National Guideline for the Discharge of Effluent From Land-based Sources into the Coastal Environment

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

20 YEARS OF FREEDOM
south africa 1994 - 2014

National Guideline for the Discharge of Effluent from Land-based Sources into the Coastal Environment

Published in terms of Section 83 (1)f and 83 (1)g of the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008)

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This document is available on the DEA website http://www.environment.gov.za

PLEASE NOTE: This document is a guideline and serves as reference and supportive text only and cannot take the place of legislation. This document will not take the place of any regulations published by DEA. This document must be read together with the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008).

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REFERENCING
When referencing this document, it should be cited as follows:
Department of Environmental Affairs. (2014). *National Guideline for the Discharge of Effluent from Land-based Sources into the Coastal Environment*. Pretoria, South Africa. RP101/2014.

RP101/2014

ISBN: 978-0-621-42619-9

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EXECUTIVE SUMMARY

Prior to the promulgation of the Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (ICMA), the disposal of land-derived effluent into the coastal environment through pipelines were controlled and regulated by the Department of Water Affairs (DWA) under the National Water Act, 1998 (Act No. 36 of 1998) (NWA). Through the promulgation of the ICMA, the responsibility was transferred to the Department of Environmental Affairs (DEA). The ICMA is aimed at regulating the discharge of effluent into the coastal waters from any source on land (Section 69) by requiring that such discharges are authorised under a permit or general authorisation. In order to achieve this goal the DEA has taken the responsibility to adopt and revise the 2004 version of an Operational Policy, which was developed under the previous Department of Water Affairs and Forestry (DWAF, into a *National Guideline for Coastal Effluent Discharges from Land-based Sources* that takes cognisance of legislation and principles developed post 2004.

This guideline includes a hierarchy of decision-making which contains elements of the Receiving Water Quality Objectives approach, as well as the precautionary principle of environmental protection through source reduction, minimisation, treatment, re-use, etc. This hierarchy was developed by the DWA and remains valid in this document (Section 3: Basic Principles includes the details of the hierarchy). Essentially, the DEA supports this approach and an application to dispose of effluent to the coastal environment must demonstrate that all reasonable efforts have been made, firstly to prevent waste, and secondly to minimise it. Only thereafter will minimum effluent standards or standards based on the receiving environment approach, whichever is strictest, be considered.

The **goal** of this guideline for the discharge of effluent to the coastal environment of South Africa is as follows:

To achieve coastal water quality that is fit for use and a healthy aquatic system that is maintained on a sustainable basis while allowing for justifiable social and economic development. This will be achieved in accordance with the hierarchy of decision-making of water quality management, namely:

- ***Prevention of waste;***
- ***Minimisation of waste; and***
- ***Responsible disposal.***

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

The **basic principles** provide the broad reference framework or direction within which to develop specific ground rules for the discharge of land-based effluent to the coastal environment, as well as the management thereof. These principles were distilled from the broader international and national legislative context [essentially, the ICMA is informed by the NEMA principles contained in Section 2(4)(a)(vii) of the NEMA.

The basic principles pertaining to this guideline are as follows:

Principle 1: Pollution Prevention, Waste Minimisation and Precautionary Approach

Principle 2: Receiving Coastal Environmental Quality Objectives Approach

Principle 3: Integrated Assessment Approach

Principle 4: Polluter Pays Principle

Principle 5: Participatory Approach

Ground Rules are derived within the broader context of the Basic Principles and provide more specific rules that will be applied by the DEA when considering permit applications to dispose of effluent into the coastal environment. For this guideline, the Ground Rules in Section 4 are addressed under specific themes considered to be of particular importance for such discharges (in alignment with the key components of the management framework), namely:

- Legislative Framework
- Management institutions and Administrative Responsibilities
- Environmental Quality Objectives
- Activities and Associated Waste Loads
- Scientific and Engineering Assessment
- Monitoring and Contingency Plans.

The summarised table below lists the ground rules pertaining to the above themes together with the applicable basic principles supported.

NO.	GROUND RULE	PRINCIPLE SUPPORTED
GROUND RULES RELATED TO THE LEGISLATIVE FRAMEWORK		
1	The discharge of any effluent into the coastal environment from a land-based process in which it has been heated must be authorised by the DEA in terms of section 69 of the ICMA.	Integrated Assessment Approach
2	Any discharge of land-based effluent to the coastal environment from an activity triggering any of the Listing Notices in the Environmental Impact Assessment (EIA) Regulations under the NEMA, is subject to the applicable environmental authorisation issued under the NEMA: EIA Regulations (2010) administered by the DEA and / or a Coastal Waters Discharge Permit (CWDP) or a General Authorisation (GA) in terms of Section 69 of the ICMA, unless the activity conforms to a standard as prescribed in section 24 of the NEMA and in terms of the ICMA.	Integrated Assessment Approach
3	A CWDP is valid for a period up to 5 years subject to a midterm review as stipulated in the conditions upon which the permit is granted. Revisions to permit conditions can further be motivated on the grounds of negative impacts on the environment and non-compliance with permit conditions.	Integrated Assessment Approach
4	The discharge of land-based effluent to any area declared a Marine Protected Area under the Marine Living Resources Act (Act No. 18 of 1998) is prohibited, unless the Minister of Environmental Affairs provides permission to do so.	Pollution Prevention, Waste Minimisation and Precautionary Approach
5	Any land-based effluent discharge to the coastal environment may be subject to a disposal charge to be developed in consultation with stakeholders.	Polluter Pays Principle
GROUND RULES RELATED TO MANAGEMENT INSTITUTIONS AND ADMINISTRATIVE RESPONSIBILITIES		
6	The discharge of land-based effluent to the coastal environment is currently governed by the DEA under the ICMA, however, the DEA will work in consultation with relevant local, provincial and national government departments (in particular the DWA in cases where discharge occurs in an estuary), as well as local management institutions (such as pipeline or catchment forums). This collaboration is required to ensure effective cooperative governance in the management of waste discharges to the coastal environment of South Africa.	Participatory Approach

7	The discharge of land-based effluent to the coastal environment (offshore, surf zone or estuaries) must be managed (which includes, but is not limited to, monitoring and compliance) through a local management institution such as the establishment of forums. This can be an existing institution, such as a pipeline forum, monitoring committee, pipeline advisory committee, water quality committee or catchment forum. Representation must include government authorities (i.e. that hold jurisdiction), as well as non-government role players (e.g. industries, users of the coastal environment and Non-Governmental Organisations (NGO's).	Participatory Approach
GROUND RULES RELATED TO SENSITIVE AREAS		
8	Estuaries are classified as 'sensitive areas'. The discharge of municipal and industrial effluent to these systems will therefore not be considered except in extraordinary circumstances in which such inflows are required to improve or maintain the resource quality objectives (also taking into account effects of water quantity) or where the ecological functioning has been irreversibly modified to support commercial harbours where exemption to this rule may be considered. In the latter case, the resource quality objectives of other designated beneficial uses of the area, however, must be met as a minimum. Therefore, applications for a CWDP for estuaries require consultation with the DWA.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach.
9	The surf zone is classified as a 'sensitive area'. The discharge of municipal and industrial effluent to the surf zone should therefore be avoided. Where legitimate motivation can be provided (e.g. in cases in which seawater used on land is returned to source), the environmental quality objectives for the study area must be met as a minimum. These include objectives pertaining to alteration of the natural salinity regime (in the case of freshwater discharges) and aesthetic impacts associated with the visibility of the discharge practice on land.	Pollution Prevention, Waste Minimisation and Precautionary Approach
10	Discharges of land-based effluent to the offshore coastal waters through a coastal outfall should be considered as the preferred option over any estuary or surf zone discharge, unless the suitability of the areas to accommodate such activities are properly assessed.	Pollution Prevention, Waste Minimisation and Precautionary Approach
GROUND RULES RELATED TO ENVIRONMENTAL QUALITY OBJECTIVES		
11	Site-specific environmental quality objectives for the coastal environment (excluding estuaries) must take into account the South African Water Quality Guidelines for coastal marine waters (RSA DWAF, 1995a) or any future updates thereof. In instances where a standard is proposed and for which concurrence is required from the DEA, such a standard must be in line with this guideline, more stringent, applicable and responsive.	Pollution Prevention, Waste Minimisation; Receiving Water Quality Objectives Approach
12	Where, in exceptional circumstances (as listed in Ground Rule 8), a discharge to an estuary is considered, resource and environmental quality objectives must be determined according to the methodology for estuaries developed by the DWA. Estuaries are included in the definition of 'the water resource' in the NWA and objectives therefore must take into account the provisions of the NWA.	Receiving Water Quality Objectives Approach
13	Environmental quality objectives must be complied with in the area beyond the initial mixing zone.	Pollution Prevention, Waste Minimisation and Precautionary Approach and Receiving Water Quality Objectives Approach
GROUND RULES RELATED TO WASTE LOADS - MUNICIPAL EFFLUENT		
14	South Africa is a water scarce country. Coastal discharge of land-based municipal	Pollution Prevention,

	effluent (particularly freshwater) will therefore only be considered where it has been evaluated in terms of the Water Services Development Plan for a particular municipal area required under the Water Services Act (Act No. 108 of 1997), and which, in turn, forms part of the Integrated Development Plans required in terms of the Local Government Transition Act (Act No. 209 of 1993). This requirement supports the concept of a 'Master Plan for water supply/demand and effluent treatment'.	Waste Minimisation and Precautionary Approach; Integrated Assessment Approach
15	Municipal wastewater treatment works (WWTWs) receiving industrial effluent (also referred to as trade effluent) will be subject to the Ground Rules for Industrial Effluent (refer to Ground Rules 19 to 22). Service Providers or Local Authorities operating such treatment works will be required to prepare industrial effluent management plans (as part of the 'Master Plan'). It is also the responsibility of the Service Provider or Local Authority to investigate possible synergistic and/or cumulative effects which may occur as a result of the interaction between different (industrial) effluent inputs.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach
16	The design, construction and management of collection systems (i.e. the land-based facilities at which the effluent is collected prior to discharging to the coastal environment) are outside the scope of this guideline. The design, construction and management of such systems must comply with related policies and specifications of the DWA and DEA.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach
17	In general and in support of responsible discharge including taking into account the sensitivity of the receiving environment, the following treatments apply to the following zones after the publication of this national guideline: i) Primary treatment will be required as a minimum for all new or proposed discharge of municipal effluent to the offshore coastal environment. ii) Preliminary treatment will be accepted as a minimum requirement for all existing municipal effluent discharges to the offshore coastal environment, provided that the receiving environment is suitable for this coastal discharge and that the environmental (or resource) quality objectives are met. However, future expansions or upgrades to such existing coastal outfalls will require primary treatment of the effluent prior to discharge unless it can be proven that key socio-economic factors require otherwise. Nevertheless, environmental (or resource) quality objectives must still be met and take into account the interest of the whole community (as defined in the ICMA). iii) Secondary treatment with disinfection will be required as a minimum for all discharges of municipal effluent to the surf zone and estuaries (where such discharges are allowed – refer to Ground Rules 8 and 9).	Pollution Prevention, Waste Minimisation and Precautionary Approach
18	The discharge of sludge arising from effluent treatment facilities (e.g. primary, secondary and tertiary) must be in accordance with the Minimum Requirements for Waste Disposal by Landfill (DWAF, 1998) and the 'Sludge Guidelines' (1998 as amended in 2000) of the DWA or any future updates of such policies or guidelines.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach
GROUND RULES RELATED TO WASTE LOADS - INDUSTRIAL EFFLUENT		
19	Industrial discharges has not been defined as yet under the ICMA, however, under Section 21 of the NWA, the following water sources have been classified as industrial effluent, requiring a licence, for discharge to the coastal environment: i) Water used in an industrial process on land. ii) Contaminated (or polluted) stormwater run-off originating from industrial areas that passes through man-made structures (such as canals, pipelines, etc.) excluding rivers and municipal sewerage, directly into the estuary, surf zone or coastal waters, freshwater or seawater used as cooling water on land, e.g. Power	Integrated Assessment Approach

	Generation (cooling water intake and discharge). iii) Seawater used in an industrial process on land, e.g. seafood processing, coastal mining activities and return flows from oceanariums/aquariums. The above classification remains valid until appropriate regulations have been developed under the ICMA.	
20	An industry discharging effluent to a municipal WWTW or directly to the coastal environment (or applying for a permit to do so), will be required to provide a detailed description of the waste stream in terms of both volume (quantity) and quality (i.e. listing all substances present and their concentrations and loads). Where industries discharge effluent to a WWTW, the water service provider is responsible for obtaining this information from the industry concerned. The DEA or local authority may also require a detailed inventory of the raw materials, as well as process material, used by an industry.	Pollution Prevention, Waste Minimisation and Precautionary Approach
21	Industrial effluent discharged to a municipal WWTW disposing to the coastal environment will be subject to appropriate pre-treatment. It is the responsibility of the local authority operating the WWTW to ensure compliance in this regard.	Pollution Prevention, Waste Minimisation and Precautionary Approach
22	Effluent containing radioactive substances is governed by the Department of Energy (in concurrence with the DEA and DWA) and must comply with guidelines developed in this regard.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach
23	Diffuse land-based effluent (such as urban stormwater run-off, agricultural return flows and contaminated groundwater seepage) discharged into the coastal environment should not have any negative impact on the receiving environment, i.e. the environmental quality objectives must be met.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach
GROUND RULES RELATED TO SCIENTIFIC and ENGINEERING ASSESSMENT		
24	An application for a Coastal Waters Discharge Permit (CWDP) will only be considered where a holistic process has been followed for the discharge of land-based effluent to the coastal environment. This implies that potential impacts on the receiving environment be investigated in both the near and far field, taking into account other anthropogenic activities and waste inputs so as to address possible synergistic and/or cumulative effects. Guidelines in this regard are provided in RSA DWAF (2004a).	Integrated Assessment Approach
25	A permit application for the discharge of land-based effluent to the coastal environment will only be considered where a discharge system is designed, constructed and operated in accordance with recognised scientific, hydraulic and structural guidelines in order to meet environmental quality objectives.	Pollution Prevention, Waste Minimisation and Precautionary Approach
26	Recognised numerical modelling techniques must be applied in the scientific and engineering assessment and design of a coastal disposal system, as and where considered appropriate, according to recognised scientific and engineering guidelines.	Pollution Prevention, Waste Minimisation and Precautionary Approach
27	A precautionary approach must be followed in the assessment and design of any coastal disposal system in which the temporal and spatial coverage and accuracy of physical and chemical oceanographic data do not adequately describe site-specific conditions.	Integrated Assessment Approach; Pollution Prevention, Waste Minimisation and Precautionary Approach
GROUND RULES RELATED TO MONITORING and CONTINGENCY PLANS		
28	Any authority or industry responsible for the operation and management of a coastal disposal system will be subject to the implementation of a monitoring programme.	Pollution Prevention, Waste Minimisation and

		Precautionary Approach; Integrated Assessment Approach; Participatory Approach
29	Authorities operating WWTW that receive industrial effluent (also referred to as trade effluents) must ensure that monitoring programmes are implemented to record the individual flow and composition of such effluent inputs prior to entering the effluent reticulation system, as part of their industrial effluent management	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach; Participatory Approach
30	Any authority or industry responsible for the operation and management of a coastal disposal system will be required to prepare contingency plans pertaining to maintenance shutdowns, failure in operations or emergency incidents. Such emergency Incidents are subject to the reporting provisions of Section 30 of the NEMA.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach; Participatory Approach
31	Any authority or industry responsible for the operation and management of a coastal disposal system will be required to provide the DEA with a regular evaluation of the performance of the coastal disposal system. The DEA will consult with DWA on the evaluation of the performance in the case of a discharge into an estuary.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach; Participatory Approach
32	Where performance evaluations indicate non-compliance with the predetermined specifications (including the environmental quality objectives), the responsible authority or industry responsible for managing the effluent industry will be required to propose mitigating actions to ensure compliance (e.g. rehabilitation or alternative treatment options). The responsible authority and the industry operating the effluent disposal system will be required to implement such actions at their own cost upon approval of the DEA.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Polluter Pays Principle
33	The decommissioning of a coastal discharge structure must be addressed in the planning stages as part of the EIA process (if an EIA is required), supporting the cradle-to-grave principle. In the case of existing coastal discharge structures (authorised prior to the publication of this national guideline), the authority, service provider or industry responsible for the operation and management of the coastal discharge will be required to conduct decommissioning in an environmentally responsible manner which must conform, inter alia, to the duty of care principle contained in section 28 of NEMA. This may require an EIA. Negotiations should be conducted on a case-by-case basis, involving the DWA, DEA, the permit holder, service providers or industry responsible for the coastal discharge and any other parties that may be affected by the decommissioning process.	Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach

This guideline includes a **Management Framework** (Section 5) which outlines a generic and structured approach within which the management and control of the effluent discharges should be conducted. The Framework consists of the following components that will be evaluated as part of permit application processes.

- Legislative Framework and Legal Validation;
- Management Institutions and Administrative Responsibilities;

- Determination of Environmental Quality Objectives;
- Specification Activities and Associated Waste Loads (including determination of critical limits); and
- Scientific and Engineering Assessment.
- Monitoring and Contingency Plans (including evaluation and reporting).

A fairly detailed process for the assessment and authorisation of effluent disposal licences under the NWA was previously implemented by the DWA. At the time of drafting this guideline, the DEA was in the process of developing a system to issue CWDPs / General Authorisations (GAs) that includes the management aspects listed above. The implementation process that will be utilised to evaluate and issue a CWDP/GA, taking into consideration the above-mentioned components, is discussed in Section 5. Section 5 of this guideline includes a summary of the applicable legislation and guideline instruments that were developed since the preparation of the DWA's 2004 Operational Policy. Finally, the DWA Operational Policy include acknowledgments, references, supplementary documentation as well as a list of bibliography, which remains valid unless stated otherwise in this guideline.

