

A CRITICAL REVIEW OF THE APPLICATION FOR A KAROO GAS
EXPLORATION RIGHT BY SHELL EXPLORATION COMPANY B.V

Dated 05 April 2011

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EXECUTIVE SUMMARY

Introduction

- 1 This Critical Review is motivated by the application made by a multinational, Shell Exploration Company BV ('Shell') to undertake hydraulic fracturing, or 'fracking' as it is known, in three precincts in the Karoo totalling an area of 90 000 square kilometres. Shell has applied for an exploration right to undertake fracking in terms of section 79 of the Minerals and Petroleum Development Act, 28 of 2004 ("the Application"). In so-doing Shell is required, amongst other things, to submit an environmental management plan in terms of section 39 within a period of 120 days of the Application being accepted.
- 2 It is the environmental management plan ("the EMP") which is currently in draft form and which is being subjected to a required public participation process that is central to this critical review.

The nature of hydraulic fracturing ("fracking")

- 3 Hydraulic fracturing, ('fracking') involves the injection of a liquid chemical mixture contained in vast quantities of water into deep boreholes to create sufficient pressure to cause fracturing of rocks at that level. The purpose of fracking is to find out whether or not there is gas in the Karoo's shale deposits; the gas is seen by Shell as a potentially exploitable commercial source of energy.
- 4 From the information that has been made available by Shell the proposed exploration will apparently entail drilling 8 boreholes in each precinct (i.e. 24 boreholes in total) of up to 5km depth over a 3-year period, extendable to 9 years. It appears that each well will need between 0.3 million and 6 million litres of water (i.e. a scenario of between 7.2 million and 144 million litres of water required). Shell has been extremely vague as to its anticipated source of water, with no concrete indication being given in the draft EMP nor in the public consultation meetings as to where the multinational intends to source the requisite water from.
- 5 Apart from issues of water scarcity, fracking raises serious issues of water quality and thus public health. Potentially toxic chemicals and particulate materials are introduced to hold the fractures open once the initial pressure is released in the borehole.

- 6 Currently, no specific drilling sites have been identified within the precincts; apart from broad ‘setback’ guidelines for attributes deemed sensitive in the Application. As such, any location within the extensive precinct areas is a ‘possible’ site.

The international context

- 7 Fracking has raised major concerns world-wide for a wide-variety of reasons amplified in the main body of the report below. In short:

- a. **The United States of America:** the Environmental Protection Agency is engaged at the Federal level in an environmental impact study on hydraulic fracturing. At the state level: New York State placed a moratorium on hydraulic fracturing in December 2010; the state of Maryland has placed a moratorium on drilling in March 2011 until the Department of the Environment completes a two-year study on the impacts on drinking water and public health; the state of New Jersey declared itself a ‘no fracking’ zone in March 2011.

- b. **The United Kingdom:**

- i. Proposed fracking in the UK has very recently been subject to a major study known as the Tyndall Report,¹ as well as an enquiry by the House of Commons, before the Energy and Climate Change Committee, (“the E&CCC enquiry”).² Amongst other things the Tyndall Report notes that ‘...there is a real paucity of information on which to base an analysis of how shale gas could impact on GHG emissions and what environmental and health impacts its extraction may have’; that there is a clear risk of contamination of groundwater from shale gas extraction; that it is important to recognise that most problems arise due to errors in construction or operation and these cannot be eliminated. It also notes that ‘very significant’ amounts of water are required to extract shale gas and this could put severe pressure on water supplies in areas of drilling; the impacts of climate change may further exacerbate this problem.

¹ Shale gas: a provisional assessment of climate change and environmental impacts. A report by researchers at The Tyndall Centre, University of Manchester. January 2011 (Final)

² House of Commons, Corrected Transcript of Oral Evidence Taken Before the Energy and Climate Change Committee, HC 795-i, Wednesday 9 February 2011 <<http://www.publications.parliament.uk/pa/cm201011/cmselect/cmenergy/c795-i/c79501.htm>>.

- ii. The Tyndall Report continues: ‘..in itself, this lack of information can be seen as a finding, as along with the growing body of evidence for ground and surface water contamination from the US and the requirement for the application of the precautionary principle in the EU; shale gas extraction in the UK must surely be delayed until clear evidence of its safety can be presented.’ The Report goes on to say that with the considerable uncertainty surrounding the environmental impacts of shale gas extraction, ‘it seems sensible to wait for the results of the US EPA investigation to bring forward further information’.

- iii. The UK’s Energy and Climate Change Committee (“the E&CCC”) recently held an inquiry into the exploration for and exploitation of shale gas. As regards the harmful nature of the chemicals used in fracking, it was noted *“that there could be some issues of mobilization of chemicals within the shale to surface and ground waters. That is one of the reasons, of course, that the inquiry in the States by the EPA has been undertaken. Again, it would seem a wise thing to do to investigate that.”*³

- c. **Canada:** In Canada the authorities commissioned the ‘BAPE’ report in reaction to the high percentage of wells drilled recently by the shale gas industry, which exhibited problems relating to sealing in Québec province.⁴ Among other things the report notes the paucity of scientific studies in Canada, the United States or elsewhere to assess the impacts of drilling with hydraulic fracturing on groundwater. The Commission made a number of recommendations, which are also pertinent to the Shell proposal. These include: that the use of chemical additives for which the environmental or health-related risks cannot be assessed, or which may present a risk, in the water used for hydraulic fracturing should be prohibited; that it would be appropriate to assess the long-term risk associated with the presence of contaminated water from hydraulic fracturing activities in rock formations; that a study of the cumulative impacts of the disposal of wastewater from the shale gas industry be undertaken. The Commission also pointed out that a high percentage of unexpected natural gas emissions observed from wells pose a risk of explosion, and little is known about the seismic risks associated with the industry. The report stated that a

³ E&CCC Transcript, page 25.

⁴ *Bureau d'audiences publiques sur l'environnement* ("BAPE") report: Report 273, Sustainable Development of the Shale Gas Industry in Québec. Inquiry and public hearing report translation. February 2011.

strategic environmental assessment of the cumulative impacts was seen to be ‘a necessary element of both an informed decision and improved social acceptability’.

- d. **France:** On 14 March 2011, France extended a moratorium on shale gas exploration until June 2011 at which time two official reports are due to be published on the economic, social and environmental impacts of the exploration for, and exploitation of, shale gas. The extension of the moratorium comes just days after the French Prime Minister, Francois Fillon, imposed a ban on drilling for unconventional oil and gas until mid-April, at which time a preliminary risk report is expected. The moratorium was extended primarily to allow for more time to properly explore the environmental risks associated with shale gas exploration and follows rigorous protests against shale gas exploration in France.⁵

- 8 The above commentary highlights the fact that, internationally, there are sincere and significant concerns regarding the risks that fracking poses to, amongst other things, human health and the environment.

The constitutional context

- 9 This Review highlights five provisions in the Bill of Rights contained in Chapter 2 of the Constitution which has relevance to Shell’s proposal:
 - a. **The environmental right** (section 24 of the Constitution). It is argued that any application to conduct fracking in the Karoo is not in conformity with the right to sustainable development, in particular the right to “*secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*” as set out in sub-section 24(b)(iii) of the Constitution.
 - b. **The property right** (section 25 of the Constitution). It is argued that while Shell may acquire a property right to explore, prospect or mine in the Karoo this right must be tempered in accordance with developing legal norms. These include the fact that property rights are not absolute and the fact that they must be exercised in accordance

⁵See “Moratorium on Shale Gas Extended Until June 2011” available online at http://www.maplecroft.com/portfolio/ethical_insight/articles/24229/ where it is reported that French parliamentary deputies have proposed the creation of a 30-member inquiry commission to examine, not only the impacts of shale gas exploration, but also how and under what regulation previously-awarded exploration licences had been awarded. Notably, the report also states that a “previous initiative had resulted in the signing of a motion on 3 March 2011 by 80 parliamentarians “against the exploitation of shale gas.” See further “The French Public Says No to ‘le Fracking’” http://www.businessweek.com/magazine/content/11_15/b4223060759263.htm

with right to administrative justice and the doctrine of the public trust as set out in the principles of the National Environmental Management Act 73 Of 1998. It is also argued that the multi-faceted decision-making process that goes with the granting of property a right to explore prospect or mine is closely allied to the right to just administrative action.

- c. **The right to just administrative action** (section 33 of the Constitution). It is argued that ‘administrative justice’ includes the requirement that decision-making, particular in a complex matter such as Shell’s proposal where a multiplicity of national and provincial government agencies are involved requires comprehensive, well informed and integrated decision-making. This is more so in the light of the fact that evidence has been gathered from leading experts in their respective fields which indicates that there are potentially serious risks in undertaking fracturing.
- d. **The right of access to information** (section 32 of the Constitution). It is argued that the right of ‘access to information’ includes the right that interested and potentially affected parties have full disclosure as well as the right to comment at every step of the decision making process amongst other things.
- e. **The right to sufficient water** (section 27(1)(b) of the Constitution). It is argued that a water licence should be declined on the ground of the right to access to sufficient water as amplified in the National Water Act 36 of 1998. Among other things the Water Act lays down stringent water licensing criteria as well as providing for a ‘Reserve’.

10 The Constitutional Court in *Bengwenyama Minerals (Pty) Ltd and Others v Genorah Resources (Pty) Ltd and Others (CCT 39/10) [2010] ZACC 26 (30 November 2010)* acknowledged the interplay and interdependence of various rights in the Bill of Rights in the minerals rights context in stating:

The Mineral and Petroleum Resources Development Act was enacted amongst other things to give effect to those constitutional norms. It contains provisions that have a material impact on each of the levels referred to, namely that of individual ownership of land, community ownership of land and the empowerment of previously

*disadvantaged people to gain access to this country's bounteous mineral resources.*⁶

Structure, expert input and compilation of this document

- 11 This Critical Review was compiled by Dr Luke Havemann, Havemann Inc, Specialist Energy Attorneys, Cape Town; Prof Jan Glazewski, Professor in the Institute of Marine & Environmental Law, University of Cape Town; and Susie Brownlie, Environmental Consultant, de Villiers and Brownlie Associates.
- 12 Dr Havemann holds a Masters Degree in Marine and Environmental Law from the University of Cape Town and a PhD in the Enviro-Legal Regulation of Oil and Gas from the University of Aberdeen, Scotland.
- 13 Prof Glazewski holds a BComm LLB from the University of Cape Town, an LLM from the University of London, a Master's degree in Environmental Studies from the University of Cape Town as well as an LLD by published work from the University of Cape Town.
- 14 Ms Brownlie holds a BSc Honours in Zoology from the University of Cape Town and a Master degree, with distinction, in Environmental Science from the University of Cape Town.
- 15 Dr Havemann, Prof Glazewski and Ms Brownlie obtained specialist input from the following experts in their respective fields, as listed hereunder:
 - a. **Groundwater:** Dr Chris Hartnady and Ms Rowena Hay. Dr Hartnady holds a PhD in Geology from the University of Cape Town where he later held the position of Associate Professor in the Department Geological Sciences. Currently, Dr Hartnady fulfills the role of Technical Director for Umvoto, a water resource and development management consultancy

⁶ At para 3.

(“Umvoto”). Ms Hay holds an MSc in Marine Geology from the University of Cape Town and is the managing director of Umvoto. Ms Hay’s specialisation is hydrogeological exploration and contamination modeling and she has been widely involved in integrated water resource management, including projects directing water management policy at a provincial and national level.

b. **Water resources:** Ms Carin Bosman. Ms Bosman holds a Masters Degree in Environmental Management and Analysis and a BSc Honours in Chemistry. Ms Bosman is an independent sustainability advisor and environmental specialist with more than twenty years’ experience in environmental governance, water resource protection and waste management.

c. **Public health:** Prof Leslie London. Prof London is an Associate Director for Environmental Health in the Centre for Occupational and Environmental Health and he holds the following qualifications: a medical degree (MB ChB), a doctorate in Public Health (MD), a specialization in Public Health Medicine (M Med Public Health) a diploma in Occupational Health, and a BSC Honours in Epidemiology.

d. **Socio-economic:** Dr Doreen Atkinson, Prof Ben Cousins and Prof Tony Leiman. Dr Atkinson holds a BA Honours in Politics from Rhodes University, a MA in Political Science from the University of California, Berkely, and a PhD in Political Science from the University of KwaZulu-Natal. Dr Atkinson is Manager of the Heartland and Karoo Institute and Director of the University of the Free State’s Strategic Academic Research Cluster on Sustainable Development. Prof Ben Cousins is a rural sociologist and holds a Department of Science and Technology/National Research Foundation (“DST/NRF”) Chair in Poverty, Land and Agrarian Studies at the University of the Western Cape. He has worked on land reform and rural development in Southern Africa for over thirty years. Prof Leiman has been researching and teaching environmental economics for over twenty years and is a member of the Environmental Economics Policy Research Unit, a collaborative association of academic researchers specializing in environmental and natural resource issues.

e. **Paleontology:** Prof Bruce Rubidge, Dr Judy Maguire and Dr Sven Ouzman. Prof Rubidge is Director of the Bernard Price Institute for Palaeontological Research. He holds a PhD in Geology and Paleontology, an M.Sc. in Palaeontology *cum laude*, a B.Sc. Hons Palaeontology *cum laude* and a BSc majoring in Zoology and Geology. Dr Judy Maguire holds a BSc majoring in Botany, Zoology and Geology from the University of Witwatersrand. Dr Maguire also holds a BSc Honours in Geology, as well as a PhD in Paleontology, from Witwatersrand University. Dr Sven Ouzman holds a PhD from the University of California, Berkeley, and is Curator of Pre-Colonial Archaeology of the Social History Department of the Iziko South African Museum.

f. **Heritage:** Dr Judy Maguire (see above under Paleontology).

g. **Archaeology:** Dr Sven Ouzman (see above under Paleontology).

h. **Astronomy:** Prof Brian Warner and Prof Phillip Charles. Prof Warner holds four doctoral degrees in astronomy and is Emeritus Professor at the University of Cape Town where he was Head of the Department of Astronomy from 1972 to 2004. Prof Charles is Director of the South African Astronomical Observatory and has previously held the following positions: Head of Astrophysics, University of Oxford; Professor of Physics, Oxford University of Oxford; and, Professor and Head of Astronomy, University of South Hampton.

i. **Biodiversity:** Prof Sue Milton-Dean. Prof Milton-Dean holds a PhD in Plant Ecology from the University of Cape Town. She is also a retired Professor of Nature Conservation with 24 years of experience in Karoo vegetation ecology.

j. **Ornithology:** Dr Richard Dean. Dr Dean holds a PhD in Zoology from the University of Cape Town. Dr Dean's expertise includes arid savanna and desert bird biology, avian biogeography, plant-animal interactions in arid and semi-arid savanna, and desert ecology.

k. **Energy policy:** Dr Glynn Morris and Mr Jeremy Wakeford. Mr Glynn Morris holds the degrees BSc Eng (Mechanical) and MSc Engineering (Energy Studies) and he is a director of

various companies including AGAMA Energy Ltd and GreenX Energy (Pty) Ltd. Mr Wakeford holds Masters Degrees in Economics from Cambridge University and the University of Cape Town, and is currently a PhD candidate at Stellenbosch University researching the socio-economic implications of global oil depletion for South Africa. Mr Wakeford is also Chairman of the Association for the Study of Peak Oil, South Africa.

16 Each of the experts and/or consultants referred to above was advised as follows and requested, within very severe time constraints, to provide to provide their input, comments and viewpoints:

a. *“The focus of our argument is on the following aspects:*

- i. *Inadequate or insufficient information on which to base a decision which would ensure (as legally required) that the NEMA principles would be satisfied;*
- ii. *Lack of evaluation against the ‘bigger picture’ strategic context for sustainable development;*
- iii. *Uncertainties, unknowns, gaps in information;*
- iv. *Risks of irreplaceable loss of – or irreversible damage to - important/ valued resources (either heritage or biophysical or ...), many of which may have no substitute;*
- v. *No consideration of distributional effects – who benefits, who bears the costs, in short or in long term; effects on vulnerable parties, (fairness, environmental justice/ equity);*
- vi. *Poor capability and institutional capacity of government to check or enforce mitigation.*

b. *We would thus appreciate it if you would please structure your response as far as possible in accordance with the above aspects.”*

17 The aforesaid experts’ responses have been synthesized in Part B of this report while Part A deals with the international perspective, the Constitutional dimension, the legislative context and the flawed decision-making process.

Legislative context

18 When considered in the context of South Africa’s environmental legislative framework, the draft EMP demonstrates significant non-compliance with the national environmental management principles for sustainable development set out in the National Environmental Management Act 1998 (‘NEMA’). The NEMA principles have been embraced by the Minerals and Petroleum Development Act 28 of 2002.

19 In this regard, this Critical Review highlights the following concerns:

- a. It is questionable that the proposed activity represents the ‘best practicable environmental option’ for the affected area, especially in the absence of comparison with alternative land uses (including alternative energy generation options);⁷
- b. There is insufficient information on potential health risks of potential public health consequences as a result of water contamination;
- c. There is an unacceptable risk of losing globally unique biodiversity, jeopardising ecological integrity and causing loss of irreplaceable resources for which remedy is not feasible;
- d. There is an unacceptable risk of having an irreversible negative impact on the sense of place of the Karoo and on the lives, health and livelihoods of its communities;
- e. There is a substantial risk of inequitable distribution of impacts arising from the proposed activity, and of vulnerable rural people having to bear the negative impacts; and
- f. In the light of significant uncertainties there is a need to take a risk-averse and cautious approach.

20 It is highly problematic that the abovementioned concerns have arisen in a context where decision-making is being, and may well continue to be, made in a flawed regulatory context. To this end, the following points must be borne in mind:

- a. Fracking is an unprecedented activity in South Africa;
- b. A policy vacuum exists in relation to the exploitation of shale gas;
- c. Project-level environmental impact assessment is an inappropriate mode of environmental management in this case – regional strategic environmental assessment would be appropriate;

⁷ Energy return on energy invested’ considerations suggest that, under South African conditions, shale gas is uncompetitive with nuclear, wind or solar (Concentrated Solar Power) sources (refer to Part B)

- d. Authorisation processes are fragmented and limited;
- e. There is a probable conflict of interests as regards the decision-making role played by the relevant regulatory authority, namely, the Petroleum Agency of South Africa (“PASA”); and
- f. There is a serious lack of capacity to monitor and enforce compliance with any conditions of approval.

Conclusion

- 21 The Application is the first in a series of possible steps on the road to obtaining authorisation for the exploitation of shale gas in the Karoo. Each step should not be considered in isolation from the broader policy environment and from the logical outcome of the Application. From an environmental perspective, and taking into account the lives and livelihoods of the affected communities in the Karoo, it is appropriate to consider the ‘endgame’ situation of the Application. In this situation, the scale and severity of the potentially significant impacts identified in relation to the exploration activities would be substantially magnified: the potential effects on irreplaceable water resources, livelihoods and the sense of place of the Karoo, and the potential harms to health and environmental ‘well-being’ in the sense that this word is used in the environmental right contained in section 24 of the Constitution.
- 22 The values of affected communities and stakeholders in the Karoo, the strategic vision and levels of environmental quality chosen by them, and the best way to achieve equitable and sustainable development in that region are crucial informants to evaluating the significance of likely impacts. Given the level of resistance and conflict with both legal requirements and stakeholder values at this early stage, as well as the potential ‘Achilles Heel’ of providing water for the proposed activity, it would behove the competent authorities to give due consideration to the wisdom of approving an activity that has little, if any, chance of reaching that ‘endgame’ position.
- 23 This Critical Review concludes by requesting government to put an immediate end not only to the Application but also to decline any future fracking exploration in the Karoo by Shell or other consortium on a number of grounds including the following:
- a. inconsistency with Constitutional provisions, norms and values;

- b. lack of evaluation against the ‘bigger picture’ strategic context for sustainable development and/ or of land use alternatives that could better meet sustainable development objectives;
- c. insufficient information to make informed rational decisions in the best interests of sustainable development in South Africa;
- d. inadequate information on the distributional effects and the equity and environmental justice implications, with particular regard for vulnerable parties;
- e. uncertainties, unknowns and gaps in information that pose unacceptable risks to water resources in a water stressed region, and to health of both communities and ecosystems; and
- f. negative impacts on the rural livelihoods and the sense of place of the Karoo.

24 As an alternative, this Critical Review proposes that the entire Application be subject to a moratorium pending:

- a. a comprehensive study on why other mainly developed countries have placed moratoriums on fracking in their respective countries or states;
- b. the release of the first report of the National Planning Commission on land use in the region concerned;
- c. the undertaking of a Strategic Environmental Assessment that takes cognisance of the entire sub-region and investigates reasonable and feasible alternative land use and development trajectories that could constitute the ‘best practicable environmental option’ for the Karoo;
- d. the undertaking of a study to determine the current state of groundwater resources and their variability, the availability of water and of the implications and opportunity costs of using water for fracking as a precondition to considering the granting of exploration rights, and before any other studies or impact assessment;
- e. the outcome of South Africa’s bid to host the SKA;
- f. the coming into force of the Mineral and Petroleum Resources Development Amendment Act 49 of 2008 which will, together with the National Environmental Management Amendment Act 62 of 2008, provide for integrated decision-making.

- 25 The underlying argument of this Critical Review is that an immediate halt should be imposed on Shell's application for an exploration right as well as on any other application for any other form of permit, right or authorisation that, if successful, may bring the advent of fracking in South Africa a step closer to fruition.

