THE GOVERNMENT OF GAUTENG PROVINCE

Integrated Strategy and Action Plans for Sustainable Health Care Risk Waste Management in Gauteng

July 2004

Final Version

ACKNOWLEDGEMENT:

This Strategy and Action Plan for Health Care Waste Management in Gauteng was produced based on a number of consultations with a number of relevant stakeholders including a Workshop held 6-7 November 2003 for final discussion and consultation of the Strategy and Action Plan. Furthermore, the Strategy and Action Plan has been informed by, among others: (a) the Draft Gauteng Health Care Waste Management regulations (2004), (b) Draft Gauteng Waste Reporting Regulations (2004), (c) the Gauteng Health Care Waste Management Policy, November 2000, that was endorsed by the provincial legislature, (d) the Gauteng Health Care Waste Management Pilot Projects, (e) the preparations for the Gauteng Provincial Health Care Waste Tender and (f) the 2004 revision of the SANS Code 10248:2004 "Management of Healthcare Waste".

The Department of Agriculture, Conservation and Environment would like to thank the Danish International Development Assistance (DANIDA) for the invaluable support in the making of this Strategy and Action Plan as well as the overall support provided to the Gauteng Sustainable Health Care Waste Management Project that was conducted 2000-2004.

This document, the proceedings from the said workshop and many other documents are available at www.dacel.gov.za or www.csir.co.za/ciwm/hcrw .

Job	1459103		
Ref.No.	TOK 03-10-30 HCW Management Strategy & Action Plan Final V08	Prepd.	NJB/KO
Edition	Final Version	Checked	(DF/ TOK)
Date	July 2004	Appd.	(TOK)

Table of contents

Executive Summary

The Strategy and Action Plans for Sustainable Health Care Waste (HCW) Management in Gauteng is based on the Vision to, within the framework and principles of the NWMS, facilitate the establishment of an integrated, environmentally sustainable, occupationally healthy and safe, financially viable, institutionally feasible and operationally practical, comprehensive "cradle-to-grave" management system for HCW in Gauteng, covering all HCW generators in the province, addressing the short, medium and long-term needs.

HCW generators (large and small), service providers (transport, treatment and disposal) as well as administrative authorities on both provincial as well as local level, are all affected by the Strategy and are therefore identified in terms of roles and responsibilities for effective implementation of the Strategy.

This Strategy and Action Plan is one of many outcomes that are produced by the Province's project "Sustainable Health Care Waste Management in Gauteng". As such, this Strategy and Action Plan is informed by the many previous activities and outputs produced, including the Status Quo Study, the Gauteng Policy for Sustainable Health Care Waste management, the Feasibility Study for Suitable Provincial Health Care Waste management Scenarios, the HCW Pilot Projects at Leratong Hospital and Itireleng Clinic as well as inputs and comments received as a consequence of the numerous workshops and consultations that have been held during the planning and the course of the Project.

Much progress has been made during the course of the course of the Project. Hence, in many ways some of the objectives set out in the Policy endorsed by the Gauteng Legislature November 2001 has been achieved or is being achieved already.

Although focussing on health care risk waste (HCRW), health care general waste (HCGW) is also included in the Strategy, in as far is it would impact on the effectiveness with which HCRW is managed. All categories of HCRW, other than radioactive waste, are included in the HCW strategy. Radioactive waste is handled in terms of the National Nuclear Regulator Act, Act 47 of 1999, and falls outside of the jurisdiction of the HCRW management industry.

For the sake of prioritising Activities, the Action Plans are broken down into short-term (years 2003, 2004), medium-term (years 2005, 2006, 2007) and long-term (2008 onwards) phases. The short and medium term will predominantly serve for the implementation of the Strategy, whereas the long term is intended for the ongoing rendering of services, with focus on the monitoring and evaluation of the Strategy, thereby ensuring that the Strategy is serving its intended purpose in a sustainable manner.

The Strategy and Action Plans are developed against the current legal framework in South Africa, with cognisance also being taken of provincial and local legislation. In addition to a summary of the relevant legislation being provided in this document, reference is also made to a more comprehensive document in which detailed evaluation of the relevant legislation is provided.

Having formulised the Vision for the Strategy and Action Plans as described above, the next step in the Strategy formulation process was to identify and evaluate problems and shortcomings impeding the implementation of an environmentally sound, safe and healthy HCW management system. During the status quo study on HCW management in Gauteng, which was undertaken in the year 2000, a number of problems were identified and recorded. In addition to this, a number of problems were identified and listed during consultation with a wide range of stakeholders during the formulation of the project design for Sustainable HCW Management in Gauteng. Further problems and shortcomings were finally revealed during visits to a number of health care facilities and other institutions within the HCW management sector at the start of the project. All of the problems and shortcomings identified were categorised in accordance with what was considered to be its main

impact sphere, i.e. environmental, occupational health & safety, institutional & organisational, technical, financial, legal as well as information & awareness.

The principles and criteria, used to obtain direction during prioritisation of problems and needs, were adopted from the IP&WM White Paper, the Policy for Environmentally Sustainable HCW Management in Gauteng, as well as other nationally recognised policies relating to HCW management.

For each problem identified, one or more Activities were then described that are to be undertaken in order to address the identified problems. The list of Activities, including appropriate timeframes, is summarised in the main text of this document according to the party primarily responsible for its execution.

Against the background of the policies, principles and criteria, the various Activities were then combined to form short term, medium term and long term Action Plans, also identifying the organisation / institution responsible for execution of the various Activities. The Action Plans further identified supporting organisations considered to be co-responsible for execution of any particular Activity.

In order to be able to implement the Strategy, certain resources will be required and the next phase of the Strategy formulation was therefore aimed at estimating the human resources and financial input required to implement the Action Plans required for meeting the overall strategic targets. All resource requirements were finally presented in monitory terms, thereby allowing for the overall input to be presented in uniform and comparable units.

Having determined the resources required by each of the institutions or organisations for implementation of the Strategy, the extent to which the Activities will support the overall Objective was estimated by evaluating the anticipated impacts of the various Activities in terms of the environment, occupational health and safety, capacity building & awareness for improved HCW management.

The final step in the Strategy formulation process was to set up a programme for monitoring and evaluation of the level of success with which the various Activities were undertaken. This is an ongoing process not only to be undertaken during the short and medium terms, but also during the long-term. Should it be found that the Activities were not effectively implemented, or should Activities implemented not provide the required results, future adjustments are to be made that would ensure compliance with the overall objective.

1. Introduction

1.1 Background

Increased environmental awareness in South Africa has during the last decade focused the efforts amongst authorities on the potential impact that waste, and in particular Health Care Risk Waste (HCRW), can have on human health as well as the environment.

A lack of awareness and capacity within health care facilities do however often result in safe, healthy and environmentally sound Health Care Waste (HCW) management practises being neglected. Studies have demonstrated that much HCW is incorrectly segregated into HCRW and Health Care General Waste (HCGW). This not only results in HCGW being disposed of with HCRW, thus unnecessarily increasing the HCRW stream that requires costly treatment, but it also results in HCRW being disposed of with the HCGW, which creates a risk to all people coming in contact with such HCGW.

Untreated HCRW, as well as poorly incinerated HCRW ash, is often disposed of on uncontrolled waste disposal sites where informal reclamation of recyclable materials may be undertaken, thus exposing workers and pickers to increased health and safety risks. In addition to this, disposal of untreated HCRW on uncontrolled waste disposal sites may result in spreading of infectious materials by animals as well as the contamination of groundwater.

Even though the National Waste Management Strategies & Action Plans for South Africa – Action Plan for Waste Treatment & Disposal (Version C, Sept. 1999) makes provision for environmentally sound treatment and disposal of HCRW, the backlog in the provision of suitable HCRW treatment facilities and sustainable HCW management systems, were still to be addressed. Only as of the year 2002 was there sufficient HCRW treatment capacity at regional facilities in Gauteng, meeting the required environmental standards. Several of the plants commissioned before 2002 did not comply with the emission standards as laid down in the Gauteng HCW Management Policy (Nov. 2001) and the Gauteng HCRW Management Regulations (Draft 6, June 2003), resulting in a need either for such plants to be upgraded, or alternatively decommissioned.

The current situation in terms of availability of certain HCW management facilities therefore results in Gauteng's HCW management needs being classified as short, medium and long-term. It is however to be noted that the process of upgrading and improving on the standard of HCW management in Gauteng already commenced, with a number of critical improvements being made concurrently with the execution of the project on sustainable HCW Management in Gauteng.

1.2 Objectives and Vision

The objectives of this **Strategy and Action Plan** is to establish a framework for a broad course of actions designed to make the best use of resources and opportunities to improve on the standard of HCW management in Gauteng.

The Gauteng Provincial Government, with Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACEL) and Gauteng Department of Health (GDoH) as the two primary executing agencies, will implement the Strategy and Action Plans. The Strategy and Action Plans will furthermore, be implemented in close cooperation with all stakeholders – public as well as private - directly involved in HCW management in Gauteng.

Although the Strategy and Action Plans are primarily directed towards the stakeholders within HCW management, it will also impact on other health care facility staff members as well as patients.

The **Vision** of the Strategy, representing the final goal for all activities dealing with HCW management, is formulated as follows:

Vision of the HCW Management Strategy for Gauteng

The Vision of the Gauteng HCW Management Strategy is, within the framework and principles of the NWMS, to facilitate the establishment of an integrated, environmentally sustainable, occupationally healthy and safe, financially viable, institutionally feasible and operationally practical, comprehensive "cradle-to-grave" management system for HCW in Gauteng, covering all HCW generators in the province, addressing the short, medium and long term needs.

The immediate objectives of the Strategy are formulated as below:

The Immediate Objectives

- To formulate an integrated Strategy for sustainable HCW management for Gauteng;
- To define institutional arrangements required to render sustainable HCW Management in Gauteng;
- To develop Action Plans for implementation of the Strategy;
- To estimate financial and human resource requirements for implementation of the Action Plans;
- To evaluate the impacts of implementing the Action Plans, including impacts on the environment, occupational health & safety, public health, employment, etc;
- To put in place verification mechanisms.

It is the ambition that the implementation of the Strategy will result in improved HCW management in Gauteng that will amongst others lead to the following results:

Expected Results

- Reduced environmental impact resulting from HCRW, in particular from treatment and disposal of HCRW and its residues;
- Improved occupational health and safety at all organisations involved in HCW management, with for instance a reduction in the number of needle stick injuries;
- Effective cooperation between the various governing bodies as well as the various parties responsible for HCW management in both the public and private sector;
- Sound and effective technical solutions to address the various shortcomings identified in the HCW management system;
- Cost effectiveness and affordability of HCW treatment and disposal, through for instance improved HCW segregation as well as more efficient and safer handling of the HCW;
- Legal mechanisms for promulgation of the required standards as well as effective enforcement of such standards;
- A society that is well informed around the risks associated with HCW as well as staff that are well trained in effective HCW management.

The Strategy is formulated as a part of the Sustainable HCW Management Project, implemented by the Gauteng Government, and executed by the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACEL) and Gauteng Department of Health (GDoH).

The Strategy follows among others a Policy on Sustainable HCW Management in Gauteng (Nov. 2001) that set out the overall framework for the initiatives within HCW management, as well as the subsequent Gauteng HCRW Management Regulations (Draft 6, June 2003). The Strategy and the Action Plans are developed within the framework of the National Waste Management Strategies & Action Plans SA – Action Plan for Waste Treatment & Disposal (Version C, Sept. 1999).

1.3 Scope of the Strategy and Action Plans

The Strategy and Action Plans covers all organisations that are involved in HCW Management in Gauteng, including:

Health care waste generators:

Large scale HCW generators:

- Public hospitals and clinics;
- Private hospitals and clinics;
- Blood transfusion centres.

Small scale HCW generators:

- Medical laboratories;
- Pharmaceutical industries;
- Medical General Practitioners;
- Medical specialists;
- Dentists;
- Allied practitioners;
- Pharmacies;
- Old age homes;
- Hospices;
- Veterinary hospitals;
- Veterinary surgeons;
- Rehabilitation centres;
- Psychiatric hospitals;
- Prisons;
- Tattoo artists and piercing shops;
- Mortuaries;
- Private homes.

HCRW service providers:

HCRW transport operators;
HCRW treatment plants
Disposal facilities.

Administrative authorities:

Provincial government bodies:

Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACEL);
Gauteng Department of Health (GDoH);
Gauteng Department of Public Transport, Roads and Works (GDPTRW);

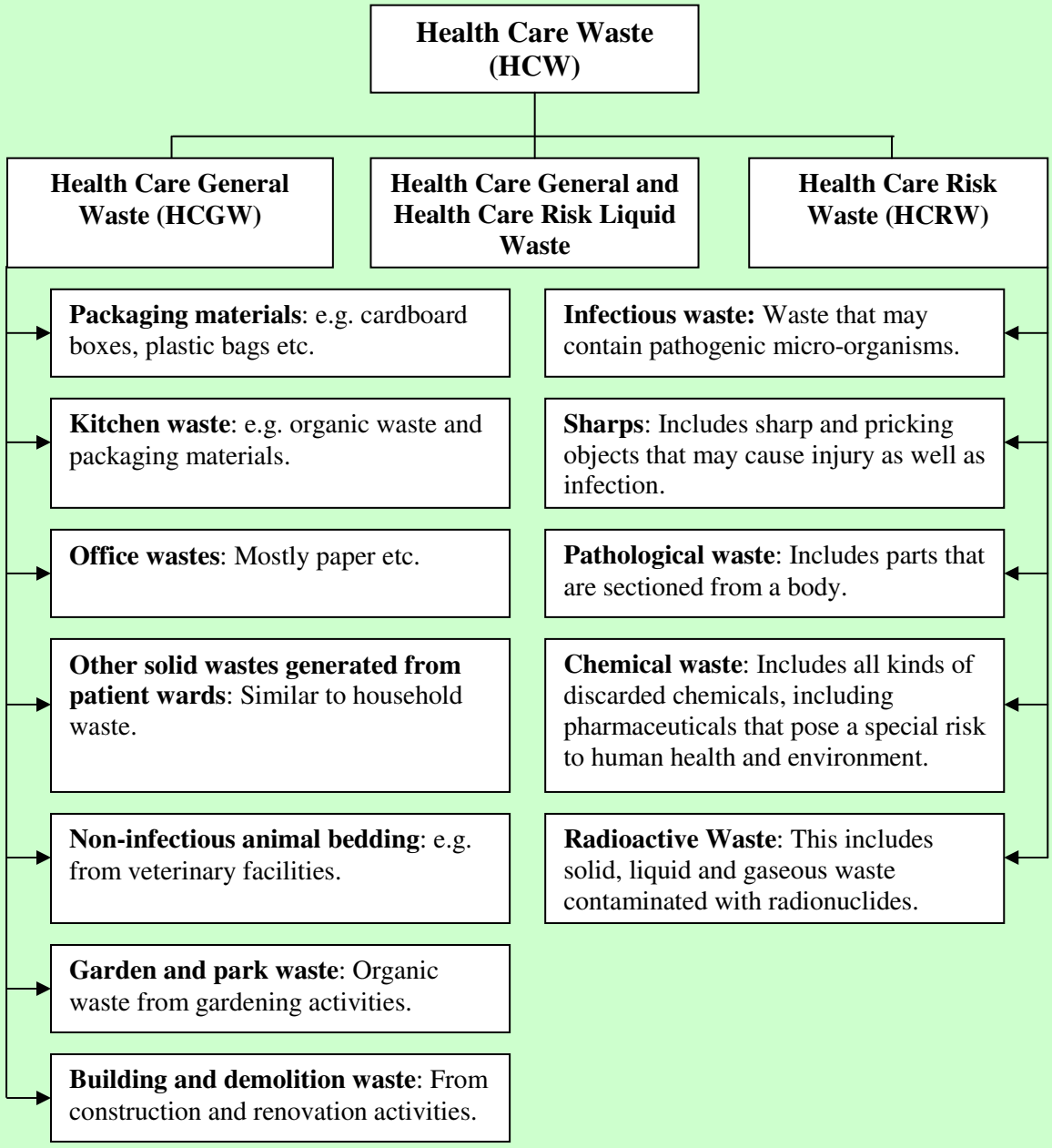
Local Authorities.

The map presented in Figure 1.1 indicate some of the cities and towns in Gauteng, as well as the distribution of major HCW generators throughout the province (“Feasibility Study into the Possible Regionalisation of Health Care Risk Waste Treatment / Disposal Facilities in Gauteng” (Nov. 2000))

Figure 1.1: *HCRW generation in Gauteng (Nov. 2000).*

The Strategy and Action Plans are intended to address the management of all HCRW categories, as indicated in Box 1.1 below:

Box 1.1: *Primary Health Care Waste Categories*



The total amount of HCRW generated in Gauteng by both public and private health care facilities during the year 2000 was estimated to be approximately 1 200 tonnes per month. ("Feasibility Study into the Possible Regionalisation of Health Care Risk Waste Treatment / Disposal Facilities in Gauteng", Nov 2000).

In Gauteng, some 600 major HCRW generators produced in the order of 89% of the total HCRW stream, whilst about 9 700 minor generators produced in the order of 11% of the total HCRW stream. ("Feasibility Study into the Possible Regionalisation of Health Care Risk Waste Treatment / Disposal Facilities in Gauteng", Nov. 2000).

More data on the amounts of HCRW generated at the various types of health care facilities, as well as estimates on the predicted future generation of HCRW has been presented in previous publications from DACE. Having considered a number of variables that are likely to impact on future HCRW generation rates, a preliminary estimate of the future HCRW generation rates predict that

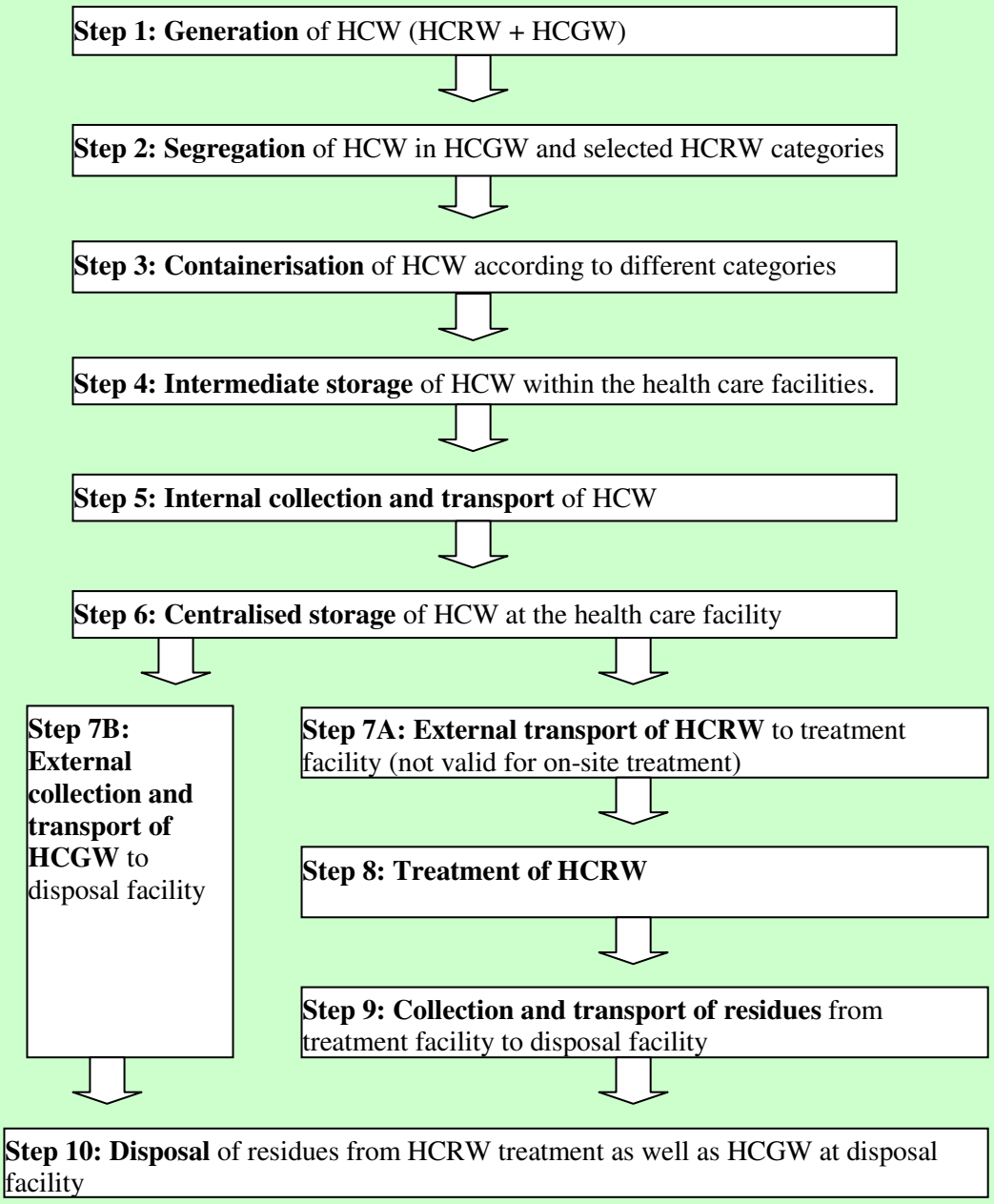
there may be an increase in the HCRW generation rate by approximately 1,7% per annum. However, if HCW segregation is done more effectively, it is estimated that there could be a reduction in the HCW generation rate, by as much as 30% during the period when improved segregation is taking place.

Figure 1.2: *Potential variations in the HCRW mass being generated in Gauteng during the next 17*

years.

HCW is passing through a number of steps from its point of generation at the health care facilities, through transport and treatment to its final disposal at a landfill. This so-called waste flow is illustrated in Box 1.2 below.

Box 1.2: *The "cradle to grave" HCW flow path.*



Having considered the distribution and rate of HCRW generation in Gauteng, it is further important that the available HCRW treatment facilities in Gauteng be evaluated. The various thermal and non-thermal HCRW treatment facilities permitted by the end of year 2003 to operate in accordance with the Gauteng HCRW Management Regulations (Draft 6, June 2003), are presented in Figure 1.4 below:

Figure 1.4: HCRW treatment facilities in Gauteng (Dec. 2003), permitted in accordance with the Gauteng HCRW Management Regulations (Draft 6, June 2003)

More information on the HCW Management system in Gauteng is available "Feasibility Study into the Possible Regionalisation of Health Care Risk Waste Treatment / Disposal Facilities in Gauteng" (Nov. 2000).

1.4 Phasing of the Strategy

The Strategy covers an initial 5-year implementation period as the short and medium term phases from the start of implementation, which was set as 1 January 2003. Subsequent to the implementation phase, ongoing execution and monitoring is to be undertaken as the long-term phase. The overall period is therefore divided into three phases as follows:

Phasing of the Strategy and Action Plans

- Short term phase: Year 2003 and 2004
- Medium term phase: Year 2005, 2006 and 2007
- Long term phase: Year 2008 onwards.

The Strategy and Action Plans covers the initial two phases for implementation thereof, after which the focus will in the long-term phase move towards sustaining of Activities implemented, whilst also monitoring the process to ensure that the required Outputs are achieved.

2. Institutional and legal framework for HCW Management

This chapter includes a brief introduction to the institutional and legislative framework for the present HCW management system in Gauteng. This framework will serve as a basis for the formulation of the Strategy and the Action Plans.

2.1 Institutional framework for HCW Management

The most important stakeholders related to HCW Management in Gauteng are:

- Gauteng Department of Health (GDoH);
- Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACEL);
- Gauteng Department for Public Transport Roads and Works (GDPTRW)
- Local Governments, in particular in relation to planning for waste management incl. local and smaller generators of HCRW within the communities;
- Private and public/municipal health care facilities (HCF's);
- Private HCRW management service providers.

GDoH has the overall responsibility to ensure that resources are made available by both private and public HCF's to have its staff members sufficiently trained and informed about the requirements for effective HCW management in accordance with the Gauteng HCRW Management Regulations, and that the HCF's are sufficiently staffed to fulfil their respective duties and responsibilities. GDoH furthermore has the general responsibility to plan for all developments within the health care sector.

DACEL has the overall responsibility to protect the environment by setting and enforcing standards by regulating any potentially polluting activities, including collection, transport, treatment and disposal of HCW.

GDPTRW are responsible for maintaining the infrastructure at provincial health care facilities including on-site HCRW Incinerators and carrying out works orders for various infrastructure including HCW storage areas.

Local Governments are responsible for local level waste management, which may include issuing Bylaws for various waste streams including HCRW generated within the community. Also Local Governments runn municipal clinics and home based care services etc. that generate HCRW.

The private and public HCF's have through its "duty-of-care", the responsibility for the appropriate daily handling of HCW, including segregation of HCW, internal collection and transport of HCW as well as ensuring that the HCRW is treated and disposed of according to the legal requirements.

The private HCRW management service providers are responsible to provide a service for the environmentally sound, yet healthy and safe collection, transport, treatment and disposal of HCRW generated at the various HCF's.

Apart from the aforesaid stakeholders that are central to HCW management activities, the Department of Labour plays an important role as it is responsible for issuing and monitoring of regulations that will ensure occupationally healthy and safe working conditions during the handling of HCRW, at HCF's as well as at service providers.

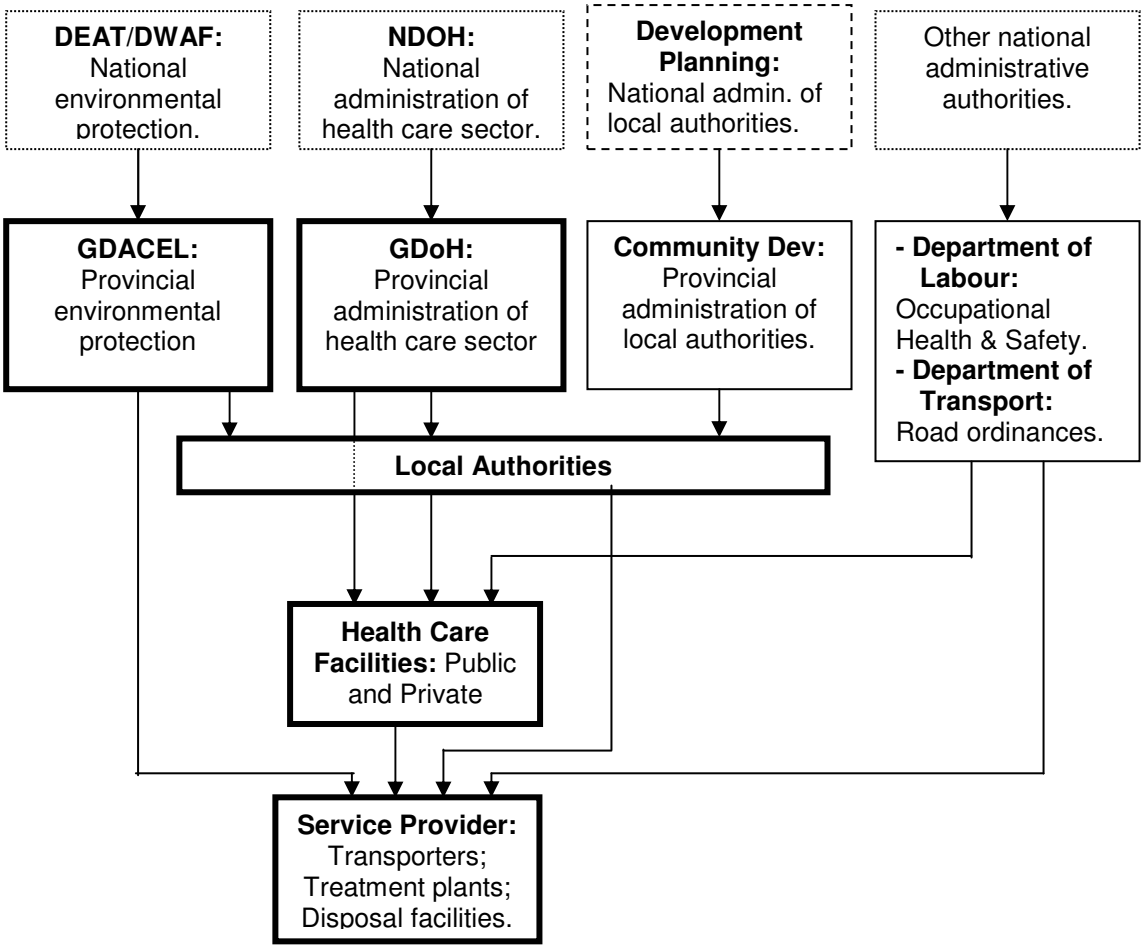
The Department of Transport has in turn the responsibility to ensure that transport of untreated HCRW as well as the residues from treated HCRW is undertaken in accordance with the relevant Transport Acts, and that such Acts addresses the special risks associated with the transport of HCRW.

Since most of the Regulations enforced by provincial authorities stems from acts promulgated by National Departments, the National Departments plays a leading role in establishing the framework for HCW management at provincial level. In addition to provincial authorities, local authorities are also responsible for the enforcement of certain acts promulgated on national level.

.

The institutional framework for HCW management in Gauteng, as described above, is illustrated in the following diagram (Box 2.1).

Box 2.1: *Institutional Framework for HCW Management in Gauteng.*



2.2 Legal framework for HCW Management in Gauteng

A number of acts, regulations, policies and strategies - at national, provincial and local government level - presently set the framework for HCW management activities in Gauteng. The most important acts, regulations, codes, policies and strategies related to HCW management are briefly described below:

2.2.1 Policies and Strategies

During the last decade a number of policy and strategy documents were formulated to provide direction to environmental aspects and waste management activities in South Africa, which included the following:

- Consultative National Environmental Policy Process (CONNEP);

- National Environmental Management Act (NEMA);
- Integrated Pollution and Waste Management Policy (IP&WM);
- National Waste Management Strategy (NWMS);
- Policy for Environmentally Sustainable HCW Management in Gauteng (PESHCWM).

The content and relationship between these policy documents are summarised below. A further discussion on the relevance of the various policies, principles and criteria in relation to this Strategy and Action Plans is presented under Strategic Targets below.

- **Consultative National Environmental Policy Process (CONNEP)**

  The NWMS is the result of a policy development process initiated in 1995 and completed in 1997 by the Consultative National Environmental Policy Process (CONNEP). CONNEP was the first fully participatory environmental policy formulation process in South Africa and culminated in the promulgation of the National Environmental Management Act (Act 107 of 1998) (NEMA) and the development of the Integrated Pollution and Waste Management Policy (IP&WM). NEMA represents the vehicle for the development of environmental legislation and the IP&WM Policy represents the vehicle for the development of waste policies.

  The IP&WM Policy formed the basis for the NWMS. Environmental protection is highly esteemed in South Africa with South Africa being one of the few countries in the world, which make the access to a clean environment a constitutional right and environmental impact a crosscutting issue to be considered in all aspects of governmental activities.

- **Integrated Pollution and Waste Management (IP&WM)**

  A draft White Paper on Integrated Pollution and Waste Management (IP&WM) for South Africa: A policy on pollution prevention, waste minimisation, impact control and remediation, was published under Notice 227 of 2000 (Government Gazette No. 20978 of 17 March 2000) ("the White Paper"). In the draft White Paper a paradigm shift is represented towards pollution prevention, waste minimisation, cross-media integration, institutional horizontal and vertical integration of departments and spheres of government, and involvement of all sectors of society in pollution and waste management. The White Paper details the government's specific policy for pollution and waste management that will apply to all government institutions (including the municipal sphere of government) and to society at large and to all activities that impact on pollution and waste management.

  The management of waste will be implemented in a holistic and integrated manner, and will extend over the entire waste cycle, from cradle-to-grave, including the generation, storage, collection, transportation, treatment and final disposal of waste. Government aims to (i) encourage the prevention and minimisation of waste generation, (ii) encourage the management and minimisation of the impact of unavoidable waste from its generation to its final disposal, (iii) ensure that integrity and sustained "fitness for use" of all environmental media, i.e. air, water and land, (iv) ensure the remediation of any pollution of the environment by holding responsible parties accountable and (v) ensure environmental justice by integrating environmental considerations with social, political and development needs and rights of all sectors, communities and individuals.

