



## DEPARTMENT OF WATER AFFAIRS

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 R.I. Official

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 012-336 - ####

Directorate: Hydrological Services – Groundwater Resource Assessment and Monitoring

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 27/2/7/CS####/X##

**Deputy Director: Resources.**

DWA – National Office.

**Attention: W.F. Official**

Tel: 012 323 ####

### **REQUEST FOR GEOHYDROLOGICAL EVALUATION AND RECOMMENDATION FOR INTEGRATED WATER USE LICENCE APPLICATION.**

Your request for comment regarding the above mentioned document dated XX / XX / 20XX has reference.

(Refer to documents: Groundwater Model for the Dewatering of the XXXXXXXX area. (by: L.U.C. Consultants consulting (Pty) Ltd on April 2007)

The following has been noted in the attached supporting documents/reports submitted to this office:

1. Geohydrological assessment of the water use activity/impact

<b>Aspects in terms of geohydrological conditions on site</b>	<b>Indicator</b>
a). A Geohydrological investigation has been conducted	It is said to have been conducted but the document was not submitted.
b). A geophysical investigation has been conducted	Information not supplied

<b>Aspects in terms of geohydrological conditions on site</b>	<b>Indicator</b>
c). Receiving aquifer is a Dolomitic Aquifer System	The dolomites and banded ironstone; contact between the dolomites and banded ironstone being the most permeable zone. Four main aquifers can be distinguished: Crocodile River primary aquifer, Malmani Subgroup Dolomite, Penge banded iron formation and secondary quartzite, shale and lava aquifer.
d). Major/minor aquifer	Major
e). Hydrogeology at site: Structural geological features (Faults, dykes, etc.)	Yes
f). Current status of groundwater quality on site	For the Primary Crocodile River alluvial aquifer the water quality strongly reflects the quality of the river water. Donkerpoort basin and other dolomite aquifers and Banded iron formation fractured rock aquifers, the water quality is typical of water generally found in dolomitic aquifers with Ca and Mg the dominant cations and bicarbonate the dominant anions.
g). Groundwater pollution potential	Yes
h). Groundwater model carried out as part of assessment	Yes, due data gaps and other limitations, the mass transport model could not be calibrated

Aspects in terms of geohydrological conditions on site	Indicator
	sufficiently.
i). Possible impact on down-gradient resources	Yes, in terms of quality. And in terms of quantity, no significant impacts on any of the surrounding groundwater. The cone of depression is not noticeable on a regional scale beyond the boundaries of the Donkerspoort basin.
j). Geohydrology situation well studied	Yes
k). Hydrocensus required	<u>No</u>
l). More intensive groundwater investigation required	<u>No</u>
m). Surrounding groundwater users potentially impacted	No, but the spreading of groundwater contamination from surrounding sources may however, be accelerated by several orders of magnitude because of the increased groundwater flow velocities induced by the pumping.

Aspects in terms of geohydrological conditions on site	Indicator
<p>n). Other issues:</p> <p>The summary of water quality is indistinct, after all the analysis done at site regarding groundwater there is no conclusive conclusion given. The general water quality at site is not given but a summary on each aquifer and all boreholes has been noted. From this summary it is deduced that the quality of water at site is of good quality, However, some boreholes reports slightly higher concentrations of constituents for which no explanation could be deduced. It is also noted that there has been problems at sites (Boreholes ##, G## and DP#) due to hydrocarbon contaminations and borehole ## was taken out of the production circuit. Geopollution Technologies were appointed to assess the extent of contamination and to recommend remedial action to clean up the contamination. After investigations and new boreholes drilled, none of the follow-up sampling exercises showed any significant hydrocarbon contents. No trend of continuous contamination could be detected in bore ## or any of the monitoring boreholes, as a result borehole 16 was re-commissioned as a production borehole but will continue be monitored for hydrocarbons, volatile organic compounds (VOC's) and semi-VOC's.</p>	

2. Groundwater Monitoring Program

Important issues		Indicator
a). Monitoring program exists		Yes
b). Acceptable monitoring program presented		It is not clear, not sufficiently addressed!
c). Monitor holes available to monitor groundwater flow regime with relation to Water Use Activity	Upstream	It is not clear, not sufficiently addressed!
	Downstream	
	At site	Yes
d). Existing monitor network adequate		Positions of groundwater sampling points are not clearly indicated on the attached map.

