



**DEPARTMENT OF ENVIRONMENTAL
AFFAIRS AND TOURISM**

DANIDA



**Report Number: 2.1
DEAT Report Number: 12/9/6**

**NATIONAL WASTE MANAGEMENT
STRATEGY IMPLEMENTATION
SOUTH AFRICA**

WASTE INFORMATION SYSTEM

FRAMEWORK DOCUMENT

FINAL REPORT

31 March 2005

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Ref: 104.Sydafrika.1.MFS.57-1

Report no:

Version no: Final

Date: 2005-03-31

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SUPPORTING DOCUMENTATION

This framework report should be read in conjunction with the following reports, which provide background and detail to the proposed WIS framework approach.

- Department of Environmental Affairs and Tourism, 2005. Waste Information System Status Quo Analysis.
- Department of Environmental Affairs and Tourism, 2005. Waste Information Needs Analysis. Objectives, Needs and Challenges.

LIST OF ABBREVIATIONS

AQIS	Air Quality Information System
DANIDA	Danish International Development Agency
DEAT	Department of Environmental Affairs and Tourism
DoH	Department of Health
DPLG	Department of Provincial and Local Government
DTI	Department of Trade and Industry
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
EIS	Environmental Information System
GIS	Geographical Information System
HCRW	Health Care Risk Waste
ICT	Information and Communication Technology
IDP	Integrated Development Plan
IWMP	Integrated Waste Management Plan
IWMSA	Institute for Waste Management of Southern Africa
NEAS	National Environmental Authorisation System
NWMS	National Waste Management Strategy
NWMSI	National Waste Management Strategy Implementation
PMG	Project Management Group
PRTR	Pollution Release and Transfer Register
SA	Republic of South Africa
SABS	Standards South Africa
SAWIC	South African Waste Information Centre
SITA	State Information Technology Agency
TAC	Technical Advisory Committee
WIO	Waste Information Officer
WIS	Waste Information System

1 Vision

The vision of the Department of Environmental Affairs and Tourism (DEAT) is to establish a waste information system for South Africa which supports the needs of local, provincial and national government with respect to the management of waste, by collecting reliable, national data on waste, and by providing “*accessible information to interested and affected parties, that will support effective integrated pollution and waste management*” (DEAT, 2000).

It is also the intent of DEAT to collect this data without placing undue financial and capacity burden onto industry and the private sector, who will be responsible for providing the data, and government, who will be responsible for collecting, verifying and disseminating the data and information.

2 Needs, Objectives and Challenges

2.1 Needs and Objectives

The need of government with respect to waste information is to gather data on waste role-players, waste types and waste quantities with the objective to:

- Facilitate waste management planning at all three spheres of government;
- Raise awareness on waste management through public access to information;
- Identify priority waste streams requiring government intervention;
- Support business involved in waste management, e.g. waste recycling;
- Support local government to ensure cost recovery of services delivered;
- Monitor waste trends;
- Report on national and international environmental agreements and obligations e.g. State of Environment Reporting, Basel Convention;
- Aid research and development in the field of waste management;
- Aid decision-making by government;
- Support the development of integrated waste management plans;
- Monitor the success of government policy implementation and support new policy development; and
- Aid enforcement and compliance monitoring.

The ultimate goal of collecting waste data is to support the improvement of integrated waste management in South Africa through the dissemination and use of reliable waste information, thereby ensuring the protection of the environment and human health.

The needs and objectives of the national waste information system were identified through workshops and meetings with representatives from local, provincial, and national government. The assessment of the needs of government with respect to waste information is detailed in a supporting report.

2.2 Challenges

With the delay in the implementation of the National Waste Management Strategy (1998), many provinces and local authorities developed their own waste and pollution information systems. A status quo assessment of existing WIS was conducted as part of the first phase of this project, the findings of which are presented in a supporting report. Of the four provincial systems reviewed, only one is routinely collecting waste information, while two are still in the development and initial data collection phase. Of the two local authority systems reviewed, only one is routinely collecting waste information. A review of the Swaziland WIS indicated that this system, developed in 2002, is not routinely collecting data. As such, it is recognised that there is a potentially high failure rate for WIS generally, which must be considered in the development of the national WIS. It is critical to the successful implementation of the national WIS that the current challenges to design and implementation of the WIS be overcome by the three spheres of government and the private sector. Such challenges, as captured through workshops with local, provincial and national government⁽¹⁾ and meetings with key stakeholders (detailed in a supporting report), include:

2.2.1 *Within government*

- Lack of high-level political and management support to operate the WIS at local, provincial and national government level;
- Poor communication between the three spheres of government;
- Lack of resources within government to sustain the system, including human, financial and ICT;
- Lack of experienced or knowledgeable staff within government, particularly as it relates to the WIS;
- Current lack of data to populate the WIS and uncertainty as to the accuracy and reliability of existing data;
- Conflict or duplication of data reporting between WIS and other government environmental information systems;
- Absence of legislation at all levels of government to enforce reporting to the WIS, and
- Three spheres of government are unclear as to their roles and responsibilities with regards to data collection, verification and dissemination.