ACRONYMS

ANZECC	Australian and New Zealand Environment and Conservation Council
BAT	Best available technology
BOD	Biochemical oxygen demand
COD	Chemical oxygen demand
CTD	Conductivity-Temperature-Depth
CWA	Clean Water Act (United States)
CWDP	Coastal Waters Discharge Permit
DBSA	Development Bank of South Africa
DEA	Department of Environmental Affairs
Defra	Department of Environment, Food and Rural Affairs (UK)
DPLG	Department of Provincial and Local Government
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
EPA (Australia)	Environmental Protection Authority (Australia)
EPA	Environmental Protection Agency
GA	General Authorisation
GPA	Global Programme of Action
IEM	Integrated Environmental Management
ICMA	Integrated Coastal Management Act (Act No. 24 of 2008)
KZN	Kwazulu-Natal
MPA	Marine Protected Area
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NPOA	National Programme of Action
NWA	National Water Act (Act No. 36 of 1998)
MEC	Member of the Executive Council of a coastal province

RSA	Republic of South Africa
SANCOR	South African National Committee for Oceanographic Research
SEPA	Scottish Environment Protection Agency
UNEP	United Nations Environmental Programme
US-EPA	United States Environmental Protection Agency
WESSA	Wildlife and Environment Society of South Africa
WHO	World Health Organisation
WRC	Water Research Centre
WWF	WWF - formerly known as the World Wildlife Fund
WWTW	Waste water treatment works

GLOSSARY OF TERMS

Agricultural run-off / flows	Irrigation tail-water, other field drainage, animal yard, feedlot, or dairy run-off, etc.
Anthropogenic	Having to do with man, or caused by humans.
Aquaculture	Breeding and rearing of freshwater and marine (mariculture) organisms, such as fish, including the husbandry, management, nutrition, genetics and controlled propagation of all aquatic organisms for use by humans.
Assimilative capacity	The ability of an ecosystem to absorb substances such as human waste and pollutants.
Bathymetry	Measurement of the depths of water bodies (ocean, estuaries, dams).
Biochemical oxygen demand (BOD)	A measurement of the amount of oxygen taken up by micro-organisms in oxidizing reducing material in the water sample. Normally measured over a 5 day period at 37^0C.
Catchment	In relation to a watercourse or watercourses or part of a watercourse, this term refers to the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.
Coastal area	The part of the land affected by its proximity to the sea, and that part of the sea affected by its proximity to the land as well as the extent to which man's land-based activities have a measurable influence on water chemistry and marine ecology.
Coastal Discharge	Discharging effluent to the coastal environment either to an estuary or the surf zone or through a coastal outfall (i.e. to the offshore coastal environment).
Coastal Waters	Any marine waters that form part of the internal waters or territorial waters or estuary of the Republic of South Africa, as defined in the Maritime Zones Act (Act No. 15 of 1994) and ICMA.
Coastal Waters Discharge Permit (CWDP)	A permit to discharge effluent that originates from a source on land into coastal waters under section 69 (1) of the ICMA.
Community	Assemblage of organisms characterised by a distinctive combination of species that occupy a common environment and interact with one another.
Compliance monitoring	means conducting surveys, inspections and examinations to determine the effectiveness of management strategies and actions to ensure compliance with permit conditions

Cumulative impact (or effect)	Refers to the impact on the environment which results from the incremental or combined effects of one or more developmental activities in a specified area over a particular time period, which may occur simultaneously, sequentially, or in an interactive manner.
Dilution	The reduction in concentration of a substance due to mixing with water.
Domestic effluent	Wastewater/effluent arising from domestic and commercial activities and premises, which may contain sewage (as per General Authorisations - GG 20526 GN 1191 of 8 October 1999).
Ecosystem	A community of plants, animals and organisms interacting with each other and with the non-living (physical and chemical) components of their environment.
Effluent	Any liquid discharged into the coastal environment as waste, and includes any substance dissolved or suspended in the liquid; or liquid which is a different temperature from the body of water into which it is being discharged.
Environmental impact	A positive or negative environmental change (biophysical, social and/or economic) caused by human action.
environmental monitoring	Surveys, inspections and examinations to determine the trends and status of changes in the receiving coastal waters, in terms of the health of important ecosystems and designated beneficial uses
Environmental quality objective	A statement of the quality requirement for a body of water to be suitable for a particular use (also referred to as Resource Quality Objective).
Estuary	A body of surface water- (a) That is part of a water course that is permanently or periodically open to the sea; (b) In which a rise and fall of the water level as a result of the tides is measurable at spring tides when the water course is open to the sea; or (c) In respect of which the salinity is measurably higher as a result of the influence of the sea;
Far field	Within the context of ocean outfalls, the spatial/volumetric extent of the receiving water body in which the waste field is transported and dispersed after the initial dilution process.
General Authorisation (GA)	An authorisation issued by the Minister under section 69(2) of the ICMA.
Habitat	A place, characterised by its physical properties and other life forms, where an organism or community occurs.
Head works	The head works receives effluent from a catchment and treats it to a specified standard prior to discharge.

Industrial effluent	Wastewater/effluent arising from industrial activities and premises. Contaminated stormwater drainage from industrial premises is included in this definition.
Initial dilution	The dilution of the effluent plume generated by jet momentum and the buoyancy effects that occur between the outlet ports of a marine outfall's diffuser and the sea surface.
Initial mixing zone	During the initial dilution process, ambient water is entrained by jet and buoyancy-induced turbulence and shear, causing dilution of the rising effluent plume. When the density of the discharge plume approaches the density of the seawater, the initial dilution process will cease and, depending on stratification in the water column, this process may stop below the surface. The spatial/volumetric extent of the initial dilution process is referred to as the **initial mixing zone**. This process can be manipulated by the hydraulic design of the outfall system (discharge rate and diffuser configuration). Ambient processes will control the further mixing of the effluent plume. However, these cannot be manipulated and the degree of mixing, when compared with the achievable initial dilutions, is almost insignificant. Only the physical location of the discharge structure can be optimised for achieving required dilutions at distant locations.
Integrated Development Plan	A plan drawn up by local government to prioritise and co-ordinate development activities and investment, and to promote effective use of budgets.
Land-derived	Means originating from a source on land, also referred to as land-based.
Land-based treatment	The treatment of effluent at an inland site. Inland treatment, for example includes preliminary, primary, secondary or tertiary treatment of the effluent prior to discharge.
Mariculture/ Marine aquaculture	Cultivation of marine plants and animals in natural and artificial environments.
Marine environment	Includes estuaries, coastal marine and near-shore zones, and open-ocean-deep-sea regions.
Measurement parameter	Within the context of this document, any parameter or variable that is measured to determine specific information about an ecosystem.
Municipal effluent	Domestic effluent or the mixture of domestic effluent with industrial effluent and/or urban stormwater run-off.
Near field	Within the context of ocean outfalls, this refers to the spatial/volumetric extent of the receiving water body in which the initial dilution process takes place.
Non-point source pollution	Pollution originating from a number of diffuse sources often associated with run-off from agricultural and urban areas.

Offshore	Within the context of ocean outfalls, this is the area of the sea in which wave action has an insignificant effect on water circulation and shoreline processes (erosion and accretion). Also means beyond the surf zone.
On site treatment	Means processes used in reducing or eliminating the contaminants in non-domestic effluent or in altering its nature, before discharging it into any waste treatment system.
Point-source pollution	Pollution discharged from a specific fixed location, such as a pipe or outfall structure.
Pollution	Any change in the environment caused by (i) Substances; (ii) Radioactive or other waves; or (iii) Noise, odours, dust, or heat emanating from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future (NEMA, 1998 and ICMA, 2008).
Precautionary principle	Avoiding risk through a cautious approach to development and environmental management in that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and when they cannot be altogether prevented, are minimised and remedied.
Preliminary treatment	Involves the removal from effluent of 'litter' and solids by coarse and/or fine screens as well as the removal of 'grit' (particles sizes > 0.2 mm and with a specific gravity > 2.6) by settling or separation. The effect on the suspended solid concentrations and BOD in the sewage is insignificant.
Pretreatment	Processes used in reducing or eliminating the contaminants in non-domestic effluent or in altering its nature, before discharging it into a wastewater treatment system.
Primary treatment	Involves the removal from effluent of settleable organic and inorganic solids by sedimentation tanks. The solids, which settle as sludge, have to be disposed of or treated. Fats (oil and grease) are also skimmed from the top of the settling tank. During primary treatment > 40% of suspended solids and 20% of Biological Oxygen Demand (*BOD)* are removed.

Reserve	The quantity and quality of water required: • to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be relying upon, taking water from, or being supplied from the relevant water resource, and • to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.
Resource quality objectives	Management Objectives for a resource relating to the quality of all the aspects of a water resource including: • the quantity, pattern, timing, water-level and assurance of in stream flow; • the water quality, including the physical, chemical and biological characteristics of the water; • the character and condition of the in stream and riparian habitat; and • the characteristics, condition and distribution of the aquatic biota. For Example: the objectives set by the DWA in terms of Chapter 3 of the NWA.
Rhodamine-B dye	A fluorescent red basic xanthene dye used in the coastal environment to determine transport and dispersion patterns.
Seashore	The water and the land between the high- and low-water marks.
Secondary dilution or dispersion	The further dilution that occurs after initial dilution when an effluent plume is adverted away from the discharge area.
Secondary treatment	The separation of liquid and solids contained in primary treated effluent by a stabilising process, utilising micro-organisms and oxygen (aerobic biological treatment by biofilters and/or aeration tanks). The liquid and solids are separated through settling and the sludge is disposed of or treated. Normally secondary treatment removes > 70% of suspended solids and BOD.
Sludge	Residual sludge, whether treated or untreated, from urban effluent treatment plants.
Surf zone	Also referred to as the 'breaker zone' where water depths are less than half the wavelength of the incoming waves with the result that the orbital pattern of the waves collapses and breakers are formed.
Synergistic effect	When the effect of two chemicals acting together has a greater negative impact on an ecosystem than the impact of each chemical individually, or the sum of the individual impacts.
Tertiary treatment	Involves the further treatment of secondary treated effluent to remove nitrogen, phosphorus, ammonia, remaining suspended solids, organic compounds, heavy metals and dissolved solids by special treatment processes.

Trade effluent	Term used for industrial effluent discharged to a WWTW.
Treatment	Any method, technique or process that is designed to; (i) Change the physical, biological or chemical character or composition of an effluent; (ii) Remove, separate, concentrate or recover a hazardous or toxic component of an effluent; or (iii) Destroy or reduce the toxicity of an effluent. In order to minimise the impact of the effluent on the environment prior to further use or disposal. (NEM: Waste Act, 2008 [Act No. 59 of 2008]).
Urban stormwater run-off	Stormwater run-off from paved areas, including parking lots, streets, residential subdivisions, of buildings, roofs, highways, etc.
Waste	Refers to any substance, whether or not that substance can be re-used, recycled or recovered – (i) That is surplus, unwanted, rejected, discarded, abandoned or disposed of; (ii) That the generator has no further use of, for the purposes of production, reprocessing or consumption; and (iii) That is discharged or deposited in a manner that may detrimentally impact on the environment.
Water containing waste	Also referred to as 'effluent' in this Guideline. The term is relevant to the DWA's Operational Policy of 2004.

Section 1:
INTRODUCTION

1.1 HISTORICAL PERSPECTIVE

Prior to the promulgation of the Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (ICMA), the disposal of land-based effluent into the coastal environment through pipelines was controlled by the DWA under the NWA. The NWA allowed for the issuing of exemptions from the requirements specified in section 21(1) of the NWA. Such exemptions were also issued in terms of discharges to the coastal environment. In coastal areas, freshwater discharges often did not comply with the quality standards for rivers. Such discharges were exempted from meeting the prescribed standards as well as from returning the water to the source of abstraction. These exemptions were granted for effluent discharges to the:

- Offshore coastal environment;
- Surf zone; and
- Estuaries.

In the case of offshore coastal outfalls, not only was exemption granted to discharge water to the sea (i.e. not necessarily to the place of abstraction), but there was also relaxation of the *General and Special Standard* (Government Notice No. 991 – 18 May 1984). In order to minimise the negative impact on the coastal environment, the DWA adopted a receiving water quality objectives and fitness for use approach. To assist in setting receiving water quality objectives for the coastal environment, the *Water Quality Criteria for the South Africa coastal zone* were published in 1984 (Lusher, 1984). In 1995 this document was replaced by the *South African Water Quality Guidelines for Coastal Marine Waters* (RSA DWAF, 1995a).

In the case of effluent discharges to the surf zone and estuaries, exemption was granted to discharge freshwater to the sea (i.e. not necessarily to the place of abstraction), provided that the effluent was treated to the *General and Special Standard* (Government Notice No. 991 – 18 May 1984). However, *General and Special Standard* did not, for example, take into account potential negative impacts of 'freshwater' on these largely saline receiving environments.

Even though the design and planning of offshore coastal outfalls incorporated the Receiving Water Quality Objectives approach, this earlier approach was not applied to surf zone and estuarine discharges. Also, other options along the pollution prevention route, such as recycling, re-use or the application of waste reduction and minimisation technologies at source, were not strictly enforced. Design criteria for existing coastal outfalls also specified a minimum flow to obtain the desired dilution and dispersion. Such minimum flows would also have been seen as a limiting factor in applying waste minimisation and cleaner production.

The DWA developed a detailed Operational Policy and guidelines to address the management of such discharges (then referred to as 'water containing waste[1]'). Through the promulgation of the ICMA, the responsibility for managing such discharges was transferred to the DEA. Under Section 69 of the ICMA, the DEA seeks to regulate the discharge of effluent into the coastal waters from any source on land by requiring that such discharges are authorised under a permit or general

[1] The NWA still makes reference to "water containing waste" in section 21F, which deals with the discharge of waste or water containing waste into a water resource. The discharge referred to in this paragraph refers only to what the NWA refers to as a "sea outfall". Other discharges are still regulated by the DWA as a water use.

authorisation. In order to achieve this, the DEA has opted to review and update the existing Operational Policy published by the DWA in 2004, rather than to create a new guideline. The DEA recognises that the 2004 Operational Policy was developed through extensive stakeholder consultation and with the support of various scientific and technical experts.

Currently, the ICMA allows for general authorisations and permits to be issued for coastal effluent discharges. As stated in section 69 (3) of the ICMA:

"Any person who wishes to discharge effluent into coastal waters in circumstances that are not authorised under a general authorisation referred to in subsection (2) must apply to the Department for a coastal waters discharge permit."

Additionally, section 69 (6) of the ICMA provides that:

"A person who discharges effluent into coastal waters -

a) *must not waste water;*

b) *may only do so to the extent that it is not reasonable practicable to return any freshwater in that effluent to the water resource from which it was taken;*

c) *must discharge the effluent subject to any condition contained in the relevant authorisation;*

d) *must comply with any applicable waste standards or water management practices prescribed under this Act or in section 29 of the NWA or any Act of Parliament specifically dealing with waste, unless the conditions of the relevant authorisation provide otherwise; and*

e) *must register the discharge with the department responsible for water affairs."*

In the case of authorising a discharge of effluent into an estuary, consultation with the DWA is required.

It must be noted that the DWA published its *Water Quality Management Policies and Strategies in the RSA* (RSA DWAF, 1991). These policies and strategies changed the DWA's approach to water quality management from the Uniform Effluent Standard approach (i.e. enforcing compliance to *General and Special Standard*) to the Receiving Water Quality Objectives approach (i.e. focusing on the fundamental water quality management goal, namely maintaining fitness for use). This change was necessary to counter the continuing deterioration of water quality and to meet the challenges of the future. The DWA had recognised that without the necessary precaution, the Receiving Water Quality Objectives approach would inevitably lead to the deterioration of water resources to the point where they would be only marginally fit for their recognised uses.

To counter the limitations of this new approach, and consistent with environmental policy worldwide, the DWA decided to embody in its water quality management policy a hierarchy of decision making which contains elements of the Receiving Water Quality Objectives approach, as well as the precautionary principle of environmental protection through source reduction, minimisation, treatment, re-use, etc. This hierarchy is detailed in Section 3: Basic Principles. Essentially, the DEA supports this approach in this national guideline and an application to discharge effluent to the coastal environment must demonstrate that all reasonable efforts have been made, firstly to prevent waste, and secondly to minimise it. Only thereafter will minimum effluent standards or standards based on the receiving environment approach, whichever is strictest, be considered.

Alternative options of managing effluent must therefore be investigated. Discharge of effluent to the coastal environment is NOT the 'default' option in coastal areas. In evaluating land-based effluent discharges in coastal areas it should be considered that, for example:

- Real estate value in coastal areas is high which can have implications in terms of large surface areas required for treatment plants (e.g. maturation and oxidation ponds).
- The coastal environment, particularly the surf zone and estuaries, constitutes ecologically sensitive areas in which discharge of freshwater or effluent of an unacceptable quality can have negative impacts, causing overall degradation with economically, socially and ecologically negative effects.
- Coastal areas are popular holiday and tourist destinations that particularly require that water should be of a high quality to support, for example, recreational use.

1.2 THIS NATIONAL GUIDELINE

In 1998, the NWA was promulgated to give legal status to the White Paper on a National Water Policy for South Africa (April 1997) and the DWA's water quality management policies and strategies, amongst others. The National Water Resource Strategy (developed under the NWA) provides the framework for the protection, use, development, conservation, management and control of water resources of South Africa as a whole. In particular the strategy recognises that, although '*most water used in a non-consumptive manner is directly recycled for re-use or returned to the rivers for re-use elsewhere, there is further potential, particularly in coastal areas for re-use of water'* (RSA DWAF, 2002b).

To fulfil its legal obligation in terms of the management and control of land-based wastewater/effluent under section 21 of the NWA, the DWA commissioned a project to develop an O*perational Policy*, specifically focusing on the *disposal of land-derived water containing waste (or wastewater) to the marine environment of South Africa* (i.e. the entire coastal zone), incorporating all relevant international and national principles, policies and legislation. The Operational Policy is a valuable tool notwithstanding the change in the responsibilities/authorities in coastal water quality management (RSA DWAF, 2004a).

