag* household waste recovery and recycling programme was implemented in August 2002 in the Marina Da Gama area for more than 1000 households. It encourages residents to separate their recyclables (all valuable packaging waste materials including paper, cardboard, glass, plastics, tins etc) from normal rubbish and place it in a yellow bag which is provided to the participating households free of charge. Each household receives one bag on a weekly base.. Residents are kept informed of the project progress via regular newsletters and specially erected display boards informing them of the rate of participation on a weekly base.

Phase 1:

In the first phase of the pilot project (which ran until February 2003) the Yellow Bags were supplied by the City Council. All Yellow Bags were collected together with the normal refuse in the same collection vehicle. All refuse was then disposed of at the Coastal Park Landfill where only a small fraction of the Yellow Bag recyclables were collected by the salvagers and sold to the recycling contractor on site.

At that stage an average of about 2 tons of recyclables equivalent to about 500-600 bags were collected on a weekly base from about 1000 households through the Yellow Bag. Comparisons between weekly and monthly household participation rates revealed that an

average of 50-60% participated on a weekly base but in fact about 75-80% of all participants put out a yellow bag at least once per month

The number of yellow bags collected in Phase 1 (August 2002-February 2003) steadily increased since inception of the project from initially less than 300 bags to about 600 bags per week. Participation rates were monitored on a weekly base and samples of

40 Yellow bags were taken out each week to do a waste characterization study of the items found and to do a financial analysis of the recyclables. It was found that each Yellow Bag contained on average about 3.5 kg worth of recyclables bearing combined approximate monetary value of R 1 per bag.[5]

Major challenges identified in Phase 1:

- Many bags (estimated between 20-50% and depending on the compaction rate of the collection vehicle) tore open and released some or all of the recyclables in the mixed waste stream. This problem aggravated dramatically and proportional to the amount of garden waste (especially branches) that was collected by those vehicles.
- Tipping of at the landfill “buried a lot the Yellow Bags” to a point where they were impossible to get pulled out from the heap with out shifting large amounts of rubbish first. Turning the waste heap
- The pickers at Coastal Park landfill site did not show a lot of interest to recover the Yellow Bags and were very selective what they recovered
- The contractor responsible for the pickers did not record and feedback any of the statistics requested by Council e.g. the number of bags removed /recovered by pickers from the total waste load, types and volumes of waste recovered, the monetary value of those recyclables etc.
- Time consuming to distribute bags and documentation via Council
- Informal collectors interfered to some degree by salvaging through or even removing entire Yellow Bags but the impact was manageable though it was the number one complaint of participants. An increase of informal collectors was not observed as salvaging has happened already prior to the project implementation
- Negative impact on the cleanliness of the area was only observed in isolated incidences and at various occasions law enforcement supported the team by monitoring and issuing spot fines to offenders.

Lessons learnt from Phase 1:

The need for:

- a separate collection and transport or a vehicle with trailer for the recyclables
- better data of the amount and value of recyclables found in the Yellow Bag to do a cost/benefit analysis
- a partnership to help to facilitate and run the program as a pilot project and aligned to business principles and market dynamics

Phase 2:

Phase 2 of the Yellow Bag project was started after the first phase data evaluation showed encouraging sign for the need of such a program and is still running since April 2002 in partnership with a recycling company called Enviroglass & Waste under the management of Andre Burger. As part of the agreement Enviroglass undertook to collect the recyclables with an individual truck following closely the Council collection vehicle every Monday morning for collection. This truck is supplied by Enviroglass and the bags are collected by the company at no cost to Council. The Yellow Bags are also financed by Enviroglass and the distribution of the bags and information pamphlets to all participating households are equally the private recycler's responsibility. Initially all 1000 pilot households were supplied with one bag per week but in order to reduce costs to the recycler, bags are handed out on a “empty for a full YB” base thereby only supplying the people with bags who are actually participating

Since Enviroglass took over running the YB program on behalf of the City Council (initially as a 3 month pilot but with an intention to extend for another 3 month) the project showed some encouraging developments.

- Within the period 07.04 to 11.08.2003 a total of 39.3 tons of recyclables have been recovered and recycled from a total of 15770 Yellow Bag

- Waste fractions comprising of 8.5 tons newspaper, 3 tons magazines, 4.6 tons cardboard, 3 tons office grade paper, 1.9 tons tins, 11.3 tons glass, 1.2 tons PET, 0.8 tons HDPE, 0.028 t PVC, 0.9 t LDPE and 0.121t PP were recovered

- After continued education efforts 90% of the items found in the Yellow Bag can be recycled- the rest comprises of waste items which are mostly non recyclables due to a lack of demand in the recycling market. Those items include predominantly: foamed polystyrene boxes and food trays, overprinted cardboard and plastic sheets, laminated and/or component packaging such as TETRAPAK (milk cartons), mixed plastic blends etc.

- The amount of recyclables recovered from households could be increased to about 2.1 tons per week (which forms about 10% of the current waste streams received from those households[6]).

- From a total of 16000 bags handed out to residents 9635 were returned full

- An equivalent of 3 full-time jobs for previously unemployed people were created to facilitate the distribution of bags, collection and sorting of the waste on the premises of Enviroglass.

[5] This value was derived with the support of the Kronendal Drop Off depot who helped to sort the mixed recyclables waste samples into the various categories that are sold to the respective recyclers.
[6] Please note that due to the fact that people are currently limited to one Yellow Bag per week this value does not reflect the full recovery rate that could be theoretically achieved if all recyclables would be taken out of the waste stream.

Cost/Benefit Analysis:

Financial Situation for Enviroglass & Waste

From the start of Phase 2 the Enviroglass & Waste manager Andre Burger continuously strived to optimize his operation in order to cut cost and time requirement (e.g. for sorting) as much as possible.

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Successful improvements included:

-Upsizing of the collection truck capacity in order to save on the number of beats required
-Ongoing education of both the MdG residents (e.g. through pamphlets) and the sorters to streamline and increase sorting speed
-Acquisition of cheaper bags
-Hand out of bags mostly on a “need only” base to participants
-Finding recyclers for more “exotic” waste materials such as PVC

- Despite continuous optimization of the service delivery Enviroglass did not break even financially yet and incurred so far a total loss of R 8500 within the first 19 weeks of the pilot.
- With all cost included and factored in such as staff, petrol, equipment etc to distribute bags, collect bags and sort bags the current expense for Enviroglass is R 2.86 per bag.
- Proceeding from the recyclables are totalling on average R 1.90
- The financial loss incurred is therefore currently R 0.96 per bag

Financial Situation for the City of Cape Town

In Phase 2 no cost for the Yellow Bag were incurred by City Council as Enviroglass took over the entire operation and the City Council’s role was reduced to monitoring the project and evaluating the performance.

In terms of actual savings for collection, cleansing or disposal the following scenario unfolded:

Collection:
Despite the fact that less waste has been landfilled no direct savings in collection could been made since the number of beats staid the same for the area. Additionally a lot of the compaction vehicles tend to over compact so despite less waste to transport a load reduction does not necessarily automatically translate into reduced collection activities

Cleansing:
no additional cost or savings incurred by YB

Disposal:

With regards to airspace savings some very interesting and significant trends surfaced while analysing the bulk to weight ratio of recyclables. Empirical results and experience suggested the following bulking factors for the certain waste types found in the Yellow Bag :

1 ton glass crushed - 1 m3
1 ton paper- 1 m3
1 ton cardboard - 15 m3 (flattened CB)
1 ton tins flattened- -2 m3
1 ton PET bottles-40 m3
1 ton mixed plastic- 25 m3

- Evaluating the airspace savings accordingly to the amounts of waste found and their bulking factors it was found that the 39.3 tons of mixed recyclables were equivalent to a total of 315 m3 (uncompacted –equalling a bulk/weight factor of 8) or 189 m3 (assuming a 40 % compaction rate equalling bulk/weight factor of 4.8)

- Given the fact that Cape Town is currently using a weight/volume ratio of 1 the City calculates currently R 70 to pay and prepare the space to dispose of 1 m3 of waste

- **Projected airspace savings for the compacted load of all recyclables saved from disposal are therefore R 13216.22 or R 1.37 per bag**

A template (see also figure below) was therefore developed (for both a mixed recyclable stream and for its different components) to be able to calculate airspace savings from any waste stream based on its composition:

Table E : ***The Yellow Bag Calculation Template***

Waste Type all flattened/compacted	Airspace ratio m3/ton	Weight of Waste tons	Total airspace saved m3	Cost savings (based on R 70/m3)
Newspaper	1	8.462	8.462	592.34
K4, Cardboard	15	4.584	68.76	4813.2
HL2 (office grade)	1	2.954	2.954	206.78
Magazines	1	3.056	3.056	213.92
Tins	2	1.873	3.746	262.22
Glass (crushed)	1	11.271	11.271	788.97
PET	40	1.194	47.76	3343.2
Other mixed plastics	25	1.894	47.35	3314.5
SUM		35.288	193.359	13535.13
Rubbish landfilled (no savings)		4.047		
Mixed YB recycl. Uncompacted	8	39.334	314.672	22027.04
Mixed YB recycl. Compacted (40%)	4.8	39.334	188.8032	13216.22

THE WAY FORWARD:

- The Yellow Bag initiative is recognized by the City as a flagship project since valuable lesson can be learnt on an ongoing base on the socio-economic requirements for such a service
- A project following the concept of the Yellow Bag will be implemented in the near future in Seapoint to recover recyclables from large flats and housing complexes
- The need to involve the informal collectors sector has been identified and will be addressed in the next phase of the program
- The next phase will modify the modus operandi for the collection fitting a trailer for the recyclables on a Council truck. This will result in additional savings due less beats required for the service points.

Appendix E : Key Gaps and Needs from Status Quo Review

The following tables outline the key gaps and needs that were identified by various different stakeholder groups either during the status quo review, or prior to the review.

Summary of Needs Analysis for Plastic Collection

The following needs were identified during interviews with Cape Town plastic recyclers and collectors

Legislative and Policy Issues

Promulgate legislation to enforce waste sorting at source (households and industries)
Implement legislative instruments and financial incentive to force and/or encourage industry and households to use recycled products rather than those made from virgin plastics (e.g. refuse bags)

Economic Instruments and Financial Measures

Promote greater responsibility on producers to finance relevant infrastructure (e.g. regarding PET wastes it has been recommended that BEVCAN, Coca Cola, Elvinco, Packpack, Polyoak and others contribute to financing the PET wash plant and collection infrastructure
Financial support to be provided from the Council to assist collectors with collection transport costs (for example by reducing truck licences
Shops and bottling companies should offer small deposit paybacks on scrap plastic bottles,
Local collectors and recycling businesses should be protected against cheap international plastic imports
Wages for sorters seen to be too high (seen as due to the impact of the Metal Industry Union – which included plastics sorters – who requests a minimum wage of R 13/hour)

Information and Communication

Need for formalisation, education and training for micro collectors
Information should be provided to households who source-separate waste on the location of centres
Advice should be provided for recyclers and collectors on how to access funding
Better education of the public is needed on the benefits of recycling

Infrastructure Issues

Airspace credits should be given to collectors according to the volume of waste materials diverted from landfill sites
MRFs should be established on landfill sites for proper sorting of plastic types, with training to be provided by a recycler (Note: a number of those interviewed offered to assist)
The need for a Wash Plant was identified by various interviewees
More drop off points should be made available for the public
Recovery systems are needed in dairies and bakeries for broken crates
Recyclers report insufficient collection infrastructure in the Southern Suburbs

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Summary of Needs Analysis for Paper Collection

The following needs were identified during interviews with individuals involved in paper collection and recycling initiatives

Legislative and Policy Issues

Promulgate legislation requiring source separation of waste in households and in commerce and industry

Provide economic incentives for more waste recovery, collection and recycling

Infrastructure Issues

Council to assist in establishing approved collection sites, for example by providing land for site allocation

Support infrastructure is needed to improve collection from schools

Need to improve collection efficiencies (e.g. achieved by sorting at source)

Need to target large amounts of paper wastes in households

Summary of Needs Analysis for Community / NGO Drop Off Sites and Buy Back Centres

The following needs were identified during interviews with drop-off sites and buy-back centres

Legislative and Policy Issues

National legislation should be implemented enforcing source separation, and the collection of mixed recyclables from homes and businesses by Council

Urgent request to plastic industry to mark *all* plastic waste materials with the respective ID label and to make products that contain a minimum amount of different plastic types (e.g. 2 L PET Coke Bottle has four different types of plastic which makes it time consuming to dismantle);

The production of plastic goods and packaging that cannot be recycled should be discontinued and replaced by recyclable packaging materials

Legal measures should be implemented requiring the packaging industry to minimise packaging waste at source and to redesign product packaging for maximum reuse and recycling potential

"Pay as you throw" schemes should be introduced for residents and industries

Airspace credits should be provided for collection depots with (audited) records on waste recovery

Economic Instruments and Financial Measures

Full Cost Accounting should be undertaken for long-term planning for municipal solid waste

Financial compensation and subsidies should be provided for transporting recyclable materials to buyers

Infrastructure Issues

Support needed for sorting-infrastructure, including improving their location, providing access to water and electricity, to health and safety equipment, and to waste management equipment.

Micro collectors should not be allowed to sell to recyclers directly, but should use community centres (with the aim of minimising the potential for road accidents with trolleys)

Support for collection infrastructure including transport, funding for fuel, collection trolleys, emptying of rubbish skip by Council for free
More drop-off sites should be established for garden waste and builders rubble, with the aim of minimising the current large incidence of illegal dumping.
More dedicated drop-off points for household hazardous wastes and small-scale composting sites should be established

Stakeholder Input into Gap Analysis (March Workshop)

During a stakeholder workshop on the *Principles of Integrated Solid Waste Management Planning*, held on 3-5 March 2003 at the Alphen Community Centre, in Constantia, the meeting of stakeholders identified a number of different waste management needs to be addressed within Cape Town. Many of these relate specifically to waste minimisation and recycling issues. The key issues identified in this meeting are summarised below, as useful input in the Gap and Needs Analysis. These have been have clustered into the key themes that are used throughout this Gap Analysis.

Regulatory and Financial Policy Framework

Specific legislation (possibly at national level) aimed at promoting waste reduction at source
Greater focus on Extended Producer Responsibility
Legislation on packaging (for example, container deposits for returnable bottles)
Evidence of long-term political commitment and clear vision to addressing solid waste management issues (i.e. do not stop-and-start projects such as WasteWise)
More effective integration of activities between various local government departments, and increased co-operation (especially on education programmes)
Implementation of a government procurement policy (relating e.g. to the purchase of recycled products)
More rigorous penalisation of waste offenders
Provide incentives and protection for whistle blowers
Implement legislation banning plastic bags
Provide economic incentives to promote source reduction and recycling, for example through "pay as you throw" measures
Ensure adequate funding to take full environmental responsibility for waste disposal, for example by using tariffs to cross-subsidise the establishment of a fund for rehabilitation/remediation of dump sites
Ensure sufficient government resources (financial and human) for waste minimisation
Place a levy on industry for a "Green Fund" to support waste management research and new ideas
Develop market potential for recycled products

Communication, awareness and training programmes

Reduce incidences of illegal dumping through public education, and by providing well-advertised and accessible facilities (i.e. in terms of location and opening hours)
Involve residents more in solid waste management, thereby promoting greater ownership of the process
Improve marketing, communication and education on solid waste management within the decision-making structure and the wider Cape Town community
Provide a directory, users guide and/or efficient toll-free telephone number to supply information on available services and complaints, and outlining roles and responsibilities

within CCT.
Improve available information on the hidden costs associated with the supply of waste services
Put mechanisms in place to ensure ongoing education and public participation programs and strategies, arguing that WasteWise should survive
Provide clear labelling of materials used in products, as well as instructions for responsible disposal and/or recycling
Hold workshops on integrated solid waste management in townships
Ensure good design in educational materials to attract attention and market message effectively
Ensure educators are well skilled for the job, and include informal collectors and recyclers in this process
Include solid waste management in school and tertiary curricula, noting also the role of SETA
Ensure more effective monitoring and mentoring of contractors
Expand the number and scope of waste minimisation clubs as a catalyst and lobbying vehicle

Stakeholder Input into Gap Analysis (March Workshop) - Continued

Availability of appropriate infrastructure

Provide more drop-off centres for recyclable material, garden waste and greens chipping, with clear signage as to what they accept and operational hours
Improve the availability and access of drop-off centres for household hazardous waste, ensuring open on weekends and public holidays
Design of storage containers for solid waste must be appropriate for climatic conditions and easy to clean
Undertake regular, efficient cleaning of drop-off centres
Increase the availability of clearly marked skips in all areas to discourage illegal dumping *[Note: this was a highly contested point]*
Facilitate home composting, worm-farming and recycling methods

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Chapter 9 - Waste Generation, Quantities and Characteristics

An estimation of the total quantity of waste being generated in the CTMA has been made. Using socio-economic demographics and waste generation rates a waste generation model has been developed.

9

9.1 Introduction

In order to make appropriate and realistic plans for the management of waste in the CCT over the next 30 years reliable data relating to the current situation are necessary. This section briefly outlines some of the ways in which the required background data have been gathered as well as identifying gaps in the data, which shall need to be addressed in the Integrated Waste Management Plan.

Information on the quantities and types of waste being generated, recycled, disposed of, or otherwise managed in the CCT have been obtained from a number of sources, the most important of which are:

- Weighbridge records of the quantities of waste which entered landfills or transfer stations in the CTMA in 2002/2003 including the only private landfill in the CTMA, Vissershok.
- Accrual records for landfills where there are no weighbridges.
- Records of quantities received at drop-off facilities.
- The responses to questionnaires and queries sent out to private individual waste recovery operators and collectors in the CTMA.

Some assumptions and estimations have been made in order to allow for the development of a satisfactory overview of the City's waste management practices. For example, different sources of information on a particular item sometimes show discrepancies. In such cases the most up-to-date figures have generally been adopted in the absence of other corroborating information. Similarly, data have been cross-referenced wherever possible to ensure their accuracy.

9.2 Waste Categories

It is generally accepted that the total waste stream generated within a community comprises three major categories, namely

- Municipal waste,
- Industrial waste, and
- Construction and demolition waste.

Within each of the above categories there are different classes of hazardous waste materials the most important being Industrial and Municipal. Hazardous wastes generated in the CTMA are discussed in detail in Chapter 10.

9.2.1 Municipal Waste

Municipal waste can generally be categorised as all waste under the control of the local authority or agents acting on its behalf. It includes all household waste, street litter, waste delivered to resource recovery facilities, municipal parks and gardens wastes, drop-off facility waste and commercial waste from shops and businesses which have waste collection

agreements in place. It can also include industrial waste collected by the local authority or a private contractor on its behalf as well as water and wastewater sludges produced at the municipal facilities.

Table 9.1 below provides an indication of the sources of municipal wastes

Table 9.1:Sources of Municipal Wastes

Source	Facility or activity	Waste type
Regular Household Collection	Single and multi-family dwellings, informal housing.	Bins, skips.
Open areas and municipal amenities.	Street, parks, beaches, recreational areas.	Sweepings, litter, illegal dumping
	Drop-off facilities	Green waste, garage waste and bulky household waste.
Recycled	Kerbside collection (yellow bag project), schools, community projects, commercial facilities, buy-backs.	Paper, glass, tin, plastics, green waste for compost.
Commercial	Offices, business, trade, sport, restaurants, hospitality sector, markets, events, entertainment and institutional facilities.	Food wastes, office waste,
Industrial	Factories, industrial processes.	
Treatment Plants	Water and sewage treatment plants.	Sludges

9.2.2 Industrial Wastes

Industrial process wastes include a very wide range of materials. Examples found under this heading include general factory rubbish, organic wastes from food processing, acids, alkalis and metallic sludges. The most important feature of industrial wastes is that a significant proportion can be regarded as hazardous or potentially toxic, thus requiring special handling, treatment and disposal. This waste category along with medical hazardous waste is discussed in more detail in Chapter 10.

9.2.3 Construction and Demolition Waste

Construction and demolition waste comprises mainly bulky, inert materials such as bricks, concrete, tiles, glass, insulation, gypsum, plastics, metals, soil and wood, These materials have historically been disposed of at landfills with some being reclaimed or used for the management of landfills as cover, access road building or berm construction.

9.3 Current and Projected Waste Quantities

A simple formula of ***Quantity Landfilled*** + ***Quantity Recycled*** = ***Quantity Produced*** has been adopted for the estimation of the total quantities of waste produced in the CTMA. The quantity of waste landfilled can be fairly accurately determined using weighbridge data, however two of the Cities landfills, Faure and Brackenfell do not have weighbridges and quantities have been determined from accrual sheets used for charging disposers.

Exact statistics on the quantities of waste recycled are not readily available and this study has relied on data obtained from previous recycling studies undertaken in the CTMA, data from Councils two compost plants and drop-off facilities. It has been assumed that 50% of waste taken to drop-off facilities is green waste processed for compost with the remaining 50% being landfilled.

9.3.1 Current Waste Quantities Generated in the CTMA

The annual total waste generated within the CTMA in 2002/2003 is estimated to be **2,158,500 tonnes** or 5,900 tonnes/day.

A breakdown of the estimation of waste quantities generated is presented in Table 9.2 below. Figure 9.1 presents the monthly waste disposed of at ARTS and selected landfills in the CTMA. This data has been abstracted from the weighbridge data. Where no monthly figure is shown indicates unavailable data. In addition no data for Bellville for 2002 /2003 is available.

Table 9.2: Waste Generation Quantities

Disposal Location	Tonnes/annum
ARTS	147,619
Swartklip	209,122
Coastal Park	317,997
Vissershok	179,421
Bellville	247,813
Vissershok Private	320,416
Faure	226,720
Brackenfell	261,381
Total	**1,870,650**
Recycle	
Compost Plants	52,000
Drop Off Facilities	37,823
Plastic	13,200
Glass	15,000
Paper	165,000
Tin	4,850
Total	**287,873**
Grand Total	**2,158,523**

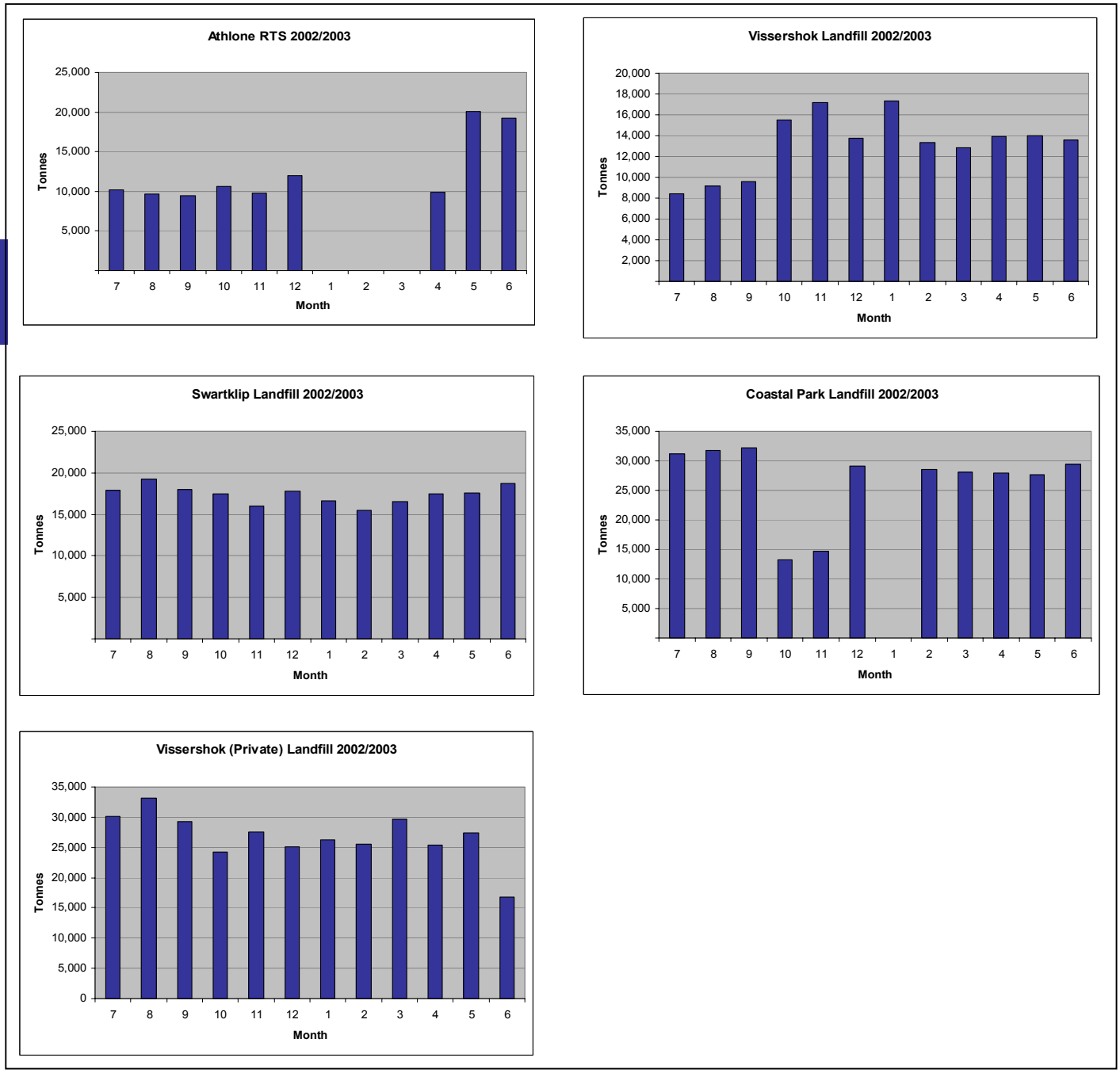


Figure 9.1 Waste Disposal at ARTS and selected landfills in the CTMA (from weighbridge data)

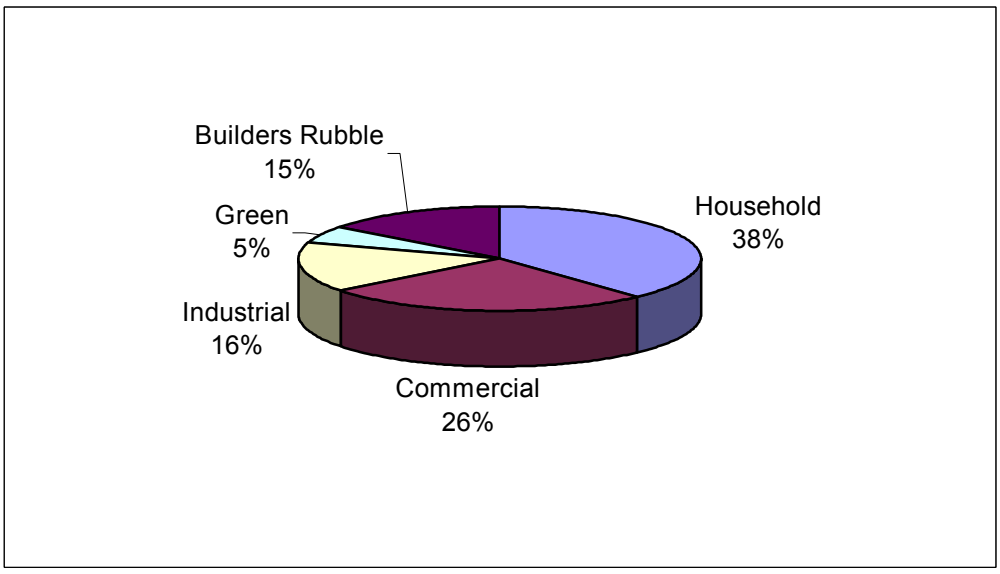
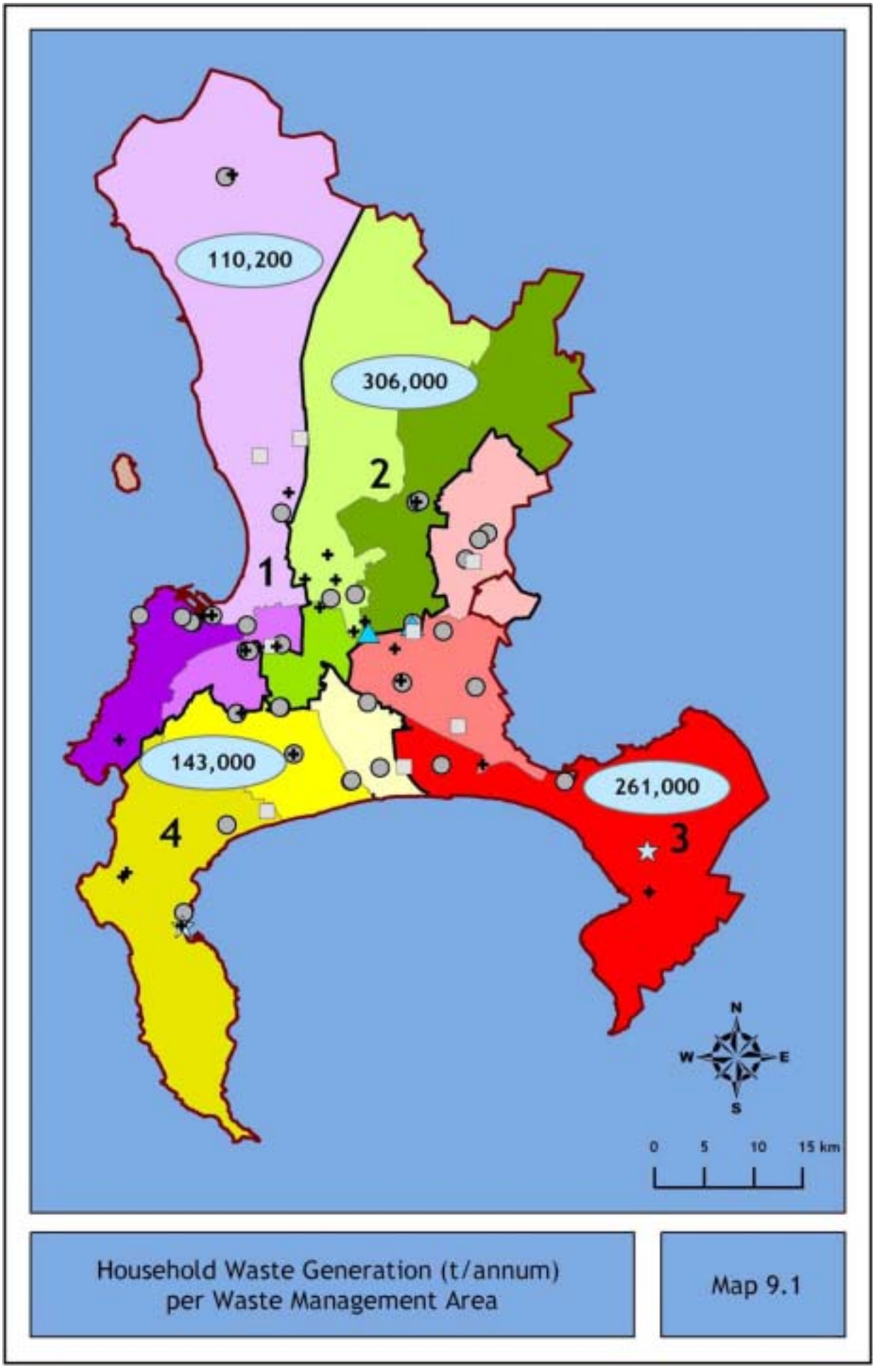


Figure 9. 2 Percentage of Waste Categories Generated in the CTMA)

Table 9. 3 Categorisation of Waste Generated in the Cape Town Metropolitan Area

Category	Tonnes/annum
Household	820,866
Commercial	567,558
Industrial	339,991
Green	111,721
Builders Rubble	318,392

9



Household Waste Generation (t/annum) per Waste Management Area

Map 9.1

Assuming a current population of 3,017,100 (refer to Section 5.3 Table 5.2) the average generation rate is 715 kg/capita/year or 1,96kg/capita/day. This is similar to the figure of 1,8kg/capita/day obtained in the Wright Pierce report of 1999[ref 9-1] if the population assumed is adjusted in accordance with the latest census data.

