Operational Guideline: Intergrated Water and Waste Management Plan

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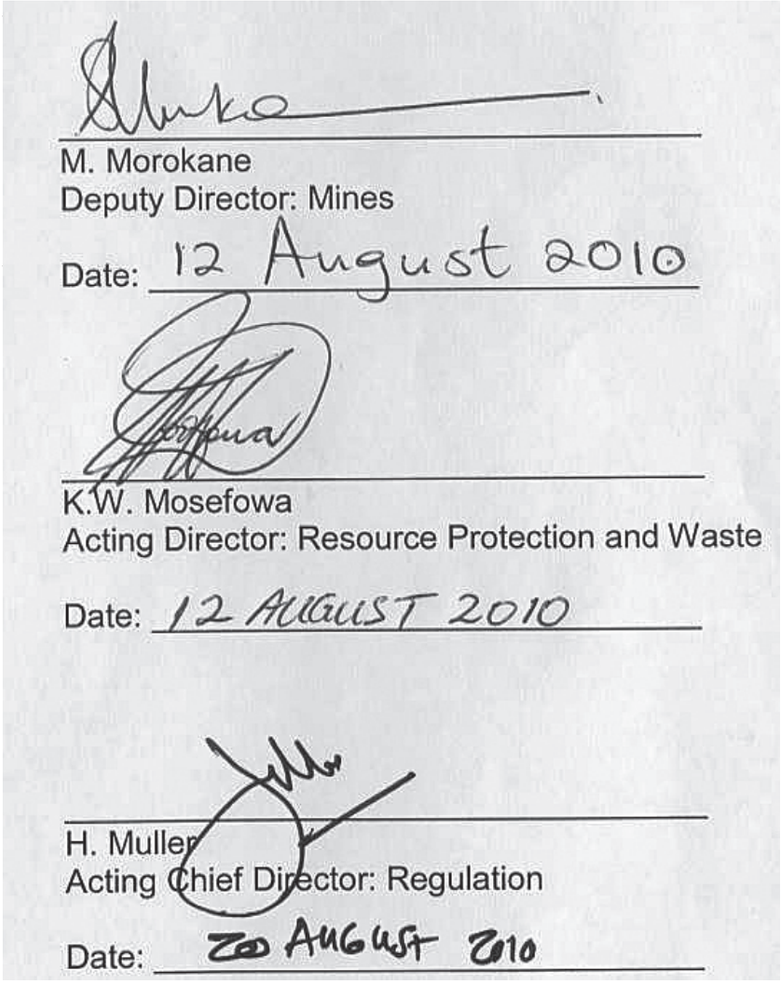
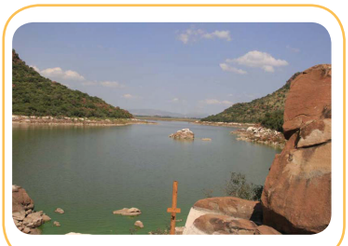
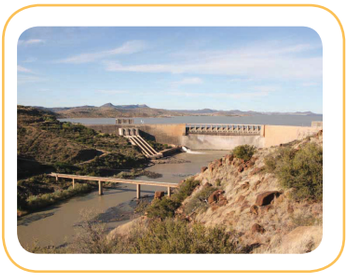


Executive Summary





The Integrated Water and Waste Management Plan (IWWMP) has been compiled to assist mines and industries who applying for a licence in terms of section 40 (1) of the National Water Act, 1998 (Act 36 of 1998). The aim is to assist in compiling water quality management technical document in accordance with an established approach acceptable to all the stakeholders 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.

Although the requirement for the compilation of an IWWMP was originally aimed at collating and rationalising the information submitted for water use licence applications, it has progressed beyond this purpose to:

Provide the regulatory authorities with focused and structured information not only to meet their general information needs, but also to articulate the required management measures and actions to achieve the water and waste related performance on an ongoing basis;

Provide direction and guidance to the water user on water and waste management of any activity.

This guideline should be used in conjunction with other guidelines as developed by DWA, such as the External Guideline on the Water Use Authorisation Process and the series of Best Practice Guidelines for water resource protection in the Industries and Mines.

This guideline advocates that the IWWMP is a living document that needs to be updated and "kept alive" as new information becomes available to provide ongoing and updated guidance to the water user on their water and waste management.