With the promulgation of the ICMA in 2008, the function of regulating and authorising coastal effluent discharges is now the responsibility of the DEA. In September 2012, the DEA hosted a national workshop with relevant stakeholders to revise the 2004 Operational Policy for adoption and continued implementation within the context of the ICMA.

This national guideline falls within a number of other legislative instruments to give effect to the Constitution of South Africa. The legislative framework for governance consists of several levels (Cloete and Wissink, 2000):

- *Principles* stating society's values in relation to a specific issue, for example, the *NEMA principles.*
- *Policy* is a statement of intent by government in which it indicates how compliance to the principles will be ensured, for example the *White paper on integrated pollution and waste management for South Africa (May 2000)*.
- *Legislation* is the primary tool of Government for the implementation of policy, providing details on how policy objectives will be implemented and enforced, for example the NEMA.
- *Regulations* provide the quantitative details relating to specific legislation, for example, the 2004 on the Control of Vehicles in the Coastal Zone Regulations, as amended and published in terms of section 44 of NEMA (GN Regulation 1399).
- *Best Practice Guidelines* is a general term that covers a wide range of activities, which may not be regulatory but which reflect the principles and support implementation of policy, for example, the DWAF's *South African Water Quality Guidelines for Coastal Marine Waters*.

This guideline for the discharge of land-based effluent to the coastal environment falls within the last category, **i.e. Best Practice Guidelines**. The guideline is geared towards assisting the DEA and its stakeholders in implementing section 69 of the ICMA.

International and national policies and legislation that were taken into account in the development of the original DWA Operational Policy are as follows (adapted from RSA DWAF, *2004b)*:

International Conventions

- Agenda 21
- Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)
- 1996 Protocol to the London Convention, 1972, as amended

National Policies

- White Paper: National Water Policy (November 1996)
- White Paper on Environmental Management Policy (July 1997)
- White Paper on Integrated Pollution and Waste Management for SA (May 2000)
- White Paper for Sustainable Coastal Development in South Africa (April 2000)

National Legislation

- The Constitution of the Republic of South Africa, 1996 (Act No.108 of 1996)
- National Water Act, 1998 (Act No.36 of 1998)
- Water Services Act, 1997 (Act No.108 of 1997)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)
- Environment Conservation Act,1989 (Act No. 73 of 1989) (ECA)
- Marine Living Resources Act, 1998 (Act No. 18 of 1998
- Health Act, 1977 (Act No.63 of 1977)
- Minerals Act, 1991 (Act No.50 of 1991)
- Hazardous Substances Act, 1973 (Act No.15) of 1973)
- Water Act, 1956 (Act No.54 of 1956)
- National Environmental Management: Coastal Zone Bill (Draft 7)
- Sea-Shore Act, 1935 (Act No. 21 of 1935)

Related National Operational Policies/Strategies

- Proposed National Water Resource Strategy
- Catchment Management Strategies
- National Water Quality Management Framework Policy

- Source Management
- Waste Discharge Charge System
- Resource Directed Measures for Protection of Water Resources
- Resource Water Quality Management Framework
- Strategic Framework for Water Services
- National Programme of Action for the protection of the marine environment form land-based activities

Since the drafting of the 2004 Operational Policy (RSA DWA, 2004a), the following legislation has been promulgated and has relevance to this guideline:

- The National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (adapted from the White Paper for Sustainable Coastal Development in South Africa (April 2000) mentioned above and replaced the National Environmental Management: Coastal Zone Bill (Draft 7));
- The National Environmental Management: Waste Act, 2008 (Act No.59 of 2008);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004);
- The National Environmental Management Act: Protected Areas , 2003 (Act No. 57 of 2003);
- The National Environmental Management: Environmental Impact Assessment Regulations, 2010.

Additionally, in 2008, the DEA developed a National Programme of Action (NPOA) for the Protection of the Marine Environment from Land-Based Activities to give effect to the GPA mentioned in the list above. The revision of the 2004 Operational Policy is a direct response to the priority actions identified by stakeholders under the NPOA.

Section 5 of this guideline includes a summary and the significance of these new legislative instruments to coastal environmental management. The DWA RSA (2004a) provided a summary of the older legislative instruments mentioned above and still bears relevance to this national guideline.

Within the context of existing strategies and policies of the DEA, the overall context of this guideline is illustrated in Figure 1.1. Although not explicitly repeated in this section, the objectives of these strategies and policies were taken into account in the development of the specific strategy, goal, basic principles and ground rules of this guideline.

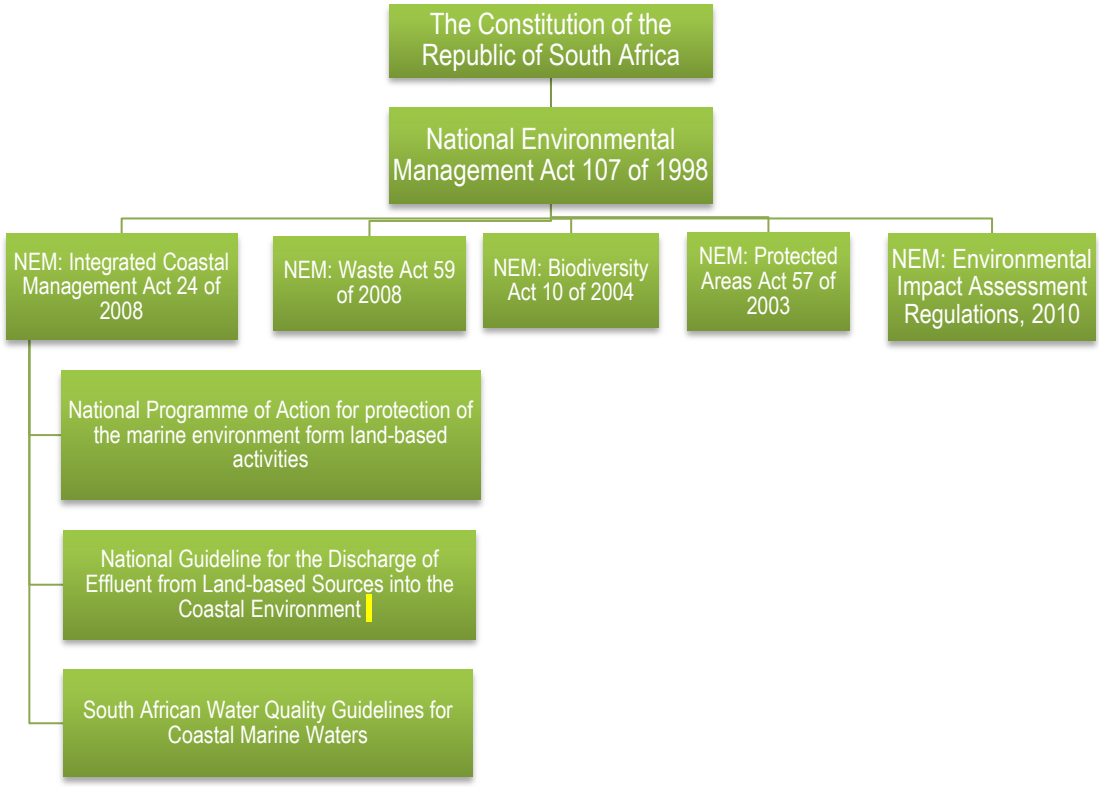


Figure 1.1: The National Guideline within the context of existing legislation and strategies within the DEA

The existing legislation under the NEMA bears relevance to the treatment of waste/effluent. The discharge of land-based effluent to the coastal environment includes point source discharges (i.e. discharges of which the volume and quality can be readily controlled) and non-point source (or diffuse) discharges (i.e. discharges of which the volume and quality are difficult to control). In the assessment of any effluent discharge to the coastal environment under the ICMA, both point and diffuse inputs must be taken into account.

Point source discharges of land-based effluent can be divided broadly into municipal effluent and industrial effluent discharges. Industrial effluent includes the discharge of seawater that is used for industrial purposes on land (e.g. coastal mining, fish processing industries and return flows from oceanariums/aquariums), as well as contaminated (or polluted) stormwater run-off from an industrial premises (i.e. containing pollutants derived from the industrial process).

Diffuse discharges include urban stormwater run-off, agricultural and mining return flows, as well as contaminated groundwater seepage (these can discharge either directly into the coastal environment or indirectly through river inflow). Although there are means of calculating and measuring the volumes and composition of diffuse effluent inputs, controlling such properties, once the effluent reaches the coastal environment (or any other water resource), is extremely difficult. Such properties, therefore, are best managed and controlled at source, i.e. the point of origin.

Land-based treatment options to manage and control effluent (i.e. treatment at source) are not within the scope of this guideline but are applicable to the NEM: Waste Act 2008 (Act No. 59 of 2008). However, treatment requirements for coastal discharge are specified, in particular, for municipal effluent discharges. In the case of industrial effluent, it is recommended that a *Code of Practice* be developed for industries in South Africa, addressing ways in which to eliminate or minimise the production of waste, based on best available technology. This source directed approach to waste elimination and

minimisation is considered to be of great value. In the case of diffuse effluent (e.g. urban stormwater run-off, agricultural and mining return flows), land-based source management and control measures need to be developed at a catchment level, taking into account existing initiatives.

1.3 CONTEXT: LARGER COASTAL WASTE MANAGEMENT FRAMEWORK

In general, human developments and activities associated with effluent discharges to the coastal environment can be subdivided into four broad sub-categories:

- Effluent originating from land-based point sources, including municipal effluent discharges and industrial effluent discharges.
- Effluent from diffuse, land-based sources, including contaminated stormwater run-off (usually originating from urban and industrial areas), agricultural return flows and contaminated groundwater seepage. Pollutants from these activities may enter the coastal environment via a river or they may be discharged directly into the coastal environment.
- Pollution associated with shipping activities, including pollution from oil and garbage.
- Dumping at sea, including the dumping of waste matter and dredge spoil.

In South Africa, the legislative framework within which these activities are governed are still largely sectoral, (i.e. 'activity focused') as illustrated below:

SUB-CATEGORY	***COMPETENT AUTHORITY***	***LEGISLATIVE MANDATE***
Discharge of effluent from land-derived point and diffuse sources into the coastal environment	*DEA*	*Integrated Coastal Management Act (Act No. 24 of 2008)*
Management of pollution from waste	*DEA*	*NEM: Waste Act (Act No. 59 of 2008)*
Pollution associated with shipping activities	*DEA (clean up)*	*Prevention and Combating of Pollution at Sea by Oil Act (Act No. 6 of 1981);* *South African Maritime Safety Act (Act No. 5 of 1998).*
	Department of Transport (prevention)	*Prevention and Combating of Pollution at Sea by Oil Act (Act No. 6 of 1981);* *Marine Pollution Intervention Act (Act No. 64 of 1987)*
Dumping at sea	*DEA*	*Integrated Coastal Management Act (Act No. 24 of 2008)*

The context of this guideline within the larger coastal pollution control and waste management is schematically illustrated in Figure 1.2.

National guidelines (relating to specific activities) are considered to be crucial building blocks in achieving an integrated and holistic pollution control and waste management system for South Africa. Similar operational policies may be developed for other waste disposal activities to the coastal environment. These would include activities associated with shipping traffic and dredge spoil dumping, which currently fall within the jurisdiction of the DEA. To facilitate effective cooperative governance, such policies should eventually be combined in an overarching policy for the management of coastal effluent from land-based and off shore sources.

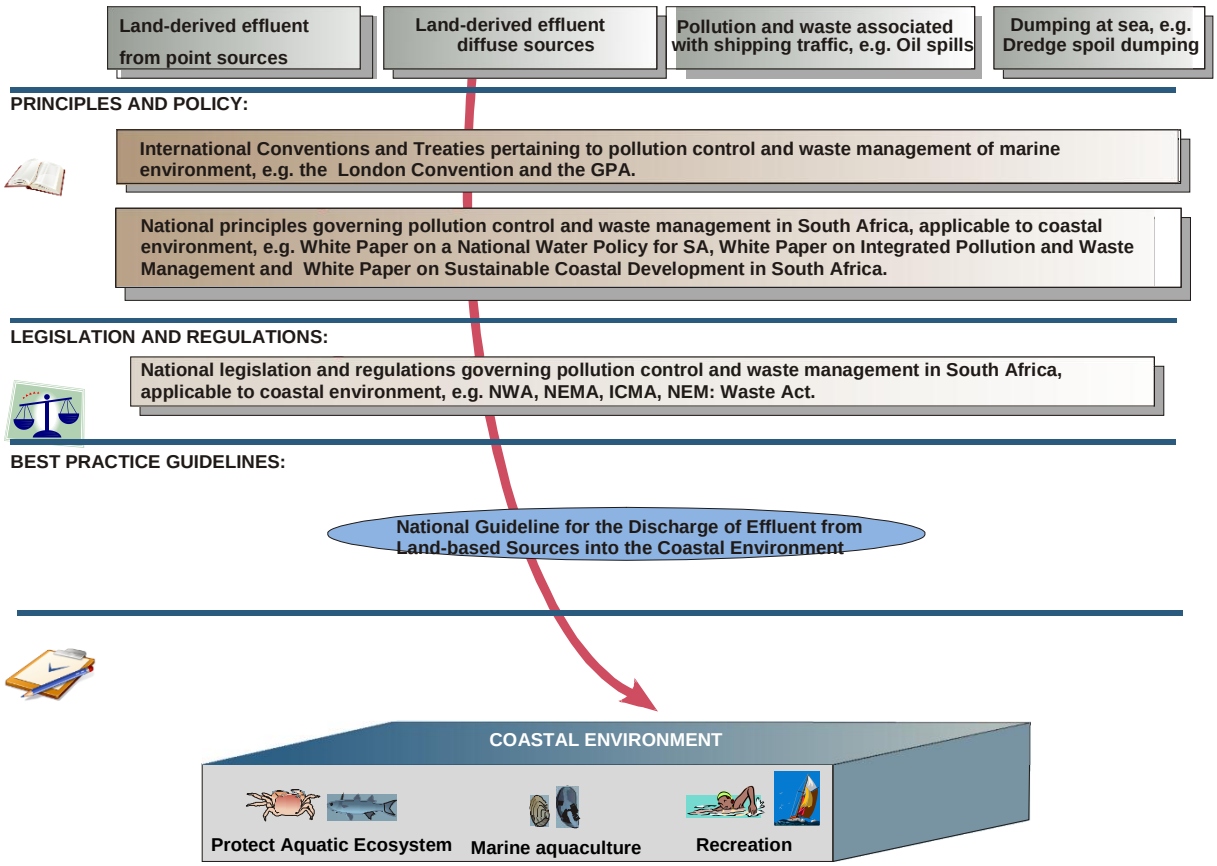


Figure 1.2: Context of the national guideline within the larger pollution and waste management framework for the coastal environment

1.4 APPROACH

The approach that was followed in deriving the National Guideline was as follows:

- In order to ensure that the guideline was strongly aligned with South Africa's overarching obligations and commitments (both international and national) in pollution and waste management in the coastal environment, international and national policies and legislation relevant to South Africa, were reviewed as a basis for this guideline.
- International trends in policy pertaining to the management of coastal effluent from land-based sources were evaluated and adopted where applicable in the SA context (refer to RSA DWAF (2004b).
- New and improved technological and scientific developments pertaining to the discharge of land-based effluent to the coastal environment, both locally and internationally were considered and included where appropriate (as incorporated in the management of coastal effluent from land-based sources [RSA DWAF, 2004a]).

- The guideline was previously applied in South Africa under the NWA and administered by the DWA via an administrative approach as an Operational Policy (RSA DWAF, 2004a). When the ICMA was promulgated, this Operational Policy was looked at for adoption by the DEA to assist in the management of land-based effluent discharges to the coastal environment. The DEA held a consultative workshop with stakeholders in September 2012 to update the Operational Policy as a national guideline for its administration by the DEA.

