THE ASSESSMENT OF THE WATER QUALITY OF THE HEX RIVER CATCHMENT – NORTH WEST PROVINCE

by

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ABSTRACT

This minor-dissertation established the long-term (July 2002 to June 2006) as well as present day (July 2005 to June 2006) water quality conditions of the Hex River and its tributaries the Dorp-, Paardekraal-, Klipgat- and Klipfontein Spruit, upstream of the Bospoort Dam. The Hex River is situated in the North-West Province, in close proximity of the town Rustenburg. The Hex River falls within the associated Hex River catchment. Various anthropogenic activities impact negatively on the water quality of the Hex River. These impacts include agriculture, livestock production, industrial effluent, mining activities, and processing as well as residential impacts including treated and untreated sewage from the town of Rustenburg as well as informal settlements in the Hex River catchment. The various land uses for the Hex River include domestic use by informal settlements in the area, including mining concessions, livestock watering as well as irrigation and the aquatic environment of the Hex River catchment and the receiving water body the Bospoort Dam. The Hex River, therefore, not only has a effect on the environment but also on the social and economic aspects in the region.

Owing to the severity of these impacts it was deemed necessary to determine the long-term water quality trends of the Hex River as well as the prevailing water quality conditions. The primary tributaries of the Hex River were included in the study to determine the source of possible pollution influx. In order to achieve the aim of the study a literature review was conducted on chemical, physical and biological water quality as well as legislative requirements controlling water quality management. A proper understanding of the various impacts as well as land uses in the area is essential in demarcating possible pollution sources. The assessment of the long-term water quality data was conducted to determine the historical water quality trends of the Hex River and associated tributaries and the deterioration in water quality over a four year period. The most recent water quality data were compared against the Target Water Quality Guideline Ranges (DWAF, 1996) for domestic use, irrigation, livestock watering as well as aquatic ecosystems.

The long-term water quality trends showed a significant mine water, industrial effluent and sewage impact on the Hex River after the confluence with the tributaries. The assessment of the current water quality situation indicated non-compliance towards the Target Water Quality Guideline Ranges (TWQGR) as stipulated by the Department of Water Affairs and Forestry (DWAF, 1996a-d), rendering the water unfit for domestic use, irrigation and livestock watering. The sources feeding the tributaries

contain water of inferior quality with a direct associated environmental risk. However, at present the risk potential is contained in the system but with a specific environmental event, such as high rainfall over a short period of time, could be released with a significant environmental impact and decrease in aquatic biodiversity.

OPSOMMING

Hierdie verhandeling bepaal die langtermyn (Julie 2002 tot Junie 2006) asook huidige water kwaliteit van de Hex Rivier en sy sytakke, die Dorp-, Paardekraal-, Klipgat- en Klipfontein Spruite, stroomop van die Bospoort Dam. Die Hex River is gelee in die Noordwes-Provinsie aangrensend tot die dorp Rustenburg. Die Hex Rivier val binne die ooreenkomstige Hex Rivier opvangsgebied. Die kwaliteit van dei water in die Hex Rivier, word geïmpakteer deur ‘n verskeidenheid van menslike aktiwiteite. Hierdie impakte sluit landbou, veeteelt, nywerheids afvalwater, mynbou aktiwiteite en verwerking asook residentiele impakte insluitend behandelde en onbehandelde riool afkomstig van die drop Rustenburg en informele nedersettings in the Hex Rivier opvanggebied. Die verskeidenheid grond gebruike van die Hex Rivier sluit huishoudelike gebruik, lewendehawe drinkwater, besproeiing en die water ekosisteme van die Hex Rivier opvangsgebied en die ontvangende watermassa van die Bospoort Dam in. Die Hex Rivier het dus nie net ‘n effek op die omgewing nie, maar ook op die sosiale en ekonomiese aspekte.

As gevolg van die erns van bogenoemde impakte is dit besluit om die langtermyn water kwaliteits tendense van die Hex Rivier te bepaal, asook die huidige water kwaliteits toestand. Aangesien die Hex Rivier deur sy sytakke gevoed word, is die riviere ook in die studie ingesluit ter bepaling van die oorsprong van moontlike besoedelings invloeiings. Om die doel van hierdie studie te bereik, is ‘n literatuurstudie van chemise, fisiese en biologiese water kwaliteit asook die wetlike vereistes ten opsigte van water kwaliteits bestuur, onderneem. ‘n Begrip ten opsigte van dei verskeie impakte asook grond gebruike in die studie area is noodsaaklik vir die afbakening van moontlike besoedelings bronne. Die evaluasie van die langtermyn water kwaliteits data is belangrik vir die bepaling van die historiese water kwaliteits tendense van die Hex Rivier en sy sytakke en die agteruitgang van die water kwaliteit oor die vier jaar periode. Die huidige water kwaliteits data is vergelyk met die “Target Water Quality Guideline Ranges” of te wel die water kwaliteits riglyne soos voorgestel deur die Departement Waterwese en Bosbou (DWAF, 1996) vir huishoudelike gebruik, besproeiing, lewendehawe drinkwater asook water ekosisteme.

Die langtermyn water kwaliteits tendense dui op ‘n beduidende mynwater, industriële afvalwater asook riool impak op die Hex Rivier na die samevloeiing met die sytakke. Die evaluasie van die huidige water kwaliteits situasie toon nalatigheid ten opsigte van die water kwaliteits riglyne soos gestipuleer

deur die Departement van Waterwese en Bosbou. Die water in die Hex Rivier opvangsgebied is dus nie geskik vir gebruik as huishoudelike water, besproeiing asook drinkwater vir vee nie. Die bronne wat die sytakke voed bevat water van lae gehalte en ‘n direkte omgewings risiko word daarmee geassosieer. Die risiko potensiaal word tans deur die sisteem ingesluit en kan met ‘n spesifieke omgewings voorval vrygelaat word met ‘n betekenisvolle omgewings impak.

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TABLE OF CONTENTS

Page

Page

LIST OF FIGURES

Page

Page

Page

Page

LIST OF TABLES

Page

Page

Page