OPERATIONAL GUIDELINE TO ASSIST IN THE COMPILATION OF AN INTEGRATED WATER AND WASTE MANAGEMENT PLAN

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Acronyms

BPG	Best Practice Guideline
CBA	Costs Benefit Analysis
CMA	Catchment Management Agency
CMS	Catchment Management Strategy
DMR	Department of Mineral Resources
D/S	Downstream
DWA	Department of Water Affairs
IAP	Interested and Affected Parties
ISP	Internal Strategic Perspective
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMPR	Environmental Management Programme Report
ERA	Environmental Risk Assessment
IWRM	Integrated Water Resource Management
IWWM	Integrated Water and Waste Management
IWWMP	Integrated Water and Waste Management Plan
NWA	National Water Act, 1998 (Act 36 of 1998)
ECA	Environmental Conservation Act, 1989 (Act 73 of 1989)
NWRS	National Water Resource Strategy
RPW	Resource Protection and Waste
RQO	Resource Quality Objective
U/S	Upstream
WULA	Water Use Licence Application
WUA	Water Use Authorisation
WfGD	Water for Growth and Development

Definitions

Activity An activity is defined as any water use or related activity which requires a water use licence in terms of section 40 of the National Water Act, 1998 and includes mines, industries, and related processes, etc.

1

Introduction and Purpose

1.1 WHY DOES DWA REQUIRE AN IWWMP?

The question could be asked why the Department of Water Affairs requires an Integrated Water and Waste Management Plan. Historically, the water use authorisaton (WUA) process generated a wealth of information. At present the submission of vast quantities of data and information to DWA contributes towards confusion, instead of addressing departmental information requirements for water use authorisation. Water users tend to submit vast quantities of information to DWA in the WUA process in an endeavour to satisfy unspecified departmental requirements. This information is often not consolidated into a simple, implementable water and waste management plan by the water user.

Therefore, over recent years more and more proponents have been requested to develop an IWWMP. Without clear guidance a situation has emerged where there is not a consistent and uniform approach by the various DWA regional offices towards the development and requirements relating to IWWMPs and the departmental officials or water users are subjected to personal interpretation of what information should be contained in an IWWMP.

Furthermore, failure to submit an IWWMP results in an unacceptable situation where DWA officials have to extract relevant information from other documentation submitted to DWA.

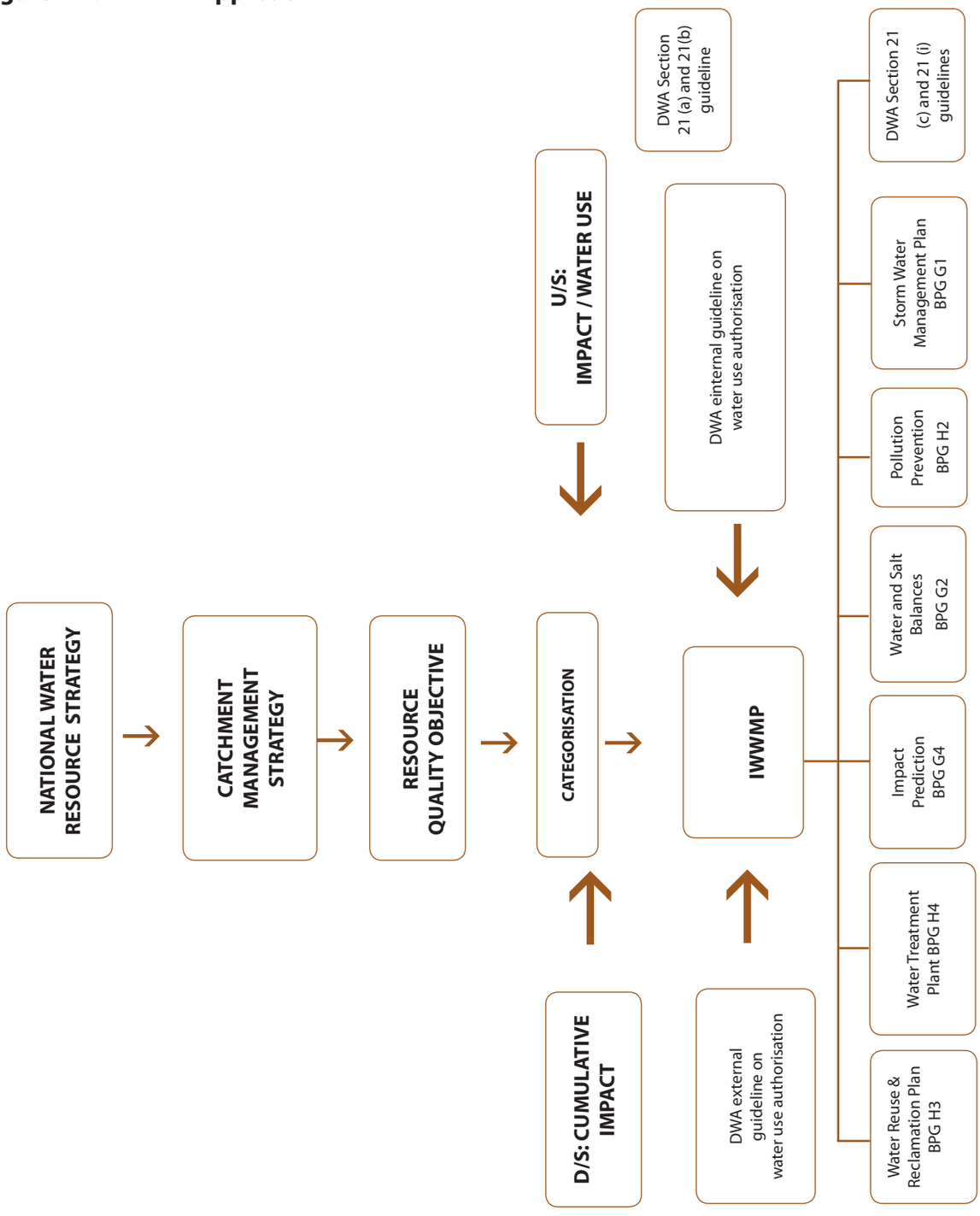
This Operational Guideline was specifically developed by the DWA in order to address this unacceptable situation.

