

Republic of South Africa



Water Quality Management Series

Operational Guideline NO. U2.1

AIDE MÉMOIRE

**FOR THE PREPARATION OF A WATER QUALITY MANAGEMENT
REPORT TO SUPPORT THE APPLICATION FOR LICENCES
FOR SEWAGE TREATMENT WORKS IN TERMS OF THE
REQUIREMENTS OF THE
NATIONAL WATER ACT,
1998 (ACT 36 OF 1998)**



Department of Water Affairs and Forestry

First Edition

FEBRUARY 2003

**Management
Series**

**Operational Guideline
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DOCUMENT INDEX

OPERATIONAL GUIDELINE IN U-SUBSERIES

- U2.1:** Operational guideline for the Aide Mémoire for the preparation of a water quality management report to support the application for licences for sewage treatment works in terms of the requirements of the National Water Act, 1998 (Act 36 of 1998).

APPROVAL

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| AUTHORS: | L. Boyd |
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Ms. L. Boyd
(Assistant Director: Water Quality Management)
(Urban Development and Agriculture)

Ms. M. Hinsch
(Deputy Director: Water Quality
Management)
(Urban Development and Agriculture)

Mr. J.L.J. van der Westhuizen
(Director: Water Quality Management)

EXECUTIVE SUMMARY

The Aide Mémoire has been compiled in order to assist local authorities and owners of sewage treatment works who are applying for a licence in terms of section 27(1) of the National Water Act 1998 (Act No 36 of 1998). The aim is to assist in drawing up a water quality management report in accordance with an established approach acceptable to all the regulating authorities concerned and to assist in the motivation of the application as well as to assist the decision makers whether to approve the application or not.

The WQMR document is not intended to be an exhaustive description of the project. Rather, it is a document containing sufficient information to make the reader aware of the overall character of the site and its surroundings, the disposal method, the likely impacts and how these are to be managed. However, the disposal method and its impacts must be fully described.

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TABLE OF CONTENTS

| | |
|--|-----------------|
| DOCUMENT INDEX | I |
| APPROVAL | II |
| ACKNOWLEDGEMENTS | III |
| EXECUTIVE SUMMARY | IV |
| | |
| <u>1. INTRODUCTION</u> | <u>1</u> |
| | |
| 1.1 PURPOSE OF THE AIDE MÉMOIRE FOR SEWAGE TREATMENT WORKS | 1 |
| 1.2. WHAT IS A WATER QUALITY MANAGEMENT REPORT (WQMR) | 1 |
| 1.3. HOW TO USE THIS AIDE MÉMOIRE | 1 |
| 1.4. NEW PROJECTS | 2 |
| 1.5. EXISTING OPERATIONS | 2 |
| 1.6. SECTIONS 22, 27, 28, 29 AND 30 OF THE NATIONAL WATER ACT, | 2 |
| 1.7. CH. III, SECTIONS 11, 12, 13, 15, 18, 19, 20 AND 21 OF THE WATER SERVICES ACT, | 2 |
| 1.8. DEPARTMENT OF WATER AFFAIR'S POLICIES AND STRATEGIES WITH REGARD TO WATER QUALITY MANAGEMENT | 3 |
| 1.9. THE INTEGRATED ENVIRONMENTAL MANAGEMENT PROCEDURE (IEM) | 3 |
| 1.10. DETERMINATION OF THE RESERVE | 4 |
| | |
| <u>A. THE EXECUTIVE SUMMARY OF THE WQMR</u> | <u>5</u> |
| | |
| <u>B. TABLE OF CONTENTS OF THE WQMR</u> | <u>5</u> |
| | |
| PART 1: ADMINISTRATIVE INFORMATION AND BRIEF PROJECT DESCRIPTION | 5 |
| PART 2: DESCRIPTION OF THE ENVIRONMENT | 5 |
| PART 3: WATER SUPPLY | 6 |
| PART 4: DESCRIPTION OF RETICULATION SYSTEM | 6 |
| PART 5: DESCRIPTION OF SEWAGE TREATMENT WORKS AND CLASSIFICATION | 7 |
| PART 6: WATER AND MATERIALS BALANCE DIAGRAM | 8 |
| PART 7: MANAGEMENT SYSTEMS AND POLLUTION PREVENTION METHODS | 8 |
| PART 8: DISPOSAL OF SOLID WASTE AND SLUDGES | 9 |
| PART 9: FINAL WASTE DISPOSAL EVALUATION | 9 |
| PART 10: RECOMMENDATIONS FROM OTHER INTERESTED PARTIES | 12 |
| PART 11: CONCLUSION | 13 |
| PART 12: REFERENCES AND SUPPORTING DOCUMENTS | 13 |
| PART 13: CONFIDENTIAL MATERIAL | 13 |
| PART 14: DECLARATION | 13 |

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1. INTRODUCTION

1.1 Purpose of the Aide Mémoire for Sewage Treatment works

The Aide Mémoire has been compiled in order to assist local authorities and owners of sewage treatment works who are applying for a licence in terms of section 27(1) of the National Water Act 1998 (Act No 36 of 1998). The aim is to assist in drawing up a water quality management report in accordance with an established approach acceptable to all the regulating authorities concerned and to assist in the motivation of the application as well as to assist the decision makers whether to approve the application or not.