2.2.2 *Within the private sector*

- Fear of ramifications on industry by government;
- Lack of public awareness of WIS to place pressure on government to maintain WIS and report on waste information for South Africa;
- Lack of communication between spheres of government and industry as to roles and responsibilities for data collection and reporting;
- Lack of data collection by industry, and
- On-site treatment / disposal of waste, not captured within the formal waste stream.

⁽¹⁾ The challenges to successful operation of a national WIS, presented here, were the most often reported obstacles faced and were provided by members of local, provincial and national government. It is accepted that these are seen as real challenges to them, although there may be disagreement with some.

The obstacles identified above may be compounded by the fact that:

- Not all generators, transporters, treatment facilities, landfills or recyclers currently weigh and/or record waste generated or received;
- Illegal or inappropriate treatment / disposal of waste occurs for which no data exists;
- Liquid hazardous waste is typically recorded by volume and not mass;
- There is currently limited identification of generators on containers or delivery notes;
- Waste loads delivered by transporters to treatment facilities and landfills, contain multi loads from a number of generators;
- There is presently no or limited tracking systems in place to ensure that, in particular, hazardous waste generated, is ultimately treated and disposed of; and
- The manifest system required for transport and safe disposal of hazardous waste is not being used and/or not being used effectively with limited or no verification by waste generators / authorities.

Cognisance is taken of these challenges in the approach to the WIS design and implementation, and will be further assessed through piloting of the WIS. However it is recognised that this project can not overcome or provide solutions to all of these challenges, since many must be dealt with through government structures and interventions.

3 Approach

3.1 National Waste Information System

Recognising the challenges which must be considered and overcome, DEAT is adopting a phased approach to the development and implementation of the WIS. As a culture of data collection and reporting is developed within the private and public sector and as local, provincial and national government are capacitated to take full ownership and responsibility for the system, so the system will be expanded to include additional data, more detail and data from additional role-players.

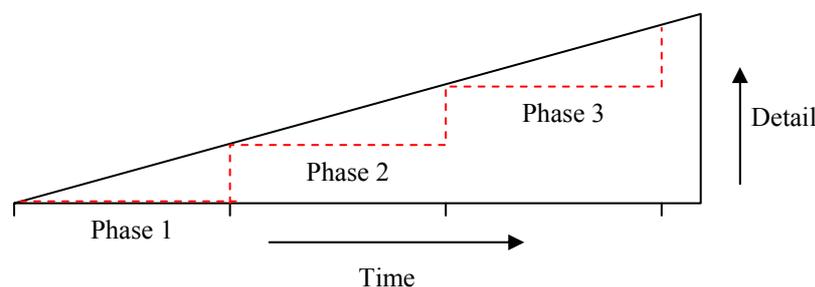


Figure 1. Phased approach to detail the WIS development

It is therefore the intention of DEAT, in Phase 1 to collect:

- Only urgently ⁽²⁾ needed data (see Needs Analysis Report);

⁽²⁾ Data defined as 'urgently needed' was identified through the prioritisation of waste information needs, i.e. short-term priorities.

- Data from the fewest, most relevant role players in the waste generation, transport, disposal and recycling system, where the necessary level of detail exists;
- Making sure that the collected data are utilised effectively; and
- Making data available to other government departments who may require it, without having to duplicate data reporting and collection.

3.2 Environmental Information Systems

It is recognised that the WIS is one of a number of environmental information systems (EIS) which exist, or which are being developed within the DEAT. The framework of the WIS ensures that where required, links are established with other EIS to ensure that the data providers are not requested to provide the same data to multiple systems. This is particularly relevant to the Air Quality Information System (AQIS) and the National Environmental Authorisation System (NEAS).

The WIS development will provide support for the development of a central data warehouse or registry within DEAT, which will register and provide a unique identifier to environmental role-players, e.g. landfill sites, scheduled processes, treatment facilities, protected areas, etc. thereby providing a common thread between all Department EIS. So for example, a treatment incinerator will be registered as 00-001 and will use this unique identifier in reporting to the waste information system, the air quality information system, the national environmental authorisation system etc. Examples of fields required in the systems include:

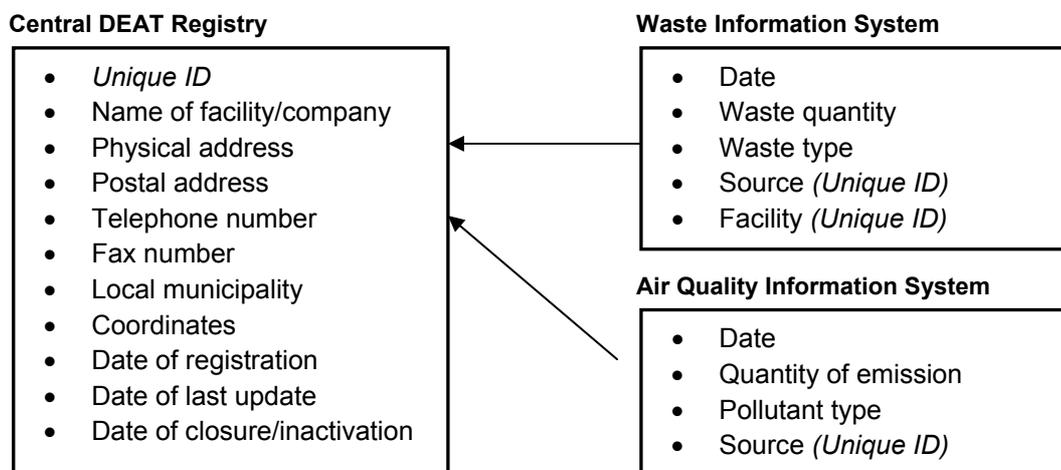


Figure 2. Example of link between environmental information systems and central data registry.

