SECTION 1: INTRODUCTION

1.1 OVERVIEW OF OPERATIONAL POLICY

The Department of Water Affairs and Forestry (DWAF) commissioned this project to develop an *operational policy*, specifically focusing on the *disposal of land-derived water containing waste (or wastewater) to the marine environment of South Africa* (including estuaries, the surf zone and offshore marine waters) in order to fulfil its legal obligation in terms of the management and control of land-derived water and water containing waste (to be referred to as 'wastewater' for the purposes of this document).

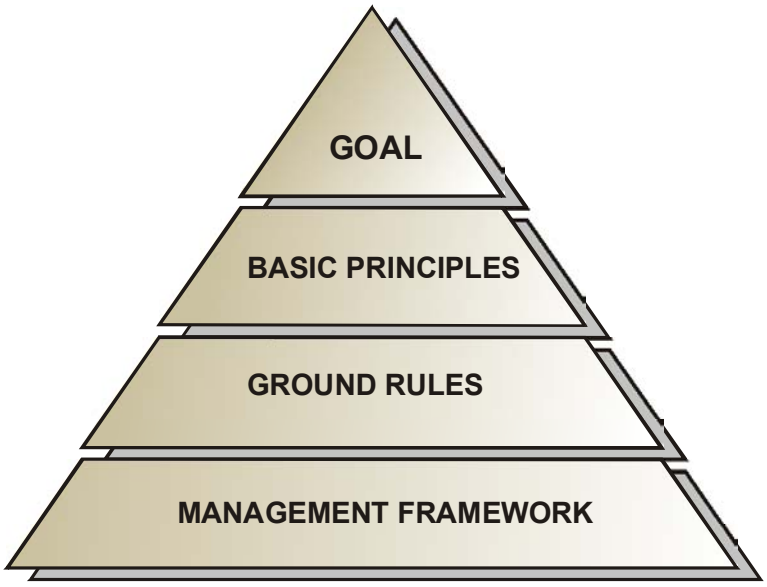
The Department of Water Affairs and Forestry's strategic view of the disposal of land-derived wastewater to the marine environment is as follows:

Taking into account the generally favourable, dynamic physical conditions along the South African coastline, responsible disposal of land-derived water containing waste (referred to as wastewater) to the marine environment is considered an option in South Africa, provided that all reasonable efforts have been made, first of all to prevent waste, and secondly, to minimise waste.

However:

- ***Because South Africa is a water scarce country, the loss of freshwater to the marine environment must be limited in terms of water conservation and demand management strategies.***
- ***According to the White Paper on a National Water Policy for South Africa, 'efforts to introduce source control will be strengthened, through standards and licensing and through changes in technologies and land use, with the final aim of getting as close as possible to a situation in which there is no discharge of pollutants into our water (including the marine environment)'.***

The structure of this operational policy for the disposal of land-derived wastewater to the marine environment of South Africa is illustrated below:



The **Goal** of this operational policy for the disposal of land-derived wastewater to the marine environment of South Africa is as follows:

To achieve water quality that is 'fit for use' and that can maintain aquatic ecosystem health on a sustainable basis by protecting of the country's water resources (including marine waters), in a manner allowing justifiable social and economic development. This will be achieved in accordance with the hierarchy of water quality management goals of the DWAF, namely:

- ***Prevent waste***
- ***Minimise waste***
- ***Dispose responsibly.***

The goal will be achieved through enforcement of the Basic Principles, Ground Rules, and Management Framework stipulated in this operational policy.

Basic Principles provide the broad framework or direction within which to develop ground rules on the disposal practices of land-derived wastewater to the marine environment, as well as the management thereof. The basic principles were distilled from the broader international and national legislative context to give international and national credibility to the policy.

Ground Rules derived within the broader framework of the Basic Principles, provide more specific rules that will be applied by Government when, for example considering new licence applications or review existing licences to dispose of land-derived wastewater to the marine environment.

(The Basic Principles and Ground Rules are discussed in detail in the *Operational policy for the disposal of land-derived water containing waste to the marine environment of South Africa* [RSA DWAF Water Quality Management Sub-Series 13.2]).