PART A: STRATEGIC CONSIDERATIONS

1 INTRODUCTION

1.1 Background

- 1 This Critical Review is motivated by the fact that a multinational oil company, Shell Exploration Company B.V. ('Shell') has applied for an exploration right to undertake 'fracking' in as yet an undefined area as reported in the media recently under section 79 of the Mineral and Petroleum Resources Act 28 of 2002 (the 'MPRDA').
- 2 Hydraulic fracturing, or 'fracking', involves the injection of a liquid chemical mixture contained in vast quantities of water into deep boreholes to create sufficient pressure to cause fracturing of rocks at that level. Additional particulate materials are introduced to hold the fractures open once the initial pressure is released in the borehole. The purpose of fracking is to find out whether or not there is gas in the Karoo's shale deposits; the gas is seen by Shell as a potentially exploitable commercial source of energy.
- 3 More specifically Shell's application is looking at a total area of 90 000km² consisting of three precincts in the Karoo: a western, central and an eastern precinct – see the map extracted from the draft EMP and attached to this Critical Review and marked "A". Exploration will entail drilling 8 boreholes in each precinct (i.e. 24 boreholes in total) of up to 5km depth over a 3-year period, extendable to 9 years. Currently, no specific drilling sites have been identified within the precincts; apart from broad 'setback' guidelines for attributes deemed sensitive in the Application. As such, any location within the extensive precinct areas is a 'possible' site.
- 4 Each well needs between 0.3 million and 6 million litres of water (i.e. an amount of between 7.2 million and 144 million litres of water required); the source of water for the proposed activity has not been determined at this stage. Thus far Shell has been extremely vague as to its anticipated source of water, no concrete indication being given in the draft EMP. This is of grave concern given that the exploration area is in a water stressed region. Even in the United Kingdom serious concerns relating to water supply were recently raised during an

inquiry into fracking conducted by the House of Commons Energy and Climate Change Committee.⁸

- 5 Apart from water quantity there are major concerns on what effect fracking will have on water quality. Based on experience in other parts of the world, fracking carries risks of radioactivity, groundwater and surface water pollution linked to the use of chemicals dangerous to human health, as well as harmful, polluting emissions.
- 6 In addition to environmental and health concerns, a significant concern that has local and international ramifications is the negative affects that fracking may have on the practice and study of astronomy. The Karoo is home to the South African Large Telescope (“SALT”), the largest single optical telescope in the southern hemisphere and the Karoo is, in layman’s terms, a hotspot for astronomical research. Unsurprisingly, South Africa has for some time been in the running to host the Square Kilometre Array (“the SKA”) radio telescope which “promises to revolutionise science by answering some of the most fundamental questions that remain about the origin, nature and evolution of the universe.”⁹ Additionally, the Karoo is also a likely home for the international southern Cherenkov Telescope Array (“the CTA”) which, together with the Karoo Array Telescope (“the MeerKAT”), is a major scientific research project into which the South African government has invested in excess of one billion rands. The astronomical endeavours present in the Karoo, as well as those that may be introduced, are potentially under threat from the dust and light that may be generated by fracking.
- 7 It must also be pointed out that, aside from environmental, health and astronomical concerns, there are certain additional concerns. These include the following: employment creation will be minimal; it is not clear how any shale gas, if found, would be used and/ or who would benefit; and, a range of associated activities and infrastructure will be require to sustain frackign operations and the potential impacts and the energy and resource use demands (or pollution burden) of those associated components have not been investigated.

⁸ Evidence given during the inquiry included the answer to the following question:

“Q113 Christopher Pincher: [W]hat about water? You mentioned that a lot of water is required to do the fracturing. Do we have enough water in the UK to do that work? Is that going to be a limiting factor given that extraction from rivers is already considerable for housing estates and so on?”

Professor Kevin Anderson: It certainly is a consideration...[w]e know that even in wet parts of the world, which is where some of these shales are, there are often issues of water supply throughout the year, and this will be another pressure on that water supply system. So, I do not think it should be ignored. I do not think it is necessarily going to stop you going ahead but it is certainly a consideration, and a serious consideration, as to: are you prepared either to increase the scale of the water supply structure nearby or are you prepared to forgo some other activity to allow you the water necessary for this process? Because there are very large quantities involved.” See House of Commons, Corrected Transcript of the Oral Evidence Taken Before the Energy and Climate Change Committee, HC 795-i <http://www.publications.parliament.uk/pa/cm201011/cmselect/cmenergy/c795-i/c79501.htm>.

⁹ www.ska.ac.za.

- 8 The afore-mentioned risks have been corroborated at the local level by various national experts as outlined in Part B of this Critical Review.

1.2 Geo-physical setting

- 9 South Africa is a semi-arid country. Population growth and increased demands for water will aggravate the water supply situation and increase pressure on government. The Karoo includes some of the driest areas of the country and faces serious water shortages. Land productivity underpins the economy of the Karoo and, like most of the country, water is its limiting factor.
- 10 The Karoo is unique. It is characterised by its sense of place: its remoteness; its wide, breathtakingly unspoiled landscapes with expansive plains and stunning mountains; its silence, peace and tranquillity; the clean air; its rich and special ecosystems with species found nowhere else in the world; its fossil heritage; its mystery and ‘timeless sense of wonder’; its magical night skies. It is seen as a source of inspiration for artists and writers alike. Its small settlements have a strong sense of community, and have adapted over time to live in harmony with nature in this arid region, relying on agriculture and tourism for their livelihoods. The towns boast rich historical and cultural resources, and the Karoo is associated with its ‘Karoo lamb’, its ostrich farms and its ‘koppies’.

1.3 Policy considerations

- 11 Fracking and the exploitation of shale gas is unprecedented in South Africa, and there is no policy on such activity. The point of departure of this Critical Review is that an undertaking of this magnitude has international and national implications and should first and foremost be considered by the highest echelons of government such as Cabinet. In ‘normal’ development proposals the proponent is required by various laws to undertake a number of invariably protracted and drawn-out environmental studies before obtaining planning and environmental authorisations.
- 12 The remainder of this review shows that fracking in the Karoo or elsewhere in the country by Shell or any other consortium should not be permitted at all; or at the very least that a lengthy moratorium be introduced. This has been the case in many other countries as described in the next section of this Critical Review. The grounds for this assertion are varied and inter-linked. The strategic perspective is presented in Part A of this Critical Review while Part B, which

draws on the expertise of various specialists, provides more detailed information in support of the key themes in Part A.

2. INTERNATIONAL PERSPECTIVES AND TRENDS

2.1 International perspective: sustainable development and South Africa's global commitments and obligations

- 13 The notion of sustainable development is the foundation stone of both international and South African environmental law. South Africa is party to numerous international conventions that are underpinned by the notion of sustainable development, for example the Convention on Biological Diversity. Sustainable Development has been embraced by the Constitution which states that everyone has the right to “*secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*”.¹⁰
- 14 The importance of the principle of sustainable development has been acknowledged by the Constitutional Court in the case of *Fuel Retailers Association of Southern Africa v Director-General: Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province and Others*¹¹ (“Fuel Retailers”). *In casu*, Ngcobo J stated as follows:

*“Sustainable development is an evolving concept of international law. Broadly speaking its evolution can be traced to the 1972 Stockholm Conference. That Conference stressed the relationship between development and the protection of the environment, in particular, the need ‘to ensure that development is compatible with the need to protect and improve [the] environment for the benefit of their population’. The principles which were proclaimed at this conference provide a setting for the development of the concept of sustainable development. Since then the concept of sustainable development has received considerable endorsement by the international community. Indeed in 2002 people from over 180 countries gathered in our country for the Johannesburg World Summit on Sustainable Development (WSSD) to reaffirm that sustainable development is a world priority”.*¹²

¹⁰ Section 24.

¹¹ 2007 (10) BCLR 1059 (CC); 2007 (6) SA 4 (CC).

¹² Para 46

15 Ngcobo J continued:

“But it was the report of the World Commission on Environment and Development (the Brundtland Report) which “coined” the term “sustainable development”. The Brundtland Report defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. It described sustainable development as—

*“[i]n essence . . . a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations”.*¹³

16 Ngcobo J further observed:

*“The 1992 Rio Conference made the concept of sustainable development a central feature of its Declaration. The Rio Declaration is especially important because it reflects a real consensus in the international community on some core principles of environmental protection and sustainable development. It developed general principles on sustainable development and provided a framework for the development of the law of sustainable development”.*¹⁴

17 Finally on the notion of sustainable development, and relevant to Shell’s proposal to conduct fracking in the Karoo, Ngcobo J noted:

“At the heart of the Rio Declaration are Principles 3 and 4. Principle 3 provides that “[t]he right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.” Principle 4 provides that “[i]n order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.” The idea that development and environmental protection must be reconciled is central to the concept of sustainable development. At the core of this

¹³ Para 47.

¹⁴ Para 49.

*Principle is the principle of integration of environmental protection and socio-economic development”.*¹⁵

2.2 International perspectives and trends: shale gas exploration and exploitation

2.2.1 Introduction

18 In response to concerns in different countries where fracking has been proposed as a process to be used in the exploration for shale gas, or where fracking has in fact been employed in the exploitation of shale gas reserves, bans, moratoriums and/or studies have been commissioned or commissions of inquiry have taken place. Key amongst these are set out below.

2.2.2 The United States of America

19 At the federal level, the United States Environmental Protection Agency (“the EPA”), at the direction of the United States Congress, announced, in March 2010, that it would be conducting a scientific study of fracking.¹⁶ On 2 February 2011, the EPA submitted its draft study plan on fracking to the EPA’s Science Advisory Board (“the SAB”), which board consists of various independent scientists. The scope of the research proposed by the EPA includes amongst other things, an analysis of the relevant chemicals, the full lifespan of the water used, and the treatment and disposal of flowback and produced or used water. The EPA’s initial research results and study findings are expected to be made public by the end of 2012, with an additional report following on further research, being made available during the course of 2014.¹⁷

20 At the state level, New York State placed a moratorium on hydraulic fracturing in December 2010. This was in reaction to the following concerns all of which are echoed in the case of the Karoo.¹⁸ These concerns include:

20.1 Pollution risks to aquifers from fracking liquids, particularly those aquifers that are relied on as a major drinking water source, given the risks of delayed damages and bioaccumulation;

¹⁵ Para 50. Note that footnotes in the judgment have been omitted.

¹⁶ See *EPA Submits Draft Hydraulic Fracturing Study Plan to Independent Scientists for Review*, available online at: <http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/26195e235a35cb3885257831005fd9cd!OpenDocument>

¹⁷ *ibid.*

¹⁸ <http://www.catskillheritage.org/archives.html#APPLETON>.

- 20.2 Air pollution risks from traffic and venting to the atmosphere;
 - 20.3 Transformation of landscapes from rural to industrial, with negative implications for rural businesses in tourism, traditional agricultural activities and associated business, and land values;
 - 20.4 Absence of regional spatial plans or zoning to demarcate areas as being appropriate or inappropriate for exploration in light of compatibility (or incompatibility) with land use;
 - 20.5 Insufficient regulatory oversight capacity to manage fracking and ensure compliance;
 - 20.6 The adequacy of compensation and delayed damages; and
 - 20.7 Inappropriate approach to the economic evaluation, and inefficiencies in externalising costs.
- 21 In addition to the approaches that have been adopted by the EPA and New York State, cognisance must be taken of the following: in the state of Maryland, state lawmakers placed a moratorium on drilling in March 2011 until the Department of the Environment completes a two-year study on the impacts on drinking water and public health;¹⁹ the state of New Jersey has declared itself a ‘no fracking’ zone in March 2011;²⁰ and the cities of Buffalo²¹ and Pittsburgh in the USA have banned fracking from taking place within their boundaries.

2.2.3 The United Kingdom

- 22 As regards the concerns relating to fracking in the United Kingdom (“the UK”) there are two documents that are of cardinal relevance. The first is the Tyndall Report of January 2011 (“the Tyndall Report”)²² and the second is the House of Commons, Corrected Transcript of the Oral Evidence Taken Before the Energy and Climate Change Committee, HC 795-i (“the E&CCC Transcript”).²³

¹⁹ <http://www.post-gazette.com/pg/11088/1135455-84.stm#ixzz1I142Zcwl>.

²⁰ <http://www.njspotlight.com/stories/11/0310/2151/>.

²¹ The Associated Press “Buffalo Denounces Frackign as EPA Releases Draft” <http://abcnews.go.com/US/wireStory?id=12877051>.

²² Shale gas: a provisional assessment of climate change and environmental impacts. A report by researchers at The Tyndall Centre, University of Manchester. January 2011 (Final).

²³ House of Commons, Corrected Transcript of Oral Evidence Taken Before the Energy and Climate Change Committee, HC 795-i, Wednesday 9 February 2011 <<http://www.publications.parliament.uk/pa/cm201011/cmselect/cmenergy/c795-i/c79501.htm>>.

- 23 As noted in the Tyndall report, cause for concern is the fact that ‘...there is a real paucity of information on which to base an analysis of how shale gas could impact on GHG emissions and what environmental and health impacts its extraction may have’.
- 24 The Tyndall Report states that there is a clear risk of contamination of groundwater from shale gas extraction: it is important to recognise that most problems arise due to errors in construction or operation and these cannot be eliminated. It also notes that ‘very significant’ amounts of water are required to extract shale gas and this could put severe pressure on water supplies in areas of drilling; the impacts of climate change may further exacerbate this problem.
- 25 In relation to the aforementioned paucity of information on the various impacts of fracking, the Tyndall Report notes that ‘[i]n itself, this lack of information can be seen as a finding, as along with the growing body of evidence for ground and surface water contamination from the US and the requirement for the application of the precautionary principle in the EU, shale gas extraction in the UK must surely be delayed until clear evidence of its safety can be presented.’ The Tyndall Report goes on to say that, with the considerable uncertainty surrounding the environmental impacts of shale gas extraction, ‘it seems sensible to wait for the results of the US EPA investigation to bring forward further information’.
- 26 Shortly after the release of the Tyndall Report, the UK’s Energy and Climate Change Committee (“the E&CCC”) held an inquiry relating to the exploration for, and exploitation of, shale gas. The official transcript of the inquiry, namely the E&CCC Transcript, reveals that prominent British academics are highly critical of, amongst other things, the environmental risks associated with fracking. Evidence given before the E&CCC included the proposal that the UK should, following on the examples set in the US, introduce a moratorium.²⁴ Evidence pertaining to the harmful nature of the chemicals used in fracking as well as the

²⁴ See the evidence given by Prof Anderson where, for example, he stated as follows: “What we [the United Kingdom (“the UK”)] require, I think, initially would be to learn from history. It seems a reasonable approach to take, yet we have not done that. We have not looked in detail at what has happened in the US. What we know in the US is that some of the states there now have a moratorium on further development pending an inquiry – an independent scientific inquiry. That seems the reasonable route to go. It is hard I would suggest to argue different to that, in the absence of independent scientific inquiry, we will go ahead. It would seem a strange position to hold. I think that we should at least wait to hear back from the EPA in the US. As the previous witnesses [Nigel Smith (Geophysicist, British Geological Survey) and Professor Richard Selley (Petroleum Geologist, Imperial College Lond)] suggested, shale is not necessarily shale. They vary in their petrochemical properties very significantly. I think you would then have to say we needed one in the UK that looked at the types of shale we have here and the differences across the shale here, and try to draw lessons form the US study once that is published. All these are very good and sound reasons why a prudent nation would not rush ahead with it [it being fracking].” Significantly, the final question posed by the E&CCC was “[S]hould there be a moratorium on shale gas exploration in the UK until 2013, when the EPA is likely to have its report out?” In response to this question, Professor Anderson answered as follows: “Yes, for environmental reasons, and the moratorium should last for probably another few decades for the climate change best perspective.”

harmful nature of the various fluids present in the shale itself (so-called formation fluids) was also given.²⁵

- 27 There can be no doubt that in the UK there are serious concerns regarding fracking, a point which is evidenced by the Tyndall Report and the fact that the E&CCC, a parliamentary committee appointed by the House of Commons, saw fit to hold an inquiry into these concerns.²⁶

2.2.4 Canada

- 28 In reaction to the very high percentage of wells that were recently being drilled by the shale gas industry in Quebec, Canada, and which exhibited problems relating to sealing, the relevant Canadian authorities commissioned the Bureau d'audiences publiques sur l'environnement to produce the so-called "BAPE Report."²⁷ Among other things, the BAPE Report notes the paucity of scientific studies in Canada, the United States or elsewhere to assess the impacts of drilling with hydraulic fracturing on groundwater. The Commission made a number of recommendations which are also pertinent to the Application by Shell. These include: that the use of chemical additives for which the environmental or health-related risks cannot be assessed, or which may present a risk, in the water used for hydraulic fracturing should be prohibited; that it would be appropriate to assess the long-term risk associated with the presence of contaminated water from hydraulic fracturing activities in rock formations; that a study of the cumulative impacts of the disposal of wastewater from the shale gas industry be undertaken. The Commission also pointed out that a high percentage of unexpected natural gas emissions observed from wells pose a risk of explosion, and little is known about the seismic risks associated with the industry. The report stated that a strategic environmental assessment of the cumulative impacts was seen to be 'a necessary element of both an informed decision and improved social acceptability'.
- 29 The above commentary highlights the fact that, internationally, there are sincere and significant concerns regarding the risks that fracking poses to, amongst other things, human health and the environment.

²⁵ As regards the harmful nature of formation fluids, Mrs Jennifer Banks, the Energy and Climate Change Officer for the UK branch of the World Wildlife Foundation ("the WWF-UK"), who gave evidence alongside Professor Anderson, these fluids "may include naturally occurring radioactive material, benzene, arsenic and mercury, so it is not just the chemicals that you are putting in; it is also that there can be harmful substances within the rock itself."

²⁶ The mandate of the E&CCC is to examine the expenditure, administration and policy of the UK's Department of Energy and Climate Change ("the DECC"). See <http://www.parliament.uk/business/committees/committees-archive/ecc/>

²⁷ *Bureau d'audiences publiques sur l'environnement* ("BAPE") report: Report 273, Sustainable Development of the Shale Gas Industry in Québec. Inquiry and public hearing report translation. February 2011.

3. THE CONSTITUTIONAL CONTEXT

3.1 Introduction

30 This part places Shell’s proposal to undertake fracking in the Karoo against the backdrop of the Bill of Rights, which is contained in Chapter 2 of South Africa’s Constitution. It does so by highlighting the following five specific provisions in the Bill of Rights:

30.1 **The environmental right** (section 24 of the Constitution): here, it will argued that any application to conduct fracking in the Karoo is not in conformity with the right to sustainable development, in particular the right to “secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development” as set out in sub-section 24(b)(iii) of the Constitution.

30.2 **The property right** (section 25 of the Constitution): the property clause refers to the ‘public interest’ and specifically states that: “For the purposes of this section – the public interest includes the nation’s commitment to land reform and to reforms to bring about equitable access to all South Africa’s natural resources; and property is not limited to land.”²⁸ In this section it will be argued that while Shell may acquire a property right to explore, prospect or mine in the Karoo, this right must be tempered in accordance with developing legal norms. These include the fact that property rights are not absolute and the fact that they must, amongst other things, be exercised in accordance with right to administrative justice as set out below. More pertinently it will argued that the multi-faceted decision-making process that goes with the granting of property a right to explore prospect or mine is closely allied to the right to just administrative action dealt with below.

30.3 **The right to just administrative action** (section 33 of the Constitution): section 33(1) states that “everyone has the right to administrative action that is lawful, reasonable and procedurally fair”. It will be argued that ‘administrative justice’ includes the requirement that decision-making, particularly in a complex matter such as this where a multiplicity of national and provincial government agencies are involved requires comprehensive, well-informed and integrated decision-making. This is more so in the light of the fact that we have gathered evidence from leading experts in their respective fields in the very short time that there are potentially serious risks in undertaking fracturing (see part (b) below). It will also be argued

²⁸ Section 25(4).

that any decision of this nature must be subject to a “cautious and risk averse approach” as contemplated in the national environmental management principles in the NEMA as well as other principles set out below.

- 30.4 **The right of access to information** (section 32 of the Constitution): Section 32(1) provides that “everyone has the right of access to: (a) any information held by the state; and (b) any information that is held by another person and that is required for the exercise or protection or any rights.” It will be argued that the right of ‘access to information’ includes the right that interested and potentially affected parties have to full disclosure as well as the right to comment at every step of the decision making process, amongst other things.
- 30.5 **The right to sufficient water** (section 27 of the Constitution): Section 27(1)(b) provides that “Everyone has the right to have access to – (a)...(b) sufficient food and water (c) ...” It will be argued that a water licence should be declined on the ground of the right to access to sufficient water as amplified in the National Water Act 36 of 1998. Among other things the Water Act lays down stringent water licensing criteria as well as providing for a ‘Reserve’.
- 31 The Constitutional Court has acknowledged the interplay and interdependence of various rights in the Bill of Rights in a matter turning on the lawfulness of the grant to a company of a prospecting right on the land of another stating:

“The Constitution also furnishes the foundation for measures to redress inequalities in respect of access to the natural resources of the country. The Mineral and Petroleum Resources Development Act (Act) was enacted amongst other things to give effect to those constitutional norms. It contains provisions that have a material impact on each of the levels referred to, namely that of individual ownership of land, community ownership of land and the empowerment of previously disadvantaged people to gain access to this country’s bounteous mineral resources.”²⁹

3.1 The environmental right and the right to sustainable development (section 24)

- 32 Section 24 of the Constitution states:

Everyone has the right—

(a) to an environment that is not harmful to their health or well-being; and

²⁹ Bengwenyama Minerals (Pty) Ltd and Others v Genorah Resources (Pty) Ltd and Others (CCT 39/10) [2010] ZACC 26 (30 November 2010) at para 3. Emphasis added.