1.5 DOCUMENTATION

The historical and existing documentation on the guideline for the management of coastal effluent from land-based sources includes the following, of which only the RSA DWAF (2004a) is updated by this guideline:

- ***RSA DWAF (2004a): Operational Policy for the disposal of land-derived water containing waste to the marine environment of South Africa,*** which is the main document containing the Operational Policy developed by DWAF, and included:

  - ***An Introduction***
  - ***Structure of Operational Policy***
  - ***Basic Principles for the disposal of land-derived effluent to the marine environment***
  - ***Ground Rules for the disposal of land-derived effluent to the marine environment***
  - ***Overview of the Management Framework for the disposal of land-derived effluent to the marine environment.***

- ***Operational Policy for the disposal of land-derived water containing waste to the marine environment of South Africa: Appendices*** (RSA DWAF 2004b), which contain supplementary information that was initially collated by DWAF as part of the 2004 Operational Policy project and which are considered to provide important background information for future updates or revisions of the Operational Policy. The Appendices include:

  - ***An overview of the current situation in South Africa with regard to the disposal of land-derived wastewater to the marine environment (Appendix A)***
  - ***An overview of the legislative context (both national and international) that underpins this operational policy (Appendix B)***
  - ***An overview of international trends in the disposal of land-derived wastewater to the marine environment (Appendix C)***
  - ***A summary of the legislation pertaining to the management and control of marine water quality in South Africa, in general (Appendix D)***
  - ***Response to comments from Key Stakeholder Workshop - 12 August 2003, Stellenbosch (Appendix E).***
  - ***Response to comments from Key Stakeholder Workshop – 10 February 2004, Stellenbosch (Appendix F).***
  - ***External Reviews (Appendix G)***

NOTE: *the proceedings of the National Workshop hosted by the DEA in September 2012 on the amendments to the DWAF 2004 Operational Policy (RSA DWA, 2004a) will be considered for attachment as Appendix H in RSA DWAF (2004c).*

- ***Policy for the disposal of land-derived water containing waste to the marine environment of South Africa: Guidance on Implementation*** (RSA DWAF 2004c). This document provides practical guidance on the implementation of the Operational Policy for the disposal of land-derived wastewater to the coastal environment in the context of the management framework (applicable to both existing and proposed discharges). Although it was attempted to make this document accessible to less technically inclined professionals in order to provide them with an overview of the implementation processes, it is primarily aimed at the managers, scientists and engineers responsible for the technical implementation of the policy. The criteria for assessing CWDP or GA applications will be adapted from this document. Additionally, the Regulations that the DEA envisages under the ICMA will also be substantially extracted from this document. The document structure follows the main components of the management framework and includes sections on:

- ***Management Institutions and Administrative Responsibilities***
- ***Legislative framework***
- ***Environmental Quality Objectives***
- ***Identification of Waste Activities and their Waste Loads***
- ***Scientific and Engineering Assessments***
- ***Monitoring***
- ***Contingency Planning***
- ***Recommendations for Future Implementation.***

Section 2:

STRUCTURE OF THE NATIONAL GUIDELINE

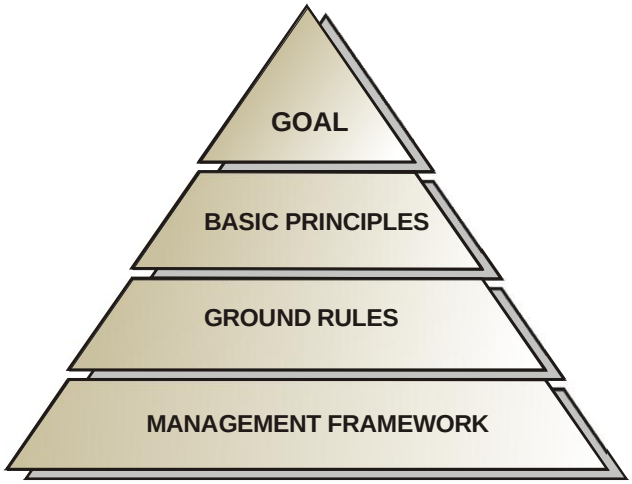
The DEA's strategic view on the disposal of land-based effluent to the coastal environment is as follows:

Taking into account the generally favourable, dynamic physical conditions along the South African coastline, the responsible disposal of land-based effluent to the coastal 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 coastal environment must be limited in terms of water conservation and demand management strategies. This is clearly reflected in Section 69 (6) of the ICMA, which states a person who wishes to discharge must not waste water. Additionally, according to the NWA, freshwater is a valuable resource and wastage thereof should be minimised.***

The structure of this guideline for the discharge of land-based effluent to the coastal environment of South Africa is illustrated below:



The **Goal** of this guideline is as follows:

To achieve coastal water quality that is fit for use and a healthy aquatic system that is maintained on a sustainable basis while allowing for justifiable social and economic development. This will be achieved in accordance with the hierarchy of decision making of water quality management, namely:

- ***Prevention of waste;***
- ***Minimisation of waste; and***
- ***Responsible disposal.***

This goal will be achieved through enforcement of the Basic Principles, Ground Rules and Management Framework described in detail in the subsequent chapters of the guideline, and which are summarised below:

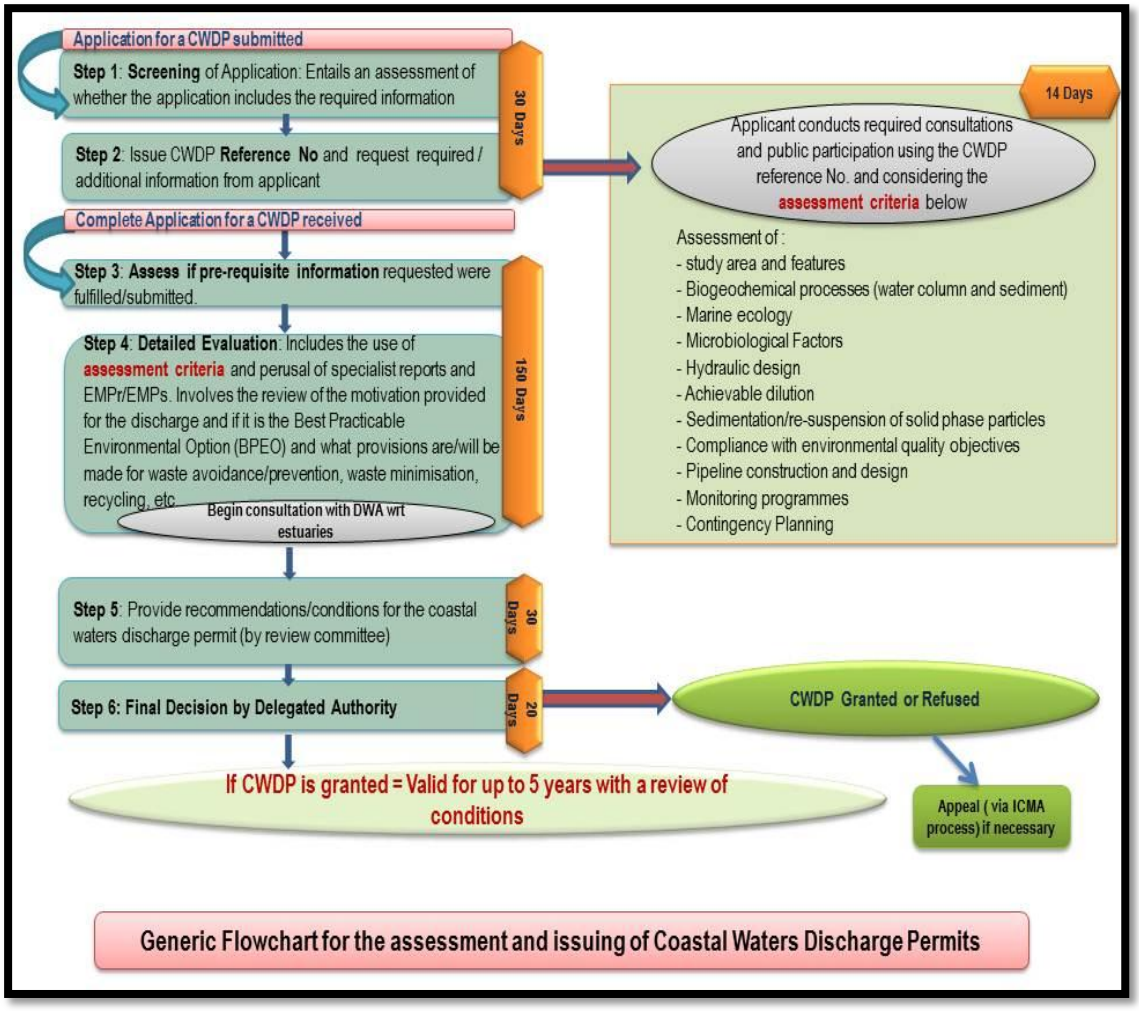
Basic Principles (Section 3): provides the broad framework or direction within which to prescribe ground rules for effluent discharge practices, as well as the management thereof. The basic principles were distilled from the broader international and national legislative context to give international and national credibility to the guideline.

Ground Rules (Section 4): derived within the broader framework of the Basic Principles, provides more specific rules that will be applied by Government when, for example, considering permit applications for the discharge of land-based effluent to the coastal environment.

The **Management Framework** (Section 5): provides a generic and structured approach within which the management and control of discharge of land-based effluent needs to be conducted. Such a framework typically consists of the following components that will be evaluated in the issuing of CWDPs or GAs.

- Legislative Framework and Legal Validation
- Management Institutions and Administrative Responsibilities
- Determination of Environmental Quality Objectives
- Specification Activities and Associated Waste Loads (including determination of critical limits)
- Scientific and Engineering Assessment
- Monitoring and Contingency Plans (including evaluation and reporting).

A fairly detailed process for the assessment and authorisation of effluent disposal licences under the NWA was previously implemented by the DWA. At the time of drafting this guideline, the DEA was in the process of developing a system for issuing CWDPs and GAs that included the management aspects listed above. Figure 2.1 below demonstrates the implementation process that will be utilised to evaluate and issue a CWDP application taking into consideration the components of the above mentioned management framework.



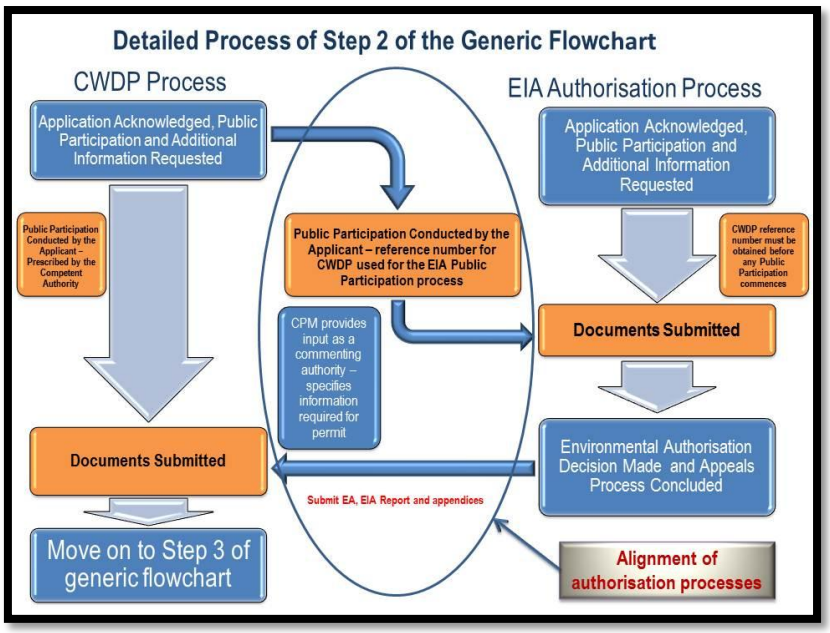


Figure 2.1: The generic process for the assessment and issuing of CWDPs in South Africa, which includes the public participation process.

Section 3:
BASIC PRINCIPLES

Basic principles provide the broad reference framework or direction within which to prescribe ground rules for the discharge of land-based effluent to the coastal environment, as well as the management thereof. These principles were distilled from the broader international and national legislative context (RSA DWAF, 2004b). The ICMA is informed by the NEMA principles contained in section 2(4)(a)(vii) of the NEMA as adapted for the coastal zone in the nationally-adopted White Paper for Sustainable Coastal Development in South Africa (DEAT, 2000). Figure 3.1 provides a description of the principles and its relevance to the coastal environment and its management.

Principle	Description
National Asset	The coast must be retained as a national asset, with public rights to access and benefit from the opportunities provided by coastal resources.
Economic Development	Coastal economic development opportunities must be optimised to meet society's needs and to promote the wellbeing of coastal communities.
Social Equity	Coastal management efforts must ensure that all people, including future generations, enjoy the rights of human dignity, equality and freedom.
Ecological Integrity	The diversity, health and productivity of coastal ecosystems must be maintained and, where appropriate, rehabilitated.
Holism	The coast must be treated as a distinctive and indivisible system, recognising the interrelationships between coastal users and ecosystems, and between the land, sea and air.
Risk Aversion & Precaution	Coastal management efforts must adopt a risk averse and precautionary approach under conditions of uncertainty.
Accountability & Responsibility	Coastal management is a shared responsibility. All people must be held responsible for the consequences of their actions, including financial responsibility for negative impacts.
Duty of Care	All people and organisations must act with due care to avoid negative impacts on the coastal environment and coastal resources.
Integration & Participation	A dedicated, co-ordinated and integrated coastal management approach must be developed and conducted in a participatory, inclusive and transparent manner.
Co-operative Governance	Partnerships between government, the private sector and civil society must be built in order to ensure co-responsibility for coastal management and to empower stakeholders to participate effectively.

Figure 3.1: the NEMA Principles as adapted for the coastal zone of South Africa (DEAT, 2000 and DEA, 2009).

There are 5 basic principles pertaining to this guideline and are as follows:

Principle 1: Pollution Prevention, Waste Minimisation and Precautionary Approach

Principle 2: Receiving Coastal Environmental Quality Objectives Approach

Principle 3: Integrated Assessment Approach

Principle 4: Polluter Pays Principle

Principle 5: Participatory Approach

These principles are explained below:

PRINCIPLE 1: POLLUTION PREVENTION, WASTE MINIMISATION AND PRECAUTIONARY APPROACH

A hierarchy of decision-making was developed by the DWA in its water quality management policies to address this principle. This hierarchy is still applicable to this guideline and thus, the DEA supports this principle. *The DEA also subscribes to the precautionary and other principles contained in section 2(4)(a)(vii) in terms of the NEMA, which applies to this hierarchy.*

The hierarchy of decision-making is as follows:

1) Pollution Prevention, preventing waste production and pollution wherever possible.

2) Minimisation of pollution and waste at source, minimising unavoidable waste through:

- ***Recycling***
- ***Detoxification***
- ***Neutralisation***
- ***Treatment and re-use of waste streams***
- ***Cleaner technologies and best management practices.***

It is crucial that in instances where waste cannot be avoided, the pollution and degradation effects of it be minimised and remedied.

3) Responsible discharge, applying the precautionary approach:

- ***Apply land-derived effluent standards for coastal waters discharge as a minimum requirement***
- ***If such standards are not sufficient, maintain fitness for use of the receiving coastal environment in accordance with the Receiving Coastal Environmental Water Quality Objective approach***
- ***Exemption from compliance with land-derived effluent standards for coastal environment will be considered only in exceptional circumstances provided that the receiving coastal environment remains fit for use in accordance with the Receiving Coastal Environmental Quality Objective approach.***

PRINCIPLE 2: RECEIVING COASTAL ENVIRONMENTAL QUALITY OBJECTIVES APPROACH

The requirements of the coastal aquatic ecosystem, as well as the requirements of the beneficial uses of the coastal water resource, will determine the objectives to be met (rather than following a uniform effluent standard approach as was the case with the General and Special Standard used before the promulgation of the ICMA under the previous Water Act (Act No. 54 of 1956).

PRINCIPLE 3: INTEGRATED ASSESSMENT APPROACH

The guideline will adhere to the principle of Integrated Environmental Management, taking cognisance of concepts such as Strategic Environmental Assessment, and Environmental Impact Assessment and supporting the following underpinning principles:

- ***'Cradle-to-grave'***
- ***Strategic adaptive management (i.e. 'improving-by-learning' and 'thinking strategically whilst implementing locally')***
- ***Best Practice (to be developed by a regulator and its implementation by the regulated community made obligatory as a minimum for responsible source management)***
- ***Consistent Performance (i.e. all coastal water users/polluters within the regulated community are required to ensure and strive for the same water quality goals at the same risk level)***
- ***Flexibility in approach (i.e. the regulator has the flexibility to consider the application of different alternatives and approaches, provided each of these is capable of meeting the desired objectives and requirements of the Source Management Strategy***
- ***Continuous improvement (encouraging continuous improvement in the actions and practices of both government and the regulated community).***

PRINCIPLE 4: POLLUTER PAYS PRINCIPLE

The responsibility for environmental costs incurred for rehabilitation of environmental damage and the costs of preventive measures to reduce or prevent such damage will be shifted to the polluters through, for example, the implementation of a coastal waters effluent discharge charge system.

PRINCIPLE 5: PARTICIPATORY APPROACH

Transparent stakeholder participation will be required, not only as part of the decision-making process (e.g. Environmental Impact Assessment process and setting of common environmental quality objectives), but also through on-going transparent and open communication on the status quo during design, construction and operations. Local management institutions (e.g. pipeline or catchment forums), for example, can be used for transparent stakeholder involvement throughout the process from application through to report back on monitoring results.

Section 4:
GROUND RULES

Ground Rules are derived within the broader context of the Basic Principles and provides more specific rules that will be applied by the DEA when considering permit applications to dispose of land-based effluent to the coastal environment. For this National Guidline, the Ground Rules are addressed under specific themes considered to be of particular importance in the discharge of coastal effluent (in alignment with the key components of the management framework), namely:

- Legislative Framework
- Management institutions and Administrative Responsibilities
- Environmental Quality Objectives
- Activities and Associated Waste Loads
- Scientific and Engineering Assessment
- Monitoring and Contingency Plans

4.1 LEGISLATIVE FRAMEWORK

For the discharge of land-based effluent there are a number of legal (or statutory) requirements that must be complied with. Ground Rules pertaining to these are listed below.

GROUND RULES RELATED TO THE LEGISLATIVE FRAMEWORK:

1: The discharge of any effluent into the coastal environment from a land-based process in which it has been heated must be authorised by the DEA in terms of section 69 of the ICMA.

Principle supported: Integrated Assessment Approach

The ICMA clearly states that no person is allowed to discharge effluent from sources on land into coastal water except in terms of a general authorisation contemplated in subsection (2) or a CDWP issued under section(3) of the ICMA.

The following activities must be authorised by a permit under section 69 of the ICMA:

- *New applications to discharge land-based effluent to the coastal environment;*
- *Existing discharges that have been authorised in terms of the NWA (1998) and the Water Act (1956) of land-based effluent to the coastal environment;*
- *Upgrades or extensions of existing WWTW or industrial facilities that result in a change in the effluent composition or volumes;*
- *Any existing discharges to the coastal environment that were not approved in terms of the original authorisation.*

NOTE: In the context of this national guideline, currently, only municipal and industrial effluent discharges (i.e. point discharges) are required to be authorised under Section 69 of the ICMA. However, this does not exclude diffuse sources

(such as urban stormwater) from being licensed. The DEA will determine criteria and thresholds for issuing CWDPs and GAs.

NOTE: Land-based activities within harbour areas that qualify as a water use, under section 21 of the NWA of 1998, are also the responsibility of the DWA and may require a licence issued by the DWA in addition to a CWDP/GA issued by the DEA. These include contaminated (or polluted) stormwater run-off from an industrial premises as well as the discharge of polluted seawater that was used in an industrial process on land. In the case of commercial harbours, the National Ports Authority, as the landowner, is responsible for ensuring that developments and activities within its boundaries meet the requirements of national law, such as those required under the NWA and the ICMA.

2: Any discharge of land-based effluent to the coastal environment from an activity triggering any of the Listing Notices in the Environmental Impact Assessment (EIA) Regulations under the NEMA, is subject to the applicable environmental authorisation issued under the NEMA: EIA Regulations (2010) administered by the DEA and / or a CWDP in terms of Section 69 of the ICMA, unless the activity conforms to a standard as prescribed in section 24 of the NEMA and in terms of the ICMA.