- **National Waste Management Strategy (NWMS)**

  A project for the development of a National Waste Management Strategy (NWMS) was initiated by DEAT and DWAF (with financial assistance from DANCED), which resulted in the following needs being identified:

  - A paradigm shift from end of pipe treatment to pollution prevention / waste minimisation;
  - Provision of basic Waste Management services to all South Africans;

- Proper consideration of health and safety;
- Integrated Waste Management;
- Integration with other government initiatives, programs and administrative systems.

The draft strategy document outlined the functions and responsibilities of the three spheres of government (i.e. the national, provincial and municipal spheres), together with a time frame for implementation. The NWMS will be regularly reviewed and the success of the strategy will be critically dependent on the availability of the necessary resources, rapid capacity building, political will and support from stakeholders. Each element of the strategy identifies strategic initiatives that must be addressed in order to move from a fragmented to an integrated approach to Waste Management. .

The principles and criteria used in the development of the NWMS are those of the Constitution, CONNEP, NEMA as well as the Policy on Integrated Pollution and Waste Management. Some of the principles used are: accountability; cradle-to-grave; equity; integration; open information; polluter pays, subsidiary; waste avoidance and minimisation.

It was agreed through the NWMS consultation process that waste would be categorised as either general or hazardous and within these two categories waste would be classified according to its source, namely domestic, commercial or industrial. Although general waste does not pose a significant threat to public health or the environment if managed properly, hazardous waste has the potential, even in low concentrations, to have a significant adverse effect on the public health or the environment and is categorised according to nine classes and four hazard ratings as described in the DWAF Minimum Requirements trilogy of documents (Waste Management Series 1994, as revised in 1998). Infectious HCRW is accordingly classified as Hazard Rating 1 or an Extreme Hazard waste. This is considered to be waste of first priority concern, containing significant concentrations of inter alia infectious products.

- **Gauteng Health Care Waste Management Policy**

The special risk that HCRW poses to society, together with the recent poor level of HCW management in Gauteng, resulted in the need for general improvement of HCRW management standards in the province.

In meeting its constitutional responsibility to ensure that every South African lives in an environment that is not harmful to his / her health or well-being, the Department of Agriculture, Conservation, Environment and Land Affairs (DACEL) together with the Gauteng Department of Health (DOH), embarked on a comprehensive programme to improve the quality of the environment through the prevention of pollution, the conservation of natural resources and the securing of ecologically sustainable development. The formulation of the HCW Management Policy therefore formed part of a process of facilitating the implementation of sustainable HCW management in Gauteng, in accordance with the following vision:

To ensure that integrated, environmentally sustainable and occupationally safe HCW management be established in Gauteng; within the frames and principles of the National Waste Management Strategy (NWMS), and covering the full HCW stream.

The Policy set the framework for this HCW management strategy and action plans. It also provides guidance to both HCW generators and HCW service providers when planning investments, preparing for increased performance standards and future market conditions, as well as when developing suitable treatment facilities and equipment for service delivery to the HCRW generators.

Based on a needs analysis undertaken as part of the policy formulation process, the policy statement for HCW management was formulated. As the overall policy statement consists of

relatively broad requirements, a set of Interim Minimum Requirements for HCW Management were included in the Policy document.

2.2.2 Acts and Regulations

NATIONAL LEGISLATION

- **The Constitution of the Republic of South Africa, Act 108 of 1996**

The Constitution of the Republic of South Africa, Act 108 of 1996 (the Constitution), is the supreme law of the country. All laws, including environmental laws, must comply with the Constitution.

The Constitution contains a Bill of Rights that guarantees certain fundamental rights. Environmental rights are set out in the Bill of Rights in Section 24 of the Constitution. The Bill of Rights also guarantees other fundamental rights, such as the right to access to information and the right to administrative justice. These rights bolster or strengthen the environmental rights guaranteed in the Constitution.

Section 24 of the Constitution, guarantees everyone 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.

All HCRW management related legislation must therefore be in compliance with the Constitution.

- **Atmospheric Pollution Prevention Act 45 of 1965**

The Atmospheric Pollution Prevention Act 45 of 1965 sets out the procedure for the certification of, what is referred to in the Act, as “Scheduled Processes”. A Scheduled Process is defined under Section 1 of the Act to mean any works or processes specified in the Second Schedule to the Act. For the purposes of the Atmospheric Pollution Prevention Act, waste incineration is considered a Scheduled Process. That is to say processes for the destruction by incineration of waste that contains chemically bonded halogens, nitrogen, phosphorus, sulphur or metal, or any waste that can give rise to noxious or offensive gases. Accordingly, the incineration of HCW is a process that is controlled under the Atmospheric Pollution Prevention Act.

The effect of this is that any person operating on a Scheduled Process in or on any premises is prohibited from so doing unless the owner is the holder of a Registration Certificate issued under the Act. In addition, there are emission guidelines for HCRW incinerators that were developed by the Directorate: Air Pollution Control, Department of Environmental Affairs and Tourism (DEAT).

The Minister of Environmental Affairs and Tourism has identified certain activities that may have a substantial detrimental effect on the environment. Such activities include Scheduled Processes listed in the Schedule to the Atmospheric Pollution Prevention Act.

Accordingly, a written authorisation issued by the Minister or an authority designated by for instance notice R 1184 in the Government Gazette which delegates certain powers to the MEC,

is required where HCRW is treated and disposed of by incineration. This authorisation will only be issued after the consideration of reports concerning the impact of the proposed activity and of alternative proposed activities on the environment. This requires that an environmental impact assessment (EIA) be undertaken.

Any emissions resulting from HCRW treatment must comply with the atmospheric pollution prevention act. With the DEAT Emission Guidelines being incorporated in the Gauteng HCRW Management Regulations, it will be enforceable in Gauteng.

- **Common Law of Nuisance**

A nuisance can be defined as the unlawful disturbance of a person's right to the enjoyment of his, her or its land. It has also been described as "interference with the physical comfort of human existence". Particular nuisances include causing foul, unpleasant or noxious odours or stenches, noise that is excessive, smoke and water pollution.

In order to succeed in an action based on nuisance, it is not necessary to prove either intention or negligence on the part of the perpetrator. What has to be established is that there has been an "unreasonable" interference with the use and enjoyment of the plaintiff's land. The determination of whether the interference is unreasonable entails a consideration of the measure or extent of the interference, the duration of the interference, the suitability of the plaintiff's use of his, her or its land and the plaintiff's susceptibility to harm, the time at which the interference took place, and the possibility of avoiding or mitigating the harm.

This would apply to most activities associated with HCW management and is therefore to be taken into consideration in planning and executing any HCW management activities.

- Environment Conservation Act 73 of 1989

The object of the Environment Conservation Act 73 of 1989 is to provide for the effective protection and controlled utilisation of the environment and for matters incidental thereto, including the following:

- Prohibition of littering;
- Removal of litter;
- Waste disposal;
- Listing of activities having a detrimental effect on the environment

The Minister of Environment Affairs and Tourism further identified the following activities (amongst others) as being activities in terms of Section 21 of the Environment Conservation Act that may have a substantial detrimental effect on the environment:

1) The construction or upgrading of certain infrastructure and facilities;
2) The disposal of waste in terms of Section 20 of the Environment Conservation Act;
3) Scheduled Processes listed in the Schedule to the Atmospheric Pollution Protection Act; and
4) Handling and treatment of hazardous waste as set out in Section 1(C) of the EIA Guidelines in the Environmental Conservation Act.

The most important aspect of the Environmental Management Act related to HCW management is the requirement for environmentally sound disposal of HCGW and residues from HCRW treatment facilities. Such sites may only be operated under a permit issued by the Minister of Water Affairs and Forestry. A disposal site is any site used for the accumulation of waste for the purpose of disposal or treatment of such waste. Waste includes any liquid, gas or solid material originating from any commercial or industrial area which is discarded by any person, is accumulated for disposal without additional treatment, is stored for the purpose of recycling or

reuse, or extraction of a reusable product from such matter, excluding, water for industrial purposes, matter discharged into a septic tank, building rubble used as a fill and any radioactive substances discarded in terms of the Nuclear Energy Act 92 of 1982.

- **Hazardous Substances Act 15 of 1973**

  HCW may include chemical waste, such as all types of discarded chemicals, including pharmaceuticals and cytotoxic substances that may pose a special risk to human health and the environment. The object of the Hazardous Substances Act 15 of 1973 is to provide for the control of substances which may cause injury or ill health to or death of human beings by reason of the toxic, corrosive, irritant, strongly sensitising or flammable nature or a generation of pressure in certain circumstances and for the control of certain electronic products.

  The Hazardous Substances Act categorises certain groups of hazardous substances. Groups I and II relate to substances of a toxic, corrosive, irritant, strongly sensitising or flammable nature. Group III relates to electronic products and Group IV relates to radioactive materials. It is possible that chemical waste that may contain Group I and II hazardous substances.

  This being the case, the Hazardous Substances Act, and Regulations promulgated there under, should be considered relevant to HCW management, and in particular regulations relating to the disposal and transportation of such substances.

- **Health Act 63 of 1977**

  The Health Act 63 of 1977 provides that local government is obliged to take measures to maintain its district in a clean and hygienic state and to prevent the occurrence of any nuisance, unhygienic or offensive condition or other condition that could be of danger to the health of any person. Where such a nuisance or a condition has occurred, local government is obliged to abate the nuisance or remedy the condition. It is possible that HCW, if incorrectly managed or disposed of, may amount to such nuisance or unhygienic or offensive conditions. In addition, the Minister is empowered in terms of the Health Act to make regulations relating to conditions that are dangerous to health. These may include regulations relating to the disposal of waste to prevent the development of conditions dangerous to health and the removal from premises of waste.

- **Human Tissue Act 65 of 1983**

  The Human Tissue Act 65 of 1983 provides that the Minister of Health may make regulations regarding the disposal of human bodies and tissue no longer required. The Human Tissue Act does not expressly provide for the disposal of HCW.

- **Medicines and Related Substances Control Act, 1965 (Act 101 of 1965)**

  Section 27 of Medicines and Related Substances Control Act, 1965 (Act 101 of 1965) provides information on the controlled manner in which different Scheduled substances are to be destroyed. Schedule 5, 6, 7 and 8 substances may only be destroyed in the presence of an inspector, an officer of the SA Police Service or any other person authorised by the Director General. A certificate confirming the destruction of the substance (or case number) is to be entered into the register. The Council may however authorise the destruction of Schedule 5 and 6 substances by the manufacturer in the absence of an inspector. Schedule 1, 2, 3 and 4 substances may be destroyed by a pharmacist or an authorised person in charge of the place where the substances are kept, who is then to certify the destruction. Destruction of medicines and scheduled substances are to be done in such a manner that it is not retrievable. No medicines are to be disposed of to municipal sewer.

- **National Environmental Management Act 107 of 1998 (NEMA)**

The National Environmental Management Act 107 of 1998 (NEMA) requires that waste be avoided, minimised, reused or recycled where possible or as a last resort be disposed of in a responsible manner. The Act requires for environmental management to be integrated. In terms of NEMA a duty-of-care is placed on every person who causes, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring. These measures may include ceasing, modifying or controlling any act, activity or any process causing the pollution or degradation; containing or preventing the movement of pollutants or cause of the degradation; and eliminating any source of the pollution or degradation. It is possible that if incorrectly managed, HCW may cause such pollution or degradation of the environment.

It should be highlighted that for the purposes of NEMA, “environment” includes the surroundings within which humans exist and that are made up of properties and conditions that influence human health and well-being. In addition, the definition of “pollution” in the Act includes a change in the environment caused by amongst others, substances emitted from any activity including the storage and treatment of waste or substances where that change has an adverse effect on human health or well-being. Similar ‘duty-of-care’ provisions are provided for in the National Water Act 36 of 1998 where certain activities may impact on water resources.

- **National Nuclear Regulator Act 47 of 1999**

The aim of the National Nuclear Regulator Act 47 of 1999 is to provide for the establishment of a National Nuclear Regulator in order to regulate nuclear activities, its objects and functions, the manner in which it is to be managed and its staff matters. In addition, the Nuclear Regulator Act aims to provide for safety standards and regulatory practices and the protection of persons, property and the environment against nuclear damage.

The National Nuclear Regulator Act will impact on the management of radioactive HCRW.

- **National Road Traffic Act 93 of 1996**

The National Road Traffic Act, 93 of 1996 replaced the Road Traffic Act 29 of 1989 with effect from 1 August 2000. Only certain Sections of the National Road Traffic Act have not as yet come into force. The purpose of the National Road Traffic Act is to provide for road traffic matters, which shall apply uniformly throughout the Republic of South Africa.

Section 54 of the Act provides that no person shall, except as prescribed, offer for transportation in a vehicle, or transport in a vehicle, or accept after transportation in, on or by a vehicle, any prescribed dangerous goods (defined as the commodities, substances and goods listed in the standard specification of the South African Bureau of Standards SABS 0228 'The identification and classification of dangerous substances and goods’).

HCRW will per definition also be considered to be dangerous goods that will therefore be subject to the conditions stated in the National Road Traffic Act.

- **National Water Act 36 of 1998**

The core values of the National Water Act are found in Section 2 of the National Water Act that describes its purpose and includes:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial and gender discrimination;
- Promoting efficient and sustainable use of water in the public interest;

- Facilitating social and economic development;
- Providing for growing demands of water users;
- Protecting aquatic and associated eco-systems and their biological diversities; and
- Reducing and preventing the pollution and degradation of water resources.

Of particular relevance is the impact that HCW or residues from HCRW treatment facilities that are illegally dumped or disposed of on inappropriate waste disposal facilities can have on water resources.

- **Nuclear Energy Act 46 of 1999**

The objective of the Nuclear Energy Act is to provide for the establishment of the South African Nuclear Energy Corporation Limited, a public company wholly owned by the State. In addition, the Nuclear Energy Act aims to provide for responsibilities for the implementation of the Safeguards Agreement and any additional protocols entered into by the Republic and the International Atomic Energy Agency in support of the Nuclear Non-Proliferation Treaty.

Furthermore, the object of the Nuclear Energy Act is to regulate the acquisition and possession of nuclear fuel, nuclear and related material and related equipment as well as the importation and exportation of nuclear fuel, material and equipment in order to comply with the international obligations of the Republic. Measures regarding the discarding of the radioactive waste and the storage of irradiated nuclear fuel are also prescribed in the Nuclear Energy Act.

The Nuclear Energy Act will once again impact on the management of radioactive HCRW.

- **Occupational Health and Safety Act 85 of 1993**

The Occupational Health and Safety Act provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery and the protection of persons other than persons at work against hazards to health and safety arriving out of or in connection with activities of persons at work. Regulations promulgated under the Occupational Health and Safety Act for Hazardous Biological Agents apply to every employer and self-employed person at a workplace where Hazardous Biological Agents are deliberately produced, processed, used, handled, stored or transported at the workplace or an incident that may result in such persons being exposed to Hazardous Biological Agents while performing his or her work. For the purposes of these Regulations Hazardous Biological Agents means hazardous biological agents which are micro-organisms, including those that have been genetically modified, pathogens, cells, cell cultures and human endoparasites that have the potential to provoke an infection toxic effects. These Hazardous Biological Agents are sub-divided into certain groups.

The Regulations provide for the disposal of Hazardous Biological Agents providing that an employer or self-employed person shall lay down procedures for appropriate decontamination and disinfection; implement written procedures enabling infectious waste to be handled and disposed of without risk; ensure that all fixture and equipment which have been in contact with hazardous biological waste are disinfected and decontaminated and ensuring that all hazardous biological waste that can cause exposure is disposed of only in sites especially designed for this purpose in terms of the Environment Conservation Act.

Also promulgated under the Occupational Health and Safety Act are the Hazardous Chemical Substances Regulations. These regulations are applicable to an employer or self-employed person who carries out work at a workplace that may expose any person to the intake of a hazardous chemical substance at that workplace. In terms of these Regulations, an employer shall, as far as reasonably practicable recycle all hazardous chemical substance waste and where disposal of such substances may take place, that this only happens on sites specifically

designated for that purpose in terms of the Environment Conservation Act and in such a manner that it does not cause a hazard inside or outside the site.

- **Local Government Municipal Systems Act 32 of 2000**

  The Local Government Municipal Systems Act provide for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of local communities, and ensure universal access to essential services and to ensure that such services are affordable to all.

  In terms of service delivery to the local community, the Act is intended to establish a simple and enabling framework for the core processes of planning, performance management, resource mobilisation and organisational change which underpin the notion of developmental local government. It is also intended to empower the poor and ensure that municipalities put in place service tariffs and credit control policies that take their needs into account by providing a framework for the provision of services, service delivery agreements and municipal service districts.

  The Act finally requires the establishment of a support framework as well as monitoring and standard setting by other spheres of government in order to progressively build local government into efficient, frontline development agencies capable of integrating the activities of all spheres of government for the overall social and economic upliftment of communities in harmony with their local natural environment.

  Although not explicitly referring to HCW, the Local Government Municipal Systems Act will have a direct impact on the way in which Local Authorities render HCW management services in its area of jurisdiction.

PROVINCIAL LEGISLATION

- **Local Government Ordinance**

  In terms of Section 79(2)(a) of Local Government Ordinance 17 of 1939, a municipal council may establish, maintain and carry out services for the removal, destruction or disposal of night soil, urine, slops, rubbish, carcasses of animals, any refuse or anything of whatever nature which it suspects to have been abandoned. Furthermore, Section 80 of the Local Government Ordinance provides that municipal councils may make by-laws relating to keeping any public place, vacant stand, vacant erf, stream or water course clean and to this end to prohibit any person from littering or allowing any liquid to flow into or onto such place it may also regulate or prohibit bathing and washing in such place and prevent the pollution of any water which inhabitants of the municipal council have a right to use.

- **Gauteng Health Care Risk Waste Management Regulations**

  These Regulations apply to all persons who generate, collect, receive, store, transport, treat, dispose of, or handle health care risk waste in any form in the Province of Gauteng. The Regulations deal with the following aspects related to HCRW management:

  (a) General requirements applicable to HCRW;
  (b) General requirements applicable to HCRW generators;
  (c) Requirements applicable to HCRW transporters;
  (d) Requirements applicable to HCRW transfer stations;
  (e) Requirements applicable to persons operating HCRW treatment facilities;
  (f) Enforcement of the Regulations;

  The Schedules to the Regulations provide detailed information on the following:

(a) Minimum requirements for packaging for HCRW;
(b) Standards for disinfection of reusable HCRW containers;
(c) Minimum environmental performance requirements for non-combustion (alternative) treatment technologies;
(d) Forms for temporary authorisation, authorisation and registration;
(e) Local Government HCW Management Plan;
(f) Details on Reporting, HCRW Management Plans and Audits;
(g) Tracking document for use by HCRW transporters;
(h) Minimum Requirements for internal transport and storage of HCRW, external collection and offsite transport of HCRW as well as for HCRW treatment and disposal.

- **Gauteng Waste Information Regulations;**

These Regulations apply to all persons who generate, collect, receive, store, transport, treat, dispose of, or handle waste in any form in the Province of Gauteng, and deals in particular with the waste information system.

The objectives of the waste information system are to:

(a) Store and provide data and information for the protection of the environment and continuous improvement of integrated waste management;
(b) Provide information to organs of state and the public;
(c) Facilitate a preferred reporting method which provides secure internet reporting formats, and monitoring intervals;
(d) Ensure that adequate and reliable information is produced and stored in a suitable format for auditing purposes.

This Regulation will apply to all HCRW generated in Gauteng, HCRW transported into or out of Gauteng, as well as all HCRW treated and disposed of in Gauteng.

LOCAL GOVERNMENT BY-LAWS

- **Johannesburg Metropolitan Municipality Waste Management Bylaws**

The main objectives of the Johannesburg Metropolitan Waste Management Bylaws are:

(a) The regulation of the collection, disposal and recycling of waste;
(b) The regulation of the provision of council services by service providers and commercial services by licensees; and
(c) Enhancing sustainable development.

In terms of HCW management, the waste management bylaws particularly deals with the registration (and permitting where applicable) of HCW generators, HCRW transporters, HCRW treatment facilities as well as disposal facilities used for the disposal of HCGW and residues from treated HCRW. Certain minimum standards are further set to make equipment compliant for use in the Metropolitan Council's area of jurisdiction.

- **City of Tshwane Metropolitan Municipality Solid Waste By-laws**

Chapter 6 of the City of Tshwane Metropolitan Municipality's Solid Waste Bylaws deals with "Special Industrial, Hazardous or Medical Waste". It requires all generators of such waste to notify the Municipality within seven days of the composition, quantities as well as the proposed handling and disposal procedures. Section 20 deals with the storage of such waste, whereas Section 21 deals with the removal and disposal of "Special Industrial, Hazardous or Medical Waste". All transporters of HCRW are to be approved by the Municipality and treatment is only

to be done at the Municipal incinerator, unless approval was granted for the use of any other incinerator. No treatment process other than incineration is allowed for in the Bylaws.

2.2.3 Codes and Standards

In addition to various policies and strategies, as well as the acts and regulations described above that impact on HCW management in Gauteng, there are a number of Codes and Standards in use at present. Although the latter does not have any independent legal standing, it plays a prominent role in the development of the Gauteng HCW management Strategy and Action Plans, which will not only advance uniformity in standards, but it will also support training and awareness initiatives:

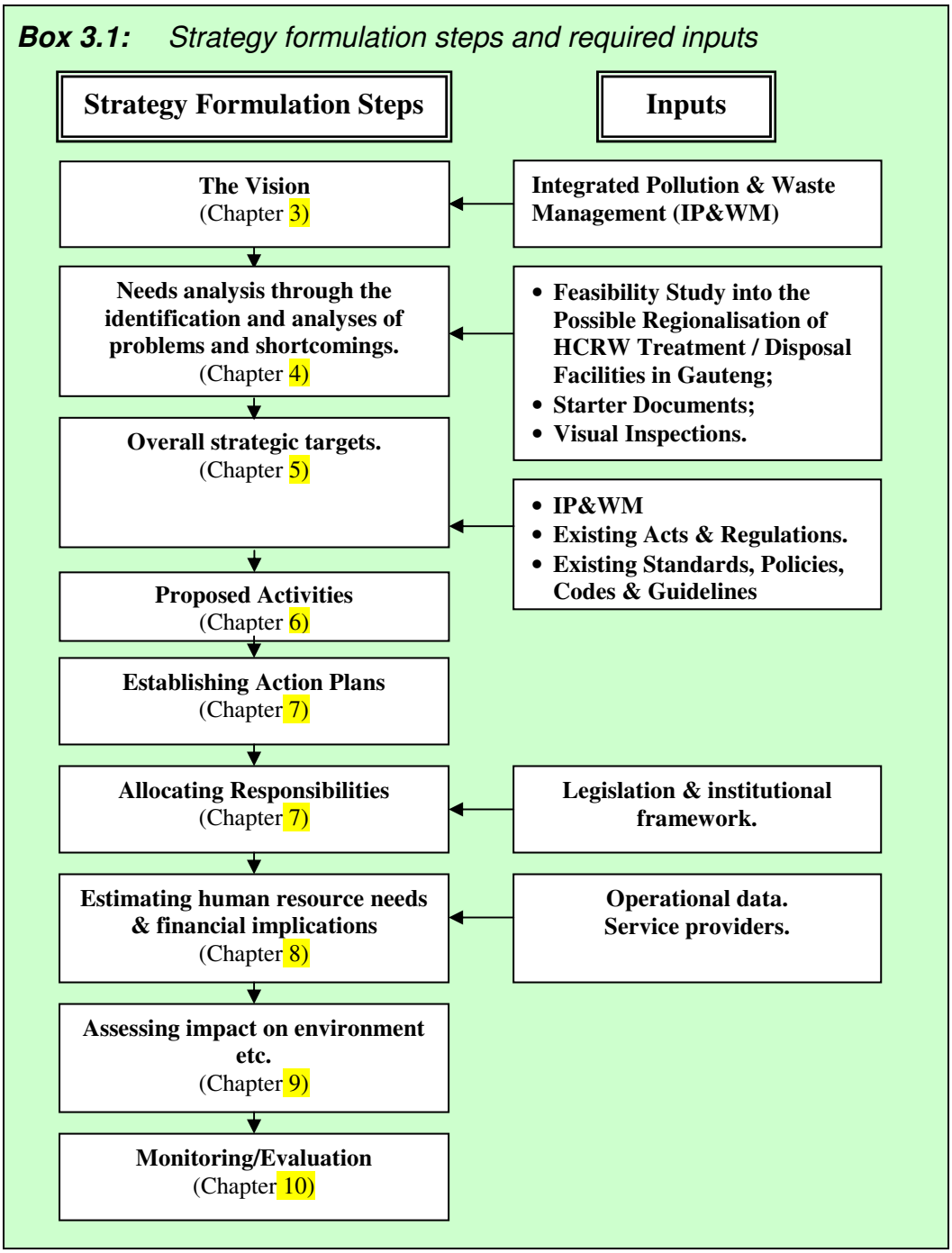
- SABS Code of Practice on Hazardous Substances – SABS 0228:1995;
- SABS Code of Practice for the Handling and Disposal of Waste Materials within Health Care Facilities – SABS 0248:1993 (as revised in 2003);
- Department of Water Affairs and Forestry (DWAF) Policy on the Disposal of Medical Waste;
- Department of Water Affairs and Forestry's (DWAF) "Minimum Requirements for Handling, Classification and Disposal of Hazardous Waste – 2nd Edition 1998";
- Department of Water Affairs and Forestry's (DWAF) "Minimum Requirements for Waste Disposal by Landfill - 2nd Edition 1998".

The Minimum Requirements Series published by the Department of Water Affairs and Forestry (DWAF) consists of three documents: (i) Minimum Requirements for Waste Disposal by Landfill; (ii) Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste and (iii) Minimum Requirements for Water Monitory at Waste Management Facilities. It establishes a reference framework of standards for waste management in South Africa. It also facilitates the enforcement of the landfill permitting system provided for in terms of Section 20(1) of the Environment Conservation Act, Act 73 of 1989. The objective of setting Minimum Requirements is to take proactive steps to prevent the degradation of water quality and the environment, and to improve the standard of waste disposal in South Africa.

3. The Strategy formulation process

This Strategy and Action Plans are formulated through a process comprising of the formulation steps and inputs as indicated in the following diagram (Box 3.1):

Box 3.1: *Strategy formulation steps and required inputs*



The different steps in the Strategy formulation process are explained in the following sections, including the inputs feeding into the various steps.

3.1 The Vision

The Vision represents the final goal (ideal situation) for HCW management for the overall health care sector in Gauteng. Hence, the Vision must be ambitious, and it may not be possible to set a

precise date for its accomplishment. However, it is important to formulate a Vision in order to make stakeholders aware of targets set for the Strategy in its final stage. The White Paper on Integrated Pollution and Waste Management for South Africa (Notice 227 in Government Gazette No. 20978 of 17 March 2000) includes a number of policy statements, which will, together with existing policies, strategies, acts, regulations, codes, standards and guidelines concerning HCW management, serve as input to the formulation of the Vision.

3.2 Identification of problems and shortcomings

Before the formulation of specific activities forming part of the Strategy can start, it is important that problems and shortcomings currently impeding the implementation of the ideal system for HCW management be identified.

The "Feasibility Study into the Possible Regionalisation of Health Care Risk Waste Treatment / Disposal Facilities in Gauteng – Nov. 2000" had, as part of the status quo investigation at the time, identified a variety of problems. In addition to this the Sustainable HCW Management in Gauteng Project Design Document also listed a number of problems and addressing these problems was considered to be a prerequisite for implementation of Sustainable HCW Management in Gauteng.

Furthermore, visits to a number of health care facilities and other institutions within the HCW management sector during the start of the Sustainable HCW Management Project, aimed at obtaining a better understanding of the current HCW management situation in Gauteng, revealed further problems and shortcomings, all of which are presented in a summarised version in Chapter 4. The detailed list of problems appears in Annexure 4.

3.3 Overall Strategic Targets

To prioritise the problems to be addressed, certain relevant policies, principles and criteria are to be adopted from the IP&WM White Paper, the Policy for Environmentally Sustainable HCWM in Gauteng and other provincially and nationally recognised policies that relates to HCW management, to provide the necessary direction. Refer to Chapter 5.

3.4 Activities

For each Problem identified, one or more Activities are described that will have to be undertaken in order to address such problems initially identified. The list of Activities (including appropriate timeframes) is summarised in Chapter 6. This represents the elements of the Action Plans that will finally have to be implemented to reach the overall Objective of the Strategy. The activities will follow the same numbering sequence used for the objectives.

3.5 Action plans and responsibilities

Based on the policies, principles and criteria, Activities will be combined to form a short and a medium term Action Plan, as indicated in Chapter 7.

The identification of roles and allocation of responsibilities is thereafter aimed at identifying the organisation / institution responsible for execution of the various activities. Furthermore, it will identify other organisations considered to be co-responsible for execution of any particular Activity.

3.6 Human resource and financial implications

This phase of the Strategy formulation will be aimed at estimating the human resources and financial input required to implement the Action Plans required for meeting the overall strategic targets. Input required for individual Activities will be estimated to determine the resource requirements for each of the Activities. Refer to Chapter 8.

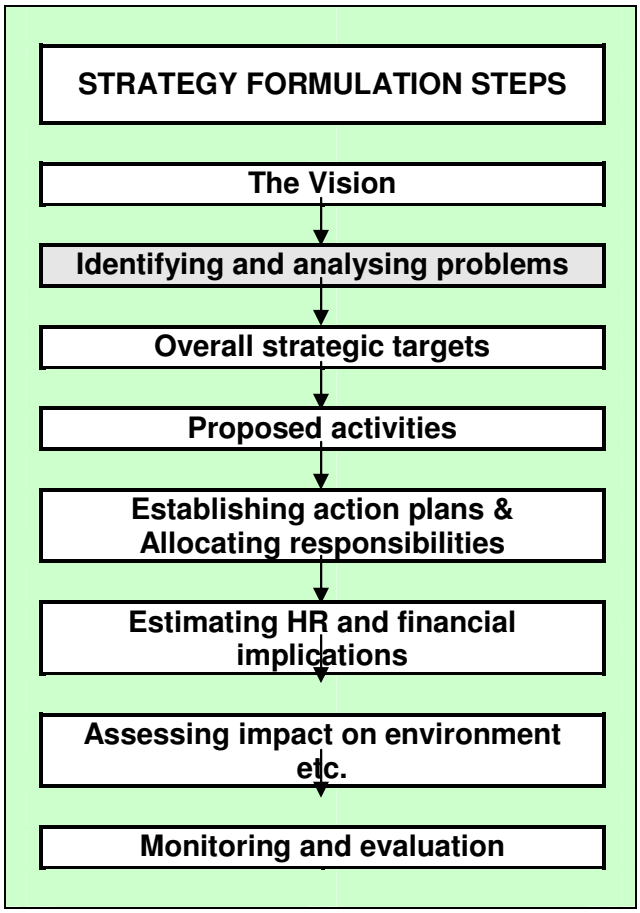
3.7 Impacts

To determine the extent to which the Activities will support the overall Objective, this phase will evaluate the anticipated Impacts of the various Activities in terms of the environmental, occupational health and safety, capacity building and awareness around improved HCW management, etc. Refer to Chapter 9.

3.8 Monitoring and evaluation

The final step in the Strategy formulation process is to set up a program for monitoring and evaluation of the level of success with which the various Activities were undertaken. Refer to Chapter 10.

4. Identified Problems and Shortcomings



This chapter of the Strategy summarises the problems and shortcomings that were identified during the previous phases of the project as well as during investigations undertaken on selected health care facilities, HCRW treatment facilities, hazardous waste landfills, etc. Reporting on the status of HCW management in Gauteng was amongst others based on information obtained from the "Feasibility Study into the Possible Regionalisation of Health Care Risk Waste Treatment / Disposal Facilities in Gauteng" (Nov. 2000), the NWMS and Action Plans for South Africa, (Action Plan for Waste Treatment and Disposal, (Version C, Sept. 1999)), the Project Design Document (Sustainable HCW Management in Gauteng – Project Document, (July 2000)) and Project Process Report (Sustainable HCW Management in Gauteng – Final Process Report, (July 2000)) and the White Paper on IP&WM (Notice 227 of 2000 (Government Gazette No. 20978 of 17 March 2000)).