3.3 WIS Functionality

3.3.1 Data providers

Phase 1 of the WIS development will focus on the collection of static and dynamic data from end-of-pipe facilities, including:

- Recyclers ⁽³⁾
- Treatment facilities, e.g. health care risk waste incinerators
- Landfill sites - GMB, GLB, H:h, H:H
- Companies exporting waste from South Africa for treatment or disposal.

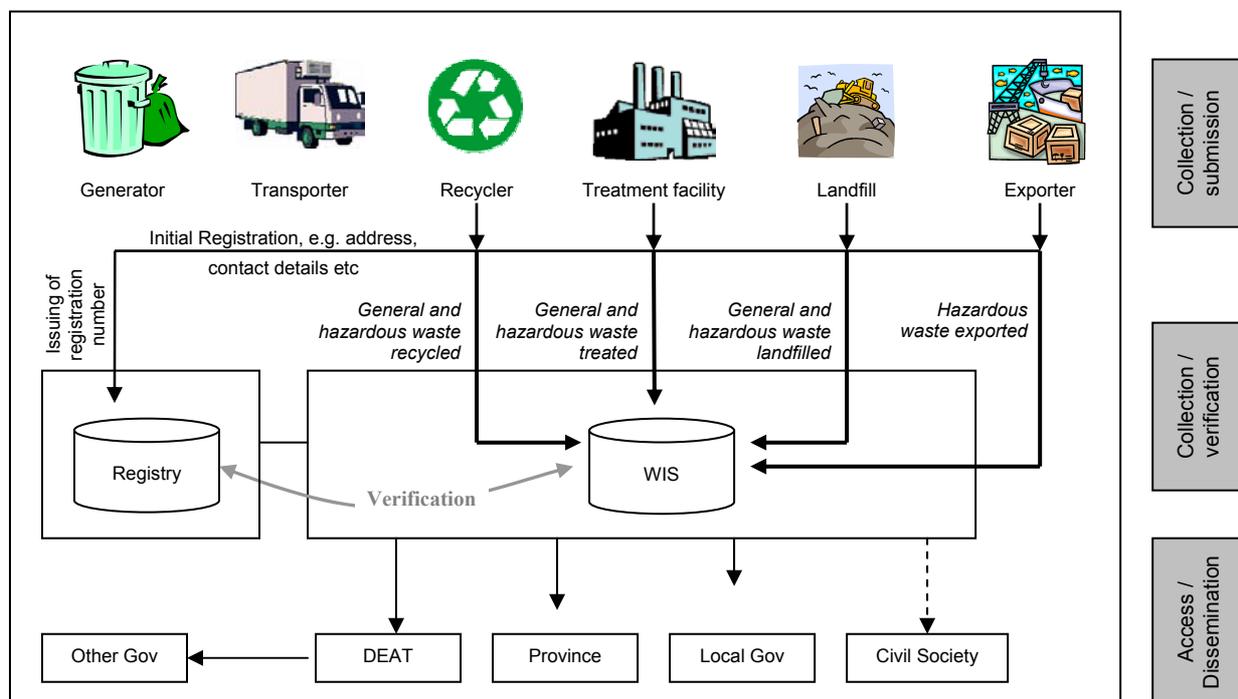


Figure 3. Overview of the data providers to the WIS

Placing the responsibility on facilities to provide the data, reduces the burden on government departments to go out and source the required data.

3.3.2 Registration

The collection of entity-specific (company) data will be through the registration of facilities within the DEAT central registry. This data does not need to be routinely collected but should instead be verified on an annual basis. Upon registration, the facility will be issued with a unique identifier, which will be used in all EIS within DEAT. A number of formats for this unique identifier have been reviewed, including erf (property) number, company registration number, etc. It is however proposed that a simple 001, 002, 003, approach be adopted. The central database will be developed as part of the WIS project and will be provided to the other EIS within the Department through the Directorate Information Technology to ensure linkages between systems.

3.3.3 Data collection

Although each province may collect the data required by DEAT however it sees fit, the recommended approach is that the waste facilities collect the required data and

⁽³⁾ Recyclers are defined here as the facilities ultimately receiving the waste for reprocessing and not the intermediate collectors, buy-back centres or transfer stations.

submit this directly to the provincial department of environment for verification. Provincial departments may delegate this function to local government, only if they can prove that sufficient capacity exists in this sphere and that the function is best placed there. However, it does raise a question of impartiality since local government will also very often be the data provider.

3.3.4 Data required

The Department will phase in the data required and the detail of the data to be collected. For phase 1 of the project, the following data will be requested by DEAT from Provinces (Table 1).