Definitions

In this document the term *waste*, as defined by the National Water Act, 1998 (Act No 36 of 1998) herein after referred to as NWA, as any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the resource to be polluted, refers to the *effluent* to be discharged from the sewage treatment works.

1.2. What is a Water Quality Management Report (WQMR)

It is a document that aims to achieve the following objectives:

- ◆ Meet the requirements of the NWA.
- ◆ Meet the requirements of the Department of Water Affairs and Forestry's water quality management policies and strategies.
- ◆ To provide a single document that will satisfy the various authorities concerned with the regulation of the environmental impacts of waste and its disposal.
- ◆ To give reasons for the need for, and the overall benefits of the proposed project.
- ◆ To describe the relevant baseline environmental conditions applicable to the waste disposal practice.
- ◆ To describe briefly the activities so that an assessment can be made of the significant

impacts that the project or activities are likely to have on the environment.

- ◆ To describe how the negative environmental impacts will be managed and how the positive impacts will be maximised.
- ◆ To set out the applicant's management criteria that will be used to manage the waste disposal practice.
- ◆ Ensure that all licences are issued expeditiously should the application be approved of.

The WQMR document is not intended to be an exhaustive description of the project. Rather, it is a document containing sufficient information to make the reader aware of the overall character of the site and its surroundings, the disposal method, the likely impacts and how these are to be managed. However, the disposal method and its impacts must be fully described. Back-up reports should be kept on file for inspection should they be required.

1.3. How to use this Aide Mémoire

The Aide Mémoire provides a LIST OF ITEMS TO BE CONSIDERED when drawing up a WQMR. All items should be considered and IF A PARTICULAR ITEM DOES NOT APPLY TO THE PROJECT, THAT ITEM SHOULD BE MARKED "NOT APPLICABLE" IN THE WQMR DOCUMENT and where practical, a brief reason should be given as to why it is not applicable.

If an item has been considered, BUT ITS IMPACT IS INSIGNIFICANT, THAT ITEM SHOULD BE MARKED "NO SIGNIFICANT IMPACT" but the item should be described and a brief reason should be given as to why there is no significant impact.

It is advisable to consult the Regional Director concerned before commencing the WQMR in order to examine the items listed in the Aide Mémoire that need to be completed and in what format. This preplanning briefing can assist in avoiding unnecessary work.

1.4. New Projects

For proposed projects, it is necessary to address only the environmental issues that may be affected by the operational activities themselves.

The plans required for the WQMR must be on scales appropriate for the particular project or aspect described. **As a guide**, 1:50 000 scale maps would be suitable for regional and catchment descriptions and 1:10 000 scale maps would be suitable, if available, for surface infrastructure layouts, operational layouts, virgin environmental conditions and water and waste management facilities.

However, larger scale plans (at a scale of 1:2 000 or even 1:1 000) may be needed to show the details of water reticulation aspects such as, pollution control dams, return dams, seepage collection and clean water diversion works and evaporation facilities and the location of all sewage pump stations.

1.5. Existing Operations

For existing operations the emphasis changes from an assessment of the potential impacts of a project on the virgin environment to establishing the actual impacts of an operation on an environment in which development has already taken place.

1.6. Sections 22, 27, 28, 29 and 30 of the National Water Act, 1998 (Act 36 of 1998)

- ❑ In terms of section 22 of the NWA a water use must be licenced unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence.
- ❑ In terms of section 27 of the NWA, in issuing a licence a responsible authority must take into account all relevant factors included under sections 27(1)(a – k).
- ❑ In terms of the NWA all licences contemplated must incorporate the essential requirements of section 28.

- ❑ In terms of section 29(1)(a – i) and 29(2) of the NWA a responsible authority may attach conditions to a licence.
- ❑ In terms of section 30(1 – 6) of the NWA, a responsible authority may, if necessary for the protection of the water resource or property, require the applicant to give security in respect of any obligation or potential obligation arising from a licence to be issued under this Act.