Water resource planning is undertaken within the framework of integrated water resource planning (IWRP) and integrated water resource management (IWRM). These integrated processes include the sustainable utilisation of water resources and the equitable distribution of water. The DWA and/or Catchment Management Agencies (CMA) implement IWRM at source by means of an IWWMP.

In summary it could be stated that the DWA requires an IWWMP as a simple, feasible, implementable plan for water users based upon site specific programmes, also taking into account the National Water Resource Strategy (NWRS), Catchment Management Strategy (CMS), Resource Quality Objectives (RQO's) and sensitivity of the receiving water resource, upstream and downstream cumulative impacts of water use activities, external water use authorisation guidelines, as well as water use specific supplementary information requirements.

Figure 1.1 provides for a schematic layout in the approach to be followed in order to compile a site specific IWWMP.

Figure 1.1: IWWMP Approach



It is important to note that all Integrated Water Resource Management (IWRM) principles need to be considered as part of the IWWMP development process. The development of a site specific IWWMP is dependant on the risk categorisation of the activity. The risk related to a specific activity will be confirmed by the responsible regional office during the pre-application consultation with DWA.

1.2 PURPOSE OF THE IWWMP

The purpose of an IWWMP is as follows:

- Compilation of a site specific, implementable, management plan addressing all the identified water use and waste management related aspects (e.g. process water balances, storm water management, groundwater management, water reuse and reclamation, water conservation and demand management, waste minimization and recycling) of a specific activity, in order to meet set goals and objectives, in accordance with IWRM principles;
- Provision of management plan to guide a water user regarding the water and waste related measures which must be implemented on site in a progressive, structured manner in the short, medium and long term; and
- Documentation of all the relevant information, as specified in this guideline, to enable DWA to make the decision regarding the authorisation of a water use.
- Clarification of the content of the IWWMP for DWA officials and the water users, as the various regional offices of DWA might have different interpretations regarding the content of an IWWMP.
- Standardisation of the format of the supporting documentation which DWA requires during submission of a Water Use Licence Application (WULA);
- Provision of guidance on the content of information required in an IWWMP as part of the water use authorisation process and level of detail that DWA requires to enable them to evaluate the supporting documentation to make a decision on authorising water use;
- Ensuring that a consistent approach is adopted by DWA and the various Regional Offices and CMA's with regards to IWWMPs.

1.3 WHO SHOULD USE THE IWWMP GUIDELINE

This document is intended to be used by the following target audience:

- Departmental officials, inclusive of Regional Offices and Catchment Management Agencies who are directly involved in the Department of Water Affairs' water use authorisation process; and

- Consultants, interested and affected parties, water users, mines and industries that require an understanding of the technical requirements of the DWA for water use authorization.

1.4 DWA'S APPROACH ON IWWMP

The compilation of an IWWMP is not a process designed to consist of the padding of information by means of the combination of all the existing information and studies into a single big document. It is also not a duplication of existing EIA and/or EMP processes. It is a process in which the essence is abstracted from all existing water management programmes and specialist studies and consolidated into a single feasible, sustainable and measurable plan that could be implemented, audited and monitored by water users, government and IAPs, and which can be updated and improved on a continual basis.