The **Management Framework** provides the generic and structured approach within which the management and control of disposal of land-derived wastewater to the marine environment of South Africa needs to be conducted.

1.2 OVERVIEW OF MANAGEMENT FRAMEWORK

The Management Framework provides the generic and structured approach within which the management and control of disposal of land-derived wastewater to the marine environment of South Africa needs to be conducted. A flow chart illustrating the logical sequence of the above-mentioned components is schematically illustrated in Figure 1.1. A brief overview of each of the components is provided below.

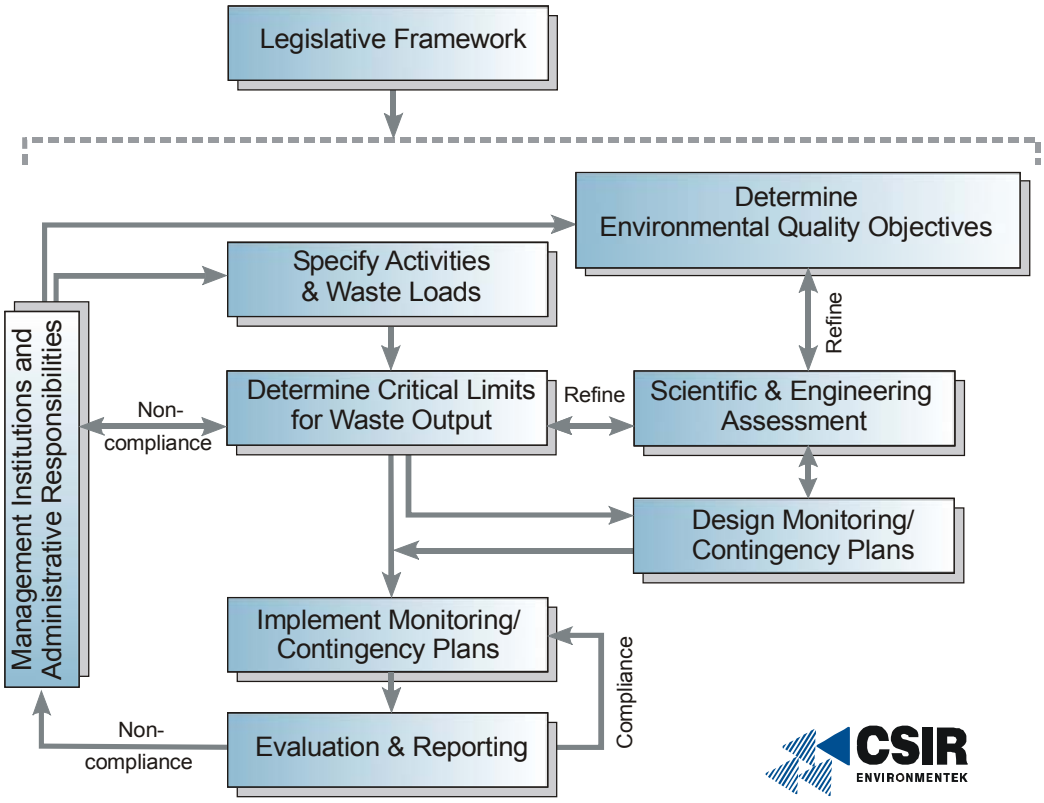


FIGURE 1.1: ***A management framework for the implementation of the Operational policy for the disposal of land-derived wastewater to the marine environment of South Africa***

1.2.1 Legislative Framework

A management framework should be designed and implemented within the international and national legislative frameworks governing the particular activities and affected environmental domains. In the case of the disposal of land-derived wastewater to the marine environment, these requirements are provided for in the *Basic Principles and Ground Rules* of this operational policy.

Further information on the legislative framework is provided in Section 2 of this Document.

1.2.2 Management Institutions and Administrative Responsibilities

The disposal of land-derived wastewater to the marine environment is currently governed by the DWAF under the National Water Act 36 of 1998. The DWAF works in consultation with other government departments. In the context of this operational policy, water use authorisation, under section 21 of the NWA will be required for:

- New applications to dispose of land-derived wastewater to the marine environment
- Existing discharges of land-derived wastewater to the marine environment that are not considered to be existing lawful water use in terms of Section 32 of the NWA
- Upgrades, extensions of existing WWTW or industries discharging to the marine environment that were not approved in terms of the original authorisation
- Change in effluent volume or composition (a licence is issued based on a specific effluent volume and composition, therefore if these change, the discharger legally must re-apply).

