

IN THE WATER TRIBUNAL

IN THE APPEAL OF:

ENDANGERED WILDLIFE TRUST	FIRST APPELLANT
FEDERATION FOR A SUSTAINABLE ENVIRONMENT	SECOND APPELLANT
MPUMALANGA LANDBOU/AGRICULTURE	THIRD APPELLANT
AND	
DIRECTOR-GENERAL (ACTING), DEPARTMENT OF WATER AND SANITATION	FIRST RESPONDENT
ATHA-AFRICA VENTURES (PTY) LTD	SECOND RESPONDENT

AFFIDAVIT

I,

ANDREW CLIFFORD JOHNSTONE

state under oath that:

- 1 I am the founder and Managing Director of GCS (Pty) Ltd ("GCS"), an environmental and water consulting company based in South Africa.
- 2 I have the following qualifications: a Bachelor of Science (with Honours) in Geography and Geology, and a Master of Science in Hydrogeology, both obtained at Rhodes University. I have more than 36 years' experience in water and environmental consulting in the mining, industrial, waste, oil and agricultural sectors in Africa. I am a Professional Natural Scientist (Reg. No.

400192/87) registered with the South African Council for Natural Scientific Professions.

- 3 In addition, I am a member of the following societies/associations: the International Mine Water Association, the Geological Society of South Africa including its Groundwater Division, the International Association of Hydrogeologists, and the Institute of Waste Management, South Africa.
- 4 My key areas of expertise include mining-related hydrogeology, environmental investigations and waste disposal management. In respect of the first, I have undertaken mining-related hydrology and hydrogeology investigations for coal, gold, platinum, base metal and heavy mineral sand mines in Africa.
- 5 The facts set out in this affidavit fall within my personal knowledge and belief, except where the context indicates otherwise, and are true and correct.
- 6 The purposes of this affidavit are three-fold:
 - 6.1 First, I confirm in this affidavit the contents of the two reviews which have been prepared by GCS for purposes of this appeal and which are to be found at pages 60 to 113 (in File 1) and pages 1641 to 1710 (in File 3), respectively.
 - 6.2 The second purpose of this affidavit is to respond to allegations of fact which are contained in the first respondent's answering affidavit dated 24 October 2017 ("the first respondent's answering affidavit") pertaining to previous mining in the area on which the surface infrastructure of the mine would be constructed ("the surface infrastructure area"); and

6.3 The third purpose of this affidavit is to respond to allegations of fact which are contained in the second respondent's written response to the appellants' amplified appeal, dated 13 March 2018, ("Atha's written response") pertaining to the presence or otherwise of a continuous impermeable or semi-impermeable dolerite sill between the two aquifer systems in the mine area, and the likely points and quality of decant after closure of the mine.

7 In this affidavit I refer to documents which are to be found in two places:

7.1 Documents contained in Atha's water use licence application ("the WULA"). The WULA comprises an Integrated Water and Waste Management Plan dated August 2015 ("the IWWMP"), and several appendices including various specialist reports; and

7.2 Documents contained in the Record of Proceedings which was prepared by the appellants on 22 March 2018. The Record of Proceedings comprises three lever arch files (Files 1, 2 and 3) which are paginated from pages 1 to 2343. These contain documents to which the appellants refer in the appeal and which are not contained in the WULA.

THE GCS REVIEWS

8 I have read the Grounds of Appeal dated 15 December 2016 ("the Original Grounds of Appeal") and the Amplified Grounds of Appeal dated 1 December 2017 ("the Amplified Grounds of Appeal"). I confirm that their contents are true and correct insofar as they pertain to GCS and to me.



9 In particular, I confirm that:

9.1 GCS prepared the report entitled "*IWULA [integrated water-use licence application], IWUL [integrated WUL] and Specialist Investigation Review of the Yzermyn Colliery Mpumalanga*", dated 18 November 2016, referred to in the Amplified Grounds of Appeal as "*the original GCS review*" (File 1, pp. 60 to 113);

9.2 The Centre for Environmental Rights ("the CER") commissioned GCS to update the original GCS review in order to take into account a revised version of a specialist report by Scientific Aquatic Services CC entitled "*Wetland Ecological Assessment as part of the Environmental Assessment and Authorisation Process for the proposed Yzermine (sic) Coal Mining Project*", dated May 2015, referred to in the Amplified Grounds of Appeal as "*the SAS 2015 assessment*";

9.3 Pursuant to that, GCS drafted a revised report dated 1 December 2017, referred to in the Amplified Grounds of Appeal as "*the revised GCS review*" (File 3, pp. 1641 to 1710); and

9.4 GCS undertook the work described in the original and revised GCS reviews.

10 I confirm that the statements in the Original and Amplified Grounds of Appeal regarding the aforesaid GCS reports and their findings are accurate.