It is therefore a departmental requirement that a water user needs to compile an IWWMP for any one of the following purposes:

- As the supporting technical documentation for any IWULA;
- When converting Existing Lawful Use (ELU) to licenced water use; and
- In order to comply with the conditions of an existing water use licence.

If adequate baseline information is not available during the compilation of the IWWMP, it is recommended that the IWWMP be considered as an Interim IWWMP. This Interim IWWMP will then contain an IWWMP action plan to address the outstanding information. DWA will issue the water use licence based upon this Interim IWWMP and the submission of an updated IWWMP will be set as a condition in the water use licence (WUL). The water use licence will also contain conditions for the annual update or review of the action plan of the IWWMP.

2 IWWMP Process

During the *Pre-application consultation stage* of the Water Use Authorisation Process the water user needs to consult DWA in a meeting to discuss the relevant strategies applicable to the specific activity, namely the NWRS, CMS, WCDM, WfGD and the ISP or (CMS), the applicable Receiving Water Quality Objectives (RWQO) and Reserve Determinations, as well as the timeframes for short, medium and long terms measures in relation to the activity.

This step is followed by written confirmation of the risk categorisation and classification of the activity or proposed water use. The risk categorisation for non-consumptive water uses, such as section 21 (c) and 21 (i) water uses, should be done in case there are other water uses associated with the activity.

The next step in the IWWMP process entails information gathering. Information is obtained from other environmental authorisation processes conducted, such as the EIA and EMPR processes. The supporting specialist investigations together with the public participation process should provide the required input into the IWWMP. Should any information gaps exist in the available information, further specialist investigations should be conducted to supply the required information.

The available information is utilised to document a broad project description and the baseline environmental situation. The relevant water use and waste management related legislative framework is summarised in the document as part of the legal assessment.

This is then followed by a site characterisation or analyses phase. Large sites are delineated into smaller facilities to facilitate proper water use and waste related assessment.

During this phase a detailed analyses is conducted of the water use and waste management activities on site, the operational management and the monitoring and controls implemented. It also includes an assessment of the implementation of best practices on site.

The performance of a risk assessment is a critical component of the site characterisation. The risk assessment should address the aspects, impacts, and the severity and probability of the risks related to the activity. The identification of the high risks associated with the activity and the site characterisation process leads to the identification of the matters which require attention in an activity (problem statement) and also a statement relating to the adequacy of the available information.

The most important component of the IWWMP development process is the formulation of various strategies, goals and objectives for the water use or waste management of an activity, in accordance with the set philosophies and policies. The policies must address the four key areas related to IWWMP development, namely process water, storm water, ground water and waste.

A range of management measures are then identified to reach the set goals and objectives. These management measures are then documented in an IWWMP action plan and this forms the heart of the IWWMP.

The IWWMP document is concluded with a statement on the legal status of the activity's water use and waste management and whether authorization is required, a motivation in terms of section 27(1) of the NWA supported by key commitments of the water user to fulfill the aspects of section 27(1) of the NWA.

The completed IWWMP is submitted to the relevant DWA Regional Office together with the completed and signed water use licence application forms, Title Deeds, the licence application fee, a copy of the Reserve Determination (if available), correspondence and the minutes of the IAP meeting(s).

The implementation of the IWWMP is an interactive process whereas its performance is monitored on an annual basis. The assessment of the IWWMP document itself, as well as the submission of information relating to monitoring and auditing conducted in terms of it could lead to the identification of its shortcomings, which must be addressed in the annual update of the action plan of the IWWMP. This will ensure that the concept of continual improvement is applied throughout the life cycle of the activity.

As part of the IWWMP process the various *Roles and Responsibilities* of the different role-players need to be understood and respected. In all instances the point of entry for any departmental discussion is the relevant Regional Office. The National Office can be consulted to provide support and advice to the Regional Office on water use activities, although they should not be approached directly. They can be contacted through the relevant DWA Regional Office.

It should be noted that the role of DWA is not to identify and select the water and waste management measures for implementation by a water user, as it is the responsibility of the water user to demonstrate to the Department that the selected management measures in the IWWMP action plan adhere to the "SMART"-concept i.e.:

S = sustainable;
M = measurable;
A = achievable;
R = resources allocated and
T = timeframe specific.

Note: It is advisable that the IWWMP guideline be used in conjunction with the DWA external guideline on water use authorisation process

2.1 ENVIRONMENTAL RISK BASED APPROACH AND RISK CATEGORISATION

The Department at all times subscribes to a differentiated approach to water resource management. In this approach the level and method of management intervention and regulatory control is based on the level of threat that a pollution source poses to the receiving water resource.