Table 9.4 Waste Generated per Capita for Waste Categories

Category	Kg/capita/day (7-day week)
Household	0,75
Commercial	0,52
Industrial	0,31
Green	0,10
Builders Rubble	0,28

In addition to the total amount of waste taken to landfill an additional amount of some 52,000 tonnes per annum of cover material is trucked in.

Of the total waste generated in the CTMA some 87% is being landfilled with the remaining 13% being recycled or processed into compost.

A breakdown into various categories of waste has been determined from the weighbridge categorisation and the following assumptions:

- 50% of waste going to drop-offs is green waste
- there is no information on the categories of waste going to Faure and Brackenfell and therefore similar proportions as for Bellville and Swartklip has been assumed for household, garden, mixed, builders rubble and cover material.
- Mixed waste is assumed to be of commercial origin and includes municipal cleansing operations, parks and forests and institutional waste.
- Athlone RTS data has not been categorised and it is therefore assumed that 50% is commercial and 50% is household.

The above indicates a number of issues that must be addressed in the IWMP. For example builders rubble and green waste is consuming some 20% of available landfill airspace assuming comparable densities in the landfill.

9.3.2 Historical Waste Growth

There are a wide variety of possible factors influencing the growth in waste, and without action many of these have potential to maintain the increase in waste in the future. The household is the key waste generating unit and studies in Britain have concluded that a person living alone can generate more than double what a family of four generates and thus

a generation rate per capita should be used with circumspect[ref 9-3]. Waste increases also typically mirror affluence and figures of from 300 g up to 2,5 kg/person/day for low income up to high income have been propagated in South Africa.

The growth of waste in the CTMA has been determined from historical data from 1986 to 2003, collated by the City. The origin of the data i.e. weighbridge, accrual sheets etc. are unknown. Data for Bellville, Faure and Brackenfell was added from 1997 onwards and the Athlone RTS was included from 1994 onwards.

9

The historical data is shown in Figure 9.3 below. A linear trend line has been fitted to the data and would indicate a growth rate of some 4,5% per annum. This is in the order of double the historical population growth in the CTMA and there are a number of factors that could influence the data, including;

- Suspect data
- Improvements in waste collection and disposal
- Rapid increase in commercial development
- Additional areas serviced (e.g. informal areas)

As a comparison with population growth between the 1996 and 2001 census's of 1,57%, Figure 9.3 below shows the growth of waste and indicates an annual waste growth rate of 3,8%. This would indicate a slow down in growth but still in the order of double the population growth rate.

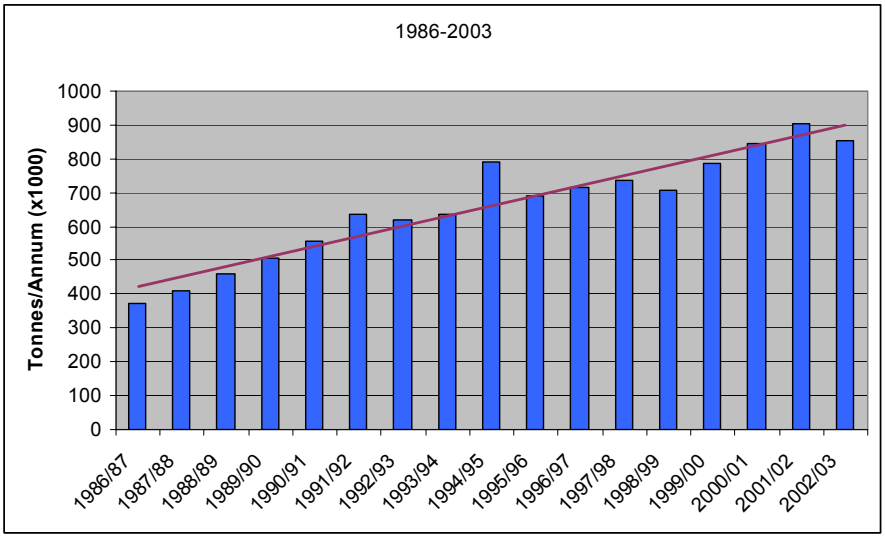


Figure. 9.3 – Annual Tonnage Generated in the CTMA between 1986 and 2003

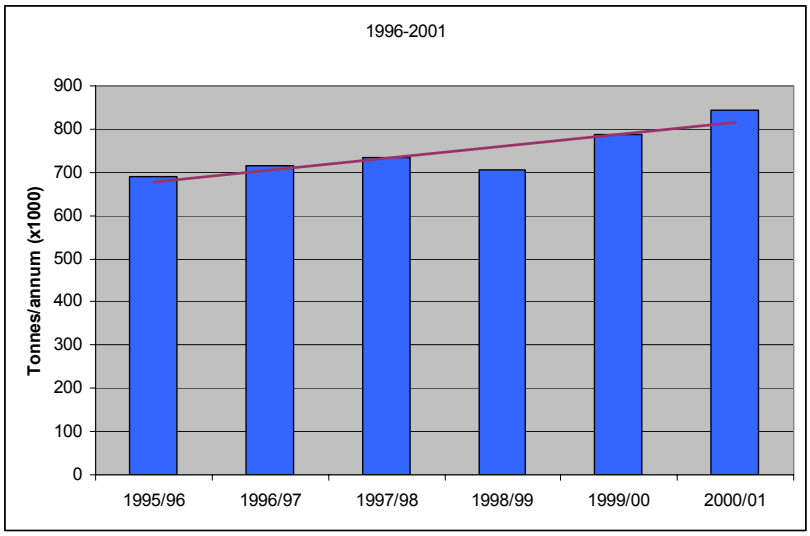


Figure. 9.4 – Annual Tonnage Generated in the CTMA between 1995 and 2001

For the purposes of developing a waste generation model for the CTMA it is proposed that two scenarios for growth rate are developed. Scenario 1 assumes that there will still be a growth in excess of the population growth rate while services levels are made equitable and then decrease to the future population growth rate. An average annual growth rate of double the population growth rate up to 2006 and then an annual growth of 1,57% (population growth between 1996 and 2001) over the remainder of the time horizon of 30 years will be used. Scenario 2 assumes that all future waste growth will be inline with the population growth rate and will reduce linearly to the following rates as per the population growth projections presented in Table 5.2 in Chapter 5.

2003-	4,00% per annum
2006-	2,12%
2016	1.12%
2031	0.39%

Table 9.5 below presents the projected annual tonnages of waste generated in the CTMA up to the year 2031.

Table 9.5 Current and Projected Waste Characteristics

Year	Scenario 1	Scenario 2
2003	2,158,529	2,158,529
2006	2,428,052	2,341,139
2016	2,837,347	2,734,779
2031	3,584,217	3,048,847

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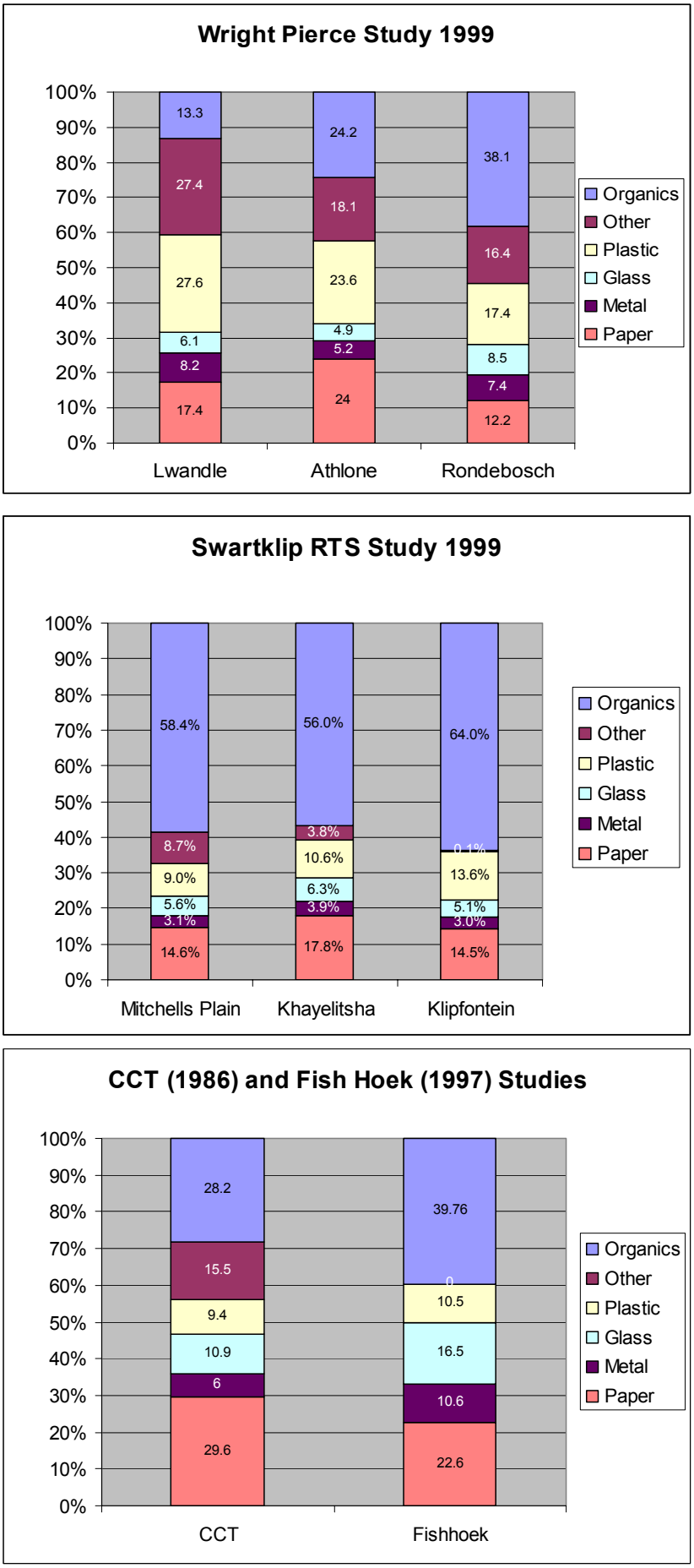

Figure 9.5 Waste Characterisation per Selected areas

9.4 Current and Projected Waste Characteristics

9.4.1 Current and Projected Waste Characteristics

A knowledge of the characteristics of waste being generated within the CTMA is a fundamental requirement for an Integrated Waste Management Plan. Waste characterisation allows one to calculate recycling and treatment potential.

Historical waste characterisation data has been obtained from:

- The Wright Pierce Report[ref 9-1]
- Swartklip Transfer Station Waste Characterisation Study [ref 9-2]

The Wright Pierce Report evaluates the 1986 study undertaken by the then Cape Town City Council, a survey undertaken in the Fish Hoek/Kommetjie/Noordhoek area in 1997 [ref 9-4] and their own study undertaken in Lwandle, Athlone/Bridgetown and Rondebosch[ref 9-1].

The Swartklip Transfer Station Waste Characterisation Study was undertaken in 1999 and included the areas of Mitchells Plain, Khayelitsha and Athlone/Nyanga.

The results of the various studies are presented graphically in Figure 9.5 below, however it must be noted that there is little information on how the surveys were undertaken, with the exception of the Swartklip study, and therefore the comparison of results should be done with caution. For the Swartklip study a protocol was developed that establishes criteria and a methodology for waste sampling, waste characterisation and safety.

The results of the various studies indicate large variances between categories. This is possibly due to a number of factors such as methodology used, characterisation criteria, season and sampling size.

The waste generation model will include quantifying the different categories of materials and therefore parameters will have to be established for the income groups proposed for the model. The above data would suggest the following

Table 9.6 Waste Characterisation per Income Group

Category	Low Income	Middle	High
Organic	57.2	38.8	38.9
Other	6.2	11.2	8.2
Plastic	9.8	15.5	14.0
Glass	6.0	7.0	12.5
Metal	3.5	4.7	9.0
Paper	16.2	22.7	17.4

The low income parameters are fairly consistent with studies done elsewhere in South Africa, indicating high levels of organics and low quantities of recyclable material. Low-

income communities tend utilise as much of the materials that they obtain, generally in small quantities, before throwing out the residual, whereas high-income areas tend to use large quantities of paper and plastic wrapped articles.

For the high income parameters it would be expected that the recyclable materials particularly the plastics and paper would be much higher. The middle and high income data can to a certain extent be considered unreliable. The main problem is how the sampling was undertaken and the results quantified. It is therefore suggested that further characterisation studies be undertaken in a sample of high and middle income areas using the Swartklip Study[ref 9-3] protocol or a refinement of it, as a basis.

9.5 Waste Stream Analysis

An analysis of the City's waste stream will be undertaken in the "assessment" stage of the development of the IWMP, which follows the status quo study. The waste stream analysis will assess each component of the total waste stream generated from within the CTMA, from generation source through to the final point of disposal. The analysis will essentially deal with the waste types, characterisation and quantities.

9.6 Waste Generation Model

A waste generation model is in the process of being developed which will serve as a fundamental component of the IWMP. The waste generation model will be completed upon finalisation of the analysis and assessment of the City's waste stream (to be undertaken in the "assessment" stage of the development of the IWMP - see 9.5 above). It is furthermore the intention that the waste generation model will form an integral part of the City's proposed Waste Information System, so that it can be updated on a regular basis and used as a management tool for future decision-making.

9.7 Gap Analysis

The following "Gaps" have been identified which should be carried forward to the "Assessment" stage of the development of the IWMP:

- Further review of the most recent data generated from the landfill weigh-bridges. Certain of the City's waste disposal facilities reveal a reduction in the deposition rates, believed to be as a result of the City's initiatives towards waste reduction, such as the development of waste "drop-off' centres where significant quantities of garden waste is being recycled.
- A review of the Status Quo Report is required with respect to waste quantities to ensure that the volumes of waste described in the various chapters of the report are consistent with the data used in the waste generation model.
- Further waste characterisation studies should be undertaken, as identified in section 9.4 of this report.

- Finalisation of the Waste Stream Analysis during the Assessment stage of the study.
- Finalisation of the Waste Generation Model during the Assessment stage of the study.

References

9-1. Cape Metropolitan Council (June 1999). *Feasibility Study Towards an Integrated Solid waste Management Plan for the Cape Metropolitan Area*. Wright-Pierce, Lee International, Entech Consultants, Bham Tayob Khan & Matunda, Mallinicks.

9-2. Ingerop Africa (Oct 1999) *Swartklip Refuse Transfer Station : Waste Characterisation Study*.

9-3. Mayor of London (Sep 2003) Rethinking Rubbish in London : The Mayor's Municipal Waste Management Strategy

9-4. Wright-Pierce, Lee International, Entech Consultants, Bham Tayob Khan & Matunda, Mallinicks (June 1999) *Feasibility Study Towards an Integrated Solid waste Management Plan for the Cape Metropolitan Area*. Extract from Annexure A of Fish Hoek/ kommetjie/ Noordhoek Contract for Collection, Removal and Disposal of Refuse.

Chapter 10 – Hazardous & Special Wastes

A situational analysis is presented in Chapter 10 of hazardous and special wastes generated in the Cape Town Metropolitan Area, including health-care waste.

10.1 Hazardous and Special Waste Categories

10.1.1 Minimum Requirement Definitions and Abbreviations (ref 10-4)

Definitions (ref 10-3)

Unless otherwise specified, this chapter assumes the following definitions:

10

- Disposal site: a site used for the accumulation of waste with the purpose of disposing or treatment of waste.
- Waste: any matter, whether gaseous, liquid or solid or any combination thereof, originating from any residential, commercial or industrial or agricultural area identified by the Minister of Environmental Affairs and Tourism as an undesirable or superfluous by-product, emission, residue or remainder of any process or activity.
- Province: any one of the nine provinces in South Africa.
- Regions: any one of the geographic areas under the jurisdiction of regional authorities, district councils or metropolitan councils of South Africa.
- Local authorities: the tier of government including local councils, metropoles and transitional authorities responsible for local government.
- Sector : a group of activities or industries producing like products, using like processes and producing like wastes.
- General waste: all urban waste that is produced within the jurisdiction of local authorities. It comprises rubble, garden, domestic, commercial and general industrial waste. It may also contain small quantities of hazardous substances dispersed within it such as batteries, insecticides and weed-killers discarded on domestic and commercial premises. General waste may be disposed of in a permitted landfill and may be equated to what is commonly referred to as domestic solid waste (DSW) and municipal solid waste (MSW) i.e that which is normally managed by a local authority.
- Hazardous waste: waste which, even in low concentrations, has the potential to have a significant adverse effect on public health and/or the environment. This would be on account of its inherent chemical and physical characteristics such as toxic, ignitable, corrosive, carcinogenic or other properties.

- Waste generation level: those areas which generate like volumes of general waste within a region.

- Duty of Care [ref 10-4]: this requires that any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorised transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, he retains responsibility for the waste generated or handled.

- Cradle to Grave [ref 10-4]: a policy of controlling a Hazardous Waste from its inception to its ultimate disposal.

10.1.2 Detailed Definition to Hazardous and Special Waste Categories

The project adopts the waste classifications and definitions used in the DWAF Baseline Studies: Waste Generation in South Africa Report [ref 10-3].

The Definition of **Hazardous Waste** according to the Environmental Conservation Act (No 73 of 1989) to be all undesirable or superfluous by-products, emissions, residues or remainders of any process of activity, whether gaseous, liquid or solid, or a combination of these. For practical reasons, material was taken to become waste when it was committed to storage.

Hazardous waste was defined, for purposes of this investigation, as any waste which poses a threat to human health or to the environment through risk of one or more of the following:

- Explosions or fires
- Chemical instability, reactions or corrosion
- Infections
- Acute toxicity
- Chronic toxicity, or cancers, mutations or birth defects.
- Eco-toxicity, or damage to natural systems
- Accumulation in biological food webs, or persistence in the environment and hence requiring special attention.

Special attention referred to above would mean that the waste could not, in its present form be released into the environment, or disposed to the sewer, or disposed of at an ordinary municipal refuse landfill site.

Special Waste is a waste type description used by the City of Cape Town for disposal of this particular waste type at the H:h landfill in Visserskok. The definition supplied by the City is as follows: [ref 5-8]

' "Special Waste" means any waste, which in the opinion of Council of the City of Cape Town, exists in such an unusual quantity or form or in such a chemical or biological state or any combination thereof, that may disrupt or impair effective waste management or threaten public health, human safety or the environment and may, in the opinion of Council of the City of Cape Town, require special handling, transportation, treatment or disposal.'

Special waste shall include: condemned foods, asbestos, etc., all liquid waste, sludges, slurries and animal carcasses, but **not** medical waste and nightsoil.

All special waste is subject to prior permitting and quality clearance by Council's permit office.

The disposal of special waste takes place in trenches in the H:h site at Vissershok and are generally disposed of by co-disposal.

10.1.3 Classification of Hazardous Waste (ref 10-3)

The waste generated within the borders of South Africa has been classified firstly in terms of the Minimum Requirements for Waste Disposal by Landfill, DWAF 1998 and then by SANS 0228 Code of Practice for the Identification and Classification of Dangerous Substances and Goods.

The initial classification in terms of the Minimum Requirements is to determine if the waste is either General Waste or Hazardous Waste. Hazardous waste is then further classified in terms of SANS 0228:2003.

SANS 0228 classifies the waste further into nine classes based on the type of risk involved. These classes are as follows:

Class 1:	Explosives
Class 2:	Gases
Class 3:	Flammable Liquids
Class 4:	Flammable Solids, substances liable to spontaneous combustion, substances that on contact with water, emit flammable gases
Class 5:	Oxidizing substances and Organic peroxides
Class 6:	Toxic and infectious substances
Class 7:	Radioactive material
Class 8:	Corrosives
Class 9:	Miscellaneous dangerous substances and goods

10.1.4 Practical Implications of SANS 0228: 2003 (ref 10-3)

SANS 0228:2003 states the following ***Danger Group Allocation*** regarding solutions and mixtures, as well as waste in general.

Each symbol listed in SANS 0028:2003 is allocated a unique number and a danger group symbol.

Each Danger group is listed as follows:

Danger Group I: Substances and goods that present a very severe risk.
Danger Group II: Substances and goods that present a serious risk.
Danger Group III: Substances and goods that present a relatively low risk.
Danger Group IV: Substances and goods that present a very low risk.

It must be noted however that SANS 0228 covers the identification and classification of dangerous substances and goods and refers to the pure chemicals. In general a waste stream is a combination of chemicals and other constituents of varying concentrations. The concentration of chemicals in the waste stream are also generally low as industry recovers as much chemical as economically possible for re-use.

10.1.5 Baseline Data Collection - Methodology

The aim of this status quo report was to assess generation, transport, disposal, discharge, treatment and recycling of hazardous waste within the City of Cape Town. The capturing of baseline information was done mostly by assessing existing information. However, selected visits, interviews and further correspondence via email were required to verify existing information as well as to add to the existing baseline information.

All published material that was readily available, as well as requested material only, were used as a basis for the compilation of this report. All the material used, the sources and/or authors are referenced in the appendix to this report.

The main reports and material utilised were obtained from four sources, namely:

DEADP: Situational Analysis of Hazardous Waste Management in the Western Cape Province, Volumes 1 and 2, August 2003.

DWAF: Baseline Studies. Waste Generation in South Africa, No W.3.0

Wright Pierce: Cape Metropolitan Council Feasibility Study towards an Integrated Solid Waste Management Plan for the Cape Metropolitan Area. Final, June 1999.

WESGRO: Cape Sector Fact / Sheets

10

Table 10.1: Key Industrial Groups [ref 10-5]

	INDUSTRIAL GROUP	INDUSTRIAL PROCESS	KEY
A:	**Agriculture, Forestry & Food Production**	Agriculture, Forest Management, Fisheries	A1
		Animal & Vegetable Products from Food Sector	A2
		Drink Industry	A3
		Manufacture of Animal Feed	A4
B:	**Mineral Extract & Upgrading**	Mining & Quarrying of Non-metallic Minerals	B1
		Mining & Quarrying of Metallic Minerals	B2
C:	**Energy**	Coal Industry including Gas Works & Coking	C1
		Petroleum & Gas Industry including Extraction & Refined Products	C2
		Production of Electricity	C3
D:	**Metal manufacture**	Ferrous Metallurgy	D1
		Non-ferrous Metallurgy	D2
		Foundry & Metal Working Operations	D3
		Metal Finishing & Electroplating	D4
E:	**Manufacture of Non-Metal Mineral Products**	Construction materials, Ceramics & Glass	E1
		Salt Recovery & Refining	E2
		Asbestos Goods	E3
		Abrasive Products	E4
F:	**Chemical & Related Industries**	Petrochemicals	F1
		Production of Primary Chemicals & Feedstocks	F2
		Production of Fine Chemicals	F3
		Production of Inks, Varnish, Paint & Glue	F4
		Fabrication of Photographic Products	F5
		Production of Pharmaceuticals & Cosmetics	F6
		Rubber & Plastic Materials	F7
		Production of Explosives and Propellants	F8
		Production of Biocides	F9
		Waste and Water Treatment	F10
		Analytical, Biochemical & Chemical laboratories	F11
G:	**Metal Goods, Engineering & Vehicle Industries**	Mechanical Engineering	G1
		Electronic & Electrical Engineering	G2
		Manufacture of Motor Vehicles & Parts	G3
H:	**Textiles, Leather & Wood Industries**	Textile, Clothing & Footwear Industry	H1
		Hide & Leather Industry	H2
		Timber, Wood & Furniture Industry	H3
J:	**Manufacture of Paper Products, Printing & Publishing**	Paper & Cardboard Industry	J1
		Printing, Publishing & Photographic Laboratories	J2
K:	**Medical, Sanitary & other Health Services**	Health, Hospitals, Medical Centres & Laboratories	K1
		Veterinary Services	K2
L:	**Commercial & Personal Services**	Laundries, Dyers & Dry Cleaners	L1
		Domestic Services	L2
		Cosmetic Institutions	L3

10.2 Current and Projected Hazardous Waste Categories

10.2.1 Status Quo of Key Industrial Sectors

The Minimum Requirements, 1998 by DWAF [Ref 10-4] uses a key to industrial groups generating hazardous waste. The industries are categorised in Table 10.1 on page 10-6 of this report.