Table 1. Data required during Phase 1 of the WIS implementation

Data required	Level of detail required for Phase 1
Time period	Annually ⁽⁴⁾
Waste quantity	Tonnes
Waste type	General, priority recyclables, hazardous, health care risk waste
Waste source	Province or country within which waste originates
Waste destination	Facility (landfill, treatment facility, recycler, to which waste is taken)

An example⁽⁵⁾ of a report submitted to DEAT by a Province would therefore be as shown in Table 2.

Table 2. Example of data required during Phase 1 of the WIS implementation

Year	Quantity (T)	Type	Source	Destination
2005	1 583 000	General	Gauteng	Weltevreden Landfill
2005	239 103	HCRW	Gauteng	AB Treatment Facility
2005	24 000	Hazardous	Gauteng	Holfontein Landfill
2005	15 381	Paper ⁽⁶⁾	Gauteng	Mondi Paper Recyclers

3.3.5 Waste Type

Initially the level of detail with regards to waste type will be restricted to general, hazardous, health care risk waste (SABS Class 6.2), and the identified priority recyclable waste streams (Table 5, 6). However, the WIS will allow for the capturing of greater detail on waste type, should provinces already be collecting it, or require it.

⁽⁴⁾ The minimum time period required will be annually, although the system will be designed to collect data at shorter time intervals of e.g. monthly.

⁽⁵⁾ Information provided in the example is fictitious and used for explanation purposes only.

⁽⁶⁾ Assuming paper is identified as a priority recyclable by the DEAT Recycling Project Team.

3.3.6 Thresholds

The Department will also phase in the facilities which will be required to report to the WIS. For Phase 1 of the project, data will be requested from:

- Medium and large general waste landfill sites (GMB and GLB). This accounts for approximately 84% of the waste stream while only requiring data from 27% of the landfill sites (DWAF Baseline Data, 1998).
- Hazardous waste landfill sites (H:H and H:h)
- Priority recyclers as identified by the recycling project team
- Exporters of hazardous waste
- Hazardous waste treatment facilities (thermal and non-thermal)

3.4 Roles and Responsibilities

The roles and responsibilities of government and the private sector are detailed in Table 3.

Table 3. Roles and responsibilities with respect to the WIS

Sphere	Role	Responsibility
National DEAT	National custodian of WIS and waste information for South Africa.	Collect from provinces, verify, collate and disseminate national information. Maintenance, updates & expansion to the WIS.
Provincial Departments of Environment	Provincial custodian of waste information.	Collect, verify and submit provincial information to DEAT.
Local Authorities	Providers of data to the WIS. Support to Provincial Authorities.	Provide accurate, reliable and timeous data to Provinces. Assess that all reporting facilities within municipal area are registered and reporting.
Private Facilities ⁽⁷⁾	Providers of data to the WIS	Provide accurate, reliable and timeous data to provinces.

These roles and responsibilities, if agreed upon, will be enforced through the National Waste Management Act and supporting regulations to be developed by DEAT during 2005/06.

The roles and responsibilities of the proposed WIS framework ensure that the responsibility of data collection lies with the most appropriate level of government, thereby facilitating linkages with other processes e.g. landfill permitting, EIA approvals, and to where there is sufficient capacity, but also ensures that local government is empowered through access to information for their area, without being made responsible for the collection of the data.

⁽⁷⁾ Facilities for Phase 1 include landfill sites, treatment facilities, recyclers and exporters of waste.

3.4.1 *Quality assurance and feedback*

The quality of the data is critical to the success of the WIS and must be checked at a number of stages within the process of submitting data.

- At the facility responsible for submitting the data, whether private or public - Provinces and DEAT must reserve the right, through regulations, to audit any facility responsible for submitting data to the WIS to assess the accuracy and reliability of the data.
- In provinces – Although checks will be built into the WIS to flag obviously erroneous data, all data submitted to the WIS must be checked by the responsible waste information officer before it is accepted into the WIS. Alternative sources of information may also be identified and used for verification of data submitted to the WIS. Feedback on performance must be given by provinces to facilities.
- At DEAT – spot checks must be conducted by DEAT officials on facilities and provinces, to ensure that data submitted are accurate and reliable. DEAT must give feedback on performance to provinces.

3.5 **Dissemination**

The dissemination of data collected by the WIS is fundamental to the success of the WIS. With the cost to government and industry to implement a WIS, it is critical that this data be used within government and made available to citizens of South Africa. The utilisation of this data and information will help ensure that accurate, reliable data are continuously submitted to the WIS. The following means of information dissemination may be considered by the Department:

- An annual State of Waste Report for South Africa, which summarises the key findings of the previous year of waste information, is prepared by DEAT. This annual report will provide the basis of the waste section in the National State of Environment Report produced by the Department every five years. This is in line with current government thinking around information dissemination, for example State of Rivers Report (DWAF), State of Coast Report (DEAT).
- Public access to a range of suitably aggregated data and standard reports published on the Internet, including
 - Summary reports which will be made available through the on-line waste information system, e.g. Report - Quantity of waste landfilled in South Africa in 2005.
 - Information will be made available in a number of formats, including standard reports, statistics, and GIS maps. It is proposed that a GIS interface be developed to spatially (maps) represent information within the WIS (Annexure B).
 - Local authorities and provinces will also have access to all data collected within their area (See Section 2.5) for utilisation as and how they may see fit, e.g. Municipal and Provincial Integrated Waste Management Plans.