There would thus be a need to establish a link between the level of control required to manage sources of pollution and the risk posed by the source. This is achieved by means of implementing a risk-based approach which allows for the identification of areas of risk and impact mitigation in these areas. If it is demonstrated that the risks posed by the source are within acceptable limits a lower level of control is required.

The Integrated Water and Waste Management Plan (IWWMP) will therefore endorse the Operational Policy that categorises and classifies activities based on levels of acceptable risk. The concept of categorisation entails a first-order screening of the activity to determine the level of regulation required. A **medium** and **low** risk activity requires a level 1 (qualitative) risk assessment in order to identify and rank the risks associated with the water use.

A **high** risk activity requires a level 2 (quantitative) risk assessment. Once the risk rating and ranking is conducted, low and insignificant risks are noted but significant risks are further investigated, managed and mitigated.

Therefore, the IWWMP for a high risk activity is more detailed and comprehensive compared to that of a medium and low risk activity.

It is also essential that the water user obtains confirmation and consent from the DWA regional office regarding water use sector risk categorisation of the activity.

3

IWWMP structure and content

3.1 EXECUTIVE SUMMARY

The executive summary should summarise the overall-benefits of the activity, highlight the major water use and waste related impacts and risks, and how these will be managed to prevent, reduce or rehabilitate adverse impacts. The purpose of the IWWMP should be highlighted as a motivation in support of a water use authorisation application as well as management plan.

3.2 CONTENT

To provide for more clarity and guidance on the technical component of the IWWMP a *Table of Contents* is contained as Appendices A of this document.

Chapter 1: Introduction

1.1 Activity background
1.2 Contact detail
1.3 Regional setting and location of activity
1.4 Property description
1.5 Purpose of IWWMP

Provide background description of the activity, the contact details of the water user/company and person responsible for the implementation of the IWWMP, description of the property and the specific purpose for the development of the IWWMP.

Chapter 2: Contextualisation of activity

1.1 Description of activity
1.2 Extent of activity
1.3 Key activity related processes and products
1.4 Activity life description
1.5 Activity infrastructure description
1.6 Key water uses and waste streams
1.7 Organisational structure of activity / company
1.8 Business and corporate policies related to the environment

This section provides a very broad description of the activity, its processes and products. It also provides the background information of the organizational structure of the water user and all the business and corporate policies related to the environment (e.g. SHECQ policy)

This section merely lists the various water uses and waste streams generated by the particular activity. This list of identified water uses and waste streams informs the legal assessment required of the water user in chapter 3 of the IWWMP.

The risk categorisation for the specific activity, as confirmed by DWA, must be stated in this section, as it will inform the level of detail required in the impact assessment.

Chapter 3: Regulatory water and waste management framework

1.1 Summary of all water uses
1.2 Existing lawful water uses
1.3 Relevant exemptions
1.4 Generally authorised water uses
1.5 New water uses to be licenced
1.6 Waste management activities (NEMWA)
1.7 Waste related authorisations
1.8 Other authorisations and regulations (EIA's, EMPs, RODs)

This section contains a complete legal assessment of all the water uses at an activity in terms of existing lawful use, current permits or exemptions, summary of new water uses, illegal water uses and water uses considered to be generally authorized. It also covers the waste management activities authorized under the section 20 of the Environmental Conservation Act, 1989 (Act 73 of 1989) and the current National Environmental Management Waste Act, 2008 (Act 59 of 2008)..

There are many different legal requirements which the water user needs to comply with and these should be specified. The objective here is to provide a summary of all the existing environmental authorisations applicable to an activity. This is a very important section and will inform the Department's decision regarding licencing and/or the dispensing with the requirement for a licence for a specific water use.

Chapter 4: Present Environmental situation

4.1 Climate
- 4.1.1 Regional Climate
- 4.1.2 Rainfall
- 4.1.3 Evaporation

4.2 Surface Water
- 4.2.1 Water Management Area
- 4.2.2 Surface Water Hydrology
- 4.2.3 Surface Water Quality
- 4.2.4 Mean Annual Runoff (MAR)
- 4.2.5 Resource Class and River Health
- 4.2.6 Receiving Water Quality Objectives and the Reserve
- 4.2.7 Surface Water User Survey

4.2.8 Sensitive Areas Survey

4.3 Groundwater

4.3.1 Aquifer Characterisation
4.3.2 Groundwater Quality
4.3.3 Hydro-census
4.3.4. Potential Pollution Source Identification
4.3.5 Groundwater Model

4.4 Socio-economic Environment

This section provides the overview of the baseline environmental situation of the specific activity. This section merely summarises the information obtained from existing documents such as EMP's, EIA's, etc. with their supporting specialist studies. The detailed studies should be included as appendices to the IWWMP document. The emphasis should however be placed on the description of the water resources.