Although the problems are presented in detail in Annexure 4 of this report, the following summary is intended to make readers aware of the nature of the problems against which this Strategy and Action Plans were developed.

4.1 Problem Identified at National, Provincial and Local Government Level

A clear lack of coherent HCW Management legislation at all three tiers of government has been identified. This includes also practical guidance to generators of HCRW as well as control and monitoring of generators and service providers collecting, treating and disposing off HCRW. Also, lack of adequate tools to monitor the development in generation and treatment capacity has left the government unable to predict and counteract treatment capacity crises in the past, which has led to unacceptable storage and illegal dumping of HCRW in the past. The lack of adequate legislation makes it impossible to prosecute unacceptable disposal of HCRW such as poor segregation and disposal of HCRW with the general waste stream.

To this end it has been decided to develop and promulgate provincial HCRW Management Regulations in Gauteng to provide a suitable tool for monitoring and improving the performance of the HCRW Service Industry and well as the Duty of Care by the HCRW generators.

4.2 Problem Identified at Health Care Facilities:

Starting from the point of generation, it was found that segregation of HCW into HCRW and HCGW is not done effectively, thus resulting in large amounts of HCGW having to be treated with HCRW at increased expense to the health care facilities, whilst at the same time placing HCGW workers as well as the public at risk by disposing of HCRW in the HCGW stream.

A number of shortcomings were further identified in as far as containerisation of HCRW is concerned. Without uniform standards, HCRW is often stored in containers that are not resistant to damage or that expose workers to injuries and / or infection. No local standards existed for storage of containerised HCRW at health care facilities or treatment facilities, which resulted in HCRW management practices that are not meeting internationally recognised standards. By being exposed to the environmental elements, containers are often damaged which results in HCRW being exposed. As many of the aforesaid problems can be ascribed to a lack of understanding and awareness among those who are directly involved in the handling of the waste, e.g. doctors, nurses, cleaners etc., it reflects in a need for increased education and training of staff in both the health care sector as well as the HCRW management industry.

4.3 Problems Identified at Transport Operators:

Transport of HCRW is often done in vehicles that are not suitable designed and equipped for the transport thereof and the lack of an effective manifest/tracking system that also results in HCRW generated in Gauteng finding its way to neighbouring provinces, where even less control over treatment standards or general waste disposal site operations make it easier for scrupulous transport contractors to dispose of poorly treated or even untreated HCRW. Small quantities of HCRW being generated by small scale generators like private practitioners or by remote rural clinics makes it difficult for collection thereof to be undertaken cost effectively, which often results in the waste being disposed of as part of the HCGW stream.

4.4 Problems Identified at Treatment Plants:

Although this aspect was addressed since the start of the project through the commissioning of sufficient environmentally sound HCRW treatment facilities in Gauteng, limited treatment facilities, operating to poor environmental standards, resulted in the emission of hazardous substances to the environment, compromising the health of the surrounding communities.

Uncoordinated and badly managed treatment facilities sometimes created backlogs in the treatment of HCRW, particularly when there were breakdowns to any of the plant or equipment. In such instances, poor management practices at treatment facilities also resulted in HCRW not being treated on a "first-in first-out" rotation basis. Since there was a shortage of treatment capacity, this resulted in HCRW remaining untreated for relatively long periods of time without being stored under controlled temperatures.

With noncompliant HCRW treatment facilities often not meeting the combustion requirements, manual overloading of the available treatment facilities resulted in the HCRW not always being completely combusted by the time that it left the incinerators and instead of being disposed of at hazardous waste disposal sites, the ash from incinerators were often disposed of at general waste disposal sites. Available treatment facilities at public hospitals were also not used optimally.

Although it is to be recognised that the above problems are not applicable to all facilities and that some of the problems were sufficiently addressed since the start of the project, there are still a number of problems encountered which result in poor HCRW management practices, not only creating a risk to the environment, but also to the health and safety of HCW workers as well as members of the public in general.

In order to make the problems operational in relation to this Strategy, all problems has been listed and grouped into the following issues:

- Environmental problems;
- Occupational health and safety problems;
- Institutional/Organisational problems;
- Technical problems;
- Financial shortcomings;
- Legal constrains;
- Information and awareness problems.

Furthermore, the listed issues have been grouped into each of the categories of institutions that the waste is handled by as well as the authorities that have the overall responsibility for the waste management, including:

- Provincial authorities;
- Local authorities;
- Health care facilities;
- Transport operators;
- Treatment operators;
- Disposal facilities.

The complete list of problems identified throughout all phases of the project and which appears in Annexure 4, are summarised in Table 4.1 below. *Although the problems listed may not apply to all parties from any particular category, problems encountered are generically listed.*

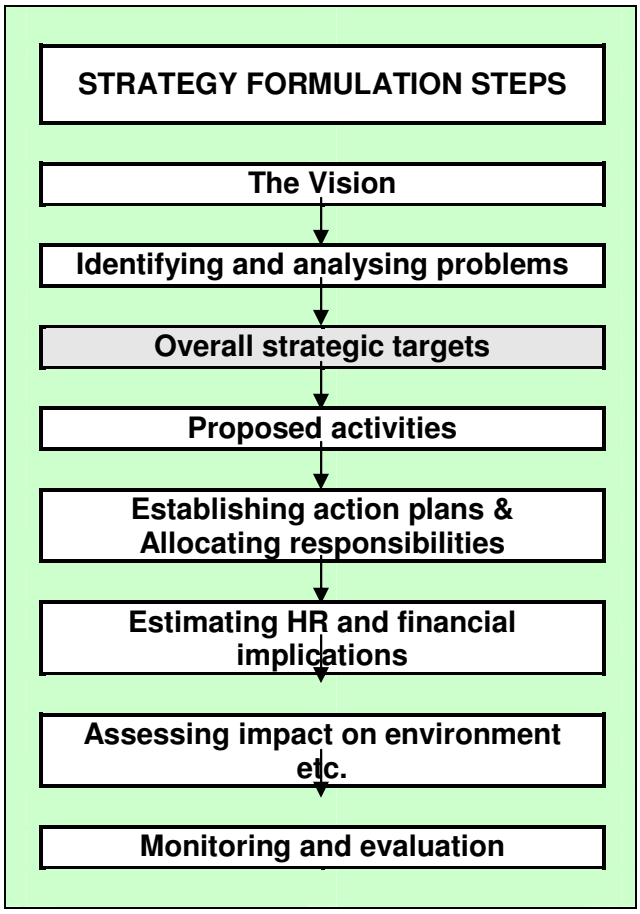
Table 4.1: *Summary of HCWM problems identified in Gauteng*

	A. Provincial authorities.	**B. Local authorities.**	**C. Health care facilities.**	**D. Transport operators.**	**E. Treatment operators.**	**F. Disposal facilities.**
1. Environmental problems.	- Air pollution; - Soil pollution; - Water pollution	- Illegal disposal in environment; - Poorly / untreated HCRW on disposal sites; - Limited rules for liquid waste to sewer.	- Environmental aspects has low priority; - Spillage; - Liquid waste.	- Collection vehicle emissions; - HCW spillage; - Collection frequencies.	- Treatment plant emissions; - Poor plant performance; - Poor plant maintenance; - Residue disposal.	- Poorly / untreated HCRW on disposal sites; - Leachate.
2. Occupational health and safety problems.	- Insufficient enforcement of OHS legislation.	- Insufficient enforcement of OHS legislation.	- Risk of infection; - Risk of injuries; - Heavy lifts.	- Risk of infection; - Risk of injuries; - Heavy lifts; - Dust exposure.	- Risk of infection; - Risk of injuries; - Heavy lifts; - Heat stress; - Emissions; - Dust exposure.	- Risk of infection; - Risk of injuries; - Heavy lifts; - Dust exposure.
3. Institutional / Organisationa	- Lack of expertise & capacity;	- Lack of expertise & manpower;	- No firm HCWM structures;	- Not registered as transporters;	- Not permitted for treatment; - No reporting.	- Not permitted for operation.

l problems.	- Insufficient inter-departmental communication	- Insufficient communication on government levels.	- Lack of expertise & manpower; - Not registered as generators.	- No reporting.		
4. Technical problems.	- Lack of data and information for planning.	- Lack of data and information for planning.	-Inappropriate HCW management equipment.	- Inappropriate HCW transport equipment.	- Inefficient or no flue gas cleaning.	- Lack of appropriate disposal sites.
5. Financial shortcomings.	- Insufficient allocation of funds.	- Insufficient funds available.	- Inappropriate allocation of funds.	- Inappropriate costing at tender.	- Inappropriate costing at tender.	- Insufficient funds available; - Inappropriate costing at tender; - Land filling is cheapest option
6. Legal constrains	- Gaps in national environmental legislation; - Low level of environmental regulations; - Lack of cooperation between provinces; - Poor enforcement.	- Limited HCWM bylaws promulgated; - Poor enforcement.	- Lack of compliance with OHS Act, Gauteng Reg's.	- Lack of compliance with Road Ordinance, OHS Act, Gauteng Reg's.	- Lack of compliance with environmental legislation, OHS Act, Gauteng Reg's.	- Lack of compliance with Minimum Requirements and OHS Act.
7. Information and awareness problems	- Lack of training materials; - Lack of trainers	- Lack of training materials; - Lack of trainers	- Insufficient awareness on handling of HCW.	- Insufficient awareness on handling and transport of HCW; - Not experienced in HCWM.	- Insufficient awareness on handling and treatment of HCW; - Not experienced in HCRW treatment.	- Insufficient awareness on disposal of waste; - Not experienced in waste disposal.

Each of the problems listed in Annexure 4 is sequentially numbered in accordance with the issues and categories that it refers to. If there is more than one problem for each issue and category, it is numbered in the following way, e.g. the "Missing registration" (under institutional / organisational problems for Health Care Facilities) is numbered as 3.B.2. This numbering is then followed throughout the remainder of the report, during the formulation of Activities (Chapter 6).

5. Strategic targets



This chapter summarises the officially formulated policies, principles, priorities and regulations that relates to the achievement of Sustainable HCW Management in Gauteng, and hence to the formulation of the Strategy and Action Plans.

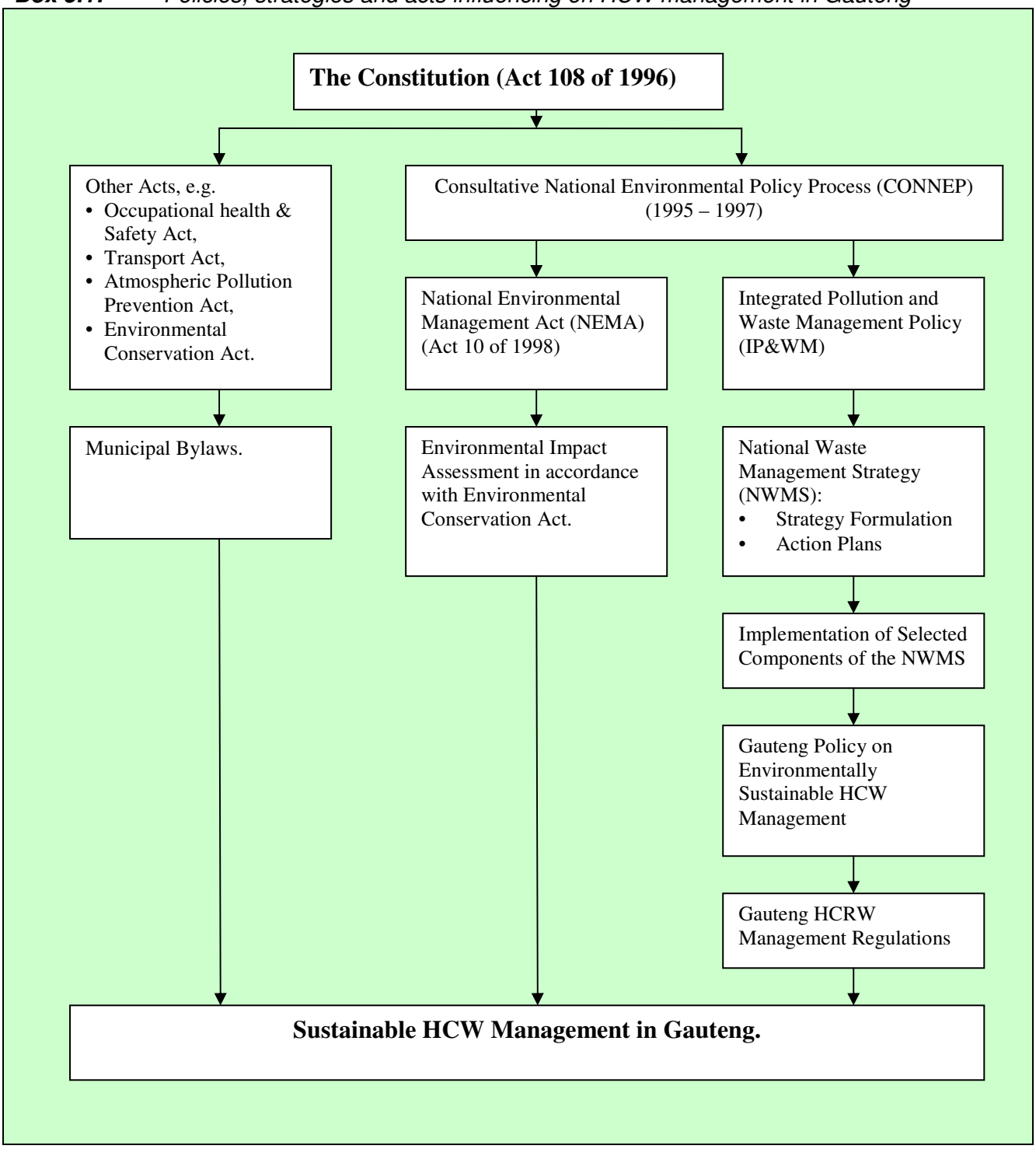
Based on these policies etc., overall Strategic Targets have been formulated to create a framework for proposing Activities and establishing Action Plans in the following chapters.

5.1 Earlier established principles and strategies

5.1.1 Summary of Policies and Strategies

With reference to the detailed description presented in Chapter 2, the interrelationship between the overall strategies, policies and acts within the environmental field and the initiatives to improve the HCW management in Gauteng is illustrated in Box 5.1 below.

Box 5.1: *Policies, strategies and acts influencing on HCW management in Gauteng*



5.1.2 Overall guiding principles for Waste Management

Table 5.1 below presents the principles from the IP&WM White Paper considered to be relevant for HCW Management in Gauteng. The table furthermore includes a brief interpretation of the aforesaid principles.

Table 5.1: *Guiding principles for HCW Management*

IP&WM Principle	Interpretation
Allocation of functions	All functions necessary to achieve Sustainable HCW Management in Gauteng should be clearly defined and informed to ensure effective execution thereof by the responsible parties.
Alignment of resources	Sufficient and appropriate resources should be allocated for the various activities related to HCW Management, thus enabling its execution.
Capacity building and education.	Effective capacity building and education can be considered to be one of the cornerstones of a well-functioning HCW Management system.
Conflict of interest.	Conflict of interest among the various stakeholders should be analysed and addressed through consensus processes, thus ensuring a uniform approach by avoiding internal conflicts during implementation of the Strategy and Action Plans.
Coordination.	Effective coordination amongst the various stakeholders and within the respective organisations should be facilitated to ensure optimum utilisation of resources.
Cradle-to-grave.	The waste flow from generation to final disposal at a disposal site should be taken into consideration, thus ensuring smooth interfacing between various activities and effective addressing of the activities forming part of the overall waste flow.
Full cost accounting.	All costs should be analysed and taken into consideration in the further development of the HCW Management system, which is to include all costs often considered to be overhead or hidden costs.
Open information.	All stakeholders and employees within the individual organisations should have easy access to all relevant information to allow for a transparent decision making process as well as an informed labour force.
Participation.	All stakeholders and employees within the individual organisations should be involved in decision-making that is related to the development and implementation of the Sustainable HCW Management system.
Prevention.	During the execution of any activities within HCW Management, prevention should have priority over curing and the necessary preventative measures are therefore to be implemented to ensure the health and safety of workers.
Polluter pays.	The general principle of polluter pays should be applied when dealing with HCW, thus placing the responsibility for the environmentally sound, yet healthy and safe treatment and disposal of HCW on the generators of such waste.
Waste avoidance and minimisation.	Waste generation should be avoided and minimised to the extend possible, which also includes effective segregation of HCW at source, resulting in the amount of HCRW requiring sophisticated treatment before disposal, also being reduced.

5.1.3 Strategic target on Waste management in general

Subsequent to the IP&WM White Paper, a National Waste Management Strategy was formulated that was to set the goals and objectives, which in more practical terms defined the overall framework for formulation of waste management practices in South Africa.

The Objective of the National Waste Management Strategy (NWMS) can be described as follows:

Objective of the National Waste Management Strategy (NWMS)

To reduce waste and diminish the environmental impact of all forms of waste so that socio-economic development of South Africa, the health of its people and the quality of the environmental resources are not adversely affected. This objective will be achieved through the development and subsequent establishment of an integrated waste management strategy which when implemented, will extend over the entire waste cycle from "cradle-to-grave".

The NWMS identified and addressed several key issues that will affect Waste Management. The relevant issues are listed below:

Key issues for waste management

- To bring about a paradigm shift from end-of-pipe control to waste prevention and minimization;
- To ensure that public health and occupational health issues receive due consideration in all waste management practices;
- To initiate a system of integrated waste management through the implementation of institutional arrangements and funding mechanisms;
- To ensure integration of waste management initiatives with other government initiatives, programs and administrative systems;
- To integrate waste management with the overarching process of environmental planning, management and protection.

5.1.4 National recommendations on HCW Management

The NWMS process was followed by the development of a program for the implementation thereof, with five starter documents being produced during March 2000. These documents prepared the framework for the development of implementation plans. One such starter document specifically deals with HCW Management issues and is entitled "Program for the implementation of the NWMS Phase One: Management of HCW". The aim of the document was to make a brief study on the current status of HCW Management in South Africa, approaches followed internationally and the particular needs of South Africa.

The abovementioned document made various recommendations, some of which are listed below:

National recommendation for HCW Management

- Integrated guidelines covering the full spectrum of HCW are to be developed;
- Provincial governments are required to undertake surveys determining the quantities, types and locations of all categories of HCW generated within its areas of jurisdiction, as well as on the status and capacity of the available treatment and disposal facilities;
- Training and awareness raising programs must, based on the aforesaid guidelines, be developed and implemented within all health care facilities;
- Sufficient funding must be made available to undertake the required studies and implement the training and awareness programs.

These national government policy processors lay the foundation on which provinces can build in order to achieve the goal of protecting the environmental rights of all South Africans through the implementation of appropriate but effective waste management systems.

5.1.5 Gauteng HCW Management Policy

The Policy for Environmentally Sustainable HCW Management in Gauteng (Nov. 2001) includes a preliminary investigation and analysis of the current problems related to HCW Management in Gauteng. Based on the problems identified the Policy included a number of overall policy statements for the management of HCRW in Gauteng. The Policy furthermore laid down a number of minimum requirements dealing with a variety of HCW Management related issues, including environmental, occupational health & safety, institutional, legislative, financial as well as information & training matters.

5.1.6 Gauteng Health Care Risk Waste Management Regulations;

These Regulations apply to all persons who generate, collect, receive, store, transport, treat, dispose of, or handle HCRW in any form in the Province of Gauteng. The Regulations deal with the following aspects related to HCRW management:

- General requirements applicable to HCRW;
- General requirements applicable to HCRW generators;
- Requirements applicable to HCRW transporters;
- Requirements applicable to HCRW transfer stations;
- Requirements applicable to persons operating HCRW treatment facilities;
- Enforcement of the Regulations;

The Schedules to the Regulations provide detailed information on the following:

- Minimum requirements for packaging for HCRW;
- Standards for disinfection of reusable HCRW containers;
- Minimum environmental performance requirements for non-combustion (alternative) treatment technologies;
- Forms for temporary authorisation, authorisation and registration;
- Local Government HCW Management Plan;
- Details on Reporting, HCRW Management Plans and Audits;
- Tracking document for use by HCRW transporters;
- Minimum Requirements for internal transport and storage of HCRW, external collection and offsite transport of HCRW as well as for HCRW treatment and disposal.

Adherence to these Regulations will be a prerequisite in Gauteng and any Strategy or Action Plans developed for implementation in Gauteng are therefore to be based on the principles of the Regulations.

5.2 The Vision of the Gauteng Strategy for HCW Management

Based both on the national strategies and policies as well as the Gauteng HCW Management Policy and HCRW Management Regulations, the **Vision** of this Strategy, representing the final goal for all activities dealing with HCW management, can be described as follows:

Vision of the HCW Management Strategy for Gauteng

The Vision of the Gauteng HCW Management Strategy is, within the frames and principles of the NWMS, aimed at facilitating the establishment of a comprehensive and integrated,

- environmentally sustainable,
- occupationally healthy and safe,
- financially viable,
- institutionally feasible,
- operationally practical,
- “cradle-to-grave”

HCW management system for implementation in Gauteng, covering all private and public health care facilities in the province, addressing the short, medium and long-term needs.

Within the context of this Strategy, the terms used in describing the Vision will have the following meanings:

- *Comprehensive and Integrated* refers to a system covering all elements required to render a sustainable HCW management service, where all elements of the system interacts, for instance by ensuring that in avoiding pollution of one medium, it will not be at the expense of another media. It further implies that all activities required along the HCW flow path, from generation to final disposal, are coordinated to ensure the most effective use of available resources;

- *Environmentally sustainable* HCW management systems are considered to be systems that do not affect the environment in a negative and irreversible manner in the long term, or as defined by the United Nations Environment Programme: "A system that can provide the present generation with its basic needs without compromising the possibilities of future generations to fulfil their needs";

- *Occupationally healthy and safe* refers to the need for the implementation of the Strategy without putting the health and safety of workers, patients or the general public at risk at any time during the process;

- *Financially viable system* refers to HCW management systems that are within the financial ability of the health care facilities in general, in the short, medium and long term;

- *Institutionally feasible* means a HCW management system that is structured in such a way that it fits in with the organisational structures in which it is to be implemented, as well as with the affected stakeholders and authorities;

- *Operationally practical* refers a HCW management system that is from a technical and operational point of view feasible for implementation in an effective manner, when considered against the background of limitations and constraints that may exist in South Africa;

- *"Cradle-to-grave"* refers to a HCW management system that deals with HCW from the point of generation, through containerisation, internal and external transport, onsite or offsite storage, to treatment and final disposal of the residues.

The immediate objectives of the Strategy are formulated as below:

The Immediate Objectives

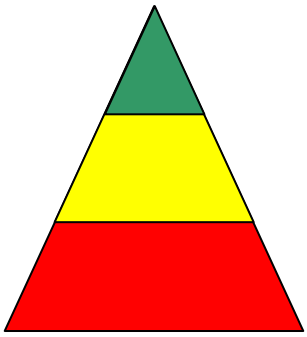
- To formulate an integrated Strategy for sustainable HCW management in Gauteng;
- To highlight institutional arrangements required for the provision of sustainable HCW Management in Gauteng;
- To develop Action Plans required for implementation of the Strategy;
- To estimate financial and human resource requirements for implementation of the Action Plans;
- To evaluate the impacts of implementing the Action Plans, including impacts on the environment, occupational health & safety, public health, employment, etc.

5.2.1 The Waste Management Hierarchy

The NWMS also refer to the Waste Management Hierarchy as a general guide for planning environmental sustainable waste management. In Box 5.2 below the overarching Waste Management Hierarchy was converted into a HCW Management Hierarchy for Gauteng.

Box 5.2: *The HCW Management Hierarchy*

Overall principle	Process	Measures
Prevention	Waste prevention.	Minimising use of disposable products
	Substitution of materials.	Green procurement to eliminate PVC
	Waste minimisation.	Improved segregation at source
Re-use & Recycling	Reuse.	Selected disinfection / sterilisation
	Processing.	Composting of organic materials
	Recycle.	Segregation of recyclable HCGW
Destruction	Incineration.	Energy recovery & volume reduction
	Other treatment.	Volume reduction
	Residue Disposal.	Final landfill of treated HCRW



As can be seen from the HCW management hierarchy presented above, the first objective when trying to reduce the environmental impacts associated with HCW management is to prevent HCW from being generated. One of the possibilities of achieving this is to substitute certain environmental hazardous materials and substances, e.g. PVC (in plastic articles, e.g. urine bags) and mercury (in thermometers). Such initiatives can be introduced through encouragement of Green Procurement procedures at HCF's.

Implementation of environmental management systems for all HCW generators can in turn lead to a reduction in the amount of HCW being generated, with improved HCW segregation at the HCFs resulting in a significant reduction in the amount of HCRW requiring costly treatment before it can be disposed of.

Reuse and Recycling is given second priority in the Waste Management Hierarchy. This includes reuse of health care equipment (e.g. glassware, linen and utensils), reuse of HCW management equipment (e.g. general infectious waste containers), as well as recycling of certain materials recovered from the HCGW (e.g. glass, metals, plastic, paper and cardboard) and processing of certain wastes (e.g. composting of organic waste). Although recycling is incorporated to varying degrees in the daily operations of HCF's, HCRW does not lend itself to this as the risk of infection outweighs the advantages achieved from recycling.

Based on the HCW hierarchy, the lowest priority is given to HCRW destruction; (thermal and non-thermal), before final disposal is undertaken. Although destruction is given lowest priority, it is often the only appropriate system for HCRW management, as the risk of infection or injuries associated with other treatment methods is too large. However, HCW prevention and proper HCW segregation can still reduce the amounts of HCRW that have to be destroyed without compromising in terms of health and safety.

5.3 Proposed Strategic Targets

Based on the above-mentioned national policies etc. the following Strategic Targets, as shown in Table 5.2 below is proposed.

Table 5.2: *Proposed environmental strategic targets*

Overall *environmental* strategic target:
To minimise the environmental impact resulting from HCW Management, thereby contributing towards the environmental sustainability of health care service delivery in South Africa.

At provincial and local authorities:
1. Internationally recognised environmental standards prominent in all provincial and local authority policies, legislation and guidelines that are related to HCW Management.
2. Planning, monitoring and enforcement of HCW Management related matters prioritised by provincial and local authorities.
3. Provincial and local authorities taking the lead in capacity building and training initiatives in its respective areas of jurisdiction.
At HCFs:
4. Internationally recognised standards met in terms of HCW containerisation, internal transport and storage (including colour coding, equipment design standards, etc.) that will ensure appropriate handling, treatment and disposal of HCW.
5. Effective HCW segregation in order to minimise the amount of HCRW that requires treatment, thereby limiting the potential impact on the environment.
6. HCRW managed and treated in an environmentally sound manner, thereby complying with the duty-of-care principle.
7. Environmental management systems implemented to allow for green procurement, waste minimisation and recycling.
At transport operators:
8. Reduced environmental impact by HCW collection resulting from inappropriate logistical planning for waste collection.
9. Reduced environmental impact by HCW collection resulting from inappropriate maintenance of transport vehicles.
At treatment plants:
10. Internationally recognised HCRW treatment efficiency standards met before being disposed of at waste disposal facilities.
11. Internationally recognised emission standards met by HCRW treatment facilities.
12. Effective rotation of HCRW delivered for treatment to limit the storage time.
At the disposal facilities:
13. Waste disposal facilities used that are suitable for disposal of HCRW residues in accordance with its classification and that are appropriately designed, constructed and operated in accordance with DWAF's Minimum Requirements.

Table 5.3: *Proposed occupational health & safety targets*

Overall strategic target for *Occupational Health & Safety*: To improve the working conditions for the employees involved in the HCW Management from an occupational health and safety point of view, reduce the health and safety risks for patients and visitors at HCFs, as well as to reduce the occupational health and safety risks for the public in general.
At provincial and local authorities:
14. Effective enforcement by provincial and local authorities of compliance with national and internationally recognised occupational health and safety standards at HCRW generators, transporters and treatment facilities.
At HCFs:
15. Effective HCW segregation that will prevent HCRW from being disposed of in HCGW containers, thus limiting the risk of infection and needle stick injuries.
16. Compliance with existing OHS legislation by HCFs to minimise the risk of infection, needle stick injuries, heavy lift injuries, etc.

At transport operators:
17. Compliance with existing OHS legislation by transporters to minimise the risk of infection, needle stick injuries, heavy lift injuries, exposure to dust, etc.
At treatment plants:
18. Compliance with existing OHS legislation by treatment facilities to minimise the risk of infection, needle stick injuries, heavy lift injuries, exposure before and during treatment processes, etc.
At disposal facilities:
19. Compliance with existing OHS legislation by waste disposal facilities to minimise the risk of infection, needle stick injuries, heavy lift injuries, exposure to poorly or untreated HCRW, etc.

Table 5.4: *Proposed institutional/organisational strategic targets*

Overall Institutional/Organisational strategic target: To strengthen the institutions/organisations involved in HCW Management, thereby enabling them to improve on the standard of HCW Management.
At provincial and local authorities:
20. Effective coordination between various stakeholders on matters related to environmentally sound, healthy and safe HCW management, facilitated by provincial and local authorities.
21. Sufficient and capable staff available from provincial and local government to support and monitor the health care sector on matters related to environmentally sound, healthy and safe HCW management.
22. Register for all HCW generators available at provincial authorities, allowing for effective monitoring whilst ensuring ongoing communication between the different stakeholders.
At HCFs:
23. Strong HCW management related organisational structures with clearly defined tasks, responsibilities and competences available at HCFs that inter alia includes HCW Management Committees.
At transport operators:
24. Strong organisational structures available at transport operators, enabling them to render effective HCW collection and transport services under normal working conditions as well as during emergency situations or breakdowns.
At treatment plants:
25. Strong organisational structures available at treatment plants, enabling them to render effective HCRW treatment/disposal service under normal working conditions as well as during emergency situations or breakdowns.
At disposal facilities:
26. Strong organisational structures available at disposal facilities, enabling them to handle residues from HCRW treatment facilities under all weather conditions, thus preventing a build-up of residues during rainy seasons.

Table 5.5: *Proposed strategic technical targets*

Overall strategic technical target: To raise the standard of technical facilities, equipment and procedures, thereby making HCW Management operations more cost effective, more efficient, more environmentally sound, healthier and safer.
At provincial and local authorities:

27. High level of technical standards for HCW Management facilitated by provincial and local authorities through legislation, tender specifications and guidelines.
28. HCW Information System (HCWIS) implemented and maintained by provincial authorities for more effective planning and monitoring of HCW management activities.
At HCFs:
29. High standard of HCW management equipment and materials maintained at HCFs.
30. Effective HCW Management procedures introduced at HCFs.
At transport operators:
31. High standard of maintenance on HCW collection vehicles to allow for high service levels, good working conditions and limited environmental impacts.
At treatment plants:
32. Compliance by treatment operators with new environmental standards for efficient HCRW treatment with limited environmental impact.
At disposal facilities
33. Waste disposal facilities conforming to DWAF's Minimum Requirements for Waste Disposal available for disposal of HCGW and residues from HCRW treatment facilities.
34. Effective control mechanisms introduced by disposal facilities to avoid disposal of untreated HCRW or treated HCRW residues, not being de-listed for such disposal, on general waste disposal sites.