Besides the DEAT and the environmental departments and directorates of provincial and local authorities, there are other government departments with a vested interest in the data collected in the waste information system. The Constitution of South Africa requires that different spheres of government operate within a framework of cooperative governance. As different national and provincial departments are

responsible for managing the environment, it is the goal of the WIS to provide information with regards to waste in SA to enable these departments to monitor the effectiveness of their policies and to make informed decisions. Identified government departments with a vested interest in the data collected in the WIS, include:

- Department of Water Affairs and Forestry (DWAFF) – assess potential impact on receiving water environment;
- Department of Provincial and Local Government (DPLG) – assess key performance indicators of provincial and local government, which include waste indicators;
- Department of Trade and Industry (DTI) – the import and export of waste for disposal, destruction or recycling, under the Basel Convention; and
- Department of Health (DoH) – assess the generation and disposal of health care risk waste (HCRW) to support HCRW management and service delivery.

It will be the responsibility of the Sub-Directorate: Waste Information Systems, to ensure that data collected in the WIS are provided to other government departments as and when required. The internet is anticipated to be one of the major distribution methods.

3.6 Access to information

All information within the WIS will be subject to the Promotion of Access to Information Act (Act 2 of 2000). Access to information directly within the web-based WIS will however be controlled through access rights (Table 4).

Table 4. Access to information within the WIS

Sphere	Access to Information
National DEAT	All information within the WIS
Provincial Dept Environment	Information only for facilities within province and publicly available information
Local Authorities	Information only for facilities within local authority and publicly available information
Civil Society	Publicly available summary information

3.7 South African Waste Information Centre

It is recognised that not all of the waste information requirements need to be or can be met through the WIS. As such, it is proposed that the WIS form part of an internet-based South African Waste Information Centre (SAWIC), which collects and provides supporting information to the WIS. The supporting information will be collected by members of government, industry and the private sector and made available through the centre, by DEAT. To add further value to the data collected within the WIS, it is proposed that some means of data interpretation or re-representation be provided in SAWIC through e.g. supporting tools, graphs, reports etc.

Possible information to be made available through the SAWIC, include:

- Waste data – data collected through the WIS made available at the spatial scale of national, provincial or municipal, as e.g. tables, statistics, maps and indicators.
- Publications – national, provincial or municipal reports, guidelines, documents, e.g. provincial hazardous waste integrated waste management plans (IWMP), municipal integrated development plans (IDP) and IWMP.
- Legislation – waste and appropriate environmental legislation.
- Tools – to provide supporting or reworked information, e.g. remaining treatment capacity in province, remaining landfill airspace in municipality, conversion factors for waste volume to waste mass, etc.;
- Waste prevention – waste exchange system, price watch of recyclable commodities, guidelines, best practice, e.g. how to establish a sustainable, cost effective buy-back recycling centre etc.
- Waste links – local and international waste links where additional waste information, best practice, guidelines etc. can be sourced.

Many of these information requirements and tools will only be captured or better understood during the piloting of the WIS in provinces and local authorities and will be added to the framework of the Waste Information Centre.

A proposed layout of the Waste Information Centre and the content of the Centre is attached as Annexure C.

4 Assumptions and Limitations

4.1 Assumptions

In developing the WIS, the following assumptions are made.

4.1.1 Legal assumptions

The framework of the WIS, detailing who needs to submit data to the WIS, when and how will be legislated in the National Waste Management Act, or in Regulations to the Act to be drafted during the NWMSI project. This national legislation needs to be supported by Provincial Regulations and Municipal By-laws.

4.1.2 Technical assumptions

- Waste is weighed and kilograms or tonnes are the standard measure of reporting in the WIS. During the phasing in of the WIS, volumes of waste may be accepted and automatically converted to an approximate weight by the WIS;
- Data is submitted to government (preferably electronically), according to a strictly adhered to format or template for data capture and reporting;
- A central data registry is maintained by DEAT;
- DEAT can guarantee the web server is maintained and fully operational with minimal downtime to ensure access to WIS;
- DEAT can guarantee that all data within the WIS is secure from external tampering and that data is regularly backed up and safely stored off-site.

4.1.3 *Institutional assumptions*

- The WIS is managed and operated by suitably qualified staff at provincial and national government levels;
- DEAT, SITA or the Internet Service Provider can provide sufficient technical IT assistance to ensure that the WIS is always on-line, functional and accessible.
- Regular training is provided to waste facilities and government to ensure on-going capacity development.

4.2 **Limitations of the WIS**

It is recognised that in the short-term:

- the WIS will not be a tracking system of waste from the point of generation to final disposal, or
- a pollutant release and transfer registry as envisaged in the white paper on integrated pollution and waste management;
- the level of confidence attached to the data may be low, but will improve over time as data are verified and capacity built in government to accurately verify information provided by local authorities and industry.

5 **Consultation**

The framework detailed above has been presented to the DEAT project management group (PMG), the WIS Technical Advisory Committee⁽⁸⁾ (TAC), Working Group II, representatives of the Institute for Waste Management (IWMSA) and representatives of industry. While it is recognised that the WIS will not answer all questions immediately, the phased approach to the system has been acknowledged as a practical means of ensuring that at least the minimum data required by government, will be collected as a start.