The Department will inform the proponent regarding to the current and future management class of the relevant water resource and the applicable Reserve Determination. The applicable Receiving Water Quality Objectives will be provided by the Department.

The determination of the Present Ecological Status (PES) and Ecological Importance and Sensitivity (EIS) will assist in the determination of management measures required to be implemented by the water user in the specific catchment.

Due to the potential impact of high risk activities on the groundwater resources, appropriate scientific assessment and modeling must be performed in order to establish quantitative relationships between sources, pathways and receptors which could include geochemical, hydrological, and geohydrological modeling of the impact of a water use on the resource. DWA regards this as a critical component of the baseline environmental situation.

5 Analyses and characterisation of Activity

1.1 Site delineation for characterisation

5.1 Water and Waste Management

1.1.1 Process water (water supply, water balance, reuse and recycling, water conservation and demand management, sewerage management, point source discharges)

5.2 Storm water (clean and dirty water management)

1.1.2 Groundwater (identification of potential sources of pollution, source term characterization, impact prediction)
1.1.3 Waste (waste stream identification, characterization, reuse, recycling, minimization)

5.3 Operational Management

1.1.4 Organisational structure
1.1.5 Resources and Competencies
1.1.6 Education and Training
1.1.7 Internal and external communication
1.1.8 Awareness raising

5.4 Monitoring and control

1.1.9 Surface water monitoring
1.1.10 Groundwater monitoring
1.1.11 Bio monitoring
1.1.12 Waste monitoring

5.5 Risk Assessment /Best Practice assessment
5.6 Issues and responses from public consultation process
5.7 Matters requiring attention / problem statement
5.8 Assessment of level and confidence of information

This section contains an analyses or characterisation of all the water use and waste management aspects of an activity. The focus should be on the four key areas, namely process water, storm water, groundwater and waste. Large activities should be delineated into smaller facilities to enable proper site characterisation. The operational management and the monitoring programmes and control of an operation must also be analysed. As part of the site characterisation a best practice assessment should be performed for all the facilities to assess the extent of implementation of current best practices.

In order to assess the capability of a proponent to implement the IWWMP it is necessary to provide information pertaining to the responsibilities for the implementation of the measures in the organisational structure, give details regarding the available resources and level of competency of staff. The water user must also provide clarity on education and training, internal and external communication, and awareness raising to ensure the efficient execution of the plan.

The site characterisation process further requires that a risk assessment must be conducted to identify, rate and rank the aspects, impacts and risks related to the activity. The risk assessment can either be conducted in accordance with an approach proposed by DWA (Refer to Appendix B) or a company specific risk methodology.

The risks to the environment and human health should be addressed as part of this process. The risk assessment process will identify and prioritize all issues identified as posing potential significant risks to the receiving environment and to the activity.

A qualitative or quantitative impact assessment must be conducted in accordance with an acceptable methodology for all water use impacts during all the life cycle phases of the activity. For high risk/impact activities and water uses the DWA Best practice Guideline G4: Impact Prediction provides a methodology and a process to conduct a detailed impact prediction / assessment.

DWA requires that public consultation must be performed as part of the water use authorisation process. It is therefore essential that the community and IAP's are consulted and have access to information from planning stages to decommissioning and closure phases of an activity.

In order to save costs this public consultation process can be incorporated with other similar processes for a specific water use or activity. During the site characterisation phase the issues and responses from this public consultation process must be evaluated. These issues will inform the process of identifying the matters requiring attention in the IWWMP.

Based upon all the abovementioned analyses, a statement must be made regarding all the matters requiring attention.

This should be followed by an assessment of the level of confidence which can be placed upon the available information. Some additional work may be required to address the identified gaps in the IWWMP as action plans.

6 Water and Waste Management

1.1 Water and Waste Management Philosophy (surface water, groundwater, storm water and waste)
1.2 Strategies (surface water, groundwater, storm water and waste)
1.3 Performance objectives / goals (Table)
1.4 Measures to achieve and sustain performance objectives
1.5 Options analyses and motivation for implementation of preferred option (Optional)
1.6 IWWMP Action Plan (Priority actions and other short, medium and long term actions)
1.7 Control and Monitoring
- 1.7.1 Monitoring of change in baseline (environment) information (surface water-, groundwater- and bio-monitoring)
- 1.7.2 Audit and report on performance of measures
- 1.7.3 Audit and report on relevance of action plan

This section contains the water and waste management philosophies for storm water, process water, ground water and waste applicable to the activity. These philosophies are informed by company policies and legislation. These philosophies are then translated to strategies for storm water, process water, ground water and waste management for the activity. Goals and objectives are formulated for the water use or waste management of the activity in accordance with the philosophies and strategies to ensure improvement of the status of the water resources.