The different reports used as the sources for the status quo report use different systems and categories for identifying hazardous waste generators. The key to industrial groups listed in Table 10-1 on page 10-6, used as a standard for this report, is based on the Minimum Requirements [ref 10-4].

The disposal of each waste stream is broadly described in this chapter and the abbreviations are the same as used in the Minimum Requirements [ref 10-4] and the Department of Environment Affairs and Development Planning: Situational Analysis [ref 10-2].

The discussion of the different Key Industries producing hazardous waste is mainly based on information from two sources, namely:

- Baseline Studies: Waste Generation in South Africa, Water Quality Management Series: No W.3.0, Department of Water Affairs and Forestry, July 1998 Abbreviated as **DWAF – BS** [ref 10-3]

- Situational Analysis of Hazardous Waste Management in the Western Cape Province Department of Environment Affairs and Development Planning, August 2003-12-04 Abbreviated as **DEADP – SA** [ref 10-2]

The abbreviations of **DWAF – BS** and **DEADP – SA** are used in the following sections of this chapter to refer to the specific sources of information used.

It is important to note that the mass of hazardous waste generated by the Key Industries **is not necessarily representative of all the industries in the City of Cape Town**.

The DWAF – BS was undertaken for South Africa but provides a provincial breakdown. The DEADP –SA study was done for the Western Cape Province and had to be adapted for the City of Cape Town.

The DEADP - SA addressed a varying sample percentage of generators in the key industries. The details of the actual market share analysed of each key industrial group are unknown as there are no legislative means or initiatives by which industry may be compelled to register. There are also no known bodies except for Wesgro, who access information from the key groups of the industries.

There are various institutions, chambers and concerns who have members which voluntary belong to a specific industrial group, such as:

- Chamber of Commerce
- Wesgro
- Cape Metal Finishing Association
- Packaging Institute
- Plastics Institute
- Others

Membership is voluntary and the exact number of industries in the industrial group is thus not available.

NOTE:

The mass of hazardous waste produced by industry is thus not accurate for the total industry but rather an indication of which hazardous waste types are generated by industry.

10.2.2 Projected Hazardous Waste Quantities and Trends

The projection of the hazardous waste mass increase for the CTMA area is varied. The following projections by different organisations are set out below:

(a) City of Cape Town: Waste Management

The solid waste projected mass increase by CCT Waste Management, is given as follows:

- General Waste: 5.5 – 6% projected increase pa
- Hazardous Waste: stable, no increase

Most of the special waste disposals by Waste-Care at CCT are now done at the VWMF, adding to the growth of that facility. The above growth indication excludes wastewater sludges.

(b) City of Cape Town: Scientific Services

The sewer transgressions have been stable over the last few years (Scientific Officer at Scientific Services). There are nevertheless industries that need to reduce their discharges of hazardous industrial effluents into the sewer systems, especially those engaged in the electroplating industry.

(c) Vissershok Waste Management Facility

The projected hazardous waste increase supplied by the WasteMan Group is as follows:

- Hazardous Waste 1.5 – 2.0% projected increase pa

(d) Wesgro

Wesgro initiated a study at the University of Stellenbosch which reviewed the overall economic performance of the Western Cape in terms of the growth sectors. Relevant issues are listed below:

- Agriculture and Fishing Sector: A slightly decreased GDP is forecast for 2003. The severe drought and land reform issues are issues which need capacity building to handle. Top quality agricultural exports indicate a need to expand or improve modern farming processes, equipment and machinery. The exchange rate is not a major concern for the fishing industry, aqua- and mariculture sectors - the quota and catchment limitations are more of a problem.
- Manufacturing: The strong Rand dampens major export drives by the steel industry, boat building, software sector, furniture, textile and automotive components.
- Construction, property development and housing: A buoyant sector with lower interest level boosting construction, especially public-sector housing.
- ICT (Software): Western Cape is not succeeding in attracting as many corporate head quarters as it did a decade ago.
- Professional services establishment have lately made impressive strides into export markers, supplying other African countries, the Middle East, Australia / New Zealand and selected countries in Asia and Latin America. Although efforts are dampened by the stronger Rand, the service quality and other factors may help to maintain market shares.
- The electricity, gas and water – supply / sectors have major capital projects on the horizon.
- The health and education sectors will further expand if linking of public and private sector projects occur or creative new funding sources are found.

10.3 Hazardous and Special Waste: Generation Model

10.3.1 Mass of Hazardous Waste: Generated

The mass of hazardous waste generated in the CCT as indicated in Table B of Appendix B is not a true figure. As discussed in Section 10.2.1 of this report, it is clear that the reported mass of hazardous waste produced as per the DWAF – BS and DEADP – SA studies are a better indication of the hazardous waste streams arising than the actual mass generated.

The uncertainties associated with hazardous waste production are due to:

- Lack of co-operation from industry
- Unwillingness of industry to share strategic marketing information
- Ignorance exists in some industries on the hazardous waste types and disposal required.
  Management is often environmentally focussed and the "sludge" is taken to the "dump".
- Unwillingness to divulge information due to bad hazardous waste management practices which may lead to prosecution.
- There is a lack of legislative requirements and application in terms of the registration of hazardous waste generators, their waste types, mass and frequency of production.
- Arrogance in certain industries with an attitude of "catch me if you can. If you catch me, what will or can you do to me?"

The summary of the two major reports is thus given in Appendix B in terms of hazardous waste generated per key industrial sector.

10.3.2 Hazardous Waste Generated outside the City and brought into the City of Cape Town for disposal

The VWMF is mostly used for the disposal of hazardous waste from outside the borders of the City. The following information was obtained:

Hazardous waste from Western Cape Industries

B2: Mining and Quarrying from Saldanha Bay

○ Fluorescent tubes	ca. 2520.00 tpa
○ Oil rags	ca. 144.00 tpa

D2: Non Ferrous Metallurgy from Saldanha area

○ Mercuric chloride waste	ca. 0.24 tpa
○ Filter bags	ca. 1260.18 tpa
○ Fluorescent tubes	ca. 1.26 tpa

D3: Foundary and Metal Works from Saldanha area

○ Used oil for disposal	ca. 1620.00 tpa
○ Spent acid	ca. 122.60 tpa
○ Fluorescent tubes	ca. 0.50 tpa

- Medical waste ca. 0.02 tpa
- Inorganic salts ca. 1000.00 tpa
- Iron oxide waste ca. 1032.00 tpa
- Toxic metal waste ca. 4.20 tpa

F3: Production of fine chemicals from Somerset West

- Asbestos waste ca. 600.00 tpa
- Catalyst (if not odd) ca. 300.00 tpa

F8: Production of explosives and propellants from Wellington and Somerset West

- Ash from chemical fibres ca. 36.20 tpa
- Impregnated cotton waste ca. 23.00 tpa
- Dehydrated sludge ca. 30.00 tpa
- Used oil ca. 1.12 tpa
- Aluminium / sulphuric sludge ca. 10.00 tpa
- Contaminated packaging ca. 0.30 tpa
- Paint sludge ca. 30.00 tpa
- Hardener ca. 0.20 tpa
- Trichloro ethylene waste ca. 0.20 tpa

H2: Hide and Leather Industry

- Organic solids (off cuts ca. 9550.00 tpa
- and shavings) ca. 5.00 tpa
- Chrome waste ca. 20.04 tpa

H3: Timber and Wood Industry in George and Mossel Bay

- CCA waste ca. 3.20 tpa

SUBTOTAL ca. 18 172.26 tpa

- Hazardous waste received from Kwa-Zulu Natal:

- Hazardous waste from the Eastern Cape:
  No quantities were available. This procedure stopped when Aloes re-opened.

  - Marpol washings, coke, pitch, organo lead, etc ca. 365.25 tpa

SUBTOTAL ca. 365.25 tpa

The approximated total mass of known hazardous waste brought into the City of Cape Town is ca. 18 537.51 tpa.

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Table 10-3: Vissershok (CCT): Vissershok Complex operated by City of Cape Town [ref105-2]

Type of Waste	Actual tonnages per annum for the period June 1997 to July 2002
Organic waste	24 523.10
Inorganic waste	7 845.36
* Contaminated foodstuff	8 338.74
Sewage sludge	2775.74
Sanitary waste	886.60
* Tyres and rubber	327.62
High hazard waste	153.48
Average Annual Mass	**44 849.96**

Key: * Special waste

Table 10-4: VWMF: Vissershok Waste Management Facility operated by Enviroserv / Wasteman

Type of Waste	August 2000 to July 2001 (m^3)	August 2001 to July 2002 (m^3)
Dry hazardous waste	54 004.00	35 499.00
Sludges	120 830.00	145 673.00
Safe Disposal	8 484.00	9 395.00
Liquid in drums	17 736.00	22 780.00
Flammable solids	312.00	285.00
Flammable liquids	1984.00	691.00
Oxidising agents	1.50	0.70
Toxic waste	112.00	52.00
Corrosive waste	588.00	648.00
Infectious waste	52.00	0.00
TOTAL	**204 103.00**	**215 024.00**

The annual average total is 209 565.50 tpa for the VWMF facility (as above).

The figures were supplied in m^3 and the Specific Gravity (SG) taken as 1. Thus $1m^3$ is approximately equivalent to 1 ton.

10.3.2 Mass of Hazardous Waste Disposed

The figures for disposal of hazardous waste are relevant and may rather be used as generation figures to indicate the extent of hazardous waste management in the City of Cape Town.

The two main hazardous waste disposal facilities provided the following disposal figures to DEADP – SA. The figures exclude health care waste that requires incineration.

The drum re-conditioners, solvent recyclers, oil recyclers and hazardous waste exchange figures are not available to incorporate in the above estimation of the hazardous waste generated and disposed of in the City of Cape Town.

Table 10-5: Health Care Waste for incineration and sterilization
(Refer to Section K1 of this chapter for clarity)

Type of Waste	Tpa
Private Sector:	
Sharps	ca. 93.54
Infectious waste	ca. 831.78
Pharmaceutical waste	ca. 7.50
Anatomical waste	ca. 22.60
Fixer remains	ca. 11.70
SUBTOTAL	ca. 307.00
Provincial:	
Health care waste	ca. 650.00
SUBTOTAL	ca. 650.00
TOTAL	**ca. 957.00 tpa**

10.3.3 Comparison of Hazardous waste disposed in the City of Cape Town to the generation figures provided by industry

Table 10-6 summarises the comparison of hazardous waste quantities generated in and outside of the borders, but disposed of in the City of Cape Town, with the total disposal of hazardous waste at the two hazardous waste landfills as well as the health care facilities.

Table 10-6: Hazardous Waste Mass Balance

Haz W Generation: current annual tonnages			Haz W Disposal: current annual tonnages		
Source	Subtotal	Total	Source	Subtotal	Total
DWAF – BS*	(50 696.81)		VCCT (incl waste water sludge)	44 849.96	
DEADP – SA (incl waste water sludge)	564 035.67	582 573.18	VWMF (incl waste water sludge)	209 563.50	255 370.46
Externally generated haz. waste brought in the City	18 537.51		Health Care (incinerators & sterilisations)	957.00	

Key: * The figure in brackets is not used in the total, the DEADP – SA figures are used.
The following should be noted:

1. The practice of wastewater treatment sludge (ca. 130 000.00 tpa) to landfill no longer takes places due to disposal onto agricultural lands. Refer to F10 Appendix A.

2. The difference in tonnages between generation and disposal can be attributed to the lack of response by certain industries during data capturing. Refer to Section 10.3.1 of this report for further details.

10.4 Collection, Storage, Transportation and Disposal of Hazardous Waste

10.4.1 Collection, storage and transportation

CODES OF CONDUCT AND LEGISLATIVE REQUIREMENTS

Hazardous Waste, by definition occurs in a solid, sludge, liquid or gaseous state.

A range of contractors varying from "fly-by-night" to highly professional transporting companies undertakes collection of hazardous waste in the CCT.

The key principles for waste management are given in the Minimum Requirements, 1998 by DWAF [ref 5-5]. The two most important principles are Duty of Care and Cradle-to-Grave. The codes are especially relevant to the transporters.

Duty of Care: This requires that any person who generates, transports, treats or disposes of waste must ensure that there is no unauthorised transfer or escape of waste from his control. Such a person must retain documentation describing both the waste and any related transactions. In this way, he retains responsibility for the waste generation or handling.

Cradle-to-Grave: A policy of controlling a Hazardous Waste from its inception to its ultimate disposal.

The discussion of the Cradle-to Grave principle by Kirsten Youens in Law Talk published in the Natal Mercury on 5 February 2003 [ref 10-8], is very informative. An extract is given below:

"…About 2 500 dangerous substances are listed in the SANS Code of Practice 0228, including medical waste, chemicals, paint and petrol. As the cradle-to-grave principle places a positive duty on the generator to ensure the product etc is safely designed, manufactured, packaged, transported, utilised and disposed of, harm caused by a failure to do so suggests negligence on the part of the generator. Such negligence may give rise to a civil claim for damages for the harm caused. The King Report on Corporate Governance also deals with the implementation of environmental corporate governance and confirms the duties set out by environmental legislation such as the National Environmental Management Act and with the principles of best practice.

All manufacturers should carry out product life-cycle assessments and make the necessary changes to ensure that harm to the environment is avoided. Where it is impossible to avoid the harm, such harm should be minimised or remedied."

There are various legislative requirements for the transporters. A legal review is covered in Chapter 2 of this report. However, the main act governing transport of hazardous waste is the National Road Traffic Act, 1986 (Act 93 of 1986) linking with the Hazardous Substances Act and Regulations, Act 15 of 1973, Regulation 73. The Hazardous Substances Act and Regulations were administered form 1985 and require the use of the HAZCHEM codification

transport manifest and display of relevant decals for the vehicles transporting in excess of 500 l on or in a vehicle.

There are six relevant SANS Code of Practices specifically pertaining to the transportation of hazardous waste. These codes provide specific information in terms of identification, packaging, transportation, vehicle design and emergency systems, namely [ref 10-8 and 10-2]:

- SANS Code of Practice 0228: The identification and classification of dangerous goods (based on pure chemicals)
- SANS Code of Practice 0229: Packaging of dangerous goods for road and rail transportation in RSA
- SANS Code of Practice 0230: Vehicle Inspection Requirements
- SANS Code of Practice 0231-1: Transportation of dangerous goods – Emergency information systems. Part 1: Emergency information system for road transport
- SANS Code of Practice 0232: Emergency Response Information
- SANS Code of Practice 1518: Design Requirements for Vehicles

The SANS 0228 Code is based on pure chemicals as well as hazardous waste. The Code is widely used by the hazardous waste transporters, as it is easy to apply. In the analysis of a waste stream, the toxic nature, danger group and hazard rating are determined which indicate the major chemical contaminants in the solid stream. By using the major chemical contaminants as well as the other applicable parameters indicating the nature of the hazardous stream, the related HAZCHEM classification is applied.

STORAGE OF HAZARDOUS WASTE

Due to the nature of the hazardous waste, the containers for storage vary significantly in size, shape and construction. Once again, packaging containers vary from highly effective ISO containers to plastic bags.

The duration of storage of hazardous waste normally depends on the storage capacity of the generator. The generator stores the hazardous waste until his in-situ container or containment system is full or nearly full. The prohibitive high cost of transport acts as a motivation for the generator to only send full loads for disposal and/or treatment.

The temporary storage of hazardous waste on a firm waterproof base protected from the ingress of stormwater from the surrounding areas is allowed per the Minimum Requirement. [ref 10-4], i.e. "A Generator may accumulate the following quantities of Hazardous Waste on site for 90 days or less without a permit for a waste disposal site:

Hazard Rating 1: 10 kgs
Hazard Rating 2: 100 kgs
Hazard Rating 3: 1 000 kgs
Hazard Rating 4: 10 000 kgs

provided that:

- the waste is stored in such a manner that no pollution of the environment occurs at any time;
- the date upon which accumulation begins is clearly marked and visible for inspection on each container;
- while being stored on site, each container and tank is labelled or marked clearly with the words "Hazardous Waste";
- the generator fences off the storage area to prevent unauthorised access and erects a weatherproof, durable and clearly legible notice-board in official languages at every entrance of the storage area with the words 'Hazardous Waste: unauthorised entry prohibited'."

The generator who accumulated more than the above specified quantities or for more than 90 days is subjected to the requirements of section 20 (1) of the Environment Conservation Act (Act 73 of 1989), i.e. must register the site in terms of the Minimum Requirements Permit.

In the City of Cape Town the responsible hazardous waste generators and transporters have the following actual storage systems, which meet international standards, e.g.

- Static or plastic (PVC and HDPE mostly) containers (sub surface or surface) for effluent or sludges
- Static soak aways
- Mobile plastic containers: 0.25 m^3 – 10 m^3
- Mobile roll-on-roll-off (RORO) steel containers: 8 – 10 m^3
- Mobile steel solid waste bins: 5.5 – 12 m^3
  These bins should be covered with tarpaulins when containing hazardous solid waste
- Mobile over-drums of 0.25 m^3 for reinforcing rusted or leaking drums
- Sealed units fitting on drums for the crushing of fluorescent tubes directly into 210l steel drums
- 210 l drums for re-packing of smaller glass containers used for spent laboratory chemicals
- Health care waste containers for sharps infectious containers, anatomical parts, etc
  The sizes and material of the containers vary depending on the contractor

However, the irresponsible waste generators and transporters use sub-standard containers for example, empty mineral drink bottles for health care sharps and plastic bags for asbestos lagging and body parts.

TRANSPORTATION OF HAZARDOUS WASTE

Transportation of hazardous waste takes place in various forms/types of road vehicles, as well as by rail. The vehicles vary from custom made vehicles to private cars where clinic staff transport health care waste to a provincial incinerator.
The responsible hazardous waste transporter uses a range of custom made vehicles, which carry a number of various containers, depending on demand. The vehicles can transport

minute quantities (if required) up to a maximum of 20 ton when a tanker – trailer system is used.

Examples of waste collection vehicles servicing bulk containers are shown in Table 10.9 below. This table is extracted from the DEADP report on the Situational Analysis of Hazardous Waste in the Western Cape [ref 10-2].

The DEADP Situational Analyses of Hazardous Waste in the Western Cape, Aug 2003 [ref 10-4] list the collection and transportation service providers for potentially hazardous and hazardous waste in the Western Cape. The same companies act as service providers to the City of Cape Town as set out in Table 10.10 and 10.11 below (Personal Communication, Resource Management Services).

TRANSPORT ROUTES

In general the shortest route between the generator and the disposal site is currently used. Responsible route planning for hazardous waste needs to be addressed in future studies.

TRANSPORTATION SPILLS

If there is a transport accident resulting in leakage or spillage of the Hazardous Waste, two direct actions are required, namely,

- Emergency action must be taken to contain the spilled material and to prevent further uncontrolled spillage or leakage. In addition immediate steps must be instituted to clear the road from any material that may delay or stop the traffic.
  These emergency actions are normally initiated by the driver of the vehicle and executed by emergency services personnel. Emergency action should follow immediately after the incident and would normally last for three to four hours thereafter.

- Remedial action must be taken to clean up and remove any spillage or residue and to ensure that no environmental pollution or contamination of water resources will take place at a later stage.

Emergency Action- DWAF Minimum Requirements [ref 10-4]

"If a road accident causes leakage or spillage of Hazardous Waste, the driver of the vehicle must immediately notify the local emergency services of the incident, clearly stating:

- the location
- the nature of the load being carried; and
- the status at the site of the accident itself, i.e., whether further leakage is still taking place, whether the vehicle or the load is on fire and what the traffic situation is."

Until assistance arrives, the driver will be responsible for warning and if necessary regulating traffic. Bystanders must, under all circumstances, be kept away from the vehicle and its load.

The Transport Emergency Card (Tremcard), which must accompany the load, must be recovered from the vehicle and handed to the police and/or emergency personnel on their arrival. The Tremcard information on emergency action and the HAZCHEM placard on the vehicle will provide the emergency services with the initial information required for action.

Table 10-7: Bulk Containers and Refuse Collection Systems [ref 10-2]

System	Sizes (m^3)	Remarks
Skip system or lift on	5.5	• Open and closed bins for solid waste
	6.0	• Enclosed for sludges, dangerous or smelly wastes
	9.0	• Tanks for liquids
	11.0	• Reinforced or closed for refuse collection with a static compactor
	12.0	
Rear end loader	Usually 5.5	Bulk containers compatible with semi-industrial rear end loading compactor with top crane
Roll-on / Roll-off *Open and Compaction* Tanks	20 25 28 30 9.5	Another form of container loading mechanism for open, closed, compaction and tank containers

Table 10-8: Potentially Hazardous Waste Service Providers (Collection & Transportation)

Potentially Hazardous (Large)	Potentially Hazardous (Medium)	Marine based services	Sanitary Waste	
• FFS Refiners	• Aquiline Tradecor	• Pentow Marine	• Cannon Hygiene	• Design Hygiene
• OilKol	• Andries Thirion	• Altatech	• Rentokil	• Cannon Hygiene
	• Daniel Whitfield	• SE Marine Cape Diving	• Steiner Hygiene	• Fokus Pest Control
• Unitrans			• Sanitech	• Thubalethu C S
• Jowells Transport			• Initial Healthcare	• Orkin E S
• Tanker Services			• Lindol E S	• Salutaire
			• Contractokil	• Steiner Hygiene

Key: Potentially Hazardous Waste = waste or lube oils
CS = Cleaning Services
ES = Environmental Services

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Table 10-9: Hazardous Waste Service Providers (Collection & Transportation)

Hazardous Waste (Larger Service Providers)	Hazardous Waste (Smaller Service Providers)	Future Service Providers	Health Care Waste (excludes sanitary waste)
• Enviroserv – waste tech	• Marthinisen	• Waste Control	• BCL Medical Waste Management
• Wasteman	• De Vries Disposal	• Interwaste	• Sanumed
	• Sepane		• Evertrade
			• Cannon Hygiene
	• **(Ad hoc)**		• Steiner Services
	• 24 Hour Spill Response		• Rentokil

Since spillages of Hazardous Waste resulting from road accidents failure of the containers normally happen outside the generator's premises, arrangements must be made beforehand for good and prompt communication between the carrying vehicle and the generator of the waste. When such an incident is reported the generator must promptly inform the Regional Office of the Department of Water Affairs and Forestry. In addition, the generator must ensure that all technical information relating to the waste material is made available immediately to emergency teams on the site of the incident.

It should be noted that the generator – or his representative, i.e transporter – retains primary responsibility for ensuring that adequate steps are taken to minimise the effect of an accident or incident on the public and on the environment.

If there is a serious accident that results in substantial losses or consequential damage, it is advisable that the generator should also advise its insurance company since they may wish to send an assessor to conduct an on-site inspection.

Remedial action *(ref 10-4)*

Remedial action to clean up any spillage remaining on site after an accident has to be initiated by the generator.

Such remedial action may be undertaken by the generator himself, a waste disposal contractor appointed by either the generator or by the insurance company or, if this fails, by the State.

In such event all costs relating to the remedial action will be recovered by the State from the generator of the waste.

The remedial action will depend on the nature and properties of the waste material, on the physical environment in which it has been spilled and on the severity of the spillage. In

some instances washing away of residues with water may prove adequate but in other instances chemical treatment of the residue or even digging up of soil and removal thereof to a disposal site may be required.

The major objective of the clean-up procedure must be to minimise the risk of contaminating the environment and in particular the water sources at a later stage.

Reporting of road accidents and spillage [ref 10-4]

All road accidents must be reported to the Department of Transport on the prescribed documentation. In addition, an incident report must be compiled, giving full details of the nature of the incident, amounts of waste material lost and remedial action taken to prevent environmental and water pollution. Such a report should be sent to the Department of Water Affairs & Forestry, Directorate of Water Quality Management, Private Bag X313, Pretoria, 001.

The DEADP Situational Analysis of Hazardous Waste in the Western Cape [ref 10-4] reports of Hazardous Water spills within the City of Cape Town over the period 2001 – 2003. The spills were handled by 24-hour Spill Response, Spill Control Technologies and Drizit. There is no record of the number of hazardous waste spills handled by Hazmat Support Services.

The same study mentioned above [ref 10-2] reported ca. 128 spills per annum in the Port of Cape Town. The spills of hazardous materials in the different quays vary from marine and bunker oil to brake fluid.

10.4.2 Disposal of Hazardous Waste [ref 10-2]

Hazardous waste is treated to reduce the toxicity of the harmful components in the waste and to reduce the volume of waste to be disposed of prior to final disposal so as to minimise the impact of the waste on the environment.

The treatment technology used for a specific hazardous waste type will depend on its physical and chemical characteristics.

The most frequently used treatment technologies are:

- Physical treatment
- Chemical treatment
- Biological treatment

With the less frequently used treatment technologies being:

- Encapsulation and
- Incineration
- Electro thermal deactivation

The information below is quoted from the DEADP Study on the Situational Analysis of Hazardous Waste Management in the Western Cape [ref 10-2].

Table 10-10: Physical Treatment Technologies most generally used in Cape Town [ref 10-2]

Physical Process	Process Description	Applications	Key to Industrial Groups
EVAPORATION	The liquid effluent which does not conform to discharge standards is evaporated in solar ponds for volume reduction.	• Refinery surface run-off	C2
FILTRATION	Removal of solids prior to discharge to sewer by mechanical means. The filtered water is also removed by a waste contractor for co-disposal on landfill if it does not conform to discharge standards.	• Metal finishing & Electro -plating treated sludges • Brewery filtration of kieselguhr • Winery filtration of fermentation barrels • Waste Water Treatment • Removal of fine dust from stacks	D4 A3 A3 F10 C2
FLOCCULATION	Removal of colloidal suspended solids by pre-coagulation with chemicals such as alum, lime, ferrous sulphate, electrolytes, etc	• Metal Finishing & Electroplating sludges • Chemical Production • Waste water treatment	D4 F2,3 F10
FLOTATION	Removal of suspended solids by the passing of air through the effluent. Particles and air bubbles consolidate and float to the surface where it is skimmed off.	• Removal of oily waste from surfaces • Removal of colloidal humus particles from raw water • Recovery of particulates in heavy metal industries	F10 F10 D1
ION EXCHANGE	Cationic or anionic ion exchange with dissolved ions in the effluent produce of resultant precipitate.	• De-ionisation of water • Production of chemicals	F10 F2,3
REVERSE OSMOSIS	Concentration of dissolved components on one side of a semi-permeable method.	• Water purification • Removal of heavy metals	F10 D4
SETTLEMENT	Gravity settlement suspended particles in chemically treated effluent. The overflow or supernatant often goes to sewer.	• Oil traps • Production of water based paints, inks and glues • Evaporation dams	G3 F4 H2
SOLVENT EXTRACTION	The concentration of a waste solution with solvents such as petroleum ether, kerosene and chloroform which has a high affinity for certain dissolved components.	• Laboratories • Pharmaceutical & cosmetic preparation • Production of photographic products • Production of fine chemicals • Petrochemical refinery	F11 F6 F5 F3 C2
WASTE BLENDING	Mixing or blending of a flammable waste with sufficient fly ash, bottom ash or other material approved by the Department, so that the flash point is > 61°C. Also, blending of waste sludges or effluent with inert solids such as fly ash for physical absorption.	• Mostly done on H:H and H:h landfills	

OTHER LESS COMMONLY USED PHYSICAL TREATMENT METHODS:	
• AIR STRIPPING	• ULTRAFILTRATION
• ELECTRODIALYSIS	• SOLIDIFICATION
	• VITRIFICATION

(a) Physical Treatment [ref 10-2]

The most generally used physical treatment methods encountered are evaporation of treated effluent as well as phase separation by physical or gravitational means.

EXISTING FACILITIES

The physical treatment facilities available in the Western Cape Province are listed below.