- (b) *to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—*
- (i) *prevent pollution and ecological degradation;*
 - (ii) *promote conservation; and*
 - (iii) *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*³⁰

33 The inclusion of an environmental right including the notion of sustainable development by the visionary drafters of South Africa’s democratic Constitution has been pronounced upon by the South African courts including the Constitutional Court in a number of cases. Of relevance to Shell’s proposal to frack in the Karoo are the following excerpts on the environmental right and nature of sustainable development from some of South Africa’s highest courts, including the Constitutional Court:

33.1 In *Director: Mineral Development, Gauteng Region and Sasol Mining (Pty) Ltd v Save the Vaal Environment and Others 1999 (2) SA 709 (SCA)*, the Supreme Court of Appeal stated:

*“Our Constitution, by including environmental rights as fundamental justiciable human rights, by necessary implication requires that environmental considerations be accorded appropriate recognition and respect in the administrative process in our country. Together with the change in our ideological climate must come a change in our legal and administrative approach to environmental concerns.”*³¹

33.2 In *BP Southern Africa (Pty) Ltd v MEC for Agriculture, Conservation and Land Affairs 2004(5) SA 124 WLD*, it was held that:

“[S]ustainable development constitutes an integral part of modern international law and will balance the competing demands of development and environmental protection. The concept of ‘sustainable development’ is the fundamental building block around which environmental legal norms have been fashioned, both internationally and in South Africa...pure economic principles will no longer determine, in an unbridled fashion, whether a development is acceptable. Development, which may be regarded as economically and financially sound, will, in future, be balanced by its environmental impact, taking coherent cognisance of the principle of intergenerational equity and sustainable use of resources in order to arrive at an integrated management of the environment, sustainable development and

³⁰ Section 24. Emphasis added.

³¹ Para 20.

socio-economic concerns. By elevating the environment to a fundamental justiciable human right, South Africa has irreversibly embarked on a road, which will lead to the goal of attaining a protected environment by an integrated approach, which takes into consideration, inter alia, socio-economic concerns and principles.”³²

33.3 In *Fuel Retailers Association of Southern Africa v Director-General: Environmental Management, Department of Agriculture, Conservation and Environment, Mpumalanga Province and Others 2007 (10) BCLR 1059 (CC); 2007 (6) SA 4 (CC)*:

33.3.1 The Constitutional Court (per Ngobo J) stated that:

“NEMA, which was enacted to give effect to section 24 of the Constitution, embraces the concept of sustainable development. Sustainable development is defined to mean “the integration of social, economic and environmental factors into planning, implementation and decision-making for the benefit of present and future generations”. This broad definition of sustainable development incorporates two of the internationally recognised elements of the concept of sustainable development, namely, the principle of integration of environmental protection and socio-economic development, and the principle of inter-generational and intra-generational equity. In addition, NEMA sets out some of the factors that are relevant to decisions on sustainable development. These factors largely reflect international experience. But as NEMA makes it clear, these factors are not exhaustive.”³³

33.3.2 Ngcobo J then went on to observe:

The Constitution recognises the interrelationship between the environment and development; indeed it recognises the need for the protection of the environment while at the same time it recognises the need for social and economic development. It contemplates the integration of environmental protection and socio-economic development. It envisages that environmental considerations will be balanced with socio-economic considerations through the ideal of sustainable development. This is apparent from section 24(b)(iii) which provides that the environment will be protected by securing “ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”. Sustainable development and sustainable use and exploitation of natural resources are at the core of the protection of the environment.”³⁴

³² Para 144A-114D.

³³ Para 59. Emphasis added.

³⁴ Para 45.

The principle of integration of environmental protection and socio-economic development is therefore fundamental to the concept of sustainable development. Indeed economic development, social development and the protection of the environment are now considered pillars of sustainable development. As recognised in the WSSD, States have assumed — “. . . a collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development - economic development, social development and environmental protection - at the local, national, regional and global levels.”³⁵

33.3.3 Ngcobo J went on to place sustainable development in the context of international law observing that the concept of sustainable development had received the approval of the International Court of Justice and cited with approval the following dictum of Judge Weeramantry in *Case Concerning the Construction of the Gabčíkovo-Nagymaros Project (Hungary/Slovakia) (1998) 37 ILM 162*:

Throughout the ages, mankind has, for economic and other reasons, constantly interfered with nature. In the past, this was often done without consideration of the effects upon the environment. Owing to new scientific insights and to a growing awareness of the risks for mankind—for present and future generations—of pursuit of such interventions at an unconsidered and unabated pace, new norms and standards have been developed, set forth in a great number of instruments during the last two decades. Such new norms have to be taken into consideration, and such new standards given proper weight, not only when States contemplate new activities but also when continuing with activities begun in the past. This need to reconcile economic development with protection of the environment is aptly expressed in the concept of sustainable development.³⁶

33.3.4 Finally on the concept of sustainable development Ngcobo J stated:

It is in the light of these developments in the international law of environment and sustainable development that the concept of sustainable development must be construed and understood in our law.³⁷

³⁵ Para 50.

³⁶ Para 54.

³⁷ Para 56.

- 34 The environmental right refers to environmental protection “for the benefit of present and future generations...”³⁸ The potential damage to future generations is potentially very serious, particularly if Shell’s record in Nigeria is anything to go by. Concern about the effects of Shell’ activities on future generations has been expressed in public consultation meetings.³⁹ Shell’s environmental record has been subject to various legal proceedings including before the African Commission on Human Rights.⁴⁰
- 35 The notion of inter-generational equity has been considered by the International Court of Justice (ICJ) in the *Advisory Opinion on the Legality of the Treaty on Nuclear Weapons*,⁴¹ where (ICJ) was asked to give an advisory opinion on the question whether “the threat or use of nuclear weapons in any circumstances is permitted under international law”.⁴²
- 36 On the issue of inter-generational equity the ICJ noted that nuclear weapons have the potential to destroy the entire ecosystem of the planet.⁴³ It stated:

*“When incontrovertible scientific evidence speaks of pollution of the environment on a scale that spans hundreds of generations, this Court would fail in its trust if it did not take serious note of the ways in which the distant future is protected by present law. This one factor of impairment of the environment over such a seemingly infinite time span would by itself be sufficient to call into operation the protective principles of international law which the Court, as the pre-eminent authority empowered to state them, must necessarily apply.”*⁴⁴

3.2 The property right (section 25)

- 37 While Shell may acquire a property right to explore, prospect or mine in the Karoo this right must be tempered in accordance with developing legal norms. These include the fact that property rights are not absolute and the fact that they must be exercised in accordance with

³⁸ Section 25(b).

³⁹ For example at Kelvin Grove, Newlands, Cape Town, 25 March 2011.

⁴⁰ Decision Regarding Communication 155/96 (Social and Economic Rights Action Centre (SERAC) and Another v Nigeria). Case No. ACHPR/COMM/A044/1 (27 May, 2002), noted by Dinah Shelton (2002) 96 *American Journal of International Law* 937; Fons Coomans ‘The *Ogoni* case before the African Commission on Human and Peoples’ Rights’ (2003) 52 *International and Comparative Law Quarterly* 749; Kaniye SA Ebeku “The right to a satisfactory environment and the African Commission” 2003 *African Human Rights Law Journal* 149; van der Linde and Louw “Considering the interpretation of article 24 of the African Charter for Human and Peoples’ Rights in the light of SERAC communication” 2003 *African Human Rights Law Journal* 167; 1982 *International Legal Materials* 59 art 24.

⁴¹ (1996) 35 ILM 809.

⁴² At 815.

⁴³ Fn 56 at 888.

⁴⁴ Fn 56 at 888.

right to administrative justice and the doctrine of the public trust as set out in the principles of the National Environmental Management Act 73 of 1998. It is also argued that the multi-faceted decision-making process that goes with the granting of property a right to explore prospect or mine is closely allied to the right to just administrative action.

3.3 The right to just administrative action (section 33)

38 Administrative justice includes the requirement that decision-making, particularly in a complex matter such as Shell's proposal where a multiplicity of national and provincial government agencies are involved requires comprehensive, well informed and integrated decision-making. This is more so in the light of the fact that evidence has been gathered from leading experts in their respective fields which indicates that there are potentially serious risks in undertaking fracturing as set out in Part B of this Critical Review.

39 The complex nature of decision-making by administrative agencies was considered by the Constitutional Court in *Bato Star Fishing (Pty) Ltd v Minister of Environmental Affairs and Tourism and Others 2004 (4) SA 490 (CC); 2004 (7) BCLR 687 (CC)* ('Bato Star Fishing'), a matter involving the allocation of fishing rights in the context of transformation in South Africa. The Court at paragraph 45 stated:

"In treating the decisions of administrative agencies with the appropriate respect, a court is recognising the proper role of the executive within the Constitution. In doing so a court should be careful not to attribute to itself superior wisdom in relation to matters entrusted to other branches of government. A court should thus give due weight to findings of fact and policy decisions made by those with special expertise and experience in the field. The extent to which a court should give weight to these considerations will depend upon the character of the decision itself, as well as on the identity of the decision-maker. A decision that requires an equilibrium to be struck between a range of competing interests or considerations and which is to be taken by a person or institution with specific expertise in that area must be shown respect by the courts. Often a power will identify a goal to be achieved, but will not dictate which route should be followed to achieve that goal. In such circumstances a court should pay due respect to the route selected by the decision-maker. This does not mean however that where the decision is one which will not reasonably result in the achievement of the goal, or which is not reasonably supported on the facts or not reasonable in the light of the reasons given for it, a court may not review that decision. A court should not rubber-stamp an unreasonable decision simply because of the complexity of the decision or the identity of the decision-maker."

3.4 The right of access to information (section 32)

40 It is argued that the right of ‘access to information’ includes the right that interested and potentially affected parties have to full disclosure as well as the right to comment at every step of the decision making process amongst other things.

41 In *Trustees for the Timebeing of the Biowatch Trust v Registrar Genetic Resources and Others* (23005/2002) [2005] ZAGPHC 135 (23 February 2005):

41.1 Dunn AJ stated, at paragraph 34, that:

The inclusion of a right of access to information in the form of section 32(1)(a) of the Constitution is unusual. The statutory regime of many countries merely provide for a “freedom” - as opposed to a “right” - to information. The purpose behind the positive right embodied in section 32(1) is the facilitation of transparent and accountable government, as required by Constitutional Principle IX set out in Schedule 4 to the interim Constitution, 1993 (Act No 200 of 1993).

41.2 He continued, at paragraph 35:

As indicated earlier the right of access to information is intended to serve a wider purpose, namely to ensure that there is open and accountable administration at all levels of government - a vital ingredient in our new constitutional culture and in an open and democratic society.

42 In *Earthlife Africa (Cape Town Branch) v Eskom Holdings Ltd* (04/27514) [2005] ZAGPHC 129 (15 December 2005) Fevrier stated, at paragraph 47:

In my view, the 24 (sic) of the Constitution everyone has the right to an environment that is not harmful to their health or wellbeing and to have the environment protected. This application clearly addresses such matters so that the crucial issue is whether the applicant is or not entitled to access to the remainder of the records. In other words, it is necessary to decide whether the respondent is entitled, under the Information Act, to refuse access to the remainder of the information and documentation.

3.4 The right to sufficient water (section 27(1)(b))

43 It is argued that a water licence should be declined on the ground of the right to access to sufficient water as amplified in the National Water Act 36 of 1998. Among other things the Water Act lays down stringent water licensing criteria as well as providing for a ‘Reserve’.

44 The section 27(1)(b) right to sufficient water, more specifically what constituted sufficient water, was the subject of protracted litigation culminating in the Constitutional Court in *Mazibuko v City of Johannesburg (Centre for Housing Rights as Amicus Curiae)*⁴⁵ where in the context of the Phiri residents in Soweto the court dismissed the argument that 25 litres of water per person per day was insufficient to meet their basic needs.⁴⁶

4. THE LEGISLATIVE CONTEXT

4.1 Introduction

45 This section deals with the concept of sustainable development as it is applied in South African legislation. It focuses on the following pieces of legislation as they are of specific relevance to this case:

45.1 the NEMA;

45.2 the MPRDA;

45.3 the National Water Act; and

45.4 the Development Facilitation Act, 15 of 1994, as well as the respective provincial planning laws of the three provinces concerned, the Eastern Cape, the Northern Cape and the Western Cape provinces.

4.2 The National Environmental Management Act 1998 (NEMA): Act 107 of 1998

4.2.1 Introduction to the NEMA

⁴⁵ [2009] ZACC 28.

⁴⁶ See also the SCA judgment in *City of Johannesburg v Mazibuko* [2008] 4 All SA 471W.

46 ‘Sustainable development’ is defined in s1 of the NEMA as ‘...the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations’.

47 What follows is a commentary on the national environmental management principles, first in broad terms and thereafter on specific principles that have particular application in this instance. It argues that any application to conduct fracking in the Karoo is not in conformity with a number of the NEMA principles.

4.2.2 The NEMA principles

4.2.2.1 Introduction to the NEMA principles

48 Central to our argument are the NEMA principles, which provide for integrated decision-making. We will show that the principles underlie not only decisions made by the Ministry of Water and Environment but any decision made by any government departments where sustainable development, natural resources or the environment is in issue.

49 The set of bed-rock national environmental principles set out in NEMA “apply throughout the Republic to the actions of all organs of state that may significantly affect the environment”⁴⁷
...

50 This is re-iterated in section 37 of the MPRDA which states that:

(1) The principles set out in section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998)

(b) apply to all prospecting and mining operations, as the case may be, and any matter relating to such operation; and

(c) serve as guidelines for the interpretation, administration and implementation of the environmental requirements of this Act.

⁴⁷ Section 2(1). Emphasis added.

- 51 The NEMA also states that the principles “...serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment.”⁴⁸ In addition they “...guide the interpretation, administration and implementation of this Act, and any other law concerned with the protection or management of the environment.”⁴⁹
- 52 The NEMA principles were considered by the Constitutional Court in the *Fuel Retailers* case where Ngcobo stated at paragraph:⁶³

The provisions of NEMA which are relevant to this case and which were relied upon by the applicant are those that contain the national environmental management principles, the general objectives of integrated environmental management and those that deal with the implementation of these principles and objectives. The national environmental management principles that are relevant in this case are those contained in sections ...

- 53 Also referring to the NEMA principles, Willis J stated in *Sasol Oil (Pty) Ltd and Another v Metcalfe NO*, that “these principles, in my view, reflect a broad international consensus as to the need to protect the environment but, at the same time, ensure human development.”⁵⁰
- 54 The NEMA principles were also considered by the Constitutional Court in the *Kyalami Ridge* case⁵¹ where the then Chief Justice Chaskalson, referring to NEMA as “The Management Act” stated:

Section 2(1), which deals with the application of the principles, provides:

“The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and—

(a) shall apply alongside all other appropriate and relevant considerations, including the State's responsibility to respect, protect, promote and fulfil the social and economic rights in Chapter 2 of the Constitution and in particular the basic needs of categories of persons disadvantaged by unfair discrimination;

(b) serve as the general framework within which environmental management and implementation plans must be formulated;

⁴⁸ Section 2(1)(c).

⁴⁹ Section 2(1)(e).

⁵⁰ 2004 (5) SA 161 (W) 171G at para 15.

⁵¹ *Minister of Public Works and Others v Kyalami Ridge Environmental Association and Another (Mukwevho Intervening)* 2001 (3) SA 1151 (CC).

(c) serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment;

(d) serve as principles by reference to which a conciliator appointed under this Act must make recommendations; and

(e) guide the interpretation, administration and implementation of this Act, and any other law concerned with the protection or management of the environment.”⁵²

*Seen in the context of the Management Act as a whole the principles are directed to the formulation of environmental policies by the relevant organs of state, and the drafting and adopting of their environmental implementation and management plans, rather than to controlling the manner in which organs of state use their property. The section does not make provision for rights and obligations; instead it sets out principles expressed at times in abstract rather than concrete terms. These principles must be taken into account by the relevant departments of state and the provincial governments in the preparation of their environmental implementation plans; by municipalities in the preparation of their policies including integrated development plans and the setting of land development objectives; by conciliators in resolving differences between the Committee for Environmental Co-ordination and Departments of State; and in the preparation of environmental impact reports required for the granting of permission for certain prescribed activities that may not be undertaken in terms of the Management Act without the sanction of a Minister or an MEC. They must be balanced against other relevant considerations including the state’s obligation to fulfil its constitutional obligations in respect of social and economic rights.*⁵³

55 In *Bato Star Fishing (Pty) Ltd v Minister of Environmental Affairs and Tourism and Others* 2004 (4) SA 490 (CC); 2004 (7) BCLR 687 (CC) (‘Bato Star Fishing’) the Constitutional Court considered the role of the objects, rather than the principles, of the Marine Living Resources Act 18 of 1998 as set out in section of that Act. The Constitutional Court stated, at paragraph 32, as follows:

The gravamen of the applicant’s complaint under this head is that the Chief Director paid insufficient attention to the requirements of section 2(j), [one of the objectives of the Act relating to transformation] as repeated in section 18(5) of the Act. The question to be considered is the proper interpretation of section 2(j) taking into account section 18(5) and, in particular, the nature of the obligations imposed upon the Chief Director by these provisions. In this regard, it should be noted that section 2 contains a wide number of objectives and principles, for example, the conservation of the marine ecosystem, the sustainable use of marine living resources, and the need to utilise marine living resources to achieve economic growth, to build capacity in the industry and to create employment. Not all the objectives and principles will be

⁵² Paragraph 68.

⁵³ Paragraph 69.

relevant to every decision taken under the Act. In relation to some decisions, the objectives and principles listed in section 2 may to some extent be in conflict with one another as they cannot all be fully achieved simultaneously. Moreover, there may be many different ways of achieving each of the objectives individually. The section does not give clear guidance on which method should be selected or how an equilibrium is to be reached.

4.2.3 The applicability of the NEMA principles to fracking in the Karoo

56 The NEMA principles commence by stating that:

- (a) *Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.*⁵⁴
- (b) *“Development must be socially, environmentally and economically sustainable.”*⁵⁵
- (c) *“Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge.”*⁵⁶
- (d) *“The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.”*⁵⁷

57 One of the key principles of NEMA requires people and their needs to be placed at the forefront of environmental management – batho pele.⁵⁸ It requires all developments to be socially, economically and environmentally sustainable. Significantly for the present case, it requires that the social, economic and environmental impact of a proposed development be “considered, assessed and evaluated” and that any decision made “must be appropriate in the light of such consideration and assessment”.⁵⁹ This is underscored by the requirement that decisions must take into account the interests, needs and values of all interested and affected persons.

⁵⁴ Section 2(2).

⁵⁵ Section 2(3).

⁵⁶ Section 2(4)(g).

⁵⁷ Section 2(4)(i).

⁵⁸ Section 2(2).

⁵⁹ Section 2(4)(i).

58 Construed in the light of section 24 of the Constitution, NEMA therefore requires the integration of environmental protection and economic and social development. It requires that the interests of the environment be balanced with socio-economic interests. Thus, whenever a development which may have a significant impact on the environment is planned, it envisages that there will always be a need to weigh considerations of development, as underpinned by the right to socio-economic development, against environmental considerations, as underpinned by the right to environmental protection. In this sense, it contemplates that environmental decisions will achieve a balance between environmental and socio-economic developmental considerations through the concept of sustainable development.

59 To sum up therefore NEMA makes it abundantly clear that the obligation of the environmental authorities includes the consideration of socio-economic factors as an integral part of its environmental responsibility.⁶⁰ It follows therefore that the parties correctly accepted that the Department was obliged to consider the impact of the proposed filling station on socio-economic conditions. It is within this context that the nature and scope of the obligation to consider socio-economic factors, in particular, whether it includes the obligation to assess the cumulative impact of the proposed filling station and existing ones, and the impact of the proposed filling station on existing ones. But first what are the relevant provisions of NEMA?

60 Section 24,⁶¹ which deals with the implementation of the general objectives of integrated environmental management, provides that—

“In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on—

(a) the environment;

(b) socio-economic conditions; and

⁶⁰ This principle was considered in the following cases: *BP Southern Africa (Pty) Ltd v MEC for Agriculture, Conservation, Environment and Land Affairs* 2004 (5) SA 124 (W) at 140E-151H; *Turnstone Trading CC v Director General Environmental Management, Department of Agriculture, Conservation & Development*, case no 3104/04 (T), 11 March 2005, unreported, at paras 17-19; *MEC for Agriculture, Conservation, Environment and Land Affairs v Sasol Oil (Pty) Ltd and Another* 2006 (5) SA 483 (SCA) at para 15.

⁶¹ In dealing with NEMA in this case it is important to bear in mind that this statute has, since its enactment in 1998, been amended. Section 24(1) was amended in 2004 to delete the reference to social, economic and cultural impacts. However, in section 23(2)(b) the general objectives of integrated environmental management were not amended. This provision proclaims that one of the general objectives of integrated environmental management is “to identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage”. The provisions of NEMA that are relevant to this case are those that were in force at the time when the application for authorisation was made.

