TECHNICAL BRIEF

August 2016
The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

Limiting and mitigating the impact of coal mines on wetlands

A multiyear collaborative effort between the Water Research Commission (WRC), CSIR, the South African National Biodiversity Institute (SANBI), Working for Wetlands (WfWET), and the Coaltech Research Association has resulted in an innovative suite of products to limit and mitigate the impact of coal-mining on wetlands.

Background

By virtue of their positions in the landscape and relationship to drainage networks, wetlands are frequently impacted by coal-mining activities, especially opencast methods. The impacts are ongoing, since coal is a strategic resource and will continue to be mined to support the country's development.

However, regulatory authorities and the public now have an improved understanding of the range of economic, social, ecological and hydrological costs of wetland loss and degradation. The rules of the game have changed, with regulators increasingly insisting that mines avoid, minimise and mitigate their impacts on wetlands, and internalise the true costs of wetland loss into their balance sheets.

Many mining proposals entailing large-scale wetland loss have encountered delays in licence approvals, unrealistic rehabilitation commitments and unwelcome public and media attention. As a result, the coal mining sector has realised that it needs to proactively and systematically address the business risk posed by its impact on wetlands.

To this end, the WRC, with its research partners, have developed a suite of products to help mines minimise the impact on wetlands. This includes ***a High Risk Wetlands Atlas*** to guide mining companies and regulators with regard to high risk wetlands and associated landscapes. It identifies key wetland landscapes in the grassland biome of Mpumalanga that are particularly important or irreplaceable in terms of biodiversity, water resource management and ecosystem services.

There is also a users' guide to the Atlas and a DVD that contains this ***High Risk Wetlands Atlas***, the required software to use it, and the underlying spatial data for those who use their own GIS systems.

In addition to the Atlas and its users' guide, other volumes in this set include:

1. *Wetland Offsets: A best practice guideline for South Africa*
2. *Wetland Rehabilitation in Mining Landscapes: An Introductory Guide*

High Risk Wetlands Atlas and Users' Guide

The atlas provides access to key data that are very useful for mining planners, such as the Mpumalanga Biodiversity Sector Plan, updated Protected Area data, revised Strategic Water Source Data, revised Freshwater Ecosystem Protection Area (FEPA) data and the new wetland data for Mpumalanga. Four new spatial data layers relevant for helping the mining sector limit and mitigate its impact on wetlands in Mpumalanga have been overlaid.

These layers are:

- A disaggregated set of the underlying spatial data for the DEA Mining and Biodiversity Guideline, which allow one to identify the specific features that triggered the categories in the summary data.
- An interpreted version of the DEA Mining and Biodiversity Guideline spatial summary layer, which divides the broad national categories based on local land cover and the features found at a site. The layer quickly summarises probable low, medium and high value areas within each category on the Mining and Biodiversity Guideline Spatial layer. The assessment is relative to all sites in Mpumalanga.
- An Ecological Infrastructure for Water analysis of Mpumalanga, which incorporates a combined Ecological Infrastructure for Water Supply summary layer as well as individual layers for:
- Ecological Infrastructure for Water Production and Flow Augmentation Analysis.
    - Ecological Infrastructure for Flood Attenuation.
    - Ecological Infrastructure for Water Quality.
    - Ecological Infrastructure for Erosion Control.

The Users' Guide provides all required information for users to install the atlas and access the underlying data, as well as to provide supporting information on the preparation and content of the spatial data.

Wetland offsets: A best practice guideline

This is a practical tool for the consistent application of wetland offsets in South Africa. It is primarily aimed at wetland offsets required as part of water use authorisation processes (e.g. in an application for a Water Use Licence under the National Water Act) where compensatory actions are required to achieve water resource management and biodiversity conservation objectives.

The guideline is equally relevant for use in environmental impact assessment (EIA) processes (e.g. as part of the environmental authorisation process in terms of the National Environmental Management Act or in an application for a mining licence or development of an Environmental Management Programme under the Mineral and Petroleum Resources Development Act).