Principle supported: Integrated Assessment Approach

The Environmental Assessments must be performed in accordance with the EIA Regulations (2010) under the NEMA and must investigate all alternatives, including recycling/re-use.

This applies to:

- *New proposals to dispose of land-based effluent to the coastal environment;*
- *Existing discharges of land-based effluent to the coastal environment that are not classified as an existing/lawful water use (and that have not been subject to an EIA);*
- *Upgrades or extensions of existing WWTW or industrial facilities that result in a change in the effluent composition or volumes (a permit is issued based on a specific effluent volume and composition, therefore for such changes the discharger legally may re-apply); and*
- *Any existing discharges to the coastal environment that were not approved in terms of the original authorisation.*

Failure to comply with any conditions stipulated in the permit and/or authorisation will be a violation of the law and is subject to prosecution. Where the potential impact of an existing lawful effluent discharge has not been assessed properly or where there is reason to believe that such discharge has a negative impact on the receiving coastal environment, the permit holder will be requested to engage in specific studies, as would be required for a permit authorisation process. The extent of such investigations will depend on potential risks and the sensitivity of the receiving coastal environment. An EIA, as such, will not necessarily be needed in such instances, unless listed activities are triggered. According to the EIA Regulations of 2010, only independent, qualified environmental assessment practitioners may undertake an EIA. It is the responsibility of the applicant and the environmental assessment practitioners to obtain the assessment criteria upon which the CWDP/GA are issued so as to comply with the requirements for the evaluation of the receiving environmental impact of the coastal discharge.

NOTE*: It is important to remember that where a NEMA listed activity is triggered, an environmental authorisation will inform the CWDP authorisation process unless the activity conforms to a standard as prescribed in section 24 of the*

NEMA. The environmental authorisation process does not necessarily guarantee the issuing of a CWDP by the DEA.

In instances where a NEMA listed activity is triggered, the CDWP/GA will not be issued without an environmental authorisation. Such applications for a CWDP/GA may be lodged in parallel to the application for an environmental authorisation to obtain a reference number and the assessment criteria that address matters pertaining to the impacts to the receiving environment as to avoid unnecessary delays in the process. Pre-consultation meetings will be held with applicants when required. The applicable impact studies and public participation processes conducted by the applicant will assist the CWDP/GA application process. Where no listed activities in the NEMA are triggered, the environmental authorisation process will not be applicable and the CWDP/GA process will then be the only process. In such instances, the DEA may prescribe a basic public participation process. Section 5 describes this process in detail.

3: A CWDP is valid for a period up to 5 years subject to a midterm review as stipulated in the conditions upon which the permit is granted. Revisions to permit conditions can further be motivated on the grounds of negative impacts on the environment and non-compliance with permit conditions.

Principle supported: Integrated Assessment Approach

NOTE: Subsequent to the National Workshop in 2012, the DEA has decided that the CWDP will be issued for a validity period of up to 5 years with a mid-term review.

As the competent authority, the DEA is required to report on the status of the pipeline discharges and their impact on the environment every 3 years. All issued permits will therefore be reviewed to consider the following:

- *Compliance with all permit conditions;*
- *Re-assessment of whether the discharge of the effluent can still be considered as the Best Practical Environmental Option, taking the hierarchy of decision making into account (refer to Basic Principle: Pollution Prevention and Waste Minimisation),*
- *Review of monitoring reports to assess, for example, whether monitoring objectives that were defined as part of the monitoring programme (refer to Ground Rule 28) have been met.*

Based on the outcome of the above, the permit holder could be requested to conduct further investigations for confirmation. The extent of such investigations will depend on potential risks and sensitivity of the receiving coastal environment.

4: The discharge of land-based effluent to any area declared a Marine Protected Area under the Marine Living Resources Act (Act No. 18 of 1998) is prohibited, unless the Minister of Environmental Affairs provides permission to do so.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach

The Marine Living Resources Act (1998) prohibits, amongst other activities, the discharge of waste to any marine protected area, unless the Minister of Environmental Affairs provides permission to do so. However, the Minister may grant permission in cases in which such activity is to the benefit of the MPA, which is unlikely to be the case for an effluent discharge.

For proposed discharges to the coastal environment the boundaries of both existing and proposed MPAs must be taken into account. Where the influence of the discharge to the coastal environment overlaps with the boundaries on a proposed MPA, mitigating actions, if required, must be decided upon in consultation with the responsible authorities, in this case the DEA will consult with the DWA, DAFF and/or the relevant municipality. In instances where an MPA has been established and is already occupied by an existing pipeline, all reasonable precautionary measures must be taken to ensure impacts to the MPA are mitigated.

5: Any land-based effluent discharge to the coastal environment may be subject to a disposal charge to be developed in consultation with stakeholders.

Principle supported: Polluter Pays Principle

The aims of such a disposal charge would be to:

- *Promote and encourage the efficient use of water resources;*
- *Promote the internalisation of environmental costs by polluters; and to*
- *Recover some of the costs of coastal water quality monitoring carried out by the permitting authority.*

4.2 MANAGEMENT INSTITUTIONS AND ADMINISTRATIVE RESPONSIBILITIES

Licensing of land-based effluent discharges to the coastal environment is administered by the DEA: Oceans and Coasts Branch (as stipulated in Ground Rule 1). Although the DEA is responsible for the overarching management and administration of the discharge of effluent into the coastal environment, a key element in the successful implementation of this guideline is the establishment of local management institutions, representing all the role players in a designated area, which fulfil the role of 'local watchdogs' or 'custodians'. Water services providers (operating WWTWs) and industries still hold ultimate responsibility in terms of their individual licence conditions with the DWA and DEA jointly.

Where multiple developments and activities occur in a specific area, it is usually extremely difficult and financially uneconomical to manage coastal environmental issues in isolation because of, for example, potential cumulative or synergistic effects on the receiving environment. Collaboration is often best achieved through a joint local management institution. Local management institutions are also considered the appropriate platform for facilitating the joint funding of studies (such as impact assessments and monitoring) for two or more developments/activities that may be responsible for pollution in a particular area. Although such institutions could be initiated from a local level it is, however, crucial that these be coordinated from a national (or regional) level by the DEA in consultation with the DWA and/or the DAFF in the case of estuaries).

GROUND RULES RELATED TO MANAGEMENT INSTITUTIONS AND ADMINISTRATIVE RESPONSIBILITIES:

6: The discharge of land-based effluent to the coastal environment is currently governed by the DEA under the ICMA, however, the DEA will work in consultation with relevant local, provincial and national government departments (in particular the DWA in cases where discharge occurs in an estuary), as well as local management institutions (such as pipeline or catchment forums). This collaboration is required to ensure effective cooperative governance in the management of waste discharges to the coastal environment of South Africa.

Principle supported: Participatory Approach

7: The discharge of land-based effluent to the coastal environment (offshore, surf zone or estuaries) must be managed (which includes, but is not limited to, monitoring and compliance) through a local management institution such as the establishment of forums. This can be an existing institution, such as a pipeline forum, monitoring committee, pipeline advisory committee, water quality committee or catchment forum. Representation must include government authorities (i.e. that hold jurisdiction), as well as non-government

role players (e.g. industries, users of the coastal environment and Non-Governmental Organisations..

Principle supported: Participatory Approach

Local management institutions, for example, play a leading role in identifying non-compliance, based on information provided by scientifically-sound monitoring programmes. In the case of non-compliance, scientifically-sound monitoring data and information will provide the local management institution with an informed, scientific base from which to advise the Department in order to respond appropriately.

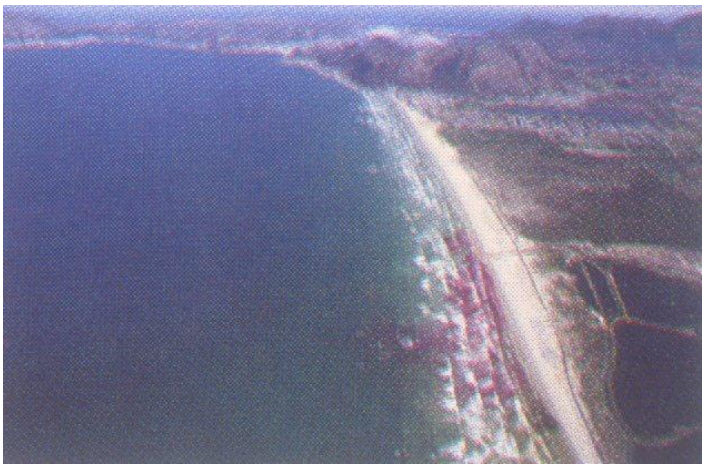
4.3 ENVIRONMENTAL QUALITY OBJECTIVES

4.3.1 Sensitive Areas

Although the technologies applied in the planning and design of effluent discharges to the coastal environment inherently highlight or 'flag' sensitive areas, the international trend currently is to explicitly identify zones or areas in the coastal environment that can generically be defined as 'sensitive areas' with regard to the discharge of effluent or even 'clean' freshwater (refer to RSA DWAF, 2004b).

The coastal environment can be subdivided roughly into three zones, each having distinctly different physical processes that influence their ability to assimilate effluent, although the overall functioning is still strongly interdependent. These are the:

- Offshore environment
- Surf zone
- Estuaries



Rhodamine-B dye test illustration the 'trapping concept' of effluent discharges to the surf zone

The offshore environment (typically defined as the zone beyond the surf zone or breaker zone) extends over a large area and usually has strong, more uniform water circulation characteristics that allow for effective transport and dispersion. In contrast, the physical processes in the surf zone and estuaries are often very complex and highly variable. Water exchange from these zones are also not very good, as illustrated by the transport and dispersion processes observed in the surf zone in False Bay, using Rhodamine-B dye as a tracer. These zones are therefore considered as being ecologically sensitive with very little assimilative capacity for anthropogenic inputs, such as land-derived effluent. Estuaries are sheltered water bodies in which circulation patterns depend largely on the river inflow and the state of the mouth. Water exchange therefore ranges from 'very good' when river inflow is high and water is continuously flushed from the system to 'limited' or 'no' water exchange when the mouth is closed. The latter exchange is particularly relevant to South Africa, where more than 75% of its estuaries are temporarily closed off to the sea. This high complexity in circulation patterns of the surf zone and estuaries largely reduces the accuracy with which transport and dispersion processes can be quantified, a key requirement in assessing the suitability of using the coastal environment for the discharge of effluent.

In the context of the above, although the offshore environment is considered to be more appropriate for the discharge of effluent, compared to surf zone and estuaries, the suitability of a particular offshore environment largely depends on factors such as:

- Circulation characteristics, for example, strong currents enhance the achievable initial dilution, whereas rapid transport of the plume reduces the degree of decay of microbiological organisms between the discharge location and relevant beneficial use areas.
- Stratification in the water column, for example, strong stratification (e.g. presence of a thermocline) results in the inhibition of a rising buoyant effluent plume and subsequent reduced initial dilution.
- Proximity of depositional areas, i.e. areas where wave and flow generated bed shear stresses (turbulence) are reduced, resulting in particulate material (and associated pollutants) being deposited onto sediments.
- Presence of offshore reefs and islands, as well as MPAs (under the Marine Living Resource Act 18 of 1998), which are also considered to be 'sensitive areas'.
- Risk of damage, for example shipping routes where the outfall structure could be damaged by dropping or dragging anchors.

Inappropriate effluent discharges (e.g. when treatment systems malfunction, usually during the holiday season from overloading) or even disposing of 'clean' freshwater (e.g. tertiary treated effluent) to sensitive systems such as estuaries and the surf zone can have serious ripple effects, both ecologically and socio-economically. Historically, discharges to the coastal environment around the South African coast (particularly discharges to estuaries and the surf zone) were allowed not necessarily on the grounds that it was the best environmental option. Economic considerations were more frequently the driving factor behind decisions rather than environmental or social considerations.

The surf zone and estuaries are thus classified as 'sensitive areas' in terms of the discharge of treated effluent, while evidence of suitability must be provided for discharge to the offshore environment (further justification is provided in each of the Ground Rules).

Estuaries are classified as sensitive areas for the following reasons:

- *Discharging freshwater into sheltered saline or semi-saline environments such as estuaries is likely to modify the natural salinity regime, with potentially negative impacts on the ecosystem. Significant changes in inflows to temporarily open/closed estuaries can also modify the natural frequency and occurrence of mouth opening (this is particularly relevant since more than 75% of South Africa's estuaries are naturally closed off from the sea at times).*
- *Because discharges to estuaries do not have a distinct 'initial dilution process' as encountered in offshore discharges (i.e. dilution generated by jet momentum and buoyancy effects that occur between the outlet ports and the sea surface), it is most likely that there will be a zone of non-compliance in the receiving environment, unless the constituent concentration in the effluent is equal to the resource quality objectives (i.e. 'compliance at end of pipe').*
- *Estuaries are sheltered water bodies in which circulation patterns are largely dependent on the river inflow and the state of the mouth. The complex physical dynamics of estuaries largely reduce the accuracy with which transport and dispersion processes can be quantified, a key requirement in assessing the suitability of discharge of land-based effluent to the coastal environment as an option.*
- *Estuaries are transition areas between rivers and the sea. These ecologically sensitive areas provide unique habitats for a diversity of biota, and in addition also act as nursery areas for numerous coastal organisms.*

A large proportion of beneficial uses of the coastal environment (e.g. recreation and marine aquaculture) occur in estuaries. The high real estate value along the coast is often strongly linked to acceptable water quality of estuaries, which can also be severely compromised by inappropriate discharge of effluent

GROUND RULES RELATED TO SENSITIVE AREAS:

8: Estuaries are classified as 'sensitive areas'. The discharge of municipal and industrial effluent to these systems will therefore not be considered except in exceptional circumstances in which such inflows are required to improve or maintain the resource quality objectives (also taking into account effects of water quantity) or where the ecological functioning has been irreversibly modified to support commercial harbours where exemption to this rule may be considered. In the latter case, the resource quality objectives of other designated beneficial uses of the area, however, must be met as a minimum. Therefore, applications for a CWDP for estuaries require consultation with the DWA.

Principle supported: Pollution Prevention, Waste Minimisation AND Precautionary Approach; Integrated Assessment Approach.

NOTE: In issuing a CWDP, the DEA will consider the provisions made in the NEM: BA with reference to the estuarine classification.

9: The surf zone is classified as a 'sensitive area'. The discharge of municipal and industrial effluent to the surf zone should therefore be avoided. Where legitimate motivation can be provided (e.g. in cases in which seawater used on land is returned to source), the environmental quality objectives for the study area must be met as a minimum. These include objectives pertaining to alteration of the natural salinity regime (in the case of freshwater discharges) and aesthetic impacts associated with the visibility of the discharge practice on land.

Principle supported: Pollution Prevention, Waste Minimisation AND Precautionary Approach

The surf zone is classified as a sensitive area for the following reasons:

- *Discharging freshwater into sheltered saline environments such as the surf zone modifies the natural salinity regime, with potentially negative impacts on the ecosystem.*
- *Because discharges to the surf zone do not have a distinct 'initial dilution process' as encountered in offshore discharges (i.e. dilution generated by jet momentum and buoyancy effects that occur between the outlet ports and the sea surface), it is most likely that there will be a zone of non-compliance in the receiving environment, unless the constituent concentration in the effluent is equal to the environmental quality objectives (i.e. 'compliance at end of pipe').*
- *The complex physical dynamics encountered in the surf zone largely reduce the accuracy with which transport and dispersion processes can be quantified, a key requirement in assessing the suitability of discharge of land-based effluent to the coastal environment as an option.*
- *These ecologically sensitive areas are transition areas between the land and the sea, providing unique habitats for a diversity of biota.*

A large proportion of beneficial uses of the coastal environment (e.g. recreation and marine aquaculture) occur in the surf zone (i.e. beaches). The high real estate value along the coast is often strongly linked to acceptable aesthetics and water quality at beaches, which can be severely compromised by inappropriate discharge of effluent.

10: Discharges of land-based effluent to the offshore coastal waters through a coastal outfall should be considered as the preferred option over any estuary or surf zone discharge, unless the suitability of the

areas to accommodate such activities is properly assessed.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach

Suitability of the coastal environment (generally defined as the area beyond the surf zone, in which circulation patterns are usually more uniform) for the discharge land-based effluent through a coastal outfall mainly depends on:

- *Circulation characteristics*
- *Stratification in the water column*
- *Morphology of the seabed (with specific reference to the proximity of depositional areas where pollutants/contaminants may accumulate)*
- *Presence of offshore reefs and islands, also considered sensitive areas.*
- *Risk of damage, e.g. if situated along shipping routes*
- *Proximity of other existing coastal outfalls.*

4.3.2 Setting Environmental Quality Objectives

The receiving water quality objectives approach requires that the aquatic ecosystem of a water resource and the requirements of the beneficial uses of that water resource together determine the objectives that need to be adhered to, rather than following a uniform effluent standard approach as was the case with the General and Special Standard under the previous Water Act (Act No. 54 of 1956). The receiving water quality objectives approach is also widely used internationally (refer to RSA DWAF [2004b]).

Section 24 (10) of the NEMA makes provision for the Minister or MEC to develop or adopt standards (for activities, or for any part of an activity or for a combination of activities in terms of Section 24[2][d]) for an activity to conform to[2]. However, the national Minister of Environmental Affairs has to provide concurrence before an MEC may prescribe such standards. Applications for a CWDP must be accompanied by a letter of intent to comply with such standards where an environmental authorisation is not required. Moreover, such standards must prove to be:

- In line with this guideline;
- More stringent than the receiving water quality objectives supported by this guideline, and where such objectives have been determined; and
- Applicable and responsive to the receiving environment.

With the promulgation of the ICMA, estuaries are now managed by the DEA in formal consultation with the DWA. DWA is responsible for reserve determination in estuaries. The reserve determination encompasses a Classification system as well as the Reserve and Resource Quality Objectives (the term used for environmental quality objectives in the case of estuaries) and the DEA will take into account the ecological uses and resource quality objectives already developed by the DWA prior to the issuing of a CWDP/GA.