(c) the cultural heritage,

of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity.”⁶²

- 61 The principles of NEMA that have been relied upon by the applicant must be understood in the context of the role of these principles in decisions affecting the environment, the general objectives of integration of environmental management and the procedures for the implementation of the NEMA principles.
- 62 NEMA principles “apply... to the actions of all organs of state that may significantly affect the environment”.⁶³ They provide not only the general framework within which environmental management and implementation decisions must be formulated,⁶⁴ but they also provide guidelines that should guide state organs in the exercise of their functions that may affect the environment.⁶⁵ Perhaps more importantly, these principles provide guidance for the interpretation and implementation not only of NEMA but any other legislation that is concerned with the protection and management of the environment.⁶⁶ It is therefore plain that these principles must be observed as they are of considerable importance to the protection and management of the environment.
- 63 Apart from these principles, NEMA contemplates the integration of environmental management activities and to this extent it outlines the general objectives of integrated environmental management. Section 23 of NEMA sets out these general objectives. These include the objectives to promote the integration of the national environmental management principles into decisions that may significantly affect the environment;⁶⁷ and to identify, predict and evaluate actual and potential impact on the environment, socio-economic conditions and cultural heritage.⁶⁸ Their apparent purpose is to minimise the negative impact

⁶² Section 24(1) of NEMA.

⁶³ Section 2(1).

⁶⁴ Section 2(1)(b).

⁶⁵ Section 2(1)(c).

⁶⁶ Section 2(1)(e).

⁶⁷ Section 23(2)(a) provides: “The general objective of integrated environmental management is to promote the integration of the principles of environmental management set out in section 2 into the making of all decisions which may have a significant effect on the environment”.

⁶⁸ Section 23(2)(b) provides: “The general objective of integrated environmental management is to identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in section 2”.

on the environment and socio-economic conditions and to promote compliance with the principles of environmental management.⁶⁹

64 The ambit and scope of the NEMA principles were more generally scrutinised previously, by the Constitutional Court, in *Minister of Public Works and Others v Kyalami Ridge Environmental Association and Others*,⁷⁰ where Chaskalson JP emphasised the role that the principles are to play in directing the state's formulation of environmental policies.⁷¹

4.2.3 The applicability of the NEMA principles to the Application

65 The key principles in this case and context are listed below, with a brief motivation for their particular consideration.

66 The national environmental management principles explicitly acknowledge the interdependence of socioeconomic and biophysical systems; often referred to as taking a systems approach and highlighting the need to give due consideration to social-ecological resilience⁷². In harsh environments such as the Karoo, overlain by the anticipated effects of climate change, the resilience of these social-ecological systems – rather than the impacts of particular actions on specific components of those systems – is of paramount importance to achieving sustainable development.

S2(4)(b): Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.

67 Consideration of alternatives is fundamental to determining the 'best practicable environmental option'. These alternatives include the 'status quo' or 'no development' option: pursuing the current development path with its ecological sustainability, socioeconomic and equity implications.

68 Given that our natural resource base is under pressure and our ecosystems face degradation as we pursue growth and seek to eradicate poverty:

⁶⁹ Ibid.

⁷⁰ 2001 (3) SA 1151 (CC) and 2001 (7) BCLR 652 (CC).

⁷¹ At para 69.

⁷² For example, *Exploring Sustainability Science: a Southern African Perspective*. M Burns and A Weaver (eds). SUN Press. 2008.

S2(4) (a) Sustainable development requires the consideration of all relevant factors including:

S2(4) (a) (i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;

S2(4) (a) (ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; and

S2(4) (a) (vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised.

69 According to the National Framework for Sustainable Development in South Africa, our current growth and poverty eradication strategies are not decoupling from unsustainable natural resource use and exploitation, and that ‘We need to act rapidly and decisively to change this.’⁷³

70 Projections of population growth and increased demands for water will worsen the water supply situation and increase pressure on government. Since the increasing risk of water shortages is ‘inevitable’, there is a need to plan for water shortages and social resilience, especially in rural communities who are most vulnerable. A decline in social resilience will potentially have negative effects on governance, reducing the capacity for government to implement policies that promote sustainable development.⁷⁴

71 Given the uniqueness of the Karoo and the potential for risks of irreversible impacts and/or loss of irreplaceable resources, some of which (e.g. biodiversity, heritage resources) are in the global interest, consideration must be given to the following:

71.1 *S2(4)(a)(iii): that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;*

71.2 *S2(4)(n): global and international responsibilities relating to the environment must be discharged in the national interest;*

⁷³ Department of Environmental Affairs and Tourism, July 2008. 2.9 in Annex 2.

⁷⁴ Funke *et al* in Burns and Weaver 2008. Exploring Sustainability Science: a southern African perspective. SUN Press.

71.3 *S2(4)(o): the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.*

72 With due regard for the significant risks to the environment, the communities and the people of South Africa potentially affected by the proposed fracking, the numerous uncertainties relating to the proposed activities, the gaps in information and the fact that the proposed activity is unprecedented in this country, consideration must be given to the following provisions:

72.1 *S2(4) (a) (viii): that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied;*

72.2 *S2(4)(a)(vii): that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.*⁷⁵

73 Given the uniqueness of the Karoo, many of the potentially impacted natural resources are likely to be irreplaceable. Their loss would have significant equity and environmental justice implications with regard to livelihoods, health and wellbeing of communities that rely on the integrity of these resources; irreplaceable losses often have no acceptable, affordable or accessible substitute and can thus not be compensated. In these situations, such losses would be in direct conflict with sustainable development objectives. This situation points to the need to take a strictly risk-averse approach in decision making, as reflected in s2 of NEMA. When the cost of degradation may be serious or appears irreversible and/ or there is little prior experience or scientific confidence about the outcome, it is prudent to follow the strict precautionary principle (i.e. confine impacts within the realm of complete reversibility and only allow impacts that have been shown neither to pose danger to ecosystems nor diminish environmental quality).⁷⁶

74 With reference to concerns about the negative legacy of the proposed operation on the sense of place of the Karoo and its people, we point out the following provisions:

⁷⁵ Applied in legal judgements, e.g. "...the authorities are enjoined to adopt a risk adverse and cautious approach and to prevent and remedy the negative impacts on the environment." Minister of Environmental Affairs and Tourism and Others v HTF Developers (Pty) Ltd 2008(2) SA 319 CC.

⁷⁶ B Sadler. 1996. International study of the effectiveness of environmental assessment: environmental assessment in a changing world – evaluating practice to improve performance. CEAA and IAIA.

- 74.1 *S2(4) (e): responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle;*
- 74.2 *S2(4) (p): the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.*
- 75 The chemicals used in the fracking process have not been fully disclosed by drilling companies, but it is known that some are toxic, some are toxic to aquatic organisms, some are acute toxins, some are known carcinogens, more are suspected carcinogens, some are classified as mutagenic, and some are classified as having reproductive side effects. There is a risk of radioactivity from the proposed operation.
- 76 Such pollutants and environmental degradation may cause significant harm to human health not only during the proposed activity but in the long term; some effects may be irreversible.
- 77 Following on from the notion of inter-generational equity as contained in the environmental right and the Roman Law notion of Res Publicae namely that the state owns certain property on behalf of the people:
- 77.1 *S2(4)(o): The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.*
- 78 This notion is also the foundation of the Mineral and Petroleum Resources Development Act, 28 of 2002 (the 'MPRDA') which states:
- (1) *Mineral and petroleum resources are the common heritage of all the people of South Africa and the State is the custodian thereof for the benefit of all South African;*
- (2) *As the custodian of the nation's mineral and petroleum resources, the State, acting through the Minister, may-*
- (a) *grant, issue, refuse, control, administer and manage any reconnaissance permission, prospecting right, permission to remove, mining right, mining permit,*

retention permit, technical co-operation permit, reconnaissance permit, exploration right and production right; and

(b) in consultation with the Minister of Finance, determine and levy, any fee or consideration payable in terms of any relevant Act of Parliament.

(3) The Minister must ensure the sustainable development of South Africa's mineral and petroleum resources within a framework of national environmental policy, norms and standards while promoting economic and social development.

79 The MPRDA will be discussed further hereunder.

80 With regard to the questionable justification of the proposed development, and the equity and environmental justice implications of the development, note the following:

S2(4) (a) (v): that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;

S2(4) (c): environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.

S2(4) (d): equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.

S2(4) (g): decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge.

81 The distributional effects of the proposed activity are crucial to an evaluation of whether or not it would be 'justifiable'. That is, an analysis of who would benefit from the development and who would bear the costs, in what timeframes, and whether or not those benefits would outweigh the costs in the long term whilst safeguarding the environment for future generations, is essential. According to the National Framework for Sustainable Development in South Africa⁷⁷, it is the poor who often experience the economic costs of ecosystem degradation most directly because the majority of poor households depend on natural resources and ecosystem services.

82 Some attributes (tourism or heritage attractions) and natural resources (e.g. water) in the Karoo have no substitute and thus, where they are adversely impacted, they cannot be

⁷⁷ Department of Environmental Affairs and Tourism, July 2008. 2.9 in Annex 2.

compensated. Particularly where these impacts affect the more vulnerable sectors of society who depend heavily on these resources for health, their lives and/or livelihoods, and who have little resilience or buffer, they can be devastating.

- 83 Of crucial importance in this instance, given that freshwater is South Africa's most critical natural resource and under enormous pressure from both a growing population and development:

S2(4) (r): Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

4.3 The Minerals and Petroleum Resources Development Act (MPRDA): Act 28 of 2002

4.3.1 Introduction to the MPRDA

- 84 The preamble of the MPRDA states the following among other things:

“RECOGNISING that minerals and petroleum are non-renewable natural resources;

ACKNOWLEDGING that South Africa's mineral and petroleum resources belong to the nation and that the State is the custodian thereof;

AFFIRMING the State's obligation to protect the environment for the benefit of present and future generations, to ensure ecologically sustainable development of mineral and petroleum resources and to promote economic and social development;

RECOGNISING the need to promote local and rural development and the social upliftment of communities affected by mining; ...”

- 85 Shell has applied for an exploration licence to explore for shale gas. Arguably, this falls within the definition of 'petroleum' contained in the MPRDA as follows:

'petroleum' means any liquid, solid hydrocarbon or combustible gas existing in a natural condition in the earth's crust and includes any such liquid or solid hydrocarbon or combustible gas, which gas has in any manner been returned to such natural condition, but does not include coal, bituminous shale or other stratified deposits from which oil can be obtained by destructive distillation or gas arising from a marsh or other surface deposit.

86 As such, Shell’s application falls primarily under Chapter 6 (sections 69 to 90) of the MPRDA headed “Petroleum Exploration and Production”.

87 Section 79 headed “Application for exploration right” sets out the procedure for applying for an exploration right and amongst other things provides in subsection 79(4):

“If the designated agency accepts the application, the designated agency must, within 14 days from the date of acceptance, notify the applicant in writing-

(a) to notify and consult with any affected party; and

(b) to submit an environmental management programme in terms of section 39 within a period of 120 days from the date of the notice.”⁷⁸

88 It is the environmental management plan (EMP) which is currently in draft form and which is being circulated for public comment that is central to this objection. Before describing the nature and purpose of the EMP it necessary to elaborate on the role and functions of the ‘designated agency’ in the decision-making process.

89 Section 70 of the MPRDA provides for the established of a designated agency in the following terms:

The Minister may designate an organ of State or a wholly owned and controlled agency or company belonging to the State to perform the functions referred to in this Chapter.

90 In line with this section, the Minister established The Petroleum Agency of South Africa (“PASA”) in 1996. Its stated mission statement is to facilitate the exploration and development of South Africa’s resources of oil and gas for the optimal benefit of its people.⁷⁹ The stated vision of the Petroleum Agency SA is the development of a vibrant upstream oil and gas industry in South Africa:

⁷⁸ Own emphasis.

⁷⁹ See PASA’s website (<http://www.petroleumagencyrsa.com/home.aspx>) which contains the following statement: “Designated in terms of the Mineral and Petroleum Resources Development Act, Petroleum Agency SA promotes exploration for onshore and offshore oil and gas resources and their optimal development on behalf of government. The Agency regulates exploration and production activities, and acts as the custodian of the national petroleum exploration and production database.”

“As the petroleum agency for the Republic of South Africa, we will actively promote exploration for natural oil and gas resources and their optimal development for the benefit of South Africa.”⁸⁰

91 No express mention is made of fair and equitable accesses to natural resources, prevention of environmental degradation or pollution prevention.

92 Petroleum Agency SA promotes exploration for onshore and offshore oil and gas resources and their optimal development on behalf of government. The Agency regulates exploration and production activities, and acts as the custodian of the national petroleum exploration and production database.

93 The Petroleum, Oil and Gas Corporation of South Africa (Pty) Limited (Petro SA) on the other hand owns, operates and manages South Africa’s petroleum industry’s commercial assets. Insofar as PetroSA is a national company and PASA promotes exploration on behalf of the government, it follows that PASA is the marketing arm of PetroSA.

94 PASA has been designated by the government, through the Minister of Minerals and Energy, as the official agency responsible for the promotion and regulation of South Africa’s petroleum resources. Its role was statutorily endorsed in June 2004 in terms of the Mineral and Petroleum Resources Development Act of 2002.⁸¹

95 Section 71, which sets out the general functions of PASA provides that:

The designated agency must-

(a) promote onshore and offshore exploration for and production of petroleum;

(b) receive applications for reconnaissance permits, technical co-operation permits, exploration rights and production rights in the prescribed manner;

(c) evaluate such applications and make recommendations to the Minister;

(d) monitor and report regularly to the Minister in respect of compliance with such permits or rights;

⁸⁰ Own emphasis.

⁸¹ http://www.cef.org.za/index.php?option=com_content&view=article&id=8&Itemid=9.

- (e) receive, maintain, store, interpret, evaluate, add value to, disseminate or deal in all geological or geophysical information relating to petroleum submitted in terms of section 88;*
- (f) bring to the notice of the Minister any information in relation to the exploration and production of petroleum which is likely to be of use or benefit to the State;*
- (g) advise and recommend to the Minister on the need to by itself, through contractors or through any other state enterprise carry out on behalf of the State reconnaissance operations in connection with petroleum;*
- (h) collect the prescribed fees and considerations in respect of reconnaissance permits, technical co-operation permits, exploration rights and production rights;*
- (i) review and make recommendations to the Minister with regard to the approval of environmental management plans, environmental management programmes, development programmes and amendments thereto; and*
- (j) perform any other function, in respect of petroleum, which the Minister may determine from time to time.*

96 Subsection 79(4) provides in relation to the granting and duration of an exploration right:

- (1) The Minister must grant an exploration right if-*
 - (a) the applicant has access to financial resources and has the technical ability to conduct the proposed exploration operation optimally in accordance with the exploration work programme;*
 - (b) the estimated expenditure is compatible with the intended exploration operation and duration of the exploration work programme;*
 - (c) the Minister has approved the environmental management programme in terms of section 39 (4);*
 - (d) the applicant has the ability to comply with the relevant provisions of the Mine Health and Safety Act, 1996 (Act 29 of 1996);*
 - (e) the applicant is not in contravention of any relevant provision of this Act;*
 - (f) the applicant has complied with the terms and conditions of the technical co-operation permit, if applicable; and*
 - (g) the granting of such right will further the objects referred to in section 2 (d) and (f).*
- (2) The Minister after taking into account the need for and extent of exploration [for] the project may request that the applicant gives effect to section 2 (d) .*

(3) The Minister must refuse to grant an exploration right if the application does not meet all the requirements referred to in subsection (1).

(4) If the Minister refuses to grant an exploration right, the Minister must, within 30 days of the decision, in writing notify the applicant of the decision and the reasons therefor.

(5) An exploration right is subject to prescribed terms and conditions and is valid for the period specified in the right, which period may not exceed three years.

97 In the mining rights matter of *Bengwenyama Minerals (Pty) Ltd and Others v Genorah Resources (Pty) Ltd and Others* (CCT 39/10) [2010] ZACC 26 (30 November 2010), the Constitutional Court stated:

97.1 At paragraph 75:

It is one of the objects of the Act to give effect to the environmental rights protected in section 24 of the Constitution by ensuring that the nation's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development. In terms of section 17(1)(c) of the Act the Minister must grant a prospecting right if, amongst other requirements, the prospecting will not result in unacceptable pollution, ecological degradation or damage to the environment. An applicant for a prospecting right must submit a prescribed environmental management plan in terms of section 39(2) of the Act. Section 41(1) of the Act requires that the prescribed financial provision for the rehabilitation or management of negative environmental impacts must be provided to the Minister by an applicant for prospecting rights.

97.2 At paragraph 76:

There is no evidence on affidavit by the Deputy Director General who granted the prospecting rights to Genorah that he or she considered and was satisfied that the environmental requirement in section 17(1)(c) read with section 39(2) was fulfilled. It would in any event have been difficult to do so because Genorah's environmental plan was only approved by a different (acting) Regional Manager on 13 November 2006, some two months after the prospecting rights were granted. The financial guarantee was also only provided after the granting of the prospecting rights, namely on 15 September 2006.

97.3 At paragraph 77:

On Genorah’s behalf counsel argued that environmental satisfaction was not a prerequisite or jurisdictional fact for the granting of a prospecting right because section 17(5) provides that the granting of a prospecting right in terms of section 17(1) only “becomes effective on the date on which the environmental management programme is approved in terms of section 39.” The argument is misconceived, firstly because an applicant who applies for the granting of a prospecting right needs to submit an environmental management plan (not a programme), and secondly because the section explicitly states that the granting of the prospecting right only becomes “effective” on approval of the programme. It obviously relates to the implementation of the prospecting operation, not its approval. Approval of the prospecting operation is dependent on an assessment that the operation will not result in unacceptable pollution, ecological degradation or damage to the environment.

97.4 At paragraph 78:

This ground of review must succeed on the basis that there is nothing on record to show that the requirement set out in section 17(1)(c) of the Act was fulfilled.

4.3 The National Water Act (NWA): Act 36 of 1998

98 This section covers water use and licensing, as well as the Reserve.

4.3.1 Water use and licensing

99 The National Water Act, 36 of 1998, (the ‘NWA’) subjects all ‘water use’ to a license requirement subject to certain exceptions stipulated in section 22(1), the main one being if a general authorisation for a specified ‘water use’ has been issued under a general section 39 authorisation. The latter is not relevant to Shell; a licence will be required for its particular ‘water-use’.

100 The phrase “water use” is widely defined to include a broad range of activities which accordingly fall under the control regime and is set out in full. According to section 21 of the Act ‘water use’ includes:

- (a) taking water from a water resource;
- (b) storing water;
- (c) impeding or diverting the flow of water in a watercourse;

- (d) engaging in a stream flow reduction activity contemplated in section 36;
- (e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- (f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- (g) disposing of waste in a manner which may detrimentally impact on a water resource;
- (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- (i) altering the bed, banks, course or characteristics of a watercourse;
- (j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and,
- (k) using water for recreational purposes.

101 We have underlined those subsections, which we believe are relevant to Shell's application.

102 This wide-ranging definition includes activities impacting on the physical system which contains water, even though the water may not be found there at a particular point in time. It should be noted that the term "water use" also includes polluting activities which are pertinent to the application.⁸² Recent judgements reflect growing concern about, and enforcement of laws safeguarding South Africa's water resources. For example, in a matter involving the management and pollution of water resources by mining houses, *Minister of Water Affairs and Forestry v Stilfontein Gold Mining Co Ltd and Others* 2006 (5) SA 333 (W), the Court stated that the objectives of certain directives issued in terms of s19 of the National Water Act 36 of 1998 "*is to prevent pollution of valuable water resources. To permit mining companies and their directors to flout environmental obligations is contrary to the Constitution, the Mineral and Petroleum Resources Development Act and the National Environmental Management Act....*"

103 It should also be noted that the wide-ranging definition of 'water-use' quoted above includes activities impacting on the physical system, which contains water, even though the water may not be found there at a particular point in time. Furthermore the wide definition of "water use" reflects an integrated and holistic approach, which implicitly recognises the unity of the hydrological cycle. However it is argued below that such an integrated approach is not reflected in the decision-making process where a number of government agencies acting under different laws will be making the decision as to whether Shell should be granted an exploration licence.

⁸² S 21(f), (g) and (h).

104 The Department of Water Affairs (DWA) has to take into account a number of considerations in issuing a water licence, or a general authorisation. These considerations are set out in section 27 headed “Considerations for issue of general authorisations and licences” which states:

In issuing a general authorisation or licence a responsible authority must take into account all relevant factors, including-

- (a) *existing lawful water uses;*
- (b) *the need to redress the results of past racial and gender discrimination;*
- (c) *efficient and beneficial use of water in the public interest;*
- (d) *the socio-economic impact-*
 - (i) *of the water use or uses if authorised; or*
 - (ii) *of the failure to authorise the water use or uses;*
- (e) *any catchment management strategy applicable to the relevant water resource;*
- (f) *the likely effect of the water use to be authorised on the water resource and on other water users;*
- (g) *the class and the resource quality objectives of the water resource;*
- (h) *investments already made and to be made by the water user in respect of the water use in question;*
- (i) *the strategic importance of the water use to be authorised;*
- (j) *the quality of water in the water resource which may be required for the Reserve and for meeting international obligations; and*
- (k) *the probable duration of any undertaking for which a water use is to be authorised.*

105 Section 28, headed ‘Essential requirements of licences’, goes on to specify a number of conditions which a licence must specify. These conditions include the condition that “this Critical Review periods during which the licence may be reviewed under section 49, which must be at intervals of not more than five years” must be specified.