CONTRACTORS

- Vissershok Waste Management Treatment Facility (Enviroserv/Wasteman) e.g. co-disposal, blending, etc.
- Vissershok Landfill Complex (City of Cape Town) e.g. co-disposal

INDUSTRY

- Explosives Producer in Swartklip: G:L:B+
- Treatment by burning / incineration
- Fuel Firing Systems (FFS): The company is an used oil reprocessing company operating in Vissershok area

(b) Chemical Treatment [ref 10-2]

"Chemical Treatment of waste in the Western Cape ranges from effective application to no application at all.

Industries which practise responsible waste management use state of the art technology. The industrial sector paying the least attention to chemical treatment prior to sewer discharge is possibly the Metal Finishing and Electroplating Industry.

The most commonly used chemical treatment processes are listed in Table 10.11.

EXISTING CHEMICAL TREATMENT FACILITIES

The existing chemical treatment facilities are listed below.
Contractors

- Vissershok Waste Management Treatment Facility (Enviroserv/Wasteman) e.g. neutralisation, oxidation, reduction, etc.

Industry

- A small sector of the Metal Finishing Industry, with in-situ treatment
- Petrochemical Refiners
- Cape Precious Metal for the recovery of silver (Ag) from photographic developers and radiology wards."

Table 10-11: Chemical Treatment Technologies most generally used in the Western Cape

Chemical Process	Process Description	Applications	Key to Industrial Groups
DECHLORINATION	Removal of chlorine from highly chlorinated toxic organic waste	• Chemical decomposition of pesticides	C3
ELECTROLYSIS	Removal of cations and anions by passing an electrical current through a solution	• Removal of selective metal ions such as silver from waste pickling solutions • Silver recovery from photographic solutions	F6 J2
HYDROLYSIS	Water is added to organic compounds usually in the presence of a base and raised temperatures	• Petrochemical refinery	C2
NEUTRALISATION	The raising and lowering of the pH of an acidic or alkaline effluent to a neutral pH of 7 by addition of either a base or acid respectively	• Neutralisation of corrosive acids or alkalis • Neutralisation of heavy metal ions in acids or alkalis to produce a metal hydroxide particle	D4 D4
OXIDATION	Oxidation occurs when one or more electrons are added to a molecule	• Oxidation of cyanides in zinc plating process	D4
PRECIPITATION	Formation and removal of solids from a liquid effluent by addition of precipitating agents such as lime and alkali metals	• Removal of insoluble heavy metal hydroxides or sulphides	D4 H2
REDUCTION	Reduction occurs when one or more electrons are removed from a molecule	• Reduction of hexavalent chrome to trivalent chrome	D4

(c) Biological Treatment (ref 10-9)

Biological treatment is not commonly used in the Western Cape Province. There are two examples listed below. However, when it is used, it is often used successfully for the treatment of organic effluents or organic spills by using in-situ or biotechnologically engineered bacteria.

EXISTING FACILITIES

The existing facilities employing biological treatment technologies are listed below.

- Sewage Works: Aerobic and anaerobic treatment of wastewater are commonly used by sewage works in the Western Cape Province.
- Both Vissershok landfill facilities: The production of biogas, especially methane, is a common by-product of anaerobic treatment of a biodegradable organic waste. Anaerobic treatment of food and brewery waste can successfully break down a variety of aromatic organic substances.

(d) Encapsulation, Solidification and Immobilisation [Ref 10-2]

"The encapsulation of chlorinated solvents and PCB's is still commonly used by the two private hazardous waste facilities in the Western Cape Province. Vissershok Waste Management Treatment Facility (Enviroserv/Wasteman) actively encapsulates while the Vissershok Complex of the City of Cape Town no longer provides an encapsulation service. However, a fenced area of previously encapsulated waste is still part of the complex and falls within the Section 20, solid waste site permit, issued in terms of the Environment Conservation Act, Act 73 of 1989.

EXISTING FACILITIES

The existing facilities employing encapsulation and solidification are listed below.

- The solidification of organo lead such as tetra-ethyl and tetra-methyl lead is practised at PetroSA.
- Cast slabs at Vissershok Waste Management Treatment Facility (Enviroserv/Wasteman) and Vissershom Complex of the City of Cape Town are derived from solidification. These sites have separate encapsulation areas.

(e) Landfill – Ash Blend [ref 10-2]

The blending of organic waste with fly-ash usually has a two-fold purpose. The fly-ash contains a polozoic property of adsorption and absorption as well as neutralisation of acidic properties by the high calcium oxide (CaO) content of the fly-ash.

EXISTING FACILITIES

Ash blending is mostly done at the Vissershok Waste Management Treatment Facility (Enviroserv/Wasteman).

(f) Incineration [ref 10-2]

Incineration is the aerobic combustion of waste materials. It appears that 90% or more of all the thermal treatment equipment used for incineration is limited to various sizes of multi-chamber furnaces such as the ones used in hospitals.

EXISTING FACILITIES

PROVINCIAL HEALTH CARE WASTE TREATMENT FACILITIES

The number of incinerators being operated by the Provincial hospitals in the Western Cape Province appears to fluctuate as they are continually breaking down due to the age of the facilities.

All of the provincial incinerators operate at between 500 to 600ºC and therefore stack emissions are unlikely to comply with the prescribed national emission standard. One or two of these facilities are located within residential areas and on this basis should either be required to complete an environmental impact assessment or be closed down. From discussions with the individual hospitals, provincial inspections do not include air emission testing."

(g) Electro Thermal Destruction

The health care waste is pre-milled and water sprayed. The mixture is moved into a closed tube where the solids are segregated from the air by means of cyclones and filters. The air is sterilised and deodorised prior to discharge. The solids are thermally treated in an oven prior to disposal of VWMF.

10.5 Gap Analysis

10.5.1 (i) Introduction

There are fortunately many environmentally responsible industries in the CTMA. However, only a few have updated and accurate records on hazardous records on hazardous waste management.

10.5.2 (ii) Gap Analysis and Assessment of Needs

The status quo report clearly indicates that there is very little available research and survey reports on hazardous waste management in the CTMA. The DEADP report on the Situational Analysis of Hazardous Management in the Western Cape Province, Volumes 1 and 2, August 2003 is current. However, the report was prepared for the Province and the available data does not always apply to the CTMA only. Information is available in the report but presented as an umbrella.

The status quo report preparation highlighted certain information gaps regarding hazardous and special wastes. The most prominent are listed below:

GAPS	NEEDS
❑ Available reports exist for the Western Cape and not CTMA.	❑ There is a need for a "door-to-door" hazardous waste management survey of the CTMA industries.
❑ Available information per Key Industries in the CTMA is incomplete and is not available at Institutions and Chambers.	❑ There is an urgent need for an "Environmental Watchdog" who can co-ordinate and address the various environmental issues and provide a sustainable interaction with industry
❑ There is insufficient people and skills capacity in the regulatory authorities	❑ Industry in general must take responsibility for their environmental

to continually assess the hazardous waste management performance of the industries.	management and adopt the IWMP.
❑ The medium to smaller industries are generally not environmentally orientated as they often perceive integrated waste management as a new cost factor. Companies such as BECO, Waste Minimisation Clubs, and the CMFA plays an important role in stimulating environmental awareness and sustainable management.	❑ Existing and future information must be standardised and reported in the format used by the Minimum Requirements, 1998 by DWAF.
❑ There is no specific information on the stockpiles of hazardous waste on industrial premises. It does occur due to prohibitive treatment / disposal costs or lack of management. This occurrence was observed in certain wood treatment facilities, PCB users, etc.	❑ There is a need for the compilation of a list of stockpiles of hazardous waste in industry. This list should indicate the need of alternative treatment technologies and indicate the transgressing management practices.
❑ There is no specific information on wine farms using cellar effluent for irrigation.	❑ There is a need for record keeping and follow up of occupational health related cases which occur in industry and are highlighted in the press or via the respective unions, concerning the effect of hazardous waste mismanagement.
❑ There is no specific information on the success with which the food industry sells pips, peels, processed grain, etc to farmers for animal feed.	
❑ Pesticide containers and residue stockpiles in the CTMA are not addressed.	
❑ There is no co-ordinated data on public complaints relating to mismanagement of hazardous waste and / or occupational health concerns eg legal action of worker's union at Swartklip explosives regarding occupational health issues and proposed Morningside Committee's Mercury Monitoring in the Vissershok area.	
❑ Private waste contractors do not always have accurate and updated records of the treatment / disposal of hazardous waste on landfills / facilities in the	

CTMA.	
❑ There are no known records of petrochemical storage tank leakages and remediation of the soils.	
❑ The City of Cape Town has an incomplete hazardous waste classification system in terms of the Minimum Requirements of 1998, DWAF.	

Appendices

Appendix A

A1: AGRICULTURE, FORESTRY AND FOOD PRODUCTION

Agriculture in the Western Cape is a primary contributor of the economy with as many as 11 sectors contributing significantly to agricultural production. The City of Cape Town therefore has various related industries processing and supplying to the 11 sectors. Examples of the sectors are animal products, dairy, flowers, fruit, grains, cereals and oilseed, vegetables, natural products, viticulture and other crops (ref 5-3).

The Parks and Forestry Department mostly control the forestry activities within the City of Cape Town. There are eight private and independent wood treatment facilities in the City of Cape Town (ref 10-2).

The Western Cape has a 90% share of the total catch of the South African fishing industry. This mature sector has been restructured to increase access for previously disadvantaged fishermen and to boost smaller players under the Marine Living Resources Act of 1998. The actual share of the market within the shorelines of the CCT is not clear. However, an estimated 90 – 95% of the producers have their offices in Cape Town and not along the West Coast. However, the Benguela current within the western coastal shelf has harbours in Cape Town and Saldanha Bay (ref 10-5).

Aquaculture and mariculture producers reside mostly outside the city borders.

Agriculture

This sector is not a manufacturing group as such but is mostly user and processing orientated.

Sectors: Animal Farming
Flower Producers
Natural Products
Fruit Producers
Seed and Pesticides Suppliers

Hazardous Waste Types and Volumes

DWAF – BS: The main types are hazardous biomass consisting of manure, fertilizer and pesticide run-off. The volume is unknown.

DEADP – SA: Hazardous waste is mostly pesticide run-off and empty containers. The volume is unknown.

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not analysed

DEADP – SA: Empty pesticide containers are often returned to the supplier. The Stellenbosch area has historically accumulated empty pesticide containers (which will be partially indicative of the City of Cape Town's viticulture farming community). The VWMF is used for disposal of empty pesticide containers.

Forest Management

There are no commercial forests in the area according to the DWAF - BA and DEADP - SA reports. Treatment of wood is done on a commercial basis and discussed in key industry group H3: Timber, Wood and Furniture Industry.

Fisheries

The main hazardous waste generated is by the production sector rather than aquaculture and mariculture.

Sectors: Production and processing of fish and fish products
Aquaculture
Mariculture

Hazardous Waste types and volumes

DWAF – BS: No information available. The volumes are unknown.
DEADP – SA: Hazardous waste types and volumes are as follows:

- Asbestos lagging ca. 6.00 tpa
- Off spec products ca. 0.05 tpa
- Fluorescent tubes ca. 0.20 tpa
- Laboratory chemical ca. 288.00 tpa
- Process rinse water unknown

Disposal of Hazardous Waste and Facility used

General disposal is as follows:

- Asbestos lagging : LWT at VWMF
- Off spec products : LWT at VWMF
- Fluorescent tubes : CTR at VWMF
- Laboratory chemical : ENC at VWMF

A2: ANIMAL AND VEGETABLE PRODUCTS FROM FOOD SECTOR

Food production and processing in the City of Cape Town is extensive. Wesgro (ref 10-9.4) estimates 29 key companies control the main production sectors.

Animal Products

This group includes red and white meat processing.

Sectors: Red meat
Poultry
Dairy

Hazardous Waste Types and Volumes

DWAF – BS: Not analysed in the report.
DEADP – SA: The hazardous waste generated is mostly from research and quality control laboratories such as:

- Laboratory chemicals 2.06 tpa
- Off spec food 144.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not analysed
DEADP – SA: The disposal is as follows:

- Laboratory chemicals : ENC at VWMF
- Off spec food : LWT at VWMF

Vegetable Products

The growth, harvesting and processing of vegetables cover a broad spectrum of industries.

Sectors: Grain Milling
Edible oil and margarine
Vegetable bottling, canning and freezing
Mushroom growers
Butchery spices
Sauces and crisps
Yeast production

Hazardous Waste types and volumes

DWAF – BS: Liquid food rests during food production forms the basis for high bacterial and oxygen demanding effluent.

- Liquid Food rests ca. 17000.00 tpa

DEADP – SA: The extraction of oils from seeds produce the most hazardous waste, namely:

- Nickel catalyst ca. 3000.00 tpa
- Spent solvent waste ca. 3005.00 tpa
- Off spec products unknown
- Laboratory chemicals ca. 7.46 tpa
- Process rinse water unknown volumes

Disposal of Hazardous Waste and Facility used

DWAF – BS: The disposal is mostly in a high hazard site, thus:

- Liquid Food rests : LFB VWMF

DEADP – SA: Varied disposal options are used, namely:

- Nickel catalyst : LWT at VWMF
- Spent solvent waste : LFB at VWMF
- Off spec products : LWT at VWMF
- Laboratory chemicals : ENC at VWMF
- Process rinse water : possibly to sewer

A3: DRINKS INDUSTRY

This industry covers a wide spectrum of liquid drinks, from soft fruit juices to alcoholic beverages.

Sectors: Wine
Beer
Sorghum
Carbonated beverages
Non- carbonated beverages
Fruit juices

Drinks

Hazardous Waste Types and Volumes

DWAF – BS: Fermentation waste was regarded as the main hazardous waste type in this industry, thus:

- Fermentation waste ca. 1300.00 tpa

DEADP – SA: The laboratory effluents and quality control chemicals were found to be the most frequently generated hazardous waste.

- Laboratory waste ca. 0.52 tpa
- Caustic effluent ca. 30.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS:

- Fermentation waste : LFB at VWMF

DEADP – SA:

- Fermentation waste Sold to farmers or used for compost making
- Laboratory chemicals : ENC or INC at VWMF
- Caustic effluent : NCR at VWMF

A4: MANUFACTURING OF ANIMAL FEED

This is a very small sector in the City of Cape Town with only one known manufacturer.

Sector: Animal feed

Hazardous Waste Types and Volume

DWAF – BS: Not analysed

DEADP – SA: The animal feed production plant uses flavourants, antibiotics and food in the products. An on-site laboratory produces redundant chemicals. The hazardous waste produced is thus:

- Laboratory chemicals ca. 2.00 tpa
- Chemical effluent ca. 5.00 tpa

Disposal of Hazardous Waste and Facility used:

DWAF – BS: Not analysed

DEADP – SA: The chemical waste requires treatment or environmental isolation, thus:

- Laboratory chemicals : ENC at VWMF
- Laboratory effluent : NCR at VWMF

B: MINERAL EXTRACTION AND UPGRADING

The mining, quarrying and extraction of minerals is not a major industrial sector in the City of Cape Town. There is one kaolin mine in Noordhoek. (ref 10-2)

B1: MINING AND QUARRYING OF NON-METALLIC MINERALS

NON-METALLIC MINERALS

Sector: Kaolin

Hazardous Waste Types and Volumes

DWAF – BS: Not analysed
DEADP – SA: The kaolin mine produces two hazardous waste types, namely:

- Oil rags ca. 24.00 tpa
- Reclaimed used oil ca. 1.20 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not analysed
DEADP – SA: The kaolin mine's hazardous waste is managed as follows:

- Oil rags : LWT at VWMF
- Reclaimed used oil : RCY

B2: MINING AND QUARRYING OF METALLIC MINERALS

METALLIC MINERALS

No information in any published report.

C: ENERGY

The City of Cape Town uses a variety of energy sources. The use of alternative energy is part of the strategy for the City.

The City's boundaries include a nuclear power station, a partially productive coal fired power station as well as a gas turbine power station.

C1: COAL INDUSTRY INCLUDING GAS WORKS AND COKING

Sector: Power Station
Extracting of commercial gas and processing of coal occur within the City boundaries.

C2: PETROLEUM AND GAS INDUSTRY

PETROLUEM INDUSTRY

Sectors: Petro-chemical
Refinery
Refinery for used oils

Hazardous Waste Types and Volumes

DWAF – BS: This report focussed on hazardous waste arising from petrochemical storage and processing. The hazardous wastes are as follows:

- Crude tank sludge ca. 30.00 tpa
- Diesel tank sludge ca. 20.00 tpa
- Petrol tank sludge ca. 20.00 tpa

- Bitumen ca. 1000.00 tpa
- Catalyst ca. 20 000.00 tpa

DEADP- SA: The quantity of waste emanating from the tank farm was found to be small while production waste was the major waste contributor. The volumes are higher as is probably due to the survey. The hazardous waste arising in this sector is as follows:

- Oil sludge ca. 970.00 tpa
- Amine waste ca. 420.00 tpa
- Caustic sludge ca. 300.00 tpa
- Catalyst waste ca. 265.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: The hazardous wastes are all landfilled at a high hazard facility, namely: LWT at VWMF

- Crude tank sludge : LWT at VWMF
- Diesel tank sludge : LWT at VWMF
- Petrol tank sludge : LWT at VWMF
- Bitumen : LWT at VWMF
- Catalyst : LWT at VWMF

DEADP – SA: The hazardous wastes are managed as follows, namely:

- Oil sludge : LWT at VWMF
- Amine waste : LWT at VWMF
- Caustic sludge : CTR at VWMF
- Catalyst waste : LWT at VWMF

C3: PRODUCTION OF ELECTRICITY

NUCLEAR FUEL

Sector: Nuclear Power Station

Hazardous Waste Types and Volumes

DWAF – BS: Not analysed

DEADP – SA: The Koeberg nuclear power station along the West Coast produces high and low hazard waste. Different drums with or without lead, or varying thicknesses of concrete are used and described as C1, C2, C4 and C_2F.

- Low level radioactive waste ca. 126.00 tpa
- Low and intermediate radioactive waste in C1, C2, and C4 drums ca. 2.00 tpa
- Intermediate and high level radioactive waste as C_2F ca. 0.50 tpa
- High level radioactive waste as C_2F ca. 0.02 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: No information

DEADP –SA: All the radioactive waste is disposed of outside the boundary of the City at Vaalputs Nuclear Disposal Site near Springbok in the Northern Cape. Storage of hazardous waste at the Koeberg plant occurs when high level radioactive waste is kept until the radiation levels falls to acceptable levels approved for disposal at Vaalputs.

COAL ENERGY

The Athlone coal fired power station was not addressed in any of the reports. This station is functional but not in operation. The facility will be used to provide energy during periods of high energy demand.

GAS TURBINE ENERGY

Sector: Acacia Gas Turbine Power Generator

Hazardous Waste Types and Volumes

DWAF – BS: Not analysed
DEADP – SA: The gas turbine produces minimal hazardous waste which mostly arise from plant washings, namely:

- Spent solvents ca. 0.17 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not analysed
DEADP – SA: The spent solvents are not recycled but managed as follows:

- Spent solvents : LFB at VWMF

ENERGY DISTRIBUTION

Sector: Distribution of energy in small power lines

Hazardous Waste Types and Volumes

DWAF – BS: Not analysed
DEADP – SA: The used oils and fluorescent tubes generated during distribution are kept at the Brackenfell centre. The waste types are the following, namely:

- Used oils ca. 0.50 tpa
- Fluorescent tubes ca. 0.50 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not analysed
DEADP – SA: The hazardous waste is managed as follows:

- Used oils : RCY
- Fluorescent tubes : CTR at VWMF

TRANSMISSION OF ENERGY

Transmissions are controlled at substations outside the City borders. The storage of PCB capacitor cans takes place at substations in Vredendal (Juno substation) and Sutherland (Komsberg substation).

Disposal of PCB's was historically at both hazardous waste facilities, namely VWMF and VCCT. The City Council facility has stopped encapsulation procedures since 1996. Eskom is storing all PCB's on their substation premises over the last 15 – 20 years.

D: METAL MANUFACTURING

The ferrous and non-ferrous metallurgy, foundry finishing and electroplating operations in the City of Cape Town are confined to mostly foundry and metal electroplating factories.

10

D1: FERROUS METALLURGY

The ferrous metallurgical plant is not in the City of Cape Town although hazardous waste is brought into the City's boundaries for disposal. Refer to Section D3.

FERROUS METALLURGY

Sector: Steel manufacturing
Iron manufacturing

Hazardous Waste Types and Volumes

DWAF – BS: Not analysed
DEADP – SA: Incorporated under D3: Foundry and metal working operations

D2: NON-FERROUS METALLURGY

MINERAL PROCESSING

The non-ferrous group operates a mine, processing magnetic separation plant and smelter outside the boundaries of the City of Cape Town. However, some of the hazardous waste is brought into the City's boundaries for disposal.
Sector: Mineral processing

Hazardous Waste Produced and Volumes

DWAF – BS: Not analysed
DEADP- SA: A variety of hazardous waste types are produced outside the borders of the City but disposed of within the high hazardous waste disposal facility in Cape Town. The hazardous waste types are:

- Mercuric chloride waste ca. 0.24 tpa
- Glass oxides, filters, batteries, oily waste and refractory waste ca. 1260.18 tpa
- Fluorescent tubes ca. 1.26 tpa
- Used oils ca. 36.50 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not analysed
DEADP – SA: The hazardous waste generated outside the City's borders are transported to the hazardous waste facility in Cape Town and disposed of as follows:

- Mercuric chloride waste : ENC at VWMF
- Glass oxides, filters, batteries, oily waste and refractory waste : LFC at VWMF
- Fluorescent tubes : CTR at VWMF
- Used oils : RCY

D3: FOUNDRY AND METAL WORKING OPERATIONS

FOUNDRY AND CASTINGS

Sectors: Foundries
Casting Works
Forges
Metal Processing

Hazardous Waste Types and Volumes

DWAF – BS: There are hazardous waste generated by two major foundries outside the borders of the City but brought into the City for disposal. Various steel works and foundries in the City contributed to the waste stream. The waste types are as follows:

- Refractory waste ca. 500.00 tpa
- Laboratory waste ca. 1.00 tpa
- Transformer Oil (PCB) ca. 1.00 tpa
- Cleaning solvent waste ca. 1.00 tpa
- Alcenul waste ca. 5.00 tpa
- Oil sludge ca. 6.00 tpa

DEADP – SA: This report highlights the generation of hazardous waste at two major foundaries outside the City's borders. However, the waste is disposed of within the City's boundary and is thus included in this study, namely:

- Used oil waste ca. 1620.00 tpa
- Used oil ca. 1524.00 tpa
- Spent acids ca. 122.60 tpa
- Fluorescent oil ca. 0.50 tpa
- Transformer oil (PCB) unknown volume
- Metallic pellets unknown volume
- Inorganic salts ca. 1000.00 tpa
- Iron Oxide waste ca. 1032.00 tpa
- Toxic metals ca. 4.20 tpa
- Medical waste ca. 0.02 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: All hazardous waste types are disposed of at a high hazard disposal facility, namely VWMF without pre-treatment thus:

- Refractory, laboratory, alcenul, solvent waste, oil sludge : LWT at VWMF
- Transformer oil (PCB) : ENC at VWMF

DEADP – SA: The hazardous waste types are individually treated if required, namely:

- Used oil waste : LFB at VWMF
- Used oil : RCY

- Spent acids : CTR /NCR at VWMF
- Fluorescent oil : ENC at VWMF
- Transformer oil (PCB) : ENC at VWMF
- Metallic pellets : RCY
- Inorganic salts : LFB at VWMF
- Iron Oxide waste : LFB at VWMF
- Toxic metals : CTR at VWMF
- Medical waste : INC at VWMF

10

D4: METAL FINISHING AND ELECTROPLATING

METAL FINISHING AND ELECTROPLATING

Sources: Anodising works
Galvanising works
Electroplating shops
Etching shops
Phosphating pre-treatment works
Pickling pre-treatment works
Passivating treatment works

Hazardous Waste Types and Volumes

DWAF – BS: The study found a variety of hazardous waste types, such as:

- Inorganic electroplating / galvanising sludges ca. 5.40 tpa
- Alkali waste (caustic) ca. 2007.00 tpa
- Waste mineral oils ca. 930.00 tpa
- Non-halogenic solvent waste ca. 1833.00 tpa
- Halogenic solvent waste ca. 310.00 tpa

DEADP – SA: The electroplating industry was found to make a significant contribution to hazardous waste generation in the Western Cape. Only an estimated 0.5% of the possible number of electroplaters were surveyed. However, they probably produced 60% of the industry's waste. A summary of the hazardous waste types are as follows:

- Pre-treated effluent tank bottoms ca. 390 00.00 tpa
- Oil and metal dust ca. 29.00 tpa
- Sand and grit ca. 10.00 tpa
- Spent acids ca. 130.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: All of the waste types are disposed of at a high hazard facility. The list is as follows:

- Inorganic electroplating / galvanising sludges : LWT at VWMF
- Alkali waste (caustic) : LWT at VWMF
- Waste mineral oils : LWT at VWMF
- Non-halogenic solvent waste : LWT at VWMF
- Halogenic solvent waste : LWT at VWMF

DEADP – SA: There is evidence of continual transgressions of metallic effluents into the sewer by various of the smaller electroplators. The main responsible role players are members of the Cape Metal Finishing Association (CMFA) and manage their hazardous waste correctly by disposal as follows:

- Pre-treated effluent tank bottoms : CTR at VWMF

- Oil and metal dust : LWT at VWMF
- Sand and grit : LWT at VWMF
- Spent acids : RCY

E: MANUFACTURE OF NON- METAL MINERAL PRODUCTS

E1: CONSTRUCTION MATERIALS, CERAMIC AND GLASS

The Noordhoek Kaolin mine is incorporated in key industry B: Mining and Quarrying of Non-Metallic Minerals.

This group of industries in Cape Town condenses to manufacturers of putty and cement based fillers.

Sectors: Putty Manufacturing
Cement based fillers manufacturing

Hazardous Waste Types and Volumes

DWAF – BS: Not addressed in the study
DEADP – SA: No hazardous waste generated

E2: SALT RECOVERY AND REFINING: SALT PROCESSES

One salt plant is in Cape Town.

Sectors: Mining of rock salt
Refining of salt

Hazardous Waste Types and Volumes

DWAF – BS: Not addressed in the study
DEADP – SA: No hazardous waste generated

E3: ASBESTOS GOODS AND PRODUCTS

Sectors: Fibre-cement manufacturing
Demolition of asbestos lagging
Demolition of asbestos sheeting

Hazardous Waste Types and Volumes

DWAF – BS: The fibre cement factory in Brackenfell was still operational or busy with site rehabilitation during this report. The waste was as follows:

- Asbestos cement lagging waste ca. 50.00 tpa

DEADP – SA: This study indicates a large mass of asbestos fibre product waste resulting mainly from the demolition of buildings. There is no asbestos cement factory in the City of Cape Town any longer. The waste is generated as follows:

- Asbestos cement lagging waste ca. 730.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: Disposal is in sealed bags and done as follows:

- Asbestos cement bags : LWT at VWMF

DEADP – SA: All asbestos cement products are sealed in bags as per the asbestos regulations. The sealed bags of lagging are disposed of at landfills, generally high and medium hazard landfills.

- Asbestos cement bags : LWT at VWMF / VCCT

E4: ABRASIVE PRODUCTS

No information is available in the referenced reports to this sector.

F: CHEMICALS AND RELATED INDUSTRIES

The manufacturing of chemicals and its allied industries are forming a major part of the South African manufacturing sector. Cape Town however, mostly has distribution centres and not many manufacturing plants.

F1: PETRO CHEMICALS

There are no petro chemical manufacturers in Cape Town, confirmed by the listed reports.

F2: PRODUCTION OF PRIMARY CHEMICALS AND FEEDSTOCKS

There are no known primary chemical producers within the City of Cape Town as per the listed reports.

F3: FINE CHEMICALS

There are only fine chemicals produced outside the City's boundaries. The one manufacturer does produce hazardous waste which is disposed of within the City of Cape Town.