PREVIOUS MINING IN THE SURFACE INFRASTRUCTURE AREA

11 The first respondent's answering affidavit contains the following allegations:

- 11.1 The area on which the surface infrastructure of the mine would be situated (“the surface infrastructure area”) has been previously disturbed by mining activity, and there is more than one entrance (or adit) to an old mine on the surface infrastructure area (File 2 p. 1103 para 24);
- 11.2 There is still an old steel structure apparently left behind by the miners on the surface infrastructure area (File 2 p. 1104 para 27); and
- 11.3 For these reasons “*the area to be mined is not virgin biodiversity with an irreplaceable impact (sic) alleged by the Appellant. It was previously mined for profit*” (File 2 p. 1104 para 28)
- 12 Before dealing with these allegations, I point out that they pertain only to the surface infrastructure area (which is 22.4 hectares). By way of comparison, the underground portion of the mine would comprise 1 200 hectares (see the IWWMP p. 14). It is the impacts associated with the underground mining on the wetlands, springs and baseflow to rivers/streams associated with the aquifers which will be dewatered by mining, and groundwater contamination post-closure of the mine, which are of most concern.

The old adits

- 13 There are no existing adits in the surface infrastructure area.
- 14 The IWWMP and the specialist report by Natural Scientific Services (“NSS”), *Biodiversity Baseline and Impact Assessment Report*, refer to certain old adits outside of the surface infrastructure area related to mining which NSS

suggested took place in the 19th century (IWWMP p. 95; NSS pp. 159 and 218). (The NSS report is to be found at Appendices F8 to F15 of the IWWMP.)

- 15 On 16 February 2018 I conducted a site inspection of the surface infrastructure area and of the nearest of the adits identified by NSS. I confirm that the two adits that I inspected are indeed old, and are of a type which would have been used for artisanal mining (i.e. small scale informal mining by individuals or communities) or for exploration. I attach as annexure "**AJ1**" a photograph of one of the adits that I inspected. This photograph was taken in my presence on the property Vaalbank 74 HT at GPS co-ordinates 27 deg 12' 53.0" S; 30 deg 19' 20.8 E, which is adjacent to Portion 1 of Yzermyn 96 HT.
- 16 There was no evidence of water flowing from the adits that I inspected. In my view this is because the adits were terminated before intersecting the regional groundwater level. This is demonstrated in a figure prepared at my instance on 27 June 2018 by Prevlan Chetty, the Geographic Information Systems Manager at GCS, which is attached marked "**AJ2**". That the old adits are dry, short and shallow is confirmed by Atha in its written response (File 3 p. 2107 para 326.3).
- 17 There can be no comparison between this historical and informal small-scale mining on a neighbouring property and the mine which Atha proposes, which is a modern large-scale commercial coal mine which will fundamentally and permanently alter the groundwater levels in the area.
- 18 As regards the remains of the steel structure to which the first respondent refers in his affidavit, I attach as annexure "**AJ3**" a photograph of a partially intact structure which I observed in the surface infrastructure area. I believe

that this may be what the first respondent is referring to. This is self-evidently not a structure associated with any old mining, but is more likely a “core shed” which was set up to store the core samples obtained during exploration drilling for the mine which is now proposed.

A CONTINUOUS DOLERITE SILL

19 Atha’s written response states repeatedly that the dewatering impacts associated with the proposed mine will be limited because the mining will take place in the deeper fractured aquifer, and there is very limited connectivity between this aquifer and the upper weathered aquifer which feeds certain of the springs and wetlands. This limited connectivity, Atha says, is caused by the existence of an impermeable dolerite sill between the two aquifer systems (namely the deeper fractured aquifer containing the coal seams, and the upper weathered aquifer). Atha relies for this contention on its second groundwater specialist, Delta H (“*Yzermyn Underground Coal Mine – Numerical Groundwater Model Report*” dated August 2014 (“the Delta H report”)) (see for example Atha’s answering affidavit File 3 p. 1972 para 28.2; and File 3 p. 2107 para 326.3).

20 “*Dewatering*” is a term used to describe the pumping out of groundwater from the underground mine during the operational phase of the mine, which results in a decline in the pre-mining groundwater levels in the aquifers above and adjacent to the underground mine workings. Springs, wetlands and baseflow to streams/rivers which are fed by groundwater will be affected by a drawdown in groundwater levels.