Wetland offsets are enduring measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse impacts on wetlands.

They are implemented to address any anticipated significant residual impacts arising from development projects after appropriate avoidance, minimisation and rehabilitation measures have been taken into account.

The goals of wetland offsets are to achieve 'No Net Loss' and preferably a net gain with respect to the full spectrum of functions and values provided by wetlands. These include:

- Water resource and ecosystem service value, especially in relation to regulating and supporting functions pertinent to water resource management and disaster risk reduction, such as flood control and water quality enhancement, but also including direct services such as food and water provisioning and cultural services such as spiritual, recreational, and cultural benefits that sustain communities;
- Ecosystem Conservation, especially in terms of meeting national, provincial and local objectives for habitat protection and avoiding a deterioration in ecosystem threat status; and
- Species of Conservation Concern, to ensure that the status of threatened, rare or keystone wetland-dependant species is maintained or improved.

This guideline has been developed in response to the growing need for practical guidance on wetland offsets, which are increasingly being prescribed through regulatory processes in response to ongoing loss and degradation of wetland resources.

It has been specifically designed for application where significant, large-scale residual wetland impacts are encountered (e.g. large scale infrastructure projects and opencast mining). The document provides an equally useful framework to inform wetland offset design and implementation in other contexts where there are smaller, but still significant, residual impacts and a wetland offset is still required (e.g. agriculture or small development projects).

The guideline provides practical guidance for determining the size and characteristics of a wetland offset, and determining the requirements for its implementation, once a decision on the need for a wetland offset has been taken through the water use authorisation process by the Department of Water and Sanitation (DWS).

Where this guideline is being used in other authorisation processes, the decision on the need for a wetland offset will be determined though an environmental impact assessment process and interactions with the relevant regulatory authority. It should thus be seen in the broader context of other relevant policies and guidelines including policy documents from the DWS and/or other applicable

departments (such as Environmental Affairs and Mineral Resources), the national policy framework for biodiversity offsets and any provincial biodiversity offset policies and guidelines. In the event of any conflict between this guideline and existing policy and legislation, the latter will prevail.

The guideline emphasises that wetland offsets are applied within the mitigation hierarchy and are only aimed at compensating for significant residual impacts of project development on the environment after all appropriate steps have first been taken to avoid/prevent, minimise/reduce and remediate/rehabilitate impacts.

Wetlands offsets cannot be applied as the only or first mitigation option; the prior sequence of mitigation steps must first be exhausted. The guideline details how to calculate the residual impacts of a development in terms of Water Resources and Ecosystem Services, Ecosystem Conservation, and Species of Conservation Concern.

It also sets out the offset ratios to be used in determining an appropriate offset. It then provides guidance on the identification of appropriate offset sites and measures, and details the process of calculating whether or not the proposed offset receiving area sufficiently meets the requirements in terms of objectives and targets for Water Resources and Ecosystem Services, Ecosystem Conservation and Species of Conservation Concern. The offset ratios applied at the receiving site are designed to accommodate issues of risk and security of tenure, and aim to incentivise good practice.

The guideline document is supported by an electronic Wetland Offset Calculator to assist with calculations. The guideline includes two appendices: Appendix A includes a list protection levels and ecosystem threat statuses for wetland groups required for the calculations of offsets, while Appendix B provides specific guidance on the use of the Wetland Offset Calculator which is also relevant for manually doing the calculations.

It is crucial to know that Wetland offsets are a final compensation or mitigation measure where an approved project has significant residual impacts after all other reasonable mitigation measures have been fully implemented. They are not an alternative to the full application of the mitigation hierarchy.

Wetland offsets are not an easy or quick way out for obtaining approval for a development in an area where wetlands are impacted. The implementation of a wetland offset requires careful identification of suitable wetland sites which need to be appropriately managed, secured and monitored for the long term, and hence costs may be high.

The addition of a wetland offset to an otherwise un-acceptable impact on wetlands does not change the acceptability of the impact, and hence should not influence the decision-making process regarding the authorisation of a proposed development.