106 In the same vein, section 29, headed ‘Conditions for issue of general authorisations and licences’, stipulates that the responsible authority may attach conditions to every licence. This includes conditions -

- (a) *relating to the protection of-*
 - (i) *the water resource in question;*
 - (ii) *the stream flow regime; and*
 - (iii) *other existing and potential water users;*
- (b) *relating to water management by-*
 - (i) *specifying management practices and general requirements for any water use, including water conservation measures;*

- (ii) *requiring the monitoring and analysis of and reporting on every water use and imposing a duty to measure and record aspects of water use, specifying measuring and recording devices to be used;*
- (iii) *requiring the preparation and approval of and adherence to, a water management plan;*
- (iv) *requiring the payment of charges for water use as provided for in Chapter 5;*
- (v) *requiring the licensee to provide or make water available to a person specified in the licence; and*
- (vi) *in the case of a general authorisation, requiring the registration of the water use with the responsible authority and the payment of a registration fee as a pre-condition of that use;*
- (c) *relating to return flow and discharge or disposal of waste, by-*
 - (i) *specifying a water resource to which it must be returned or other manner in which it must be disposed of;*
 - (ii) *specifying permissible levels for some or all of its chemical and physical components;*
 - (iii) *specifying treatment to which it must be subjected, before it is discharged; and*
 - (iv) *specifying the volume which may be returned;*
- (d) *in the case of a controlled activity-*
 - (i) *specifying the waste treatment, pollution control and monitoring equipment to be installed, maintained and operated; and*
 - (ii) *specifying the management practices to be followed to prevent the pollution of any water resource;*
- (e) *in the case of taking or storage of water-*
 - (i) *setting out the specific quantity of water or percentage of flow which may be taken;*
 - (ii) *setting out the rate of abstraction;*
 - (iii) *specifying the method of construction of a borehole and the method of abstraction from the borehole;*
 - (iv) *specifying the place from where water may be taken;*
 - (v) *specifying the times when water may be taken;*
 - (vi) *identifying or limiting the area of land on which any water taken from a resource may be used;*
 - (vii) *limiting the quantity of water which may be stored;*
 - (viii) *specifying locations where water may be stored; and*
 - (ix) *requiring the licensee to become a member of a water user association before water may be taken;*
- (f) *in the case of a stream flow reduction activity-*
 - (i) *specifying practices to be followed to limit stream flow reduction and other detrimental impacts on the water resource; and*
 - (ii) *setting or prescribing a method for determining the extent of the stream flow reduction caused by the authorised activity;*
- (g) *which are necessary or desirable to achieve the purpose for which the licence was issued;*
- (h) *which are necessary or desirable to ensure compliance with the provisions of this Act; and*
- (i) *in the case of a licence-*

- (i) *specifying times when water may or may not be used;*
- (ii) *containing provisions for its termination if an authorised use of water is not implemented or not fully implemented;*
- (iii) *designating water for future or contingent use; or*
- (iv) *which have been agreed to by the licensee.*

107 Section 29(2) goes on to stipulate that if “a licensee has agreed to pay compensation to another person in terms of any arrangement to use water, the responsible authority may make the obligation to pay compensation a condition of the licence”.

108 Of particular relevance to Shell’s proposal is section 30, which requires the furnishing of security by the applicant. It stipulates:

(1) A responsible authority may, if it is necessary for the protection of the water resource or property, require the applicant to give security in respect of any obligation or potential obligation arising from a licence to be issued under this Act.

109 Given Shell’s record in other parts of Africa, including the Niger Delta, it is incumbent on the DWA to impose a not insubstantial sum as security should the project be given the go-ahead which this Critical Review argues should not be the case.

4.4.2 The Reserve

110 Relevant to Shell’s application and the fact that we are dealing with a particularly water scarce area is the notion of a ‘Reserve’, provided for in Chapter 3 of the NWA.

111 The Act defines the “Reserve” as ... the quantity and quality of water required –

(a) to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be –

- (i) relying upon;*
- (ii) taking water from; or*
- (iii) being supplied from,*
- (iv) the relevant water resource; and*

*(b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.*⁸³

112 As such, it should be noted that the Reserve consists of two components: a basic human needs component, and an ecological component.⁸⁴ Several points should be noted about the Reserve. First, the notion of the Reserve applies to all water resources, including groundwater and wetlands.⁸⁵ Second, although the White Paper suggested that the basic needs component takes precedence over the environmental component,⁸⁶ the Act gives them equal priority. Third, it is not a straightforward matter to quantify either component. The White Paper suggested a provisional quantity of 25 litres per person per day as a short-term quantum.

113 The quantification of the ecological component is more problematic: how much water is necessary in a particular catchment to protect aquatic ecosystems to secure ecological sustainable development? The water management strategies and the resource quality objectives provide the criteria to determine the Reserve, and a range of methods based on a national resource protection classification system is provided for in Chapter 3 of the Act.

114 Section 16, headed “Determination of the Reserve”, provides more detail in this regard. It obliges the Minister to determine the Reserve for all or part of a water resource as soon as is reasonably practicable after the class of that water resource, or part thereof, has been determined. The determination of the Reserve must be in accordance with the class of the water resource and adequate allowance must be made for each component of the Reserve.⁸⁷ The Minister is obliged to publish a notice in the Government Gazette of the intention to determine the Reserve and invite and consider written submissions in this regard.⁸⁸

115 Because of the difficulties involved in determining the Reserve, the Act provides for a “preliminary determination” to be made if the classification system for water resources is not yet in place.⁸⁹ A responsible authority may authorise the use of water before the various strategies, classification system and resource quality objectives have been determined, but not before the preliminary Reserve has been quantified.⁹⁰ Furthermore, all matters, including the determination of the resource quality objectives, hinge on the obligation of the Minister,

⁸³S 1(1)(xviii).

⁸⁴Principle 9 of the Fundamental Principles.

⁸⁵See the definition of “water resource”.

⁸⁶Par 5.2.2 of the White Paper fn 4.

⁸⁷S 16(2).

⁸⁸S 16(3).

⁸⁹S 17.

⁹⁰S 22(5).

Director-General, organs of state and water management institutions to “. . . give effect to the Reserve . . . when exercising any power or performing any duty in terms of this Act”.⁹¹ The compensation provision⁹² provides that in determining the amount of compensation, any reduction in the original entitlement made in order to provide for the Reserve shall be disregarded.⁹³

116 The point is that, in considering the granting of a licence to Shell, DWA has to consider the notion of the human and ecological components of the Reserve.

4.5 Planning law: the Development Facilitation Act (DFA), Act 36 of 1998, and provincial planning legislation

4.5.1 Introduction

117 Planning law in South Africa is a cooperative governance exercise between national and provincial government agencies. The main national statute is the Development Facilitation Act 67 of 1995 (the ‘DFA’). The main national government agency is the National Planning Commission.

118 There are three sets of potentially relevant provincial laws: Northern Cape Planning and Development Act 7 of 1998; the Land Use Planning Ordinance (Western Cape) 15 of 1985, and the Land Use Planning Ordinance (Eastern Cape) 15 of 1985.

119 At the basis of these laws, is the notion of future spatial development planning which takes the legislative form of provincial and local level Spatial Development Plans (SDFs), Integrated Development Plans (IDPs) and others. Also of importance is national planning, as carried out by the relatively new National Planning Commission. Our contention is that the draft EMP does not taken adequate cognizance of these national, provincial and local planning instruments.

⁹¹S 18.

⁹²S 22(6).

⁹³S 22(7).

4.5.2 Development Facilitation Act 67 of 1995 (the ‘DFA’)

120 The DFA is underpinned by a set of “general principles for land development and conflict resolution” in Chapter 1 of the Act.⁹⁴ These principles which apply to the State and local authorities alike, are to guide the administration of all land use plans and serve as guidelines for competent authorities in the carrying out of their administrative land development functions.⁹⁵

121 The land development principles are extensive and broad-ranging and generally seek to merge wise and economically beneficial land-use practices with the ideals set out in and spirit of the Constitution. The principles also incorporate other sound planning norms such as discouraging urban sprawl and encouraging the development of more compact towns and cities.⁹⁶ Among the principles pertinent to the Shell proposal is the following principle:⁹⁷

... “each proposed land development area should be judged on its own merits and no particular use of land, such as residential, commercial, conservational, industrial, community facility, mining, agricultural or public use, should in advance or in general be regarded as being less important or desirable than any other use of land.”

122 Also pertinent to the Shell proposal is the principle that there be public participation in the local development process,⁹⁸ and the principle that “. . . each proposed land development area should be judged on its own merits and no particular use of land . . . should in advance or in general be regarded as being less important or desirable than any other use of land”.⁹⁹

4.5.3 Provincial planning laws

123 The Northern Cape Province has replaced the “old” Cape Province legislation with the Northern Cape Planning and Development Act 7 of 1998.¹⁰⁰ It specifically endorses the DFA in stating that it is “. . . to complement the accelerated development procedures as provided for in the Development Facilitation Act 1995”.¹⁰¹ The opening section of the Act also

⁹⁴Ss 2–4.

⁹⁵S 2(a) to (c).

⁹⁶S 3(1)(c)(vi).

⁹⁷S 3(1)(j).

⁹⁸S 3(1)(d).

⁹⁹S 3(1)(j).

¹⁰⁰The Act commenced on 1 June 2000.

¹⁰¹Preamble.

specifies that the general principles prescribed in the DFA shall apply in the Province of the Northern Cape, more particularly that the principles shall apply to any planning and land development related actions taken by the MEC; that they serve to guide the administration of any spatial plans, policies, development objectives, implementation programmes and projects, regulations and guidelines administered by the MEC, and serve as guidelines for the exercise of any discretion, recommendation or decision made or taken under the Act.¹⁰² The section also specifically advocates the resolution of disputes by mediation.¹⁰³

124 The Western Cape and Eastern Cape provincial planning laws, namely the Land Use Planning Ordinance 15 of 1985 ('LUPO') is dealt with together as it is essentially the same law for current purpose. This is so because prior to 1994 these were one province.

125 The LUPO incorporates the notion of future spatial planning by providing for "structure plans". Their stated purpose as set out in LUPO is as follows:

*"the general purpose of a structure plan shall be to lay down guidelines for the future spatial development of the area to which it relates (including urban renewal, urban design or the preparation of development plans) in such a way as will most effectively promote the order of the area as well as the general welfare of the community concerned."*¹⁰⁴

126 In the Western Cape and Eastern Cape these are given effect by Structure Plans as provided for in the LUPO.

127 It is contended that the draft EMP pays inadequate attention to these important national and future spatial planning instruments.

4.6 The Astronomy Geographic Advantage Act (AGAA): Act 21 of 2007

128 The AGAA is designed to provide for, amongst other things, "the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy..."¹⁰⁵ To this end, the objects of the AGAA include: protecting areas in which astronomy projects of national strategic importance can be undertaken;¹⁰⁶ and, regulating activities which cause or

¹⁰² S 2(a)-(c).

¹⁰³ S 3.

¹⁰⁴ S 5(1) of the LUPO. It is anticipated that the LUPO will be replaced in due course by the Western Cape Land and Development Act 7 of 1999, which has been passed, but has not yet come into force. See par 7.5.10 below.

¹⁰⁵ Preamble to the AGAA.

¹⁰⁶ Section 2(c).

could cause light pollution or radio frequency interference or interfere in any other way with astronomy and related scientific endeavours in those areas.¹⁰⁷

129 In furtherance of the purposes of the AGAA, the Minister of Science and Technology is authorised to declare so-called astronomy advantage areas.¹⁰⁸ Significantly, the Minister of Science and Technology has declared almost the entire Northern Cape province to be an astronomy advantage area, the only exclusion being the Sol Plaatjie municipality.¹⁰⁹ Notably, a significant portion of the areas within which Shell has proposed to conduct its exploration activities fall within a Core Astronomy Advantage Area and included therein are: the South African Large Telescope (“SALT”); the MeerKAT radio telescope; and, the core of the proposed Square Kilometre Array radio telescope.

130 As will be expanded upon in more detail in Part B of this review, serious concerns have been raised by leading astronomers, as well the South African Astronomical Observatory (“the SAAO”), regarding, not only the potentially adverse impact that fracking may have on the borehole water which supplies the South African Astronomical Observatory in Sutherland, but also the atmospheric and light pollution that fracking may give rise to. Quantitative estimates of these forms of pollution have not been provided for in the draft EMP and they may well negatively impact upon, not only SALT, but also the potential success of South Africa’s bid to host the Square Kilometre Array radio astronomy telescope (“the SKA Project”),¹¹⁰ the proposed Cherenkov Telescope Array and the Meerkat radio observatory.¹¹¹

131 In the light of the foregoing, it is clear that, in order to determine whether or not the activities proposed by Shell will be consistent with the provisions of the AGAA, the location of the proposed activities as well as the nature of the associated atmospheric and light pollution must be identified. The draft EMP fails, however, to identify precisely where the proposed exploration activities will take place, or nature of the aforementioned forms of

¹⁰⁷ Section 2(e).

¹⁰⁸ In accordance with s6(a), (b) and (c) of the AGAA, read with s5(1) and s1 thereof, the Minister of Science and Technology to declare astronomy advantage areas for the purposes of: “ensur[ing] that geographic areas...which are suitable for astronomy and related scientific endeavours...are protected, preserved and properly maintained”; “enhance[ing] the existing geographic advantage of those areas that are highly suited for astronomy and scientific endeavours through the restriction of activities that cause or could cause light pollution...or interfere in any other way with astronomy and related scientific endeavours or astronomy advantage in those areas”; and, “provid[ing] for the management of those areas in the public interest and in accordance with good national and international practices.” An astronomy advantage area is defined, under s1 of the AGAA as a core advantage area, a central astronomy advantage area, or a coordinated astronomy advantage area.

¹⁰⁹ Notice No. 115 in Government Gazette No. 32951, 19 February 2010.

¹¹⁰ In 2005 South Africa submitted a bid to host the SKA telescope and the competing bids have since been reduced to Australia and South Africa. The SKA is an advanced technology project with an expected capital expenditure in excess of 1.5 billion euros.

¹¹¹ The establishment of the MeerKAT and the SKA have been declared to be astronomy and related scientific endeavours for the purposes of the AGAA. See Notice No. 897 in Government Gazette No. 33614, 15 October 2010.

pollution. Accordingly, the draft EMP contains insufficient information for the relevant authorities to determine whether compliance with the provisions of the AGAA will be achieved. It follows that the draft EMP ought to be viewed as an inappropriate instrument on which to reach a decision regarding Shell's proposed exploratory activities.

5. ALIGNMENT WITH LAND USE AND SPATIAL PLANNING POLICY

132 In order to make a positive contribution to sustainable development, a proposed activity should be aligned and compatible with higher order sectoral or spatial policy and plans. Inconsistencies with strategic direction can seldom be effectively remedied by project-or activity-level mitigation. It is considered 'good practice' therefore to test for consistency as a 'first step' in the environmental assessment of proposed activities; strategic tools should be used as the higher order 'litmus test': only in this hierarchical way can cumulative impacts at a landscape level be adequately considered.¹¹²

133 The Green Paper on National Strategic Planning¹¹³ noted that the "...lack of a coherent long term plan has weakened our ability to provide clear and consistent policies. It has limited our capacity to mobilise all of society in pursuit of our developmental objectives. It has hampered our efforts to prioritise resource allocations and to drive the implementation of government's objectives and priorities. In addition, weaknesses in coordination of government have led to policy inconsistencies". The Green Paper stated that an 'agreed vision about the country's direction' was needed, and that 'we need to attend to the tendency towards voluntarism and short-termism that has in many respects marked activities of government, state entities, the business community and civil society'.

134 Thematic or cross-cutting national planning issues that were identified as being the subject of focused investigations include, amongst others:

134.1 The long-term availability of water;

134.2 Energy consumption and production;

¹¹² The benefits of strategic level, integrated planning and impact assessment at landscape scale include the consideration of cumulative effects, helping to define and maintain chosen levels of environmental quality, avoiding the causes of impacts rather than simply mitigating them as unavoidable consequences of development, and determining the future direction for development in an area in a way that promotes sustainability. Source: DEA&T 2007. *Strategic Environmental Assessment*. IEM Guideline Series 4.

¹¹³ Green Paper: National Strategic Planning, September 2009 (the Presidency, RSA).

- 134.3 Conservation, biodiversity and climate change mitigation and adaptation;
- 134.4 Local economic development and spatial settlements trends;
- 134.5 Food security and sustainable rural development;
- 134.6 Innovation, technology and equitable economic growth; and
- 134.7 Poverty, inequality and the challenge of social cohesion.
- 135 The National Planning Commission was appointed on the 30th of April 2010 for the purposes of developing the country's National Strategic Plan in consultation with government and in partnership with the broader society. This Commission will produce a vision statement and national plan in November 2011. A coherent national spatial planning policy will guide the rational organisation of land use and ensure better balance in the demands for development with the need to conserve the environment.¹¹⁴
- 136 Any proposed land use must, therefore, consider the strategic-level policies and plans for the affected area, reflecting the vision, aspirations and shared objectives of stakeholders for that area.
- 137 In this regard, provincial Spatial Development Frameworks, provincial and local authority Integrated Development Plans, local SDFs and/ or Spatial Development Plans, Environmental Management Frameworks (EMFs) and Growth Management Strategies provide the benchmark against which to evaluate a proposed activity. Since the concept of 'sustainable development' entered South Africa's law, an integrated consideration of people and their needs, their environment, their heritage, and ways to optimize use of available resources in the most spatially efficient manner has guided the development of such plans. That is, 'sustainability' is embedded in them. Any activity that is contrary to or infringes on the plans and strategies has the potential to undermine sustainable development, particularly where it places a major demand and/ or burden on the natural resource base.
- 138 There are numerous potentially competing land uses and activities proposed for the Karoo, e.g. uranium mining, tourism, Square Kilometre Array (SKA) project, amongst others. The proposed fracking is another such activity. To achieve sustainable development in the Karoo

¹¹⁴ The Presidency: Strategic Plan 2011/12-2013/14.

requires a strategic level assessment of these competing uses in terms of policies and plans to arrive at the best development options for the country and that region as a whole. Project-level EIA effectively circumvents these higher order considerations, posing a potentially major risk to sustainable development objectives such as espoused in the National Framework for Sustainable Development (DEAT 2008). This states:

South Africa aspires to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration. The core principles underscore a cyclical and systems approach to achieving sustainable development and require:

- (a) Efficient and sustainable use of natural resources;*
- (b) Socio-economic systems are embedded within, and dependent upon, eco-systems;*
- (c) Basic human needs must be met to ensure resources necessary for long-term survival are not destroyed for short term gain.*

139 Land use is the integrator of social and ecological systems, determining the structures, functions and resilience of both. In the Little Karoo, for example, historical land use decisions and policies decreased the resilience of the system. A new approach is needed that focuses on reducing vulnerability and increasing resilience of the interdependent social-ecological system. The sustainable management of social-ecological systems requires decision makers to begin to understand the complexities and interdependencies that characterise such systems and the full ramifications of policy and management decisions.’ So-called ‘joined-up thinking is essential when dealing with complex social-ecological systems.’¹¹⁵

140 The issue of land use alternatives and the need and purpose of a proposed activity that is inconsistent with these strategic tools is of paramount importance: where alternative locations or sites exist that could accommodate that land use, they should be investigated to ensure that the ‘best practicable environmental option’ is identified. A comparative evaluation of the proposed fracking with the implications of pursuing the current development path, in terms of ecological sustainability, socioeconomic and equity implications, should form a key component of that investigation. Also, where there are alternative ways of meeting the stated need for the proposed activity in the affected area, these options should likewise be investigated. In the case of fracking in the Karoo, South Africa has a number of energy generation options (e.g. solar or wind energy); a full economic valuation of these different options must be undertaken before it can be determined that exploration for shale gas is the

¹¹⁵ P370 in Exploring Sustainability Science: a southern African perspective. M Burns and A Weaver (eds). SUN Press. 2008.

‘best practicable environmental option’, particularly since there would be opportunity costs associated with each choice.

- 141 Linked to this point, consideration of the ‘no go’ alternative for the proposed fracking may ‘free up’ opportunities for other land use activities (potentially including energy generation) that may be foreclosed should shale gas be developed.

6. THE ENERGY CONTEXT

- 142 The international trend in energy (and power sector) generation investments is increasingly towards renewable energy: global investments in renewable energy generation (excluding large hydro) have exceeded fossil fuel based generation investments since 2008.

- 143 Currently in South Africa, the issues and priorities in the energy sector are not well understood or defined, and data are poor. As a result, almost all current interventions or activities in the energy sector are somewhat blinkered and/or driven by narrow agendas. Consequently, the ‘big picture’ for decisions on whether to pursue the extraction of a non-renewable natural resource such as shale gas for heat and electricity generation is essentially incomplete or ill-defined. Shell’s proposed activities are therefore based on somewhat arbitrary (or opportunistic) assumptions, which are not tested against the ‘big picture’ needs and constraints or shared by the stakeholders.