1.7. Chapter III, Sections 11, 12, 13, 15, 18, 19, 20 and 21 of the Water Services Act, 1997 (Act No. 108 of 1997)

- ❑ In terms of Chapter III, section 11(1) of the Water Services Act, 1997 (Act 108 of 1997) every water services authority has a duty to all consumers or potential consumers in its jurisdiction to progressively ensure efficient, affordable, economical and sustainable access to water services.
- ❑ In terms of Chapter III, section 12(1) (a and b) every water services authority has the duty to prepare a water services development plan which must contain details as set out in section 13. In terms of section 15(5) the water services development plan must form part of any integrated development plan contemplated in the Local government Transition Act, 1993 (Act No. 209 of 1993) and in terms of section 18(1) must report on the implementation of its development plan during each financial year.
- ❑ Sections 19 and 20 indicate the requirements for contracts and joint ventures for water services providers.
- ❑ Section 21 (3)(b)(i – v) indicates the requirements for the provision of by-laws.

In order for a proper assessment of these applications to be made, it is essential (and obligatory in terms of the NWA) that the applicant furnishes detailed information concerning the operations. The requirements are set out in this document.

1.8. Department of Water Affairs's policies and strategies with regard to water quality management

Far-reaching economic, political, social and demographic changes throughout South Africa have had major impacts on water quality. Countrywide there has been a steady decline in water quality. As a result, the Directorate: Water Quality Management of the Department of Water Affairs and Forestry embarked upon a program to re-evaluate and develop its water quality management policies. A document entitled "Water Quality Management Policies and Strategies in the RSA" (April 1991), presently being updated, explains the approach which the DWA and F is taking with respect to water quality management.

The purpose of the above-mentioned document is to:

- ◆ Provide a perspective on water quality problems in South Africa;
- ◆ Review current Water Affairs' water quality management policies and strategies;
- ◆ Review the development of appropriate policies to deal with deteriorating water quality in the light of economic and social-political trends.

South Africa's surface and groundwater resources show pronounced regional differences and changes in water quality. The changes in those areas where water quality has deteriorated significantly are mostly due to man's activities. Exceptions are the ambient salinity levels of certain rivers of the Eastern and Western Cape where natural salination is of geological origin.

Salination of surface water resources, microbiological quality and eutrophication present the most serious current water quality problems. Some of the groundwater resources of the country have already been contaminated. Micro-pollutants, microbiological quality and sedimentation also warrant urgent attention.

As defined in the NWA the National Government, acting through the Minister, is the public trustee of the nation's water resources. It must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons and in accordance with its constitutional mandate.

The protection of water resources is fundamentally related to their use, development, conservation, management and control. Section 12 of the NWA provides for the first stage in the protection process, which is the development of a system to classify the nation's water resources. From this the class and resource quality objectives of all or part of water resources considered to be significant, must be determined. This must be done in terms of section 13 of the NWA. The purpose of the resource quality objectives is to establish clear goals relating to the quality of the relevant water resources. In determining these objectives a balance must be sought between the need to protect and sustain water resources on the one hand, and the need to develop and use them on the other.

Provision is made for preliminary determinations of the class and resource quality objectives of water resources before the formal classification system is established. Once the class of a water resource and the resource quality objectives have been determined they are binding on all authorities and institutions when exercising any power or performing any duty under this Act.

The challenge to ensure the protection, use, development, conservation, management and control of the country's water resources in a sustainable and equitable manner and for the benefit of all persons, will depend in part on the implementation of effective and dynamic water quality management policies and strategies, flexible enough to meet the demand of an increasingly complex and rapidly changing South Africa.

1.9. The Integrated Environmental Management Procedure (IEM)

Integrated Environmental Management (IEM) is designed to ensure that the environmental consequences of development proposals are understood and adequately considered in the planning process. The term "environmental" is used in its broadest sense, encompassing biophysical and socio-economic components. The purpose of IEM is to resolve or mitigate any negative impacts and to enhance positive aspects of development proposals.

1.9.1. The principles underpinning Integrated Environmental Management

The basic principles underpinning IEM are that there be:

- ◆ informed decision-making;
- ◆ accountability for information on which decisions are taken;
- ◆ accountability for decisions taken;
- ◆ a broad meaning given to the term environment (i.e. one that includes physical, biological, social, economic, cultural, historical and political components);
- ◆ an integrated, comprehensive and cohesive approach to obtain sustainable development;
- ◆ an open, participatory approach in the planning of proposals;
- ◆ consultation with interested and affected parties;
- ◆ due consideration of alternative options;
- ◆ an attempt to mitigate negative impacts and enhance positive aspects of proposals;
- ◆ an attempt to ensure that the “social costs” of development proposals (those borne by society, rather than the developers) are less than the “social benefits” (benefits to society as a result of actions of the developers); demographic regard for individual rights and obligations;
- ◆ compliance with these principles during all stages of the planning, implementation and decommissioning of proposals (i.e. from “cradle to grave”), and
- ◆ the opportunity for public and specialist input in the decision-making process.

The Water environment, as part of the total environment can be managed by using the IEM procedure so that correct long-term decisions are made.