Wetland Rehabilitation in Mining Landscapes: An Introductory Guide

Wetlands ecosystems are vital ecological infrastructure that provide valuable services to people and are important biodiversity assets. Wetlands help to buffer flood waters, soak up water to release more gradually over time, filter sediments, purify water, and provide forage for livestock and refuge for numerous species.

While remarkably resilient in many ways, they are vulnerable to a range of direct, indirect and cumulative impacts. In mining landscapes changes in landscape hydrology and water quality often impact upon downstream water resources and associated users with various consequences for people and biodiversity.

The current state of wetland ecosystems in South Africa is such that impacts on remaining wetlands have cumulative, and sometimes significant consequences. There are indications that the cumulative loss or deterioration of services derived from wetlands is undermining the ability of the affected landscapes to deliver these functions, which in turn has social, economic and ecological implications. This is of direct relevance to the mining sector.

Impacts on wetlands should be avoided and minimised whenever possible. Where wetland impacts or degradation do take place, wetland rehabilitation should form part of the mitigation of these impacts. Wetland rehabilitation can be successful if it is well planned and implemented.

The ***Wetland rehabilitation in a mining landscape: introductory guide*** provides practical, user-friendly guidance to specialists, mining houses and regulators on appropriate wetland rehabilitation strategies, planning, methods and implementation.

The guide builds on existing guidelines and experience in wetland rehabilitation to consolidate guidance that is specific to wetland rehabilitation in ***mining landscapes***. This was necessary as the available information on mine

planning, impact mitigation and rehabilitation of mining landscapes did not specifically or adequately address wetland rehabilitation in this context.

Mining frequently impacts on water quality and hydrology in ways that differ from other land uses, and can create challenging water quality and hydrological conditions. Such conditions will frequently necessitate customising wetland rehabilitation approaches that ensure wetland rehabilitation structures can cope with associated water quantity and quality issues, making mining-specific wetland rehabilitation guidance necessary.

The introductory guide is structured to provide users with the core principles that should inform planning and decision-making at different phases of wetland rehabilitation, namely planning, implementation, and monitoring and long-term management phases.

Key elements integral to wetland rehabilitation in each phase are summarised in easy-reference checklists that help users ensure that the guidelines provided in this document are adhered to. An overview of legal considerations for wetland rehabilitation in the mining landscape is also provided.

By consolidating existing guidance on wetland rehabilitation in mining landscapes, this introductory guide aims to promote the standardised application of tools in wetland rehabilitation and improve clarity with respect to wetland rehabilitation planning, design and implementation in mining landscapes. In particular the guidance is intended to provide appropriate practical and strategic approaches to wetland rehabilitation, and to support the development of wetland rehabilitation and management commitments and license conditions that are realistic, achievable and can be monitored. Well planned and implemented wetland rehabilitation can help to avoid a range of risks for proponents, government and affected communities and ensure compliance with environmental legislative provisions and authorisation requirements.

The introductory guide should help to ensure that wetland rehabilitation activities leave a meaningful and lasting legacy that helps to address and to some extent compensate for some of the negative impacts that mining activities have on water resources. In so doing, it is envisaged that this will assist the mining sector in proactively and responsibly contributing to broader water resource management objectives and so secure a more sustainable future for biodiversity and communities living in these landscapes.

Further reading:

High Risk Wetlands Atlas: Reference Guide to the Mpumalanga Mining Decision Support Tool (**Report No. TT 659/16**)
A review of depressional wetlands (pans) in South Africa, including a water quality classification system (**Report No. 2230/1/16**)
Wetland Offsets: A best practice guideline for South Africa (**Report No. TT 660/16**)
Wetland Rehabilitation in Mining Landscapes: An Introductory Guide (**Report No. TT 658/16**)
Assessment of the ecological integrity of the Zaalklapspruit wetland in Mpumalanga (South Africa) before and after rehabilitation: The Grootspruit Case Study (**Report No. 2230/2/16**)

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