- 21 Delta H acknowledges in its report that dewatering due to the pumping out of water from the underground mine workings will capture groundwater, which would have otherwise contributed to spring discharges, wetlands and stream/river baseflow (p. vi); and that groundwater dependent eco-systems and springs located within the significant zone of dewatering of the upper weathered aquifer, limited to the site boundaries, could be negatively impacted and some may dry up during the life of mine (p. 53).
- 22 I point out that this is in itself an unacceptable impact given that:
- 22.1 The wetlands in the proposed underground mining area have a 'VERY HIGH' Ecological Importance and Sensitivity (EIS), meaning that the wetlands are considered to be ecologically important and sensitive on a national or even an international level, the biodiversity of these wetlands is likely to be very sensitive to flow and habitat modifications and the wetlands play a major role in moderating the quantity and quality of water of major rivers (NSS pp. 199 and 100; SAS 2015 assessment pp. 80 and 26);
- 22.2 The dewatering will result in a reduction in baseflow to the headwater streams originating in the area, and consequently an overall reduction in the runoff of the catchment; and
- 22.3 The underground mining area falls within the Mabola Protected Environment and the Enkangala Drakensberg Strategic Water Source Area.

- 23 But Delta H also makes it clear that its findings, of what it characterises as being limited impacts, are premised on the existence of a continuous dolerite sill of limited permeability, and acknowledges that if the premise of a continuous impermeable or semi-permeable sill is incorrect, the dewatering impact would be far more severe (Delta H pp. 49; 50).
- 24 During preparation for the appeal hearing, it became clear that the available evidence shows positively that there is no continuous dolerite sill.

The hydrogeological logs of WSP

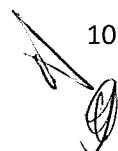
- 25 WSP was Atha's first environmental assessment practitioner. WSP prepared a Geohydrology Impact Assessment report based on preliminary modelling by Irene Lea who is a groundwater specialist.
- 26 A copy of WSP's Geohydrology Impact Assessment report dated 3 September 2013 is in File 2 at p. 1472. A copy of the full set of borehole logs of the boreholes which were drilled by WSP for the environmental impact assessment is attached marked "AJ4". The full set of borehole logs did not form part of the version of the report which was initially provided by EcoPartners, Atha's second environmental assessment practitioner, to the CER on 8 July 2016. This is confirmed in the accompanying affidavit of Suzanne Powell, an attorney in the employ of CER. The full set of borehole logs was provided to the CER on 14 June 2018 by Charlaine Baartjes of EcoPartners, when it was discovered during preparation for the appeal hearing that these were missing.
- 27 As appears from the borehole logs:



- 27.1 Fourteen boreholes were drilled by WSP, the locations of which are shown in a figure prepared by WSP (File 2 at p. 1508);
- 27.2 Eight of these boreholes were drilled to intersect the coal seams (these boreholes being CBH1; CBH2D; CBH3D; CBH4D; CBH5D; CBH6; CBH7D and CBH8D);
- 27.3 Only two of these deep boreholes intersected dolerite, being CBH4D which intersected "dolostone" below the Alfred and Dundas coal seams; and CBH7D which intersected dolerite at a depth of 12 m.
- 28 The borehole logs, as well as their geospatial distribution, clearly demonstrate that there is no continuous dolerite sill which separates the deeper fractured aquifer (in which the coal seams are located), and the upper weathered aquifer.

The geological exploration borehole results

- 29 An analysis of the borehole logs of the geological exploration boreholes confirm that there is no continuous dolerite sill separating the deeper fractured aquifer and the upper weathered aquifer. I attach as annexure "**AJ5**" a summary of the exploration borehole logs on which I have highlighted in yellow the boreholes where dolerite was encountered above the Alfred coal seam (which is the uppermost of the two coal seams to be targeted). The data from the exploration boreholes is attached marked "**AJ6**".
- 30 As appears from annexure "AJ5", of forty-eight exploration boreholes, only twelve intersected dolerite above the coal seams. As also appears from



annexure "AJ5", where dolerite was intersected, this was at varying depths in the various boreholes.

- 31 What annexure "AJ5" shows is that there are very likely several different dolerite intrusions in the aquifer above the underground mining area. What there is not, is a *continuous* dolerite sill as conceptualised by Delta H.
- 32 In fact, the contact and fracture zones in the dolerite intrusions provide *preferential* flow paths for groundwater.
- 33 In conclusion under this head it must be accepted, based on the evidence of the WSP and exploration borehole results that far more severe dewatering impacts than those described by Delta H - which are premised on a continuous dolerite sill - are to be expected.

THE LIKELY POINT OF DECANT

- 34 Delta H, Atha's second groundwater specialist, predicts that it will take forty-five years for the mine voids to be completely flooded once active dewatering (pumping out of water) ceases. Thereafter, decant from the underground mine voids via the adit (entrance) and/or unsealed exploration boreholes in the vicinity is likely to occur (Delta H p. 68).
- 35 Atha says in its written response that "*in reality the situation is a bit more complex*", and that potential pollutants could flow through fractures and other discontinuities in the rock out of the mine workings (and that for this reason, water levels would need to be kept below the environmentally critical level and fractures and discontinuities could be grouted) (Atha's written response, File 3 p. 2086 para 269.2).