As is the case with estuaries, environmental quality objectives are similarly important for the broader coastal environment, based on the requirements of the site-specific coastal ecosystems, as well as other designated beneficial uses (both existing

[2] *The Department has noted that the NEMA makes provisions for prescribing standards as contemplated in section 24 (2)(d) (e.g. the proposed standards for the abalone industry in the Western Cape Province).*

and future). The identification and mapping of coastal ecosystems and the beneficial uses of the receiving coastal environment provides a sound basis from which to derive site-specific environmental quality objectives.

The following are also defined as beneficial uses of South Africa's coastal waters:

- Recreation
- Tourism
- Marine aquaculture and fisheries
- Industrial uses (e.g. taking in cooling water and water for fish processing).

To assist in setting environmental quality objectives for coastal ecosystems and their beneficial uses, the DEA has initiated a process to update the *South African Water Quality Guidelines for Coastal Marine Waters.* Thus far, *Volume 2: Guidelines for Recreational Use has been updated (DEA, 2012)*. The South African guidelines provide recommended target values (not standards but imply the maximum allowable limit) for a range of substances, but are not exhaustive. Therefore, in setting site-specific environmental quality objectives, it may be necessary to consult additional information obtained from published literature, best available international guidelines (e.g. ANZECC 2000a; Environment Canada, 2002; US-EPA, 2002), as well as site-specific data.

Environmental quality objectives need to be specified as measurable values for specific water column, sediment, biological and/or microbiological parameters to provide a practical and effective means against which to evaluate potential impacts of effluent discharges. Current practice in most other countries is to define what is referred to as 'List I' and 'List II' substances (*RSA DWAF, 2004b).* List I substances are regarded as being particularly hazardous because of their toxicity, persistence and bioaccumulation and need to be *eliminated* from the discharge of land-based effluent. List II substances, in contrast, are considered less hazardous but nevertheless have a deleterious effect on the aquatic environment. List II substances must be *controlled*. List II substances, therefore, are typically those for which specific target values need to be determined. List I and List II substances are currently not available for South Africa and need to be determined and addressed in future revisions of the *South African Water Quality Guidelines for Coastal Marine Waters* (RSA DWAF, 1995a).

GROUND RULES RELATED TO ENVIRONMENTAL QUALITY OBJECTIVES:

11: Site-specific environmental quality objectives for the coastal environment (excluding estuaries) must take into account the* South African Water Quality Guidelines for coastal marine waters *(RSA DWAF, 1995a) or any future updates thereof. In instances where a standard is proposed and for which concurrence is required from the DEA, such a standard must be in line with this guideline, more stringent, applicable and responsive.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Receiving Water Quality Objectives Approach

The South African Water Quality Guidelines for Coastal Marine Waters *(DWAF, 1995a) provides recommended target values for a list of substances in relation to aquatic ecosystem requirements as well as for other beneficial uses. However, the information provided in these documents are not exhaustive and does not provide target values for ALL possible substances. Therefore, in setting environmental quality objectives for the coastal environment, the information contained in the guideline documents should be supported by information from additional sources such as published literature, best available international guidelines and site-specific data.*

List I substances are regarded as being particularly hazardous because of their toxicity, persistence and bioaccumulation and must be eliminated from effluent discharges. List II substances, in contrast, are considered less hazardous but

nevertheless have a deleterious effect on the aquatic environment. List II substances must be controlled. List II substances, therefore, are typically those for which specific environmental target values must be determined. Recommended lists are provided in RSA DWAF (2004b).

12: Where, in exceptional circumstances (as listed in Ground Rule 8), a discharge to an estuary is considered, resource and environmental quality objectives must be determined according to the methodology for estuaries developed by the DWA. Estuaries are included in the definition of 'the water resource' in the NWA and objectives therefore must take into account the provisions of the NWA.

Principle supported: Receiving Water Quality Objectives Approach

13: Environmental quality objectives must be complied with in the area beyond the initial mixing zone.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Receiving Water Quality Objectives Approach

The initial mixing zone is defined as the area in the water column in which the initial dilution process takes place whereby 'clean' seawater is entrained during the rise of the buoyant plume. The degree of dilution and the geometry of the rising plume depend on the buoyancy of the effluent, as well as the current profile and stratification in the water column.

Instances whereby this rule may be relaxed include microbiological parameters that do not necessarily affect the health of aquatic ecosystems, but rather affect specific beneficial uses (e.g. recreation and marine aquaculture) that may be at a distant location from the point of discharge. Microbiological parameters are also further subject to secondary dilution and decay while being transported away from the initial mixing zone.

4.4 ACTIVITIES AND ASSOCIATED WASTE LOADS

4.4.1 Municipal Effluent

Being a semi-arid country, a key concern in South Africa is future water demand. A major constraint in the management of municipal effluent, including that of towns and cities along the South African coast, is that the discharge of land-based effluent is currently not addressed within the context of future water demand and supply. Additionally, instead of planning the collection, treatment and discharge of effluent in, for example, an entire metropolitan area in a holistic manner, effluent treatment works (WWTW) are typically designed and operated in a fragmented manner. As a result, the effluent discharges from these WWTW often have cumulative negative impacts on the receiving environment (e.g. rivers and their estuaries) which were not taken into account in either the design or operations of such WWTW.

Therefore, in the discharge of land-based effluent (particularly freshwater), issues of the following nature need to be taken into account:

- Water supply and future water demand
- Reserve requirements for rivers and estuaries (specified under the NWA)
- Groundwater resources

- Surface water resources
- Sanitation (including reticulation systems)
- Effluent treatment and discharge into the coastal environment
- Trade effluents
- Stormwater reticulation and discharge.

It is therefore crucial that effluent discharges be managed within a 'Master Plan' for water. For example, where re-use of effluent will be essential to meet future water demand, effluent treatment and disposal systems must accommodate such requirements in their design criteria, even though the ultimate implementation of such criteria may be incremental. The development of treatment and disposal facilities for land-based effluent in the context of a holistic master plan, which includes water supply (taking into account future water demand), is a key requirement of the World Bank for all its projects pertaining to the installation, upgrading and rehabilitation of effluent treatment in the world, such as in Mombasa, Kenya (Gibb Eastern Africa, 1997). In a particular area a WWTW, for example, may initially only implement preliminary treatment with a coastal outfall. Thereafter treatment facilities can be gradually upgraded as dictated by financial resources and water demand. Also, because the coastal outfall was initially designed to accommodate preliminary treated effluent, plant failure at any later stage in the life cycle of the WWTW will not have a negative impact on the receiving coastal environment because the disposal route (i.e. still the coastal outfall) was designed for the 'worst case'.

In terms of achieving this 'Master Plan' concept, the Water Services Development Plans that need to be prepared by a water services provider (e.g. local municipality) under the Water Services Act (Act No. 108 of 1997), as part of the Integrated Development Plans in terms of the Local Government Transition Act (Act No. 209 of 1993), can be extended to include the discharge of land-based effluent.

The design of a coastal discharge practice depends largely on the quantity and quality of the effluent. These, in turn, depend on the service population (including industrial effluent discharges into WWTWs) that are effectively linked to the collecting system and the degree of treatment of the effluent prior to discharge. Although non-sewered treatment (i.e. no collecting system structure), such as septic tanks, may be acceptable options for smaller communities, these are usually not acceptable for larger service populations. The risk of impact on water resources, associated with spillages and seepage, increases markedly with the increase in the number and density of non-sewered systems. Internationally it has become common practice to provide a collecting system to communities with a service population greater than about 2 000, including coastal communities (RSA DWAF, 2004b). South African policy in this regard is dealt with in documents such as *Strategic Framework for Water Services* (RSA DWAF, 2003a) and *Managing the water quality effects of settlements* (RSA DWAF, 1999b; RSA DWAF, 2002a).

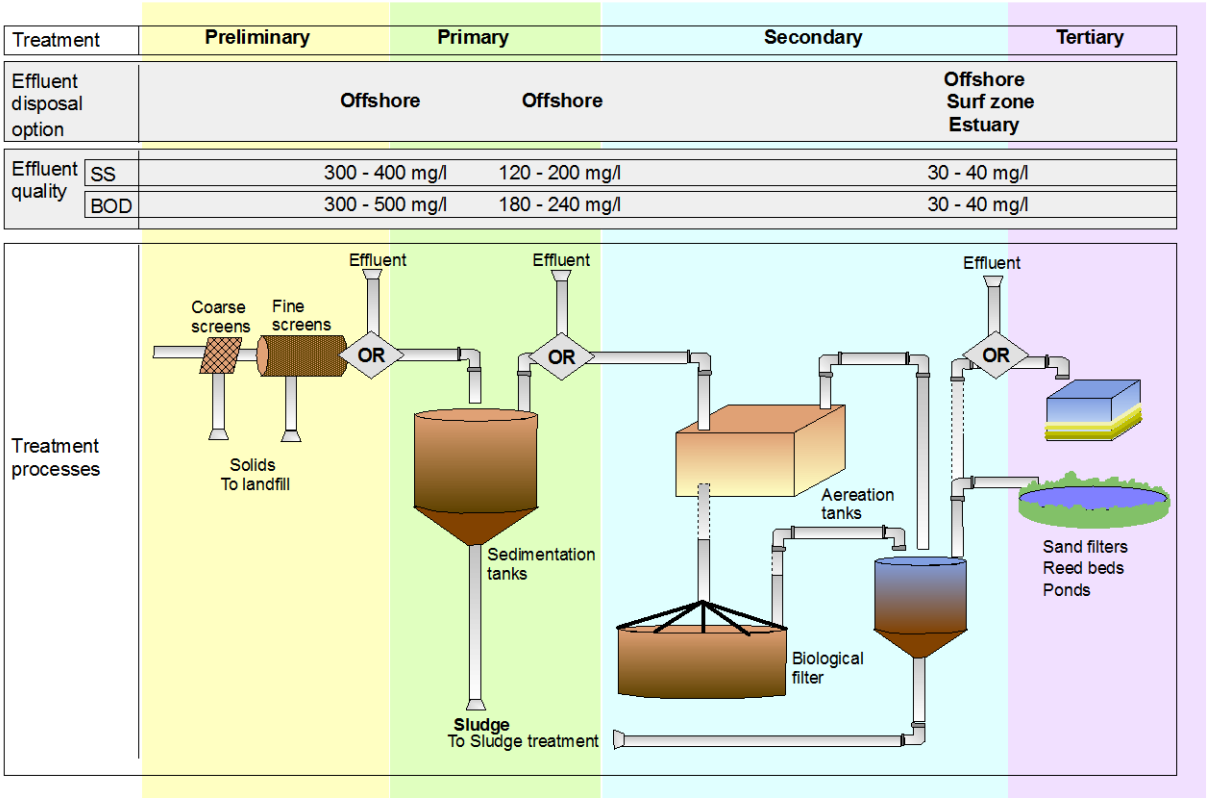


Figure 4.1: A schematic illustration of the different treatment processes for municipal effluent

With regard to the level of treatment of municipal effluent prior to discharge, the main objective applied internationally is to reduce waste loads, particularly those of suspended solids and biochemical oxygen demand. Municipal effluent has characteristic loads of these two substances that are easy to measure and, by reducing these, it is also possible to markedly decrease the loads of other potentially harmful substances, e.g. nutrients and toxins such as trace metals. Treatment levels of municipal effluent (sewage) can broadly be categorised into:

- Preliminary treatment
- Primary treatment
- Secondary treatment
- Tertiary treatment
- Disinfection.

The typical treatment process for domestic sewage is schematically illustrated in Figure 4.1.

Most countries require primary treatment as a minimum for offshore coastal outfalls. In the United States, Australia and the European Community this minimum rule applies only for service populations of between 50 000 and 150 000. For larger service populations these countries require at least secondary treatment, in many instances including disinfection (RSA DWAF, 2004b).

As an incentive to reduce waste loads in municipal effluent, both the United States and Australia have introduced a charge system, similar to the Waste Disposal Charge System being developed by the DWAF (RSA DWAF, 2003b).

***GROUND RULES RELATED TO MUNICIPAL EFFLUENT**:*

14: ***South Africa is a water scarce country. Coastal discharge of land -based municipal effluent (particularly freshwater) will therefore only be considered where it has been evaluated in terms of the Water Services Development Plan for a particular municipal area (required under the Water Services Act [Act No. 108 of 1997], and which, in turn, forms part of the Integrated Development Plans required in terms of the Local Government Transition Act [Act No. 209 of 1993]). This requirement supports the concept of a 'Master Plan for water supply/demand and effluent treatment'.***

Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach

It is crucial that effluent discharges be managed within a 'Master Plan'[3] for water, taking into account, for example:

- *Water supply and future water demand*
- *Reserve requirements for river and estuaries (under the NWA)*
- *Groundwater resources*
- *Surface water resources*
- *Sanitation (including reticulation systems)*
- *Effluent treatment and disposal*
- *Trade effluents*
- *Stormwater reticulation and discharge.*

It is crucial that the upgrading of WWTW also be addressed as part of the holistic 'Master Plan' for water.

15: ***Municipal WWTWs receiving industrial effluent (also referred to as trade effluent) will be subject to the Ground Rules for Industrial Effluent (refer to Ground Rules 19 to 22). Service Providers or Local Authorities operating such treatment works will be required to prepare industrial effluent management plans (as part of the 'Master Plan'). It is also the responsibility of the Service Provider or Local Authority to investigate possible synergistic and/or cumulative effects which may occur as a result of the interaction between different (industrial) effluent inputs.***

Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach

It is the responsibility of the Service Provider or Local Authority operating a WWTW to ensure that industrial effluent discharges to the works adhere to the ground rules for Industrial Effluent (refer to section 4.4.2).

16: ***The design, construction and management of collection systems (i.e. the land-based facilities at which the effluent is collected prior to discharging to the coastal environment) are outside the scope of this guideline. The design, construction and management of such systems must comply with related policies and specifications of the DWA and DEA.***

Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach

Policy and specifications on sanitation, e.g. sewage collecting systems, are generic and not necessarily relevant only to effluent that is disposed into the coastal environment. As a result, this national guideline on coastal effluent discharges are

[3] That which is required in terms of the Water Services Act, 1997 (Act No 108 of 1997)

not prescriptive regarding collecting systems and refers to relevant policies and frameworks on sanitation. In South Africa, guidelines on sanitation systems for settlements, for example, use population density, in terms of households per hectare, as a guideline. Such guidelines are discussed in further detail in documents such as:

- *Strategic Framework for Water Services (RSA DWAF, 2003a)*
- *Managing the water quality effects of settlements (RSA DWAF, 1999b; RSA DWAF, 2002a).*

Furthermore, the environmental authorisations issued and environmental management programmed approved by the DEA (provincial or national departments) for such infrastructure will prescribe best practices for the construction and management thereof.

17: In general and in support of responsible discharge including taking into account the sensitivity of the receiving environment, the following treatments apply to the following zones after the publication of this National Guideline:

i) Primary treatment will be required as a minimum for all new or proposed discharge of municipal effluent to the offshore coastal environment.

ii) Preliminary treatment will be accepted as a minimum requirement for all existing municipal effluent discharges to the offshore coastal environment, provided that the receiving environment is suitable for this coastal discharge and that the environmental (or resource) quality objectives are met. However, future expansions or upgrades to such existing coastal outfalls will require primary treatment of the effluent prior to discharge unless it can be proven that key socio-economic factors require otherwise. Nevertheless, environmental (or resource) quality objectives must still be met and take into account the interest of the whole community (as defined in the ICMA).

iii) Secondary treatment with disinfection will be required as a minimum for all discharges of municipal effluent to the surf zone and estuaries (where such discharges are allowed – refer to Ground Rules 8 and 9).

NOTE: The above sets the minimum requirements. Where such levels of treatment still do not meet the requirements of the receiving environment, as defined in terms of the environmental (or resource) quality objectives, higher levels of treatment will be required. Furthermore, in order to determine realistic objectives, applications for a CWDP will be evaluated on a case- by- case basis. The receiving environmental objectives will dictate the level of treatment required for discharges not covered under municipal effluent. Operators of WWTWs must investigate methods to continuously improve the operations that affect the effluent quality and quantity.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach

Government's policy (White Paper on a National Water Policy for SA, 1997) is to strengthen source controls with the final aim of getting as close as possible to a situation in which there is zero discharge of effluent to the environment. In light of this, the DWA and DEA can therefore require or recommend more stringent levels of treatment based on, for example, the outcome of pre-assessments or detailed investigations, as part of the permit authorisation process.

Internationally, primary treatment, and even secondary treatment, is increasingly being put forward as the minimum for treatment levels for discharge to the offshore coastal environment. For example, in the United States, Australia and the European Community, this minimum rule applies for service populations of between 50 000 and 150 000. For larger service populations these countries require at least secondary treatment, in many instances including disinfection

18: The discharge of sludge arising from effluent treatment facilities (e.g. primary, secondary and tertiary) must be in accordance with the Minimum Requirements for Waste Disposal by Landfill (DWAF, 1998) and the

'Sludge Guidelines' (1998 as amended in 2000) of the DWA or any future updates of such policies or guidelines.

Principles supported: ***Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach***

4.4.2 Industrial Effluent

Operational policies regarding the discharge of industrial effluent to the environment (including the coastal environment) are extensive and follow different approaches (RSA DWAF, 2004b). Important aspects are highlighted below.

One approach is to identify specific industrial installations that are required to obtain authorisation to operate. For example, in the European Community the *Directive on integrated pollution prevention and control* (96/61/EC) provides a list of industrial installations and a set of common rules on permits (www.europa.eu.int/comm/environment/ippc). The permits have to be based on the concept of *Best Available Techniques* (BAT) and, realising that in many cases BAT entail quite radical environmental improvements which could jeopardise many jobs, the directive grants listed installations an 11-year transition period. The directive also identifies specific aspects that need to be taken into account when determining best available techniques.