1.10. Determination of the Reserve

Before a licence can be issued as described in 1.6 above, the reserve of a water resource or part of a water resource must be determined in terms of section 16 of the NWA. The Reserve consists of two parts *viz.* the basic human needs reserve and the ecological reserve. The basic human needs reserve provides for the essential needs of individuals served by the water resource in question and includes water for drinking, for food preparation and for personal hygiene. The ecological reserve relates to the water required to protect the aquatic ecosystems of the water resource. This however, requires that the water resource is classified and resource quality objectives set in terms of part 2, section 13 and 14 of the NWA.

In order to give effect to the reserve, on application for a licence, the Regional office needs to apply for the reserve determination for the resource concerned, if it has not yet been determined.

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A. THE EXECUTIVE SUMMARY OF THE WQMR

The executive summary should summarise the overall benefits of the project, highlight the major environmental findings and how these will be managed to prevent, reduce or rehabilitate adverse impacts.

B. TABLE OF CONTENTS OF THE WQMR

Application for a licence to dispose of waste from a Sewage Purification Work by eg. discharge, irrigation etc.

Part 1: Administrative Information and Brief Project Description

1.1. Name, address, telephone and fax numbers and contact persons for:

- ◆ Water Services Authority
- ◆ Water Services Provider
- ◆ the holding company/authority
- ◆ the applicant (name and status)
- ◆ the site name

1.2 Details regarding existing exemptions - if applicable.

In terms sections 21, 22 and 26 of the Environmental Conservation Act, 1989, a sewage treatment work and associated infrastructure is a listed activity depending on capacity and size.

If exempted, attach copy of letter to the report.

1.3 Details regarding the contract between the water services authority and the water services provider. (Attach a copy of the contract to this report)

1.4 Magisterial district and relevant regional services authority

1.5 Name of the nearest town/residential area and its distance from the site

1.6 Surface infrastructure serving the site (e.g. roads, railways, power lines etc.)

1.7 Ownership of the land

1.8 Longitude and Latitude of the site

1.9 Zoning of the land

1.10 Ownership of adjacent/potentially impacted land

1.11 Occupier of the adjacent land

1.12 Zoning of the adjacent land

1.13 Name of the river catchment

1.14 Brief description of the intention of this application

NB: Use maps to indicate the above information where necessary.

1.15 Has this sewage treatment works been included in the Water Services Development Plan (WSDP)

- ◆ WSDP Registry File Number as given by the Department

Part 2: Description of the Environment (for orientation and first order screening)

2.1 Climate

- ◆ regional climate
- ◆ rainfall data
- ◆ temperature data
- ◆ wind data
- ◆ evaporation data
- ◆ extreme weather conditions prevalent (e.g. snow, frost, hail etc.)

2.2 Topography

2.3 Soil

2.4 Geology - General geology of the area - presence of dykes, sills and faults

2.5 Land capacity (arable, grazing, wetland or wilderness)

2.6 Land use – zoning

2.7 Natural vegetation and plant life

2.8 Surface water

- - ◆ name of nearest watercourse
 - ◆ water quality - pH, conductivity etc.
 - ◆ surface water use (domestic, industrial, agricultural, recreational or natural environment)
 - ◆ water authority
 - ◆ presence of wetlands
- 2.9 Groundwater**
- ◆ presence and position on a map, of boreholes within a 1000 m radius of the site
 - ◆ yield of boreholes
 - ◆ groundwater use
 - ◆ groundwater quality (pH, conductivity, nitrate)
- 2.10 Air quality**
- 2.11 Noise**
- 2.12 Sites of archaeological interest**
- 2.13 Sensitive landscapes**
- 2.14 Visual aspects**
- 2.15 Regional socio-economic structure (Short description)**
- ◆ population
 - ◆ economic activities
 - ◆ unemployment rate
 - ◆ housing demand
 - ◆ social infrastructure
 - ◆ water supply and sanitation
 - ◆ power supply
- 2.16 Interested and Affected parties**
- 2.17 Industrial activity**
- ◆ types of industries present
 - ◆ waste purification
 - ◆ by industry/third party
 - ◆ by local authority

Part 3: Water supply

3.1 Water use

3.1.1 Sources of water

- ◆ local authority
- ◆ river

- ◆ boreholes
- ◆ sea
- ◆ irrigation board or waterboard
- ◆ use of excess groundwater
 - ◆ recycled waste (internal source, eg. cooling water)
 - ◆ recycled waste (external source, e.g. sewage waste)

In all above cases the average daily/monthly and maximum daily/monthly quantities are required.