Table 5.6: *Proposed strategic financial targets*

Overall strategic financial target: To become more cost conscious in terms of HCW management practices by developing and implementing more appropriate and cost effective HCW Management systems, as well as by reducing the HCRW stream to the absolute minimum.
At provincial and local authorities:
35. Information on costs associated with HCW Management disseminated by provincial authorities to all affected parties for increased awareness on the financial implications of HCW management.
36. Sufficient funds for both capital and operational expenditure allocated by provincial and local authorities for any areas of HCW Management services that are under budgeted.
At HCFs:
37. HCW Management expenditure analysed by HCF's as part of a process of making HCW Management systems more cost-effective.
38. Sufficient funds for both capital and operational expenditure allocate by HCF's for any areas of HCW Management services that are under budgeted.
At transport operators:
39. Sufficient allowance made by transport operators during tender cost estimates and annual internal budgets to allow for the rendering of HCW management services that are environmentally sound, healthy and safe.
At treatment plants:
40. Sufficient allowance made by treatment plants during tender cost estimates and annual internal budgets to allow for the rendering of HCRW treatment services that are environmentally sound, healthy and safe.
At disposal facilities:
41. Sufficient allowance made by waste disposal facilities in internal annual budgets to allow for the disposal of HCGW and treated HCRW residues in an environmentally sound, healthy and safe manner.

Table 5.7: *Proposed strategic legal targets*

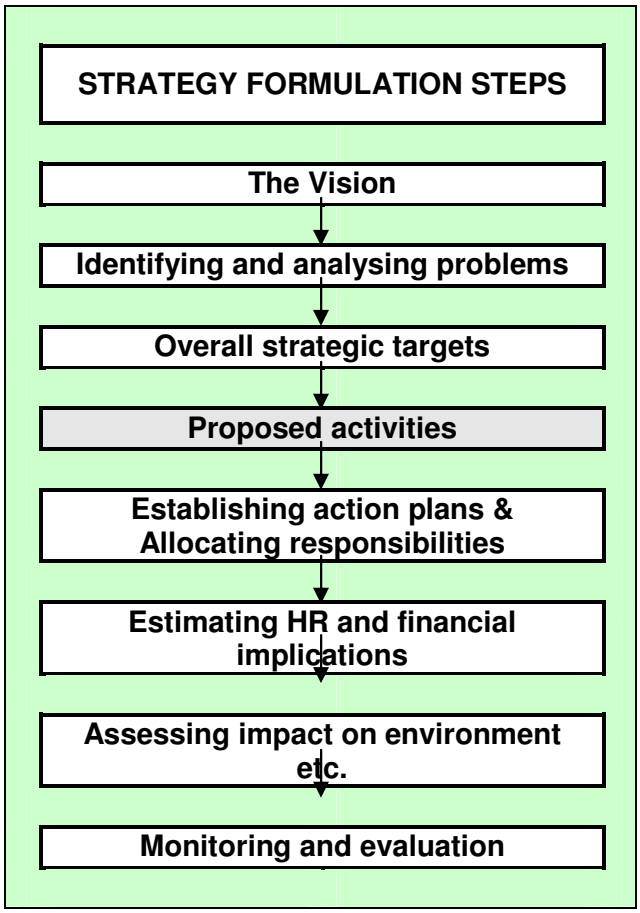
Overall strategic legal target: To improve on the level and standard of all legislation related to HCW Management to internationally accepted norms and to strengthen the enforcement of such legislation.
At provincial and local authorities:
42. Strict HCW management related legislation promulgated by provincial authorities, in particular controlling treatment efficiencies and emission standards for thermal as well as non-thermal treatment processes.
43. Strict legislation concerning disposal of residues from HCRW treatment processes promulgated by provincial authorities.
44. Strict and uniform HCW management related legislation promulgated in cooperation with national departments (e.g. DoH, DEAT, DWAF, DoT, DoL), to ensure compliance throughout SA with international standards.
45. Effective enforcement by both provincial as well as local authorities of HCW Management related legislation.
At HCFs:
46. Compliance with all HCW Management related legislation by HCFs, and in particular the Gauteng HCRW Management Regulations and the OHS Act, to ensure that all equipment and procedures used for HCW Management meet the required standards.
At transport operators:
47. Compliance with all relevant HCW management related legislation by transport operators, and in particular the Gauteng HCRW Management Regulations, the OHS Act and the Road Ordinances, to ensure that all collection vehicles, equipment and procedures used for HCW Management meet the required standards.
At treatment plants:
48. Compliance with all relevant HCRW management related legislation by treatment facilities, and in particular the Gauteng HCRW Management Regulations and the OHS Act, to ensure that all plants, equipment and procedures applied for HCW Management meet the required standards.
At disposal facilities:
49. Compliance with all relevant HCW management related legislation by disposal site operators, and in particular the Gauteng HCRW Management Regulations and the OHS Act, to ensure that all disposal sites, equipment and procedures used for HCW Management meet the required standards.

Table 5.8: *Overall Strategic Capacity Building*

Overall *strategic capacity building* target: To improve on the capacity building and awareness of all employees dealing with HCW, all patients and visitors coming in contact with HCW and all waste disposal site operators.
At provincial and local authorities:
50. Training and awareness programmes developed by provincial and local authorities that will assist HCFs in training and informing employees on correct HCW Management procedures and practices.
51. Training and awareness materials that will assist HCFs in training and informing employees on correct HCW Management procedures and practices, printed and distributed by provincial and local authorities.
At HCFs:
52. Training courses presented and information campaigns conducted by HCFs to all employees involved in HCW Management, thereby improving the standard of HCW management.

At transport operators:
53. Training courses presented and information campaigns conducted by HCW transport operators to all employees involved in HCW Management, thereby improving the standard of HCW management.
At treatment plants:
54. Training courses presented and information campaigns conducted by operators of HCRW treatment facilities to all employees involved in HCW Management, thereby improving the standard of HCW management.
At disposal facilities:
55. Training courses presented and information campaigns conducted by operators of waste disposal facilities to all employees involved in HCW Management, thereby improving the standard of HCW management.

6. Activities



This chapter summarises the Activities to be undertaken in order to address and solve the problems and shortcomings identified and referred to in Chapter 4.

Similar to the problem identification in Chapter 4, the proposed Activities are primarily grouped according to the various stakeholders responsible for its execution and secondarily according to the elements on which it have the biggest impact.

Although the starting date for implementation of short-term Activities falls within the Gauteng Sustainable HCW Management project period, thereby including a number of Activities already executed, some prominent Activities were undertaken even before 1 January 2003. These Activities inter alia include the following:

- Status Quo Study undertaken to determine the extent of the HCRW management problems in Gauteng, which was considered to be vitally important for the implementation of the Sustainable HCW Management project;
- Institutional agreements reached and a Steering Committee set up to monitor the execution of the project as well as the HCW management standards in future;
- Development and approval by provincial cabinet of the sustainable HCW Management Policy for Gauteng;
- Setting and approval of internationally recognised standards for effective and environmentally sound HCRW treatment;
- Provision of HCRW treatment facilities in Gauteng meeting the aforesaid efficiency and environmental standards;
- Development of HCW management training programme, training materials and information materials;

- Conduction of a detailed HCW Characterisation and Generation Study that has provided information on the segregation efficiency and scope for improvements as well as the extend of mis-segregation putting workers and the environment at risk.

6.1 Activities to be implemented by Provincial authorities

In the case of the Gauteng HCW Management Strategy, the provincial authorities have the overall responsibilities to develop strategies, monitor performance and allocate resources required for sustainable HCW Management in the province. In addition to this the provincial authorities act as advisors to the local authorities and the health care facilities in order to identify the most appropriate systems for undertaking their HCW management functions.

Table 6.1 below present the Activities to be implement by provincial authorities as part of a drive towards improved HCW Management in Gauteng.

Table 6.1: *Activities to be implemented by Provincial authorities*

Activity No.	Activity	Timeframe
1.1	**Responds to problem A.1: Environmental.**	
1.1.1	DOH and DACEL to prioritise planning, monitoring and enforcement of matters related to HCW Management.	Short term.
1.1.2	DACEL to review current legislation in comparison with international standards with the aim of legislating improved HCRW treatment efficiency standards, stricter treatment emission standards as well as standards on disposal of treated HCRW residues.	Has been accomplished.
1.1.3	DOH, with support from DACEL, to introduce new tender specifications for outsourcing of HCRW management services in Gauteng.	Has been accomplished.
1.1.4	DOH and DACEL to make more resources available for monitoring and enforcement of legislation related to HCW management.	Short term.
1.1.5	DOH, in cooperation with DACEL, to prepare guidelines for sustainable HCW management in Gauteng.	Has been accomplished.
1.1.6	DACEL to ensure implementation of a HCRW tracking system for large generators.	Short term.
1.2	**Responds to problem A.2: Occupational Health and Safety.**	
1.2.1	DOH, in cooperation with Department of Labour (DOL), to ensure enforcement of OHS standards for HCFs and other parties involved in HCW Management, with the aim of meeting internationally recognised standards.	Short term to long term.
1.2.2	DoH, in cooperation with local authorities and HCFs, to develop HCW management plans that are appropriate for each of the respective facilities.	Short term.
1.2.3	DoH, in cooperation with local authorities and HCFs, to review and update HCW management plans developed and implemented for each of the respective facilities.	Medium term.
1.3	**Responds to problem A.3: Institutional matters.**	
1.3.1	DOH and DACEL to allocate the necessary human resources for implementation of this Strategy by appropriately trained staff.	Short term.
1.3.2	DOH, in cooperation with DACEL, to establish a forum for coordination of activities aimed at improving HCW Management, including implementation of this Strategy.	Short term to long term.

1.3.3	DoH to enter into a Memorandum of Understanding (MoU) to inspect HCFs and enforce the OHS Act.	Short term.
1.4	**Responds to problem A.4: Technical.**	
1.4.1	DACEL, in cooperation with DOH, to design a HCW Information System (HCWIS) for capturing of data relevant to HCW Management.	Short term.
1.4.2	DACEL and DOH to implement HCWIS to enable improved monitoring and planning of HCW Management activities in Gauteng.	Short term to long term.
1.4.3	DOH and DACEL to investigate the market for equipment for internal collection, transport and storing of HCRW	Medium term to long term.
1.4.4.	DOH and DACEL to investigate possible ways of HCRW minimisation.	Short term to long term.
1.4.5	DoH in cooperation with the local authorities and HCFs to develop and implement HCRW generator registration system.	Short term.
1.4.6	DACEL in cooperation with the service providers to develop and implement service provider registration system.	Short term.
1.5	**Responds to problem A.5: Financial.**	
1.5.1	DOH and DACEL to allocate sufficient funds for implementation of this Strategy, whilst also encouraging other stakeholders involved in HCW Management in Gauteng to follow provincial government's example.	Short term
1.6	**Responds to problem A.6: Legal.**	
1.6.1	See 1.1.2, 1.1.4, 1.1.5 and 1.2.1	
1.7	**Responds to problem A.7: Information and training**	
1.7.1	DOH, in cooperation with DACEL, to develop a training programme primarily aimed at provincial HCF staff, but also suitable for staff from other institutions involved in HCW Management.	Has been accomplished.
1.7.2	DOH, in cooperation with DACEL, to develop training and information materials suitable for use by HCFs during internal training courses.	Has been accomplished.
1.7.3	DOH, in cooperation with DACEL, to prepare training materials (manuals, guidelines, etc.) suitable for use by provincial HCFs as well as other institutions involved in HCW Management.	Short term.
1.7.4	DOH, in cooperation with DACEL, to prepare information materials (posters, pamphlets, etc.) suitable for use by provincial HCFs as well as other institutions involved in HCW Management.	Short term.
1.7.5	DOH, in cooperation with HCFs to implement ongoing training programmes.	Short term to long term.
1.7.6	DOH, in cooperation with HCFs to review and update training programmes.	Medium term to long term.

6.2 Activities to be implemented by Local authorities

The local authorities have the responsibility for monitoring the operation of landfills as well as the discharge of wastewater, including wastewater from HCFs.

Table 6.2 below presents the Activities that local authorities should implement in order to reduce the impact of HCW on the environment.

Table 6.2: *Activities to be implemented by local authorities*

Activity	Activity	Timeframe

No.		
2.1	**Responds to problem B.1: Environment.**	
2.1.1	Local authorities to prioritise enforcement of legislation related to HCW Management, e.g. by discussing new initiatives in relevant forums.	Short term.
2.1.2	Local authorities to effectively monitor disposal of hazardous waste by landfill (avoiding illegal disposal or dumping of untreated HCRW and residues from HCRW treatment).	Short term to long term.
2.1.3	Local authorities to prepare common rules for discharge of liquid waste from HCFs to sewer.	Short term.
2.1.4	Local authorities to effectively monitor discharge of liquid waste from HCFs to sewer.	Short term to long term.
2.1.5	Local authorities to ensure implementation of a HCRW tracking system for small generators.	Medium term.
2.2	**Responds to problem B.2: Occupational Health and Safety.**	
2.2.1	Effective enforcement of OHS Act and Gauteng HCRW Management Regulations.	Short term.
2.3	**Responds to problem B.3: Institutional matters.**	
2.3.1	Local authorities to allocate the necessary human resources for effective monitoring.	Short term to long term.
2.4	**Responds to problem B.4: Technical.**	
2.4.1`	Introduce a registration system for small generators.	Short term.
2.4.2	Introduce HCRW collection / drop-off system for small generators.	Short term.
2.4.3	Local authorities, in cooperation with DoH and HCFs, to develop tender specifications for outsourcing of HCRW management services to clinics.	Short term.
2.5	**Responds to problem B.5: Financial.**	
2.5.1	Local authorities to allocate sufficient funds for establishing / upgrading of HCW Management systems in its area of jurisdiction.	Short term
2.6	**Responds to problem B.6: Legal.**	
2.6.1	Local authorities to issue circular/order on correct HCW management procedures and monitor compliance therewith.	Short term
2.6.2	Local authorities to issue circular/order on correct discharge of liquid waste from HCFs to sewer and monitor compliance therewith.	Short term
2.6.3	Local Authorities to develop and promulgate bylaws that are in adherence with provincial and national legislation.	Short term.
2.7	**Responds to problem B.4: Information and training.**	
2.7.1	Local authorities to ensure that staff is appropriately trained to monitor landfill operations and discharge of liquid waste from HCFs to sewer.	Short term

6.3 Activities to be implemented by health care facilities.

The health care facilities are the generators of the HCW and as such represent the first steps of the HCW flow path. HCFs have to ensure appropriate handling of HCW from generation, up to the point

where it is delivered to a service provider for transport, treatment and disposal. In terms of the National Waste Management Strategy, HCFs have a "duty-of-care" as generators of HCW, to ensure that all HCW generated as part of its health care service delivery, is managed, treated and disposed of in an environmentally sound, healthy and safe manner.

The proposed Activities include both planning and physical implementation of numerous activities related to HCW Management, with the Activities involving many of the HCF staff groups.

Regarding the purchase of new HCW management equipment, it is assumed that this will be done in accordance with the tender specifications for outsourcing of HCRW management services as approved by DOH's Departmental Acquisition Council (DAC).

Table 6.3 below presents the activities that HFCs will be responsible for during implementation of the Strategy.

Table 6.3: *Activities to be implemented by health care facilities*

Activity No.	Activity	Timeframe
3.1	**Responds to problem C.1: Environment.**	
3.1.1	HCF management is, in cooperation with the relevant staff groups, to establish a plan for improved HCW Management (following e.g. the template presented in the "Guidelines for Sustainable HCW Management in Gauteng".)	Short term.
3.1.2	HCF management is, in cooperation with the procurement department, to ensure that waste minimisation and recycling is introduced to the maximum extend possible.	Short term to medium term.
3.1.3	HCF management is, in cooperation with the relevant staff organisations, to consider the need for introducing an environmental management system that would include HCW Management.	Medium term.
3.1.4	HCFs to implement a HCRW tracking system.	Short term.
3.2	**Responds to problem C.2: Occupational Health and Safety.**	
3.2.1	HCF middle management is, in cooperation with senior management, to introduce procedures for HCRW handling, for instance in accordance with the "Guidelines for Sustainable HCW Management in Gauteng".	Short term.
3.2.2	HCF management is to keep records and present statistics on OHS incidents, among others needle prick injuries, thereby enabling monitoring of important OHS indicators.	Short term to long term.
3.3	**Responds to problem C.3: Institutional matters.**	
3.3.1	HCF management is to establish a firm organisation for HCW management within the HCF. Clear job descriptions and allocation of responsibilities and competencies is to be done.	Short term.
3.3.2	All HCFs are to implement the HCWIS, including registration with DOH/DACEL as generators of HCRW.	Short term to long term.
3.3.3	HCFs to submit regular reports on HCRW generation.	Short to long term.
3.4	**Responds to problem C.4: Technical/Equipment.**	
3.4.1	Specifications for any required equipment, civil works etc. to be formulated in accordance with the tender specifications for outsourcing of HCRW management services.	Short term.

3.4.2	Purchase 50% of equipment required for waste handling and storing in the short term, with the remaining 50% purchased in the medium term.	Short term to medium term.
3.4.3	Install 50% of new equipment for public HCFs in the short term, with the remaining 50% installed in the medium term.	Short term to medium term.
3.4.4	Effectively introduce maintenance procedures for new equipment etc.	Short term to long term.
3.5	**Responds to problem C.5: Financial.**	
3.5.1	HCF management to review current HCW Management budgets and adjust accordingly to enable implementation of the new HCW Management system as part of this Strategy.	Short term.
3.6	**Responds to problem C.6: Legal.**	
3.6.1	HCF management is, in cooperation with the relevant staff organisations, to prepare and distribute Codes of Practice for HCW Management for the various departments, for instance according to the templates presented in the "Guidelines for Sustainable HCW Management in Gauteng".	Short term.
3.7	**Responds to problem C.7: Information and training**	
3.7.1	HCF management is, in cooperation with the relevant staff organisations, to develop appropriate training programmes for improved HCW Management, typically in accordance with the "Guidelines for Sustainable HCW Management in Gauteng".	Short term.
3.7.2	Training and information materials to be prepared and distributed.	Short term.
3.7.3	Training courses, following the principle of "training-the-trainers", to be conducted according to programmes that will coincide with the implementation of new HCW management equipment.	Short term to medium term.

6.4 Activities to be implemented by transport operators

The transport operators are responsible for the collection and transport of HCRW from the generators to the HCRW treatment facilities. Transporters of HCGW are not considered to participate in these Activities. The transport operators are to work closely with HCF staff members responsible for the central storage of HCRW as well as the receipt of empty reusable/disposable HCRW containers. Transport operators are often also directly or indirectly responsible for treatment of HCRW.

Table 6.4 below present the Activities for which transport operators are responsible during implementation of the Strategy.

Table 6.4: *Activities to be implemented by transport operators*

Activity No.	Activity	Timeframe
4.1	**Responds to problem D.1: Environment.**	
4.1.1	Transport operators are to introduce procedures that would prevent spillage of HCRW during its operation.	Short term.
4.1.2	Transport operators are to investigate ways and means of reducing emissions from vehicles during operation, e.g. trough optimised route planning and effective vehicle maintenance.	Short term.

4.1.3	Transport operators to implement a HCRW tracking system.	Short term.
4.2	**Responds to problem D.2: Occupational Health and Safety.**	
4.2.1	Transport operators are to introduce appropriate procedures and equipment that would reduce OHS risks, including: - Risk of infection; - Exposure to dust; - Heavy lifts; - Risk of other injuries.	Short term.
4.2.2	Transport operators are to ensure that sufficient and appropriate personal protective equipment (PPE) is available and used by all staff.	Short term.
4.3	**Responds to problem D.3: Institutional matters.**	
4.3.1	All transport operators are to register with DACEL.	Short term.
4.3.2	All transport operators are to implement HCWIS.	Short term.
4.3.3	All transporters to report on HCRW imports / exports to and from Gauteng.	Short term to long term.
4.4	**Responds to problem D.4: Technical.**	
4.4.1	All transport operators servicing public HCFs are to ensure that their vehicles are appropriate for the new HCRW containers adopted by the HCFs.	Short term.
4.5	**Responds to problem D.5: Financial.**	
4.5.1	Transport operators are to improve on costing of their services when tendering.	Short term.
4.6	**Responds to problem D.6: Legal.**	
4.6.1	Transport operators are to comply with all relevant legislation, including: - Road Ordinance; - OHS Act; - Gauteng HCRW Management Regulations; - Relevant bylaws.	Short term.
4.7	**Responds to problem D.4: Information and training.**	
4.7.1	Transport operators are to ensure that all staff dealing with HCRW is trained to handle such waste in a responsible and safe manner.	Short term.
4.7.2	Transport operators are to prepare and distribute information materials that will keep staff informed of proper HCRW handling procedures.	Short term.

6.5 Activities to be implemented by treatment plant operators

The treatment plant operators are responsible for the treatment of HCRW, as well as the environmentally sound disposal of residues. Although there were in the past a number of onsite HCRW treatment facilities at provincial HCFs, there is a tendency for HCRW generated at such HCFs to be treated on regional level by private HCRW treatment plant operators, some of which may also be providing the HCRW collection and transport service to HCFs.

Table 6.5 below presents the Activities that treatment plant operators should undertake as part of the implementation of the Strategy.

Table 6.5: *Activities to be implemented by HCRW treatment plant operators*

Activity No.	Activity	Timeframe
5.1	**Responds to problem E.1: Environment.**	
5.1.1	Treatment plant operators are to introduce procedures that will prevent spillage of HCRW during the handling thereof.	Short term.
5.1.2	Treatment plant operators are to comply with all environmental standards and requirements.	Short term.
5.1.3	Treatment plant operators to implement environmental reporting procedures.	Medium term.
5.1.4	Treatment plant operators to implement a HCRW tracking system.	Short term.
5.2	**Responds to problem E.2: Occupational Health and Safety.**	
5.2.1	Treatment plant operators are to introduce appropriate procedures and systems that would reduce OHS risks, including: - Risk of infection; - Exposure to dust; - Heavy lifts; - Heat stress; - Risk of other injuries.	Short term.
5.2.2	Treatment plant operators are to ensure that sufficient and appropriate personal protective equipment (PPE) is available and used by all staff.	Short term.
5.3	**Responds to problem E.3: Institutional matters.**	
5.3.1	All treatment plant operators are to register with DACEL.	Short term.
5.3.2	All treatment plant operators are to implement the HCWIS and report as required.	Short term.
5.4	**Responds to problem E.4: Technical.**	
5.4.1	Treatment plant operators servicing public HCFs are to ensure that their equipment is appropriate for the new HCRW containers adopted by the HCFs.	Short term.
5.4.2	Treatment plant operators are to comply with environmental and other legislation when installing new HCRW treatment equipment or when upgrading existing equipment.	Short term.
5.5	**Responds to problem E.5: Financial.**	
5.5.1	Treatment plant operators are to improve on costing of their services when tendering.	Short term.
5.6	**Responds to problem E.6: Legal.**	
5.6.1	Treatment plant operators are to comply with all relevant legislation: - OHS Act; - Gauteng HCRW Management Regulations; - Relevant bylaws.	Short term.
5.7	**Responds to problem E.4: Information and training.**	
5.7.1	Treatment plant operators are to ensure that all staff dealing with HCRW is trained to handle such waste in a responsible and safe	Short term.

	manner.	
5.7.2	Treatment plant operators are to ensure that all staff operating HCRW treatment plants is sufficiently trained in its operating procedures.	Short term.
5.7.3	Treatment plant operators are to prepare and distribute information materials that will keep staff informed of proper HCRW handling procedures.	Short term.

6.6 Activities to be implemented by operators of disposal facilities

The operators of disposal facilities are responsible for the environmentally sound disposal of HCGW as well as treated HCRW residues. Such operators are either local authorities undertaking the waste disposal operation in-house, private operators undertaking the waste disposal operation on behalf of the local authorities, or alternatively private operators operating their own private waste disposal facilities.

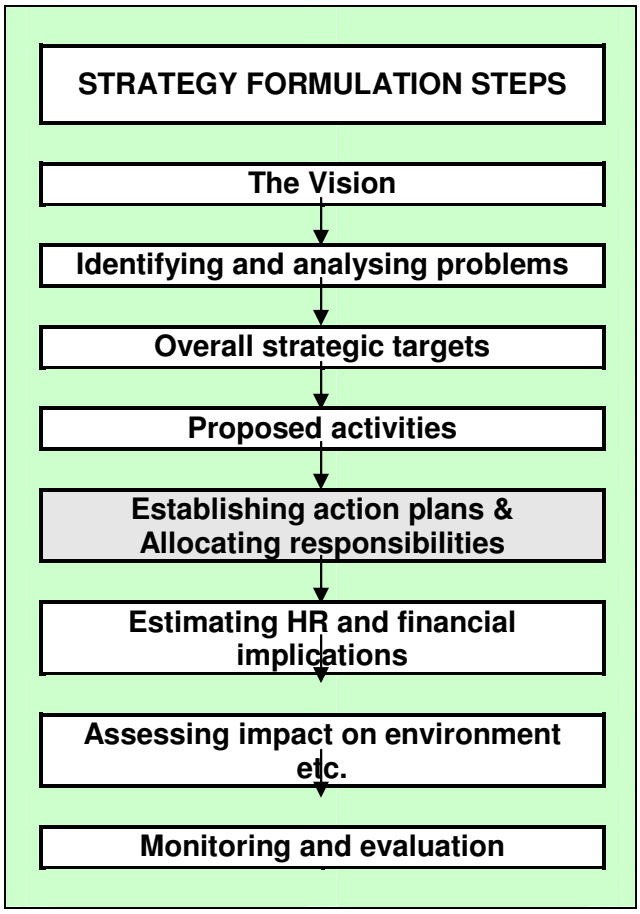
Table 6.6 below present the Activities that operators of waste disposal facilities should undertake as part of the implementation of the Strategy.

Table 6.6: *Activities to be implemented by operators of disposal facilities*

Activity No.	Activity	Timeframe
6.1	**Responds to problem F.1: Environment.**	
6.1.1	Disposal site operators are to ensure that no untreated HCRW is disposed of at the landfills, and that treated HCRW residues are disposed of appropriately and in accordance with its classification.	Short term to long term.
6.1.2	Disposal site operators are to comply with all environmental requirements, including proper treatment / disposal of leachate.	Short term to long term.
6.2	**Responds to problem F.2: Occupational Health and Safety.**	
6.2.1	Disposal site operators are to introduce appropriate procedures to reduce OHS risks, including: - Risk of infection; - Exposure to dust; - Heavy lifts; - Risk of other injuries.	Short term.
6.2.2	Disposal site operators are to ensure that sufficient and appropriate personal protective equipment (PPE) is available and used by all staff.	Short term.
6.3	**Responds to problem F.3: Institutional matters.**	
6.3.1	All disposal site operators are to be permitted by DWAF.	Short term.
6.3.2	All disposal site operators are to be registered with DACEL.	Short term.
6.4	**Responds to problem F.4: Technical.**	
6.4.1	Disposal site operators are to ensure that more facilities are provided for disposal of HCRW treatment residues.	Medium term to long term.
6.5	**Responds to problem F.5: Financial.**	
6.5.1	Disposal site operators are to improve on costing of their services when bidding for tenders.	Short term.
6.5.2	Ensure that disposal to landfill is not abused with it being the	Short term.

	cheapest option.	
6.6	**Responds to problem F.6: Legal.**	
6.6.1	All disposal site operators are to comply with all relevant legislation: Minimum Requirements for Waste Disposal by Landfill; - OHS Act; - Gauteng HCRW Management Regulations; - Relevant bylaws.	Short term.
6.7	**Responds to problem F.4: Information and training.**	
6.7.1	Disposal site operators are to ensure that all staff dealing with HCRW is trained to handle such waste in a responsible and safe manner.	Short term.
6.7.2	Disposal site operators are to ensure that all staff operating the disposal facility is sufficiently trained in its operating procedures.	Short term.
6.7.3	Disposal site operators are to prepare and distribute information materials that will keep staff informed of proper HCRW handling procedures, if encountered on general waste disposal facilities.	Short term.

7. Action Plans and Responsibilities for HCWM in Gauteng



This chapter describes three Action Plans for implementation of the HCWM Strategy; one Action Plan for short-term implementation, one for medium-term implementation and the last for long-term implementation. The building blocks of the Action Plans are the individual Activities listed in Chapter 6, put together in integrated systems according to the Policies, Principles, Priorities and Criteria referred to in the previous chapter.

As part of the Action Plan descriptions, alternative approaches will be discussed where certain Activities might result in extraordinary requirements in terms of resources, development of new technology or other aspects for which the timeframe is not fully predictable.

The three Action Plans will cover the following respective time periods:

- Short term: The 1st and 2nd years from commencement date of 1 January 2003;
- Medium term: The 3rd to 5th years from commencement date of 1 January 2003;
- Long term: From the 6th year onwards, with the commencement date of 1 January 2003.

The presentation of the Action Plans is divided into the same key issues as the Problems and Needs, once again sub-divided into the various stages of the waste flow.

Time schedules for the three Actions Plans are shown as the last part of the chapter.

This chapter further provides an overview of the respective organisations that will be responsible for execution of the various activities (indicated by an uppercase "**X**"), as well as any other organisations that may be co-responsible to ensure effective implementation of the Strategy (indicated by a lowercase "x"). Activities that are completed are indicated by "√".