Sectors: Fine chemical manufacturing
Refining of bulk chemicals

Hazardous Waste Types and Volumes

DWAF – BS: Not addressed in the study
DEADP – SA: The hazardous waste types generated in the Helderberg Metropole are as follows:

- Asbestos waste ca. 600.00 tpa (once off)
- Spent catalyst ca. 300.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not addressed in this study
DEADP – SA: The hazardous waste generated in the Helderberg Metropole is disposed of within the high hazardous facility in Cape Town as follows:

- Asbestos waste : LWT at VWMF
- Spent catalyst : RCY
  or LWT at VWMF

F4: PRODUCTION OF INKS, VARNISH, PAINT AND GLUE

Sectors: Ink production

Varnish production
Paint production
Glue production
Adhesives and Sealant production

Hazardous Waste Types and Volumes

DWAF – BS: There is reference to the industries in Cape Town manufacturing adhesives, sealants and non-solvent based paint. The hazardous waste streams are indicated as follows:

- Benzene and tolvene waste ca. 120.00 tpa
- Non-solvent paint waste (including graphic workshop waste) ca. 510.00 tpa

DEADP – SA: This study found two main streams of hazardous waste, namely:

- Water based pit sludges ca. 172.00 tpa
- Spent solvent waste ca. 20.00 tpa
- Spent solvents unknown

Disposal of Hazardous Waste and Facility used

DWAF – BS: Disposal takes place in the high hazardous waste landfill, namely:

- Benzene and tolvene waste : LWT at VWMF
- Non-solvent paint waste (including graphic workshop waste) : LWT at VWMF

DEADP – SA: The hazardous waste is disposed of in both hazardous waste facilities as follows:

- Spent solvent waste : LFB at VWMF
- Water based pit sludges : LWT at VWMF and VCCT
- Spent solvents : RCY

F5: PRODUCTION OF PHOTOGRAPHIC PRODUCTS

There are no manufacturing industries for developers and fixers. The products are imported from overseas. Thus, no hazardous waste is produced during manufacturing. The use of photographic chemicals is discussed in sector J2: Photographic laboratories.

F6: PRODUCTION OF PHARMACEUTICALS AND COSMETICS

PHARMACEUTICALS

The pharmaceutical manufacturers are mostly in Gauteng. There is an estimated 7% production contribution by the Western Cape market, of which the City of Cape Town forms a minor part.
Sectors: Pharmaceutical Industry

Hazardous Waste Types and Volumes

DWAF – BS: This study highlighted the generation of raw material waste and expired stock. The hazardous waste are thus:

- Raw material wastes ca. 195.00 tpa
- Expired scheduled products and packaging ca. 39.00 tpa

DEADP – SA: The manufacturing of pharmaceuticals is not a major industry in Cape Town. The laboratories linked to the factories generate most of the hazardous waste during research and quality control, namely:

- Spent solvent waste ca. 5.02 tpa
- Used oil ca. 16.80 tpa
- Bio-medical research waste ca. 84.00 tpa
- Caustic oil sludge ca. 864.00 tpa
- Aqueos effluent ca. 6367.10 tpa
- Expired scheduled products and packaging unknown volume

Disposal of Hazardous Waste and Facility used

DWAF – BS: The pharmaceutical waste is disposed of at the City's high hazard waste site as follows:

- Raw material waste : CTR at VWMF
- Expired scheduled products : LWT at VWMF

DEADP – SA: The hazardous waste is found to be managed as follows:

- Spent solvent waste : ENC or LFB at VWMF
- Used oil : RCY
- Bio-medical research waste : INC at VWMF
- Caustic oil sludge : LWT at VWMF
- Aqueos effluent : LWT at VWMF
- Expired scheduled products and packaging : LWT at VWMF

COSMETICS

Sectors: Cosmetic Manufacturers

Hazardous Waste Types and Volumes

DWAF – BS: The generation of solvents and non-solvent cosmetic and chemical sludges were found under the sector "other chemical formulations". Upon further investigation, the sector is mostly manufacturers of hair salon products. The listed hazardous waste type is:

- Non solvent solids and packaging ca. 21.00 tpa

DEADP – SA: Not addressed in the study

Disposal of Hazardous Waste and Facility used

DWAF – BS:

- Non solvent waste and packaging : LWT at VWMF

DEADP – SA: Not addressed in the study

F7: RUBBER AND PLASTIC MATERIALS

There are no rubber vulcanising companies within the City boundaries. There are however many re-treaders. There are no manufacturers of plastic raw materials in the City of Cape Town. The use of

recycled material as a by-product in the manufacturing of black plastic bags are done by various bag manufacturers. There is, however no hazardous waste generated.

PLASTICS

The production of polymer for plastic manufacturers is done by Sasol in Gauteng. There are however two synthetic fibre plants in the City.

Sector: Nylon spinners
Fibre producers

Hazardous Waste Types and Volumes

DWAF – BS: Not addressed in the study
DEADP – SA: The two synthetic fibre plants produce a variety of hazardous wastes, namely:

- Glycol sludge ca. 312.000 tpa
- Laboratory waste ca. 5.00 tpa
- Used machine oils ca. 7.50 tpa
- Floor washings ca. 92.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not addressed in the study
DEADP – SA: Disposal is as follows:

- Glycol sludge : LWT at VWMF
- Laboratory waste : ENC at VWMF
- Used machine oils : LWT at VWMF
- Floor washings : LWT at VWMF

RUBBER

No vulcanised rubber is manufactured in the City. However, old tyres disposed of on landfill are not hazardous but regarded as special waste.

Hazardous Waste Type and Volumes

DWAF – BS: Tyre converters use solvents during conversion and moulding of retreads. The hazardous waste and special wastes are as follows:

- Spent solvents ca. 14.00 tpa
- Old tyres volume unknown

DEADP – SA: The disposal of old tyres is problematic and the tyres are regarded as special waste.

- Old tyres ca. 10% of the total produced

Disposal of Hazardous and Special Waste and Facility used

DWAF – BS: The spent solvent is heavily contaminated and not worth recycling. Disposal is as follows:

- Spent solvents : LWT at VWMF

DEADP – SA: The old tyres were routed to the low hazard landfill at Vissershok operated by the City of Cape Town. Currently the tyres are allowed for disposal at all general waste sites in the City. Thus, :

- Old tyres : LWT at VWMF and General Landfill Sites

F8: EXPLOSIVES AND PROPELLANTS

10

There is one ammunition assembly plant at Swartklip. The activities of the unions of employees are occasionally in the news as there are a few court cases against the company for lack of safety standards as well as workman's compensation claims.

There are two factories outside the City boundaries producing hazardous waste which are disposed of within the City.

Sectors: Ammunition processing
Ammunition assembly
Explosive manufacturer
Explosive raw material manufacturer

Hazardous Waste Types and Volumes

DWAF – BS: Only match manufacturers were listed but not in the Western Cape.
DEADP – SA: Hazardous waste from the Swartklip plant arises from the incinerator on the premises after the thermal destruction of explosive waste. There is a small electro-planting plant operating on the premises. The hazardous waste types are:

- Incinerator ash ca. 50.00 tpa
- Plating effluent ca. 120.00 tpa

The two explosive manufacturing plants outside the City's boundaries produce the following hazardous waste for disposal within the City's boundaries at high hazardous waste disposal facilities. The wastes are:

- Ash from chemical fibres ca. 36.20 tpa
- Cotton waste (impregnated with flammables) ca. 23.00 tpa
- Dehydrated sludge ca. 60.00 tpa
- Used oil ca. 1.12 tpa
- Aluminium trihydrate and sulphuric sludge ca. 10.00 tpa
- Contaminated packaging ca. 0.30 tpa
- Paint sludge ca. 30.00 tpa
- Hardener waste ca. 0.20 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not relevant.
DEADP – SA: The hazardous waste produced at Swartklip plant are disposed of within the City boundaries as follows:

- Incinerator ash : LWT at VWMF
- Plating effluent :LFB at VWMF

The two explosive manufacturer's waste brought into the City boundaries are disposed of as follows:

- Ash from chemical fibres : LWT at VWMF
- Cotton waste (impregnated with flammables) : LWT at VWMF
- Dehydrated sludge : LWT at VWMF
- Used oil : LFB at VWMF
- Aluminium trihydrate and sulphuric sludge : NCR at VWMF
- Contaminated packaging : LWT at VWMF
- Paint sludge : LWT at VWMF
- Hardener waste : LWT at VWMF

F9: PRODUCTION OF BIOCIDES: PESTICIDES

Pesticides as a subsection of the broader range of biocides were indicated in the one reference study.
Sectors: Pesticide manufacturer

Hazardous Waste Types and Volumes

DWAF – BS: Two manufacturers were listed within the City which may still be operational. The one is an orchard supplier and the other a laboratory. The hazardous waste generated is:

- Pesticide raw material and product waste ca. 10.00 tpa

DEADP – SA: None listed

Disposal of Hazardous Waste and Facility used

DWAF – BS: The hazardous materials is disposed of as follows:

- Pesticide raw material and product waste : LWT at VWMF

DEADP – SA: Not addressed in the study.

F10: WASTEWATER AND WATER TREATMENT

The wastewater department (Trading Services) handles wastewater treatment for the City of Cape Town as a bulk service. There are a number of sewage treatment works operated by the City producing primary digested (aerobic) and anaerobic sludge as well as waste activated, raw primary, humus secondary biofilter sludge and sludge from a biodisc unit [ref 10-2].
Sectors: Wastewater treatment works
Sewage works

Hazardous Waste Types and Volumes

DWAF – BS: The CCT is not addressed as a single unit. The estimated annual waste water treated sludge for South Africa during 1992 was ca. 12 000 000 tpa.

DEADP – SA: The type and quality of the wastewater sludges are described in detail in this section of the study. The sludges from 75% of the works are high in boron, exceeding 80 mg/kg boron. High heavy metal concentrations occur in the works closest to the industries. Contamination of sludges with heavy metals such as nickel, zinc, lead and iron is probably due to untreated or poorly treated electroplating discharges into the sewer.

- The City of Cape Town currently produces ca 5 000 000 m^3 of sludge per annum. The sludge is dewatered to approximately 12% solids to ca 333 000 m^3 of sludge per annum[ref 10-6] (ca 130 000 tpa).

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not addressed in the study

DEADP – SA: This study indicates high total tonnages disposed of at the two hazardous waste landfill facilities within the City boundaries. The sludge to the landfills increased from 77 600.00 tpa during 2000 to 128 000.00 tpa during 2002. The quantity of sludges stored at the works are not known.

The disposal of Type D sludge to a general landfill, when de-listed is allowed at a rate of less than 8 tons per hectare per annum. The disposal of Type D sludge to landfill and alternative disposal rates is addressed in a paper by King and Kloppers [ref 10-6].

The land application of air-dried activated sludge is currently in practice outside Cape Town as an experiment to determine whether disposal onto agricultural lands will be preferable to disposal onto a landfill. Wheat sown on an area where the sludge was land-farmed has yielded better results than comparable growth alongside a control strip without the application of sludge. The future disposal of the bulk of the pre-dominantly waste activated sludges is still to be evaluated and decided on by the City of Cape Town [ref 10-6]. At present no sludge is being disposed of onto the City's general landfill sites.

WATER TREATMENT SLUDGE

There are ten water treatment plants supplying the water to the City of Cape Town of which six are within the City's borders.

Hazardous Waste Types and Volumes

DWAF – BS: Not addressed in the study

DEADP – SA: There are six works within the City boundaries, namely Atlantis, Brooklands (Simons Town), Blackheath, Kloofnek, Constantia Nek and Faure. Only the Faure Plant operates with iron based flocculant while the Atlantis plant uses ion exchange. The balance of the plants use aluminium based flocculants. The aluminium based flocculant plants produce a low hazard, low volume sludge. The Faure plant produces a sludge with manganese values of 700.00 – 2200.00 mg/kg dry sludge.

- Faure plant sludge: ca. 20 000.00 – 24 000.00 tpa

Disposal of Hazardous Waste and Facility Used

DWAF – BS: Not addressed in the study

DEADP – SA: The Faure treatment works sludge is disposed of at Swartklip landfill without treatment. The de-listing application for the sludge is currently taking place. On closure of Swartklip landfill, the sludge will in all probability be disposed of at Coastal Park Landfill. The aluminium based flocculant works produce low hazard sludges which are discharged to sewer, river (minor volumes) or the sea.

F11: LABORATORIES

All the hazardous waste types generated by research, analytic and quality control chemical laboratories are discussed under the specific industry for which the laboratory is

functioning. Medical and biomedical research laboratories are discussed in Section K: Medical, Sanitary and other Health Services.

G: METAL GOODS, ENGINEERING AND VEHICLE INDUSTRIES

This sector was not specifically addressed in the references consulted. The engineering and metal good production plants are incorporated under D3 and D4: Foundary, Metal Working Operations and Metal Finishing.

H: TEXTILE, LEATHER AND WOOD INDUSTRIES

H1: TEXTILE, CLOTHING AND FOOTWARE

According to Wesgro [ref 10-9] reports, the textile industry is the second most dominant manufacturer in the region. Ca. 80% of the clothes manufactured in the region is done in the City of Cape Town.

Sectors: Textile production
Silk
Wool articles
Man-made staple fibres
Carpets
Woven fabrics
Knitted fabrics

Hazardous Waste Types and Volumes

DWAF – BS: This study indicates that ca. 30% of the wool washing and scouring residues arise within the City of Cape Town in relation to the Western Cape as a region. The waste contains: 98.5% moisture, wool grease, oils and lead naphtenate.

- Wool scouring residue ca. 2066.70 tpa
- Wool washing waste ca. 1733.30 tpa

DEADP – SA: This sector was not investigated.

Disposal of Hazardous Waste and Facility used

DWAF – BS: The wool washing and scouring residues are pre-treated in an in-house effluent plant and disposed of at an on-site "dumping area".

DEADP - SA: This sector was not investigated.

H2: HIDE AND LEATHER INDUSTRY

The City of Cape Town has only one hide company and one tannery.

Sectors: Hide processing
Tanneries

Hazardous Waste Types and Volumes

DWAF – BS: The presence of scrapped hides is reported to have a risk rating due to the BOD value.

- Scrapped hides ca. 50.00 m^3 tpa

DEADP – SA: The hide curing plant produced mainly brine solutions while the tannery produced sodium sulphide (Na_2S) which is converted to sodium sulphate (Na_2SO_4). Stored sulphide was

occasionally disposed of on a hazardous waste landfill. There is also a Wellington based tannery outside the City borders, producing shavings and off cuts disposed of within the City. The waste types are:

- Brine solution ca. 360.00 tpa
- Sodium sulphate effluent unknown
- Solid sulphide waste unknown
- Organic solids (shavings and off-cuts) ca. 9550.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: The scrapped hides are disposed of on a municipal landfill.

- Scrapped hides : LWT at a General Landfill Sites

DEADP – SA: The disposal is as follows:

- Brine solution : LWT at VWMF
- Sodium sulphate effluent : To sewer
- Solid sulphide waste : LWT at VWMF
- Organic solids (shavings and off-cuts) : LWT at VWMF

H3: TIMBER, WOOD AND FURNITURE INDUSTRY

There are a small number of wood treatment industries and timber processing plants in Cape Town. Most of the wood and timber treatment and processing plants are in Eden district along the Southern Cape Coast.

Sectors: Wood treatment
Timber processing
Furniture manufacturing

Hazardous Waste Types and Volumes

DWAF – BS: The City of Cape Town has ca. 20% of the timber processing facilities in terms of the Western Cape. This industry uses chromated cypric arsenate (CCA) as the treatment chemicals. The waste types are:

- CCA waste ca. 5.00 tpa

DEADP – SA: Most of the Southern Cape timber industries bring their high hazard sludges and solids for disposal within the City boundaries. There is a small mass of wood treatment sludges generated in the City of Cape Town, namely:

- CCA sludge from Southern Cape ca. 9.00 tpa
- Timber waste sludges ca. 4.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS:

- CCA waste : LWT at VWMF

DEADP – SA:

- CCA sludges from Southern Cape : LWT at VWMF
- Timber waste sludges : LWT at VWMF

J: MANUFACTURING OF PAPER PRODUCTS, PRINTING AND PUBLISHING

J1: CARDBOARD AND PAPER INDUSTRY

There is a few industries producing cardboard and low grade paper. The big paper mills are not in the Western Cape.

Sectors: Cardboard Manufacturing
Paper and Cardboard Packaging

Hazardous Waste Types and Volumes

DWAF – BS: The main paper and cardboard producers in the Western Cape is in Cape Town, namely 85% of the industry. There were only two hazardous waste types identified, namely:

- Laboratory effluent containing potassium dichromate ($K_2Cr_20_7$) and Mercury Sulphate ($HgSO_4$) ca. 0.10 tpa
- Mineral oil waste ca. 55.00 tpa

DEADP – SA: There is one tissue paper manufacturer and various corrugated paper plants. The hazardous waste streams produced are as follows:

- Aqueous effluent sludge ca. 40.00 tpa
- Aqueous based inks ca. 36.00 tpa
- Spent white spirits ca. 3.36 tpa
- Rags, inks and solvents ca. 1.70 tpa
- Calcium carbonate sludge ca. 60.00 tpa
- Fluorescent tubes ca. 0.20 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: The hazardous waste is disposed of as follows:

- Laboratory effluents : LWT at VWMF
- Mineral oil wastes : LWT at VWMF

DEADP – SA: The hazardous waste types are disposed of as follows:

- Aqueous effluent sludge : LWT at VWMF
- Aqueous based inks : LWT at VWMF
- Spent white spirits : LFB at VWMF
- Rags, inks and solvents : LFB at VWMF
- Calcium carbonate sludge : LWT at VWMF
- Fluorescent tubes : CTR at VWMF

J2: PRINTING, PUBLISHING AND PHOTOGRAPHIC LABORATORIES

PRINTING AND PUBLISHING

The printing and publishing industry in Cape Town is extensive.

Sectors: Publishing
Printing

Hazardous Waste Volume and Disposal

DWAF – BS: This study found mostly spent solvents and developers arising as hazardous waste. The types and volumes are:

- Spent solvents ca. 218.00 tpa
- Developers ca. 250.00 tpa

DEADP –SA: Except for Paarl Post, most of the printing houses are within the City of Cape Town. Printing equipment is cleaned with white spirits when printing in oil-based inks while water is used as cleaning material for water based inks. The cleaning effluents are pre-treated. The hazardous types are:

- Inks, glue and solvent sludges ca. 704.00 tpa
- Perchloro ethylene waste ca. 5.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: The hazardous waste are managed as follows:

- Spent solvents : LFB at VWMF
- Developers : Discharge to sewer

DEADP – SA: The hazardous waste are disposed of as below:

- Inks, glue and solvent sludges : LWT at VWMF
- Perchloro ethylene waste : RCY

PHOTOGRAPHIC

The photographic industry is vast and the number of development laboratories are in the hundreds. Most suburbs have a variety of compact speed-service photo developers in the shopping complexes.

Sectors: Photographic Development

Hazardous Waste Types and Volumes

DWAF – BS: The developers were found to be producing developers and processing chemicals.

- Developing solution wastes ca. 250.00 tpa

DEADP – SA: This study found that all the development fluids and fixers are imported by major franchise holders. The hazardous waste type is a mixture of spent solutions containing developer, fixer, bleach and perchloro ethylene.

- Developer effluent waste ca. 1 100.00 tpa

Disposal of Hazardous Waste and Facility used

DWAF – BS: This study found that the photographic developers in general flush the hazardous waste down the sewer.

DEADP - SA: This study is done ca. 5 years later than the DWAF – BS study and indicates a welcome change in the responsible management of the waste developers. The management of the hazardous waste is thus:

- Developing solution wastes : RCY

K: MEDICAL, SANITARY AND OTHER HEALTH SERVICES

K1: HEALTH, HOSPITALS, MEDICAL CENTRES AND LABORATORIES

This industry produces some of the most hazardous and infectious wastes from a variety of source generators. The management of the hazardous waste varies from sophisticated pre-disposal methods

to sewer discharge. The information obtained for this industry represents at least 90 – 95% of the generators, and can be considered as a reflection of good approximation of what is generated in the City of Cape Town.

Sectors: State hospitals
Medi-Clinics
Day Clinics
Dentists
Tattooists
Phychiatric Institutions
Old Age Homes

Hazardous Waste Types and Volumes

DWAF – BS: This report deals with the Western Cape Province as a whole. The standard hazardous waste generation, including a component of general waste is defined as 1.95 kg per bed per day in hospitals with a bed occupancy of 70 – 80%. No reliable figures were received from the contractors handling the medical waste.
DEADP – SA: In Chapter 11 of this report, the estimated percentage health care waste regarded as hazardous with a potential to create health risks is only ten to twenty five percent (10 – 25%) of the total health care waste produced.

This industry creates a variety of wastes such as sharps, infectious waste, pharmaceutical waste, heavy metals and laboratory waste. A brief and estimated summary of the hazardous wastes generated are given below:

- Clinics and Hopitals

Sharps	ca. 93.54 tpa
Infectious	ca. 831.78 tpa
Pharmaceutical waste	ca. 7.50 tpa
Anatomical waste	ca. 22.60 tpa
Fixer remains	ca. 11.70 tpa
Gluteraldehyde Sterilizing chemicals	unknown volume
Cytotoxic chemicals	unknown volume

- Old Age Homes
  No indication of mass and types
- Sanitary Waste
  No accurate indication of mass and types

The total health care waste deactivated and incinerated by the private sector in the City of Cape Town is ca. 307.00 tpa. The balance of ca. 650.00 tpa is taken to be incinerated by Provincial incinerators.

Disposal of Hazardous Waste and Facility used

DWAF – BS: Not addressed in the study.
DEADP – SA: The disposal of the health care wastes vary from drain discharge of photographic developers and other chemical solutions to incineration of cytotoxics.

The disposal by the various health care facilities was used to provide a full scenario. The information received by the generators are not always reliable, therefore disposal methods are supplied for the estimated disposal for most of the health care waste in the City.

The disposal methods are:

- In-house disposal at provincial incinerators
- Electrothermal Deactivation H:H facility
- Two incineration H:H facility
- Fixer: RCY or drain discharge

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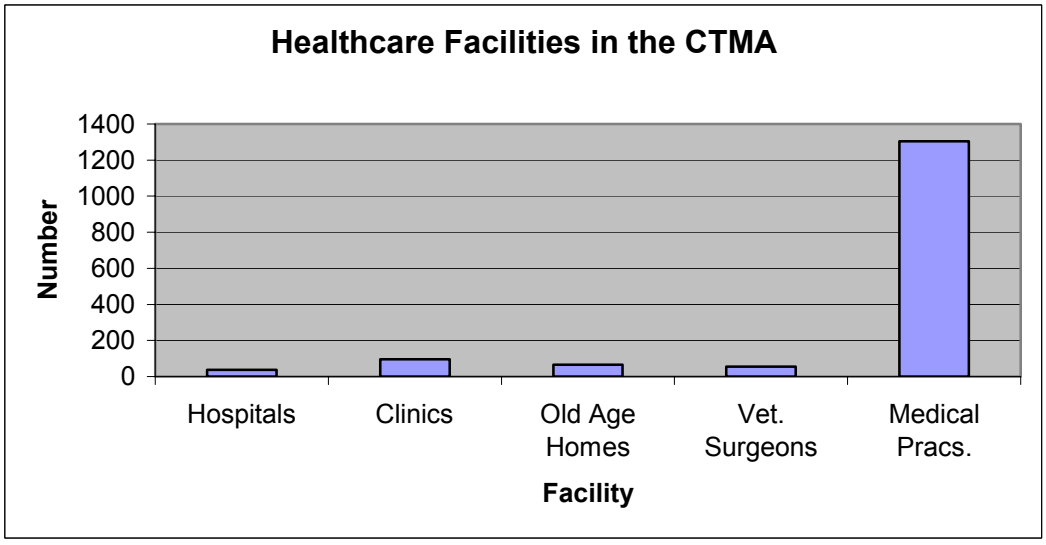
Table A-1 Healthcare Facilities in the CTMA (ref 10-4)

Facility	Number
Hospitals	**37**
Clinics	**96**
Old Age Homes	**66**
Vet. Surgeons	**55**
Medical Pracs.	**1305**
TOTAL	**1559**



FigureA-1 Healthcare Facilities in the CTMA (ref 10-2)

K2: VETERINARY SERVICES

None of the studies address this specific sector.

L: COMMERCIAL AND PERSONAL SERVICES

Not addressed in any of the study references.

The existing waste generation points and services provided by the Metropole are shown in Table A-1 and Figure A-1 above.