The waste facilities consulted have confirmed that the basic data which will be expected will not place an undue burden on them, with many already collecting this basic data set. It is however expected that the minimum data requirements will place new requirements and expectations on local authorities, as permit holders of landfill sites, although by targeting the larger GMB and GLB landfill sites, it is hoped that local authorities required to submit data to the WIS will either already be collecting data or have the capacity to provide the required data.

6 **Strategy for Implementation**

Based on the findings of the WIS pilot projects, the implementation of the national WIS, the activities, targets and timeframes will be detailed in a supporting implementation strategy to be developed within the project. As a minimum, the implementation of each subsequent phase of the WIS development will require that:

- reporting facilities and local, provincial and national government are meeting their current legislated waste information reporting obligations;

⁽⁸⁾ The WIS TAC consists of 13 representatives from DEAT, Provincial and Local Government.

- the data collected to date are reliable;
- capacity exists and is being built within local, provincial and national government;
- the WIS and data within the WIS are being used by government to support planning and decision-making; and
- funding is available to support ICT system expansions and capacity building, training and support programmes.

If these requirements cannot be met, the need to expand the system in the future should be seriously reconsidered.

The following phased implementation of reporting facilities and detail of information is proposed, but will be subject to review and approval by DEAT and stakeholders at each step in implementation of the WIS.

Table 5. Detail of data submitted to WIS for each Phase of Implementation

	Phase 1	Phase 2	Phase 3	Phase 4
Time period ⁽⁹⁾	Annually	Annually	Annually	Annually
Quantity	Tonnes (weighed and estimated)	Tonnes (weighed and estimated)	Tonnes (weighed and estimated)	Tonnes (weighed)
General waste classification	General waste, priority recyclables ⁽¹¹⁾	General, + additional priority recyclables ⁽¹¹⁾	General, + additional priority recyclables ⁽¹¹⁾	General, + additional priority recyclables ⁽¹¹⁾
Hazardous waste classification	Hazardous and Class 6.2 (HCRW)	9 Classes (SABS 10228)	9 classes and sub-classes (SABS 10228)	9 classes and sub-classes (SABS 10228)
Generator	Province or Country	Province or Country	Municipality or Country	Generator or Country
Transporter	None	None	None	None
Waste facility	Facility	Facility	Facility	Facility

Table 6. Thresholds for companies required to submit data to the WIS

	Phase 1	Phase 2	Phase 3	Phase 4
<i>Generators</i> required to submit data	None	None	None	Major generators of hazardous waste ⁽¹⁰⁾
<i>Landfills</i> required to submit data	GMB, GLB, H:H, H:h	GMB, GLB, H:H, H:h	GSB, GMB, GLB, H:H, H:h	GCB, GSB, GMB, GLB, H:H, H:h
<i>Recyclers</i> required to submit data	Paper, plastic ⁽¹¹⁾	Paper, plastic, glass, tyres ⁽¹¹⁾	Paper, plastic, glass, tyres, oil, beverage cans ⁽¹¹⁾	Paper, plastic, glass, tyres, oil, beverage cans, e-

⁽⁹⁾ Although DEAT will only require data from provinces annually, it is recommended that the provinces start collecting monthly data on a quarterly or six-monthly basis to allow for sufficient reaction time, should intervention be required at facilities.

⁽¹⁰⁾ Thresholds for generators and the identification of major hazardous waste generators to be determined closer to implementation of phase 4, thresholds may be based on waste type, waste quantity or industry sector.

⁽¹¹⁾ Prioritisation of recyclers still to be confirmed by Department of Environmental Affairs and Tourism.

	Phase 1	Phase 2	Phase 3	Phase 4
				waste, scrap metal (11)
<i>Treatment facilities</i> required to submit data	Hazardous waste	Hazardous waste	Hazardous waste	Hazardous waste
<i>Exporters</i> required to submit data	Hazardous waste	Hazardous waste	General and Hazardous waste	General and Hazardous waste

As a minimum, each phase should be successfully operated for a period of 3-5 years before the next phase of implementation is considered.

Companies reporting to the WIS may be expanded from the end-of-pipe landfills, treatment facilities and recyclers, to eventually include generators and transporters of waste. However, this should be seen as a long-term objective of the WIS.

7 References

Department of Environmental Affairs and Tourism, 2000. White Paper on Integrated Pollution and Waste Management for South Africa. A Policy on Pollution Prevention, Waste Minimisation, Impact Management and Remediation. Government Gazette Vol.417, No.20978, 17 March 2000. General Notice 227 of 2000.

Department of Environmental Affairs and Tourism, 2005. Waste Information System Status Quo Analysis.

Department of Environmental Affairs and Tourism, 2005. Waste Information Needs Analysis. Objectives, Needs and Challenges.

**Annexure A:
Proposed WIS Database Design**

1 General

The proposed database design for the WIS is based on a relational database design and is appropriate for database management systems (DBMS) such as Oracle, MySQL and MS SQL Server. The proposed design should be seen as a first draft, since changes will need to be made over the next few months, as additional requirements surface and new ideas are adopted.