Table 7.1: *Action Plan for implementation by Provincial authorities*

Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support
1.1	**Environmental.**												
1.1.1	Prioritise planning, etc.							x	**X**		x		
1.1.2	Legislation on emissions.							√					√
1.1.3	Tender Specifications.								√				√
1.1.4	Enforce Specs and Regulations.							x	**X**		x		
1.1.5	HCW Management Guidelines.							√					√
1.1.6	Implement HCRW tracking.							**X**			x	x	
1.2	**Occupational Health & Safety.**												
1.2.1	Enforcement of OHS standards.								**X**	x	x	x	
1.2.2	Develop HCWM plans.								**X**	x	x		
1.2.3	Review / update HCWM plans.								**X**	x	x		
1.3	**Institutional Matters.**												
1.3.1	Allocate personnel for Strategy.							x	**X**				
1.3.2	Establish forum for coordination.							x	**X**	x	x		
1.3.3	Dept Labour MoU to inspect.								**X**	x	x		
1.4	**Technical.**												
1.4.1	Develop HCWIS.							√					√
1.4.2	Implement HCWIS.							**X**	x	x	x	x	
1.4.3	Investigate market for equipment							x	**X**		x		
1.4.4	Investigate HCRW minimisation							x	**X**		x		
1.4.5	Generator register system.								**X**	x	x		
1.4.6	Service provider register system							**X**				x	
1.5	**Financial.**												
1.5.1	Allocate funds for Strategy.							x	**X**		x		
1.6	**Legal.**												
1.7	**Information and Training.**												
1.7.1	Develop training programme.							√	√		√		√
1.7.2	Develop training & info material							√	√		√		√
1.7.3	Prepare training materials.							x	**X**		x		
1.7.4	Prepare information materials.							x	**X**		x		
1.7.5	Ongoing staff training.								**X**		x		

Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support
1.7.6	Review and update training.								**X**		x		

Table 7.2: *Action Plan for implementation by Local Authorities*

Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support
2.1	**Environmental.**												
2.1.1	Prioritise legislation enforcement									**X**			
2.1.2	Effective landfill monitoring.							x		**X**		x	
2.1.3	Rules for liquid disposal.							x		**X**			x
2.1.4	Liquid discharge monitoring.							x		**X**			
2.1.5	Small generator tracking system.							x		**X**			
2.2	**Occupational Health & Safety.**												
2.2.1	Ensure OHS Act compliance.									**X**			
2.3	**Institutional Matters.**												
2.3.1	Personnel for monitoring.									**X**			
2.4	**Technical.**												
2.4.1	Small generator register system.								x	**X**			
2.4.2	Small generator collection.								x	**X**	x		
2.4.3	HCWM tender spec. for clinics.								x	**X**	x		
2.5	**Financial.**												
2.5.1	Funds to upgrade HCW systems.									**X**			
2.6	**Legal.**												
2.6.1	Circular on HCW procedures.								x	**X**	x		
2.6.2	Circular on liquid discharge.							x		**X**	x		
2.6.3	Promulgate appropriate bylaws.							x		**X**			
2.7	**Information and Training.**												
2.7.1	Landfill monitoring staff trained.							x		**X**			

Table 7.3: *Action Plan for implementation by health care facilities*

Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support
3.1	**Environmental.**												
3.1.1	HCW management plans.								x	x	**X**		
3.1.2	Waste minimisation & recycling.							x		x	**X**		x
3.1.3	Environ. management system.							x			**X**		x
3.1.4	HCRW tracking system.										**X**	x	
3.2	**Occupational Health & Safety.**												
3.2.1	HCW management procedures.								x		**X**		x
3.2.2	HCW data recording & statistics									x	**X**		
3.3	**Institutional Matters.**												
3.3.1	HCW organisational structure								x		**X**		
3.3.2	Implement HCWIS.							x			**X**	x	
3.3.3	Report on HCRW generation.								x		**X**	x	
3.4	**Technical.**												
3.4.1	Equipment & infrastructure Spec								x	x	**X**		x
3.4.2	Purchase HCW equipment.								x	x	**X**		
3.4.3	Install HCW equipment.										**X**	x	
3.4.4	Equip. maintenance procedures.								x		**X**		x
3.5	**Financial.**												
3.5.1	Budget for new HCW system.								x	x	**X**		
3.6	**Legal.**												
3.6.1	HCW Codes of Practice.								x		**X**		
3.7	**Information and Training.**												
3.7.1	Develop training programme.								x	x	**X**		x
3.7.2	Prepare and distribute material.								x	x	**X**		x
3.7.3	Conduct training-the-trainers								x	x	**X**	x	

Table 7.4: *Action Plan for implementation by Transport operators*

Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support

Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support
4.1	**Environmental.**												
4.1.1	HCW spillage prevention.							x	x			**X**	
4.1.2	Reduced vehicle emissions.							x	x			**X**	
4.1.3	Implement HCRW tracking.							x			x	**X**	
4.2	**Occupational Health & Safety.**												
4.2.1	Reduced OHS risks.								x			**X**	
4.2.2	Workers using appropriate PPE.										x	**X**	
4.3	**Institutional Matters.**												
4.3.1	DACEL registration.							x				**X**	
4.3.2	Implement HCWIS.							x			x	**X**	
4.3.3	Report on HCRW import/export.							x				**X**	
4.4	**Technical.**												
4.4.1	Vehicle / container compatibility								x		x	**X**	
4.5	**Financial.**												
4.5.1	Appropriate costing of services.											**X**	
4.6	**Legal.**												
4.6.1	Compliance with legislation.											**X**	
4.7	**Information and Training.**												
4.7.1	Staff trained to handle HCRW.								x			**X**	
4.7.2	Information on HCRW handling.								x			**X**	

Table 7.5: *Action Plan for implementation by HCRW treatment plant operators*

Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support
5.1	**Environmental.**												
5.1.1	HCW spillage prevention.							x				**X**	
5.1.2	Treatment standard compliance.							x				**X**	
5.1.3	Environmental reporting.							x				**X**	
5.1.4	HCRW tracking system.										x	**X**	
5.2	**Occupational Health & Safety.**												
5.2.1	Reduced OHS risks.								x		x	**X**	

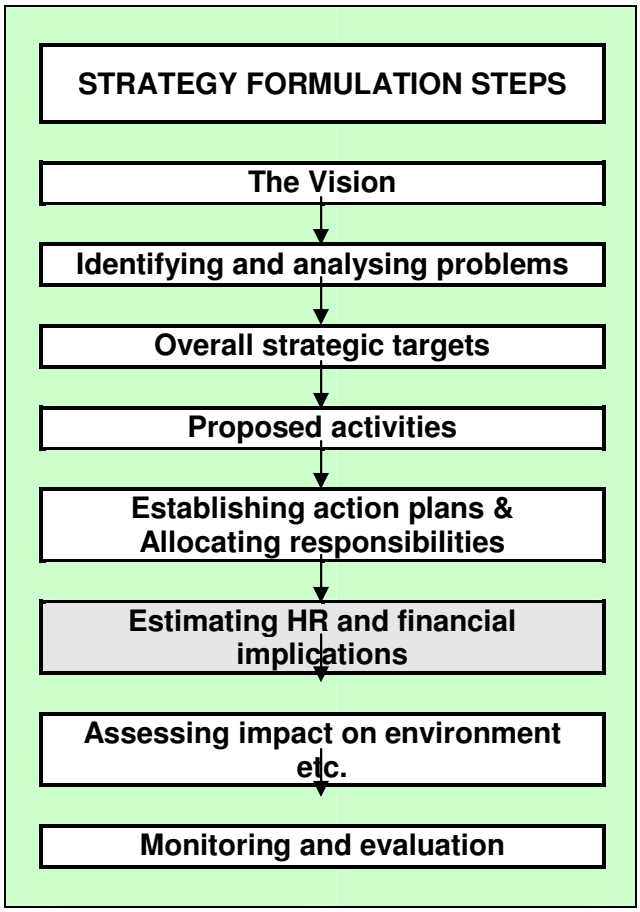
Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support
5.2.2	Workers using appropriate PPE.											X	
5.3	**Institutional Matters.**												
5.3.1	DACEL registration.							x				X	
5.3.2	Implement HCWIS.							x			x	X	
5.4	**Technical.**												
5.4.1	Plant / container compatibility.								x		x	X	
5.4.2	Appropriate treatment plants.							x				X	x
5.5	**Financial.**												
5.5.1	Appropriate costing of services.											X	
5.6	**Legal.**												
5.6.1	Compliance with legislation.							x	x			X	
5.7	**Information and Training.**												
5.7.1	Staff trained to handle HCRW.								x			X	
5.7.2	Staff trained in plant operation.											X	
5.7.3	Information on HCRW handling.								x			X	

Table 7.6: *Action Plan for implementation by disposal site operators*

Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support
6.1	**Environmental.**												
6.1.1	Only treated HCRW disposed of.									x	x	X	
6.1.2	Environmental compliance.							x		x		X	
6.2	**Occupational Health & Safety.**												
6.2.1	Reduced OHS risks.								x			X	
6.2.2	Workers using appropriate PPE.									x		X	
6.3	**Institutional Matters.**												
6.3.1	DWAF permitting.									x		X	
6.3.2	DACEL registration.							x				X	
6.4	**Technical.**												

Activity no.	Activity Description	Short term		Medium term			Long term	Responsibility					
		2003	2004	2005	2006	2007	2008 onwards	DACEL	GDoH	Local Authorities	Health Care Facilities	Service Providers	Consultant support
6.4.1	Sufficient appropriate facilities.							x		x		**X**	
6.5	**Financial.**												
6.5.1	Appropriate costing of services.											**X**	
6.5.2	Prevent abuse of landfilling.												
6.6	**Legal.**												
6.6.1	Compliance with legislation.							x	x			**X**	
6.7	**Information and Training.**												
6.7.1	Staff trained to handle HCRW.								x			**X**	
6.7.2	Staff trained in waste disposal.									x		**X**	
6.7.3	Information on HCRW handling.								x	x		**X**	

8. Required Inputs



This chapter includes estimates of the human resources and infrastructure inputs required for implementing the Strategy, all presented in monetary terms.

8.1 Financial commitments for provincial authorities (DOH and DACEL)

The financial commitments for provincial government includes all additional costs expected to be incurred by the provincial head offices as well as the regional offices (in the case of the DoH), with the costs directly associated with the HCF's measured separately. Hence, a number of the costs indicated in this document is assumed to reflect recourses already committed as many of the assignments would be carried out by already appointed personnel that would have this work as part of their overall work portfolio.

Although there may be a wide range of salary levels for the respective persons involved in the organisation of HCW management activities, only 3 salary scales were used, corresponding to the level of seniority of the persons required to undertake the work at the provincial head office and regional offices.

In the following tables, the number of units required will be presented as number of units (say a) over the required number of months that the activity is due to be undertaken (say b), "a / b". As it may not necessarily justify a fulltime person, it could result in a value of "a" that is less than "b". Where more than one person will be required over the specified period of time, it is presented as number of persons (say c) multiplied by the number of units (say a), over the required number of years (say b), "c x a / b".

Table 8.1: *Additional staff required at provincial level*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Staff Training							
1.1.1 A	DOH, prioritise planning etc.	Person-month	24 / 24		R 20.000	R 480.000	R 0
1.1.1.B	DACEL, prioritise planning etc.	Person-month	3.6 / 24		R 20.000	R 72.000	R 0
1.1.2	DACEL, introduce new legislation on emissions	Person-month				Completed	Completed
1.1.3	DOH, introduce tender specifications	Person-month				Completed	Completed
1.1.4.A	DOH, allocate more resources for enforcement	Person-month	2 x 6 / 24	2 x12 / 36	R 10.000	R 120.000	R 240.000
1.1.4.B	DACEL, allocate more resources for enforcement	Person-month	4.8 / 24	7.2 / 36	R 10.000	R 48.000	R 72.000
1.1.5	DACEL, standards for liquid waste	Person-month	0.6 / 6	0	R 20.000	R 12.000	R 0
1.1.6.A	DOH, prepare guidelines	Person-month				Completed	Completed
1.1.6.B	DACEL, prepare guidelines	Person-month				Completed	Completed
1.2.2	DOH, enforcement of rules concerning OHS	Person-month	1 x 6/24	2 x 6/36	R 10.000	R 60.000	R 120.000
1.3.2.A	DOH, establish a forum for coordination	Person-month	6/36	6/36	R 20.000	R 120.000	R 120.000
1.3.2.B	DACEL, establish a forum for coordination	Person-month	1/36	1/36	R 10.000	R 10.000	R 10.000
1.4.2.A	DOH, implement the HCWIS	Person-month	6/36	6/36	R 20.000	R 120.000	R 120.000
1.4.2.B	DACEL, implement the HCWIS	Person-month	1/36	1/36	R 10.000	R 10.000	R 10.000
1.4.3	DOH, investigate market for equipment	Person-month	1/36	1/36	R 10.000	R 10.000	R 10.000
1.4.4.A	DOH, investigate possibilities for minimising waste	Person-month	6/36	6/36	R 20.000	R 120.000	R 120.000
1.4.4.B	DACEL, investigate possibilities for minimising waste	Person-month	1/36	1/36	R 10.000	R 10.000	R 10.000
1.5.1.A	DOH, allocate sufficient funds	Person-month	1/36	1/36	R 10.000	R 10.000	R 10.000
1.5.1.B	DACEL, allocate sufficient funds	Person-month	1/36	1/36	R 10.000	R 10.000	R 10.000
1.7.1.A	DOH, establish a training programme	Person to be trained-	0	120/36	R 2.500	R 112.500	R 300.000
1.7.1.B	DACEL, establish a training	Person-month	1/36	1/36	R 10.000	R 10.000	R 10.000

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
	programme						
1.7.2.A	DOH, prepare training materials	Person-month	3/24	1/36	R 10.000	R 30.000	R 10.000
1.7.2.B	DACEL, prepare training materials	Person-month	3/24	1/36	R 10.000	R 30.000	R 10.000
1.7.3.A	DOH, prepare information materials	Person-month	37704	1/36	R 10.000	R 30.000	R 10.000
1.7.3.B	DACEL, prepare information materials	Person-month	37704	1/36	R 10.000	R 30.000	R 10.000
	Sub-total (Additional staff)					**1.454.500**	**1.202.000**

Table 8.2: *Additional staff training required at provincial level*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Staff Training							
1.1.4.A	DOH, allocate more resources for enforcement	Person-month	2/24		R 20.000	R 40.000	R 0
1.1.4.B	DACEL, allocate more resources for enforcement	Person-month	2/24		R 20.000	R 20.000	R 0
1.1.5	DACEL, standards for liquid waste	Person-month	1/24		R 20.000	R 20.000	R 0
	Sub-total (Training of staff)					**R 80.000**	**R 0**

Table 8.3: *Additional consultancy required at provincial level*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Consultancy							
1.1.2	DACEL, introduce new legislation on emissions	Person-month				Completed	Completed
1.1.3	DOH, introduce tender specifications	Person-month				Completed	Completed
1.1.5	DACEL, standards for liquid waste	Person-month	0	2/24	R 80.000	R 0	R 160.000
1.1.6.A	DOH/DACEL, prepare guidelines	Person-month				Completed	Completed
1.7.2.A	DOH, prepare training materials	Person-month	3/24		R 60.000	R 180.000	R 0
1.7.2.B	DACEL, prepare training materials	Person-month	1		R 60.000	R 60.000	R 0
1.7.3.A	DOH, prepare information materials	Person-month	0	2	R 60.000	R 0	R 120.000
1.7.3.B	DACEL, prepare information materials	Person-month	1	1	R 60.000	R 60.000	R 60.000
	Sub-total (Consultancy)					**R 300.000**	**R 340.000**

Table 8.4: *Additional material publishing required at provincial level.*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Publishing guidelines, training and information materials etc							
1.1.6.A	DOH, prepare guidelines	Document	84		R 100	R 8.400	R 0
1.1.6.B	DACEL, prepare guidelines	Document	2		R 100	R 200	R 0
1.7.2.A	DOH, prepare training materials	Document	3440		R 100	R 344.000	R 0
1.7.2.B	DACEL, prepare training materials	Document	20		R 100	R 2.000	R 0
1.7.3.A	DOH, prepare	Poster Set	172		R 1.000	R 172.000	R 0

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
	information materials						
1.7.3.B	DACEL, prepare information materials	Sum	1		R 5.000	R 5.000	R 0
	Sub-total (Publishing materials)					**R 531.600**	**R 0**

Table 8.5 DELETED

8.2 Local Authorities

The financial commitments for local government includes all additional costs expected to be incurred by the 3 Metropolitan Municipalities, as well as the 3 District Municipalities, without any distinction being made between the particular needs for any of these Municipalities. The estimated costs further allows for Metropolitan / District Municipality costs as well as Local Municipality costs, also including the costs directly associated with the clinics.

Although there may be a wide range of salary levels for the respective persons involved in the organisation of HCW management activities, only 3 salary scales were used, corresponding to the level of seniority of the persons required to undertake the work.

In the following tables, the number of units required will be presented as number of units (say a) over the required number of years (say b), “a / b”. As it may not necessarily justify a fulltime person, it could have a value of “a” that is less than “b”. Where more than one person will be required over the required period of time, it is presented as number of persons (say c) multiplied by the number of units (say a), over the required number of years (say b), “c x a / b”.

Table 8.6: *Additional staff required at local authorities*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short Term	Activity Cost Medium term
Additional staff							
2.1.1	Prioritise enforcement of legislation through forums.	Person-month	36		R 7.500	R 270.000	R 0
2.1.2	Improved monitoring of landfill operations.	Person-month	4	6	R 5.000	R 20.000	R 30.000
2.1.3	Develop common rules for liquid discharge to sewer.	Person-month	0	2	R 80.000	R 0	R 160.000
2.1.4	Improve monitoring of liquid discharge by HCF's.	Person-month	2	3	R 5.000	R 10.000	R 15.000
2.3.1	Human resources for improved monitoring. Duplicated	Person-month	0	0	R 0	R 0	R 0
2.6.1	Circular / order	Person-month	6		R 2.500	R 15.000	R 0

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short Term	Activity Cost Medium term
	for improved HCW management.						
2.6.2	Circular / order for HCF liquid discharge.	Person-month	6		R 2.500	R 15.000	R 0
	Sub-total (Additional staff)					330.000	205.000

Table 8.7: *Additional staff training required at local authorities*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short Term	Activity Cost Medium term
Training of staff							
2.7.1	Staff trained for effective landfill/discharge monitoring.	Person-month	6		R 10.000	R 60.000	R 0
	Sub-total (Training of staff)					R 60.000	R 0

Table 8.8: *Additional consultancy required at local authorities*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Consultancy							
2.1.3	Develop common rules for liquid discharge to sewer.	Person-month	2	0	R 80.000	R 160.000	R 0
	Sub-total (Consultancy)					R 160.000	R 0

Table 8.9: *Additional material publishing required at local authorities*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Publishing guidelines, training and information materials etc							
2.6.1	Circular / order for improved HCW management.	Sum	6		R 2.000	R 12.000	R 0
2.6.2	Circular / order for HCF liquid discharge.	Sum	6		R 2.000	R 12.000	R 0
	Sub-total (Publishing materials)					R 24.000	R 0

Table 8.10: *Additional equipment and materials required at local authorities*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Equipment and materials.							
2.5.1	Funding available to upgrade HCW man. Activities	Sum	0		R 60.000	R 0	R 0
	Sub-total (Equipment and materials)					R 0	R 0

8.3 Provincial Health Care Facilities (Hospitals and Clinics)

The financial commitments for provincial health care facilities includes all additional costs expected to be incurred by the provincial hospitals and clinics, but excluding the costs already incurred through the outsourcing of HCRW management services at such facilities.

Although there may be a wide range of salary levels for the respective persons involved in the organisation of HCW management activities, only 3 salary scales were used, corresponding to the level of seniority of the persons required to undertake the work at the provincial hospitals and clinics.

In the following tables, the number of units required will be presented as number of units (say a) over the required number of years (say b), “a / b”. It may not necessarily justify a fulltime person and it could have a value of “a” that is less than “b”. Where more than one person will be required over the required period of time, it is presented as number of persons (say c) multiplied by the number of units (say a), over the required number of years (say b), “c x a / b”.

Table 8.11: Additional staff required at provincial hospitals and clinics.

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Additional staff (P=Provincial Government; L=Local Government)							
3.1.1.A	P-Develop and implement HCW management plans at hospitals.	Person-month	2		R 15.000	R 30.000	R 0
3.1.1.B	P-Develop and implement HCW management plans at clinics.	Person-month					
3.1.1.C	L-Develop and implement HCW management plans at clinics.	Person-month					
3.1.2.A	P-Develop and implement waste minimisation and recycling at hospitals.	Person-month	6	0	R 7.500	R 45.000	R 0
3.1.2.B	P-Develop and implement waste minimisation and recycling at	Person-month					

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
	clinics.						
3.1.2.C	L-Develop and implement waste minimisation and recycling at clinics.	Person-month					
3.1.3.A	P-Develop and implement environmental management system at hospitals.	Person-month		6	R 15.000	R 0	R 90.000
3.1.3.B	P-Develop and implement environmental management system at clinics.	Person-month					
3.1.3.C	L-Develop and implement environmental management system at clinics.	Person-month					
3.2.1.A	P-Develop and implement HCW management procedures at hospitals.	Person-month	3		R 15.000	R 45.000	R 0
3.2.1.B	P-Develop and implement HCW management procedures at clinics.	Person-month					
3.2.1.C	L-Develop and implement HCW management procedures at clinics.	Person-month					
3.2.2.A	P-Monitor OHS indicators by means of statistics at hospitals.	Person-month	300	400	R 350	R 105.000	R 140.000
3.2.2.B	P-Monitor OHS indicators by means of statistics at clinics.	Person-month					
3.2.2.C	L-Monitor OHS indicators by means of statistics at clinics.	Person-month					
3.3.1.A	P-HCW man. organisational structure implemented at hospitals.	Person-month	0		R 15.000	R 0	R 0
3.3.1.B	P-HCW man. organisational structure implemented at clinics.	Person-month					
3.3.1.C	L-HCW man.	Person-month					

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
	organisational structure implemented at clinics.						
3.3.2.A	P-Implement HCWIS, including DACEL registration at hospitals.	Person-month	6	12	R 15.000	R 90.000	R 180.000
3.3.2.B	P-Implement HCWIS, including DACEL registration at clinics.	Person-month					
3.3.2.C	L-Implement HCWIS, including DACEL registration at clinics.	Person-month					
3.4.1.A	P-Specification of new equipment and infrastructure at hospitals.	Person-month	3		R 15.000	R 45.000	R 0
3.4.1.B	P-Specification of new equipment and infrastructure at clinics.	Person-month					
3.4.1.C	L-Specification of new equipment and infrastructure at clinics.	Person-month					
3.4.5.A	P-Maintenance procedures for new equipment at hospitals.	Person-month	3	0	R 15.000	R 45.000	R 0
3.4.5.B	P-Maintenance procedures for new equipment at clinics.	Person-month					
3.4.5.C	L-Maintenance procedures for new equipment at clinics.	Person-month					
3.5.1.A	P-Adjust budget to meet new HCW man. requirements at hospitals.	Person-month	3	6	R 10.000	R 30.000	R 60.000
3.5.1.B	P-Adjust budget to meet new HCW man. requirements at clinics.	Person-month					
3.5.1.C	L-Adjust budget to meet new HCW man. requirements at clinics.	Person-month					
3.6.1.A	P-Develop and distribute HCW Codes of practice at hospitals.	Person-month	6	0	R 20.000	R 120.000	R 0
3.6.1.B	P-Develop and	Person-month					

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
	distribute HCW Codes of practice at clinics.						
3.6.1.C	L-Develop and distribute HCW Codes of practice at clinics.	Person-month					
3.7.1.A	P-Develop training programme for improved HCW man. at hospitals.	Person-month	3		R 15.000	R 45.000	R 0
3.7.1.B	P-Develop training programme for improved HCW man. at clinics.	Person-month					
3.7.1.C	L-Develop training programme for improved HCW man. at clinics.	Person-month					
3.7.2.A	P-Develop and distribute training materials at hospitals.	Person-month	0	2	R 15.000	R 0	R 30.000
3.7.2.B	P-Develop and distribute training materials at clinics.	Person-month					
3.7.2.C	L-Develop and distribute training materials at clinics.	Person-month					
	Sub-total (Additional staff)					**R 600.000**	**R 500.000**

Table 8.12: *Additional staff training required at provincial hospitals and clinics.*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Training of staff (P=Provincial Government; L=Local Government)							
3.1.1.A	P-Develop and implement HCW management plans at hospitals.	Person-month	2		R 15.000	R 30.000	R 0
3.1.1.B	P-Develop and implement HCW management plans at clinics.	Person-month					
3.1.1.C	L-Develop and implement HCW management plans at clinics.	Person-month					
3.1.2.A	P-Develop and implement waste minimisation and recycling at hospitals.	Person-month	0,5	2	R 10.000	R 5.000	R 20.000

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
3.1.2.B	P-Develop and implement waste minimisation and recycling at clinics.	Person-month					
3.1.2.C	L-Develop and implement waste minimisation and recycling at clinics.	Person-month					
3.1.3.A	P-Develop and implement environmental management system at hospitals.	Person-month		38	R 3.750	R 0	R 142.500
3.1.3.B	P-Develop and implement environmental management system at clinics.	Person-month					
3.1.3.C	L-Develop and implement environmental management system at clinics.	Person-month					
3.2.1.A	P-Develop and implement HCW management procedures at hospitals.	Person-month	38		R 3.750	R 142.500	R 0
3.2.1.B	P-Develop and implement HCW management procedures at clinics.	Person-month					
3.2.1.C	L-Develop and implement HCW management procedures at clinics.	Person-month					
3.3.1.A	P-HCW man. organisational structure implemented at hospitals.	Person-month	38		R 3.750	R 142.500	R 0
3.3.1.B	P-HCW man. organisational structure implemented at clinics.	Person-month					
3.3.1.C	L-HCW man. organisational structure implemented at clinics.	Person-month					
3.3.2.A	P-Implement HCWIS, including DACEL registration at hospitals.	Person-month	0	1	R 10.000	R 0	R 10.000
3.3.2.B	P-Implement HCWIS, including	Person-month					

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
	DACEL registration at clinics.						
3.3.2.C	L-Implement HCWIS, including DACEL registration at clinics.	Person-month					
3.4.5.A	P-Maintenance procedures for new equipment at hospitals.	Person-month	168	0	R 150	R 25.200	R 0
3.4.5.B	P-Maintenance procedures for new equipment at clinics.	Person-month					
3.4.5.C	L-Maintenance procedures for new equipment at clinics.	Person-month					
3.6.1.A	P-Develop and distribute HCW Codes of practice at hospitals.	Person-month	168	0	R 150	R 25.200	R 0
3.6.1.B	P-Develop and distribute HCW Codes of practice at clinics.	Person-month					
3.6.1.C	L-Develop and distribute HCW Codes of practice at clinics.	Person-month					
3.7.2.A	P-Develop and distribute training materials at hospitals.	Person-month	168		R 150	R 25.200	R 0
3.7.2.B	P-Develop and distribute training materials at clinics.	Person-month					
3.7.2.C	L-Develop and distribute training materials at clinics.	Person-month					
3.7.3.A	P-Present training courses at hospitals.	Person-month	10	168	R 3.750	R 37.500	R 630.000
3.7.3.B	P-Present training courses at clinics.	Person-month					
3.7.3.C	L-Present training courses at clinics.	Person-month					
	Sub-total (Training of staff)					**R 433.100**	**R 802.500**

Table 8.13: *Additional consultancy required at provincial hospitals and clinics.*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Consultancy (P=Provincial Government; L=Local Government)							
3.1.2.A	P-Develop and implement waste minimisation and recycling at hospitals.	Person-month	1	1	R 80.000	R 80.000	R 80.000
3.1.2.B	P-Develop and implement waste minimisation and recycling at clinics.	Person-month					
3.1.2.C	L-Develop and implement waste minimisation and recycling at clinics.	Person-month					
3.1.3.A	P-Develop and implement environmental management system at hospitals.	Person-month		3	R 80.000	R 0	R 240.000
3.1.3.B	P-Develop and implement environmental management system at clinics.	Person-month					
3.1.3.C	L-Develop and implement environmental management system at clinics.	Person-month					
3.2.1.A	P-Develop and implement HCW management procedures at hospitals.	Person-month	3		R 80.000	R 240.000	R 0
3.2.1.B	P-Develop and implement HCW management procedures at clinics.	Person-month					
3.2.1.C	L-Develop and implement HCW management procedures at clinics.	Person-month					
3.4.1.A	P-Specification of new equipment and infrastructure at hospitals.	Person-month	0	1	R 80.000	R 0	R 80.000
3.4.1.B	P-Specification of new equipment and infrastructure at clinics.	Person-month					
3.4.1.C	L-Specification of new equipment and infrastructure at clinics.	Person-month					
3.4.5.A	P-Maintenance procedures for new equipment at hospitals.	Person-month	1	1	R 80.000	R 80.000	R 80.000

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
3.4.5.B	P-Maintenance procedures for new equipment at clinics.	Person-month					
3.4.5.C	L-Maintenance procedures for new equipment at clinics.	Person-month					
3.6.1.A	P-Develop and distribute HCW Codes of practice at hospitals.	Person-month	3	0	R 60.000	R 180.000	R 0
3.6.1.B	P-Develop and distribute HCW Codes of practice at clinics.	Person-month					
3.6.1.C	L-Develop and distribute HCW Codes of practice at clinics.	Person-month					
3.7.2.A	P-Develop and distribute training materials at hospitals.	Person-month	0	2	R 60.000	R 0	R 120.000
3.7.2.B	P-Develop and distribute training materials at clinics.	Person-month					
3.7.2.C	L-Develop and distribute training materials at clinics.	Person-month					
	Sub-total (Consultancy)					**R 580.000**	**R 600.000**

Table 8.14: *Additional material publishing required at provincial hospitals and clinics.*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Publishing guidelines, training and information materials etc (P=Provincial Government; L=Local Government)							
3.1.1.A	P-Develop and implement HCW management plans at hospitals.	Sum	344		R 50	R 17.200	R 0
3.1.1.B	P-Develop and implement HCW management plans at clinics.	Sum					
3.1.1.C	L-Develop and implement HCW management plans at clinics.	Sum					
3.1.3.A	P-Develop and implement environmental management system at hospitals.	Sum		344	R 50	R 0	R 17.200
3.1.3.B	P-Develop and implement environmental management	Sum					

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
	system at clinics.						
3.1.3.C	L-Develop and implement environmental management system at clinics.	Sum					
3.2.1.A	P-Develop and implement HCW management procedures at hospitals.	Sum	344		R 50	R 17.200	R 0
3.2.1.B	P-Develop and implement HCW management procedures at clinics.	Sum					
3.2.1.C	L-Develop and implement HCW management procedures at clinics.	Sum					
3.3.1.A	P-HCW man. organisational structure implemented at hospitals.	Sum	344		R 50	R 17.200	R 0
3.3.1.B	P-HCW man. organisational structure implemented at clinics.	Sum					
3.3.1.C	L-HCW man. organisational structure implemented at clinics.	Sum					
3.3.2.A	P-Implement HCWIS at hospitals, including DACEL registration.	Sum	344	0	R 50	R 17.200	R 0
3.3.2.B	P-Implement HCWIS at clinics, including DACEL registration.	Sum					
3.3.2.C	L-Implement HCWIS at clinics, including DACEL registration.	Sum					
3.4.5.A	P-Maintenance procedures for new equipment at hospitals.	Sum	344	0	R 50	R 17.200	R 0
3.4.5.B	P-Maintenance procedures for new equipment at clinics.	Sum					
3.4.5.C	L-Maintenance procedures for new equipment at clinics.	Sum					
3.6.1.A	P-Develop and distribute HCW	Sum	344	0	R 50	R 17.200	R 0

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
	Codes of practice at hospitals.						
3.6.1.B	P-Develop and distribute HCW Codes of practice at clinics.	Sum					
3.6.1.C	L-Develop and distribute HCW Codes of practice at clinics.	Sum					
3.7.2.A	P-Develop and distribute training materials at hospitals.	Sum	2000		R 100	R 200.000	R 0
3.7.2.B	P-Develop and distribute training materials at clinics.	Sum					
3.7.2.C	L-Develop and distribute training materials at clinics.	Sum					
	Sub-total (Publishing materials)					**R 303.200**	**R 17.200**

Table 8.15: *Additional equipment and materials required at provincial hospitals and clinics*

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
Equipment and materials (P=Provincial Government; L=Local Government)							
3.3.2.A	P-Implement HCWIS at hospitals, including DACEL registration.	0	0	0	R 5.000	R 0	R 0
3.3.2.B	P-Implement HCWIS at clinics, including DACEL registration.						
3.3.2.C	L-Implement HCWIS at clinics, including DACEL registration.						
3.4.2.A	Upgrade Waste Storage Areas	Sum	60	20	R 50.000	R 3.000.000	R 1.000.000
3.4.2.B	Removal of onsite incinerators	Sum	10	0	R 20.000	R 200.000	R 0
3.4.2.C	Upgrade of sluice rooms	Sum	600	200	R 1.000	R 600.000	200000
3.4.3.A	Improve domestic waste infrastructure	Sum	30	20	R 60.000	R 1.800.000	R 1.200.000

Activity no.	Activity Description.	Unit.	Units Require Short term	Units Required. Medium term	Unit Cost	Activity Cost Short term	Activity Cost Medium term
3.4.3.B	P-Install 50% waste handling and storage equipment at clinics.	Sum					
3.4.3.C	L-Install 50% waste handling and storage equipment at clinics.	Sum					
	Sub-total (Equipment and materials)					**R 5.600.000**	**R 2.400.000**

8.4 Cost Summary

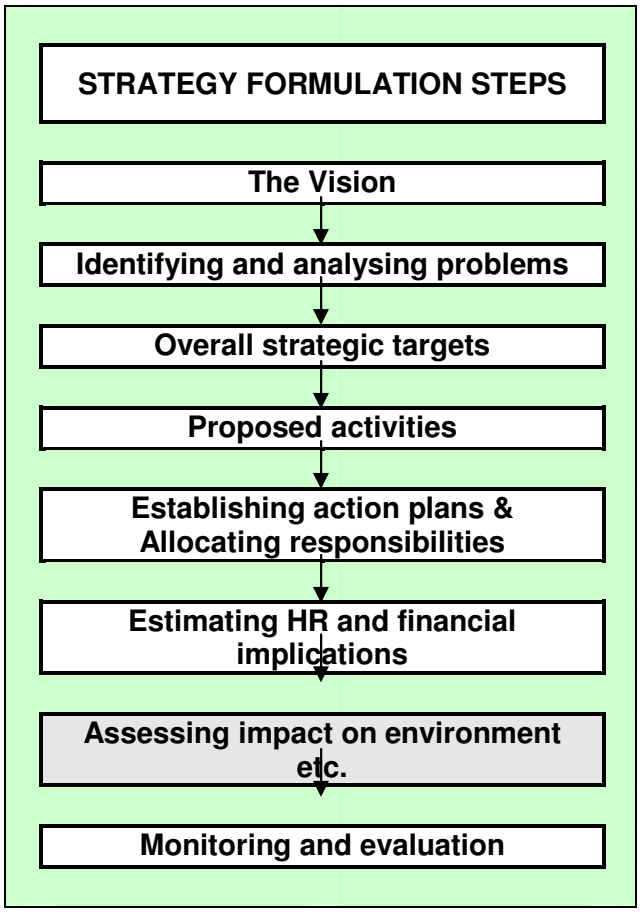
The following table presents a summary of the expected financial implications associated with the implementation of the overall HCW Management Strategy in Gauteng.