3.1.2 Yearly usage patterns (e.g. more in summer than winter)

3.1.3 Yearly water use

3.1.4 Water rights (Legal documents)

- ◆ riparian rights
- ◆ public or private water
- ◆ entitlements
- ◆ water court orders
- ◆ quotas
- ◆ agreements

Part 4: Description of Reticulation system

4.1 Percentage of area served which is unsewered

4.1.1 How is this area serviced:

- ◆ pit latrines
- ◆ bucket system
- ◆ conservancy tanks
- ◆ septic tanks and french drains

4.2 Percentage of the area which is sewerred/to be sewerred

4.2.1 What type of network is in place/will be installed

- ◆ standard reticulation
- ◆ small bore system

4.2.2 Location of sewers

- ◆ mid block
- ◆ standard

4.3 Nature of sewage

4.3.1 Domestic component - projections (no. of persons)

| Population | year x | year x + 5 | year x + 10 | year x + 15 | year x + 20 |
|-----------------------|--------|------------|-------------|-------------|-------------|
| High Income Permanent | | | | | |
| Low Income Permanent | | | | | |
| Holiday Makers | | | | | |

4.3.2 Industrial component

- ◆ daily volumes/expected volume treated
- ◆ type of industrial waste
 - ◆ mainly organic
 - ◆ organic/inorganic
 - ◆ heavy metals
 - ◆ mixture
- ◆ names of industries contributing to the volume (and locally treated) including problem constituents received from each

4.4 Hydraulic and organic loading

4.4.1 Hydraulic loading

- ◆ high income
- ◆ low income
- ◆ holiday makers
- ◆ industrial component

4.4.2 COD load (g/day)

4.4.3 Total Nitrogen as TKN (g/day)

4.4.4 Phosphate as P (g/day)

4.4.5 Peak dry weather flow factor

- ◆ X x Normal DWF

4.4.6 Peak wet weather flow factor

- ◆ X x Peak DWF

Part 5: Description of Sewage Treatment works and Classification

5.1 Inlet works (screens, grit channels and flow measurement)

5.1.1 State your method of disposal of screenings and grit, e.g. by burial, incineration, etc.

5.1.2 State the location of the disposal site and/or the name of the solid waste dump

5.1.3 Method of flow measurement

5.2 Primary sedimentation tanks:

5.2.1 What are the nominal upward flow rates for:

- ◆ average dry weather (m^3/hr)
- ◆ peak storm flow (m^3/hr)

5.3 Septic tanks

5.3.1. State the number of septic tanks and volume of each

5.3.2 State the average retention time in the tank(s) at average dry weather flow (hours)

5.3.3 State the average depth of tank(s) (m)

5.3.4 State the (proposed) methods of periodical desludging

5.3.5 State the methods of disposal of the sludge so removed

5.3.6 State the method of disposal of the overflow, if not to further processing, eg. to french drains, soakaway, etc.

5.4 Biological filtration systems

5.4.1 State the number of cubic meters of settled sewage per cubic meter of media per day ($m^3/m^3/day$)

5.4.2 State the number of grams of “4 hour PV” per cubic meter of media per day ($gm/m^3/day$)

5.5 Activated sludge systems - where applicable, give proprietary names: State the:

5.5.1 Type of system and basic design information;

5.5.2 Method of operation; and

5.5.3 Method of phosphate removal, if any.

5.6 Humus tanks or secondary sedimentation tanks:

5.6.1 What are the nominal upward flow rates for:

- ◆ average dry weather flow (m^3/hr)
- ◆ peak storm flow (m^3/hr)

5.7 Sludge handling:

- 5.7.1** State the quantity of wet sludge (to be produced per day) (m^3)
- 5.7.2** State the method of treatment of surplus activated sludge discharged, prior to its disposal on land or to drying beds or by other means
- 5.7.3** State the relative digester capacity (m^3 /capita)
- 5.7.4** State the total digester capacity (m^3)
- 5.7.5** How is the supernatant liquid (to be) disposed of ?
- 5.7.6** If land disposal of wet sludge is (to be) used, state the area of land (ha)
- 5.7.7** State the relative capacity (m^3 /capita) of any sludge drying beds
- 5.7.8** State the total area (m^2) of any sludge drying beds
- 5.7.9** How is drainage from the beds or other separators (to be) dealt with?
- 5.7.10** What other means are (to be) used for dealing with digested or any other sludge?
- 5.7.11** How is the dried sludge (to be) finally disposed of, e.g. on land, by incineration, etc.?

5.8 Oxidation pond systems:

- 5.8.1** Describe any pretreatment units ahead of the ponds and state their capacity
- 5.8.2** State the number of ponds in the system, their depth and surface area for each
- 5.8.3** Give the sequence of flow through the pond system
- 5.8.4** What is the:
 - ◆ average dry weather flow (m^3 /hr)
 - ◆ peak storm flow (m^3 /hr) of the pond system, if any ?
- 5.8.5** Where is the outflow (to be) directed to, e.g. evaporation ponds, irrigation, etc.

