

# The Business Case for Accurate Mine Water Management – Illustrated with Case Studies

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## Introduction

During the recession the mining industry has reduced costs wherever possible. The easy cost cutting has been done. Innovation in faster, better and cheaper ore extraction has led the way with emphasis on reductions in maintenance (just-in-time) and targeted management of input costs.

One area which has been neglected is the reduction of water costs. Reducing the cost of water to business has the added advantage of reducing the costs of managing environmental impacts. Water affects mining as input and output costs. Water is used in all aspects of production and processing. Ground water, in particular, is often misunderstood and intercepted at the last possible moment resulting in increased costs for pumping and treatment which is often not necessary if the water is intercepted prior to coming into contact with the ore body and pollutants such as diesel.

## Methodology and case studies

Understanding the source, storage and conduits for ground water flow requires accurate monitoring.

Modern monitoring techniques, automation and miniaturisation of water chemistry and pressure probes have enabled water levels and flow rates to be collected in real time. The data is then converted to information in the format of graphs and illustrations. Figure 1 illustrates a dashboard showing the water levels around an open pit. The method used is an intense monitoring system of Geokon probes, telemetry and dashboarding.

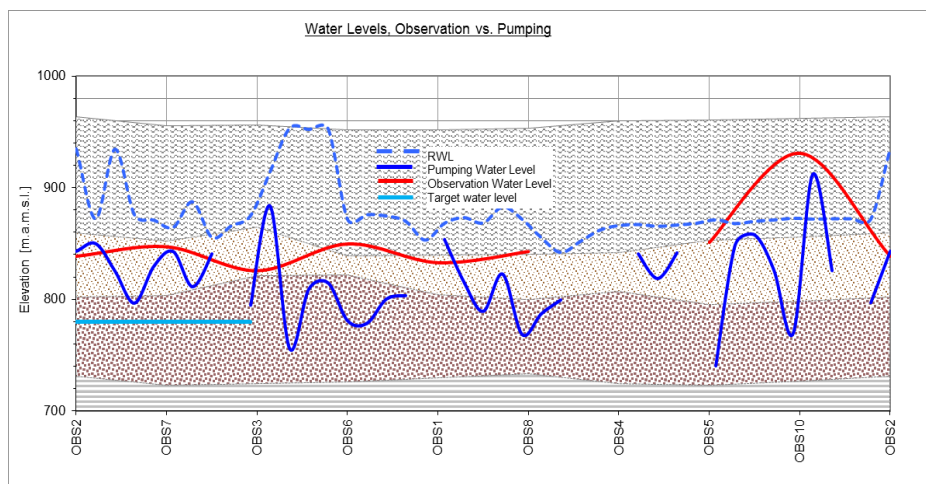


Figure 1 Expanded fence diagram of a large open pit showing water levels in the high walls

This figure is used in weekly water management meetings to review the success of pit perimeter dewatering boreholes.

The data is then converted to knowledge. For example, the success of pumping cycles in reducing water levels for specific sectors of the pit. The success can be related to the expenditure on pumping, both capex and opex to enable the link between energy spend and slope stability to be established. Telemetry transmits the water level information from dedicated water level probes to a centralised interpretative centre where the information is used to produce dashboards illustrating knowledge of the water inflows, storage and possible risk level.

This example from Botswana shows the use of Big Data techniques in pore pressure monitoring to increase pit slope angle and profitability by reducing waste stripping. The open pit was dewatered using a combination of pit perimeter boreholes, inclined drainage coreholes and sump pumping. The use of monitoring piezometers located in inclined core holes showed the distribution of pore pressures in specific geotechnical domains and enabled the success of the pumping and drainage boreholes to be evaluated. (Morton et al 2008)<sup>1</sup>. Figure 2 shows the layout of a telemetry system for an open pit zinc mine in Namibia. Their objective is to lower the water table in pit compartments in advance of mining.

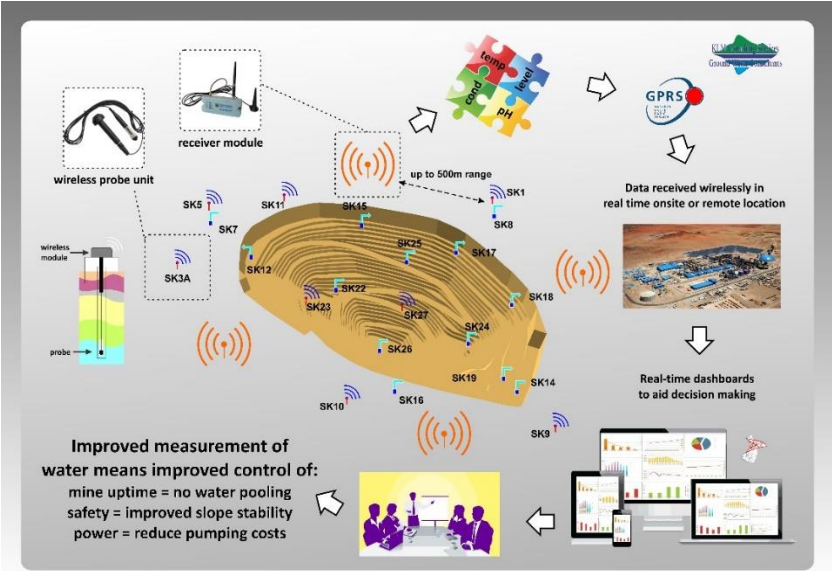


Figure 2 Telemetry layout and design for water level monitoring boreholes around an open pit

Examples from Australia are given to show how the use of accurate water level monitoring has reduced costs to both Iron ore and coal mines.

**Conclusion**

Most mines list water risk in the top ten risks to business. The risk is often compounded by lack of information on the source, storage and conduits for ground water flow. Accurate and site specific monitoring dramatically reduces risk and costs of water management. An example from a coal mine in the Witbank area is used to demonstrate the effectiveness of the strategy.

<sup>1</sup> Morton KL, Muresan M, Ramsden F (2008). The importance of pore pressure monitoring in SAIMM volume 108