Appendix B

Table B: Estimated Hazardous Production in the City of Cape Town

Key	Industry	DWAF - BS (ref 10-3)		DEADP - SA (ref 10-2)	
		Type	Approximate Mass in tonnes per annum	Type	Approximate Mass in tonnes per annum
A	Agriculture, Forestry and Food				
A1	Agriculture	NA	NA	NA	NA
	Forestry	NA	NA	NA	NA
	Fisheries	Asbestos lagging	6.00 tpa	NA	NA
		Off spec products	0.05 tpa		
		Fluorescent tubes	0.20 tpa		
		Laboratory chemical	288.00 tpa		
		Process rinse water	unknown		
A2	Animal Products	Laboratory chemical	2.06 tpa	NA	NA
		Off spec food	144.00		
	Vegetable Products	Liquid food rests	17000.00	Nickel catalyst	3000.00
				Spent solvents	3005.00
				Off-spec products	Unknown
				Laboratory chemicals	7.46
				Process rinse water	Unknown
A3	Drinks Industry	Fermentation waste	Ca. 1300.00	Laboratory chemicals	0.52
				Caustic effluent	30.00
A4	Animal Feed	NA		Laboratory chemicals	2.00
				Chemical effluents	5.00
A	SUBTOTAL		18 740.31		6049.98

10

Key	Industry	DWAF - BS (ref 10-3)		DEADP - SA (ref 10-2)	
		Type	Approximate Mass in tonnes per annum	Type	Approximate Mass in tonnes per annum
B	Mineral Extraction and Upgrading				
B1	Mining & Quarrying: Non Metallic Mineral	NA		Oil rags	24.00
				Reclaimed used oil	1.20
B2	Mining & Quarrying: Metallic Minerals	NA		NA	
B	SUBTOTAL		NA		25.20
C	Energy				
C1	Coal Industry	NA		NA	
C2	Petroleum and Gas Industry	Crude tank sludge	30.00	Oil sludge	970.00
		Diesel tank sludge	20.00	Amine waste	420.00
		Petrol tank sludge	20.00	Caustic sludge	300.00
		Bitumen	1000.00	Catalyst waste	265.00
		Catalyst	20 000.00		
C3	Electricity			Low level RAD waste	126.00
				Low & interim RAD waste (C1,C2,C4)	2.00
				Intermedia-te & high RAD waste (C_2F)	0.50
				High level RAD waste	0.02
				Spent solvents	0.17
				Used oils	0.50
				Fluorescent tubes	0.50
				PCB storage	unknown
C	SUBTOTAL		21 070.00		2084.69

Key	Industry	DWAF - BS (ref 10-3)		DEADP - SA (ref 10-2)	
		Type	Approximate Mass in tonnes per annum	Type	Approximate Mass in tonnes per annum
D	Metal Manufacturing				
D1	Ferrous Metallurgy	NA		Refer to D3	
D2	Non Ferrous Metallurgy	NA		Nil	
D3	Foundary and Metal working operations	Refractory waste	500.00	Nil	
		Laboratory waste	1.00		
		Transformer oil	1.00		
		Cleaning solvent	1.00		
		Alcenul waste	5.00		
		Oil sludge	6.00		
D4	Metal Finishing and Electroplating	Inorganic sludges	5.40	Pre-treated tank bottoms	390.00
		Caustic waste	2007.00	Oil & metal dust	29.00
		Waste mineral oils	1833.00	Sand and grit	10.00
		Non halogenic solvents	930.00	Spent acids	130.00
		Halogenic	310.00		
D	SUBTOTAL		5599.40		559.00
E	Manufacturing of Non Metal Mineral Products				
E1	Construction, Ceramic, Glass	NA		NA	
E2	Salt recovery	NA		NA	
E3	Asbestos Good	Asbestos cement / lagging	50.00	Asbestos cement / lagging	730.00
E4	Abrasive Products	NA		NA	
E	SUBTOTAL		50.00		730.00
F	Chemicals and related industries				
F1	Petrochemicals	NA		NA	

Key	Industry	DWAF - BS (ref 10-3)		DEADP - SA (ref 10-2)	
		Type	Approximate Mass in tonnes per annum	Type	Approximate Mass in tonnes per annum
F2	Primary Chemicals, Feedstock	NA		NA	
F3	Fine Chemicals	NA		Asbestos waste	300.00
F4	Inks, varnish, paint and glue	Benzene and toluene waste	120.00	Spent solvents	Unknown
		Non-solvent paint waste	510.00	Spent solvent waste	20.00
F5	Production of photographic products	NA		Nil	
F6	Production of pharmaceuticals and cosmetics	Raw materials	195.00	Spent solvent waste	5.02
		Expired scheduled		Used oil	16.80
		Products and packaging	39.00	Bio-medical waste	84.00
		Non-solvent based solids	21.00	Caustic oil sludge	864.00
				Aqeous effluent	6367.10
				Expired product	unknown
F7	Rubber and plastics	Spent solvents	14.00	Glycol sludge	312.00
		Old tyres	Unknown	Laboratory waste	5.00
				Used machine oil	7.50
				Floor washings	92.00
				Old tyres	Unknown
F8	Explosive and propellants	NA		Incinerator ash	50.00
				Plating effluent	120.00
F9	Production of Biocides	Pesticide wastes	10.00	Nil	

Key	Industry	DWAF - BS (ref 10-3)		DEADP - SA (ref 10-2)	
		Type	Approximate Mass in tonnes per annum	Type	Approximate Mass in tonnes per annum
F10	Waste and Water Treatment	NA		Waste water sludge	130 000.00
				Water treatment sludge	24 000.00
F11	Laboratories	NA		Various individual sectors	
F	SUBTOTAL		909.00		162 416.42
G	Metal goods engineering and vehicle industries	NA		NA	
G	SUBTOTAL	NA		NA	
H	Textile, leather and wood				
H1	Textile	Wool scouring residue	2066.70	NA	
		Wool washing waste	1733.30		
H2	Hide & leather	Scrapped hides	50.00	Brine solution	360.00
				Sodium sulphate effluent	Unknown
				Solid sulphide waste	Unknown
H3	Timber	CCA waste	5.00	CCA sludges	9.00
				Timber sludges	4.00
H	SUBTOTAL		3855.00		373.00
J	Paper products, printing and publishing				
J1	Cardboard & paper	Laboratory effluent	0.10	Aqeous effluent sludge	40.00

Key	Industry	DWAF - BS (ref 10-3)		DEADP - SA (ref 10-2)	
		Type	Approximate Mass in tonnes per annum	Type	Approximate Mass in tonnes per annum
		Mineral oil waste	55.00	Spent white spirits	3.36
				Aqeous based inks	36.00
				Rags, inks, solvents	1.70
				Calcium/ Carbonate sludge	60.00
				Fluoresc-ent tubes	0.20
J2	Printing, publishing, photographic labs	Spent solvents	218.00	Inks, glue solvents	704.00
		Developers	250.00	Perchloroethylene waste	5.00
				Developer effluent	1100.00
J	SUBTOTAL		523.10		1950.26
K	Medical, sanitary and other health services				
K1	Health, hospitals, centres and labs	NA		Sharps	93.54
				Infectious waste	831.78
				Pharma-ceutical waste	7.50
				Anatomical waste	22.60
				Fixer	11.70
				Gluteraldehyde waste	Unknown
				Cytotoxic waste	Unknown
K2	Veterinary Services	NA		NA	
K	SUBTOTAL	NA			967.12

Key	Industry	DWAF - BS (ref 10-3)		DEADP - SA (ref 10-2)	
		Type	Approximate Mass in tonnes per annum	Type	Approximate Mass in tonnes per annum
L	Commercial and personal services	NA		NA	
L	SUBTOTAL	NA		NA	
	GRAND TOTAL		50 746.81		175 154.99

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10-9.21 Wesgro Clothing Sector Fact Sheet (Sep 2002).

10-9.22 Wesgro Cape Sector Fact Sheet. The Furniture Industry. Reprint 03/00

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Chapter 11 – Waste Information System

Chapter 11 describes the need for a Waste Information System (WIS) and the alternative options for implementation.

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11.1 INTRODUCTION

The National Integrated Waste Management Bill requires that municipalities collect data for the national waste information system. Local government, through DEADP, is at an advanced stage in developing a waste information system (WIS) into which the City of Cape Town and indeed all other municipalities of the Western Cape, will be required to submit information on an annual basis.

At present the Waste Department of the City of Cape Town has no comprehensive database or overlying integrated management information system in place to produce reliable data and management information. Decisions and policies in the past have often been made without being guided and informed by a proper knowledge-based system.

It is against the background described above that the Waste Department has decided to proceed with the acquisition of a WIS that best meets its future planning and management requirements and to promote review of the effectiveness of the new strategies flowing out of the IWMP. The acquisition of the WIS will be undertaken through a separate procurement process. In terms of the requirements of the Project Team contracted to assist the City in developing its IWMP, is to assist in preparing the Terms of Reference for the WIS procurement.

The WIS is to include weighbridge software and should ideally interface with the City's new SAP information and business solution (which has the facility to include a waste module).

The elements of the WIS considered to be necessary for the City's requirements include the following:

- The system must serve as an effective design, operating, planning and financial management tool for the Waste Department.
- The system must be able to be easily interrogated and should provide meaningful management information of such a value to enable effective decision-making.
- The system must interface effectively with the City's SAP information and business solution.
- The system must be able to effectively provide the data required by DEADP for the maintenance of their Provincial and National WIS systems.
- Development of the WIS software must ensure that all the data and information required by the Waste Department can be easily accessed and output in a format that suits the current systems used by the management staff.
- Data verification and quality control systems are to be incorporated.
- The system must be able to accept weighbridge data and perform the required analyses, include a GIS component, optimise collection beats, include staff information, details of plant, depots and waste departments facilities, and record existing information required for the management of waste reduction, collection and disposal.
- The system must be designed to report on the progress and effectiveness of the strategies adopted in terms of the IWMP.

- The system could be linked to a Quality Management System. The Waste Department may consider following the lead taken by the City's Water Department in seeking accreditation to an internationally recognised Quality Management System such as ISO 9001:2000.

11.2 STATUS QUO

The Waste Department does not possess its own integrated WIS. However, a number of software programmes and spreadsheets have been developed and are used by the management staff. Work that has been done by the Waste Department includes the following:

- Extensive GIS development
- Interfacing with the SAP system with respect to property identification, zoning, physical addresses, billing, types of services provided, logging of complaints.

These programmes/systems could be useful for linking and incorporating into the proposed WIS.

11.3 GAP ANALYSIS

The following options for developing the City's WIS have been identified:

a. Installing the SAP waste module system, which may require modification to suit the specific reporting requirements of the City.
b. Installing a locally or internationally developed commercial WIS software system.
c. Interacting with other local authorities who have installed a similar system (Pikitup for example has, through aid from DANCED, recently installed a WIS system).
d. Developing a "tailor-made" system incorporating existing software currently being used by the waste department.

11.4 RECOMMENDATIONS

It is recommended that the Project Team initially hold a round of meetings with designated City Council officials and representatives of the SAP system during the "Assessment" stage of the IWMP process to determine the way forward.

Chapter 12 – Waste Monitoring & Auditing

This Chapter provides a summary of the existing Waste Monitoring and Auditing Systems in place.

12.1 Existing Monitoring Systems

The existing monitoring systems within the City of Cape Town pertaining to hazardous waste management are classified broadly into three different groups.

12.1.1 Monitoring by CoCT Waste Management Facilities

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The monitoring systems used by the Waste Management Department are governed by the following legal requirements and other guidelines, namely:

- Section 20 (1) Operations or Operations-to-Closure Permits in terms of the Environment Conservation Act, 1989 (Act 73 of 1989)
- Record of Decision in terms of Section 21, 22 and 26 as well as listed activity (No 8) ito the EIA regulations promulgated ito the Environment Conservation Act, 1989 (Act 73 of 1989)
- Amendments by DWAF to the Section 20 (1) Permit in terms of the Environmental Conservation Act, 1989 (Act 73 of 1989)
- Status Quo Reporting in the quarterly external audit by Naude Associates
- In-house standards
- Special projects such as the Hg air disposal study requested by the Morningside Residents Monitoring Committee
- Other studies or guidelines may occur from time to time

The landfills and transfer stations operated by the City is monitored for the following:

- waste types
- waste volumes / mass
- groundwater quality and management (except for ARTS)
- groundwater trends
- leachate quality and management
- surface water quality and management
- biogass monitoring
- air analysis (if required)
- health of workers
- reporting of incidents, annual figures to DWAF
- continuation of first aid training and stock
- continuation of fire register upkeep
- stock and usage of personal protective clothing
- management of contactor employing salvage workers
- other compliance requirements in the said Permit and ROD
- construction and engineering operations in the DWAF approved permit
- monitoring of FFS audit compliances by the ROSE Foundation
- other parameters when required

The frequency of the monitoring of each parameter varies according to the status of the facility and/or the said Permit Requirements. However, groundwater, leachate and biogas monitoring are briefly discussed for clarity:

Ground Water Monitoring: General, large landfills with surplus precipitation generally required a full borehole analysis biannually in January and July. This requirement is also applicable to the transfer stations and the hazardous waste landfill. This bi-annual analysis during the dry and wet season is referred to as Background Monitoring. The analytical results of the background monitoring over a period of time is used to prepare a trend analysis. If the trend indicates a deviation and/or if abnormalities are observed in the analysis, Detection Monitoring is required by DWAF. This type of monitoring is done quarterly. If results are still a concern, Investigative Monitoring may be required by DWAF on a monthly basis.

The Brackenfell landfill has a special permit condition requiring annual analysis of specific groundwater indicators such as alkalinity, potassium and chloride, over and above the background monitoring on biannually in July and January.

Leachate Quality Monitoring: Varies from daily readings at the Vissershok leachate treatment plant to bi-annual readings at Brackenfell landfill.

Biogas Monitoring: Biogas Monitoring is done monthly on the landfills and in the offices. When biogas readings are above the norm specified in the Permit or Minimum Requirement, weekly or daily readings may be required.

12.1.2 Private Waste Contractors

The Vissershok Waste Management Facility jointly operated by Enviroserv and Wasteman is monitored for the same general parameters as the City of Cape Town, namely:

- waste types
- waste volumes and mass
- ground water quality and management
- ground water trends
- leachate quality and management
- surface water quality and management
- biogas management
- air analysis (if required)
- health of workers
- reporting of incidents, etc

The above facility also operates a health care waste incinerator which is monitored in terms of:

- gaseous emissions (pier review, refer to Section 12.2.1)
- radioactive levels of the ash is monitored twice a year by the Department of Radiation (re Mr C Mitchell, Manager at VWMF)

12.1.3 Industry

Industry has a variation of production sectors and a variation in the commitment of their role players to the environment.

Key industries such as Caltex Refinery monitors the stack emissions, hazardous waste generation and disposal mass, deep sea discharge impacts, etc.

The Cape Metal Fishing Association has a number of committed electroplating industries which used DANSET evaluations and funding together with industry's own initiatives to monitor their hazardous waste generation. The monitoring results were used to improve their operations and reduce hazardous waste by participation in waste minimisation and waste exchange initiatives.

Fuel Firing Systems and various other petro-chemical recyclers make use of the ROSE Foundation for monitoring and auditing.

12.2 Existing Auditing Management

Auditing of hazardous waste management facilities are done due to two primary driving forces, namely:

- Compliance Permit and ROD compliance requirements in terms of Section 20 (1) and 28 of the Environment Conservation Act, 1989 (Act 73 of 1989)
- Commitment by certain companies pursue of environmental excellence stipulated in terms of their in-house standards and Environmental Management Plans.

The most frequent reason for auditing is the said Compliance Operating Permit and ROD requirements. However, there are companies generating hazardous waste and/or hazardous waste contractors who are environmentally responsible and operate within the ISO 14001 status. The ISO 14001 systems pursue sustainable environmental management.

The existing audits vary in format, protocol, frequency and type. A few of the most often used audit evaluations are listed below:

- External compliance audit (Permit and ROD)
- Internal management audit (Operations)
- ISO 14001 evaluation audit
- Environmental audits (ROD and other environmental requirements)
- Contractor's environmental audits as required by CoCT construction tenders.

The types of audits frequently used by the major hazardous waste disposal companies are discussed below. The audits used by industry vary significantly and are not addressed in this report.

12.2.1 Audits by CoCT Waste Management Facilities

- Internal Audits: In-house audits are done on a monthly basis by the hazardous waste facility and/or site manager. The findings of the internal audits are discussed in the monthly internal management meetings. Copies of the monthly audits are supplied to the external compliance auditor.

- External Audits: Compliance and Status Quo Audits. The general large landfills and hazardous landfill are audited as stipulated in their DWAF permits in terms of Section 20(1) of the Environmental Conservation Act, 1989 (Act 73 of 1989). External audits are generally required on an annual basis for large general sites and transfer stations as well as twice yearly for the low hazard facility. The external compliance audit cycle is quarterly for the City. The status quo section of the audit addresses issues of importance which are not necessarily specified in the permit conditions and/or expand on permit conditions. The quarterly external audits are submitted to the client within 30 days and forwarded to DWAF by the client as soon as possible.

- DWAF Audits: In terms of the said permits, DWAF retains the right to audit at will. This right has not yet been exercised.

12.2.2 Private Hazardous Waste Facilities

The VWMF operated by Enviroserv and Waste Man are externally audited every six months in terms of an in-house protocol. The frequency of the external compliance audits required by DWAF is once a year. An external Specialist whose report is submitted timeously to DWAF evaluates the external audit.

The Health Care Waste Facilities in Cape Town are mainly permitted to operate in terms of Section 20 (1) of the Environment Conservation Act, 1989 (Act 73 of 1989) as well as the Air Pollution Prevention Act, 1965 (Act 45 of 1965).

The auditing status of the facilities is as follows:

- DISPOSETECH operated by Enviroserv: There is an annual pier review arranged/requested by the Department of Air Pollution Control. This is a recent development.
- OTHER HEALTH CARE INCINERATORS AND STERLISING UNIT: No major audits were identified or mentioned during the data capturing period of the DEADP – SA Study (Ref 5-4).
- FFS: An annual environmental audit is commissioned by the ROSE Foundation to ensure the oil processing sites in terms of their physical state and process operations.

12.3 Gap Analysis

12.3.1(i) Introduction

The CTMA is very committed to the environmental monitoring and auditing of their own hazardous waste facilities. The DWAF permit for operation of VCoCT requires annual compliance monitoring. The CTMA has an external auditor doing quarterly compliance and ROD audits, where applicable. The private hazardous waste management facilities are audited by appointed external auditors, as required. However, there are various private and public health care waste facilities which are probably not audited or their performance evaluated.

12.3.1(ii) Gap Analysis

There are a few gaps which were highlighted in the preparation of the Status Quo report, namely:

1. There is not always a functioning Resident Monitoring Committee for each relevant hazardous waste facility.

2. There is a lack of groundwater monitoring at certain facilities such as Bellville South Landfill and a lack of air quality monitoring at the Vissershok Complex.

3. There is often a breakdown in information between Scientific Services and Cleansing regarding hazardous waste sample analyses, disposal permission and actual waste disposed. The process is not effective.

4. There is no monitoring of occupational health complaints / reported cases. Refer to No. 6 in gap analysis.

12.3.1 (iii) Need Analysis

1. External auditors may require Environmental registration.

2. There is a need to develop a "close loop-system" with effective communication between Scientific Services and Cleansing regarding hazardous waste disposal enquiries and the execution thereof.

3. There is a need for public liaison and public education regarding the standards of CTMA management.

4. There is a need to monitor all hazardous waste management issues in the CTMA.

References

12-1. Compliance Audit and Status Quo Reports for the City of Cape Town by Naude Associates.

Ref CMC –01-03, DATED January 2003
Ref CMC –02-03, DATED May 2003
Ref CCT –03-03, DATED November 2003

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Chapter 13 – Waste Education and Special Projects

This Chapter examines the role of learning and education within the CTMA and provides a summary of special waste educational projects and stakeholders in the City of Cape Town.

13.1 Introduction

This chapter highlights the importance of education and learning with respect to solid waste management and illustrates the power of education to shift perceptions towards litter and dumping and develop capacity to "reduce, reuse and recycle" waste in our daily lives.

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The major projects related to waste education within the CCT are described but it is beyond the scope of this chapter to list many smaller, independent education initiatives organised by civic groups, NGO's, CBO's, industries and schools.

Extracts from relevant texts are referenced for further reading, in particular the CCT's Environmental Education Strategy. This has been done in order to demonstrate that waste education must be co-ordinated with the efforts of the Environmental Education Strategy.

Terms and Definitions

Education is not confined to the classroom and not aimed at children only; despite the formal ring to the term 'education'; it has life-long relevance to people from all walks of life. It is also increasingly recognised that environmental education is not merely a 'nice-to-have' or a peripheral activity, but rather an integral part of the socio-economic development processes so necessary to ensure equality and a better quality of life for all. This recognition is closely associated with the fact that environmental education cannot deal with 'green' issues or the biophysical environment in isolation from the social, economic and political aspects of environmental matters [(ref 13-3)].

Learning. The use of the term learning, in contrast, for example, to words such as schooling or education is deliberate. It is meant to convey that learning occurs when and wherever people encounter experience and engage in its reception, interpretation, transformation, and communication (http://www.adbi.org/bookinprogress/biptxt.htm).

Communication is a more limited endeavour, with a specific task of getting specific information or ideas across to people, seen here not as 'learners' but as 'target audiences'. While a communication campaign about environmental issues and actions can be a valuable start to or component of education and training, the processes should not be conflated or confused. Communications is generally more a one-way process, than interactive. It is not open-ended, as it aims to change a limited set of behaviours in defined ways. Information (e.g. a pamphlet on water shortages) and messages (e.g. a "Don't Litter" poster) can raise awareness and can be used for educational processes, but cannot on their own achieve the required educational outcomes. Corporate communications about what an organisation is doing in relation to environmental matters, has even more limited educational value, although it has considerable public relations value [(ref 13-3)].

Training is a particular form of education, aimed at developing specific skills, in relation to specific tasks that are often job-related. Examples are the skills to operate a front-end loader, or implement an environmental management system in an office or in a nature reserve. The National Skills Development Act supports the view that skills should also be informed by **an understanding of the reasons behind tasks**. Workers need to understand

why they are required to recycle paper or protect fynbos. For this reason, training overlaps with other educational processes, and environmental consciousness and commitment are important outcomes of environmental training, along with practical know-how (ref 13 -3).

Marketing in the form of promoting environmental projects or achievements is a useful strategy to obtain public support and funding. Environmental education initiatives provide excellent promotional opportunities. However, **corporate promotional communications** and **education** are two different activities with and should not be conflated. **The intended outcomes differ**: marketing aims to promote an organisation and its environmental work; education aims to develop better capacity to address environmental issues. In terms of methods, promotional strategies (e.g. an unmanned display at an Expo or a brochure with little substantial information) are mostly one-way communications without opportunities for interaction and capacity-building (ref 13- 3).

13.2 The role of education and learning in an IWMP

13.2.1 Motivation - General

In terms of human resource efficiency statistics from the Green Grassroots Network (ref 13-12) humans produce, on average, 71 tons of waste for every one ton of finished consumer goods.

The Waste Wise CD Rom provides an audio experience of "The Natural Step" - an international sustainability framework that further expands on the impact of human waste on a global scale.

> "When we throw a product away it represents more than just a piece of waste, it also embodies all resources used to produce it. If you add them all, the real weight of a toothbrush becomes 1.5kg and that of a cell phone becomes 75kg"
> Margot Wallstroem EU Environment Commissioner

Consequences for Cape Town?
Costs to clean up litter and dumping stand at approximately R150 million per annum. It has been shown through past experience that clean ups on their own without education are expensive and ineffective.

Further information of the effects of poorly managed waste can be found on the Waste Wise CD Rom and in www.wastewise.org.za.

How can education (learning) assist? The transformative power of education and learning is described from the Learning Architecture Concept (http://www.adbi.org/bookinprogress/biptxt.htm):

The consequences of poorly managed waste were rated as the top environmental concern for residents in the CCT (see SOER 2002), thus providing the perfect raw materials to motivate learning and problem solving.

13.2.2 Motivation – Legal Requirements

The following excerpt is taken from the Environmental Education & Training (EET) Strategy 2003 (ref 13-3):

"The Environmental Education & Training Strategy is premised on the understanding that

- a number of national policies and legal frameworks mandate and/or require the City to undertake environmental education & training
- institutional policies require an environmental education strategy and the application of environmental education as tool in various sectoral strategies
- environmental education & training complements and supports various core local government functions.

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INTERNATIONAL GUIDELINES

Local Agenda 21 (ref 13-26)

The South African government supports Agenda 21, adopted at the 1992 United Nations Conference on Environment and Development. Agenda 21, Chapter 23 (p.2), states that "Education is critical for sustainable development and increasing the capacity of people to address environment and development issues".

NATIONAL DIRECTIVES & LEGAL REQUIREMENTS

Reconstruction and Development Programme (RDP, 1994) (ref 13-22)

An early indication that the current government would consider environment and environmental education as vital concerns was the RDP, which advocated "programmes to rekindle our people's love of land, to increase environmental consciousness amongst our youth, to co-ordinate **environmental education policy at all levels**, and to empower communities to act on environmental issues and to promote an environmental ethic" (p.40, emphasis added).

SA Constitution (1996) (ref 13-7)

The South African Constitution, within its Bill of Rights (p.10), provides all citizens with the rights (a) "To an environment that is not harmful to their health or well being, and (b) To have the environment protected for the benefit of present and future generations, through reasonable **legislative and other measures**" (emphasis added).

National Environmental Management Act (NEMA, No 107 of 1998) (ref 13- 18)

NEMA provides the country with principles of environmental management, several of which emphasise the role of public participation, and the role of environmental education in making such participation possible. For example:

- "The participation of all interested and affected parties in environmental governance must be promoted, and all *people must have the opportunity to develop understanding, skills and capacity* necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured (4f)".
- "Community well being and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means (4h)".

NEMA notes that the "effectiveness of governance structures is influenced by the capacity of civil society to work together with government" (DEA&T, 1999:115). This point is reflected in IMEP's vision for a local public able to take collective responsibility for the environment, and indicates the need for capacity-building.

King Report on Corporate Governance (Institute of Directors, 2002) (ref 13- 13)

This document, supported by the City Manager, sets benchmarks for corporations. These are particularly important in organisations comparing themselves with international best practice. The King Report calls for transparency and accountability in the 'triple bottom-line' of economic, social and environmental responsibilities, and for companies to take responsibility for the internal management of associated risks. The environmental risk audit currently applied on a limited basis in the CCT, directly and indirectly ascertains whether environmentally trained staff are in place, and whether adequate training provisions have been made.

National Skills Development Act (1998) (ref 13-20)

The Act and associated National Skills Levy bears a strong message from National government for employers to invest in the training of employees.

White Paper on Education and Training (1995) (ref 13-9)

The 1995 *White Paper on Education and Training* states that "environmental education, involving an interdisciplinary, integrated and active approach to learning, must be a vital element of **all levels and programmes of the education and training system**, in order to create environmentally literate and active citizens and ensure that all South Africans, present and future, enjoy a decent quality of life through the sustainable use of resources" (p.18).

The White Paper advocates environmental education and training **at all levels**. This would include the local government sphere, particularly when it comes to the environmental education & training of government officials and workers. The education of the youth is the responsibility of national and provincial government. However, the Constitution does state that where the capacity exists, functions can be delegated to local government, and that the spheres of government, while distinctive, are interdependent and interrelated. Local government should support the other spheres of government (such as the national Department of Education, DoE) in areas of its own focus, such as environmental management and sustainable development.

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Curriculum 2005 (ref 13-8)

Curriculum 2005 is the curriculum framework for the General Education and Training band of schooling. Among its key features is learning that produces meaningful **outcomes** and is **relevant** to learners' lives. One implication is that, while the required **outcomes** are determined nationally, the **content** of what is taught must relate strongly to the local context. These principles also inform the Department of Education's (DoE's) National Environmental Education Programme (NEEP) which is implemented in the Western Cape by the provincial Education Department (WCED). These principles (and the NEEP) give the CCT a valuable opportunity to provide the WCED with information on the local environment and environmental management needs and practices.

National Integrated Waste Management Bill (Draft 8.0, June 2002) (ref 13- 19)

The Bill requires Municipalities to implement waste public awareness campaigns focusing on education and the role of civil society eliminating, minimizing and managing, waste and pollution. The Municipalities are therefore required to compile Waste Management Plans, which must follow the waste hierarchy. Waste education strategies must be compiled stipulated by DEAT's NWMS action plans following avoidance and waste reduction above reuse, recycle, treatment and disposal (in that order) to the industrial, commercial sectors and communities.

Waste Management Strategies and Action Plans (Version B, September 1999)(ref 13-30)

Version B of this document refers to "The Capacity Building, Education, Awareness and Communication Action Plan". This focuses on the following objectives:

- The development and implementation of ongoing **capacity building programmes** for the national, provincial and local government departments that are directly involved in implementing the NWMS.
- The development and implementation of ongoing **education, awareness and communication programmes** for other government departments, the private sector and members of civil society who contribute to the implementation and success of the NWMS.

INSTITUTIONAL POLICIES

Vision for the City of Cape Town

Environmental Education and Training (EET) as outlined in this Strategy(ref 13-3) can contribute to several aspects of the* Cape Town 2005 and Beyond Vision for the City*, as follows:

- A sustainable city – a city that offers a future to our children and their children The future depends on the careful management today of Cape Town's natural resources and life-support systems – fresh air, water, wetlands, biodiversity, land, fishing stocks and other marine resources, and the scenic coasts and landscapes

which attract so many visitors and investment; education informs and training enables this careful environmental management.

- An accessible city – a city that extends the benefits of urban society to all and builds the capacity of its people. Environmental education increases residents' access to the natural beauty and resources of the City; education and training builds people's capacity to improve and wisely manage the environments in which they live and work
- A credible city – a well governed city trusted by its people. Environmental training for CCT staff will ensure that the City manages the local environment well and thus gains credibility for its custodian role
- A competent city – a city with skills, capabilities and a competitive edge Environmental training for CCT staff will ensure that the City manages the local environment in its care competently
- A safe and caring city - Environmental education and training can inform CCT staff and the public about how to care for natural resources, and keep the environment safe
- A prosperous city known for its ability to compete in the world of the 21st century and its commitment to the challenges facing South Africa, South African Development Corporation (SADC) and the African continent. Cape Town can take the lead in Africa in responding to challenges such as pollution prevention, waste management and access to clean, affordable energy and water, while meeting internationally recognised environmental standards for trade and industry. This requires multi-level environmental education.

EET contributes to poverty reduction, economic development and employment creation, *in the long run,* through its role in ensuring that the natural resources on which jobs, livelihoods and economic development depend, are managed sustainably. Environmental education & training for CCT staff will address service delivery, good governance and human resource development among the City's more than 24 000 employees.

Integrated Metropolitan Environmental Policy (IMEP) (ref 13- 15)

The CCT's IMEP identifies a number of sectoral implementation strategies for managing Cape Town's environment. These include Air Quality, Biodiversity, Coastal Zone, Energy, Urban Open Space and Waste. Environmental education is identified as both a tool for implementing these sectoral strategies, and as a separate Strategy. In endorsing IMEP and adopting the Integrated Metropolitan Environmental Management Strategy (IMEMS), the City has acknowledged that for its Integrated Metropolitan Environmental Policy to succeed, environmental education (and training) provisions are essential.