5.9 Tertiary treatment - state basic design details, where applicable for:

- 5.9.1** Micromesh screens
- 5.9.2** Rapid gravity sand filters
- 5.9.3** Slow sand filters
- 5.9.4** Hamlin filters
- 5.9.5** Reedbed systems
- 5.9.6** Maturation pond system, i.e. the number of ponds, the sequence in

which they are used (e.g. in series), the retention time in each pond (days) and the total capacity of the ponds (m^3)

5.9.7 Phosphate removal - give details of the method and of the basic design

5.9.8 Disinfection of the final effluent - if by chlorination, give details of the method and the contact time in the pond or contact tank; if by any other method, UV light, ozone, etc., give details of use, including the period of application and the intensity

5.9.9 Any other tertiary treatment

5.10 Classification of works and operators

5.10.1. is the works classified?

5.10.2. are all operators classified?

- request relevant forms for classification of both the works and the operators in terms of the present Regulation No. R 2834 from (012) 336 7547.

5.11 Fencing around the works – describe.

Part 6: Water and Materials Balance**Diagram**

Supply a flow diagram showing all inputs and outputs (including materials, chemicals, wastes, sludges, solid waste etc.)

Part 7: Management Systems and Pollution**Prevention Methods**

7.1 Description of hierarchy of operating staff

7.2 Availability of mechanical maintenance staff

7.3 Availability of electrical maintenance staff

7.4 Availability of process control staff and/or process consultants

7.5 Are there a set of drainage by-laws in place (if so, attach a copy)

- ◆ are the by-laws actively administered

7.6 Technology - This must be answered considering the description of the environment and the environmental impacts

- 7.6.1 Is the waste treatment process the best option to protect the described environment - motivate
- 7.6.2 Is the disposal practice the best option - motivate
- 7.6.3 Is the best available technology in use (best environmental option) - motivate
- 7.6.4 What are the alternative options of treatment and disposal?
- 7.6.5 Why was the proposed/existing option chosen
- 7.7 WQ Operational Management Plan
- 7.7.1 What are the chances of a system failure?
- 7.7.2 What are the implications of such a failure?
- 7.7.3 What safety factors have been used?
- 7.7.4 What are the management and maintenance plans?
- 7.7.5 Availability of standby/spare equipment?
- 7.7.6 What are the accident and emergency action plans?
- 7.7.7 What plans are there to minimise the pollution hazard/potential?
- 7.7.8 What monitoring and auditing systems do you have to detect malfunctions?
- 7.7.9 Are there alarm systems in place at all pump stations?
- 7.7.10 Are there notification procedures for the downstream users?

Part 8: Disposal of solid waste and sludges

8.1 Description of solid waste

8.1.1 Solid waste

- ◆ quantity
- ◆ tons per day
- ◆ tons per year

8.1.2 Analyses of solid waste (composition and percentages)

8.2 Description of sludges

- ◆ quantity
- ◆ tons per day
- ◆ tons per year

8.2.1 Analyses of sludges

8.2.2 Classification of sludges according to the Guidelines:

Permissible Utilisation and Disposal of Sewage Sludge, Edition 1 August 1997.

8.2.3 Disposal to ponds/lagoons

- ◆ Groundwater monitoring

8.2.4 Land disposal

- ◆ Irrigation
- ◆ Composting
- ◆ Analyses of soils
- ◆ On site
- ◆ Off site

- ◆ Description of groundwater monitoring

8.2.5 Description of contracts for removal of sludges.

Part 9: Final Waste Disposal Evaluation

There are various options which can be taken when disposing of waste. It can be disposed of to:

- ◆ land
 - ◆ ponds/dams and or irrigation
- ◆ groundwater
 - ◆ recharging of aquifers
- ◆ surface water
- ◆ estuaries or lagoons
- ◆ sea
 - ◆ surf zone
 - ◆ deep sea pipelines
- ◆ air - evaporation
- ◆ municipal works or private contractor
- ◆ contained areas
- ◆ mined out areas (underground)

The waste disposal practice needs to be fully evaluated taking into account various norms and standards. Before an exemption allowing a certain disposal practice can be issued, it is imperative that the practice is shown to have a minimal environmental impact and that the practice has the minimum effect on the health and interest of other water users in the environment.

9.1 Quantity

- ◆ number of days discharged
- ◆ average m³ per day/maximum and peak
- ◆ average m³ per year/maximum and peak

9.2 Land disposal - ponds or dams**9.2.1 Waste quality analyses**

- ◆ pH
- ◆ conductivity
- ◆ suspended solids (SS)
- ◆ COD
- ◆ NH₃
- ◆ NO₃
- ◆ Ortho phosphate (as P)
- ◆ *Faecal. coli*

9.2.2 What is the waste quantity

- ◆ daily volumes
- ◆ monthly volumes for each month

9.2.3 What is the geology underlying the dams**9.2.4 What is the depth of the watertable****9.2.5 What is the slope of the site****9.2.6 What is the average monthly evaporation and rainfall**