Thereafter a range of management measures are identified to reach the set objectives. These measures may be presented to and discussed with the DWA to ensure that all possible measures have been considered.

An options analysis may be required in instances where more than one potential management measure has been identified, in order to determine the most appropriate (feasible and sustainable) measure to be implemented.

The outcome of such options analyses will demonstrate the financial feasibility of the preferred selected management option, and it will form part of a motivation for the selection of the preferred management measures. Management options could also be based on BPEO and BATNEEC.

However, it is important to note that if an options analysis has not been conducted,

it does not constitute a fatal flaw in the IWWMP and WUA process.

The action plan in the IWWMP must include the time frame and schedule for the implementation of the selected management measures. The management measures may include priority measures which must be implemented to address major legal non-compliance or a high business risks, and then other short, medium and long term actions.

7 Conclusion

7.1 Regulatory status of activity
7.2 Statement on water uses requiring authorization, dispensing with the requirement for a licence and possible exemption from Regulations
7.3 Motivation in terms of Section 27(1) of the NWA
7.4 Key commitments

The section on the regulatory status of the activity should summarise the water use and waste related aspects of the activity and will identify issues which need to be addressed. This is followed by a statement regarding the specific water uses requiring authorisation, exemption from Regulations or dispensing with the requirements for a licence, supported by a motivation in terms of section 27(1) of the National Water Act, 1998 (Act 36 of 1998). The document is concluded with a section where the applicant documents its key commitments relating to water use and waste related activities for consideration by DWA.

8 References

This section contains the references to the other documents.

4 CHECKLIST AND FINAL STRUCTURE OF IWWMP

This section contains all the specialist studies, such as water balances, impact prediction reports, storm water management plans, groundwater reports, EIAs, EMPs, etc. referred to in the IWWMP and which supports the IWWMP.

The IWWMP will be assessed by DWA and verified against the checklist stated in paragraphs 3.1 to 3.4 below to ensure that all relevant aspects have been addressed in the documented plan:

4.1 Quantification of the water resource problem

- Are the existing water quality data adequate to identify contaminants of concern?
- How well have the nature, extent and causes of the water management problems on site been identified?
- To what extent has the analysis and characterization of the problems considered current thinking on water resource management?
- Are there any discernable trends?

4.2 Targets, Indicators and Monitoring

- Does the IWWMP define medium and long-term goals towards sustainable management of water resources?
- Does the IWWMP make provision for the establishment of indicators of progress and set annual and medium term targets?
- Are these indicators and targets appropriate and consistent with the policies and strategies considered for implementation of the IWWMP?
- Are the proposed monitoring, review and evaluation as well as auditing systems adequate and sustainable?

4.3 PRIORITY ACTIONS

- Does the IWWMP describe clear priorities for action, relevant to the goals and targets, feasibility in terms of achieving targets, their estimated costs, available resources, institutional capacities and effectiveness?
- Does the water management strategy have an adequate and credible financial provisioning plan to support the implementation of the IWWMP?
- To what extent do the structural and sectoral goals and objectives as well as actions of the IWWMP address key performance areas of strategy, institutional matters and the sustainable management of the water resource?
- Does the IWWMP address the components of section 27(1) of the NWA?

4.4 Creating Awareness

- Does the IWWMP describe the participatory process used to identify water use and waste related aspects?
- Does the IWWMP summarise the major issues raised during the consultation process?
- To what extent have the matters raised impact on the content of the plan?
- Does the plan make provision for linkage with other initiatives in terms of water resource management?
- Does the IWWMP make provision for continual involvement of stakeholders?

5 REVIEW AND APPROVAL of IWWMP

The IWWMP must supply DWA with a very clear management commitment to ensure the implementation of the IWWMP action plan. The completed IWWMP needs to be endorsed and implemented by the water user, and it will be captured as a water use licence condition. The implementation of an IWWMP is therefore enforced through the water use licence conditions in the water use authorisation process.

The IWWMP needs to address the issues and concerns of the major stakeholders. It is therefore required that stakeholders are consulted from the onset of the development of the IWWMP.

Agreement must be reached between the proponent and DWA during the pre-application consultation stage regarding the purpose and scope of the IWWMP, the process to be followed and the content of the plan. If the process for development of the IWWMP and the content of the IWWMP as stipulated in this guideline are adhered to, all the water use and waste related aspects have been addressed in accordance with DWA requirements and stakeholders were consulted and their concerns have been addressed, it will ensure that the IWWMP will be ultimately accepted by the Department.