Table 8.16: *Summary of expected financial implications for implementation of the overall HCW Management Strategy in Gauteng*

	Provincial Authorities (DoH and DACEL)		Local Authorities (3 Metro and 3 District)		Public Health Care Facilities. (Hospitals and Clinics)		**Total**	
	Short	Medium	Short	Medium	Short	Medium	Short	Medium
Additional staff	R 1.454.500	R 1.202.000	R 330.000	R 205.000	R 600.000	R 500.000	R 2.384.500	R 1.907.000
Training of staff	R 80.000	R 0	R 60.000	R 0	R 433.100	R 802.500	R 573.100	R 802.500
Consultancy	R 300.000	R 340.000	R 160.000	R 0	R 580.000	R 600.000	R 1.040.000	R 940.000
Publishing	R 531.600	R 0	R 24.000	R 0	R 303.200	R 17.200	R 858.800	R 17.200
Equipment and materials	R 0	R 0	R 0	R 0	R 5.600.000	R 2.400.000	R 5.600.000	R 2.400.000
Total	**2.366.100**	**1.542.000**	**574.000**	**205.000**	**7.516.300**	**4.319.700**	**10.456.400**	**6.066.700**

It should be noted that in the assessment of staff input required, all activities required have been included in the cost estimates. However, in reality it could be assumed that much of this work would be carried out by already appointed staff who would have these activities as part of their job description.

9. Assessment of the Impact of the Strategy



This chapter includes an assessment of the impact that can be expected from the implementation of the Strategy. The assessment is based on calculation and evaluation of a number of "performance indicators" that each represents the essential aspect of the Vision of the Strategy (see section 5.2), for which the overall objective is to ensure the implementation of improved and sustainable HCW management in Gauteng. The performance indicators chosen to assess the various aspects of the Vision are shown in Table 9.1 below.

Table 9.1: *Performance indicators chosen for the assessment of the impact of the Strategy*

Aspect of the Vision	Performance indicators chosen
Comprehensive and integrated HCW management systems.	• Number of HCFs where new HCW management systems have been introduced according to the standards described in the Gauteng HCRW Management Regulations and the Tender Specification. • Number of Local Government plans for HCRW Management • Number of HCF that have produced a HCW Management Plan for their facility • Number of facilities registered with the Waste Information System as per the Waste Reporting Regulation
Environmentally sustainable.	• Amount of HCRW generated. • Emission of air pollutants (Particulates, HCl, etc.) • Emission of global warming gasses (CO_2 & HC_4) • Green procurement procedures implemented.

Aspect of the Vision	Performance indicators chosen
Occupationally healthy and safe.	• Number of needle prick injuries reported. • Amount of HCRW lifted manually over distances in stead of wheeled or mechanical transfer. • Degree of correct segregation
Financially viable system.	• HCF's expenditures for HCW management. • Socio-economic effects.
Institutionally feasible.	• Number of staff trained and informed about the new HCW Management systems. • Number of HCW management officers appointed including replacement of HCW Officers that become unavailable. • Number of HCW management teams established. • Participation in a HCW Management Interest Group established for exchange of information and networking between various stakeholders involved in HCW management.
Operationally practical.	• Efficiency of HCW segregation. • Reusable vs. disposable containers for HCRW.
"Cradle-to-grave".	• Number of facilities reporting on the HCW information system implemented. • Number of facilities covered by HCRW tracking systems.

9.1 Impact on the implementation of a new HCW management system

An important yardstick for the success of the Strategy is the number of HCFs where environmentally sound, healthy and safe HCW managements systems are implemented. This requires that such comprehensive and integrated HCW management systems are not only to be implemented at HCFs, but also in terms of HCW collection, external transportation as well as treatment, ensuring overall compliance with the Gauteng HCRW Management Regulations (Gauteng Health Care Waste Management Regulations – DACEL Draft 6, June 2003).

It is assumed that the HCW management systems described in the Tenders Specification for outsourcing of HCRW management services to provincial hospitals and clinics (Project Specification – Sustainable HCW Management in Gauteng – Final Draft, June 2003), primarily based on reusable wheelie bins, plastic liners and disposable sharps containers, will ensure compatibility between the internal HCRW segregation and containerisation systems and the external HCRW collection, transport and treatment systems.

As described in the Action Plans (chapter 7), implementation of the Strategy will result in the introduction of improved HCW management systems in all provincial HCFs by 2005.

The remaining hospitals and clinics in Gauteng are private HCFs that are not directly affected by the Strategy. However, it is likely that the implementation of the Strategy in public HCFs will influence decision makers from private HCFs, leading to improved HCW management systems in the private health care sector. This will not only be as a result of the private sector identifying advantages and benefits resulting from the improved new HCW management systems, but also because the waste management service providers would to a certain degree adopt the systems proposed by and tested during the Sustainable Health Care Waste Management Project.

9.2 Environmental impact

The implementation of the Strategy will impact on the environment in many different ways. For the purpose this study it was decided to assess the environmental impact based on indicators that are central to HCW management and that are often used to describe the overall impact of an activity on the environment. The indicators include:

- Amounts of HCRW generated;
- Emission of air pollutants (Particulates, HCl, NO_x, SO_2);
- Emission of global warming gasses (CO_2 & HC_4);
- Green procurement procedures implemented.

9.2.1 Amounts of HCRW generated

One of the central objectives of the Strategy for Sustainable HCW Management in Gauteng is to improve the efficiency of the HCW segregation, thereby not only reducing the health and safety risks associated with the handling of the HCW, but also to reduce the amount of HCRW requiring treatment. The benefits associated with a reduced HCRW stream is twofold: (i) From an environmental point of view it would reduce the resource demanding special collection, transport and treatment of HCGW incorrectly classified as HCRW, and (ii) from a financial point of view it would be appropriate to avoid the much more costly collection, transport and treatment required for HCRW that could in fact be disposed of as HCGW.

Based on the findings of a HCW generation and characterisation study (Health Care Waste Generation and Characterisation Study for Health and Treatment Facilities – DACEL 2003.), undertaken as part of the Sustainable Health Care Waste Management Project, it was found that a significant amount of incorrectly segregated HCGW is placed in general infections HCRW receptacles. At public hospitals the amount of HCGW in the HCRW stream is in the order of 30% whereas at private hospitals it is around 22%. This is a clear indication that there is a significant amount of HCGW unnecessarily being treated and disposed of as HCRW at high costs.

During the pilot project conducted at Leratong Hospital as part of the Sustainable HCW Management Project, it was demonstrated that a significant improvement could be achieved in HCW segregation through interventions that included improved equipment, increased training and improved supervision. Hence, the percentage HCGW in the general infectious HCRW receptacles was reduced from approximately 25% to 7%. However, there were not any indications of a reduction in the overall HCRW stream from the pre- to the post intervention study, among others, due to the fact that significant amounts of HCRW that was previously incorrectly disposed off as HCGW, was during the post-intervention study correctly segregated and therefore placed in the HCRW receptacles, thereby in turn increasing the amount of HCRW to be treated. Even though the proportions of HCRW in the HCGW stream are relatively small (4.4% in the pre-intervention study and 2.5% in the post intervention study) the actual amounts are relatively high due to the higher amounts of HCGW being generated. Although this did not result in a nett reduction in the amount of HCRW requiring expensive treatment, it did make the working conditions for HCGW workers, as well landfill operators, significantly safer.

9.2.2 Emission of air pollutants during treatment

The primary emission of pollutants resulting from “cradle-to-grave” HCW management includes:

- Emissions resulting from HCRW treatment;

- Emissions from vehicles transporting HCRW from the point of generation to the treatment facility, as well as from vehicles transporting treated HCRW residues from the treatment facility to the disposal site.

HCRW treatment technologies can be divided into two main categories, i.e. incineration and non-burn technologies. Incineration technologies emit a range of air pollutants during treatment, whereas the non-burn technologies will not generate noticeable air pollutants during treatment. Non-burn technologies will however indirectly result in emission of global warming gasses from the degradation of organic materials disposed of at landfills subsequent to treatment. The impact on global warming is assessed in Section 9.2.3.

There has been a considerable improvement in the standard of HCRW treatment technologies applied since the inception of the Sustainable HCW management Project in Gauteng. As part of this Strategy the improved emission standards for HCRW treatment plants, as required by the Gauteng HCRW Management Regulations, are described.

As part of the Sustainable HCW Management Project in Gauteng, a Feasibility Study (Feasibility Study for Sustainable Health Care Waste Management Scenarios for Gauteng – DACEL: Draft 2002) was undertaken to assess the financial, technical and environmental impacts of various scenarios aimed at improving the overall standard of HCW management in Gauteng. The Feasibility Study inter alia included estimates of the environmental impact resulting from HCW management systems based on reusable wheelie bins for general infectious waste at the HCFs and based on a 50/50 mix of burn and non-burn technologies for treatment. The results of these estimates are presented in the following.

Table 9.2 below shows the results of the estimates of the present emissions (Feasibility Study into the Possible Regionalisation of Medical Waste Treatment Facilities in Gauteng – DACEL 2000), the expected emissions when all HCRW is treated and new emissions standards that will be comparable with EU standards when introduced.

Table 9.2: *Estimated monthly emissions from treatment plants: Status Quo, mixed regional treatment (future) and the difference.*

Impact Treatment Plants	**Unit**	**Status Quo**	**Mix regional treatment**	**Difference**
Non-burn				
Use of Power (non-burn)	MJ	0	316.440	-316.440
Use of water	litre	0	46.880	-46.880
Incineration				
HCl (incineration)	kg HCl	2.092	209	1.883
NO_x	kg NO_x	4.184	1.395	2.789
CO	kg CO	3.487	349	3.138
SO_2	kg SO_2	3.487	174	3.313
Dust	kg Dust	2.510	244	2.266
Hg	kg Hg	2,79	0,35	2,44
Dioxin (TEQ-I)	mg TEQ	0,0139	0,0014	0,0125
CO_2	kg CO_2	2.619.418	1.309.709	1.309.709
Use of Power	MJ	126.576	63.288	63.288
Use of Fuel	MJ	253.152	126.576	126.576
Supplanted energy	MJ	0	-410.196	-410.196

As presented above, considerably reductions in the emissions of all gases can be expected, primarily due to the regulation of new emission standards for Gauteng.

Both the burn and the non-burn treatment facilities will require power (electricity) and fuel to operate, with the non-burn technologies requiring more power than the burn technologies. As indicated in Table 9.2, the need for power and fuel required for incinerators will be reduced by 50% from that indicated for the Status Quo, as it is assumed that half of the HCRW stream will in future be treated by non-burn technologies. The burn technologies will in turn generate some supplant energy (heat from combustion), that could in some instances be utilised. However, the total energy consumption in the future scenario will most likely increase, due to the fact that the non-burn technologies are consuming more energy, whilst it is at the same time unlikely that the supplant energy from the incinerators can be utilised.

The reduction in the emission of CO_2, which is a global warming gas, results from the introduction of non-burn treatment envisaged for half of the HCRW stream. This reduction in the emission of a global warming gas will to a certain degree be neutralised by emission of another global warming gas, methane (CH_4), as indicated below.

The introduction of non-burn technologies will increase the tonnage of residues to be transported by trucks (from 199 to 686 tonnes per month), resulting in the emission of more polluting gases to the atmosphere. The estimates made as part of the Feasibility Study are presented in Table 9.3 below.

Table 9.3: *Estimated monthly emissions from trucks transporting residues: Status Quo, mixed regional treatment (future) and the difference.*

Impact Transport of Residues	Unit	Status Quo	Mix regional treatment	Difference
NO_x	kg NO_x	0,27	0,95	-0,68
SO_2	kg SO_2	0,08	0,29	-0,21
CO	kg CO	0,18	0,62	-0,44
Dust	kg dust	0,05	0,16	-0,11
Dioxin (TEQ-I) (diesel)	mg Dioxin (TEQ)	0,00003	0,00009	-0,00006
Fuel	litre	996	3.428	-2.432
CO_2	kg CO_2	2877	9903	-7026

As indicated in the table above, the increase in the emissions will be marginal in relation to the emissions from the treatment facilities.

The increased need for power for the non-burn treatment plants will result in a marginal increase in the emission of various gases from the coal fired power plants that are supplying electricity to the Gauteng area. The estimated increase in emissions required to address the increased need for power is presented in Table 9.4 below.

Table 9.4: *Estimated monthly emissions from power plants supplying power to the HCRW treatment plants in Gauteng: Status Quo, mixed regional treatment (future) and the difference.*

Impact at Power Plants (Coal -→ Power)	Unit	Status Quo	Mix regional treatment	Difference
Power	kWh/month	35.160	105.480	-70.320
CO_2	kg CO_2	14.767	44.302	-29.535
SO_2	kg SO_2	35	105	-70
NO_x	kg NO_x	25	74	-49
Dust	kg dust	7	21,1	-14,1

It appears from the above that there will be some emission of polluting substances in supplying the additional electricity required by the non-burn treatment facilities, although it will be marginal in relation to the emissions from the burn treatment plants.

The disposal of residues from the treatment of HCRW to landfill not only results in air emissions, but also in a number of other environmental factors such as generation and discharge of leachate and land use. The impact, estimated during the Feasibility Study is shown in Table 9.5 below.

Table 9.5: *Estimated monthly emissions from disposal of residues by landfill and other environmental impacts: Status Quo, mixed regional treatment (future) and the difference.*

Impact at Landfill	Unit	Status Quo	Mix regional treatment	Difference
Non-burn				
Leachate	litre	0	5.860	-5.860
COD	kg COD	0	645	-645
Hg	kg Hg	0	0	0
CH_4	kg CH_4	0	181.660	-181.660
CO_2	kg CO_2	0	498.100	-498.100
Loss of land	m^2	0	82	-82
Incineration				
Leachate	litre	1.992	996	996
Hg	kg Hg	0,02	0,01	0,01
Loss of land	m^2	4,74	2,37	2,37

From Table 9.5 it appears that the generation of leachate as well as the emission of CO_2 and CH_4 will increase considerably when non-burn technologies are introduced. This is primarily due to the fact that non-burn technologies will generate substantial amounts of organic residues to be disposed of at landfills, whilst smaller amounts of inorganic residues will be generated.

Generally speaking, the burn technologies will primarily result in increased air emissions during treatment, whilst the non-burn technologies will result in increased amounts of organic solid waste to be disposed of at landfills that will generate air emissions during its decomposition.

9.2.3 Emission of global warming gasses

There are two global warming gasses that are of particular importance from an environmental point of view when considering the Gauteng HCW management system, i.e. CO_2 (carbon dioxide) and CH_4 (methane).

Carbon dioxide is emitted during the incineration of HCRW, from the vehicles transporting the HCRW and its treated residues as well as from the landfills where the residues from the non-burn treatment facilities are disposed of. When HCRW delivered to incinerators is treated, the total carbon content of the HCRW is converted into CO_2 with a small fraction being converted into CO (carbon monoxide). Similarly, the carbon content of the fuel used by the vehicles transporting the HCRW and its residues is converted into CO_2 and CO, but primarily CO.

Methane will be emitted from landfills where organic residues from the non-burn treatment facilities are disposed of. The generation of CO_2 versus CH_4 depends on the availability of oxygen. Where oxygen is available the organic compounds of the HCRW will degrade through emission of CO_2 (aerobic process). If no oxygen is available the organic materials will degrade through the emission of CH_4 (anaerobic process). In these calculations it is assumed that 50% of the HCRW residues degrades through an aerobic process and the remainder through an anaerobic process.

In Table 9.6 below the total estimated emission of global warming gasses before and after implementation of the Strategy is presented. CH_4 has an impact on global warming that is 25 times more severe than the impact of CO_2. Hence, the table also includes a line, indicating the total weighted impact on the global warming, where CH_4 is converted into a CO_2-equivelant (CO_2-eq).

Table 9.6: *Estimates of the monthly emissions from power plants supplying power to the treatment plants: Status Quo, mixed regional treatment (future) and the difference.*

.

Global warming, all sources	Unit	Status Quo	Mix regional treatment	Difference
Treatment, CO_2	kg CO_2	2.619.418	1.309.709	-1.309.709
Transport of residues, CO_2	kg CO_2	2877	9903	7026
Power production, CO_2	kg CO_2	14.767	44.302	29.535
Land filling, CH_4	kg CO_2-eq	0	4541500	4.541.500
Land filling, CO_2	kg CO_2	0	498.100	498.100
Total	kg CO_2-eq	2.637.062	6.403.514	3.766.452

As it appears, the introduction of non-burn treatment technologies will result in an increased impact on global warming, primarily due to the assumed anaerobic digestion of 50% of the organic residuals. However, this is merely an assumption, resulting in the estimates only considered to be indicative.

9.2.4 Green procurement implemented.

Green procurement is a procedure to promote the purchase of equipment and materials that would be less harmful to the environment during its life cycle. Although green procurement is difficult to define, the fact that some HCFs may have implemented such procedures will be an indication that such HCFs are more environmentally conscious than others.

As a performance monitoring indicator, detailed recording of the following could for instance be used:

- The number of mercury containing thermometers that were replaced with non-mercury containing thermometers;
- The number of PVC containing products replaced with non-PVC containing products.

Up until now none of the provincial HCFs in Gauteng implemented Green procurement programmes, so this indicator would only be relevant for future monitoring.

9.3 Impact on occupationally health and safety

Needle prick injuries resulting from the direct or indirect handling of infected syringe needles or cut wounds from infected sharp objects, could have serious consequences for workers. The handling of HCRW containing such infected items not safely contained in puncture resistant containers or where such items are incorrectly disposed of as HCGW, are just some of the ways in which workers can be exposed to such risks.

Hence, needle prick injuries or injuries from sharp objects could be used as indicators on safe handling of infected sharps.

Up until now only limited statistics are available on the number of needle prick and cut wound injuries in the public health care sector and HCW management industry. Even though reporting of such injuries is compulsory in terms of the OHS Act, only few stakeholders currently register and report on these incidents.

It is however believed that the introduction of the proposed new HCW management systems will reduce the number of needle prick and cut wound injuries considerably, due to the fact that new puncture resistant sharps containers and wheelie bins are introduced that would minimise the risk of humans coming in direct contact with such HCRW.

Another factor that could be used as an indicator of occupational health and safety conditions in the workplace is the amount of HCRW manually handled. The less HCRW manually handled, the better and safer the working conditions.

The last indicator that could be considered under Occupational Health and Safety is the number of infections that can be attributed to HCW management.

9.4 Financial implications

An important consideration in the Strategy is the impact that implementation of the improved new HCW management system will have on the cost of rendering such services. The installation of new equipment increased training, etc. is set to increase the cost of rendering the HCRW management services, in particularly during the initial stages when most of the capital investment in durable items is to be made.

It is however at the same time also expected that improved segregation will reduce the amount of HCRW requiring expensive treatment, thus reducing the treatment cost. The important consideration is however to what the actual increased cost would be, and to extent the anticipated saving can compensate for the increased cost of service delivery, should the saving materialise.

Although the expected cost for the HCRW management service delivery was determined as part of the HCRW management tender development process, it is uncertain how long it will take to achieve

the level of training and awareness that would result in the HCRW stream being reduced to such an extent that it can result in a substantial saving through improved segregation.

The Strategy will also have a socio-economic impact. Some of the factors or indicators that will be relevant in this respect are:

- Creation of jobs requiring higher skills;
- Increased turnover of the companies appointed to render the HCRW management services.

During the implementation phase of the improved new HCW management system it is unlikely that more jobs will be created than before. Although it is expected that the new HCRW management systems will be more efficient, thereby not requiring more workers, it will be more sophisticated, requiring workers to be better trained. This may result in an increased workload during the initial stages, but once the required skills have been acquired and the systems have been in operation for some time, the workload will probably be the same as before or even less due to the fact that the systems will be more efficient. However, the jobs will be more specialised due to the fact that the systems are more sophisticated, and thereby demand higher skills.

The aforesaid trends will probable apply to all of the affected HCFs and service providers.

The HCRW management market has already changed considerably since inception of the Sustainable Health Care Waste Management Project. New HCRW treatment service providers, making use of both burn as well as non-burn treatment technologies, were established whilst existing HCRW treatment facility operators will have to comply with more stringent emission standards.

The establishment of new HCRW treatment facilities resulted in an increase of the HCRW treatment capacity, bringing about more competition in the market. Although it is expected that the amount of HCRW generated by public HCFs would reduce through improved segregation, it is estimated that a significant amount of HCRW from Gauteng as well as neighbouring provinces is currently unaccounted for. By implementing the improved control mechanisms allowed for as part of the new HCW management system, almost all HCRW generated will in future be delivered to environmentally compliant treatment facilities. In addition to this, the onsite incinerators previously used at most public and private hospitals, will no longer be allowed to operate unless it can meet the required environmental standards, thereby further increasing the amount of HCRW to be treated by private HCRW treatment facilities.

9.5 Impact on institutional aspects

The most prominent indicators on the development of the institutional settings, resulting from the implementation of the Strategy, are the following:

- Number of staff trained in the operation of the improved new HCW management systems;
- Number of HCW management officers appointed;
- Number of HCW management teams established;
- Participation in a HCW Management Interest Group established for exchange of information and networking between various stakeholders involved in HCW management.

Effective training and skills development are important preconditions for the successful implementation of the improved new HCW management systems. Although it is difficult to predict at this stage how the staff will react to the new HCW management system, and how much effort will be required during the training, there will most certainly be an improvement on the current procedures.

Results obtained during the evaluation of pilot project undertaken as part of the Sustainable Health Care Waste Management Project, clearly indicated that HCW management procedures improved amongst staff members involved with and trained during the pilot project.

Another useful indicator is the number of HCW management officers appointed. This indicator will - together with the number of HCFs that established HCW management teams - show how many HCFs that have implemented a firmer organisational structure for HCW management, and thereby in principle have improved the HCW management.

The final indicator could be the participation of stakeholders from various disciplines associated with HCW management, in an HCW Management Interest Group established for exchange of information and networking. Although such an interest is established outside of the jurisdiction of this project, the extent to which is supported and the level of involvement by various stakeholders would be an important indicator of the success achieved in terms of institutional aspects.

9.6 Impact on HCW management operation practices

The efficiency with which HCW is segregated is one of the indicators that could be used to determine whether the HCW management system has improved, as well as the extent to which the staff has been able to use the new equipment and adapt to the new procedures.

According to the information obtained from the HCW Generation and Composition Study, the level of incorrect HCW segregation has reduced from 25% before the pilot project interventions to 7% after the pilot project interventions.

Number of incidents where containers are overloaded, containers not being sealed / marked appropriately or containers being left unattended in unsecured areas, are further indicators that could be used effectively to determine the impact that the Strategy has on HCW management operation practices.

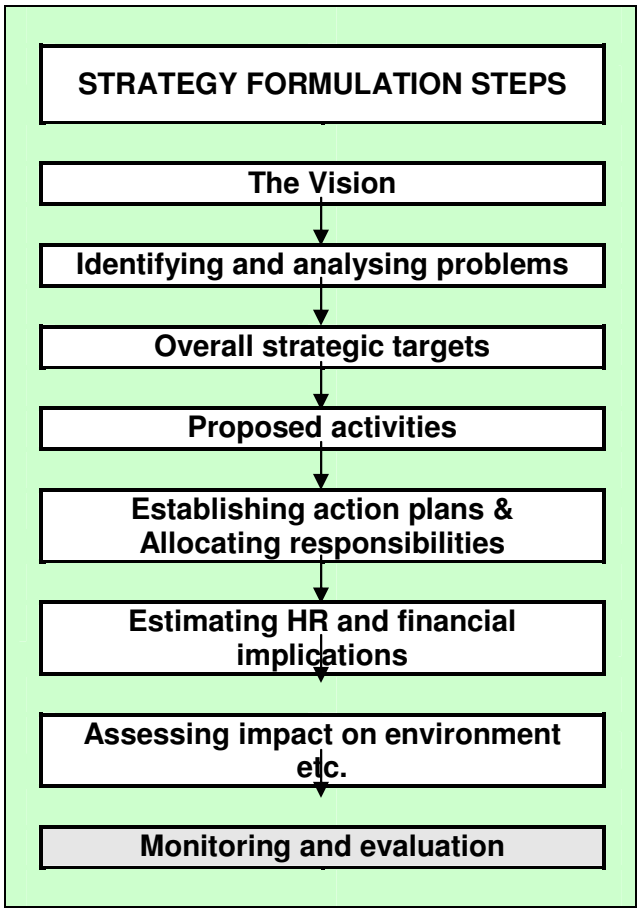
9.7 Tracking from “cradle-to-grave”

One way of monitoring the “cradle-to-grave” flow of HCRW is by implementing a HCW information system (HCWIS). Through effective use of the HCWIS it is possible to follow the flow of HCRW from its point of generation at HCFs, through internal transport, storage, collection, external transport and treatment, from where the treated residue is then transported for final disposal at landfills.

The number of HCFs that successfully implemented the HCWIS will serve as an indicator of how effective HCRW can be tracked from cradle-to-grave.

A further indicator that could be used is the number of HCFs that successfully implemented a HCRW tracking system to verify compliance with the HCRW generator’s “duty of care” to ensure that all HCRW generated is treated and disposed of in an environmentally sound manner.

10. Monitoring and evaluating the Impact of Strategy



10.1 Establishing a monitoring programme

It is important to include means of monitoring the level of success with which the Strategy is implemented, resulting in improved HCW management standards that would lead to:

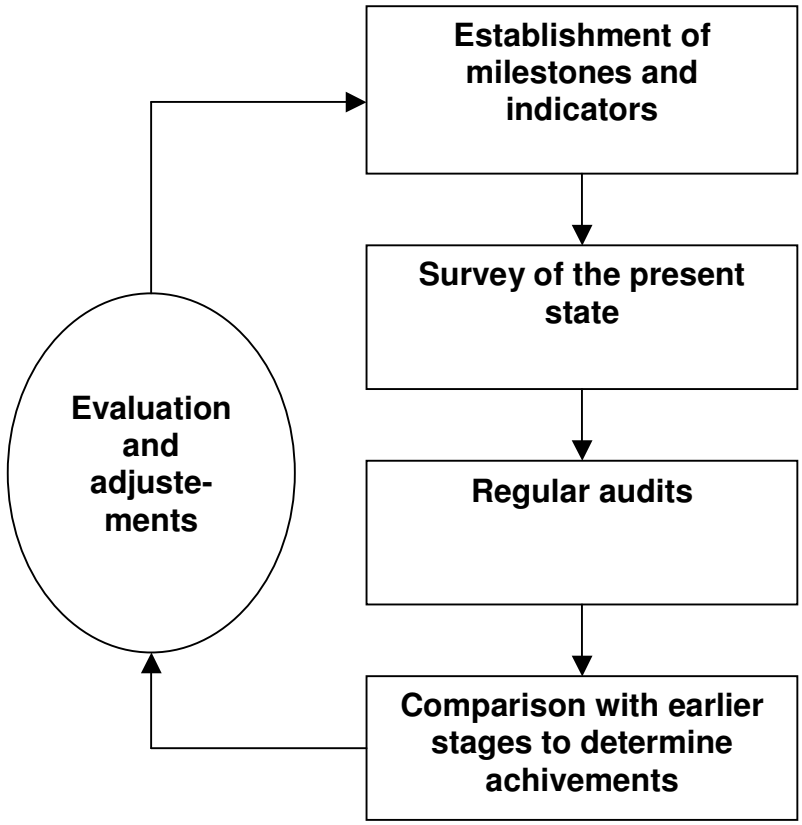
- Reduced impact on the environment;
- Improved occupational health and safety;
- Affordable service delivery;
- Improved public health.

In addition to the above, it is further important for progress monitoring to be done in such a way that the need for adjustments to the Strategy can be identified at an early stage, thereby ensuring implementation of Strategies that are tailor-made for the institutions where it is respectively implemented.

For this purpose a Monitoring Programme is proposed as part of the Strategy. Such a Monitoring Programme could be structured as shown in Box 10.1 below.

Box 10.1: Overall structure of monitoring and evaluation

Box 10.1: Overall structure of monitoring and evaluation programme



As a starting point, a number of milestone and indicators should be established so that there is a common understanding on how improvements related to HCW management should be accomplished. Milestones can be various Activities within the Action Plans, and a criteria for success can be the timely and successfully implementation of any particular activity. Indicators can be physical as well as non-physical parameters as described in the previous chapter.

Once the milestones and indicators were determined, the baseline should be established to define the original status, before the Strategy for improved HCW management was implemented. Reference could in this instance be made to the status quo as described in the Feasibility Study into the Possible Regionalisation of Medical Waste Treatment Facilities in Gauteng – DACEL 2000.

The next element of the Monitoring Programme should be regular audits by independent parties to determine which milestones that have been reach and measured the various indicators. For each audit the present state - determined by the indicators – is to be compared with the previous condition, with the comparison intended to show improvements in the overall state of HCW management in that particular institution. If no improvements are reported, or if there is deterioration in conditions, the Activities must be re-evaluated and if necessary adjusted in order to ensure that the expected goals are achieved.

11. Summary and conclusions

Formulation of the Strategy and Actions Plans for HCW management, which is an integral part of the project on Sustainable HCW Management in Gauteng, stems from the need for the overall improvement of HCW management standards in the province, identified during a Status Quo Study undertaken in 2000. The Vision of the Gauteng HCW Management Strategy was therefore defined, within the framework and principles of the NWMS, to facilitate the establishment of an integrated, environmentally sustainable, occupationally healthy and safe, financially viable, institutionally feasible and operationally practical, comprehensive “cradle-to-grave” management system for HCW in Gauteng, covering all HCW generators in the province, addressing the short, medium and long term needs.

The Strategy and Action Plans covers all organisations that are involved in HCW Management in Gauteng, including:

- Large HCW generators like hospitals, clinics and blood transfusion services;
- Small HCW generators like general practitioners, dentists, pharmacies, private homes, etc.;
- HCRW service providers, like HCRW transporters, treatment plants and disposal facilities;
- Administrative authorities like provincial departments and local governments.

The Strategy and Action Plans are intended to address the management of all HCW categories, with particular emphasis on the following HCRW categories:

- Infectious waste, which is waste that may contain pathogenic micro-organisms;
- Sharps, including sharp and pricking objects that may cause injury as well as infection;
- Pathological waste, that includes parts that are sectioned from a body;
- Chemical waste, consisting of all kinds of discarded chemicals, including pharmaceuticals that pose a special risk to human health and environment;
- Health care risk liquid waste.

Radioactive Waste, consisting of solid, liquid and gaseous waste contaminated with radionuclides, is excluded from this Strategy and Action Plans as such waste materials are specifically dealt with in terms of the National Nuclear Regulator Act 1999 (act 47 of 1999).

The total amount of HCRW generated in Gauteng by both public and private HCFs during the year 2000 was estimated to be approximately 1 200 tonnes per month. In Gauteng, some 600 major HCRW generators produced in the order of 89% of the total HCRW stream, whilst about 9 700 minor generators produced in the order of 11% of the total HCRW stream.

Having considered a number of variables likely to impact on future HCRW generation rates, a preliminary estimate of the future HCRW generation rates predict that there may be an increase by approximately 1,7% per annum. However, if HCW segregation is done more effectively, it is estimated that there could be a reduction in the HCW generation rate, by as much as 30% during the period when improved segregation is taking place.

HCW is passing through a number of steps from its point of generation at the HCFs, through transport and treatment to its final disposal at a landfill. This so-called waste flow consists of the following:

- Generation of HCW (HCRW + HCGW);
- Segregation of HCW in HCGW and selected HCRW categories;
- Containerisation of HCW according to different categories;
- Intermediate storage of HCW within the HCFs;
- Internal collection and transport of HCW;

- Centralised storage of HCW at the HCFs;
- External transport of HCRW to treatment facilities and of HCGW to disposal facilities;
- Treatment of HCRW;
- Collection of residues from treatment facilities and transport to disposal facilities;
- Disposal of residues from HCRW treatment as well as HCGW at disposal facilities.