In keeping with the City's vision, IMEP's 2020 vision includes an environmentally educated public, who will have high expectations of local government in terms of environmental governance and management, but would also be willing and able to take collective responsibility for the City's environmental resources. This vision gives guidelines to the intended outcomes of environmental education activities.

ENVIRONMENTAL EDUCATION & TRAINING IN LOCAL GOVERNMENT

The Municipal Systems Act (Act 32 of 2000) (ref 13 -21)

This policy outlines the role and responsibilities of local governments as to:

- Provide democratic and **accountable** government for local communities;
- Ensure the provision of services to communities in a **sustainable** manner;
- Promote **social** and economic development;
- Promote a safe and healthy **environment**;
- Encourage the **involvement** of communities and community organisations in the matters of local government, and
- Strive, within its financial and administrative capacity, to achieve the objectives above.

These responsibilities indicate a need for an environmentally educated work force (accountable) as well as an environmentally educated public (involvement). Environmental education and training support core local government functions in a number of ways, including:

Trading Services: Education can facilitate waste reduction and recycling projects and develop an understanding of the true cost of waste management and the need for an integrated waste management strategy for the City.

From a survey of policies and legal frameworks, as well as the local situation, it is clear that environmental education and training are mandated responsibilities that need to be part of the formal operations and performance management systems of a local government corporation.

13.3 CCT Waste Education and Awareness Initiatives

13.3.1 Waste Wise[ref 13-2]

In December 2001/January 2002, Waste Wise was developed as a holistic and integrated anti-litter/anti-dumping campaign, in an attempt to halt the trend of escalating costs for clean ups. Waste Wise was developed as a strategic framework to 'clean up the CCT and keep it clean'. Waste Wise is intended to be a 5-year project aimed at linking Law Enforcement, Operations and Education.

Waste Wise is based on the concept of the local authority forming partnerships with, and building capacity within the residential, industrial and commercial communities, and systematically targeting all areas in Cape Town for sustainable clean-ups. The fundamental difference between Waste Wise and past clean up projects is that Waste Wise encourages communities to take ownership of their environment and to work in partnership with the local authority (in line with the recognised United Nations Local Agenda 21 framework).

At the outset of Waste Wise (then called Mess Action Campaign (MAC)), three task teams were formed - Legal & Enforcement, Education & Publicity and Operations. The role of the Legal and Enforcement Task team was the review of existing by-laws for litter and dumping as well as the provision of additional resources. The Operations Task team provided a "top-up" of capacity for existing core service branches. The Education and Publicity Task team focused on six primary areas namely Schools, Communities, Industry/Commerce, Special Events, Institutions and the CCT's own administration.

The Waste Wise strategy is aiming at educating the affected community with appropriate strategies as the first step. Education included awareness on the costs of poorly managed waste, penalties for dumping, contact numbers to report illegal dumping and assistance with waste related projects. The operations team's role has been to would then clean up dumped material in the area with the enforcement team monitoring the dumping hotspots.

Waste Wise is based on three main guiding principles:

- **Sustainability and Empowerment**: To combat a popular perception that "Littering is good because it creates jobs", community groups have NOT been paid to do clean ups. Waste Wise however supports community members with skills transfer and infrastructure (e.g. sorting sheds for recyclables, food gardens) to foster long term, sustainable projects to combat the waste problem.

- **Focus on cause and symptoms**: Litter and dumping is symptomatic of a larger problem in that we, as a society, produce too much waste. Waste Wise developed a proactive response to the litter and dumping problem. Changing perceptions, mindsets and behaviour regarding waste and getting as near as possible to the source of the waste by investing resources in long-term changes to reduce waste being unnecessary created. A dedicated team has thus been appointed to work with and educate companies that

ultimately produce typical "litter items" e.g. the plastics and packaging. The aim of the team has been to reduce the amount of waste entering our society and ending up on our landfills.

- **Education** is a vital part to the sustainability of any clean up efforts within the City.

For further details of the Waste Wise campaign in its entirety the following sources can be accessed:

- Refs. 13-6 & 23: Waste Wise – Final report.
- The Waste Wise CD Rom provides an interactive details and descriptions of the Waste Wise campaign
- Waste Wise website: www. Wastewise.org.za or www.capetown.gov.za.

The Education and Publicity Task Team

The composition of the Education and Publicity Task Team has been build in a multi-directorate manner, across various departments as well as all administrations. A survey identified existing waste education initiatives in each administration. The aim has been to identify stakeholders to participate on the Task team and to compile best practices into one strategy that could be uniformly used throughout the City (see section 13.3.1). Representatives have been invited to participate on the Task Team used to meet every fortnight. The initial task team consisted of representatives from all the administrations namely Cape Town, Blaauwberg, Tygerberg, Helderberg, Oostenberg, CMC and South Peninsula.

The following departments have been represented on the Task Team:

- Waste Management
- Environmental Health
- Environmental Management
- Air Pollution Control
- Community Services
- Parks and Amenities
- Appointed representatives from the FCA, BECO and Clean Cape Communications
- Law Enforcement project manager

Links (and projects) were established with:

- Catchment Management
- Economic Development
- Local Agenda 21
- 107 call centre
- Urban Renewal Projects
- World Summit on Sustainable Development
- Earthship Mission Possible
- Keep Durban Beautiful
- The Natural Step

The role of the Education and Publicity Task Team has been to review, develop and implement educational strategies to support a sustainable solution to cleaning up the CCT by challenging current perceptions to waste and resulting habits linked to those perceptions.

The action plan for Waste Wise and all associated projects follows the structure below:

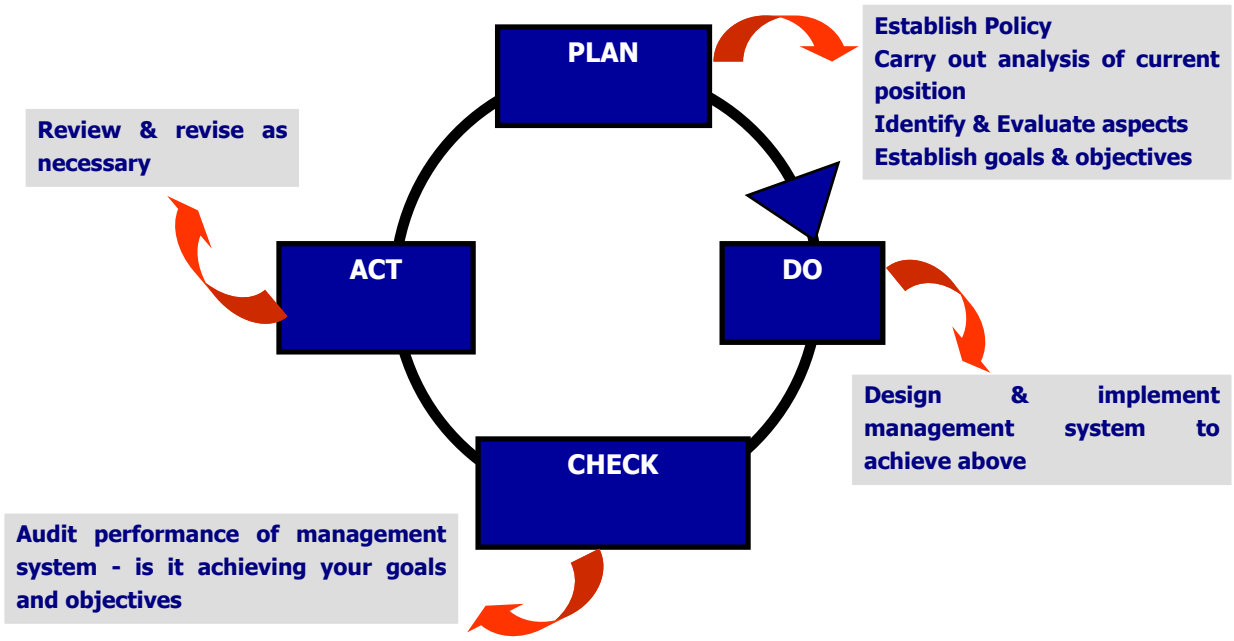

Figure 13.1: The Plan, Do, Check, Act cycle based on Deming (ref 13-25)

Communication and Educational Strategies for Waste Wise

Education strategies have been developed for the following sectors targeting both the causes of the waste problem (lack of integrated waste management starting with source reduction) as well as the symptoms (illegal dumping and littering):

- **Communities**: formal, informal, traders
- **Schools**: primary, secondary
- **Industry**: industrial and commercial
- **CCT Administrations**: councillors, officials and workers
- **Institutions**: e.g. hospitals
- **Special events** e.g. The Argus Cycle Tour
- **Communications:** A specialist communications team was appointed to communicate all aspects of the campaign.

Outcomes of communication and education

A brief summary of the major outcomes of Waste Wise communication and education are outlined below.

Waste Wise Schools Programme (facilitated by the Fairest Cape Association)

- assisted with the inclusion of waste education material into the school curriculum for 2005
- trained 1713 teachers
- 20 556 training hours
- delivered in 106 schools across the City
- facilitated the implementation of recycling, greening, composting and food garden projects as well as the development of waste management plans

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For a complete list of participating schools and their relevant projects please refer to the Waste Wise final progress report Refs. 13-6 & 23.

Waste Wise Community Programmes (facilitated by the Fairest Cape Association)

- 120 Waste Wise workshops delivered
- 730 people trained at workshops
- 21 335 door to door presentations
- 94 250 people presented to
- 10 community co-ordinators trained
- 7 fieldworkers trained
- 160 door to door presenters trained

For a complete list of participating communities and relevant outcomes please refer to the Waste Wise final progress report Refs. 13-6 & 23.

Industry and Commerce and CCT facilities (Facilitated by BECO)

- The Waste Wise Campaign facilitated the initiation of six Waste Minimisation Clubs (WMC's) (please also refer to section 8.2) in partnership with industrial and commercial sectors whose core business and products have been closely linked to the existing littering and dumping problem in CCT
- Benefits to the broader Cape Town community included less waste being produced, more efficient use of raw materials, energy and water. Higher industrial productivity thereby created economic growth and job opportunities.
- Success stories of 6 Waste Minimisation Clubs (comprising more than 40 business entities in total as well as council facilities) are available
- The clubs were located in the following industrial sectors/areas: plastics, meat, motor servicing industries, the Blue Route Shopping Mall, Cape Town Civic Centre and the Atlantis Industrial area. A new club endorsed by Waste Wise begun in Parow Industria in January 2003
- Apart from the overall environmental benefits, many direct financial savings opportunities to the Council were realised
- Savings in one Council vehicle repair workshop are in excess of R 500 000 per year. Council could save R17 million if ALL workshops follow the recommendations made through a preventative vehicle maintenance scheme
- The Civic Centre WMC revealed saving opportunities of R400 000 for cartridge refills. Reducing the amount of non recyclable throwaway coffee cups, plates and cutlery

could save R186 000 per year please refer to separate summary report on WMC savings

- Promotional materials such as a video as well as newsletters have been developed to market the concept of WMC's. (See Waste Wise CD Rom). Provincial Government (DEADP) recently completed a video showing the operation of WMCs in the Western Cape and comprising of saving examples and interviews from the Waste Wise WMC members.
- Recommendations for Policy for Waste Minimisation for the CCT have been completed and will be incorporated into the Integrated Waste Management Plan for the City.

For further details of success stories, please see the Waste Wise final progress report Refs. 13-6 & 23.

Special Events (Facilitated by Fairest Cape Association)

- 20 information stands displayed at special events
- 5 Waste Management systems developed at events such as the Argus cycle tour
- development of an environmental Events Charter focusing on waste management for all future events in Cape
- community groups were able to receive the benefits from the recyclables collected at these events.

See the Waste Wise CD Rom for more information.

Institutions (Facilitated by the Fairest Cape Association)

- Institutions such as hospitals and health care clinics have been made aware and engaged in the process with a view to introducing integrated waste management (IWM) systems thus reducing the amount of medical waste being dumped and incinerated.
- A pilot waste management project is being run at the Red Cross Children's Hospital
- 10 waste management programmes are being run at clinics
- Recommendations for IWM within the Defence Force have been drafted.

See the Waste Wise CD Rom for more information.

Media and Communications (Facilitated by Clean Cape Communications)

- Development of Waste Wise logo - The three arrows in the logo depict the education, enforcement and operations components of Waste Wise. The symbolism will later be adapted to symbolise community, government and business as well as reduce, reuse and recycle.
- Development of Waste Wise CD Rom
- Development of Waste Wise website (www.wastewise.org.za)
- Survey on effectiveness of Waste Wise media campaign
- Development of print adverts, slogans, press releases, billboards, radio adverts and posters. The "litter hurts" advert will be published in a grade 6 textbook.

- Development of marketing materials such as caps and shirts
- Inclusion of the Waste Wise logo in Cape Town map book to highlight the location of all drops offs, landfills and transfer stations.

Refer to the Waste Wise CD Rom to hear the radio adverts developed as well as view the newspaper adverts and posters.

Sponsorship Drive (Facilitated by Clean Cape Communications)

- Waste Wise was introduced to 50 companies
- 10 companies have been engaged in discussions regarding public private partnerships and proposals have been drafted

See Waste Wise progress report Refs. 13-6 & 23.

Special Projects

- The Integrated Waste Exchange (IWEX) was supported and facilitated by Waste Wise. See the Waste Wise progress report Refs. 13-6 & 23.
- Yellow Bag recycling project – the first household source separation project in Cape Town (involving 100+ household units) reflected a participation rate between 50 - 60% in the Marina da Gama area.
  See the Waste Wise progress report Refs. 13-6 & 23.
- A puppet show in partnership with Two Oceans Aquarium, Wastewater, Catchment Management, Water Management, Waste Management and Waste Wise has been developed. The display will run at Two Oceans Aquarium for five years to highlight issues surrounding water, waste water and waste management.
- A hazardous waste project in partnership with UCT investigating the management and disposal of batteries has been completed (ref 13-6).
- Earthship Mission Possible (EaMP) - the communications vessel of explorer Robert Swan, who has walked to both North and South poles, arrived back in Cape Town after clearing 1000 tons of rubbish from Antarctica. EaMP carried the Waste Wise message to every town and City on the three month journey to the World Summit. A message from our Mayor was sent to mayors of the towns and cities through which the vessel passed on it's way to the World Summit. All mayors signed a pledge of commitment to clean up and live better.

See Waste Wise CD Rom for further information

Summary of the structure of Waste Wise

A synopsis of the Waste Wise campaign in its entirety is detailed below and highlights the major changes within the campaign structure as well as within the CCT.

Financial year 2001/2002

- A budget of R 40 million was allocated to Waste Wise. R 8 million of this was dedicated to the Education component.
- An overall Project Manager was appointed with two project managers and the campaign was guided by a steering committee.

- Three task teams were formed, Legal & Enforcement, Education & Publicity and Operations.
- The Task teams reported to a Steering Committee who in turn reported to EXCO.
- By January 2002, six Service Delivery Units (SDU's) comprising of multi – disciplinary teams were set up. These teams included other directorates such as Environmental Health, Roads and Stormwater etc.
- Dumping hot spots were monitored and 2300 sites were identified as hot spots. The most intensively dumped areas were targeted first.
- Tenders were awarded in 2001 to BECO ISB for to start up and run waste minimisation initiatives for industry/commerce and the CCT facilities and Clean Cape Communications (a joint venture between Mehlo Media and Liebenberg and Stander) for the publicity and sponsorship aspects of the campaign.
- The Fairest Cape Association (as an NGO) was appointed without a formal tender process to develop strategies for schools and community education, special events and institutions and roll out relevant programmes.

Financial year 2002/2003

- As a result of the Municipal elections in November 2000, the six previous Municipal Local Councils, MLC's, in the Cape Metropolitan Area coalesced into a single political and administrative entity.
- The restructuring process resulted in the appointment of new interim heads for Solid Waste.
- The budget for Waste Wise was cut by 75 %. Funding only remained for reduced law enforcement activities and the continuation of the education arm of Waste Wise. No budget was allocated for operations.
- Project Managers for Waste Wise were reduced from three to one.
- A political decision was made that the Fairest Cape Association had to participate in a public tender process in order to continue with their education program. Once the tender was approved the scope of the education was limited to only include school and community education. Initial plans for Waste Wise to develop holistic waste management solutions for special events (such as the Argus Cycle Tour etc), institutions and CCT specific projects were discontinued.
- The law enforcement component was reduced from 72 officers to 40.
- After significant changes and reductions with respect to budget and capacity, the scope of the Waste Wise project became increasingly limited and unclear.
- Approval to send out communications was difficult to acquire due to unclear reporting lines. A moratorium was put on all external communications in April 2003.

Financial year 2003/2004

- The law enforcement arm ceased to exist due to efficiency problems and further budget cuts.
- Budget cuts resulted in severe shortages for operations within Solid Waste for collections, disposal and area cleaning.
- Under new political leadership another mayoral Campaign to clean up the city is being planned as an outcome of the Mayor's Listening Campaign.

- Shortages of capacity exist within Solid Waste Education and Waste Wise.
- Contracts for the Fairest Cape Association, Clean Cape Communications and BECO expired at the end of September 2003.

13.3.2 Let's Come Clean

This awareness campaign was initiated by Waste Management CMC in November/ December 2000. Radio adverts and additional bins advertising the campaign were used to convey information detailing the contact numbers for law enforcement (to report illegal dumping) as well as the location of the landfill sites.

13.3.3 Environmental Health Waste Management Education Activities [ref 13-11]

Many initiatives have been facilitated through the Environmental Health department due to the impact of waste on the function of this department. Many informal health education sessions at schools or to small groups of the community take place and include aspects of waste management. Examples of some initiatives from South Peninsula Administration include:

- First Retreat Boy Scout Education Programme (June 1999)
  A booklet and workshop regarding public health was developed in which waste management played a vital role. A tour to Coastal Park Landfill was included as well as a community clean up. Litter bins were erected in an attempt to sustain a clean environment.

- Lavender Hill School's Clean-up (May - September 2000)
  Pupils were educated on proper waste management and encouraged not to litter, by teachers and invited speakers. This was followed by clean-up campaigns in and around the schools.

- Youth Day, Steenberg(October 2000)
  A general health awareness day was held to educate children in the area on general issues affecting their growth and development in a fun and educational manner. One of the issues highlighted was waste management. A fashion show of clothing made from waste items was held.

13.3.4 Masiphakameni ("Let us Rise") Project [ref 13-17]

The Masiphakameni ("Let us Rise") project was a community education and capacity building project aimed at the Integrated Serviced Lands Project (ISLP) developed areas of Crossroads, Phillipi and Weltervreden Valley North, but later expanded to cover Gugulethu, Nyanga and Langa as well.

Liebenberg & Stander Western Cape (Pty) Ltd together with Masimanyane Consultancy were appointed as the project consultants. Knowing the necessity of having local leadership support, the consultants immediately concentrated on obtaining support for the project from local leadership and the newly elected councilors. Levels of knowledge and

misconceptions about municipal services and home ownership were then identified through perception surveys and workshops with residents and officials. Thereafter an implementation plan and educational material were developed and implementation could begin.

Community educators from the local communities were recruited and trained. An awareness campaign was implemented using community meeting announcements, radio, a local newspaper, posters and roadshows. The community educators distributed educational leaflets to 14,000 households and a series of workshops was conducted in each target area. The consultants encountered a number of problems during implementation of these workshops, severely hampering the effectiveness of these workshops. Due to the poor results obtained a second round of more intensive door-to-door visits, comprising of a leaflet, a 15-minute message and a question & answer session, was initiated and delivered to 10 000 households. The education campaign covered municipal services - water, stormwater, cleansing, sewerage and electricity, as well as the split of responsibility between residents and the municipality, crime, sanitation and home ownership.

An independent research company conducted a final perception survey to ascertain the success of the project. There was a noticeable improvement in knowledge levels amongst the respondents measured, however a lot more education on all of these subject areas is still required.

13.3.5 Catchment, Stormwater and River Management (ref 13-3)

Environmental education and training programmes for youth and adults related to catchment management, in partnership with internal and external partners including NGO's, technicons and universities were carried out. An Education, Communications and Liaison Officer developed the programmes.

13.3.6 Pete the Pelican (ref 13-14)

"Pete the Pelican" was launched by the Cleansing & Health Departments of the Blaauwberg Municipality as an awareness campaign to "Keep the City Clean". Staff members volunteered as "actors" in a drama accompanied by songs. In addition, a roadshow consisting of a loudspeaker and banner reinforced the message: "Pete the Pelican says...Please keep the City Clean and thanks for caring".

13.3.7 Khayelitsha Integrated Waste Management Programme (ref 13-1)

The former City of Tygerberg-Planning and Environment (planning) as well as Sport and Recreation (implementation) started the mentioned initiative. The implementing agents were the CCT and Fairest Cape Association. The aim was to introduce waste and environmental management principles at a local level through environmental education initiatives. The initiative was aimed at primary and high schools as well as owners of households. It was mainly focussed on Khayelitsha schools and residents in the Tygerberg

region. The main activities involved excursions to waste transfer stations. The programme was developed based on the business plans for schools educational programme and various documentation from the FCA.

NOTE: For a detailed review please refer to reference 13-3.

13.4 National and Provincial Education and awareness initiatives

13.4.1 Local Government and Related Services, Sector Education Training Authority (LGWSETA)[ref 13-16]

"The Local Government and Water related Sector Education and Training Authority (LGWSETA) and the Institute of Waste Management Southern Africa (IWMSA) teamed up in August 2003 to develop three to four learnerships for the waste management industry.

The report highlights the proceedings and outcomes of the workshop with the waste industry, the purpose of which was to consult with said industry regarding the development of pilot waste management learnerships. This consultative workshop was held on the 10 and 11 November 2003 at the Birchwood Conference Centre, Boksburg. This workshop was the first step in the consultative approach.

The workshop identified three learnerships for immediate development. These are:

- Learnership: Sweepers (possibly NQF level 1)
- Learnership: Supervisors: landfill sites (possibly NQF level 4)
- Learnership: Waste Manager (possibly NQF level 6)

This report will now be submitted to IWMSA for endorsement, after which an advertisement will be placed in the national media, inviting interested parties to comment on the intended learnerships. Upon conclusion of the consultative phase, two parallel but coordinated processes will commence. The Environmental Science and Environmental Management and Waste Management Standards Generating Body (ESEMWM SGB) will generate unit standards for the learnerships, to be registered on the NQF. The project team will develop the training curricula, training material and provide for all arrangements to ensure that these learnerships commence in 2004."

13.4.2 "The Principles of Solid Waste Management Training Course"

Since 1997 the FCA has been working with and through the United States Environmental Protection Agency (US-EPA), independently, and with DEA&DP (previously DECAS) in presenting all of the "PRINCIPLES OF SOLID WASTE MANAGEMENT PLANNING" courses in the Western Cape and in Kimberley [ref 13-10].

A complete overhaul of the American EPA Solid Waste Management Course was recently instructed by DEA&DP (and done by the FCA) in order to provide DEA&DP with a training tool

to assist Local Authorities in the development of Integrated Solid Waste Management Plans for their areas of jurisdiction (in accordance with the objectives stipulated in the Integrated Pollution & Waste Management (IP& WM) Policy (March 2000), and National Waste Management Strategy (NWMS) as well as to "Africanize" the American training contents[13-3]. It is the aim of DEADP to assist municipalities with this process, where necessary, and provide capacity building (also outside governmental spheres) to facilitate the development of these plans [13-3].

At the date of writing DEADP the Fairest Cape has been chosen as facilitators for the Solid Waste Management Training course that will be held as a road show at local municipalities throughout the Western Cape to assist them with the development of integrated waste management planning.

13.5 Public and Private Waste Education and Awareness Initiatives

13.5.1 The Fairest Cape Association (ref 13-10)

The Fairest Cape Association is an independent, non-profit organization based in Cape Town. The association was founded in 1980 by a group of concerned citizens to raise the awareness of the detrimental effect of litter in the natural and built environment.

Initially the association raised awareness through anti-litter campaigns and clean ups, in the city, suburbs and on beaches. The Association has evolved into a respected organization initiating, participating and managing with local and provincial government, community, business and education, waste awareness programmes education and training.

Activities to date include:

- Public awareness programmes
- Education and training
- The facilitation and building of partnerships
- Contribution to Strategic Waste Planning and Education
- The FCA has been involved in the consultative process that resulted in the National Waste Management Strategy (NWMS 1999) and IP & WM policy (2000).

In addition the focus of the FCA work and projects in the past 7 years has directly reflected the NWMS goals and strategies:

- Increasing awareness and educating the public regarding waste minimization and responsible handling of waste.
- Implementing pilot projects involving waste minimization and recycling.
- Supplying a waste information service to the CCT, public and other I&AP's and
- Assisting local municipalities and CCT local administrations with training for IWM planning (using the US-EPA "Principles of Solid Waste Planning" course*).

The FCA advocates:

- Household service equity
- Adequate and accessible disposal facilities for various categories of waste
- Source separation at domestic and business premises and collection thereof
- Neighbourhood drop-off facilities for recyclables
- Rebates or tariff adjustments to incentivise households and businesses to reduce waste to landfill
- Transport subsidies for recyclables distant from markets
- Law enforcement to challenge and fine people littering, dumping illegally and inappropriately transporting materials
- Gardening and greening initiatives and the access to free municipal compost
- Self-help schemes and job creation
- Name and shame of dumpers of hazardous waste including medical waste
- A ban on new incineration and nuclear facilities

PUBLIC AWARENESS AND EDUCATION AND TRAINING

PUBLIC AWARENESS PROGRAMMES

Public awareness programmes have included:

Clean beach campaigns	1992-2001, 2003
Clean City Awards	1992/3/4 & 2002
Environmental Awards Programme	1992-1997
National Clean Up Week Campaign	1999>
Mural painting	1992-2000, 2002>

National awareness campaigns:
Arbor Day
Marine Week
Water Week
World Environment Day

EDUCATION AND TRAINING

Community waste training workshops	1997>
CCT Waste Wise Campaign	2001-2003

(Community and schools education, health and defence waste minimisation, waste management at special events)

Health Care Without Harm project	2002/2003
National Lottery Board Community project	2003>
Developing resources, schools WCED	1999>
Edutrain	2000/1
Environmental clubs	1992-1994
High Schools Environmental Quiz	1998-2002
High Schools Speech Competition	1992-1995
NEEP (curriculum development)	2000>
US-EPA Solid Waste Management Planning	1997> 4-day, 1-day courses
Teacher training (Wise Up On waste)	1993>

Urban Renewal	2001>
Youth Environment Week	2001>

FACILITATION AND BUILDING OF PARTNERSHIPS

Community programmes since 1992 include adopt-a-spot, food gardens, clean ups.

Gugulethu	2000/1
Food for waste programme	1993-1997
Khayalitsha	1999/2000
Imizamo Yethu	1999-2002
Observatory Recycling	1997-1999
Tsoga, Langa (establishment of centre)	1997
Wallacedene	1994-1997
Parow Industria CID	2002>
Woodstock Upliftment Project	2002>
Assistance with recycling initiatives	1984>

INFORMATION COLLECTION AND DISSEMINATION

- The FCA resource centre officially opened in 1994
- The centre has videos, CD-ROMs, books, journals, papers, poster materials, etc and is accessible to the public.
- The FCA developed a local Recycling directory which is updated at least once a year
- National Recycling Forum member since 1992
- Wise Up On Waste book, 5th edition English, 1st edition Afrikaans in 2002
- Distribution of guidelines for clean ups, recycling, composting, etc.