- 144 The key concerns in South Africa from an energy perspective include:

- 144.1 Security of supply (for the availability of energy services¹¹⁶ for society and the economy);
- 144.2 Access to energy services (for all South Africans to exercise equitably their choice to enjoy/pay for benefits/costs from the resource consumption and waste/emissions in the energy sector);
- 144.3 Pricing to customers (to provide predictability and economy in the costs);

¹¹⁶ Energy services are the services – such as lighting, cooked meals, person-kilometers of transport, hot water, manufactured goods, etc. – which are provided by energy service supply chains. Energy service supply chains are the complete supply chains which convert primary energy (such as coal or uranium ore, etc.) into the energy services which are desired by people and the economy

- 144.4 Environmental impacts (water consumption, wastes, CO2 emissions, non-renewable primary energy resource consumption);
- 144.5 Social and economic benefits (such as “the Green Economy” and local economic development); and,
- 144.6 Global competitiveness and stature in international relations.
- 145 There are three generalized energy service supply chains in the energy sector in South Africa, namely:
- 145.1 A direct / on-site energy conversion supply chain (such as hot water provided from a solar water heater or a donkey boiler operating on biomass from a sustainable local source);
- 145.2 A distributed generation energy service supply chain (such as a local/municipal electricity generator and distributor or gas conversion/distribution utility, e.g. Egoli gas); and
- 145.3 The more familiar centralized generation energy service supply chain (such as Eskom or the liquid fuel companies with their respective national grid or pipeline/bottle distribution system).
- 146 The topology of the overall energy system is rapidly changing from a predominantly centralized (and uni-directional) system to a more flexible and efficient (plug and play) combination of distributed and on-site generation which interacts with the centralized system in a bi-directional manner.
- 147 The shale gas exploration initiative is essentially aimed at bolstering the ‘old’ centralized generation energy service supply chain by substituting a ‘new’ primary energy resource for the more traditional (and increasingly risky) coal and nuclear primary energy resources.
- 148 All the major opportunities for increased access to energy services; increased utilization of energy efficiency and renewable energy; and decentralized local economic development (etc.) are available in the direct/on-site energy supply chains and the distributed energy service supply chains and not in the centralized energy service supply chain.
- 149 Shale gas is a non-renewable resource which by definition will provide a limited and short-term benefit and exhaust a resource which may be utilized more usefully (for applications

which we may not yet understand or need at the moment) than for the generation of electricity or heat which can be provided by many renewable energy systems. The solar resource in the area under consideration is essentially infinite when compared to the most optimistic projections of the available shale gas resource under consideration for extraction. This solar resource is already providing energy services to customers in the whole country (for natural lighting, space heating, water heating, water pumping, electricity generation, etc.) and this role can be increased dramatically with a high level of confidence in terms of risks. Similarly, the wind and bio-waste primary energy resources are distributed across the area under consideration at the locations where customers have energy service needs.

150 South Africa's electricity and water supply problems should not be treated independently although both are severe and demand urgent attention. The amount of water consumed in the production of electricity in South Africa is already of the same order of magnitude as the water use of the mining industry.¹¹⁷ Alternative energy sources have differing water requirements and as such the imperatives of water management should play a role when making decisions regarding energy production¹¹⁸. 'Energy return on energy invested' (EROEI) considerations suggest that, under South African conditions, shale gas is uncompetitive (EROEI < 5:1) with nuclear, wind or solar (Concentrated Solar Power or CSP) sources. The planning of Shell's exploration process should reflect a serious attempt to obtain new experimental data on this aspect.

151 It is thus not clear why shale gas is being pursued in the Karoo, given that:

151.1 the risks (and hence costs) associated with the alternative approaches to meeting the key concerns listed above are better defined and less damaging for energy efficiency and renewable energy systems than for the overall shale gas to energy service supply chain;

151.2 the levels of uncertainty and the impacts of the risks associated with the overall shale gas to energy service supply chain are higher than for all three renewable energy service supply chains, both in terms of the probabilities and the impacts in the event of failures, breakdowns or sabotage;

¹¹⁷ Statistics SA, 2006.

¹¹⁸ Potgieter, Petrus H. 2010. Water and energy in South Africa: managing scarcity. University of South Africa January 2010. <http://mpira.ub.uni-muenchen.de/23360/> MPRA Paper No. 23360.

- 151.3 the lasting impacts of renewable energy systems are of a different quality in terms extent and permanence. They are all visible and subject to public scrutiny – what you see is what you get; and
- 151.4 with regard to the distributional/ equity effects, the energy benefits of shale gas would typically be understood to be for heat and electricity generation within the context of a national grid (for electricity) and a commercial gas distribution infrastructure. The energy services provided by the heat and electricity will predominantly serve those who already have access to high quality energy services and will not necessarily increase access to those who do not currently enjoy access to “modern” energy services. The capital invested in the shale gas exploration and extraction could be more equitably invested in energy service infrastructure which can extend access to energy services to the unserved household and businesses / enterprises in the country. This would necessarily include distributed energy supply/generation infrastructure which does not rely on the existing electricity grid or liquid fuel distribution systems;
- 151.5 the energy conversion of the shale gas into heat or electricity would produce greenhouse gas emissions (GHG) which could be avoided by increased utilization of energy efficiency and renewable energy systems. In this way the costs of GHG emissions would not be added to the burdens of the poor who would have been denied any benefits derived from the combustion of the shale gas in the first place.
- 152 It should be noted that the challenges to government of managing the policy development, legislation and regulation, planning, implementation, operation and maintenance, monitoring and evaluation, reporting and governance in the energy sector are major. The technical capacity within government for fulfilling the functions required for leadership and management of the energy sector is inadequate and the situation is deteriorating.

7. THE FLAWED REGULATORY REGIME FOR ACHIEVING SUSTAINABLE DEVELOPMENT

7.1 Policy vacuum

- 153 South Africa does not have either policy or guidelines on unconventional gas exploration, and has no prior experience in evaluating proposals for fracking in this policy vacuum. That is,

the proposed activity is unprecedented in this country.

- 154 When compared to foreign oil and gas industries, such as that which exists in the UK, South Africa has a fledgling industry. Significantly, however, both South Africa and the UK do not possess regulatory frameworks that have been specifically drafted to address the exploration for, and exploitation of, shale gas. During his evidence before the UK's E&CCC, Professor Kevin Anderson cautioned against the advent of a shale gas industry where there are no shale gas-specific regulations. To this end, Professor Anderson stated as follows:

“[T]his is the point where really what we need to have, before you proceed with this, is a stringent regulatory framework. I have every confidence that the Environment Agency, if they are given the task of dealing with this, would deal with it appropriately, but that needs to be thought through and not rushed. I trust the relevant authorities and scientists and the Environment Agency to come up with the appropriate legislative framework, but they need the time to think through these sets of issues, to look at what has happened in the US, to learn from the experience there, to look at the EPA study when it comes out in the US and possibly to conduct their own. This is all a time-consuming process which goes back to the same argument as before that, from the environmental perspective, apart from the climate change perspective, we need to delay whilst we carry out and conduct these checks and measures.”

- 155 Notably, Mrs Jennifer Banks, when giving her evidence before the E&CCC, also stressed the importance of having an appropriate regulatory framework in place. When pointing out that there has been a lot of concern about the fact that waste water from fracking operations has been treated by municipal treatment facilities which “are not equipped to deal with that degree of contaminated water”, Mrs Banks stated that that “is certainly something that needs to be looked into and robust regulation would need to be present.”

- 156 South Africa does not have the “stringent regulatory framework” that Prof Anderson has stated is necessary or the “robust regulation” that Mrs Banks has stated needs to be present. The South African government would be ill advised to allow for Shell, or any other such corporation, to conduct its operations under the auspices of a regulatory regime that fails to specifically address, inter alia, the environmental, social, economic and health concerns that are associated with the exploitation for, and exploitation of, shale gas. As Professor Anderson stated while giving his evidence before the E&CCC: “The problem here is that we are talking about a new process and a new process requires standing back and thinking about the

legislative framework. I think just relying on existing legislative framework [sic] for a new process is not sufficient.”

7.2 Mode of environmental management

157 The general objectives of Integrated Environmental Management are set out in Chapter 5 of the NEMA. Amongst others, Section 23(2)(f) requires the identification and employment of the modes of environmental management “best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2”.

158 Given the potentially significant regional and sectoral impacts of the proposed shale gas exploration, particularly if taken to its ‘endgame’ outcome, including impacts on the natural resource base (particularly water), social-ecological resilience and sense of place of the affected region, it is suggested that a project-level EIA is not an appropriate tool by which to assess and evaluate the proposed activity. At minimum, a strategic environmental assessment (SEA) should be undertaken to enable a robust evaluation against policies, land use and sectoral plans, and the regional development objectives and capability. Whilst no specific provision is made for such SEA in current regulations, the Department of Environmental Affairs and Tourism (now the Department of Environmental Affairs) has produced two guidelines on SEA (2005, 2007), recognizing the need for such a tool in practice.

7.3 Conflict of interest

159 The Petroleum Agency SA (PASA) was established in 1996 to facilitate the exploration and development of South Africa’s resources of oil and gas for the optimal benefit of its people. PASA’s Mission is to ‘...actively promote exploration for natural oil and gas resources and their optimal development for the benefit of South Africa.’¹¹⁹

160 PASA has been designated by the government, through the Minister of Minerals and Energy, as the official agency responsible for the regulation of South Africa’s petroleum resources. Its role was statutorily endorsed in June 2004 in terms of the Mineral and Petroleum Resources Development Act of 2002.¹²⁰ They bear the responsibility, prior to making recommendations to the Minister, of administering and evaluating the application process for exploration rights.

¹¹⁹ http://www.petroleumagencyrsa.com/Libraries/Regulation/paia_manual.sflb.ashx. Emphasis added.

¹²⁰ www.cef.org.za/index.php?option=com_content&view=article&id=8&Itemid=9.

161 The fact that PASA is being called upon to be both judge and jury on an application for an activity they are mandated to promote is problematic. Similarly, the DMR's mandate places it in precarious position when it comes to weighing up exploitation versus environmental interests.

162 In 2008, amendments to both the NEMA and MPRDA were passed by Parliament to bring mining and prospecting under the former's ambit. However, these amendments have to date not been brought into effect.

7.4 Fragmentation

163 In *Fuel Retailers* Ngcobo cited the following, at paragraph 44, from the Report of the World Commission on Environment and Development: Our Common Future (Brundtland Report):

*“[E]nvironmental stresses and patterns of economic development are linked one to another. Thus agricultural policies may lie at the root of land, water, and forest degradation. Energy policies are associated with the global greenhouse effect, with acidification, and with deforestation for fuelwood in many developing nations. These stresses all threaten economic development. Thus economics and ecology must be completely integrated in decision making and lawmaking processes not just to protect the environment, but also to protect and promote development. Economy is not just about the production of wealth, and ecology is not just about the protection of nature; they are both equally relevant for improving the lot of humankind.”*¹²¹

164 According to the National Framework for Sustainable Development in South Africa¹²², it is important that sustainable resource use is embedded into the working of all Clusters and intergovernmental structures in all three spheres of government, and greater alignment of sustainability criteria in all levels of integrated and spatial planning.

165 Not only will the Application require authorization in terms of the MPRDA, but also in terms of the NEMA, since a number of the proposed activities trigger the EIA regulations in terms of that Act. In addition, permits or authorizations will be required in terms of a range of other legislation, notably the National Water Act of 1998 (Act 36 of 1998).

¹²¹ Own emphasis.

¹²² Department of Environmental Affairs and Tourism, July 2008.

- 166 The interdependence of different environmental, socioeconomic and heritage attributes is recognized in South African law (NEMA). For example, any effects on water resources will affect the lives and livelihoods of local communities, agricultural activity, and potentially the ecosystems that depend on affected water. Changes in visual or landscape character will affect the sense of place, which in turn could affect the value of the area for tourism and thus the local tourism economy. A ‘big picture’ of the social-ecological system of the Karoo and its dynamics, an understanding of linkages, trends and resilience, is essential if one is to evaluate, reliably, the potential impacts of fracking on that system. In addition, as noted in the National Framework for Sustainable Development in South Africa¹²³, economic valuation of ecosystem services as the basis for sustaining development must become an integral part of development planning and decision making, to inform policies, strategies, programmes and actions.
- 167 The suite of different legal requirements applying to the proposed activity is complex and fragmented. From the MPRDA to the NEMA EIA requirements, to permits for water, emissions, waste, the risks of particular issues and significant impacts ‘falling through the regulatory cracks’ is extremely high, in part given the opportunities for deferring consideration of these issues and impacts to a different, a parallel or a future authorization process. For example, the Application for Exploration Rights notes that a source of water has not yet been determined, and that studies on options will be carried out in future and linked to a Water Use Application at a later stage in the planning process. In addition, the chemicals to be used in fracking cannot be identified until the specifics of each borehole have been determined. In effect, no identification, assessment or evaluation of potential impacts associated with either the quantity or quality of water resources can be carried out at this stage; the requirements of both the MPRDA and s2 of NEMA cannot be met.
- 168 The deferral of dealing with these potentially ‘fatal flaw’ issues to another process at another time is highly problematic, since it is directly in conflict with s2(4)(b) of the NEMA, namely that environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.
- 169 The fragmentation and deferral of consideration of different components of the environmental assessment process implies that the decision maker cannot satisfactorily apply his/ her mind

¹²³ Department of Environmental Affairs and Tourism, July 2008. Section 7.1.2.

to the task, and cannot satisfy him/ herself that the decision taken would satisfy the requirements of both s37(1) of the MPRDA and s2 of the NEMA.

7.5 Capacity

170 Compliance monitoring and enforcement on the part of the competent authorities, given the potential significance of the impacts of the proposed activity on critical public resources such as water, is crucial. The capacity of the key competent authorities involved in this activity is poor. Both the Department of Water Affairs and the Department of Mineral Resources are severely under-resourced in relation to compliance monitoring and enforcement¹²⁴; there are serious capacity constraints at all tiers of government within the environmental and water authorities¹²⁴. Seventy nine per cent of Blue Scorpion posts across the national and regional offices are vacant.¹²⁵ The Petroleum Agency of South Africa (PASA) does not have the environmental management inspectors necessary to monitor and enforce compliance. These constraints compound the risks of serious harm.

8. CONCLUSION

171 The information in Part A of this Critical Review has been assembled and collated by synthesizing evidence from a range of experts in their particular fields. As such it reflects the considered views of leading South African and international experts in their respective fields. The evidence has gathered in great haste given the very tight frames imposed by the limited comment period.

172 In the light thereof we respectfully suggest that from a range of perspectives the proposal is fundamentally flawed. In short, it does not conform to the international best practice of sustainable development as enshrined in our Constitution and elaborated in the National Environmental Management Act that is binding on all organs of State, including the Department of Mineral Resources. In addition, the information provided in the EMP does not comply with a number of the requirements of the MPRDA.

¹²⁴ Paterson A and L Kotze (eds). 2009. Environmental Compliance and Enforcement in South Africa. Legal Perspectives. Juta Law. P50-51. The Department of Water Affairs has less than a third of the staff it needs to enforce water quality and pollution laws, according to the Minister of Water and Environmental Affairs in a response to Parliamentary Question 24 November 2010.

¹²⁵ Response from the Minister of Water and Environmental Affairs to Parliamentary Question 24 November 2010.

173 Part B of this Critical Review provides more detailed input from these experts, responding to key themes that relate directly to the NEMA principles.

174 At this juncture, we respectfully remind the decision-makers that, while ultimately the decision is a policy decision and in the realm of the executive, any decision to allow fracking in the Karoo must be 'reasonable' in the administrative law sense. In this regard, we wish to draw the decision-makers' attention to the Constitutional Court has stated (per O'Regan J) at paragraph 45 in *Bato Star Fishing*:

*What will constitute a reasonable decision will depend on the circumstances of each case, much as what will constitute a fair procedure will depend on the circumstances of each case.*¹²⁶ *Factors relevant to determining whether a decision is reasonable or not will include the nature of the decision, the identity and expertise of the decision-maker, the range of factors relevant to the decision, the reasons given for the decision, the nature of the competing interests involved and the impact of the decision on the lives and well-being of those affected. ...The court should take care not to usurp the functions of administrative agencies. Its task is to ensure that the decisions taken by administrative agencies fall within the bounds of reasonableness as required by the Constitution*¹²⁷

¹²⁶ See *Administrator, Transvaal, and Others v Traub and Others* 1989 (4) SA 731 (A) at 758H - I; *Premier, Province of Mpumalanga and Another v Executive Committee of the Association of Governing Bodies of State-Aided Schools: Eastern Transvaal* 1999 (2) SA 91 (CC); 1999 (2) BCLR 151 (CC) at para 39; *Minister of Public Works and Others v Kyalami Ridge Environmental Association and Another (Mukhwevho Intervening)* 2001 (3) SA 1151 (CC); 2001 (7) BCLR 652 (CC) at paras 100-1.

¹²⁷ Emphasis added.

PART B: DETAILED INFORMATION

175 This Part of this Critical Review contains an overview of the inadequacy of the information provided in the draft EMP for the proposed exploration right, highlights the key issues, and provides comments on these issues from six fundamental perspectives.

1. OVERVIEW OF THE INADEQUACY OF INFORMATION CONTAINED IN THE DRAFT EMP

176 The ultimate question to be asked of the draft EMP is ‘does it provide enough reliable information to enable the competent authority to apply his/her mind properly when reviewing and making a decision to grant or refuse authorisation for exploration in terms of the MPRDA requirements, whilst providing certainty that in doing so the NEMA principles are being upheld?’

177 Given the considerations set out in the subparagraphs hereunder, it is clear that the information provided does not satisfy a number of the MPRDA requirements, and does not give sufficient assurance that the NEMA principles would be upheld. For this reason, the competent authority is not in a position to take a decision on the application. It is not legally competent for the decision-making authorities in this instance to defer responsibility for considering the environmental implications of its decision to other competent authorities to be dealt with at later stage, such competent authorities including, for example, the Department of Environmental Affairs (“the DEA”) and the Department of Water Affairs (“the DWA”).

177.1 As discussed in Part A, the draft EMP does not assess the compatibility or consistency of the proposed activity with existing regional, spatial or sectoral policies, plans or programmes (e.g. National Framework for Sustainable Development, Western Cape Provincial SDF, Integrated Development Plans, District SDFs, etc.). The proposed activity is, in many respects, incompatible with the current energy context and direction in South Africa. In effect, the assessment ignores the ‘upstream tests’ of likely sustainable development. It is good practice first to evaluate a project within its particular policy, planning and programmatic context. Without this evaluation, the strategic consistency of the proposed activity is not known – and should be determined. In most instances, conflict or non-conformance with strategic direction may jeopardize sustainable development objectives.

- 177.2 Consideration of the ecological, socioeconomic and equity implications of alternative land and resource uses is fundamental to achieving the objectives of sustainable development. Only by so doing is it possible to arrive at the ‘best practicable environmental option’ referred to in s2(4)(b) of NEMA. The alternatives must include the ‘status quo’ or ‘no development’ option; that is, pursuing the current development path. The interpretation of the ‘no go’ option in the EMP is unacceptably narrow in being limited to answering the question ‘what will be foregone in the event that the proposal does not go ahead’. Rather, a comparative evaluation of the sustainability implications of the current development trends in the region compared with those of fracking and – taken to a logical conclusion – the exploitation of shale gas resources, should be undertaken.
- 177.3 The interdependence of different environmental, socioeconomic and heritage attributes is not recognized in the draft EMP. For example, any effects on water resources will affect the lives and livelihoods of local communities, agricultural activity, and potentially the ecosystems that depend on affected water. Changes in visual or landscape character will affect the sense of place, which in turn could affect the value of the area for tourism and thus the local tourism economy. A ‘big picture’ of the social-ecological system of the Karoo and its dynamics, an understanding of linkages, trends and resilience, is essential if one is to evaluate, reliably, the potential impacts of fracking on that system. The piecemeal approach to assessing individual impacts in isolation, and packaging the assessment of potentially significant impacts into discrete units depending on the specific authorization or permit requirement is inadequate.
- 177.4 The investigation, assessment and evaluation of risks and impacts are fundamental requirements in both the MPRDA (s38 and s39) and its relevant regulations¹²⁸ and NEMA (Chapter 5). An evaluation of the significance of potential impacts lies at the heart of impact assessment. The approach to assessing and evaluating the significance of potential impacts in the draft EMP is flawed and presents an unreliable and inaccurate indication of the implications to society, the environment and affected parties of the proposed exploration for the following reasons:
- 177.4.1 The evaluation is not focused on achieving or making progress towards sustainability objectives or outcomes for the affected area but gauges impacts against baseline values; this approach is outdated and flawed;

¹²⁸ Regulation 52 of the MPRDA Regulations (2004)

177.4.2 The methodology used to arrive at scores for significance is neither defensible nor acceptable, and is limited in its scope. The mathematical approach gives disproportionate and unfounded emphasis to the magnitude of impact over extent and duration considerations. It ignores the fact that significance comprises both a technical/scientific component and a societal value component.¹²⁹ The significance ratings in the draft EMP do not appear to reflect societal or affected community values. The approach ignores the fact that for a number of potential impacts there are thresholds or ‘limits of acceptable change’ reflected in laws, spatial or integrated development plans or strategies¹³⁰ that capture society’s desired levels of environmental quality. Any exceedance of these thresholds or limits would immediately render that impact of high significance; the methodology used in the draft EMP is effectively irrelevant;

177.4.3 The approach does not consider levels of confidence or certainty in making predictions; such consideration is required in ‘good practice’ impact assessment;

177.4.4 Whilst numerous potentially irreversible impacts are identified in the draft EMP,¹³¹ the implications for irreplaceable loss of valued resources (particularly those resources which could not be substituted) do not influence the significance ratings. Globally, recognition is growing of the dependence of human wellbeing on the natural resource base (e.g. Millennium Ecosystem Assessment, The Economics of Ecosystems and Biodiversity (“TEEB”)); the irreplaceable loss of natural resources on which human wellbeing depends is arguably the most important inter-generational equity issue we face. Irreplaceable losses have no substitute and can thus not be compensated; in such contexts they are in direct conflict with the objectives of sustainable development; and

177.4.5 Whilst the responsibility ultimately lies with the decision-making authority to ensure compliance with the NEMA principles, it is good practice for the impact assessment to use these principles as a ‘sustainable development objectives’ benchmark against which to evaluate the potential significance of impacts. That is, inconsistency with any of these principles immediately points to a significant impact. The methodology used in the draft EMP makes no reference to these principles, thereby effectively furnishing the decision maker with the sole responsibility – and associated risks – for determining conformance.