Having considered the distribution and rate of HCRW generation in Gauteng, the available HCRW treatment facilities in Gauteng were evaluated. Although there were 54 incinerators of varying sizes and degrees of efficiency spread throughout Gauteng during the 2000 study, none of those met the DEAT Emission Guidelines or the proposed Gauteng Regulations, requiring for a vast number of treatment facilities to be shut down if not upgradeable. The thermal and non-thermal HCRW treatment facilities permitted by the end of year 2003 to operate in accordance with the Gauteng HCRW Management Regulations (Draft 6, June 2003), are presented in Table 11.1 below.

Table 11.1 *Thermal and non-thermal HCRW treatment facilities with a Record of Decision that is assumed to comply with the Gauteng Regulations..*

Treatment Facility	Treatment Process	Estimated Treatment Capacity (tonnes/month)	Permit Status (Record of Decision) Oct 2003
Treatment Plants assumed to comply with the requirements of the Gauteng Regulations			
Evertrade Medical Waste	Electro Thermal Deactivation	1,500	RoD Granted. Operation permitted
Clinical Waste Management	Incinerator (batch fired)	210 - 400	RoD Granted. Operation permitted once final monitoring equipment functional
Sub-total		**1,710-1,900**	

It is estimated that the total monthly HCRW generation in Gauteng is in the range of 1,200 tonnes per month. Hence, and assuming not net import or export of HCRW to/from Gauteng, the table above demonstrates that there is already a 140-160% supply of required treatment capacity and it appears likely that this could increase to 200-215% over a period of time.

During the formulation of the Strategy and Action Plans, a process comprising of the following sequential steps and inputs were used:

- The Vision, with input from the Integrated Pollution and Waste Management;
- Needs analysis through the identification and analyses of problems and shortcomings, with input from the Status Quo Study, HCW management Starter Document and Visual Inspections;
- Overall strategic targets, with input from the IP&WM, Existing Acts and Regulations, Existing Standards, Policies, Codes and Guidelines;
- Proposed Activities;
- Establishing action plans;
- Allocating responsibilities, with input on legislation & institutional framework;
- Estimating human resource needs & financial implications, with input on operational data and service providers.
- Assessing impacts;
- Monitoring / evaluation.

This structured approach followed in the Strategy and Action Plan formulation ensured that cognisance be taken of the interrelationship between the various steps in the process, allowing for cross referencing where appropriate.

The Action Plans, intended to address the list of needs identified, were grouped according to the party responsible for the implementation thereof. The Action Plans were presented as short term (2003, 2004), medium term (2005, 2006, 2007) and long term (2008 onwards), making it feasible for the most critical items to be addressed first. The timing for commencement of the implementation of the Action Plans was selected such that it allows for activities executed concurrent with the Sustainable HCW Management project, also to be included.

The costs estimates for execution of the proposed Activities was determined, based on the best information available at the time and should therefore not be considered to be accurate budget figures, but rather ballpark figures.

A summary of the Milestone activities, with the associated financial implications and the party primarily responsible for its execution, is presented in Table 11.2 below. With only the Milestone Activities presented, the Activities are listed according to its main impact sphere.

Table 11.2: *Activities, timing of activities, cost estimates and allocation of primary responsibilities within Action Plans.*

Activity no.	Milestone Activity Description	Short term budget (R m)		Medium term budget (R m)			Long term (R m)	Party
		2003	2004	2005	2006	2007	2008 onwards	
1	**Environmental.**							
1.1	Evaluation						xx	DACEL
1.2								
2	**Occupational Health & Safety.**							
2.1								
2.2								
3	**Institutional Matters.**							
3.1	Firmer HCWM organisation	xx	xx	xx	xx	xx		DOH
3.2								
4	**Technical.**							
4.1	Introduce better equipment etc	xx	xx					DOH
5	**Financial.**							
5.1	Funds for improved HCWM							DOH
6	**Legal.**							
6.1	Registration of HCF's	xx						DOH
	Strengthening env. legislation	xx						DACEL
	Enforce env. & OHS legislation	xx	xx	xx	xx	xx		DACEL
7	**Information and Training.**							
7.1	Training at hospitals		xx		xx			DOH
7.2	Training for clinics etc			xx				DOH
7.3	Training at service providers		xx				xx	Service providers

In addition to the above, an assessment was further made of the expected impact that the implementation of the Strategy would have on various recipients. The assessment was based on calculation and evaluation of a number of "performance indicators" that each represents the essential aspect of the Vision of the Strategy, for which the overall objective was to ensure the implementation of improved and sustainable HCW management in Gauteng.

The Performance Indicators (sub-bullets) chosen to assess the various aspects of the Vision (main bullets) are the following:

- Comprehensive and integrated HCW management:
  - Number of HCFs where new HCW management systems have been introduced according to the standards described by the Gauteng HCRW Management Regulations and the Tender Specification for outsourcing of HCRW management services to public HCFs.
- Environmental sustainability:
  - Amount of HCRW generated;
  - Emission of air pollutants (Particulates, HCl, etc.);
  - Emission of global warming gasses (CO_2 & CH_4);
  - Green procurement procedures implemented.
- Occupational health and safety:
  - Number of needle prick injuries;
  - Amount of HCRW manually handled;
  - Number of infections attributed to HCRW management.
- Financially viability of system:
  - HCF's expenditures for HCW management;
  - Socio-economic effects.
- Institutional feasibility:
  - Number of staff trained and informed about the new HCW Management systems;
  - Number of HCW management officers appointed;
  - Number of HCW management teams established;
  - Participation in a HCW Management Interest Group established for exchange of information and networking between various stakeholders involved in HCW management.
- Operational practicality:
  - Efficiency of HCW segregation;
  - Reusable vs. disposable containers for HCRW.
- "Cradle-to-grave":
  - Number of facilities reporting on the HCW information system implemented;
  - Number of facilities covered by HCRW tracking systems.

Table 11.3: *Summary of impacts of the Strategy and Action Plans ("+" indicates a positive impact, "–" indicates a negative impact and "0" indicates no impact. The more "+" or "–" the greater the impact)*

	Impact on the environment	**Impact on occupational health & safety**	**Impact on public health**	**Impact on employment**
At authorities	0	0	0	+
At HCF's	0	+++	+	0
At transport operators	-	+	-	0
At treatment plants	+++	++	++	+
At disposal facilities	+	+	+	0
At others				
Total	**+++**	**+++++++**	**+++**	**++**

As a final step, it was considered to be important to include means of monitoring the level of success with which the Strategy and Action Plans were implemented, resulting in improved HCW management standards leading to:

- Reduced impact on the environment;
- Improved occupational health and safety;
- Affordable service delivery;
- Improved public health.

As part of the monitoring undertaken to determine the level of success, progress monitoring is to be done in a way that would identify the need for adjustments at an early stage, thereby ensuring implementation of Strategies that are tailor-made for the particular institutions where it is implemented. A number of milestones and indicators should be established so that there is a common understanding on how HCW management related improvements should be accomplished. Once the milestones and indicators were determined, the baseline is to be established that would define the initial status, before the Strategy for improved HCW management is implemented.

Annexure 1: Consultations and Development Partners

The Strategy and Action Plans have been developed during a consultative process with input and assistance from the following stakeholders:

- Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACEL);
- Gauteng Department of Health (GDoH);
- Gauteng Department of Public Transport, Roads and Works (GDPTRW);
- Gauteng Shared Service Centre (GSSC);
- Department of Water Affairs and Forestry: Highveld Region (DWAFHR);
- Department of Environmental Affairs and Tourism (DEAT);
- National Department of Health (DoH);
- National Department of Water Affairs and Forestry (DWAF);
- Gauteng Association of Local Authorities (GALA);
- Infection Control Association of SA (ICASA);
- Hospital Association of SA (HASA);
- National Environmental Health and Allied Workers Union (NEHAWU);
- SA National Civics Organisation (SANCO);
- Danish Ministry of Foreign Affairs, via the Royal Danish Embassy (DANIDA);
- Other members of the Project Steering Committee (PSC).

In addition to the above, the following interested and affected parties were also engaged in general consultations, in particular in the form of working groups:

- South African Bureau of Standards (SABS);
- Pilot Study Institutions (Leratong Hospital and Itireleng Clinic);
- The Gauteng DoH HCW Management Forum;
- The Gauteng DoH Tender Development Committee;
- Various HCW generators from both the public and private sector;
- HCRW transport and treatment service providers operating in Gauteng;
- South African incinerator manufacturers and suppliers;
- International and local consultants.

Several large scale consultations have taken place, including:

1. Workshop November 2001
2. Workshop September 2002
3. Workshop February 2003
4. Workshop March 2003
5. Workshop May 2003

Also, several smaller consultations have taken place:

1. Tender Workshop
2. Working Group Meetings on particular issues
3. Project Steering Committee Meetings
4. Various Meetings with Stakeholders

The authors of this document would like to thank all of the aforesaid parties for the valuable contribution made during the development of the Strategy and Action Plans.

Annexure 2: Abbreviations

CBO	Community Based Organisation.
CEO	Chief Executive Officer.
CHC	Community Health Centre.
DACEL	Department of Agriculture Conservation Environment and Land Affairs
DANIDA	Danish International Development Assistance.
DEAT	Department of Environmental Affairs and Tourism
DoH	Department of Health
DPTR&W	Department of Public Transport, Roads and Works
DTPW	Department of Transport and Public Works
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
ETD	Electro-thermal deactivation
EU	European Union
GALA	Gauteng Association of Local Authorities.
GDACEL	Gauteng Department of Agriculture Conservation Environment and Land Affairs
GDoH	Gauteng Department of Health
GDPTR&W	Gauteng Department of Public Transport, Roads and Works.
GSSC	Gauteng Shared Services Centre.
HCF	Health care facility
HCGW	Health care general waste
HCRW	Health care risk waste
HCW	Health care waste
HCWIS	Health care waste information system
HCWM	Health Care Waste Management
HDPE	High Density Poly Ethylene.
HIV	Human Immune Deficiency Syndrome
I&AP's	Interested and Affected Parties.
ICC	Infection Control Committees
MSW	Municipal solid waste
NDoH	National Department of Health
NEMA	National Environmental Management Act.
NGO	Non-Governmental Organisation
NWMS	National Waste Management Strategy
OHS	Occupational Health and Safety
PE	Polyethylene
PM	Particulate matter
PP	Polypropylene
PPE	Personal protective equipment
PVC	Polyvinyl chloride
REL	Rear End Loader
RSA	Republic of South Africa
SA	South Africa / South African
SABS	South African Buro of Standards, trading as SABS.
USA	United States of America
WHO	World Health Organisation
WIS	Waste Information System.
ZAR	South African Rand.

Annexure 3: Glossary

Action Plan.	Is the process of drawing up a scheme for defining targets, methods, tasks, responsibilities, timing, control procedures and the results expected. In this document the HCW short-term action plan covers years 1 and 2, medium-term action plan years 3 to 5 and the long-term action plan from year 6 onwards, based on the Strategy implementation date of 1 January 2003.
Activity.	Action taken or work performed within a project in order to transform inputs (funds, materials) into outputs (tangible products like documents, facilities, training sessions, etc.).
Animal.	In this document animal means only those animals kept at laboratories for the purposes of biological or scientific research and testing.
Assumption.	Event, condition or decision which is necessary for project success, but which is largely or completely beyond the control of project management.
Awareness.	Raising of awareness of HCW in specific and defined target groups e.g. communities, litter pickers, and households. Implemented by means of instruments like awareness campaigns, folders, public meetings, television spots, etc. The term is normally not used in relation to formal training programmes.
Bracket.	A device for holding a disposable container such as a Sharps Container or a Specican Container.
Capacity Building / Capacity Development.	The improvement of knowledge on matters related to HCW management through the dedicated efforts of training and transfer of skills to both individuals and institutions. Capacity Building is normally undertaken as formal training like on-the-job training, courses, study tours, development of systems and tools for institutions. Capacity Development in the Environment describes the process by which capacity in environment and appropriate institutions are enhanced.
Chemical Waste.	Expired pharmaceuticals from pharmacies at HCFs, HCRW from oncological wards, cytotoxic waste, and other chemical waste generated at HCFs. Chemical Waste includes liquids and solids and can include flammable substances.
Chief Executive Officer (CEO).	The duly authorised person at the HCRW generator, transport operator, transfer station, treatment facility or disposal facility, with the power to manage and control the work authorized by that person and to exercise supervision over the other employees in the employ of the facility.
Competent Authority.	Any agency, department, board, committee, governmental body, local authority, court, inspectorate, official regulator, public statutory person or appointee of the Republic of South Africa or the Province of Gauteng (whether autonomous or not) having jurisdiction (whether by virtue of Legislation, delegated authority, customary law or otherwise) over any of the parties referred to.
Container.	A bag, or a puncture resistant and leak resistant container in which HCW is placed. Containers may be reusable or disposable.

Containerisation.	The packing and storing of HCW in dedicated containers specially designed and manufactured for the purpose, thereby ensuring the minimum risk of infection or injuries to persons responsible for handling the HCW.
Collection Programme.	The Contractor's programme for collecting HCRW from HCFs. The programme shall specify days of the week and approximate times that HCRW will be collected from each HCF.
Controlled combustion treatment.	Any method, technique or process for microbial inactivation or for otherwise altering the biological, chemical or physical characteristic of HCRW so as to render the material unrecognisable and render all sharps unusable, and ensure that all blades are broken, and in order to reduce the hazards which the HCRW presents and to facilitate disposal by means of, typically, a controlled combustion technology.
Cradle-to-grave.	A policy of controlling a HCRW from its inception to its final disposal.
Development Objective.	The overall and long-term objective that is not fulfilled by the project itself. However implementation of the project contribute to fulfil the development objective.
Disinfection.	Treatment aimed at reducing the number of vegetative microorganisms to safe or relatively safe level.
Disposable Container.	Disposable Containers shall include the following: Sharps Containers, including containers for long sharps; Specican Containers for pathological waste; Red liners for general infectious waste; Black liners for HCGW.
Domestic HCRW generator.	A household or other facility which generates reasonably minimal quantities of HCRW, such as plasters, bandages, nappies or sanitary pads, during the course of daily life; but does not include households or facilities which generate HCRW such as sharps waste, or households where there is one or more chronically ill persons requiring the use of equipment such as a dialysis machine.
Durable Items.	Means collectively brackets, baskets and freestanding racks used to support disposable containers.
Enforcement officer.	Any duly authorised representative, director or employee, including environmental health specialists and local health officers, of the competent authority.
Environment.	Environment is defined as i) the natural environment, consisting of air, water, land and all forms of life, ii) the social, political, cultural, economic and working context and other factors that determine people's place in and influence on the environment, and iii) natural and constructed spatial surroundings.
Environmentally sustainable HCW Management.	HCW management systems are considered to be systems that do not affect the environment in a negative and irreversible manner over the long term, or as defined by the United Nations Environment Programme, a system that can provide the present generation with its basic needs without compromising the possibilities of future generations to fulfil their needs.
Evaluation.	A systematic and independent examination of a project or activity in order to determine its efficiency, effectiveness, impact, sustainability and the relevance of its objectives.
Exposure.	The intake of radiation or pollutant by organisms present in a particular

	environment (i.e. human, natural), which represents a potential health threat to the living organisms in that environment.
Extraordinary Items.	Disposable items not forming part of the normal daily HCRW stream, but with characteristics similar to that of HCRW.
Financially viable system.	Refers to HCW management systems that are meeting on the financial ability of the HCFs in general, in the short, medium and long term.
Feasibility Study.	Determination whether a strategy or action-plan will be acceptable, economically viable, and capable of being used or implemented successfully without causing unacceptable damage to the environment.
Flue gas (or exhaust gas).	Gases and suspended particles emitted from an incinerator or industrial stack or generally through a chimney.
Framework Strategy and Action Plans.	Conceptual or draft strategy and action plans on an outline basis also dealing with the short term and urgent HCW Management needs for Gauteng.
General Infectious Waste.	Means Infectious Waste, other than Sharps and Pathological Waste, which is suspected to contain pathogens and normally causes, or significantly contributes to the cause of increased morbidity or mortality of human beings. It inter alia includes items such as blood, contaminated dressings, contaminated diapers or any other disposable items suspected of being infectious.
Genotoxic waste.	Includes certain cytostatic drugs, vomit, urine, or faeces from patients treated with cytostatic drugs, genotoxic substances or chemicals that have mutagenic, tetratogenic or carcinogenic properties.
Groundwater.	The water contained in porous underground strata as a result of infiltration from the surface.
Guidelines.	Advisory document serving as a tool for all HCW management stakeholders covering the HCW stream from generation to final disposal, thus ensuring that the activities of HCW institutions, authorities, industry etc. are directed towards the common creation of an overall sustainable HCW Management system for Gauteng.
Health Care Facility (HCF).	Means a provincial or private hospital, community health centre, clinic, mortuary or any other health care facility that generates HCW.
Health Care General Waste (HCGW).	The non-hazardous component of HCW and can include liquids, but excludes any HCW generated from isolation wards;
Health Care Risk Waste (HCRW).	Waste capable of producing an infectious disease. HCRW includes any of the following: ▪ Laboratory waste, including, but not limited to, all of the following: - Human or animal specimen cultures from health care and pathological laboratories; - Cultures and stocks of infectious agents from research and industrial laboratories; - Wastes from the production of bacteria, viruses, or the use of spores, discarded, live and attenuated vaccines, and culture dishes and devices used to transfer, inoculate, and mix cultures; or - Waste containing any microbiological specimens sent to a laboratory for analysis; ▪ Human surgery specimens or tissue removed at surgery or autopsy; ▪ Animal parts, tissues or fluids suspected or known to be infected with any zoonotic disease; ▪ Waste, which at the point of transport from the generator's site, or

	at any point thereafter, contains recognizable fluid blood, fluid blood products and containers or equipment containing blood that is fluid or blood from animals known to be infected with any zoonotic disease; ▪ Waste containing discarded materials contaminated with excretion, exudates, or secretions from humans or animals who or which are required to be isolated by the infection control staff, the attending physician or surgeon, the attending veterinarian, or the local health officer, in order to protect others from highly communicable diseases or from isolated animals known to be infected with any zoonotic disease; ▪ All waste generated in isolation wards; ▪ Infectious liquids; ▪ Sharps waste; ▪ Chemical waste which consists of discarded solid, liquid, and gaseous chemicals, including pharmaceutical waste and other hazardous waste from diagnostic and experimental work and from cleaning, housekeeping, and disinfecting procedures; ▪ Waste containing any radio-active material; ▪ Any waste, specimen, tissue, fluid, liquid, or sharp that resembles HCRW.
Health Care Waste (HCW)	The combination of HCGW and HCRW.
Health care waste generator.	Any person, whose acts or processes produce HCW and includes, but is not limited to: ▪ Home based care givers and organisations; ▪ Medical and Dental Practitioners, clinics, hospitals, surgery centres, laboratories, research laboratories, and General Practitioners; ▪ Veterinary Practitioners, clinics, and hospitals; ▪ Traditional Healers; and ▪ Tattoo artists; body pierces, undertakers, and embalmers.
Health care waste officer.	The nominated professional within a HCF who is responsible for the day-to-day monitoring, management and problem-solving in relation to the management of HCW, including liaison with HCW service providers.
Health care risk waste disposal facility.	Any site or premises including a landfill site (when treated) used for the ultimate disposal of HCRW.
Health care risk waste transfer station.	Any person who receives but does not treat HCRW. HCRW transporters who store HCRW are also HCRW transfer stations;
Health care risk waste transporter.	Any person who transports HCRW, but does not include any person who transports HCRW for the purposes of testing or research, or who transports HCRW from one point within a facility to another point within that facility. HCRW generators who transport their own HCRW are for the purposes of this document also HCRW transporters.
Health care risk waste treatment facility.	Any premises where HCRW is treated.
Health care risk waste Vehicles.	Vehicles used by the HCRW transporter to transport HCRW.
Home based care.	Provision of health services by formal and informal caregivers in the home in order to promote, restore and maintain a person's maximum level of comfort, function and health, including care for the duration that that person suffers from an illness or disease.

Immediate Objective.	Objectives to be met in a defined short- or medium-term, in order to finally meet the Development Objective.
Incineration.	A form of both treatment and disposal. It is the controlled burning of solid, liquid or gaseous combustible wastes to produce gases and residues containing little or no combustible materials such as carbon dioxide and water.
Infectious agent.	Any type of microorganism including, spores, bacteria, fungi, parasite, or virus that normally causes, or significantly contributes to the cause of, increased morbidity or mortality of human beings.
Infectious waste.	HCRW which is suspected to contain pathogens and which normally causes, or significantly contributes to the cause of increased morbidity or mortality of human beings, and includes but is not limited to sharps waste and anatomical waste; but excludes baby-nappies and sanitary pads.
Input.	The funds, personnel, materials, etc. of a project that is necessary to produce the intended output.
In-service training.	The training provided by the party in the HCF responsible for organising training programmes for HCW workers, nurses and doctors.
Institutions.	Governmental as well as non-governmental bodies actively involved in HCW management and that will have a contribution to make towards achievement of both the Immediate Objectives as well as Development Objective.
Institutionally feasible.	A HCW management system that is structured in such a way that it fits in with the organisational structure in which it is to be implemented, as well as with the affected stakeholders and authorities.
Integrated.	Refers to a system where all elements of the system interacts, for instance by ensuring that in avoiding pollution of one media, it will not be at the expense of another media.
Integrated Health Care Waste Management.	Is a holistic and integrated course of action that specifies the institutional, infrastructural and technological support, as well as human and financial resources required to establish and implement an integrated HCW management Strategy.
Internal transport.	The movement of HCRW from one point within any premises or facility to another point within that facility.
Landfill.	To dispose of waste on land, whether by use of waste to fill in excavations or by creation of a landform above grade, where the term ‘fill’ is used in the engineering sense.
Leachate.	Liquid from a landfill containing substances that were present in the waste, either as liquid or as solids, and were dissolved by the water passing through the waste.
Leak resistant container.	A container which is constructed of impermeable material and has a strength sufficient to resist ripping, tearing, or bursting under normal conditions of usage and handling of the waste-filled container.
Liquid Wastes.	Any waste material, whether it being hazardous or non-hazardous and that is identified to contain “free liquids”, which readily separate from the solid portion of waste under ambient temperature and pressure.
Local Government / Local Authority.	The municipal sphere of Government as defined in Section 151 of the Constitution of South Africa, Act 108 of 1996.

Manifest System.	A system for documenting and controlling the fate of HCRW from "cradle-to-grave".
Major generator.	A HCRW generator that generates more than 10 (ten) kilograms per day of HCRW calculated as a monthly average.
Micro-organisms.	Any microbiological entity, cellular or non-cellular, capable of replication or of transferring genetic material.
Minor generator.	A HCRW generator that generates up to 10 (ten) kilograms per day of HCRW calculated as a monthly average, but does not include a domestic HCRW generator.
Monitoring.	Continuous or periodic surveillance of the physical implementation of a project to ensure that inputs, activities, outputs and external factors are proceeding according to plan.
Municipal solid waste.	General waste for collection by municipalities, generated mainly by households, commercial activities and street sweeping.
National Waste Management Strategies and Action Plans.	A national strategy finalized during September 1999 and issued as part of the White Paper on Integrated Pollution and Waste Management (May 2000). Forming the basis for translating the goals and objectives of the Integrated Pollution and Waste Management Policy, into practice.
Non-combustion treatment.	Any method, technique or process for microbial inactivation or for otherwise altering the biological, chemical or physical characteristic of HCRW so as to render the HCRW unrecognisable and in order to reduce the hazards it presents, and facilitate disposal by any means of technology which does not constitute controlled combustion treatment, including but not limited to autoclave treatment.
Occupationally healthy and safe.	Refers to the need for the implementation of the Strategy without putting the health and safety of the workers, the patients or the general public at risk.
Operationally practical.	Refers a HCW management system within which practical operations can be conducted in the most efficient manner.
Output.	The tangible results that can be guaranteed by the project as a consequence of its activities.
Parametric monitoring.	The monitoring of compliance of a HCRW treatment facility with the requirements of the Gauteng HCRW Management Regulations using operating parameters such as time, temperature, pressure, or size as an indicator of treatment efficiency.
Pathological waste.	Pathological waste includes tissues, organs, body parts, human foetuses and deceased animals infected with zoonotic diseases, blood, and body fluids, but excludes teeth, hair and nails.
Performance testing.	The testing conducted at a non-combustion HCRW treatment facility prior to the facility being issued with an authorisation in terms of the Gauteng HCRW Management Regulations, which testing is carried out using typical and representative HCRW or a challenged load.
Pharmaceutical waste.	All pharmaceutical products and medicinal chemicals that are no longer usable in patient treatment and which have been returned to patient care areas, and that have become outdated or contaminated or are no longer required, and items contaminated with cytotoxic pharmaceuticals.
Pilot Studies.	Testing of systems, procedures and equipment under normal working

	conditions, e.g. HCW guideline testing or Waste Information System testing, at hospitals to see whether the systems, procedures and equipment is workable as intended. Based on the practical experiences, pilot study testing normally results in modifications of the tested systems, procedures and equipment used.
Programme.	A group of related projects or activities directed towards the attainment of specific (usually similar or related) objectives e.g. Capacity Building Programme or Awareness Raising Programme.
Project.	A planned undertaking designed to achieve certain specific objectives within a given budget and within a specified period of time.
Provincial Government.	The provincial sphere of government as defined in Section 103 of the Constitution of South Africa, Act 108 of 1996.
Puncture resistant container.	Means a rigid container which, when sealed, cannot be re-opened without difficulty and which is not easily penetrated under normal use.
Pyrolysis.	The decomposition of organic material by heat in the absence of, or with limited supply of oxygen.
Radioactive waste.	Material that contains, emits, exhibits or being contaminated with radionuclides at concentrations or activities greater than clearance levels and for which no use is foreseen. Radioactivity substances must be disposed of in particular in accordance with Section 3a, Hazardous Substances Act (Act 15 of 1973) that regulates radioactive substances used for medical, scientific and industrial purposes.
Record of Decision.	Means the written authorisation granted by the competent authority in accordance with Section 22 of the Act;
Registration Sheet.	Means the documentation required for the detailed recording of HCRW collection from individual HCFs during each collection round.
Regulations.	The Health Care Risk Waste Regulations promulgated in terms of Section 24 of the Act, and includes all Schedules to the Regulations.
Relevance.	The degree to which the rationale and objectives of a project are or remain pertinent, significant and worthwhile, in relation to the identified priority needs and concerns.
Residue.	Any solid or liquid product derived from the treatment of HCRW at the treatment plant such as ash or slag.
Reusable Container.	Means a container manufactured to be used and re-used for collection of HCRW at the HCFs and transport thereof by the transporter to the treatment plant.
Risk.	The scientific judgement of probability of harm.
Sanitary landfill.	An engineering method of disposing of solid waste on land in a manner that protects the environment, e.g. by spreading the waste in thin layers, compacting it to the smallest practical volume, and covering it with soil by the end of each working day, constructing barriers to infiltration, evacuating the gases produced etc.
Scavenging / picking.	The manual sorting of solid waste at a landfill or at other places where waste is dumped, and recovering the valuable materials.
Segregation.	The systematic separation of solid waste into designated categories of HCGW and HCRW respectively.
Sharps container.	A disposable puncture resistant container which, when sealed, cannot be opened without great difficulty, and which is spill proof under normal

	handling conditions, used for the storage and transport of infected sharps items.
Sharps HCRW.	Includes any device having acute rigid corners, edges, or protuberances capable of cutting or piercing, including, but not limited to, all of the following: ▪ Hypodermic needles, syringes, blades and needles with or without attached tubing; and ▪ Broken glass items, such as Pasteur pipettes and blood vials contaminated with HCRW.
Sludge.	The accumulated solids that separate from liquids such as water or wastewater during processing, or deposits on the bottom of streams or other bodies of water.
Specican Container.	A disposable puncture resistant container which, when sealed, cannot be opened without great difficulty, and which is spill proof under normal handling conditions, used for the storage and transport of infected pathological waste or waste generated in isolation wards.
Staged Action Plan.	An action plan designed to be implemented over a period of time, with clearly defined milestones.
Stakeholders.	Any person or group of persons that may have a direct or indirect interest or involvement with any aspect related to the “cradle-to-grave” management of HCW. Often termed Interested and affected Parties (I&AP)
Statutory Requirements.	The requirements of any present or future Legislation, ordinance, proclamation, bylaw, directive, decision, regulation, rule, order, notice or code of practice having the force of law in the Province.
Sterilisation.	A reduction in micro-organisms of more than 10^6 (more than 99.9999% of the micro-organisms are killed), achieved by physical, chemical or mechanical methods or by irradiation.
Storage.	The holding of HCW in a manner that does not constitute treatment or disposal thereof.
Strategy.	The term is in this document used as in the National Waste Management Strategy (NWMS) documents: A broad course of action designed to make the best use of resources and opportunities and to offer the best prospect of achieving the defined objectives whilst dealing with the risks that may be involved in the course of action
Sustainability.	A sustainable project should lead to improvements that will persist and spread beyond the project boundaries. Hence, any donor financed project should create structures and solutions that will remain institutionally, economically, socially and environmentally viable when the external assistance comes to an end.
Technical Specifications.	Specifications designed and developed to lay down the specific and uniform rules to be adhered to and the requirements to be met in undertaking any particular activity related to HCW Management.
Tender Material.	Tender material includes all relevant Conditions, Specifications, Schedules and Annexures required for contractors to be able to submit a tender for the sound execution of any function to be undertaken in the HCW management process, developed for use to meet the needs of any number of sites or facilities.
Tracking document.	HCW tracking documents are used for the tracking of HCRW from the point of generation (source) to the treatment plant, thereby ensuring

	adherence to the duty-of-care principle that is to ensure the environmentally sound treatment and disposal of all HCRW generated.
Training Programme.	A training programme shall ensure that there is an ongoing programme of support to HCFs through liaison with the Waste Officer. The purpose of this support is to ensure: ▪ That all HCFs are prepared for introduction of new equipment; ▪ That all staff are trained in the correct use of equipment, effective segregation of HCW and in OHS aspects related to HCW management; ▪ That there is an ongoing programme of training and awareness activities for the HCFs.
Transport.	The movement of HCW from the point of generation to any intermediate point and finally to the point of treatment or disposal. Transport does not include the movement of HCW from a HCRW generator to another HCRW generator for the purposes of testing and research, or internal transport within the HCF.
Transport Operator.	A person, organisation, industry or enterprise engaged in or offering to engage in the transportation of HCRW. A transport operator shall be registered with DACEL as well as the local authorities in whose area of jurisdiction it proposes to operate.
Treatment.	Any method, technique, or process designed to change the biological character or composition of any HCRW so as to eliminate its potential for causing disease, pollution impact on the environment or risk to health.
Treatment Plant.	The plant or plants used to treat HCRW.
Verifiable Indicators.	Mechanisms used to monitor the success with which activities, outputs and objectives are fulfilled.
Waste Collection Point.	For each HCF, the location at which the HCW is delivered to in reusable containers or disposable containers and where the transport operator assumes responsibility of the HCW. The transport operator shall, in consultation with each HCF, determine the location of each waste collection point.
Waste Information System (WIS).	A system developed for ongoing recording and reporting of all HCRW generated, transported and treated in Gauteng.
Waste management.	All activities, administrative and operational, associated with the handling, transport, storage, treatment and disposal of HCW. Where applicable, this also include the supply, distribution and maintenance of all disposable as well as reusable containers.
Waste Management System.	Means collectively the supply of disposable containers, supply of reusable containers, the collection, transport, treatment and disposal of HCW.
Waste Officer.	Means for each HCF a person appointed and authorised to verify and sign the registration sheet, also being the transport operator's contact person at HCF level.
Zoonotic disease.	Is a disease that can be spread from animals to humans.