Although the DWAF is responsible for the overarching management and administration of the disposal of land-derived wastewater to the marine environment, a key element in the successful implementation of this operational policy is the establishment of local management institutions, representing all the role-players in a designated area, and which fulfil the role of 'local watchdogs' or 'custodians'.

Further information on management and administrative responsibilities is provided in Section 3 of this Document.

1.2.3 Environmental Quality Objectives

The area within which this management framework is applied must be determined, taking into account the anticipated influence of the proposed discharge, both in the near and far fields (e.g. an entire bay or ecosystem).

Environmental quality objectives must be set in consultation with stakeholders. The identification and mapping of sensitive marine ecosystems and the beneficial uses in the affected areas provide the basis for the derivation of such site-specific environmental quality objectives.

In order for environmental quality objectives to be practical and effective management tools, they need to be set in terms of measurable target values or ranges for specific water column, sediment and biological parameters.

Further guidance on procedures to be followed to determine the area boundaries, important ecosystems, beneficial uses and associated environmental quality objectives is provided in Section 4 of this Document

1.2.4 Activities and associated Waste Loads

To ensure that possible cumulative and synergistic effects are taken into account, the waste loads of the activities under investigation, as well as those of existing waste inputs to the study area (both in terms of quantity and quality), need to be defined.

Further guidance on determining the specification for different types of wastewater is provided in Section 5 of this Document

1.2.5 Scientific and Engineering Assessment

The objective of this component of the management framework is to refine the environmental quality objectives for a particular marine receiving environment and to establish whether a waste disposal practice can be designed that will comply with such environmental quality objectives. The following are required:

- Characterise the physical and biogeochemical processes and the ecological functioning of the receiving marine environment
- Conduct the hydraulic design of (offshore) outfall, based on preliminarily required dilution estimates and taking into account characteristics of waste loads (both in terms of volume and composition)
- Determine achievable near and far field dilution and deposition/re-suspension patterns, taking into account other anthropogenic influences in the study area, as well as possible synergistic or cumulative effects
- Assess for compliance with environmental quality objectives. Where compliance cannot be achieved, for example, through adjustment of the hydraulic design, either the critical limits for the waste load need to be reduced (e.g. through additional pre-treatment prior to discharge) or the environmental quality objectives need to be re-defined (only in extreme situations, e.g. in cases where the economic/social gains justify such environmental sacrifice).
- Define the structural design and construction considerations of a marine outfall to meet requirements as determined by the above.

Further guidance on the procedures to be followed in the scientific and engineering assessment is provided in Section 6 of this Document. Where appropriate, a distinction is made between requirements for a pre-assessment and a detailed investigation as specified within the authorisation process discussed in Section 3 of this document.

1.2.6 Monitoring and Contingency Plans

Long-term monitoring plans need to be designed and implemented to enable the continuous evaluation of:

- The effectiveness of management strategies and actions to comply with the licence conditions and design criteria (Compliance monitoring and System Performance monitoring)

- The trends and status of changes in the environment in terms of the health of important ecosystems and designated beneficial uses in order to respond to and also to assess if the environmental responses that were predicted during the assessment process match the actual responses (Environmental monitoring).

Monitoring programmes typically become part of the licence issued by the DWAF for a particular discharge under section 21 of the NWA. These monitoring programmes are designed and implemented at the cost of the licensee (following the Polluter Pays Principle).

To be useful from a management perspective, monitoring data must be evaluated against pre-determined objectives. Results need to be presented in clear format, providing the appointed management institution/s with the scientific and engineering information needed for effective decision making (i.e. facilitating effective adaptive management).