Contacts and Networking with National Waste Authorities and Key Stakeholders

- City of Cape Town
  - Environmental Management
  - Water and Waste Management
  - Solid Waste
  - Catchment Management
  - Environmental Health
  - Air Pollution Control
- Other municipalities Overstrand, Saldanha, Worcester
- Department of Environmental Affairs and Tourism (DEAT)
- Department of Environmental Affairs and Development Planning (DEA&DP)
- Department of Water Affairs and Forestry (DWAF)
- DEAT - Marine and Coastal Management – Coast Care
- Western Cape of Department of Education (WCED)
- WCED – Safe Schools
- Institute of Waste Management S A
- National Recycling Forum

- Recyclers: Collect-A-Can, Glass Recycling Assoc., Mondi, Nampak, SAPPI, Tedcor, WasteMan, WasteTech, Zib Enviro
- Consultants: BECO, Jeffares & Green, Entech, Icando
- Agriculture and Greening: Abalimi, Food Gardens Foundation, SEED BOTSOC, NBI
- Environmental Conservation: CAPTRUST, EMG, EJNF, Habitat Council, KEAG, UCT – EEU, WEESA
- Environmental Education: Cape Tech, WCED - CCE, EE-Rhodes and UCT, SEED, Tsoga, WEESA

13.5.2 Institute of Waste Management Southern Africa (IWMSA)

The Institute of Waste Management of Southern Africa is a non-aligned body committed to protecting the environment and educate the people of Southern Africa from adverse effects of poor waste management. The Western Cape branch of IWMSA is located in Cape Town and comprises of 9 board members who are committed to disseminate information and stimulate networking among their members and the interested and affected public sector at large.

In pursuance of its mission, the Western Cape Branch:

- Initiates, endorses and promotes sound waste management.
- Provides input in policy & ethical frameworks development
- Enhances the awareness & understanding of waste management issues through education and dissemination of information.
- Promotes environmental awareness & public involvement.
- Constantly seeks to expand its current membership base (of more than 74 business and municipal entities plus a large number of individual memberships) to include all waste management practitioners in the region.

Regular educational activities from the IWMSA Western Cape Branch:

- The **Waste Minimisation & Recycling Interest Group** (WMRIG) provides an information platform through regular meetings and networking in order to stimulate Waste Minimisation & Recycling activities and projects in Cape Town.
- The **Landfill Interest Group (LIG)** acts as an information and education platform for environmentally responsible landfilling practice and technology and a conference is held annually.

- The **Collection and Transport Interest Group** (CTIG) focusses on the practical and educational needs of this Waste Management Sector and includes regular seminars and a "Driver of the Year Competition".

- The Western Cape Branch also organizes regular **Breakfast Seminars** and sources guest speakers for relevant topics

- In addition **Roadshows** are topical seminars held outside of Cape Town in order to share information on the latest waste management technologies, projects, experiences and trends with rural areas.

- The IWMSA Western Cape is also in the process of developing educational material and the contents for an IWM training course. The final course will teach waste management and operational staff a holistic approach to integrated waste management .

13.5.3 TSOGA – Environmental Resource Centre (ref 13-26)

Tsoga runs a buy-back centre supported by local taverns, spaza shops, local institutions in Langa such as police stations, community centres, individuals and hawkers and private households in and around Langa. The centre is used as an educational networking and meeting platform by various institutions. They have also formed working relationships with industry for example, Nampak, Enviro-glass and Collect-a-can.

The following partnerships have been established:

- National Integrated Waste Management Network – established in 2001 working in joint venture with DEAT in strengthening SMME's e.g. Paper Maché, Waste Artefacts, and Recycling.
- Athlone Transfer Station –implementing waste minimisation (from 2000) at the ARTS hence aiming to reduce approximately 500 –1000 tons of waste and through that being able to create 30 jobs.
- CCT – acknowledges and recognises the existence of Tsoga.

13.5.3 Collect-a-can(ref13-24)

Collect-a-can is a non-profit organisation dedicated to environmental conservation and saving natural resources. Through its efforts South Africa now recover around 64 percent of al beverage cans sold in the country. Can collection provides a source of income to over 37 000 people across the country. The South African Breweries has been a long standing sponsor of Collect-a-can's school's competition. More than 70 schools across the Peninsula participate in this annual competition providing funds for much needed educational resources. During 2002, schools across the country, collected a staggering 28 million cans. Participating schools in the Western Cape include: Alpha School in Hanover Park, Camps Bay Primary, Malibu High in Eerste River, Liwa Primary in Nyanga and Pelican Park High School ***(Also refer to Chapter 8).***

13.6 Gap Analysis

The perceived gaps relating to waste education in the CTMA are summarised in Table 13.6.1 below. The "Needs", also set out in the table, represent possible strategies to address the gaps in Waste Education, and may be carried forward to the "Assessment" stage of the development of the City's IWMP, for further review and assessment.

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Table 13.6.1 Gaps and needs in terms of Waste Education

GAP	NEED
National and Provincial	
• Lack of co-ordination and communication between National, Provincial and Local Governments • Lack of legislation regarding IWM	• **Recommended partnership with WCED and the National Environmental Education Programme**
City of Cape Town (EE Strategy 2003 – Ref 13-3)	
• Educative activities across the organisation are 'patchy' • Environmental training is for the most part unsupported • EE staffing needs have not been addressed • Environmental education is at times under-valued and often under-supported • Lack of organisational staff development/support systems and recognition • Limited skills & lack of appropriate resources in those departments where environmental education is not seen as a core function • Too many 'scattered' initiatives driven e.g. by funding or marketing potential • Education targeting groups which are easy to reach, but not necessarily appropriate for a particular educational goal (e.g. when focussing primarily on schools) • Absence of monitoring and evaluation • No criteria against which to assess the effectiveness of educational initiatives, and to reflect their value • No criteria to guide partnerships. • lack of co-ordination across departments & directorates	• **CCT to take a leading & supportive role in environmental education** • **Environmental education partnerships with the CCT are effective and should be continued** • **Provide structured programmes to build environmental capacity among City officials** • **Develop indicators of success and benchmarks for environmental education** • **Commit the City to 'look towards its own first' – through environmental education for City staff and councillors** • **Better resource and support the CCT's environmental education facilities** • **Develop performance criteria based on a common understanding of environmental education & training as distinct from other communications processes, for staff with environmental education & training responsibilities (KPI's / job descriptions). This should include managerial staff.** • **Provide systems & resources for environmental education and training as specific functions within the CCT, and as components of line functions; this would include staffing & budgetary provisions as well as inclusion in the Organisational Performance Management System (OPMS).**

• sharing of resources, systems, lessons learnt and 'best practice' is limited
• Some CCT reserves are under-utilised as educational sites; others are used beyond capacity
• Training initiatives are not aligned with the NQF (National Qualifications Framework)
	• **Include environmental awareness in induction and refresher programmes to ensure that all CCT staff, new and existing, are aware of the City's general and specific environmental responsibilities & management processes**
	• **Ensure that all Councillors and senior managers are aware of the City's environmental responsibilities, environmental management processes and current programmes.**
	• **Develop customised environmental training programmes for CCT workers and managers, relevant to their functions, bearing in mind that for worker training to be supported and applied, managers need to understand its relevance and implementation requirements.**
	• **Seek NQF accreditation and utilise the Skills Levy for staff environmental training.**
	• **Develop and resource the environmental education & training implications of IMEP's sectoral strategies.**
	• **Develop and resource the CCT nature reserves as key implementation sites for environmental education and, where relevant, training.**
	• **Make available accessible, high quality information on the Cape Town environment and associated issues, and the City's environmental management practices, to the public and educational agencies.**
	• **Align environmental programmes for schools with Curriculum 2005 and explore partnerships with the Western Cape and national education departments' initiatives**
	• **Ensure a high quality in all the CCT's environmental education & training programmes, by:**
	  ◦ **providing adequate staff and other resources**
	  ◦ **developing or accessing locally relevant teaching and training materials**
	  ◦ **drawing on internationally-recognised and locally relevant principles**
	  ◦ **learning from internal and external initiatives whose educational value has been proven**
	  ◦ **encouraging relevant professional development for responsible staff**

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	• monitoring the quality of environmental education & training, particularly in train-the-trainer programmes and flexible staffing arrangements; in this regard the design of a generic monitoring and evaluation tool is recommended (also see below) • researching the outcomes (effectiveness) of educational programmes • developing criteria for evaluating environmental education & training programmes • regularly evaluating programmes accordingly • supporting inexperienced staff and supporting links between environmental education and training functions and functions such as environmental health, pollution control, fire and life safety. • Improve efficiency and effectiveness of environmental education & training programmes through: • goal-directed environmental education & training programmes, within this strategic framework • focussing where the effort will be most effective (rather than the easiest). • Set up processes for communication towards co-ordination, the sharing of resources, lessons learnt and 'best practice' among those conducting environmental education & training in the CCT, and support parties involved in environmental education & training outside the CCT, with the same.
Solid Waste (SW) & Waste Wise (WW) Education – Waste Wise: From Waste Wise Strategy workshop (see Ref 13-28 and 29). • Political buy in for proactive measures are limited as this involves long term planning. Unrealistic, unsustainable demands from politicians. • Political demands to only work in disadvantaged communities create a gap in education for other sectors of the City. • Education is viewed as a "nice to have" but	**Education:** • **Review Waste Wise and evaluate existing education initiatives and awareness campaigns as well as to assess alternative options, in order to identify the most effective and suitable methods for the City of Cape Town** • **Follow up on skills transfer from BECO and FCA to CCT**

not a priority. Not seen as core function
- Lack of real integration between SW and WW
- Legislation for IWM is not in place and the by law developed by the Waste Wise Law enforcement Task Team is not enforced.
- Waste Wise success stories have high marketability potential
- Good waste management has direct financial benefits and must be calculated and communicated
- IT and GIS systems available but not fully utilised
- A clean city will promote tourism
- Waste Wise can establish partnerships linking SW to communities
- Waste can be used as a resource for entrepreneurship
- Relationship to service providers for Waste Wise expired
- Sponsorship drive – initial contact made with 10 companies
- Lack of clarity surrounding the FCA relationship
- Placement process not in place – no original WW team members left
- No long term waste education plan in place
- Uncertainty of financial future of SW & WW
- WW not considered as a tool/mechanism to apply IWMS
- Measurement tools for illegal dumping and law enforcement not in place
- marketing and communications not effective/on hold – approval lines difficult
- City has new logo

Communication & Education – EPA SWMP
- Reduce incidences of illegal dumping through public education, and by providing well-advertised and accessible facilities (i.e. in terms of location and opening hours)
- Involve residents more in SWM (i.e. greater ownership of process)
- Improved marketing, communication and education within the SWM decision-making structure as well as the wider Cape Town community
- Increase availability of clearly marked skips in all areas (to discourage illegal dumping) [highly contested point]
- Information directory/users guide

- **Realise value of waste education within SW & CCT to implement IWM**
- **Determine role and scope of education within SW (w/s)**
- **Appoint appropriate staff to undertake scope of education**
- **Develop long term plan for education in line with EE strategy**
- **Develop long term plan with relevant departments within CCT such as Environmental Health etc.**
- **Link waste reduction initiatives to other relevant city departments**
- **Formalise link between CoCT and the FCA**
- **Formalise link between CoCT and Province**
- **Formalise link with IWMSA**
- **To follow up on links made re: sponsorship and partnerships (see WW progress report)**

Communication:
- **Link Solid Waste communications with City Communications - establish roles and responsibilities**
- **Streamline approval routes for external communications**
- **SW to forward all Waste Wise promotional material to City Communications as well as all relevant information from SW**
- **Assess WW Communication strategy**
- **Assess WW survey for most effective forms of communication to various socio economic groups**
- **Communicate location of drop off sites and landfills e.g. map ads**
- **Communicate SW system (users guide)**
- **Communicate WW successes**
- **Use WW logo as sub brand for City Logo**

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and/or efficient toll-free telephone number for information on available services and complaints, as well as roles and responsibilities within CCT.

- Information sharing on hidden costs of supply and services - ownership of complete SWM problem by all stakeholders
- Put mechanisms in place to ensure ongoing (i.e. sustainable) education and public participation programs and strategies, that are not impacted changes in the political structures – WasteWise should survive
- Clear labelling of materials used (i.e. composition and product safety information), as well as instructions for responsible disposal/recycling
- ISWM workshops held in townships (i.e. targeted communities)
- Recognise importance of good design in educational materials to attract attention and market message effectively
- Make sure educators are well skilled for the job, and include informal collectors and recyclers in this process
- Environmental health education for CCT workers
- SWM in school curriculum (SETA)
- Monitoring and mentoring contractors

Communication: (Ref 13-28 and 29)

- Unprompted, 33% of upper income respondents were aware of any existing anti-litter campaigns and only 16% middle and 12% lower income respondents (26% white, 25% coloured and 6% black).
- 17% of Blacks, 18% of coloureds and only 4% of White respondents were aware of the 'Waste Wise' campaign. Less than 5% of any group were aware of 'Waste Wise' workshops.
- Of those aware of the Waste Wise campaign: For Black respondents the majority (67%) became aware through billboards, 25% through the bins, 17% local papers and 14% radio. Amongst Coloureds the largest portion became aware through billboards (37%), 26% through local newspapers, 16% bins and 11% radio. However amongst the Whites the most successful initiative was local newspapers

(50%) followed by bins (25%) and radio (13%), billboards scored 0% amongst the white respondents. ▪ When shown copies of the advertisements that appeared in the local newspapers (and billboards). 30% of Black, 32% of Coloured and 11% of White respondents remembered seeing the adverts. The campaign was least successful in penetrating the white and upper income groups. ▪ The main messages remembered from the campaign were 'don't litter', 'littering is dangerous' and ''keep [Cape Town/SA/city] clean'. The element of the campaign that stuck most was 'littering is dangerous'. ▪ In reaction to the campaign the desired responses were evoked among all race and income groups. Respondents said that the campaign is educational and makes communities more litter conscious. ▪ When asked the most effective method of reaching themselves and their community, for Black and White respondents it was billboards (50% and 55% respectively) and radio (48% and 52%). 31% of Whites also named newspapers. Amongst Coloureds it was Radio (59%), Brochures in their letterbox (54%), Billboards (39%) and Newspapers (38%).	

Appendices

Appendix A: Executive Summary – Environmental Education and Training Strategy 2003

Executive Summary

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The City of Cape Town (CCT) has adopted an Integrated Metropolitan Environmental Policy (IMEP) in which the environmental education is identified as both a strategy, a tool in other sectoral environmental strategies. This Environmental Education and Training Strategy is a framework for planning and implementation and aims to:

- guide decisions regarding environmental education and training in the CCT;
- ensure that the achievements and quality of current best practice is maintained;
- address concerns regarding environmental education and training, and
- link the CCT's programmes to broader initiatives.

The motivation for environmental education and training in the CCT includes:

- policy and legal requirements;
- IMEP's sectoral environmental strategies, which require education and training;
- the complementary role of environmental education and training in core local government functions (e.g. planning, regulation and service provision)
- the need to share environmental management responsibilities between local government and environmentally educated residents.

Strategy development started in October 2000. It included consultants with 34 internal and 32 external parties through workshops, interviews and questionnaires. A situational analysis identified assets, strengths, issues and concerns. Goals and objectives were collaboratively formulated to achieve the IMEP vision, maximise assets and strengths, and address current concerns and potential issues. A Draft Strategy was circulated for public and stakeholder comment and revised for adoption in August 2003.

The Strategic Goals for Environmental Education and Training in the CCT are:

The citizens of Cape Town are environmentally aware and conscious; and
CCT staff are competent in environmental matters pertaining to their responsibilities.

To achieve these Goals, The Strategic Objectives are:

1. Establish performance criteria for environmental education and training.
2. Provide adequate systems and resources for environmental education and training.
3. Include environmental awareness a in induction and refresher programmes.
4. Help Council & managers understand the CCT environmental responsibilities.
5. Provide customised environmental training for workers and managers.
6. Seek National Qualification Framework accreditation and utilise the Skills Levy for staff environmental training.
7. Develop and resource the education and training implications of IMEP>

8. Develop and resource the CCT nature reserves as key implementation sites for environmental education and where relevant, training.
9. Make available accessible, high quality environmental (management) information.
10. Align school initiatives with Department of Education Programmes and Curriculum 2005.
11. Provide environmental education and training programmes and ensure their quality.
12. Improve efficiency and effectiveness of CCT environmental education and training.
13. Set up channels for the sharing of resources, lessons learnt and 'best practice'.

A Strategic Approach should be adopted, consisting of:

- Focussed, goal directed programmes
- Influence on and provision of information to other agencies
- Partnerships
- Internal Collaboration.

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Chapter 14 – Conclusions and Recommendations

Chapter 14 sets out the conclusions reached from the Status Quo study and recommendations to take the process of the development of the Integrated Waste Management Plan to the next stage, namely the Assessment Study.

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14.1 Conclusions

The Project Team together with officials from the Waste Department of the City of Cape Town and Department of Environmental Affairs and Development Planning have undertaken an extensive study to obtain and evaluate available "status quo" information covering solid waste relevant to the Cape Town Metropolitan Area. The status quo situational analysis is summarised and presented in this Final Status Quo Report.

The purpose of the Status Quo Report is to provide a preliminary step to the formulation of the Integrated Waste Management Plan, to review documented work already done, including policies, strategies and by-laws already in place.

During the process of the development of the City's Integrated Waste Management Plan, and arising from the parallel public participation process that is taking place, further input and information or corrections to the Final Status Quo Report (March 2004) may come to light that will then be added as a revision to the report.

It was clearly evident during the period of the status quo study that the City of Cape Town is among the leading cities in South Africa in terms of its application of the strategies embodied in the Draft National Integrated Waste Management Bill. However, a number of shortcomings were found to exist in waste management practices and legacies inherited from the previous seven former Administrations, and these shortcomings are described in the Final Status Quo Report.

Included in the respective chapters of this report is a gap analysis, conducted to identify the necessary actions, policies needing review, and by-laws requiring upgrading. Strategies and action plans to address the gaps identified shall be developed as part of the IWMP planning process.

The main areas covered by the status quo study are as follows:

14.1.1 Institutional Arrangements

Restructuring of the institutional arrangements pertaining to the City's solid waste services is long overdue. It is envisaged that the Transformation Team initiative and the Internal Business Unit (IBU) review initiatives currently being undertaken by the City will in the near future lead to a final assessment and approval by Council of the internal service delivery mechanisms, agreement of the strategic objectives, determination of political and business priorities and agreement on a phased approach for the institutional arrangements with specific structural and delivery milestones.

The institutional status quo component of the report is thus limited and without much analytical substance. This lack of substance is a result of the current political scrutiny of all institutional arrangements pertaining to services. Furthermore the status quo study does not at this stage attempt to identify any [major] gaps in the organizational structure since an approved baseline is not yet determined.

Since 1995 there have been significant strides made in local government in metropolitan Cape Town, which includes the consolidation of local democracy, the extension of services, the completion of major restructuring and many other examples of innovation and good practice. Although these are formidable achievements the social and human development outcomes for Cape Town still fall way below what they should be, and the current arrangements of managing the City are not succeeding in turning the key socio-economic trends in a positive direction. This fact has to be recognised and taken into account in transforming the institutional and organisational shape of the Waste Department.

14.1.2 Financial Arrangements

The cost to the City over the past decade in transforming its solid waste management services into a socially and environmentally acceptable situation, has been considerable. The current annual operating expenditure amount of R726,3 million and current annual capital expenditure amount of R19,7 million is to be viewed against a projected revenue from solid waste functions of R376,0 million. Clearly there is a need to address the high cost of solid waste service provision while at the same time satisfying the basic human right for a clean and healthy environment.

Gaps in the financial arrangements identified during the study include an assessment of the completeness of property-based revenues, the possibilities for under recovery of revenue due to weighbridge system controls, the return on assets to ensure sustainability, the movements in budget items from year to year, the funding shortfall for planned capital expenditure, the rebate system and indigent policies a review of the system of free-loads and drop-offs and the realignment of budget with corporate structures.

14.1.3 Policy and Legislation

Following the restructuring of local government, several municipalities and councils ceased to exist following their amalgamation with the newly established Administrations and their existing by-laws were not repealed by later by-laws. The net result is that even within one Administration there might be a number of by-laws dealing with the same or related municipal function (e.g. waste collection).

An example of this is the Tygerberg Administration which consists, among others, of the former municipalities of Goodwood, Tygerberg and Durbanville where some of the refuse related by-laws passed by the aforementioned municipalities still remain in force. The old municipal by-laws might therefore continue to be in force, albeit only partially and insofar as they relate to matters not covered in the new Administration by-law.

No publicly accessible compilation or database exists setting out which by-laws are in force, or to what extent they have been repealed. A list compiled by Province and used by the City's legal department was used for the purposes of the status quo study. Extensive engagement with the City's officials took place to identify and assess existing and relevant by-laws. The study covers an extensive range of existing legislation and by-laws covering international, national, provincial and local municipal policies and legislation.

An assessment of the by-laws and gap analysis is contained in the report that will provide the background information for preparing the City's draft by-law for solid waste management. The following key issues will be addressed in developing the new by-law:

- the new by-law should repeal or amend the existing by-laws in order to bring some sense and direction to the current plethora of local legislation;
- the principles and policies set out in the White Paper, National Waste Management Strategy, National Environmental Act, National Integrated Waste Management Bill etc should be incorporated into the new by-law;
- serious thought should be given to the City of Cape Town introducing economic instruments (eg incentives, taxes, levies) to help achieve integrated (solid) waste management;
- effect must be given to the requirements of the Municipal Systems Act and the devising of a tariff policy;
- law enforcement should be increased and stiffer fines and sentences should be implemented to act as deterrent.

14.1.4 Waste Collection and Area Cleaning

Waste collection and Area Cleaning constitute the core functions of the City's Waste Department. The two functions operate under separate departments, although resources are to some extent shared or integrated.

The Unicity has, as an interim arrangement, been partitioned into four distinct waste collection and area cleaning management areas, each managed by an Area Manager (Collection and Area Cleaning). These management areas comprise Atlantic (Blouberg/Steenberg/Twelve Apostles), Tierberg (Welgelegen/Valhalla/Klipheuwel), Impuma (Joostenberg/Blackheath/Maccassar) and Two Oceans (Wolfgat/Sandvlei/Cape Point). Fifty-seven former depots serve the four management areas. Collection beats have generally been determined according to the historic boundaries of the former Administrations. A beat is defined as an activity that is covered by a specific collection vehicle per day. The Unicity is currently divided into 601 department refuse collection beats serving 473 400 erven and a population of approximately 2,5 million. Approximately 560 000 tonnes are collected annually from 744 000 formal (81%) and informal (19%) service points.

There are essentially three levels of collection service, i.e. a containerised service (240l "wheelie" bins), plastic bags (85l) and skips for rudimentary services. The City contracts out the skip collection services and certain other collection services. The City's collection vehicles account for approximately 33% of the total waste disposed of to the landfills.

The City adopted a new standardised tariff policy in July 2002, introducing different tariffs, levies and charges for vacant land, residential properties and non-residential properties. There are no charges levied for community-based collection services.

Area Cleaning comprises street sweeping, litter picking, beach cleaning, clearing of illegal dumping, animal carcass collection, provision and servicing of litter bins, clearing hawker

waste and providing water tanker services for control of wind-blown litter. The Waste Department undertakes most of the area cleaning activities, although a number of other City departments also engage in area cleaning. The City has no policy currently in place that adequately addresses area cleaning.

The City's Collection and Area Cleaning departments still function to a significant extent within the structures and boundaries of the former seven Administrations, and cannot move forward in terms of efficient, integrated planning and restructuring until the institutional initiatives currently taking place have been finalised and adopted by the City Council. Given the financial and institutional constraints that hamper the functioning of the Waste Department, the Collection and Area Cleaning departments have nevertheless provided an effective service covering more than 95% of the City's inhabitants. Having won the prestigious "Cleanest City" award in 2003 is testimony of the success achieved by the City's Waste Department.

14.1.5 Waste Disposal

Since 1st July 1997, following restructuring of local government, the CMC Administration took over the responsibility for all municipal waste disposal in the CTMA. The Waste Disposal department has since brought waste disposal to levels of service that closely comply with the Minimum Requirements of the Department of Water Affairs and Forestry at all of the operating facilities in the metropole. Standards of public health and the state of the environment have consequently improved but the cost of waste disposal has risen significantly.

Given the situation that the City of Cape Town is currently engaged in a process of institutional restructuring and reform, the Waste Disposal department is unable to reach optimal levels in terms of its staffing, provision of infrastructure and financial resources due to constraints being applied.

Arising from the Feasibility Study towards an Integrated Waste Management Plan undertaken in 1999, the Waste Disposal department has adopted a strategic decision to develop a regional waste disposal facility for the future disposal of waste, to be serviced from a number of transfer stations to be established in the CTMA. This decision means that waste reduction will in future play a more vital role, given the high cost of transporting waste to a remote facility.

The role of the private sector in waste disposal must not be ignored. The disposal of hazardous wastes is largely undertaken by the private sector and a significant quantity of the waste stream, especially with regard to commercial and industrial wastes, is disposed of at privately-owned waste disposal facilities.

14.1.6 Waste Minimisation

There is currently no legislation in South Africa and no policy within the City explicitly requiring "Waste Minimisation" measures as part of day-to-day waste management. Given the high cost of transporting and disposing of waste, it is imperative that the City develops a

policy to reduce waste through recycling, including composting and reuse of builders' waste. South Africa has made significant strides over the past decade in terms of waste minimisation and the City should be encouraged to pursue a bold approach in this regard.

The Project Team has undertaken a comprehensive study of the various activities that constitute waste prevention and waste reduction and has identified the principal gaps and needs that should be addressed if effective waste minimisation and recycling measures are to be implemented effectively throughout the City of Cape Town.

A key constraint that currently hinders the more widespread adoption of waste minimisation and recycling – at the domestic, commercial and industrial levels – is the lack of sufficient incentives due to an inappropriate regulatory and financial policy framework. The Final Status Quo Report provides essential background information to enable the IWMP process to identify appropriate strategies and measures for the City to develop waste minimisation plans that are meaningful and sustainable.

14.1.7 Waste Generation, Quantities and Characterisation

Due to the lack of an integrated waste information system, the acquisition of data proved to be a difficult task. The information collected provides a reliable reference for further assessment and decision-making.

A breakdown of waste generation quantities indicates that the City currently generates approximately 2,16 million tonnes of waste per annum, of which 1,87 T/annum (86%) are landfilled and 0,29 T/annum (14%) recycled. The average growth rate of waste generated in the CTMA between 1986 and 2003 is 7,6%, with the current growth rate calculated to be 4,3% (compared to the 2001 census population growth rate in Cape Town of 1,57%).

A detailed waste stream analysis and development of a waste generation model will be undertaken during the assessment stage of the IWMP.

14.1.8 Hazardous and Special Wastes

The Final Status Quo Report presents a detailed summary of the status of hazard waste management in the CTMA. The Project Team had the benefit of drawing on the extensive work that has been carried out by the Department of Environmental Affairs and Development Planning (DEAD&P) on the generation, collection, treatment and disposal of hazardous and medical wastes generated in the Western Cape Province. A number of gaps have been identified that will be taken forward to the "Assessment" stage of the development of the IWMP.

14.1.9 Waste Information System

The Waste Department has no centralised integrated Waste Information System (WIS). A number of specific systems have been developed by the Waste Department, some of which are linked to the City's SAP system. A centralised integrated WIS will consolidate and integrate data in a format that will lead to improved efficiency, can report on the progress

and effectiveness of the strategies adopted in terms of the IWMP and can report to the WIS currently being developed by DEAD&P. The Waste Department has made provision for the procurement of a WIS in its 2004/2005 financial budget.

14.1.10 Waste Education and Special Projects

The Project Team highlights the importance of education and learning with respect to solid waste management and illustrates the power of education to shift perceptions towards litter and dumping and develop capacity to "reduce, reuse and recycle" waste in our daily lives. The major projects related to waste education within the CCT are described but it is beyond the scope of this study to list many smaller, independent education initiatives organised by civic groups, NGO's, CBO's, industries and schools.

The Waste Department places a high priority on waste education, training and awareness and the Final Status Quo Report describes the various initiatives that have recently been undertaken in the CTMA and identifies "gaps" to be taken forward to the "Assessment" stage of the development of the IWMP.

14.2 Recommendations

The Final Status Quo Report represents a comprehensive situational analysis of solid waste management in the Cape Town metropolitan area. It is recommended therefore that the Project Team proceed to the next stage of the process of developing the IWMP that entails the undertaking of an assessment of solid waste management functions and the determination of strategies and plans that will form the essence of the IWMP.