Important issues	Indicator
e). Extensions to existing monitoring network proposed	Since the document submitted is not clear, it is of crucial importance that the existing programme should ensure that groundwater is monitored upstream of site, at site and downstream of the site and at the exit boundary of the property.
f). Proposed monitoring network adequate for the water use activity	It is not clear, not sufficient.
g). Monitoring holes penetrate whole aquifer	Information not supplied
h). Historical Groundwater monitoring data presented	Yes
i). Monitoring record sufficient and complete	No
j). Maintenance plan for monitoring during decommission and post closure phases.	<u>Yes</u>
k). Proposed monitoring programme sufficient for managing groundwater on site	No, due to unclear presentation of monitoring points this decision can not be made. (See 2 (e) above).
<p>l). Other issues:</p> <p>The monitoring program exists but it is not explicit and its dimension is not clear. It is of crucial importance that the existing programme is designed such that it ensures that groundwater is monitored upstream of site, at site and downstream of the site (including the groundwater exit boundary). (See 2 (e) above).</p>	

3. Groundwater Management Plan (incl. remediation plan for activity).

a).Management plan submitted in terms of groundwater quality;	Yes
b). Management plan submitted in terms of groundwater quantities;	Yes

<p>c). Post Closure Management Plan submitted:</p> <p style="padding-left: 40px;">Remediation of Physical Activity:</p> <p style="padding-left: 40px;">Remediation of Storage Facilities:</p> <p style="padding-left: 40px;">Remediation of Environmental Impact:</p> <p style="padding-left: 40px;">Remediation of Water Resource Impact:</p>	<p style="text-align: center;">Yes</p> <hr style="border-top: 1px dashed orange;"/> <p style="text-align: center;">Yes</p> <hr style="border-top: 1px dashed orange;"/> <p style="text-align: center;">Yes</p> <hr style="border-top: 1px dashed orange;"/> <p style="text-align: center;">Yes</p> <hr style="border-top: 1px dashed orange;"/> <p style="text-align: center;">Yes</p>
<p>d). Other issues:</p> <p style="padding-left: 40px;">Require indication of maintenance facilities to support this remediation plan.</p>	

4. Comments

a). In terms of the IWWMP/IWULA/WULA

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The IWULA document was submitted and it complies partially with the requirements in terms of a dedicated monitoring programme and IWWMP. In terms of Geohydrological investigation the specific document was not submitted but most of its issues were discussed as internal sections submitted in the application.

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b). In terms of the Geohydrological Study

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The document was not submitted but most issues regarding Geohydrological investigation were adequately addressed.

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c). In terms of the Monitoring Plan

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The groundwater monitoring plan was submitted but from the mapped monitoring points there is no legend and labels to help assist with understanding the map. All storage & settling dams and dumps should be lined and if not they should have leachate detectors to monitor any leakage of contaminations. (See 2 (e) above). **As for the Groundwater Model:** Groundwater monitoring should be continued to ensure that there is no impact on water levels in adjacent farms. From the conclusions drawn from the groundwater model (Pg 44), bullet number 2, if the current

abstraction already introduces microbial contamination into the breccia basin aquifer. What measures are in place to ensure that the contamination is contained within the site and is dealt with accordingly? In future when dewatering rates are increased how would discharges from the XXXXXXXX WWTW impact on the aquifer system?

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#### 5. Recommendation

It is highly recommended that all issues raised by the department are attended to. The point 3 and 6 on the conclusions of the groundwater model for the dewatering of the area should be further elaborated and reasons given to support these statements.

a. Outstanding requirements.

A groundwater monitoring programme where locations of monitoring boreholes are clearly marked. This programme should ensure that point 2 (e) above is taken into consideration. If the existing monitoring programme is not as stated in 2 (e), the programme should be extended.

b. Can water use activity as requested proceed?

Yes provided all issues raised by the DWA are adequately attended to and that all recommendations made by the consultants who conducted studies at site are adhered to.

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