NOTE:

It is important to note the difference between baseline measurement programmes (or surveys) and monitoring:

- ***Baseline measurement programmes (or surveys) refer to shorter-term or once-off, intensive investigations on a wide range of parameters to obtain a better understanding of environmental processes (e.g. as part of the Scientific and Engineering Assessment component)***
- ***Long-term monitoring refers to ongoing data collection programmes that are done to evaluate continuously the effectiveness of management strategies/actions designed to maintain a desired environmental state so that responses to potentially negative impacts, including cumulative effects, can be implemented in good time.***

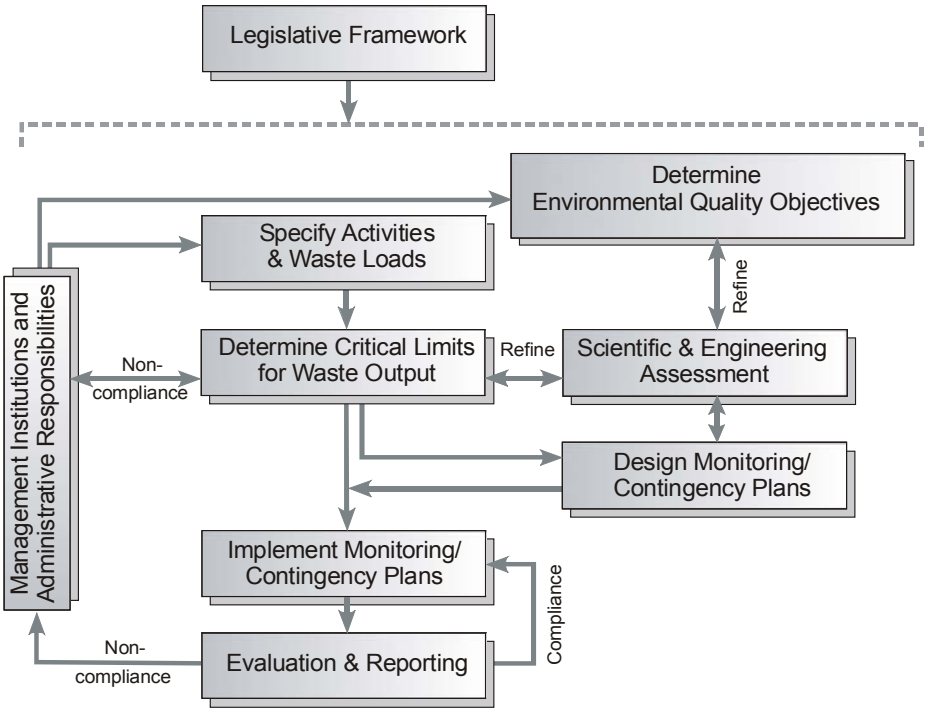
Contingency plans and mitigating actions are required to minimise the risks to the environment in the event of malfunctioning, both during construction and operation. Decommissioning of a wastewater disposal scheme is also addressed.

Further guidance on procedures to be followed in monitoring and contingency planning is provided is in Section 7 and 8 of this Document, respectively.

1.3 USE OF THIS DOCUMENT

The purpose of this document is to provide practical guidance to authorities, managers, engineers and scientists on the implementation of the operational policy for the disposal of land-derived wastewater to the marine environment in the context of the management framework (applicable to both existing and proposed discharges). Although an attempt was made to keep this document as user-friendly as possible so as also to provide the less experienced with an overview of the implementation processes, it is primarily aimed at managers, scientists and engineers who are responsible for the technical implementation of the operational policy.

Guidance on the implementation of the operational policy for the disposal of land-derived wastewater to the marine environment, provided in this document, is described within the context of the management framework (refer to Section 1.2). Important background information and procedures to be followed for each of the components of the management framework are addressed, using the following roadmap:



The authorisation process for a water use (as discussed in Section 3.1) identifies two distinct levels or stages of assessment in the licence application process, namely:

- **Pre-assessment** (also referred to as a pre-feasibility assessment or a 'fatal flaw analysis') of which the primary purpose is to establish the Best Practical Environmental Option/s for a particular water use, in this case the disposal of land-derived wastewater.

- **Detailed investigation** of which the purpose is to conduct detailed assessments to determine and quantify potential negative impacts of the selected 'Best Practical Environmental Option/s', as well as to define the design and construction considerations of the disposal scheme.

This document distinguishes between requirements for a Pre-assessment and for a Detailed Investigation, particularly in terms of the data and information required for the *Scientific and Engineering Assessment* component *(referring to Section 6 of this document).*