- ◆ monthly totals

9.2.7 Calculate the positive/negative monthly evaporation rate using all the above information**9.2.8 Calculate the size of the ponds required. Take into account the waste that was stored during months of negative evaporation rates.****9.2.9 What is the situation of the dams with regard to**

- ◆ rivers
- ◆ boreholes
- ◆ use
- ◆ yield
- ◆ quality
- ◆ springs/fountains
- ◆ natural depressions
- ◆ urban areas
- ◆ dwellings

9.2.10 Is the dam site protected from ingress of stormwater**9.2.11 What is the use of groundwater in the vicinity**

- ◆ domestic
- ◆ agricultural
- ◆ stockwatering
- ◆ irrigation
- ◆ industrial

9.2.12 Have the dams been sealed with

- ◆ plastic liners
- ◆ bentonite or other clay

9.2.13 Are there seepage collection drains and return pumps**9.2.14 Describe the leakage detection and monitoring systems in place****9.3 Land disposal - Irrigation areas****9.3.1 Waste quality analyses**

- ◆ pH
- ◆ conductivity
- ◆ suspended solids (SS)
- ◆ COD
- ◆ NH₃
- ◆ NO₃
- ◆ Ortho phosphate (as P)
- ◆ *Faecal. coli*

9.3.2 What is the waste quantity

- ◆ daily volumes
- ◆ monthly total for each month

9.3.3 What is the average monthly evaporation and rainfall

- ◆ monthly totals

9.3.4 What is the crop to be irrigated**9.3.5 What is the crop factor****9.3.6 What type of irrigation method is used (flood or overhead)**

- ◆ how many overhead sprayers are in place
- ◆ how many days are in an irrigation cycle

(attach an irrigation design layout and management plan)

9.3.7 What is the irrigation/application efficiency?**9.3.8 Determine the monthly crop irrigation requirements.****9.3.9 What is the permeability and infiltration rate of the soil profile****9.3.10 What is the slope of the irrigation area****9.3.11 What is the root depth of the soil****9.3.12 What is the underlying geology****9.3.13 Calculate the size of the irrigation area required. Take into account the irrigation of waste that was stored during months of negative evaporation rates.****9.3.14 What is the depth of the watertable**

- ◆ summer
- ◆ winter

9.3.15 Quality of the groundwater (macro analyses - major anions and cations)**9.3.16 Slope of the irrigation area**

-
- 9.3.17 Direction of groundwater flow
 - 9.3.18 Situation of the area with regard to :
 - ◆ rivers
 - ◆ boreholes
 - ◆ use
 - ◆ yield
 - ◆ quality
 - ◆ springs/fountains
 - ◆ natural depressions
 - ◆ urban areas
 - ◆ dwellings
 - 9.3.19 What is groundwater in the vicinity used for?
 - ◆ domestic
 - ◆ agricultural
 - ◆ stock watering
 - ◆ irrigation
 - ◆ industrial
 - 9.3.20 are there environmental protection methods in place such as:
 - ◆ stormwater cut-off trenches above the site
 - ◆ cut-off canals below the site
 - 9.3.21 What soil amendments are done per season to sustain soil fertility and permeability
 - 9.3.22 Soil evaluation (analyses)
- 9.4 Disposal to groundwater
- 9.4.1 Waste volume
 - 9.4.2 Waste quality analyses
 - ◆ pH
 - ◆ conductivity
 - ◆ suspended solids (SS)
 - ◆ COD
 - ◆ NH₃
 - ◆ NO₃
 - ◆ Ortho phosphate (as P)
 - ◆ *Faecal coli*
 - 9.4.3 Depth of groundwater
 - 9.4.4 Yield of groundwater (1000 m radius of disposal area)
 - 9.4.5 Quality of groundwater (macro analyses - major anions and cations)
 - 9.4.6 Potential use of groundwater
 - ◆ domestic
 - ◆ agricultural
 - ◆ stockwatering
 - ◆ irrigation
 - ◆ industrial
 - 9.4.7 Critical quality component
- 9.5 Disposal to surface water
- 9.5.1 Quantity of waste
 - 9.5.2 Annual discharge pattern
 - 9.5.3 Name of minor river catchment
 - ◆ area of catchment
 - ◆ mean monthly run-off
 - ◆ quality of river upstream of discharge
 - 9.5.4. Waste quality analyses
 - ◆ pH
 - ◆ conductivity
 - ◆ suspended solids (SS)
 - ◆ COD
 - ◆ NH₃
 - ◆ NO₃
 - ◆ Ortho phosphate (as P)
 - ◆ *Faecal coli*
 - 9.5.5 Established use of river
 - ◆ domestic
 - ◆ agricultural
 - ◆ industrial
 - ◆ recreational
 - ◆ environmental
 - 9.5.6 Establish the applicable WQ Criteria
 - 9.5.7 Establish the critical components
 - 9.5.8 Name of major river catchment
 - * Collect same information as for minor catchment
 - 9.5.9 Quality of minor catchment before discharge into major catchment (analyses)
 - 9.5.10 Quality of major catchment river upstream of minor river (analyses)
 - 9.5.11 Quality of major catchment river downstream of confluence of minor river (analyses)
 - 9.5.12 Mean monthly run-off of major catchment upstream of minor river
 - 9.5.13 Describe the RWQO's for the total catchment
 - 9.5.14 Calculate Waste Load Allocations (WLA's) and the effect which the discharge will have on the REQO (Receiving Environmental Quality Objectives)
- 9.6 Discharge to lagoon and estuary - This discharge could have an impact similar to surface or sea discharge. The questions related to surface discharge will be applicable.
- 9.7 Discharge to sea
There are two types of sea discharge