Another approach towards eliminating or minimising effluent from industrial installations is to regulate the operations and processes for specific industries, based on the concept of *Best Available Techniques*. For example, Canada sets specific standards, guidelines and an environmental code of practice for numerous industrial activities under the Canadian Environmental Protection Act of 1999.

With regard to the discharge of industrial effluent into WWTWs, most countries require that pre-treatment be applied so as to prevent damage to equipment, that the treatment or re-use of sludge is not impeded and that there will be no adverse effect on the coastal environment.

Under Section 69 (1) of the ICMA, no person may discharge effluent from a source on land into coastal waters except in terms of a GA or a CWDP. However, this would apply only to discharges into the coastal environment which is subject to the definition of effluent under the Act.

At present, South Africa's legislation therefore does not distinguish between different types of industries but rather subjects all industries to the requirement of a CWDP or a GA, including discharges to the coastal environment.

GROUND RULES RELATED TO INDUSTRIAL EFFLUENT:

19: Industrial discharges has not been defined as yet under the ICMA, however, under Section 21 of the NWA, the following water sources have been classified as industrial effluent, requiring a licence, for discharge to the coastal environment:

- ***Water used in an industrial process on land.***
- ***Contaminated (or polluted) stormwater run-off originating from industrial areas that passes through man-made structures (such as canals, pipelines, etc.) excluding rivers and municipal sewerage, directly into the estuary, surf zone or coastal waters, freshwater or seawater used as cooling water on land, e.g.***

Power Generation (cooling water intake and discharge).

- ***Seawater used in an industrial process on land, e.g. seafood processing, coastal mining activities and return flows from oceanariums/aquariums.***

The above classification remains valid until appropriate regulations have been developed under the ICMA.

Principle supported: Integrated Assessment Approach

20: An industry, discharging effluent to a municipal WWTW or directly to the coastal environment (or applying for a permit to do so), will be required to provide a detailed description of the waste stream in terms of both volume (quantity) and quality (i.e. listing all substances present and their concentrations and loads). Where industries discharge effluent to a WWTW, the water services provider is responsible for obtaining this information from the industry concerned. The DEA or local authority may also require a detailed inventory of the raw materials, as well as process material, used by an industry.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach

It will be the responsibility of an industry to supply a detailed description of their effluent to the DEA. Such information is crucial to the permit application process both in terms of evaluating potential impacts appropriately, and of evaluating suitable effluent treatment options.

Toxicity testing will not be considered as a substitute where detailed description of the composition of the effluent is not available. However, these tests are valuable techniques to be used as supplementary tools, for verifying impact assessment studies based on the detailed effluent composition.

21: Industrial effluent discharged to a municipal WWTW disposing to the coastal environment will be subject to appropriate pre-treatment. It is the responsibility of the local authority operating the WWTW to ensure compliance in this regard.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach

Appropriate pre-treatment is required to ensure that the:

- *WWTW and associated equipment are not damaged;*
- *Operation of the WWTW and the treatment or re-use of sludge are not impeded; and*
- *Discharge from the WWTW does not adversely affect the coastal environment.*

22: Effluent containing radioactive substances is governed by the Department of Energy (in concurrence with the DEA and DWA) and must comply with policy developed in this regard.

Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach

The Department of Energy is presently developing a national radioactive waste management policy and strategy in conjunction with the various role players in South Africa. Draft policy and strategy documents will soon be made available to the public for discussion (http://www.radwaste.co.za/regulation.htm).

4.4.3 Diffuse Effluent Sources (including Urban Stormwater Run-off)

Diffuse effluent sources include urban stormwater run-off, agricultural and mining return flows, as well as contaminated groundwater seepage (these can either directly discharge into the coastal environment or indirectly through river inflow).

In the assessment of any municipal or industrial effluent discharge to the coastal environment, diffuse effluent inputs must be taken into account. Although there are means of calculating and measuring the volumes and composition of diffuse effluent inputs, controlling such properties, once the effluent reaches the coastal environment (or any other water resource), is extremely difficult. Such properties, therefore, are best managed and controlled at source, i.e. the point of origin.

Operational policies for the management and control of diffuse effluent (e.g. urban stormwater run-off, agricultural and mining return flows) at source are not specific to the coastal environment, but apply to any water resources, including rivers, groundwater and wetlands. Diffuse effluent sources are therefore best dealt with on a catchment level, rather than per individual water resource component. It is, therefore, not within the scope of this guideline to address specific measures to manage and control diffuse effluent at source.

Regarding diffuse effluent discharges, urban stormwater run-off is probably one of the most important concerns in coastal metropolitan areas. The vast volumes and run-off characteristics of urban stormwater make treatment prior to discharge extremely difficult and expensive. Mitigating treatment at source, i.e. preventing pollution rather than treatment, is usually a more cost-effective route to follow in the case of these non-point sources of pollution. An approach that appears to be effective in this regard is the establishment of Stormwater Management Programmes, as implemented for example in Scotland and the United States of America (RSA DWAF, 2004b). In the United States of America, certain categories of stormwater are permitted such as:

- *Discharges associated with industrial activities;*
- *Discharges from a municipal separate storm sewer system serving a population of 100 000 or more;*
- *Discharges for which the US-EPA or relevant State determines that the stormwater discharge contributes to a violation of a water quality standard or is a significant contributor of pollutants to the waters of the United States (US-EPA, 2004).*

In other instances, stormwater is managed within a Stormwater Management Programme. The key objectives of a Stormwater Management Programme may include the:

- *Mapping of stormwater reticulation systems, including discharge points into water resources*
- *Identification and elimination of illicit connections and illicit discharges to the stormwater drainage system and facilitation of the public's ability to report illicit connections and discharges.*
- *Reduction of stormwater impacts associated with development and redevelopment projects (i.e. ensure that stormwater management considerations are integrated into planning, permitting and construction of development projects).*
- *Reduction of stormwater quality impacts associated with public agency activities through:*
  - *Procedures to prevent and respond to spills or leaks from sewage system operations;*
  - *Proper management, design and practices to prevent stormwater impacts from public construction projects;*
  - *Pollution prevention plans and best management practices for public vehicle maintenance/material storage facilities that may discharge pollutants into stormwater;*
  - *Procedures to minimize stormwater pollution associated with landscaping activities pools, and recreation areas;*
  - *Best management practices for catch basin and stormwater drainage maintenance;*

  - *Street sweeping and road maintenance programmes;*
  - *A programme to reduce pollutants from municipal parking lots; and*
  - *Procedures to implement best management practices at municipal facilities or operated industrial facilities.*
- *Increase in public knowledge and understanding of the quality, quantity, sources and impacts of stormwater run-off and of actions that can be taken to prevent pollution through education and outreach programs targeting specific audience, such as residents, industrial facility operators, commercial businesses, school children and public agency employees.*
- *Development of a stormwater quality monitoring programme that will:*
  - *Track water quality status and trends*
  - *Identify watershed-specific pollutants of concern*
  - *Improve understanding of the relationship between land uses and pollutant loads*
  - *Identify sources of pollutants and evaluate significant stormwater quality problems*
  - *Evaluate the effectiveness of stormwater management programmes, including pollutant reductions achieved by best management practices*
  - *Increase knowledge about the impacts of run-off on receiving waters.*

Reporting and evaluation of the effectiveness of implementing stormwater management programmes.

Taking the above into account, operational policies for the management and control of urban stormwater needs to be set at catchment level, as such policies are not specific to urban stormwater run-off to the coastal environment, **but should apply to run-off to any watercourse, including rivers, groundwater and wetlands.** Therefore, operational policies pertaining to stormwater will not be further addressed in this document. It is, however, proposed that a policy for the management and control of urban stormwater be developed, taking into account the international trends highlighted above, as well as existing national initiatives such as:

- *A framework for implementing non-point source management under the National Water Ac*t (RSA DWAF, 1999a)
- *Guidelines for human settlement planning and design - The Red Book* (CSIR, 2001)
- Set of documents on *Managing the Water Quality Effects of Settlements* (RSA DWAF, 1999b)
- *Towards a Strategy for a Waste Discharge Charge System* (RSA DWAF 2003b)

The *Framework for implementing non-point source management under the National Water Act* states that non-point source management is largely focused on land use, rather than water use, and should be conducted within the context of catchment management. The document proposes that a national non-point source strategy be put forward for South Africa as part of the national water resource strategy.

Guidelines for human settlement planning and design - The Red Book, also strongly reflect international trends in terms of stormwater management (CSIR, 2001). For example, the Stormwater Management Master Drainage Plans dealt with in detail in this manual are strongly aligned with the Stormwater Management Programmes applied in the United States. The Red Book also stresses that such plans be contemplated on a catchment-wide basis, irrespective of urban and other man-made boundaries.

Managing the Water Quality Effects of Settlements (RSA DWAF, 1999b; RSA DWAF, 2002a) provides the DWAF's strategy for managing waste streams from dense settlements, including the control and management of stormwater and should also be taken into account in the development of a proposed stormwater policy for South Africa.

The charges proposed in *Towards a Strategy for a Waste Discharge Charge System* (RSA DWAF, 2003b) also includes charges for diffuse sources of effluent, which should also be taken into account in the development of an policy for urban stormwater run-off for South Africa.

GROUND RULES RELATED TO DIFFUSE EFFLUENT SOURCES:

23:	***Diffuse land-based effluent (such as urban stormwater run-off, agricultural return flows and contaminated groundwater seepage) discharged into the coastal environment should not have any negative impact on the receiving environment, i.e. the environmental quality objectives must be met.***
	Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach

Although these activities are currently not licensed by DWA and DEA, the Departments may require local authorities that are, for example, responsible for stormwater management, to take measures to mitigate negative impacts.

Input from diffuse effluent discharges MUST be taken into account when conducting the scientific and engineering assessments for either an existing or new coastal disposal facility. References to methods for calculating the volume and composition of, for example, urban stormwater inputs are provided in RSA DWAF (2004c).

4.5 SCIENTIFIC AND ENGINEERING ASSESSMENT

The coastal environment functions as an ecosystem with no clear boundaries between its different components, namely estuaries, surf zone and offshore waters. It is therefore important that, where the discharge of land-based effluent to the coastal environment is considered, the interaction between these different components be taken into account. Also of crucial importance is the consideration of other waste inputs and anthropogenic activities in the area to ensure that synergistic and/or cumulative interactions are addressed.

The impact of any effluent discharge depends on the quantity and quality of the effluent, as well as prevailing physical and chemical oceanographic conditions of the receiving environment. Oceanographic conditions of the coastal waters are highly variable, both spatially and temporally, and are determined by the bathymetry of the seabed, currents, winds, tides, waves and the ambient water and sediment chemistry. In order to set outfall design criteria, it is necessary to predict the dilution, transport and fate of substances contained in the effluent (and subsequent compliance to resource quality objectives), taking into account site-specific oceanographic conditions. It is also important to consider other waste inputs in the area, from both point and diffuse sources. Such predictions and assessments are normally made with some form of predictive model tool.

Internationally, it has become a requirement to use numerical modelling techniques in the design and assessment of coastal outfalls (SEPA, 2002; WRc, 1990, Gunnerson, 1988, US-EPA 2002). Models vary greatly in type and complexity but it is essential that the model chosen be appropriate to the situation in which it is utilised. It is also important that the model be properly calibrated and validated in order to ensure that the model output is reliable and accurate.

A coastal outfall is a controllable mechanism of which the design is such that the impact on the environment, as a result of discharge quality, can be manipulated through:

- Degree of treatment (through treatment processes);
- Flow rates (controlled by either a pressure or gravity head);
- Discharge depth and distance from specific beneficial use areas (determined by pipeline length and bathymetry); and
- Dilution (diffuser).

GROUND RULES RELATED TO SCIENTIFIC AND ENGINEERING ASSESSMENT:

24: An application for a CWDP will only be considered where a holistic process has been followed for the discharge of land-based effluent to the coastal environment. This implies that potential impacts on the receiving environment be investigated in both the near and far field, taking into account other anthropogenic activities and waste inputs so as to address possible synergistic and/or cumulative effects. Guidelines in this regard are provided in RSA DWAF (2004a).

Principle supported: Integrated Assessment Approach

When assessing proposed discharges of other waste input (such as, diffuse effluent inputs (e.g. urban stormwater inputs) and dredging activities (relevant to harbour areas), a holistic approach should be taken into account. This would also require that other responsible authorities and role players (in this case the DEA and NPA) be represented on the local management institution.

Further guidance in this regard is provided in RSA DWAF (2004c)

25: A permit application for the discharge of land-based effluent to the coastal environment will only be considered where a discharge system is designed, constructed and operated in accordance with recognised scientific, hydraulic and structural guidelines in order to meet environmental quality objectives.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach

Further guidance in this regard is provided in RSA DWAF (2004c). .

26: Recognised numerical modelling techniques must be applied in the scientific and engineering assessment and design of a coastal disposal system, as and where considered appropriate, according to recognised scientific and engineering guidelines.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach

In the application of numerical modelling techniques, the following must be complied with:

- *The model chosen be appropriate to the situation in which it is utilised*
- *The model must be calibrated and validated against a full data set adequately describing the site-specific physical and chemical oceanographic conditions*
- *Sensitivity analysis must be conducted to demonstrate the effect of key output parameters, based on the variation in input data and controlling assumptions.*
- *The reporting of model output must include a clear description of assumptions, summary of numerical output, confidence limits and sensitivity and implications and the dilution, transport and fate of relevant substances, in both the near and far field.*

Further guidance in this regard is provided in RSA DWAF (2004c).

27: A precautionary approach must be followed in the assessment and design of any coastal disposal system in which the temporal and spatial coverage and accuracy of physical and chemical oceanographic data do not adequately describe site-specific conditions.

Principle supported: Integrated Assessment Approach; Pollution Prevention, Waste Minimisation and Precautionary Approach

In practice, due to time and financial constraints, it is often not possible to collect physical and chemical oceanographic data on spatial or temporal scales that would adequately describe site-specific conditions. The accuracy of prediction of near and far field dilutions, and subsequent compliance to environmental quality objectives largely depends on the adequacy of physical oceanographic data such as currents, stratification, wind, waves and tides (both statistical or real-time). Therefore, where data are not considered to be adequate, a conservative approach must be followed. Typically, this is achieved through, for example, a higher degree of treatment and/or by increasing discharge depth and/or distance from a specific beneficial use area (e.g. as determined by the pipeline length).

4.6 MONITORING AND CONTINGENCY PLANS

Internationally, it is also recognised that monitoring and assessment are key requirements for effective control and management, including that of land-based effluent discharges to the coastal environment (WRC, 1990; NZWERF, 2002; ANZECC 2000b; US-EPA, 2003). The dischargers would therefore be responsible for the monitoring. Monitoring of possible impacts associated with the discharge of effluent into the coastal environment is an essential tool to determine the environmental impacts of the discharge and if the conditions as stipulated in the permit needs to be altered in any way.

According to Chapter 7 of the NEMA, section 28 (1):

Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so as far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

Furthermore, section 58 of the ICMA places a duty to avoid causing adverse effects on the coastal environment on all individuals who undertake activities that may cause significant pollution or degradation of the environment.

The requirements pertaining to monitoring and assessment as well as contingency planning are discussed in more detail in RSA DWAF (2004a). Essentially there are three types monitoring programmes/data related to effluent discharges into the coastal environment, namely:

- *Compliance monitoring*: to determine the effectiveness of management strategies and actions to ensure compliance with permit conditions, e.g. the limits set for the volume and composition of the effluent;
- *System performance monitoring:* to determine the effectiveness of management strategies and actions to ensure performance in accordance with the design criteria, such as the hydraulic performance of the discharge system
- *Environmental monitoring:* to determine the trends and status of changes in the receiving coastal environment, in terms of the health of important ecosystems and designated beneficial uses.

A few underpinning *Ground Rules* pertaining to monitoring and contingency planning are listed below.

GROUND RULES RELATED TO MONITORING and CONTINGENCY PLANS:

28: Any authority or industry responsible for the operation and management of a coastal disposal system will be subject to the implementation of a monitoring programme.

Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach and Participatory Approach

The presentation of data to the DEA must be in a specified format and at a predetermined frequency, as will be dictated by the DEA. This is discussed in further detail in the DWAF Operational Policy of 2004 (RSA DWA, 2004a).

29: Authorities operating WWTW that receive industrial effluent (also referred to as trade effluents) must ensure that monitoring programmes are implemented to record the individual flow and composition of such effluent inputs prior to entering the effluent reticulation system, as part of their industrial effluent management plan.

Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach and Participatory Approach

Data on the individual flow and composition of waste streams must be reported to the DWA on request.

30: Any authority or industry responsible for the operation and management of a coastal disposal system will be required to prepare contingency plans pertaining to maintenance shutdowns, failure in operations or emergency incidents. Such emergency Incidents are subject to the reporting provisions of Section 30 of the NEMA.

Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach and Participatory Approach

Guidance on contingency planning for the discharge of land-based effluent to the coastal environment is discussed in further detail in the RSA DWAF (2004c).

31: Any authority or industry responsible for the operation and management of a coastal disposal system will be required to provide the DEA with a regular evaluation of the performance of the coastal disposal system. The DEA will consult with the DWA on the evaluation of the performance in the case of a discharge into an estuary.

Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach and Participatory Approach

The RSA DWAF (2004c) includes guidelines on the format and the frequency at which information on the performance of a coastal disposal facility should be provided and are discussed in further detail. Reporting may include the distribution of information to the public.

32: Where performance evaluations indicate non-compliance with the predetermined specifications (including the environmental quality objectives), the authority or industry responsible for managing the effluent will be required to propose mitigating actions to ensure compliance (e.g. rehabilitation or alternative treatment options). The responsible authority and the industry operating the effluent disposal system will be required to implement such actions at their own cost upon approval of the DEA.

Principle supported: Pollution Prevention, Waste Minimisation and Precautionary Approach and Polluter Pays Principle

As a standard condition in permits, non-compliance must be reported to the DEA as well as actions taken to ensure compliance. The DEA will work with the permit holder in order to improve compliance but directives could be issued to the permit holder for non-compliance. Only after failure to react to such a directive, will prosecution follow. The DEA, through its Environmental Management Inspectorate, will investigate and take the appropriate action.