- 36 “*Decant*” is the process by which water which has flooded into the underground mine void(s) after operations have ceased and pumping out has stopped flows to the surface through one or more decant points.
- 37 Decant from the proposed mine will contain poor quality leachate, high in dissolved solids (minerals) especially sulphate, sodium and chloride.
- 38 This is borne out by data from a range of underground coal mines in the Kwa-Zulu Natal coalfield within 150km of the proposed Yzermyn mine, which have mined the Alfred and Dundas coal seams (which are the same coal seams that Atha will mine). The decant water qualities are the following:
- 38.1 pH varies from 4,5 to 7,7
 - 38.2 Total dissolved solids – 1382 to 6402 mg/l
 - 38.3 Sulphate – 932 to 2037 mg/l
 - 38.4 Iron – 0,25 to 450 mg/l
 - 38.5 Manganese – 0,2 to 8,9 mg/l
- 39 Sulphides found in coal bearing strata are linked to the formation of Acid Mine Drainage (AMD). When these sulphide minerals (especially pyrite or ‘fool’s gold’) come into contact with water and oxygen, they oxidise via several chemical reaction pathways to form sulphuric acid and iron. This in turn leaches metals from lithologies (rock formations) it comes into contact with and the process leads to elevated concentrations of metals and salts (mostly sulphates) and a decline in pH value (acidification).

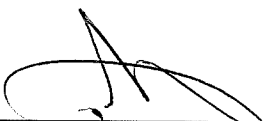


- 40 It is clear that in this case the decant water quality will not comply with the water quality standards specified in the water use licence (Table 2 on p. 35 of the licence in File 2, p. 1399).
- 41 What is more, however, is that it is evident from an analysis of the exploration borehole results that the anticipated area of decant post-closure of the mine will be the river system corresponding with the north western part of the underground workings of the mine (and not the adit, as Atha states in its written response (File 3 p. 2086 para 269.2)). I attach as annexure "AJ7" a locality figure depicting the anticipated area of decant. The area of decant corresponds with channelled valley bottom wetlands which have a Category A present ecological state (meaning that they are natural and unmodified) (SAS 2015 assessment File 2 pp. 1046 and 1041).
- 42 The reason I say that this is the anticipated area of decant is the following:
- 42.1 This is the shallowest surface elevation above the underground mine workings;
- 42.2 The surface elevation in this area is between 1458 and 1468 metres above mean sea level, which is lower than the adit which is at an elevation of 1496 metres above mean sea level;
- 42.3 The floor of the Alfred coal seam is less than 10 metres below surface in this area, as shown in annexure "AJ7";
- 42.4 After closure of the mine, the mine void will fill up with water and the groundwater level will rebound to the decant elevation (being



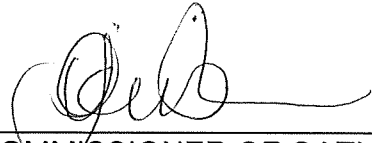
approximately 1460 metres above mean sea level), and decant onto surface in this area.

- 43 This anticipated decant area is depicted visually on a figure which is attached marked "AJ8". The figure was prepared at my instance by Prevlan Chetty and is based on a coal floor model interpolated from the exploration borehole data.
- 44 Annexure "AJ9", which was also prepared by Prevlan Chetty based on the exploration borehole data, indicates that there are portions of the mine that will not be flooded and as a result will have the potential to generate poor quality leachate and AMD indefinitely.
- 45 The only mitigation which could be implemented to prevent uncontrolled decant in this area (the river system corresponding with the north western part of the underground mine workings) is to pump the water out of the underground mine voids to maintain the water level below the decant level; and then to treat this water in a Water Treatment Plant. Both pumping and water treatment would need to be done indefinitely. That is because if pumping stops, decant will occur.



ANDREW CLIFFORD JOHNSTONE

I hereby certify that the deponent knows and understands the contents of this affidavit and that it is to the best of the deponent's knowledge both true and correct. This affidavit was signed and sworn to before me at CAPE TOWN on this the 27 day of JUNE 2018, and that the Regulations contained in Government Notice R.1258 of 21 July 1972, as amended by R1648 of 19 August 1977, and as further amended by R1428 of 11 July 1989, having been complied with.



COMMISSIONER OF OATHS

Full names: ADV. LINATHI GCILISHE

Address:

Capacity:

ADVOCATES FIRST FLOOR

42 KEEROM STREET.

CAPE TOWN

8001