The action plan of the IWWMP will be subject to an annual review as stipulated in the WUL based on the integrated water resource management principles of continual improvement throughout the entire life cycle of the activity.

Comment from DWA can be addressed as part of the annual review of the IWWMP action plan. This requirement would be enforced through the water use authorisation process and the water use licence issued for the activity. The review process will allow DWA to monitor the performance of the activity in terms of the impact on the water resource and the effectiveness of the water use and waste management measures stipulated in the action which needs to be implemented to achieve the set objectives.

6

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APPENDIX A:

CONTENTS OF INTEGRATED WATER AND WASTE MANAGEMENT PLAN

6 Water and waste management

6.1 Water and waste management philosophy (process water, storm water, groundwater, waste)

6.2 Strategies (process water, storm water, groundwater and waste)

6.3 Performance objectives / goals

6.4 Measures to achieve and sustain performance objectives

6.5 Option analyses and motivation for implementation of preferred options (Optional)

6.6 IWWMP action plan

6.7 Control and monitoring

6.8 Monitoring of change in baseline (environment) information (surface water, groundwater and bio-monitoring)

6.9 Audit and report on performance measures

6.10 Audit and report on relevance of IWWMP action plan

7 Conclusion

7.1 Regulatory status of activity

7.2 Statement on water uses requiring authorization, dispensing with licencing requirement and possible exemption from regulations

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7.4 Proposed licence conditions

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9 Appendixes: Specialist studies

APPENDIX B:

EXAMPLE OF RISK ASSESSMENT

QUANTITATIVE RISK ASSESSMENT

During the quantitative environmental risk assessment (ERA) process the applicant will be required to gather all relevant data to the water use and to the impact of the water use on the water resource. Sources of data to be used in the ERA process could include:

- Monitoring data collected and stored;
- Published data; and
- Data available from DWA or other stakeholders in the area.

By applying the above-mentioned data the applicant will be able to identify the risks of the water use on the water resource. In terms of a quantitative environmental risk assessment, the assessment will be based on:

- Probability of occurrence which describes the likelihood of the impact actually occurring and is indicated as:-
    - Improbable, where the likelihood of the impact is very low;
    - Probable, where there is a distinct possibility of the impact to occur;
    - Highly probable, where it very likely that the impact will occur;
    - Definite, where the impact will occur regardless any management measure.

- Consequence of occurrence in terms of:
    - Nature of the impact;
    - Extent of the impact, either local, regional, national or across international borders;
    - Duration of the impact, either short term (0-5 years), medium term (6-15 years) or long-term (the impact will cease after the operational life of the activity) or permanent, where mitigation measures by natural processes or human intervention will not occur;
    - Intensity of the impact, either being low, medium or high effect on the natural, cultural and social functions and processes.

- Significance level of the risk posed by the water use, which is determined through a synthesis of the probability of occurrence and consequence of occurrence.

The applicant will have to rank the risks based on the quantitative assessment as described above into high, medium, or low risks. Management measures need to be identified to mitigate, prevent and /or reduce the risk. These measures will primarily be focussed on the risks identified as high in the ranking matrix, but will also include measures for medium and low risks. The management measures will be taken forward in the IWWMP as part of the water use authorisation process.

In order to assess each of the factors for each impact the ranking scales as contained in Table B-1 could be used. Once the factors had been ranked for each impact, the environmental significance of each impact could be assessed by applying the following formula:

SP = (magnitude + duration + scale) x probability

where SP is defined as significance points.

Table B-1: Ranking Scales for ERA

PROBABILITY = P 5 – Definite / don't know 4 – High probable 3 – Medium probability 2 – low [probability 1 – Improbable 0 - None	**DURATION = D** 5 – Permanent 4 – Long-term ceases with operational life) 3 – Medium-term (5 – 15 years) 2 – Short-term (0-5 years) 1 - Immediate
SCALE = S 5 – International 4 – National 3 – Regional 2 – Local 1 – Site 0 – None	**MAGNITUDE = M** 10 – Very high / Don't know 8 – High 6 – Moderate 4 – Low 2 – Minor

The maximum value of significance points (SP) is 100. Environmental effects could therefore be rated as either high (H), moderate (M), or low (L) significance on the following basis:

- More than 60 points indicates high (H) environmental significance
- Between 30 – 60 points indicate moderate (M) environmental significance
- Less than 30 points indicates low (L) environmental significance

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