1.1 Definitions of the tables

The database will contain a number of tables, which are represented in **Figure A1**. The three main tables include:

- ‘RegUser’
- ‘RegFacility’
- ‘National Waste Information System’ or NWIS.

The ‘RegUser’ table represents the users of the system. The role these users play depends on their allocated access rights (AccessRights). The access code shows the type of ‘write’ access this user has.

The ‘RegFacility’ table represents the facility that will handle the waste (recycle, landfill, treat). This table contains mainly physical attributes such as coordinates, physical address and the code of the municipality it belongs to. This table will also be shared between multiple applications within the

Environmental Information System (EIS) of DEAT. The ‘RegFacility’ table will have a column that uniquely references a specific facility and is common in all the

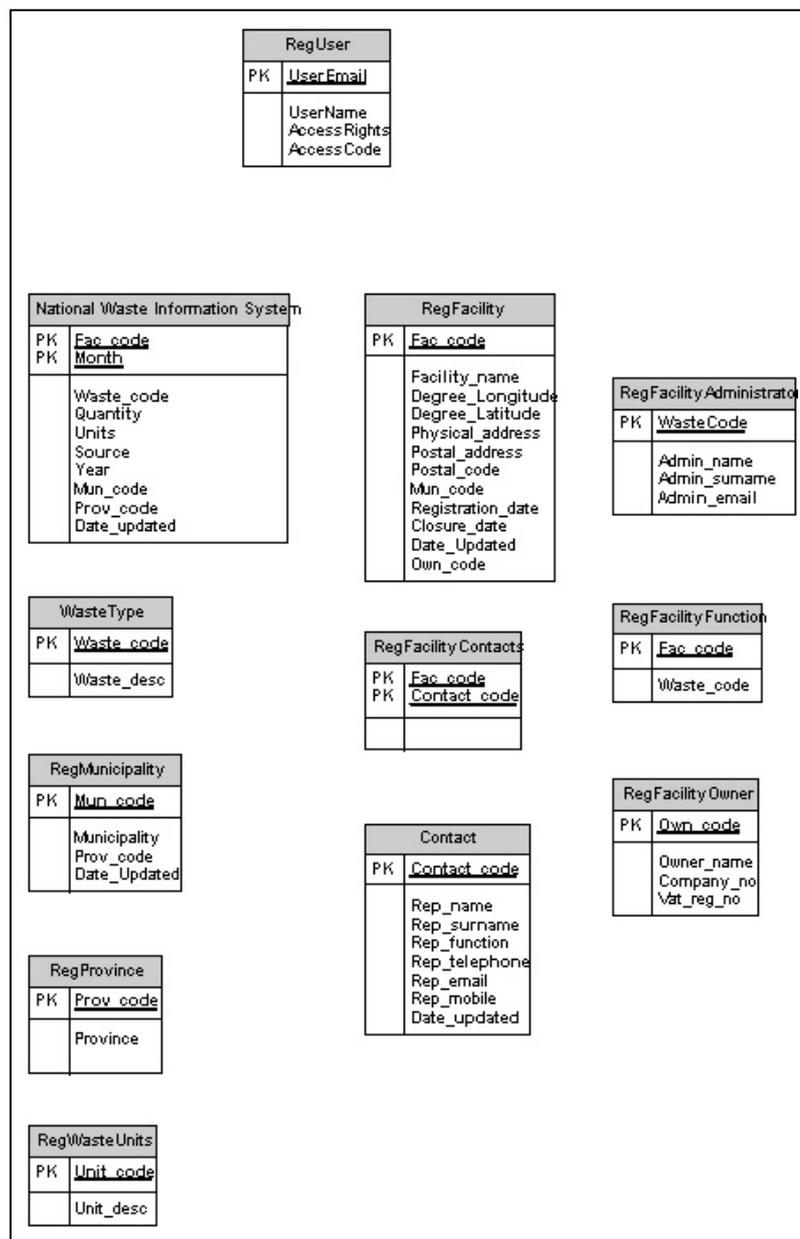


Figure A1. Proposed database design

applications within EIS. This table will most probably belong in the central DEAT Registry.

The '*NWIS*' table will contain all the information about waste handled by a specific facility, for a specific month and year, expressed in specific units (e.g. tonnes), being of a specific type and coming from a specific source. To ensure that there is no ambiguity as to which province reports on which facility, the '*NWIS*' table will contain references to both the municipality and the province, since certain municipalities are cross-border.

The other tables support the three main tables, e.g.

- '*Contact*' table - contains information about people who represent one or more facility;
- '*RegFacilityContacts*' table - links the '*Contact*' table information to the '*RegFacility*' table;
- '*RegFacilityOwner*' or ownership table - is linked to the facility table and will provide information on which company/private individual owns which facility, and
- '*RegFacilityAdministrator*' or facility administrator table - contains information about administrators of the system. These persons will be contacted by the system (via E-mail or other methods) when important data are entered or changed. If somebody registers a new facility the relevant administrator will be contacted (via E-mail) to ensure the validity of the specific registration.

Certain tables will form part of the WIS while others will form part of the proposed DEAT central registry for EIS. At this stage it is not clear which tables belong to the central DEAT registry and which tables will only be used by the NWIS. The tables to be used in the central DEAT registry will be finalised in consultation with the Directorate Information Technology and with key stakeholders within DEAT.