- ◆ surfzone
- ◆ deep sea outfalls

The following questions will be relevant to both

9.7.1 Quantity of waste discharged

- ◆ daily
- ◆ seasonal variation

9.7.2 Quality of waste discharged

- ◆ pH
- ◆ conductivity
- ◆ suspended solids (SS)
- ◆ COD
- ◆ NH₃
- ◆ NO₃
- ◆ Ortho phosphate (as P)
- ◆ *Faecal coli*

9.7.3 Sea water quality criteria applicable to the discharge area

9.7.4 Establish the critical quality components

9.7.5 Calculate dilution rates required to achieve the Sea Water Quality Criteria

9.7.6 Length of pipeline

9.7.7 Depth of the pipeline below the LWOST mark (Low Water Ordinary Spring Tide)

9.7.8 Number of diffusers at the boil

9.7.9 Calculate the dilution at the boil

9.7.10 Use of the beaches 5 km on either side of the pipeline

9.7.11 Classification of the coastline 5 km on either side of the pipeline

9.8 Disposal by evaporation

Evaporation occurs within a process because of excess heat, or in cooling towers or in specially designed dams where it is promoted. If evaporation is promoted by means of an evaporation pond system then the points that have to be addressed are exactly the same as mentioned under section 9.2

9.9 Municipal or private waste purification plant (other than works being evaluated)

9.9.1 Name of plant

9.9.2 Name of owner

9.9.3 Address, telephone and fax. no. and name of contact person

9.9.4 Registration number of the works (if applicable)

9.9.5 Letters of acceptance of the waste by the owner of the works (attach a copy of the agreement for the delivery and acceptance of the waste)

9.9.6 Purification plant compliance record

9.9.7 Are there any quality acceptance limits in operation, e.g. Drainage by-laws (attach a copy)

9.9.8 Are there any critical components in the raw waste (identify)

9.9.9 Effect of acceptance of the raw waste on the compliance record of the purification plant

Indicate on a plan - on a 1:50 000 - map

Sewage treatment works

- ◆ municipal (local authority)
- ◆ other
- ◆ describe

Re-use

- ◆ agriculture
- ◆ industrial
- ◆ municipal
- ◆ other

Land

- ◆ dams/ponds/evaporation
- ◆ irrigation only
- ◆ dams/ponds/irrigation

Stormwater drains

- ◆ name of nearest water course

Water course/river

- ◆ name
- ◆ name of greater catchment river

Estuary

- ◆ name of estuary

Sea

- ◆ name of nearest town or beach

Disposal to solid waste disposal site

- ◆ name

Groundwater (recharge)

- ◆ name of nearest user
- ◆ name of farm or district

Part 10: Recommendations from other Interested Parties (To be submitted with the application)

10.1 Department of National Health

10.2 Department of Environmental Affairs and Tourism

10.3 South African Bureau of Standards

10.4 Nature Conservation Bodies

10.5 Regional Government Institutions

10.6 Local Government Institutions

10.7 Department of Agriculture

10.8 Department of Mineral and Energy Affairs

10.9 Other specialists

10.10 Non-governmental Organisations

10.11 Interested and Affected Parties

10.12 Public Participation

Part 11: Conclusion

Your conclusion should contain a concise request for the licence required and should include *accurately* completed licence application forms* obtainable from the Regional office – see licence application manual for correct application procedure, forms etc.

*NOTE: in order for the DWAF to expedite the application in as short a time as possible the correct information is essential.

Part 12: References and Supporting Documents

References to back up the information supplied will be added as annexures under this section.

Part 13: Confidential material

Should the proponent wish to keep certain business (including technical information and innovations) or financial information confidential and to exclude this from the WQMR document, reference to this should be made in this section.

Part 14: Declaration

I hereby declare that the information submitted in this Water Quality Management Report is, to the best of my knowledge, correct.

SIGNED: _____

DESIGNATION: _____

APPLICANT'S REFERENCE

NUMBER: _____

DATE: _____