Annexure 4: Problems identified within HCW Management

This Annexure of the Strategy summarises the problems and shortcomings that were identified during the previous phases of the project, as well as during investigations undertaken on selected HCFs, HCRW treatment facilities, hazardous waste landfills, etc. Reporting on the status of HCW management in Gauteng was amongst others based on information obtained from the "Feasibility Study into the Possible Regionalisation of Health Care Risk Waste Treatment / Disposal Facilities in Gauteng" (Nov. 2000), the NWMS and Action Plans for South Africa, (Action Plan for Waste Treatment and Disposal, (Version C, Sept. 1999)), the Project Design Document (Sustainable HCW Management in Gauteng – Project Document, (July 2000)) and Project Process Report (Sustainable HCW Management in Gauteng – Process Report, (July 2000)) and the White Paper on the IP&WM (Notice 227 of 2000 (Government Gazette No. 20978 of 17 March 2000)).

Problems are grouped into the following 7 categories:

- Environmental problems;
- Occupational health and safety problems;
- Institutional/Organisational problems;
- Technical problems;
- Financial shortcomings;
- Legal constrains;
- Information and awareness problems.

Listing of problems is intended to follow the lifecycle of the waste from its source, through storage, transport, treatment, to its final disposal at the landfills. The Strategies and Action Plans are therefore aimed at addressing problems identified and grouped according to the categories listed above, focussing on both Health Care General Waste (HCGW) as well as Health Care Risk Waste (HCRW). Although the liquid component of the HCRW discharged to sewer with the municipal wastewater is included in the study, crematoriums and animal carcasses are excluded. Radioactive waste is another HCRW category that is not included in this study, since it is managed according to special standards and regulations.

It is however to be appreciated that many of the irregularities could be falling in two or more problem categories, as a result of the various potential causes of the problem. Spillage of HCRW could for instance not only result in environmental problems, but also in OHS problems and since the spillage could result from the use of inappropriate HCRW containers, the spillage could stem from technical problems or even information and awareness problems where people were not sufficiently trained to handle HCRW in an appropriate manner. Since spillage could be resulting from any of the above problems, it is important for the irregularity to be listed under all of its possible problems, which is inevitable resulting in a repetition of some irregularities, but under different problem headings.

Note: Although the following descriptions are presented in a format that generalises the identified problems, the problems are not necessarily applicable to all HCF's, HCRW transporters or HCRW treatment facilities. Due to the fact that it is not intended to quantify the extent of the various problems, reference to problems is made as if it is a general problem.

A4.1 Environmental Problems

A4.1.1 Environmental problems at HCW sources (health care facilities)

(1) HCRW generators not registered, making it difficult to ensure environmentally sound treatment and disposal of all HCRW, thereby preventing illegal dumping and pollution;
(2) Classification of HCW is not clear, making it difficult for staff to decide what waste items requires treatment before disposal, resulting in illegal disposal of untreated HCRW;
(3) Contamination of HCGW with HCRW and visa versa due to poor segregation, results in disposal of untreated HCRW on general waste disposal sites in one instance and an increased risk of pollution due to more HCRW being treated in the other instance;
(4) Insufficient training and education results in HCW management practices not being environmentally sound;
(5) Insufficient or inappropriate HCW containers used results in pollution from either HCRW spillage or HCW streams being mixed with untreated HCRW disposal on general waste sites;
(6) With HCRW containers not being strong enough or appropriately sized for high density HCRW, it leads to spillage of HCRW due to container failure, in turn resulting in pollution;
(7) Storage of HCRW within HCF wards in containers not meeting the specification, result in the spreading of pollutants and an unacceptable risk of exposure to patients and visitors:
(8) Uncoordinated transport of HCRW within HCF's by unqualified personnel, could result in spillage of HCRW and pollution of the environment when stacked containers are dropped;
(9) No backup arrangements available for removal of HCRW by alternative party or refrigerated storage in the event of equipment breakdowns, results in extended HCRW storage periods with subsequent generation of odours;
(10) Insufficient HCRW storage capacity to accommodate abnormal HCRW generation rates or HCRW build-up during breakdowns of collection or treatment systems, with inappropriate and unprotected storage leading to container damage and HCRW spillage;
(11) HCRW containers that are not resistant to inclement weather conditions are stored in the open, resulting in such containers getting damaged by rain which in turn leads to spillage;
(12) No waste generation mass recording is done, which limits control over HCRW generation and treatment required to ensure that all HCRW is treated and disposed of appropriately;
(13) Limited information available on HCRW generation and treatment rates, thus making planning for future environmentally sound HCRW treatment and disposal difficult;
(14) Generators of small volumes of HCRW does not use formal collection, treatment and disposal systems, resulting in HCRW being disposed of on general waste disposal sites;
(15) No systems are available for collection, treatment and disposal of HCRW generated at private residences, resulting in such HCRW being disposed of on general waste disposal sites;
(16) Increased use of disposable materials results in increased amounts of HCW, thus increasing the pressure on existing treatment/disposal facilities with increased risk of pollution;
(17) HCRW is littered inside and outside HCF premises due to inappropriate containerisation and storage of HCW, thus resulting in pollution of the environment;
(18) Decisions on the part of the HCRW stream to be incinerated onsite and the part to be treated at regional facilities, is inconsistent and not environmentally sound;
(19) Budget constraints impacts on HCRW management systems adopted as well as the HCRW treatment efficiency, thus resulting in poor treatment and disposal practices;
(20) HCF staff, and in particular HCW workers, are unaware of the financial implications of poor HCRW management practices, thus resulting in expensive environmental rehabilitation;
(21) HCF's are unaware of substitution of environmentally harmful materials, like PVC, with less harmful materials through green procurement.

A4.1.2 Environmental problems during collection/transport

(1) HCRW transporters are not registered and no accreditation system exists for transporters to ensure environmentally sound HCRW management operations;
(2) With HCRW stored in the same area as HCGW, HCW streams get mixed up as containers are not clearly marked and subsequently inappropriately disposed of;
(3) Insufficient training results in a lack of knowledge and awareness of environmentally sound HCW management practices;
(4) No records are kept of HCRW masses or HCRW categories collected, thus making tracking of HCRW impossible, which in turn creates the opportunity for illegal dumping;

(5) No HCRW tracking mechanisms are used from the point where the HCRW was collected, to the point where it was finally treated and disposed of, thus creating a risk of illegal dumping;
(6) Frequency and HCRW collection times are not meeting the HCRW generator's needs, thus resulting in longer HCRW storage periods at HCF's with subsequent odour generation;
(7) HCRW collection is not done according to sound practices aimed at reducing the risk of spillage and where procedures exist, such procedures are not enforced, resulting in spillage;
(8) Emergency procedures for accidents or HCRW spillage are not available, conveyed to workers and implemented by workers, resulting in pollution during accidents or spills;
(9) Inappropriately designed HCRW collection vehicles are used, which lead to HCRW spillage;
(10) Inappropriate cleaning of HCRW collection vehicles result in the spread of pollutants;
(11) HCRW collection vehicles are not equipped with the required spillage emergency equipment;
(12) HCRW collection vehicles are not clearly marked in accordance with the relevant road ordinance, thus making identification of the load and implementation of appropriate pollution prevention measures difficult in the event of an accident;
(13) The current payment system does not favour effective segregation, waste minimisation or cost-cautiousness, resulting in excessive use of disposable containers that are incinerated.

A4.1.3 Environmental problems that are localised or dispersed for onsite and regional treatment facilities (incinerators) as well as for disposal facilities

(1) A lack of training of people undertaking HCRW management results in spillage due to insufficient understanding and awareness of environmentally sound HCRW management practices;
(2) HCRW received is not recorded, thus making tracking of HCRW very difficult and thereby creating opportunities for illegal disposal;
(3) HCRW mass recording is not done, resulting in accurate data required for daily operations and future planning not being available, which in turn leads to overloading of treatment facilities with subsequent poor incineration efficiencies;
(4) Insufficient and inappropriate HCRW storage facilities results in HCRW being exposed to the elements with subsequent damage to containers and HCRW spillage;
(5) Storage of HCRW at treatment facilities is not done in an organised manner to allow for "first-in first-out", leading to longer HCRW storage which generates odours and attract flies;
(6) No refrigeration facilities available as backup storage for body tissue in the event of a backlog in treatment due to breakdowns, thus leading to odours and attracting flies;
(7) No surplus HCRW treatment capacity as back-up for use during a breakdown or during routine maintenance, resulting in a build-up of untreated HCRW during breakdowns;
(8) Incinerators are not operated according to manufacturers guidelines, resulting in emission of pollution through emissions, with untrained operators being unaware of the consequences;
(9) Poor incinerator operation leads to inefficient destruction of HCRW, thus not destroying the harmful elements before ash is removed for disposal on general waste landfills;
(10) Manual feeding of incinerators results in allowable incinerator capacities being exceeded when there is a backlog, resulting in inefficient HCRW treatment before disposal;
(11) HCRW treatment done during warm-up and shutdown phases results in incomplete treatment of HCRW, with poorly treated HCRW then being disposed of on waste disposal sites;
(12) Manual removal of ash from incinerators results in an ash build-up, which affects the treatment efficiency of residues disposed of on general waste disposal sites;
(13) Treatment facilities not operated to optimum capacity results in a loss in production with treatment becoming financially less viable with more illegal disposal methods being used;
(14) Insufficient treatment capacity results in HCRW being disposed of illegally or not being treated properly, with untreated or semi-treated HCRW disposed of at general waste sites;
(15) Poorly designed incinerators and poor blending of HCRW with different calorific values results variances in operation temperatures, ultimately affecting the treatment efficiency;
(16) Concentrated incineration of high calorific value HCRW results in excessive build-up of temperatures which can cause structural damage to equipment, affecting further treatment efficiencies;

(17) Poor HCW segregation results in incineration of aerosol cans and radioactive materials which can damage the equipment and lead to a breakdown in treatment and build-up of HCRW;
(18) HCRW treatment plants not equipped with flue gas cleaning systems emits pollutants with different impacts on the environment like CO, NO_x, particles, acidic gases, noxious halogenated compounds etc;
(19) The low height of incinerator stacks results in poor dispersion of emissions;
(20) No scheduled testing of emissions is done for reporting to regulatory authorities, which prevents detection of air pollution;
(21) Ash from HCRW incineration is mixed with boiler ash and disposed of on general waste disposal sites, leading to release of heavy metals into both surface and subsurface water;
(22) Untreated HCRW is illegally disposed of at landfills not designed for disposal thereof, resulting in release of infectious pollutants to both ground and surface water, with the added risk of spreading infectious pollutants by wind;
(23) Some materials like PVC, chlorinated solvents, mercury etc. used in HCF's represents a special environmental risk when treated, resulting in various forms of pollution;
(24) Budget constraints influences the effectiveness with which HCRW is treated, ultimately impacting on the risk of pollution that HCRW could have on the environment;
(25) Depending on the local conditions, air pollution from treatment facilities, including CO, NO_x, particles, acidic gases, noxious halogenated compounds etc., can spread over long distances;
(26) Release to surface water and infiltration to groundwater of leachate containing infectious and noxious materials from landfills where infectious and other hazardous waste were dumped;
(27) Apart from the regional aspects some of the pollutants also have an impact on the environment on national and/or global level. The emission of NO_x may result in acidic gases that may have an impact at national level, with similar affects from CH_4 after land filling and CO_2 from incineration, all having possible impacts on global warming.

A4.2 Occupational Health and Safety Problems

A4.2.1 OHS problems at Health Care Facilities

(1) HCRW generators are not registered and where registered, information is inappropriate to implement monitoring systems to ensure that HCRW is not disposed of with the domestic waste, leading to injuries and infection of waste collectors and people on disposal sites;
(2) HCW classification creates confusion as to what is to be incinerated, resulting in HCRW being disposed of as general waste leading to injuries and infection of workers;
(3) Carrying HCRW from point of generation to the respective HCW containers poses a potential risk to nursing staff and patients when accidentally coming in direct contact with HCRW;
(4) Insufficient or inappropriate HCW containers, not meeting uniform colour codes, are used. The absence of or use of incorrect sharps containers can injure and infect workers;
(5) HCRW containers are not strong enough or of the correct size for high density HCRW, resulting in container failure with injuries and infection of workers as well as patients;
(6) Temporary storage of HCRW containers within the HCF's (wards) is often not done appropriately and results in spreading of infections;
(7) Measuring HCRW by volume results in waste being compressed in containers to obtain more effective use of containers, thus creating a risk of injuries as well as failure of containers;
(8) Insufficient training of people involved in HCRW management result in a lack of knowledge and awareness on healthy and safe HCRW practices;
(9) Recapping or removal of needles at HCF's poses a special risk of needle prick injuries;
(10) High workloads and staff shortages at HCF's result in healthy and safe HCW management practices being neglected since other duties are prioritised;
(11) Workers are put at risk during internal transport of HCRW that is not properly containerised or if workers are not making use of personal protective equipment (PPE);
(12) HCRW containers not resistant to inclement weather conditions are often stored in the open, resulting in such containers being damaged by rain, thus exposing workers to HCRW;

(13) Inadequate supply of suitable internal collection trolleys etc. results in excessive manual handling with an increased risk of for instance needle prick injuries and exposure to spillage;
(14) Excessive human fatigue resulting from carrying heavy HCRW containers from one point in the HCF to another, increases the risk of injuries;
(15) HCRW storage areas at HCF's is not secured, allowing access to unauthorised parties, who could either get injured or infected by HCRW;
(16) HCRW (including sharps) is littered within and outside HCF premises due to inappropriate handling and storage, resulting in members of the public getting injured or infected;
(17) Evaporation of chemicals from chemical wastes poses a special risk to employees handling such waste when not securely packaged during storage and internal transportation;
(18) Budget constraints influences the efficiency of the HCRW management system adopted as well as the efficiency with which HCRW workers are trained and equipped with PPE;
(19) HCW workers are not monitored for occupational and health aspects;

A4.2.2 OHS problems during collection/transport

(1) HCRW transporters are not registered or accredited with no system to verify whether HCRW transporters are complying with the Occupational Health and Safety Act;
(2) Insufficient training of HCRW management workers results in a lack of knowledge and awareness around healthy and safe HCRW management practices;
(3) Poor selection and marking of HCRW containers increases the risk of workers coming in direct contact with HCRW;
(4) Volumetric billing of HCRW results in HCRW being compressed into containers and containers being overloaded, resulting in failure of containers which creates a risk of injuries and infection;
(5) HCRW handling during collection and transport poses a health and safety risk to workers not equipped with personal protective equipment or with HCRW not appropriately containerised;
(6) HCRW collection is not done according to set procedures ensuring the safety of workers and where procedures exists, such procedures are not properly enforced;
(7) HCRW collection vehicles not marked according to road ordinances, makes identification of load and implementation of appropriate OHS measures difficult in the event of an accident;
(8) Emergency procedures to be followed in the event of accidents and injuries are not available, not conveyed to workers or not implemented by workers;
(9) Carrying heavy HCRW containers results in excessive human fatigue and an increased risk of injuries;
(10) Inappropriate use of HCRW containers increases the risk of injuries and infection;
(11) Inappropriate cleaning of HCRW collection vehicles increases the risk of infection;
(12) Evaporation of chemicals from chemical wastes poses a special risk to employees handling such waste if not securely packaged during handling and transportation;
(13) HCW workers are not monitored for occupational and health aspects;

A4.2.3 OHS problems at onsite and regional treatment facilities as well as disposal facilities

(1) Insufficient training of HCRW management workers result in a lack of knowledge and awareness on healthy and safe HCRW management practices;
(2) Workers at treatment facilities are exposed to infectious HCRW due to leaking containers, with increased risks where containers are exposed to the natural elements;
(3) Insufficient treatment facilities and back-up facilities, results in a build-up of HCRW which leads to increased occupational health and safety risks for HCRW workers;
(4) Not all workers at treatment facilities are equipped with personal protection equipment (PPE) and where equipped, such equipment is not used effectively;
(5) Poor segregation of HCRW leads to incineration of aerosol cans or radio-active materials, which results in a health and safety risk for workers;
(6) Concentrated incineration of high calorific value HCRW can result in an excessive build-up of heat that leads to damage of equipment and injuries to workers;

(7) Incinerators not properly operated result in emission of polluting fumes, which impose health risks and nuisance to employees at the treatment facilities and neighbouring communities;
(8) Manual removal of ash results in increased risk of workers coming in direct contact with or inhaling incinerator ash;
(9) Access to incinerators at HCF's is unobstructed, allowing unauthorised persons to enter the premises, resulting in injuries and infection;
(10) Poor operation of incinerators results in inefficient treatment of HCRW, thus not destroying the harmful elements, with workers and scavenger's at general waste disposal sites being exposed to the ash;
(11) The low height of incinerator stacks results in poor dispersion of unhealthy emissions;
(12) HCW workers are not monitored for occupational and health aspects.

A4.3 Institutional and Organisational problems

A4.3.1 Problems at the provincial and municipal/district level

(1) The allocation of responsibilities amongst the authorities at different levels are not clear;
(2) There is not enough staff allocated at provincial, municipal and district level to undertake the improvement of HCRW management activities;
(3) No single authority is responsible for ensuring proper co-ordination of the HCW management activities from cradle-to-grave, resulting in ad hoc initiatives and activities;
(4) There is no coordinating body where all stakeholders from different disciplines involved in HCW management can co-ordinate their activities to form an integrated unit;
(5) Current Strategies and Action Plans on HCW management developed and implemented are crisis driven and not based on comprehensive and sustainable HCW management in Gauteng;
(6) Uncoordinated efforts are made by various authorities to set standards and guidelines, which adds to the present fragmentation and conflict in standards;
(7) Animal carcasses as part of the veterinarian waste stream are not presently included, but may have to be considered in future.

A4.3.2 Problems at HCF's

(1) HCF's did not establish and are not operating according to clear institutional / organisational HCW management structures;
(2) HCF's did not establish procedures to monitor and review HCW management strategies;
(3) Financial constraints are blamed for inappropriate and ineffective HCRW management;
(4) Excessive workloads and staff shortages are blamed for poor implementation of HCRW management strategies;
(5) Operations are hampered through interference by labour unions;
(6) Uncoordinated efforts are made internally by HCF's to set standards and guidelines, which adds to the present fragmentation and conflict in standards.

A4.3.3 Problems during collection and transport of HCRW

(1) Low HCRW volumes generated in certain areas does not favour economies of scale, thereby making it uneconomical to implement HCRW collection rounds in such areas;
(2) Long travelling distances to individual collection points makes it uneconomical to implement HCRW collection rounds in such areas;
(3) Poor payloads achieved when transporting low density HCRW is counter productive for efficient fleet management and could be the reason why HCRW billing is done by volume;
(4) Limited enforcement of road ordinances makes it difficult for HCRW transport contractors to operate their HCRW collection systems on level playing fields;

(5) Variations in the types and sizes of containers used by HCF's makes it difficult to optimise HCRW collection vehicles in terms of utilisation of the available loading capacity;
(6) Increasing transport costs resulting from fuel price increases makes it difficult for contractors to do financial planning, especially if escalation price increases are not based on fuel prices;
(7) Depreciation of the local currency is making it expensive to replace old vehicles in collection fleets;
(8) The ever increasing crime and in particular regarding hijacking of vehicles, increases the security risk, which is costly for fleet owners to try and counter;
(9) Operations are hampered through interference by labour unions;
(10) Uncoordinated efforts are made internally by transport contractors to set standards and guidelines, which adds to the present fragmentation and conflict in standards;
(11) Cross provincial boundary movement of HCRW occurs in particular from provinces not equipped with the required treatment facilities, thus making planning for Gauteng complex.

A4.3.4 Problems at treatment and disposal facilities

(1) Only one hazardous waste disposal site in Gauteng is permitted to receive incinerator ash, making access to an appropriate disposal facility difficult whilst monopolising the market;
(2) Limited training and capacity building amongst incinerator operators leads to limited knowledge and expertise;
(3) Privately owned HCRW treatment facilities competes in the market without some co-ordination of efforts to improve the overall standard of HCRW management;
(4) Limited enforcement of legislation related to emission standards makes it difficult for the HCRW treatment contractors to operate their treatment facilities on level playing fields;
(5) Treatment facilities and disposal sites belong to different institutional structures (private or public) than HCF's, thereby affecting co-ordination for improved HCW management;
(6) Operations are hampered through excessive interference by labour unions;
(7) Uncoordinated efforts are made internally by treatment contractors to set standards and guidelines, which adds to the present fragmentation and conflict in standards.

A4.4 Technical Problems

A4.4.1 Problems at HCF's

(1) HCF's do not have sufficient HCRW containers of appropriate design for HCW segregation;
(2) HCF's either lack sharps containers or make use of inappropriate sharps containers, thus creating a risk of injuries and infection;
(3) HCF's lack properly designed trolleys for internal collection and transport of HCW, thus creating a risk of HCW spillage;
(4) HCF's lack appropriate intermediate HCRW storage facilities for use until HCRW can be collected for internal transport to the central stores or onsite treatment facilities, thus resulting in unauthorised HCRW storage;
(5) Central HCRW storage facilities do not meet the required standards and are not fenced, not secured, not properly ventilated where enclosed, not protected against the elements, etc.
(6) HCF's are not within reach of treatment facilities for treatment of its HCRW.

A4.4.2 Problems at collection and transport service providers

(1) Vehicles used for HCRW transport do not meet loading mechanism specifications;
(2) Vehicles used for HCRW transport do not meet OHS standards;
(3) Vehicles used for HCRW transport do not meet the road ordinance standards;
(4) Specialist maintenance for HCRW transport vehicles is not readily available.

A4.4.3 Problems at treatment and disposal facilities

(1) Treatment facility technology used by both the public and private sector is outdated and not meeting the required technical standards to ensure effective treatment of HCRW;
(2) Incinerators used by both the public and private sector is not equipped with flue gas cleaning systems;
(3) HCF's with onsite treatment facilities are for various reasons not using it (not meeting environmental standards, lack of maintenance and repairs, outdated technology, etc.)
(4) Disposal sites where untreated HCRW is illegally disposed of are not developed and operated in accordance with DWAF's Minimum Requirements;
(5) Slag and ashes from incinerator facilities are not disposed of on permitted hazardous waste disposal facilities;
(6) Poor siting and operation of incinerators leads to public resistance to the establishment and operation of HCRW treatment facilities.

A4.5 Financial Shortcomings

A4.5.1 Problems at HCF's

(1) Insufficient funds for appointment of staff results in an increased workload for existing workers, in turn having a negative impact on the dedication with which HCRW management is executed;
(2) Insufficient funds for appropriate HCRW management equipment;
(3) No specific budget line for HCRW management makes it difficult to monitor and control expenditure as well as to do any operational planning based on available financial data;
(4) Insufficient funds to effectively operate onsite HCRW treatment facilities or to outsource HCRW services, results in untreated HCRW being disposed of on general waste sites;
(5) Insufficient funds allocated for training and information dissemination on sound HCW management services results in poor HCW management practices;
(6) Ignorance around financial implications of HCW management services rendered internally or externally eliminates HCRW generator's motivation to reduce the HCRW stream;
(7) Inconsistent and vague tender specifications used by different HCRW generators makes it difficult for tenderers whilst also making it difficult to adjudicate such tenders equally.

A4.5.2 Problems at collection and transport service providers

(1) Insufficient financial backing makes it difficult for upcoming contractors to keep their waste collection fleets properly maintained whilst repaying capital layouts;
(2) Economies of scale with smaller generators and long travelling distances during collection impacts on the financial viability of collection and treatment services rendered;
(3) Effective payloads impact on the efficiency with which HCRW collection services are rendered. Mass billing for HCRW management will require restructuring of tariff structures;
(4) Regionalisation of HCRW treatment facilities may improve the financial viability of operations, but increases environmental risks as HCRW is transported over longer distances;
(5) Increased security risks in terms of potential for hijacking results in increased costs incurred by attempting to combat such threats;
(6) Increasing fuel costs have a detrimental effect on waste collection contractors where contracts do not make appropriate provision for escalation price increases base on fuel prices.

A4.5.3 Problems at treatment and disposal facilities

(1) Private and public HCRW treatment facilities do not have the required funds for upgrading of technology to ensure environmentally sound operations, e.g. installation of flue gas cleaning systems;

(2) Owners of disposal facilities lack the ability and funds to be permitted and upgraded to H:H waste disposal sites required for disposal of incinerator ash;
(3) HCRW treatment facilities and H:H disposal site operators do not allocate sufficient funds to ensure that employees are sufficiently trained for proper operation of facilities;
(4) Limited operational hours of HCRW treatment facilities through single shifts reduce the financial viability with which the facilities are operated;
(5) Mechanisation could improve combustion, but will reduce treatment capacity of plants, which will have a financial implication, also impacting on the number of job opportunities;
(6) Poorly defined operational standards and limited enforcement leads to the playing field not being level for HCRW treatment facilities intending to operate environmentally sound.

A4.5.4 Problems at the provincial level

(1) Provincial authorities responsible for HCRW treatment lack funds for implementing new initiatives that will improve the standard of HCW management in the province;
(2) Provincial authorities lack funds to employ more staff for monitoring of new initiatives and ongoing activities;
(3) Insufficient funds are available for effective enforcement of legislation;
(4) Inability of the public sector to meet the required environmental standards is making it difficult to enforce compliance by the private sector.

A4.6 Legal Constrains

A4.6.1 Problems at the national/provincial level

(1) The definition of HCW and its categories is not clear, thus creating confusion on the required standards for handling, treatment and disposal thereof;
(2) There is a need to enforce legislation concerning HCW management standards in order to ensure environmentally sound, yet healthy and safe operations;
(3) There are no clear regulations concerning transporting of HCRW across provincial borders to prevent substandard treatment or illegal disposal of HCRW in neighbouring provinces;
(4) Standard tender specifications are not available, resulting in different standards being applied by different authorities outsource HCRW management services;
(5) There is a need that uniform equipment standards be applied that is considered to be appropriate for HCRW management;
(6) Fragmented and conflicting legislation creates confusion and difficulty meeting the required legislation, resulting in standards not being met. Differing bylaws is a typical example;
(7) Ineffective enforcement of legislation results in scrupulous HCW practices being used.

A4.6.2 Problems at the district/municipal level

(1) HCRW management bylaws varies from one local authority to the next, resulting in confusion due to different standards being applied by neighbouring authorities;
(2) Although legally responsible for HCRW management, local authorities are not in a financial position to provide the required facilities or services not provided by the private sector;
(3) Local authorities do not have the required resources to ensure adherence to the national, provincial and local legislation within its areas of jurisdiction through effective enforcement.

A4.6.3 Problems at health care facility level

(1) There is a lack of information and understanding by senior management on regulations related to HCW management, leading to inappropriate systems being implemented;

(2) The "duty-of-care" and "polluter pays" principles are not understood by senior management;
(3) HCF's lack clear internal instruction and guidance on how to manage HCW;
(4) Non-conformance to the OHS Act is making owners of HCF's liable for prosecution;
(5) Unsafe actions by staff members (whether as a result of ignorance or otherwise) can make owners of HCF's liable for public prosecution.

A4.6.4 Problems at the collection and transport contractor

(1) Adherence to the all aspects of the road ordinances related to transport of hazardous waste is essential for transporters of HCRW;
(2) Non-conformance to the OHS Act is making the owners / operators of the waste collection / transport businesses liable for public prosecution;
(3) Unsafe actions by its staff members (whether due to ignorance or otherwise) can make the owners / operators of HCRW collection / transport businesses liable for public prosecution.

A4.6.5 Problems at treatment and disposal facility level

(1) Legal consequences of poor HCRW treatment practices resulting in pollution through either poisonous gas emissions or disposal of poorly treated HCRW, are not always considered when operational strategies are developed by owners/operators of HCRW treatment facilities;
(2) Disposal of ash from HCRW treatment facilities on general waste sites is making the owners of the facility liable for prosecution due to its potential impact on the environment;
(3) Non-conformance to the OHS Act is making the owners/operators of the treatment/disposal facility liable for public prosecution;
(4) Unsafe actions by its staff members (whether as a result of ignorance or otherwise) can make the owners/operators of HCRW treatment/disposal facilities liable for public prosecution.

A4.7 Information and Awareness Problems

A4.7.1 Problems at HCF's

Information:

(1) Lack of data recorded at HCF's on HCRW generation as well as treatment/disposal;
(2) Lack of information on HCRW generation rate per patient per day or treatment cost per kg;
(3) Lack of data available on previous trends of HCRW generation as well as treatment/disposal;
(4) Lack of reporting to management on HCW management data required to obtain an overview of the HCW management situation, proposing ways of improving the system and planning on both local as well as provincial level;
(5) No reliable recording system to make it possible to track HCRW;
(6) Lack of information materials on sound segregation and containerisation of HCW;
(7) Lack of information materials on handling and sound internal transport and storage of HCW.

Awareness:

(8) Limited awareness on importance of effective HCW segregation among key staff (physicians, nurses and cleaners);
(9) Limited awareness amongst managers on ways of improving HCW management as well as the financial implications thereof;
(10) Limited awareness on emergency procedures in the event of an accident or HCRW spillage;
(11) Limited awareness on OHS standards to be adhered to;
(12) Limited awareness on alternative HCW containers available for safe and environmentally sound storage of HCW;
(13) Training and awareness programmes for health care workers and HCRW handlers are not addressing the needs, are uncoordinated and are not audited to ensure uniform standards.

A4.7.2 Problems at the collection and transport contractors

Information:

(1) Lack of information on mass of HCRW collected due to volumetric billing system;
(2) Lack of information on running costs of different vehicles in collection fleets;
(3) Lack of information on the cost per kilogram for HCRW collection from different sources.

Awareness:

(4) Lack of awareness amongst managers on impact of improved payloads and collection route planning on overall efficiency of HCW collection systems;
(5) Lack of awareness amongst managers on safety requirements when containers are stacked in collection vehicles;
(6) Lack of awareness on emergency procedures in the event of an accident or HCRW spillage;
(7) Lack of awareness on OHS standards to be adhered to;
(8) Lack of awareness on alternative types of collection vehicles to be used for safe and environmentally sound HCRW collection and transport;
(9) Training and awareness programmes for HCRW handlers are not addressing the needs, are uncoordinated and are not audited to ensure uniform standards.

A4.7.3 Problems at treatment and disposal facilities

Information:

(1) Lack of information on HCRW treatment/disposal cost per kg;
(2) Lack of information on overall costs to operate a HCRW treatment facility.

Awareness:

(3) Lack of awareness on cost effective yet environmentally sound operation of treatment plants;
(4) Lack of awareness on HCRW categories to be incinerated;
(5) Lack of awareness on blending of HCRW streams to ensure optimum treatment efficiency;
(6) Lack of awareness on emergency procedures to be followed in the event of plant failure;
(7) Lack of emergency preparedness in the event of an accident or spillage;
(8) Lack of awareness on occupational health and safety standards to be adhered to;
(9) Lack of awareness of alternative treatment technologies available for environmentally sound treatment of HCRW;
(10) Training and awareness programmes for HCRW handlers are not addressing the needs, are uncoordinated and are not audited to ensure uniform standards.

A4.7.4 Problems at the provincial level

Information:

(1) Lack of information on differences in HCW generation rate/patient/day for different HCF's;
(2) Lack of data on mass of HCRW treated, available treatment capacity and backup capacity;
(3) Lack of data on HCRW generators for effective monitoring to ensure that all HCRW is collected for environmentally sound treatment and disposal;
(4) Lack of data on HCRW transporters for effective monitoring to ensure that all HCRW is environmentally sound treated and disposed of;
(5) Lack of information on existing HCRW treatment facilities in Gauteng;
(6) Lack of information on HCRW mass crossing the Gauteng borders in either direction;
(7) Lack of information on effective implementation of a HCRW tracking system.

Awareness:

(8) Lack of awareness on optimum strategy to ensure environmentally sound treatment / disposal of all HCRW generated by both private and public HCF's in Gauteng;
(9) Lack of awareness on alternative treatment technologies available for implementation and environmentally sound treatment of HCRW generated in Gauteng.