¹²⁹ e.g. Department of Environmental Affairs and Tourism 2002. IEM Information Series 5: Impact significance.

¹³⁰ IDP and SDF processes follow intensive stakeholder engagement and arrive at a suite of objectives supported and endorsed by those stakeholders. These objectives and/ or vision for the affected areas provide a reliable indication of values that should influence significance ratings.

¹³¹ e.g. soil integrity, land capability, loss of Red Data or protected plant and/ or animal species, changes in groundwater recharge, effect of fuel leakage on groundwater, damage to archaeological, palaeontological or heritage features, inadequate sealing of wells and contamination of aquifers, inadequate sealing of water supply aquifers and contamination.

- 177.5 No consideration is given in the draft EMP to the implications of climate change on the status and significance of the natural resources to be affected by the proposed development. Climate change will undoubtedly affect water resources in South Africa as a whole, and increase competition for water, leading to an increase in the costs of providing water¹³² and requirements to avoid and/or rectify water pollution. This trend and associated implications should form the basis for any evaluation of impacts of the proposed development.
- 177.6 There are gaps in information and a high level of uncertainty in impact prediction associated with this unprecedented action in the Karoo environment. This fact, together with the likely irreplaceability of the affected natural resources and the equity and environmental justice implications with regard to livelihoods, health and wellbeing of communities that rely on the integrity of these resources, points to the need to take a strictly risk-averse approach in decision making, as reflected in s2 of NEMA. When the cost of degradation may be serious or appears irreversible and/or there is little prior experience or scientific confidence about the outcome, it is prudent to follow the strict precautionary principle (i.e. confine impacts within the realm of complete reversibility and only allow impacts that have been shown neither to pose danger to ecosystems nor diminish environmental quality).¹³³ Although the need to take a risk-averse and cautious approach as required in both the MPRDA and NEMA s2 is noted in the draft EMP, no material translation of this principle into a ‘so what’ for either significance of impacts or decision making is noted.
- 177.7 As acknowledged in the draft EMP, ‘the EMP must demonstrably satisfy the national environmental management principles’. Since no evaluation of potential impacts against these principles is provided, no conclusions can reliably be drawn in this respect. On the contrary, it would appear improbable that the NEMA principles could be satisfied given shortcomings in the available information and the inadequate approach used to evaluate impacts.
- 177.8 The distributional effects of the proposed activity are not considered: who would benefit, who would bear the costs, and what are the equity and environmental justice implications. Of the utmost importance, it must be borne in mind that the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and

¹³² e.g. National Climate Change Response Green Paper (December 2010, Department of Environmental Affairs)

¹³³ B Sadler. 1996. International study of the effectiveness of environmental assessment: environmental assessment in a changing world – evaluating practice to improve performance. CEAA and IAIA.

the environment must be protected as the people's common heritage.¹³⁴ In addition, the distribution of negative impacts should not unfairly discriminate against any person, but particularly vulnerable and disadvantaged persons. Without an explicit analysis of the distributional effects, and assurance that equity and environmental justice requirements would be satisfied, no decision should be taken.

177.9 Information about the proposed activities is incomplete. For example – and crucial to enable the proposed activity – the source of water is not given. In addition, the nature and quantities of potentially hazardous or toxic chemicals to be used are not yet known.¹³⁵ With particular regard to water supplies, the different options in themselves are likely to be associated with negative and potentially significant impacts. The actual location of the exploration sites is not known; given the diverse attributes of different locations and sites in the Karoo, a generic approach to describing the affected environment is not appropriate.

177.10 The impacts described in the draft EMP are generic.¹³⁶ The significance of impacts will depend on the specific characteristics of the receiving environment, and the actions taken and materials used in the proposed activity. Neither component affecting the significance of impacts is clear, pointing to a high level of uncertainty in predictions. The draft EMP notes that significance ratings are ‘purely a guideline’ and ‘will be confirmed as part of the detailed EIA’. This approach gives no assurance that the evaluation of likely significance of impacts is reliable; rather, it defers the assessment to another authorization process.

177.11 Mitigation measures are generic and vague; it is assumed that mitigation could and would be successful and effective. These assumptions are unfounded and deeply flawed. With a high level of uncertainty around the impacts and their potential significance, mitigation measures tailored to avoid, minimize and remedy negative impacts are incomplete at best and impossible or unachievable at worst. Since a number of impacts are given as ‘irreversible’, there is a high risk of loss of irreplaceable resources that, by definition, cannot be compensated. These impacts would not be consistent with the objectives of sustainable development, as required in terms of s2 of NEMA.

¹³⁴ Section 2 of NEMA.

¹³⁵ According to the EMP, chemicals used in the fracking process have not always been fully disclosed by drilling companies, but it is known that some of these chemicals are toxic, some are toxic to aquatic organisms, some are acute toxins, some are known carcinogens, more are suspected carcinogens, some are classified as mutagenic, and some are classified as having reproductive side effects.

¹³⁶ According to the EMP, the approach followed in the assessment was to identify and assess potential impacts in a broad, regional context, as well as to assess specific exploration activities generically but not in a site-specific context. A typical gas exploration well was used to assess potential impacts and to develop indicative mitigation measures.

- 177.12 The evaluation of potential impacts after mitigation has been based on the assumption that mitigation measures could and would be successfully implemented. Given that the foundation for identifying, assessing and evaluating potential impacts is flawed, the fact that generic mitigation measures are proposed, and that no analysis has been carried out as to whether or not these measures could and would be effectively implemented, this assumption holds little weight.
- 177.13 Many of the criteria to be used to refine well locations appear not to be based on defensible science or legal requirements; e.g. ‘site not to be within any untransformed area of endangered habitat’ (it appears that wells could be located within critically endangered habitat).
- 177.14 Compliance monitoring and enforcement on the part of the competent authorities, given the potential significance of the impacts of the proposed activity on critical public resources such as water, is crucial. The capacity of the key competent authorities involved in this activity is poor. Both the Department of Water Affairs and the Department of Mineral Resources are severely under-resourced in relation to compliance monitoring and enforcement¹³⁷; there are serious capacity constraints at all tiers of government within the environmental and water authorities¹³⁷. These constraints compound the risks of serious harm. The Petroleum Agency of South Africa (PASA) does not have the environmental management inspectors necessary to monitor and enforce compliance¹³⁸.

2. THE KEY ISSUES IN RELATION TO SHALE GAS EXPLORATION

- 178 In addition to the legal, spatial planning and land use, and energy issues raised in Part A, there are a number of key issues and concerns linked to the Application in question, including: groundwater, water resources, social-ecological sustainability, livelihoods and rural development, public health, heritage, astronomy, biodiversity and economics. A short description of each issue and concern is provided in this section, followed by more detailed comment in the next section.

¹³⁷ Paterson A and L Kotze (eds). 2009. Environmental Compliance and Enforcement in South Africa. Legal Perspectives. Juta Law. P50-51. The Department of Water Affairs has less than a third of the staff it needs to enforce water quality and pollution laws, according to the Minister of Water and Environmental Affairs in a response to Parliamentary Question 24 November 2010.

¹³⁸ PASA currently has 2 compliance officers. www.petroleumagencyrsa.com/Regulation/Overview.aspx

2.1 Water resources

179 Essentially all water available in South Africa has been allocated.¹³⁹

“South Africa’s water sector faces two major challenges: limited water resources; and the need to ensure that the benefits of those resources are distributed equitably. The adverse impacts of climate change will worsen the existing problem of systemic water shortages and will bring forward the limits to water resources. Increasingly, South Africa’s water security will depend on the extent to which it is able to refine and re-orientate its institutional arrangements to make the most responsible, equitable and effective use of its water, while strengthening environmental management of the natural resource base.”¹⁴⁰

180 Climate change will undoubtedly affect water resources in South Africa as a whole, and increase competition for water, leading to an increase in the costs of providing water¹⁴¹ and requirements to avoid and/or rectify water pollution. This trend and associated implications should form the basis for any evaluation of impacts of the proposed development.

181 South Africa faces a water crisis, not only in terms of quantity but quality of its water resources. By 2025, water demands in South Africa will exceed the available supply. The South Africa Environment Outlook 2005 notes that water quality is variable, with an overall deterioration since the 1999 State of Environment Report. The 2010 Report by the Africa Earth Observation Network (“AEON”)¹⁴² predicts water shortages of 19 to 33% for the country as a whole by 2025.

182 Shell’s proposed exploration could have a truly significant effect on both the quantity and quality of water resources, through the fracking operation itself with associated use of chemicals, and through the disposal of toxic and potentially hazardous liquid wastes. Importantly, these effects may not be apparent in the immediate short term, but may only manifest in the medium to long term.

2.2 Groundwater

¹³⁹ Turton, A. (2008). Three strategic water quality challenges that decision-makers need to know about and how the CSIR should respond. Retrieved October 24, 2009, from <http://hdl.handle.net/10204/2620>.

¹⁴⁰ National Climate Change Response Green Paper 2010 (published 25 November 2010, Govt Gazette No 33801) p9

¹⁴¹ e.g. National Climate Change Response Green Paper (December 2010, Department of Environmental Affairs)

¹⁴² Water-CO2-Energy Equations for South Africa

183 Groundwater in the Karoo is used predominantly for domestic, livestock watering and occasional irrigation purposes. Much of the groundwater occurs within 50-100m of the surface. The quality of groundwater is generally good, making it an important source of potable water for the Karoo communities. Given the arid nature of the Karoo, where the potential evaporation far exceeds the mean annual rainfall, water – and in particular groundwater – is the ‘life blood’ of the region. Any deterioration in quality or reduction in quantity of water poses a significant threat to the resilience of the socio-economy and ecosystems of the Karoo.

2.3 Social-ecological sustainability, livelihoods and rural development

184 The Karoo is increasingly being experienced, developed and marketed as a pristine landscape, with certain tourism, lifestyle and agricultural assets. Agriculture is diversifying, tourism in the Karoo is developing for both domestic and international markets, and increasing investment in these attributes by people attracted to its unique sense of place. To protect these trends, it is crucial to support the biophysical basis supporting them – water resources as the ‘lifeblood’, the landscape character and its biodiversity, soils, and air quality. It is also essential to safeguard the reputation and image of the Karoo as a remote, unspoiled, quiet and expansive place.

185 An understanding of the dynamic interactions between nature and society is essential in order to assess the likely effects of an activity or intervention on the vulnerability and resilience of these interdependent systems. The NEMA principles recognize this fact: that social-ecological systems are complex, integrated systems in which humans are part of nature. The combination of people and nature, together with the predominant land uses and economic activities of the Karoo (agriculture and, to a lesser extent tourism), define its ‘sense of place’.

186 It follows that any impacts on the natural resource base of the Karoo, and changes in the economic drivers, will have lasting and potentially irreversible repercussions on its social and economic fabric, and sense of place.

2.4 Public health

187 The affected communities include some of the most vulnerable rural communities in the country. In the context of this application, there are a number of impact avenues that could

occasion negative impacts on public health, including: change in the quantity or quality of water resources (particularly carcinogenic, radioactive and other toxic materials); airborne pollutants; changes in livelihoods that drive changes in social/sexual behaviour; and, an increase in sexually transmitted diseases through the influx of job-seekers. Negative impacts on public health will place a growing burden on the State; that burden could endure into the long term.

2.5 Heritage

- 188 The Karoo is known for its places of special geological interest, archaeological resources, rich examples of rock engravings and paintings, historical structures, vernacular architecture, places of spiritual significance to local communities and gravesites, and sites of conflict. In addition there are a number of gravesites and heritage buildings in different precincts. The Karoo fossil record is one of the palaeontological superlatives of the world. Important fossil resources are also found in the overlying Tertiary and Quaternary deposits.
- 189 Notably, the whole exploration area constitutes a cultural landscape, as there is evidence of human activity (principally the San people and their forebears) on and under almost all of this landscape, which has been the case almost continuously for tens to hundreds of thousands of years.
- 190 An important and very vulnerable intangible heritage asset is the Karoo's special 'sense of place:' the landscape character itself – the emptiness, the expanse, the silence, the lack of intrusion or disturbance – is heritage. Protection of 'sense of place' is written into the National Heritage Resources Act 25 of 1999. Historically, the landscape is also one of genocide and massacre, being the site on which many 'Bushman' wars were fought.
- 191 Any loss of, or damage to, these heritage resources could signal the loss of irreplaceable assets from global to local levels.

2.6 Astronomy

- 192 The present and proposed optical installations in Sutherland and the international southern Cherenkov Telescope Array (CTA), plus the MeerKAT radio observatory, are major South African scientific research projects with financial inputs of well over a billion Rands. In

addition, the South African Large Telescope (SALT) and the planned Square Kilometre Array (SKA) radio telescope, and the designated astronomy advantage areas require protection as set out in South African law.

- 193 Any changes to the environment that impair or inhibit the effective operation of these installations could have far-reaching negative implications for South Africa's astronomy.

2.7 Biodiversity

- 194 The biodiversity of the Karoo is complex, spanning a number of vegetation types with associated plants and animals, threatened and protected species and significant local endemics.

- 195 The potentially affected biomes include Succulent Karoo, Nama Karoo, grassland and Albany thicket; the target area thus spans a number of vegetation types with associated plants and animals, threatened and protected species and significant local endemics. Importantly, the Succulent Karoo is one of the world's biodiversity hotspots, and the only plant hotspot that is entirely arid. Its botanical diversity is unparalleled by any other arid region on earth. The eco-region is also a centre of diversity and endemism for reptiles and many invertebrate taxa. The Nama Karoo region is similarly one of the richest desert areas in the world, almost unique in the diversity of geology, geomorphology, plant and animal species.

- 196 The biodiversity is not only important from an intrinsic viewpoint, but it helps to regulate the spectrum of ecosystem services on which the Karoo lives depend, and on which the economy is built: natural landscapes attract tourism, plants provide grazing for livestock, and freshwater and groundwater systems function.

- 197 Negative impacts to biodiversity inevitably affect human wellbeing. In addition, where threatened or protected species or ecosystems are impacted, there may be irreplaceable loss of resources from a global to local levels.

2.8 Economics

- 198 There is no short, medium or long-term cost benefit analysis for the exploration or possible gas production activities. The potential benefits to South Africa are noted but the costs of these benefits are not assessed.
- 199 The proposed activity has the potential to generate benefits for a small group of parties, and to pass on the external costs (negative impacts on common property resources such as air, water, soils, biodiversity, and related effects on public health and livelihoods) to the local communities and wider public of South Africa.
- 200 Various economic uncertainties and risks are associated with shale gas exploration and exploitation, including, for example:
- 200.1 expatriation of resource rents by international energy companies such as Shell, which might not be in South Africa’s best strategic interests;
- 200.2 the commercial viability of shale gas is uncertain: “The concern is that much of it [shale gas production] is non-commercial even at price levels that are considerably higher than they are today”, mainly because production decline rates are typically very high;¹⁴³ and
- 200.3 shale gas exploration could impose external economic costs, such as a potential negative impact on tourism, as well as costs resulting from an increased burden on regional roads from the transport of heavy equipment to and from drill sites.
- 201 It must also be noted that development and use of South Africa’s natural resources should, as far as possible, be done in a manner that maximises local employment creation and economic multipliers. Renewable energy technologies can feasibly be produced locally and tend to have higher job creation potential compared to fossil fuel alternatives.¹⁴⁴

¹⁴³ Berman, A. 2010. Shale Gas—Abundance or Mirage? Why The Marcellus Shale Will Disappoint Expectations. Available: <http://www.theoil Drum.com/node/7075>.

¹⁴⁴ Banks, . & Schäffler, J. 2006. The potential contribution of renewable energy in South Africa. Sustainable Energy & Climate Change Project (SECCP), Earthlife Africa, Available online: <http://www.earthlife.org.za>; accessed 24/02/2011.

3. COMMENTS ON THE DRAFT EMP, EXAMINING KEY ISSUES FROM SIX FUNDAMENTAL PERSPECTIVES

202 In this section, this Critical Review has synthesised input from leading professionals in the field of each key area of concern in relation to six perspectives. Links to sections in Part A are set out in the table hereunder:

	Key Area of Concern	Links to Part A
1.	Lack of evaluation against the ‘bigger picture’ strategic context for sustainable development	International perspectives and obligations, Constitution, NEMA principles s2(3), s2(4) (l), policy and planning
2.	Inadequate or insufficient information on which to base a decision which would ensure (as legally required) that the MPRDA requirements and the NEMA principles would be satisfied	Constitution, NEMA principles, MPRDA***
3.	Uncertainties, unknowns, gaps in information – and hence risks	Constitution, NEMA principles: in particular s2(4)(a)(vii), MPRDA***
4.	Risks of irreplaceable loss of – or irreversible damage to - important/ valued resources, some of which may have no substitute	International perspectives and obligations, Constitution, NEMA principles; in particular S2(4)(a)(i)-(iii), (v)-(vii), 2(4)(n), 2(4)(o)
5.	No consideration of distributional effects – who benefits, who bears the costs in the short to long term; effects on vulnerable parties	Constitution, NEMA principles: in particular s S2(4) (c)-(d),2(4) (g), 2(4) (o)
6.	Poor capability and institutional capacity of government amongst others to check or enforce mitigation	Constitution, NEMA, flawed regulatory regime for achieving sustainable development

***With specific reference to the adequacy and sufficiency of the information provided in the EMP, the requirements of section 39 of the MPRDA and section 52 of the MPRDA 2004 regulations include the following:

Baseline information on, and description of, the affected environment;

An investigation, assessment and evaluation of potential impacts on the environment, socio-economic conditions and heritage; and

Mitigation, remedy and control/ management of any action, activity or process that may cause pollution or environmental degradation, including containing or remedying the migration of pollutants, and monitoring and performance assessment.

3.1 Lack of evaluation against the ‘bigger picture’ strategic context for sustainable development

3.1.1 Water resources

- 203 Note that the statements under point 3.1.2 below, relating to groundwater, apply to this particular section too.
- 204 Climate change and associated trends have not been addressed. The Green Paper on a national response to climate change recognises that “...sustainable development is also climate-friendly development;...the more sustainable our development path is, the easier it will be to build resilience to climate change impacts.”¹⁴⁵
- 205 Water is, literally, priceless. The lack of a market value on ‘free’ resources leads to economic distortions. In addition, water pollution affects the national economy, as well as the quality of life of the citizens of South Africa. South Africa is a water scarce country. The treatment of polluted water has a cost implication; the higher the contamination, the more expensive the treatment of water for re-use. A full/total economic valuation of water resources that may be affected would thus be required to inform any decision on the ‘best practicable option’ with regard to the allocation of water, taking due account of the basic needs of people and freshwater ecosystems.

3.1.2 Groundwater

- 206 Full life-cycle accounting of shale-gas resource extraction is very poorly documented, particularly with regard to quantitative water and energy footprinting of the whole exploration and development process, production operations and well closure procedures.
- 207 Recognition that shale-gas exploitation necessarily involves concurrent water resource extraction, contamination, and wastewater / brine disposal is currently hazy in Shell’s proposal. Water- and energy-related costs or dis-benefits appear to be externalised (i.e. the wider society rather than the proponent) carries the costs; these costs should be seen as an integral part of the shale-gas extraction economy, with the proponent taking full responsibility

¹⁴⁵ National Climate Change Response Green Paper 2010 (published 25 November 2010, Govt Gazette No 33801)

for all such negative effects.

3.1.3 Socio-ecological sustainability, livelihoods and rural development

- 208 Increasingly, the Karoo is being experienced, developed and marketed as a pristine landscape, with certain tourism, lifestyle and agricultural assets. The name “Karoo” is a brand, signifying space, emptiness and purity. “The quality of nothingness, which characterizes South Africa’s arid Karoo in the public mind, has been transformed in recent times from a perceived liability into a touristic asset”¹⁴⁶. This fact raises a myriad of interlinked issues of biodiversity, water resources, visual and aesthetics, and tourism management (“viewsheds” are becoming one of the main forms of tourist attraction).
- 209 Rural environments, livelihoods and rural development cannot be analysed in micro-environments: the impact of specific drilling sites will be much greater than simply the loss of these specific sites. If tourists stumble across exploration sites or trucking routes, the significance of the Karoo will be lost. The Karoo either is a remote, pristine refuge, or it is not. Its remoteness has to be preserved holistically. It cannot be preserved in small pieces.
- 210 The real source of new financial and productive investment in the Karoo is the in-migration of relatively wealthy people attracted to the lifestyle and unspoilt qualities of the Karoo who invest capital and skills for art, crafts, tourism, conservation and agricultural production, with economic multiplier effects. In the long term, this will build a sustainable economy. Karoo agriculture is a combination of long-established products (wool, mutton, mohair) and new niche products (e.g. Karoo lamb). The certification of Karoo lamb will benefit established farmers as well as emergent farmers.