33: The decommissioning of a coastal discharge structure must be addressed in the planning stages as part of the EIA process (if an EIA is required), supporting the cradle-to-grave principle. In the case of existing coastal discharge structures (authorised prior to the publication of this national guideline), the authority, service provider or industry responsible for the operation and management of the coastal discharge will be required to conduct decommissioning in an environmentally responsible manner which must conform, inter alia***, to the duty of care principle contained in section 28 of NEMA. This may require an EIA. Negotiations should be conducted on a case-by-case basis, involving the DWA, DEA, the permit holder, service providers or industry responsible for the coastal discharge and any other parties that may be affected by the decommissioning process.***

Principles supported: Pollution Prevention, Waste Minimisation and Precautionary Approach; Integrated Assessment Approach

With regard to existing facilities, a decommissioning plan must be submitted within 12 months of the date of issue of a CWDP or GA or as requested by the DEA.

Section 5:
MANAGEMENT FRAMEWORK

The **Management Framework** described in this chapter provides a generic and structured approach within which the management and control of discharge of land-based effluent needs to be conducted. A flow chart illustrating the logical sequence of the above-mentioned components is schematically illustrated in Figure 5.1. A brief overview of each of the components is provided below.

5.1 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 discharge of land-based effluent to the coastal environment, these requirements are provided for in the *Basic Principles and Ground Rules* of this guideline. Section 1 provides a list of international and national policies and legislation that were taken into account in the development of this guideline. The *Appendices of the 2004 Operational Policy (*RSA DWA, 2004b) contains a detailed discussion on the legislation and policies that came into existence prior to 2004. The following legislation has been promulgated since the publication of the 2004 Operational Policy and has relevance to this national guideline:

5.1.1 The National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (ICMA)

The ICMA establishes a system of integrated coastal and estuarine management in the Republic, including norms, standards and policies, in order to promote the conservation of the coastal environment, and maintain the natural attributes of coastal landscapes and seascapes, and to ensure that development and the use of natural resources within the coastal zone is socially and economically justifiable and ecologically sustainable.

The ICMA addresses a number of issues relating to coastal pollution, one of which is the discharge of effluent into coastal waters (specifically municipal and industrial effluent). The Act allows for general authorisation or permits to be issued for a coastal discharge. In terms of Section 69(6) of the Act:

A person who discharges effluent into coastal waters:

- ***a) must not waste water;***
- ***b) may only do so to the extent that it is not reasonably practicable to return any freshwater in that effluent to the water resource from which it was taken;***
- ***c) must discharge the effluent subject to any condition contained in the relevant authorisation;***
- ***d) must comply with any applicable waste standards or water management practices prescribed under this Act, section 29 of the NWA or any Act of Parliament specifically dealing with waste, unless the conditions of the relevant authorisation provide otherwise; and***
- ***e) must register the discharge with the department responsible for water affairs;***

In the case of a discharge of effluent into an estuary, consultation is required with the DWA.

Furthermore, the ICMA also stipulates, in section 33, that a National Estuarine Management Protocol must be drafted. This protocol was gazetted in 2013 and requires an estuary to be managed according to the allocated

management class and the set of both resource quality and quantity attributes. In the absence of the allocated class, an estuary must be managed in its current state and/or improved state in order to achieve national biodiversity targets as outlined in National Biodiversity Assessment of 2011 and the subsequence updates.

5.1.2 The National Environmental Management: Biodiversity Act, 2008 (Act 10 of 2008) (NEM: BA)

The NEM: BA makes provision for the development of a National Biodiversity Assessment under the National List Of Ecosystems that are threatened and in need of protection published under the NEM: BA in 2011, which allocates management classes to the estuaries in the country based on their status as mentioned in 5.1.1 above.

5.1.3 The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM: WA)

The NEM: WA regulates waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. It provides for institutional arrangements and planning matters; national norms and standards for regulating the management of waste; and specific waste management measures. It also provides for the licencing and control of waste management activities, the remediation of contaminated land and a national waste information system. It also deals with issues of compliance and enforcement.

The DEA administrative process for issuing a CWDP entails a validation step which includes an assessment of all other licence/permit/authorisations requirements. Hence, in the instance of a WWTW, for example, a CWDP will only be issued upon confirmation of a Waste License in terms of the NEM: WA.

NB: The DEA is the competent authority for the licensing of WWTW as sewage waste is categorised as hazardous material according the NEM: WA.

5.1.4 The National Environmental Management Act: Environmental Impact Assessment (EIA) Regulations of 2010

South Africa's new EIA Regulations came into effect on 2 August 2010, signalling the start of the official implementation process of a new regime aimed at improving the efficiency and effectiveness of the EIA regime. Environmental Impact Assessment is a pro-active and systematic process where potential environmental impacts both positive and negative associated with certain activities are assessed, investigated and reported. The process contributes to giving effect to the objectives of integrated environmental management as decision-makers are informed of the desirability of such activities as well as the conditions under which authorisation of the activity should be subject to, where relevant.

The new revised regulations were the result of a substantial consultative process and were published by Minister of Water and Environmental Affairs. The NEMA EIA Regulations, 2010 and the listing notices thereto replace the NEMA EIA Regulations, 2006 and its associated listing notices, which in turn replaced the old EIA Regulations under the ECA (1989). The EIA Regulations, 2010 seeks to streamline the EIA process (DEA, 2010b). It also introduces an approach where impacts associated with the sensitivity of the receiving environment are treated with more care. This is achieved through the introduction of a listing notice (LN) dedicated to activities planned for predefined sensitive areas. The Gazette Number (GNR)

546 of 18 June 2010 contains the LN 3 which lists activities in specified geographical areas. The LN1 appears in the GNR 544 of 18 June 2013 and LN2 in the GNR 545 of 18 June 20134.

As in the case of the NEM: WA, the DEA administrative process for the issuing of a CWDP entails a validation step which includes an assessment of all other licence/permit/authorisations requirements. Any activity listed in the Listing notices of the NEMA EIA Regulations, 2010 requires an environmental authorisation, without which a CWDP will not be issued by the DEA. Some of the Ground Rules on this is presented in this guideline (refer to Ground Rules 2 and 33).

NOTE:

Although a CWDP/GA will not be issued without an environmental authorisation, when a NEMA listed activity is triggered, such applications for a CWDP/GA may be lodged in parallel to the application for an environmental authorisation to obtain a reference number and the assessment criteria that address matters pertaining to the impacts to the receiving environment as to avoid unnecessary delays in the process. Pre-consultation meetings will be held with applicants when required. The applicable impact studies and public participation processes conducted by the applicant will assist the CWDP/GA application process. Where no listed activities in the NEMA are triggered, the environmental authorisation process will not be applicable and the CWDP/GA process will then be the only process. In such instances, the DEA may prescribe a basic public participation process which may consist of the following:

- *A local newspaper advertisement, inviting public comment on the application;*
- *A site notice at the entrance to the facility inviting public comment on the application;*
- *Comments on the application from all state departments who administer laws relating to any matter affecting the coastal environment; and*
- *Comments on the application from the members of any forum or committee that engages in discussions around the effluent and the coastal outfall pipeline.*

The Interested and affected parties in the above basic public participation process will be afforded at least 40 (forty) calendar days to comment on the application. The information must be made readily available to all interested and affected parties (e.g. electronically, local libraries, available at the site, etc.). The information presented to the public must include, as a minimum, the CWDP/GA application submitted to the DEA and details regarding the constituents of the effluent as well as the any other information prescribed by the DEA.

5.1.5 National Programme of Action for the Protection of the Marine Environment from Land-Based Activities (NPoA)

In 2008, the DEA developed an NPoA to give effect to the Global Programme of Action as an international treaty. South Africa is a signatory to the Washington Declaration which formalised the GPA in 1995 and is therefore obliged to undertake national action that is consistent with the commitments enshrined in the GPA. Although the NPoA is not a legal document, it is nevertheless relevant as it recommends several actions that would contribute toward the management of marine pollution from land-based sources.

[4] Correction Notices which corrected the above three Notices are: Correction Notice 1 - GNR 660 of 30 July 2010 and Correction Notice 2 - GNR 1159 of 10 December 2010.

The NPoA lists priority actions for authorities to implement to tackle activities/pressures impacting on coastal water quality. The revision of the 2004 Operational Policy is a direct response to recommendations made under the NPoA. Furthermore, a training programme with regard to this guideline for both municipal and industrial effluent is also recommended as well as a national urban stormwater management programme for South Africa. The development of best practice guidelines and monitoring for specific sectors were also recommended (such as desalination, WWTW, aquaculture).

5.2 MANAGEMENT INSTITUTIONS AND ADMINISTRATIVE RESPONSIBILITIES

The discharge of land-based effluent to the coastal environment is currently governed by the DEA under the ICMA. The DEA works in consultation with DWA, in instances where the discharge of effluent occurs in estuaries. In the context of this national guideline, CWDPs, under section 69 of the ICMA will be required for:

- New proposals to dispose of land-based effluent to the coastal environment;
- Existing discharges of land-based effluent to the coastal environment that are not classified as an existing/lawful water use (and that have not been subject to an EIA);
- Upgrades or extensions of existing WWTW or industrial facilities that result in a change in the effluent composition or volumes (a permit is issued based on a specific effluent volume and composition, therefore for such changes the discharger legally may re-apply); and
- Any existing discharges to the coastal environment that were not approved in terms of the original authorisation.

Although the DEA is responsible for the overarching management and administration of the discharge of land-based effluent to the coastal environment, a key element in the successful implementation of this guideline 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'.

A fairly detailed administration process for the authorisation of effluent licences had existed prior to the ICMA under the NWA. At the time of writing this national Guideline, the DEA was in the process of developing an effluent discharge permitting system, which is summarised below:

- **Step 1**: Screening: This will entail an assessment of whether the application falls within the scope of the ICMA or requires other potential authorisations/information (such as a waste licence under NEM: WA, or an Environmental Authorisation under the NEMA EIA Regulations, 2010).
- **Step 2**: Issuance of a CWDP Reference Number and requesting of required or additional information from the applicant. Figure 2.1 below contains the detailed process of this step. The applicant must conduct the required consultations and public participation using the issued Reference Number and consider the assessment of information required by the Department.
- **Step 3.** Assessment of prerequisite information: This will involve the review of information submitted by the applicant and if it fulfils the required minimal information requested by the Department.

- **Step 4**: Detailed investigation: This will include the use of the Department's Assessment Criteria and the perusal of independent specialist reports and EMPr/ EMPs.
- **Step 5**: Review of application and recommendation to the Delegated Authority including the drafting of the CWDP, or refusal letter. This step involves the input by a review committee consisting of the department specialists.
- **Step 6**: Final Decision by Delegated Authority.

In cases where a CWDP is granted by the DEA, the permit would remain valid for a period of up to 5 years and would entail regular reviews via compliance monitoring.

NOTE: Further information on local management institutions is provided in the RSA DWAF (2004c).

5.3 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 coastal ecosystems and the beneficial uses in the affected areas provide the basis for the derivation of such site-specific environmental quality objectives.

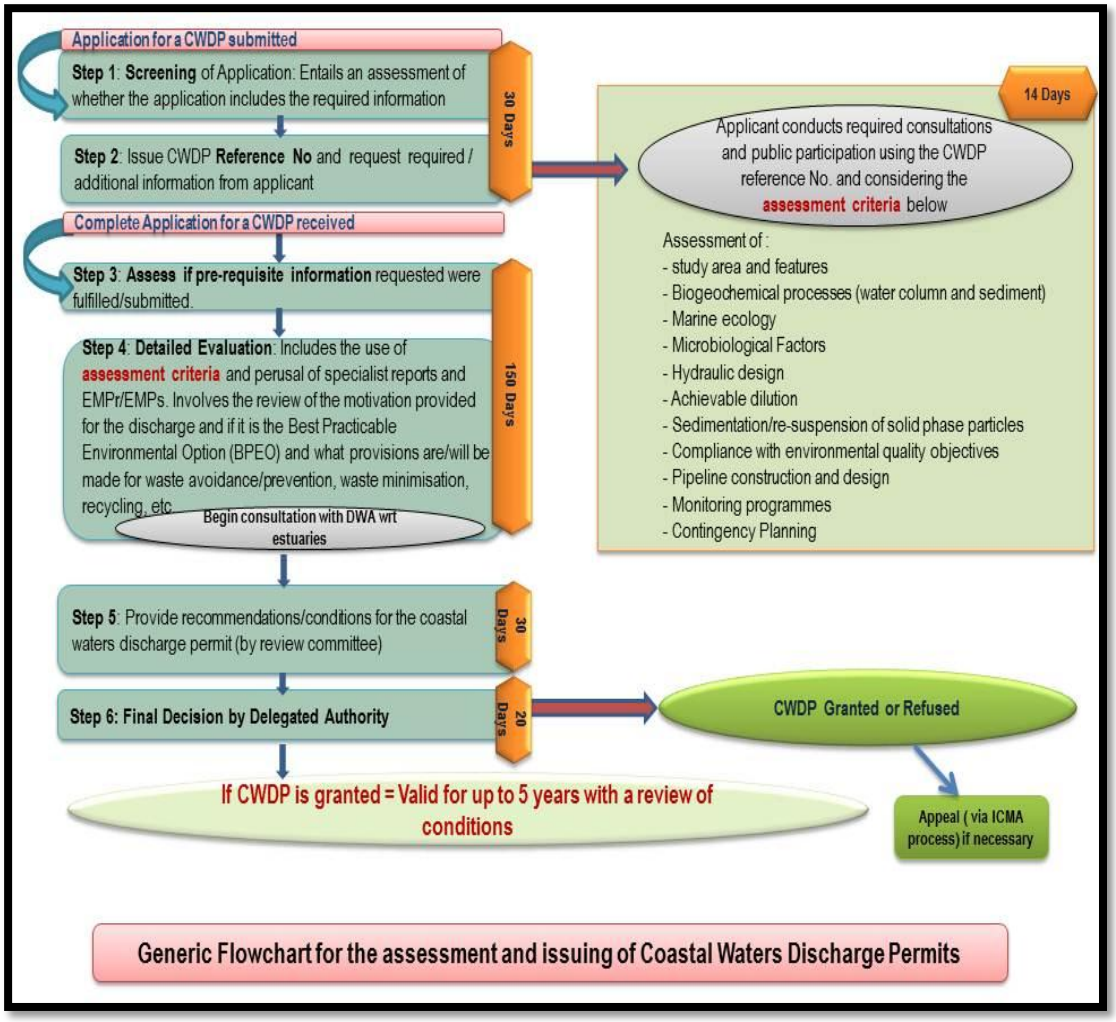
In order for environmental quality objectives to be practical and effective management tools, they need to be set in terms of measurable target values or ranges for specific water column, sediment and biological parameters.

NOTE: There is guidance on procedures to be followed to determine the area boundaries, important ecosystems, beneficial uses and associated environmental quality objectives in RSA DWAF (2004c).

5.4 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.

NOTE: Guidance for determining the specification for different types of effluent was originally provided in RSA DWAF (2004c).



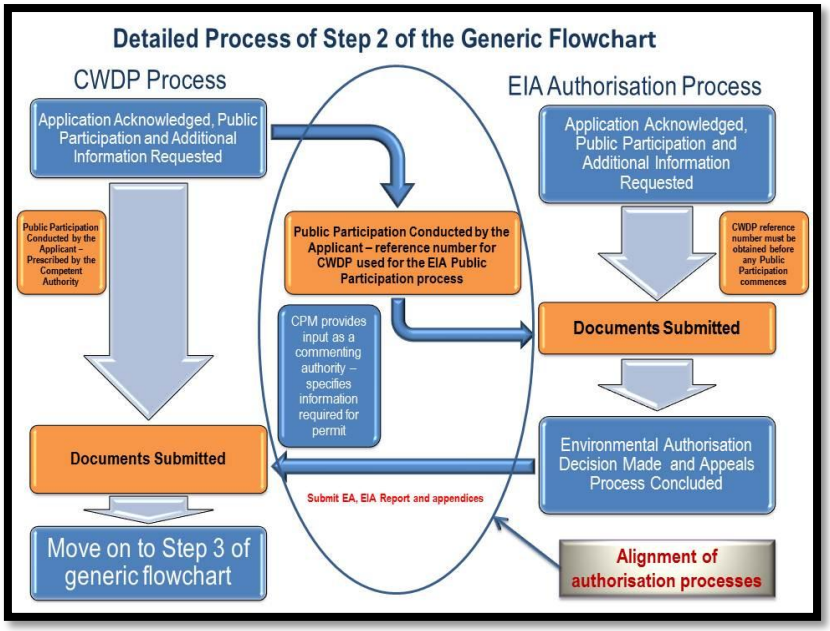


Figure 5.1: The generic process for the assessment and issuing of CWDPs in South Africa, which includes the public participation process.

5.5 SCIENTIFIC AND ENGINEERING ASSESSMENT

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

- Characterise the physical and biogeochemical processes and the ecological functioning of the receiving coastal environment;
- Conduct the hydraulic design of the (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 coastal outfall to meet requirements as determined by the above.

NOTE:* Guidance on the procedures to be followed in the scientific and engineering assessment of land-derived effluent discharges to the coastal environment is provided in *RSA* DWAF (2004c) *of 2004.

5.6 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 evaluate if the environmental responses that were predicted during the assessment process match the actual responses (Environmental monitoring).

Specific monitoring conditions will be specified in the CWDPs/GAs issued under Section 69 of the ICMA. These monitoring programmes must be designed and implemented at the cost of the permit holder (following the Polluter Pays Principle).

From a management perspective, monitoring data must be evaluated against pre-determined. Results need to be presented in a 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). Contingency plans and mitigating actions are required to minimise the risks to the environment in the event of malfunctioning equipment, both during construction and operation. Decommissioning of an effluent discharge scheme is also addressed.

NOTE: Sections 7 and 8 of the RSA DWAF (2004c) provide guidance on procedures to be followed in the design and implementation of monitoring programmes and contingency plans.

Section 6:
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