Where possible existing, accepted codes will be used within the system and other similar systems, e.g. the municipality table (*RegMunicipality*) contains unique codes for every municipality in South Africa, based on the municipality codes used by Statistics South Africa (StatsSA).

All tables created will have date-related information attached to it. This information will be maintained by the system and is important for verification and auditing purposes. It is also considered that information about the user who last changed a specific record in a specific table be added. Additional tables will be created only if, as and when the need arises, with the creation of unnecessary tables and the collection of unnecessary data being avoided.

**Annexure B:
Proposed GIS interface to WIS**

1 Background

The NWMSI Project Document and the Inception Report did not include a geographic information system (GIS) component to the national WIS, but only made reference to the fact that the WIS structure should be “*sufficient to support a GIS*”. The need for a GIS ‘interface’ to the WIS, which graphically displays the location of waste role-players and waste data, was identified during discussions with local and provincial government.

Such an approach was successfully implemented in displaying the findings of the 1998 Waste Baseline Studies (DWAF, 1998) (**Figure B1, B2**) and in the KwaZulu-Natal WIS.

The inclusion of a GIS component is therefore proposed in the WIS framework.

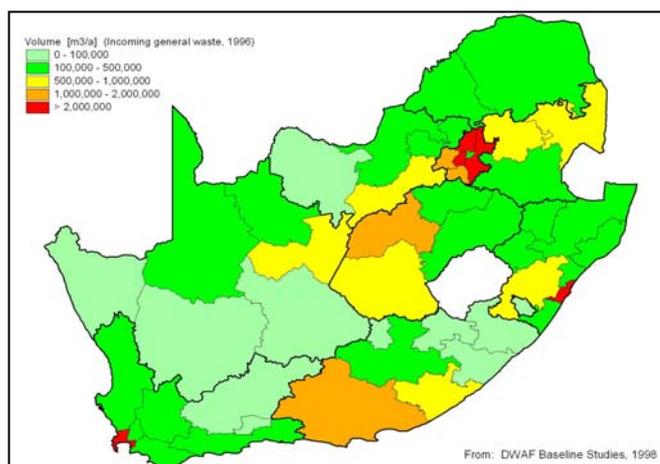


Figure B1. Volume of general waste received at landfill sites, per regional municipality (1996)

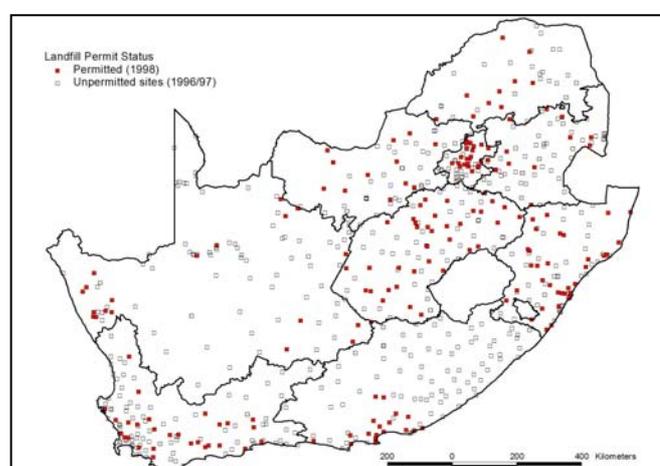


Figure B2. Permitted and non-permitted landfill sites, as at 1998

2 WIS – GIS Framework

2.1 Approach

In general, GIS is associated with the representation of information on maps (**Figure B1, B2**). Given the fact that the GIS component is part of an Information System (IS), it must be approached considering all the main components which would constitute an IS, i.e.

- Data
 - Determine data needs in terms of the following:
 - Waste information data items (e.g. waste disposal sites)
 - Alpha-numeric data that can be geo-referenced (e.g. type of waste)
 - Background data (e.g. topo-cadastral data)
 - Data formats
- Technology (hardware, software, operation systems, etc)
 - Software which can be considered in terms of required data formats
 - Other technological requirements

- Processes involving data flow
 - Identify data sources for each data item. How will data be managed from source to system?
 - How and where will data be stored?
- Reporting requirements
 - What kind of outputs would be required from the GIS in terms of maps, tables and graphs?

2.2 Methodology

The GIS must be seen as a sub-system of the national WIS as well as part of the GIS within DEAT, from a corporate point of view. The issue of data sharing and all its implications must therefore be addressed. A simple, but tested methodology is proposed, based on the following steps:

- Status quo analysis
- System requirements specification
- System design
- System implementation
- Training
- Monitoring and evaluation

2.3 Spatial Representation of Data

In terms of system requirements and the proposed WIS framework, the following data to be captured by the WIS may be spatially represented:

- Geographical data (location of):
 - Cadastral data
 - Municipal boundaries
 - Provincial boundaries
 - Waste data
 - Waste disposal (landfill) sites
 - Waste recycling (re-processing) plants
 - Waste treatment facilities
- Alpha numeric waste data (that can be geographically represented)
 - Type of waste – per facility, per municipality, per province
 - Tonnages - per facility, per municipality, per province

**Annexure C:
Proposed SAWIC Layout**