3.1.4 Public health

- 211 Negative changes in public health have a range of implications for health services, productivity and socio-economic sustainability as a whole.

3.1.5 Heritage

¹⁴⁶ Mark Ingle, “Making the most of ‘nothing’: astro-tourism, the Sublime, and the Karoo as a ‘space destination’”, in *Transformation*, vol. 74, 2010.

- 212 What is at stake here is something substantially larger and potentially more transforming than the proposed wells and support infrastructure required for the exploration stage; exploration is the forerunner of development.
- 213 A primary step for a project such as the one envisaged by Shell must involve the identification of artefacts, sites and cultural landscapes, with due regard for stakeholder values, and evaluate these in terms of proposed impact.
- 214 Historical and archaeological resources are distinct, as are palaeontological resources. Palaeontological resources are effectively ignored in the EMP. Palaeontology is treated as being synonymous with archaeology, which is certainly not the case, and Karoo fossil vertebrates are internationally renowned.
- 215 It must also be borne in mind that intangible assets possess noteworthy significance. The Karoo has a powerful ‘sense of place’, and the National Heritage Resources Act 25 of 1999 specifically recognises the importance of such values.

3.1.6 Astronomy

- 216 The present and proposed optical installations in Sutherland and the international southern Cherenkov Telescope Array (CTA), plus the Meerkat radio observatory, are major South African scientific research projects with financial inputs of well over a billion Rands - the largest currently being undertaken by the South African government, and need protection for at least the next 50 years.

3.1.7 Biodiversity

- 217 No consideration is given to the potential of investing in energy options other than shale gas. The associated biodiversity impacts arising from the exploration and exploitation of shale gas may be far greater than such alternatives. Whilst the potential benefits to South Africa of the proposed activity are noted, the costs of these benefits are not quantified.
- 218 There is no modelling of medium to long-term rates of hydraulic fracking fluid movement rates through rock and the probabilities of such fluids contaminating ground or surface water and having negative impacts on ecosystems in future.

3.2 Inadequate or insufficient information on which to base a decision

3.2.1 Water resources

- 219 Note that the statements under point 3.2.2 below relating to groundwater apply to this particular section too.
- 220 There is no information on, or investigation into, alternative water sources for the proposed fracking. Since water supply is essential for fracking, the absence of information on the ‘best practicable environmental option’ source of water renders consideration of the application premature.
- 221 There is little information on the users and uses of water in the potentially affected area.
- 222 Little information is provided on the surface water and groundwater resources. Recharge rates and the surface water-groundwater interface are not described.
- 223 The lack of information on the nature and quantity of chemicals to be used in fracking, and the fact that Shell proposes to share this information after the assessment of impacts has been undertaken and prior to developing the final hydraulic fracture design for an exploration well, is of the utmost concern. At this late stage, the potential impacts and risks of using specific chemicals cannot be objectively evaluated and no avenue would be available to influence decision making on whether or not such use would be acceptable. That is, the purpose of conducting an impact assessment – to inform wise decision-making – is effectively circumvented. This approach is unacceptable.
- 224 No indication is provided of the typical volumes of waste and wastewater that would be

generated. Also, no detail is provided on what Shell's 'technical standard' for treatment of wastewater entails, and no information on the treatment technology to be used is provided.

3.2.2 Groundwater

- 225 Any shale-gas venture with due regard for internalising external (wider public/ common property resources) costs should first explore and develop the necessary deep and/or shallow aquifer resources and the fluid/gas waste sequestration reservoirs. These actions should first be subject to the normal DWA licensing procedures under the National Water Act (NWA).
- 226 Infrastructure for aquifer monitoring is presently not in place to provide for proper water resource assessment and development. For this reason, Shell exploration procedures would have to be adapted to provide (at Shell's cost) the necessary deployment of aquifer-monitoring sites, downhole logging and monitoring equipment, and real-time telemetry of groundwater quantity and quality parameters in a totally open and transparent mode. Necessary monitoring infrastructure and data capture, data reduction and analysis protocols should be established as an integral part of the resource exploration programme, and be open for continuous observation and measurement of groundwater variability on a seasonal basis over a minimum period of three hydrological years, as a precondition of licensing.
- 227 There is insufficient information about the disposal and/or sequestration of fluid wastes. In addition, there seems to be little if any provision for bonded funding or future costs, as part of a necessary cost-internalization protocol.

3.2.3 Socio-ecological sustainability, livelihoods and rural development

- 228 Clean air and well-managed water resources are important to sustain agriculture in the Karoo. It follows that air pollution, and/or reduction in availability of water and/or deterioration of water quality pose significant risks to livelihoods and the development path of the Karoo – dust potentially affects the mohair industry, water pollution all livestock and potentially the growing interest in aromatic oil-producing crops and herbs, aloes and olives, spekboom, dairy goats and associated special cheeses, the recent aquaculture ('Karoo perlemoen') initiatives rely on reliable water supplies. All of these agriculture and lifestyle based initiatives bolster tourism and catalyse employment; employment that can support sustainable development in

the Karoo.

- 229 The growing interest in nature-based agriculture and tourism in the Karoo highlights the need to safeguard the natural resource base: game farming and hunting, agri-tourism, conservancies and eco-tourism provide jobs and positive economic multipliers.

3.2.4 Public health

- 230 There is no health report. The assessment of health issues is deferred to the EIAs on specific sites. Fracking uses chemicals with potentially serious hazards and/ or toxic effects. Emissions of formaldehyde, classified as a probable carcinogen by the International Agency on Research into Cancer, are substantially higher from natural gas, compared with conventional fossil fuels. Formaldehyde is also an allergen responsible in the occupational setting for increased rates of asthma. What this means on a population level with environmental exposures is not at all clear.
- 231 The risk of the proposed exploration attracting migrant employees into local towns poses a potentially significant risk with regard to health behaviours (alcohol, transactional sex) with both immediate health consequences requiring services, but also long-term consequences in establishing different patterns of social interactions in rural towns, with subsequent health consequences and pressure on services. Statements that such influx of job-seekers is not expected to occur are not borne out by practical experience.

3.2.5 Heritage

- 232 Despite referring to the fossil wealth of the Karoo, no evaluation of palaeontology has been undertaken. Given its global value, this omission is significant.
- 233 A lack of information on the proposed drilling/well sites, is evident.
- 234 A lack of baseline data on the spectrum of heritage resources, including intangibles such as the sense of place is evident.
- 235 Mining can affect archaeology in many ways ranging from the physical destruction of sites/artefacts/burial by drilling and construction, to the producing of dust harmful to rock

paintings and rock engravings, vibrations that can harm the rock walls or rock shelters and of stone-built structures. Importantly, it is not just the drill sites; but also access to them, where staff will be housed and where they will roam, (etc.) that need to be considered.

3.2.6 Astronomy

- 236 Potential light pollution (including from gas flaring) from the well sites and associated infrastructure, as seen in a radius of 75km from the optical and infrared telescopes at the SAAO in Sutherland, is not known and is required in order to meet legal requirements of the Astronomy Geographic Advantage Act 21 of 2007. The night sky must be protected for astronomical use.
- 237 Similarly, atmospheric pollution (chemicals and dust) generated during drilling and from associated activities and infrastructure (e.g. access roads) is not known and must be determined in relation to potentially significant impacts on the Sutherland astronomical site.
- 238 The potential seismic effects of the proposed activity are not known and could negatively affect the highly sensitive gravimeter at Sutherland.

3.2.7 Biodiversity

- 239 There is lack of clarity on the location of wells to be drilled.
- 240 The information on biodiversity is superficial and thus unreliable.
- 241 The extraction of water from any ecosystem for use in fracking will have impacts on the affected ecosystems. These effects have not been considered.
- 242 The method used for assigning sensitivity ratings to the landscape is not described in this document and therefore not repeatable. Reference is made only to the SKEP database; and to “other” databases not referenced. The categorisation of “sensitive landscapes” excludes habitat types that are characterised by endemic and rare plants or animals.
- 243 Impacts on biodiversity focus largely on threatened or protected species; this approach is outdated and inappropriate. Increasingly, good practice consideration of biodiversity in impact assessment looks not only at biodiversity pattern (e.g. species) but also at biodiversity

process or function at a landscape and ecosystem level. The thrust of conservation planning in the country in recent years has been on the production of composite plans that arrives at the most efficient configuration of areas needed to meet conservation targets.

- 244 Information on some taxa is poor (e.g. amphibians, mammals, birds, invertebrates).
- 245 There is no consideration of biodiversity (systematic conservation or Critical Biodiversity Area) plans or maps that are available for the Karoo, no reference is made to the National Spatial Biodiversity Assessment that ascribes an ecosystem status (in terms of IUCN categories of Critically Endangered, Endangered, Vulnerable or Least Threatened) to all vegetation types in South Africa in relation to scientific and defensible conservation targets, no reference to the Central Karoo District Municipality Biodiversity Assessment, South Africa's Red Lists or Red Data Books, no consideration of International Bird Areas, no consideration of provincial conservation legislation, amongst others.
- 246 The concept of "protected species" is limited to Nationally Protected species and does not consider Provincial level legislation. For example, some of the biomes and species said to occur in the Central Precinct do not occur there. Listing of only Nationally Protected and CITES species downplays the potential conservation impact of the project. Consideration of protected species is inconsistent across taxa.
- 247 It is assumed that seismic surveys would have negligible impact on the living environment; this assumption is questionable. Due investigation into potentially significant impacts should be undertaken.
- 248 The fracking of Karoo shales can have a significant impact on the composition of the deep subsurface microbial community through introducing water, increasing the porosity of rocks and altering the nutrients and gases available. The proposed injection of microbiocides will also have a negative impact on microbial biodiversity. Changes in microbial diversity will in turn affect geochemical cycling. Microbial diversity fingerprinting and profiling of groundwater ecosystems should be used to establish a reliable baseline condition prior to initiating any fracking and associated impacts, and thereafter used as an indicator to monitor changes, and check contamination or pollution for which the proponent would be responsible.
- 249 The basis for site selection and excluding some areas from consideration in this process is wholly inadequate. For biodiversity conservation, for example, it is stated that sites should not be 'within any untransformed area of endangered habitat'. This criterion ignores Critically Endangered habitat, the habitat of Critically Endangered or Endangered species, Critical Biodiversity Areas identified in biodiversity or systematic conservation plans, and

neglects to note that areas required to meet conservation targets may include semi-natural or semi-transformed areas that play a unique role in ecological process/function.

- 250 Whilst it is noted that rehabilitation will be difficult, there is no consideration of the likely rates of vegetation recovery and medium to long-term negative impacts over time on grazing and biota. The Karoo environment shows signs of vegetation removal and roads and tracks after several decades, without any signs of repairing itself.

3.3 Uncertainties, unknowns, gaps in information and, hence, risks

3.3.1 Water resources

- 251 Note that the statements under point 3.2.2 below relating to groundwater apply to this particular section too.
- 252 As the catchment has been identified as being in a water deficit, the provision of water for the Reserve must receive priority over other users. Allocating water for the proposed use poses a risk to other users and the Reserve.
- 253 Groundwater resources are mainly dependant on rainfall recharge. For this reason, any surface activity that has an impact on surface water resources poses a risk to both the quantity and quality of groundwater resources.
- 254 There is no clarity on, or investigation of, alternative water sources for the proposed activity. The EMP lists possible water supply options only; there is no investigation or evaluation of these options. All of the alternatives present a suite of potential impacts and risks. Since the activity is dependent on water, it is impossible to consider fracking and/or identify the best practicable environmental option with regard to water, without this information.
- 255 The potential effects of the proposed activity on local aquifers – both in terms of the quantity of water and on its quality and physical-chemical characteristics – is significant, and represents a risk to sustainable development of the region.
- 256 There is no clarity on the chemicals to be used in fracking or the disposal of wastes and wastewater. Contamination of surface water and groundwater is a major risk.
- 257 There is a risk of contamination of water due to failure of the drill casings or incorrect installation. The penalty for any contamination (albeit accidental) would be significant and could threaten the Reserve allocation to meet basic needs and the ecological requirement. Experience elsewhere in the world has highlighted these risks and the dangers to health (amongst others) of any contamination.

3.3.2 Groundwater

- 258 Shale gas and water resource targets are vague and must be elaborated.
- 259 The hydraulic properties of Karoo aquifers are poorly understood and need an intensive programme of experimental testing in order to satisfy DWA licensing requirements for quantitative assessment of water-resource sustainability. The three-dimensional structure of intrusive dolerite sills and dykes in the Karoo imposes controls on groundwater flow within aquifer compartments and requires better understanding to manage risks to aquifer integrity.
- 260 The state of crustal stress in the deeper part of the Karoo Basin needs better understanding prior to any exploration, with particular reference to possible fluid-pressure-induced seismic activity, if deep sequestration of fluid wastes is to be considered.
- 261 Design and technical specifications of water monitoring, water production and shale gas production wells are vague. These specifications must be explicit and must provide specific reference to provisions to prevent the accidental disruption of natural aquitard seals between deep-level (probably saline) aquifers and shallow freshwater aquifers, on which Karoo communities are heavily dependent.
- 262 Provision for the early development of three-dimensional groundwater flow, heat advection and stress-state models, on both regional and local (wellfield) scales, has to be an essential condition of DWA licensing.

3.3.3 Socio-ecological sustainability, livelihoods and rural development

- 263 The linkages and interdependencies between livelihoods, the local economy, the natural resource base and sustainable development are not recognized. The diversification and growth of agriculture and tourism are the basis for sustainable development in the Karoo; to protect these land uses and sense of place, there is a need to conserve the biophysical basis underpinning them.
- 264 There is a high risk of losing the very attributes of the Karoo that define its unique sense of place and the biophysical characteristics that support a growing and diversified basis for sustainable livelihoods and rural development.

3.3.4 Public health

- 265 No assessment or evaluation of health risks has been carried out. The assessment of health risks is deferred to the site specific EIAs.
- 266 Only direct pathways for impacts on human health are discussed. Indirect pathways, e.g. uptake of chemicals through soils into edible plants and the inhalation by livestock, to be consumed by communities, are not considered.
- 267 Measures proposed to mitigate Community Health impacts are inadequate; they appear to be aimed at ‘trying to convince the population that they are not at risk rather than doing anything about the risk’.
- 268 No evidence is presented to support the idea that risk associated with exploration wells is of a much smaller scale compared to production phase operations. It is commonly accepted that history contains many examples where we have been proven wrong because of expectations of linear associations between cause and effect.
- 269 Not only are the chemicals used for hydraulic fracturing, potentially radioactive drill cuttings and other project inputs and outputs of concern with regard to potential health impacts, but their by-products, wastes and their possible combinations and interactions would be of concern. While cancer is a main concern, exposure to ionising radiation may lead to health consequences other than cancer.
- 270 There is no discussion on the impact of Shell’s operations on the region’s waste stream, its capacity for landfill and hazardous waste management.

3.3.5 Heritage

- 271 There is a paucity of information on heritage.
- 272 The heritage of this region is very poorly understood. Apart from Prince Albert and Graaff Reinet, no heritage inventories of heritage assets of the rural towns and intervening farmland have been drawn up for the Karoo. There are very few archaeological studies; those that exist cover a minute fraction of the concession areas.
- 273 It is noted that qualified specialists would be consulted should fossils or other artefacts be encountered during drilling. This measure is far too little, far too late: investigations should be proactive or else run a high risk of significant losses.
- 274 The collection of material/excavation requires permits from SAHRA / Provincial HRA. Importantly, all archaeological (including gravesites) and paleontological remains and meteorites belong to the State.

There is mention of ‘managing’ and ‘protecting’ sites of heritage value, but none of rehabilitation.

3.3.6 Astronomy

275 Please refer to section 3.2.6.

276 Insufficient information on a number of issues presents a risk to the status and stature of South African astronomy.

3.3.7 Biodiversity

277 Please refer to shortcomings noted in section 3.2.7 as they all pose risks with regard to negative outcomes.

278 The major issues and risks such as the potential contamination of surface water and post exploration erosion and land degradation that could have lasting effects on plant and animal populations and generate losses for future landowners. These issues are risks are largely overlooked.

279 The financial provision for decommissioning and rehabilitation refers. It is unclear whether the amount of money stated in the draft EMP is related to one or all three precincts, and on what basis that amount was derived.

280 Lack of medium and long-term risk assessment suggests a path to intergenerational inequity.

281 The consideration of sewage treatment works for liquid waste disposal is questionable; it presupposes the capacity and level of treatment is appropriate for chemically complex and potentially hazardous wastes. Inappropriate handling of wastes will result in pollution and negative impacts on ecosystems and, ultimately, health.

282 Sense of place issues underpinned by ecosystems and natural landscapes are poorly addressed.

283 Mitigation measures proposed are unlikely significantly to reduce operational phase and post operational phase impacts of site clearing and access roads on fauna and flora. Significance ratings after mitigation are understated.

3.4 Risks of irreplaceable loss of or irreversible damage to valued resources, many of which may have no substitute

3.4.1 Water resources

- 284 Note that the statements under point 3.4.2 below relating to groundwater apply to this particular section too.
- 285 The loss or degradation of water resources, with long term, permanent and large scale negative implications, is undoubtedly the priority issue.
- 286 The question of water supply for the proposed activity is pivotal. Given the water scarcity in the Karoo, local abstraction of water for fracking would be directly in competition with local users. The importing of water of a different quality from that locally poses a significant risk of contamination of local water resources, with myriad negative and potentially irreversible impacts.
- 287 There is a real risk of delayed effects and/ or manifestation of contamination; i.e. lack of early detection of such contamination may reflect irreversible impacts with irreplaceable loss.
- 288 The EMP presumes infallible measures to prevent leakage or seepage. What is of concern is that, should any of these measures fail, the resulting effect will be irreversible and far-reaching. Pollution of groundwater is, to all intents and purposes, irreversible and could cause irreplaceable loss of amenity or use value. Water has no substitute. Any pollution of surface water has cost and treatment implications and, if compliance monitoring and enforcement is poor, will result in major costs to society.
- 289 Given the suggested importation of saline or waste water from other catchments for use in fracking, changes in water balance within these catchments is probable. These changes would have a number of potentially significant implications that would need to be investigated and evaluated.

3.4.2 Groundwater

- 290 The loss of water resources and/ or their degradation is the key concern.
- 291 The accidental leakage of methane gas into the atmosphere is a potentially serious hazard, with additional negative climate change effects.

3.4.3 Socio-ecological sustainability, livelihoods and rural development

- 292 There is a major risk of trading off an increase in agricultural and tourism diversification, with economic multipliers and the promise of sustainable livelihoods for a wide range of

communities in the Karoo, with an unsustainable land use that promises short-term gain for few, and long term negative impacts on the area.

- 293 It is the ‘sense of place’ qualities and landscape character of the Karoo that attract investment, enabling diversification of agriculture and tourism. Any impacts on the sense of place and/ or the natural resources underpinning agriculture and tourism are likely to jeopardise a sustainable development path.
- 294 The acceptability of noise, air quality, light pollution and visual impacts must be evaluated in the context of the specific landscape and its valued characteristics – in this case, a landscape characterised mainly by its intangible and subtle aesthetic values; it is the vast emptiness of the Karoo that attracts and contributes significantly to its sense of place and heritage value.

3.4.4 Public health

- 295 The affected communities are amongst the poorest and unhealthiest in the region. Any measures that threaten water availability in these areas will have adverse effects on health at population level.
- 296 If mercury, lead, arsenic, benzene, toluene and xylenes get into drinking water, the Karoo will have a very, very, very serious problem, which no amount of mitigation (short of importing all its water) will solve.
- 297 The agents used in fracking and as additives have no existing risk assessments. Shell’s commitments to undertake and share results of toxicity screening prior to final well design are problematic: if EIA approval is expected before such risk assessment is done, it is not clear how a robust basis for that EIA can be provided, to evaluate the risks; if risk assessment were to be done by Shell, that would pose a serious issue regarding the competence of public officials to critically interpret that assessment (there is a paucity of skills within the regulator to assess such risk assessments).
- 298 Contamination of underground water, with fracking fluids, additives, seawater, saline water etc., warrants serious attention, since there is no real remedial option for contamination at such depth.

3.4.5 Heritage

- 299 The Karoo basin is globally significant for its fossil finds; the risks of irreplaceable loss of heritage are thus high without due investigation.

- 300 There is a paucity of documentation of archaeological, palaeontological, rock art, historical and other heritage assets within any of the three target precincts, posing a major risk of oversight and loss.
- 301 Visual impacts, noise impacts and dust *inter alia* will result in an irreversible, irreplaceable loss of the sense of place and intangible heritage value of the Karoo, on which its tourism, attraction, uniqueness and inspiration rely.
- 302 Setback distances are questionable: each heritage asset or attribute requires its own evaluation of an appropriate setback area.

3.4.6 Astronomy

- 303 Negative impacts on the astronomical advantage areas could result in irreversible and/ or irreplaceable loss of unique and globally recognized facilities and services.

3.4.7 Biodiversity

- 304 The key risks are to the plant communities in the Karoo and to those threatened and/ or local endemic plant and animal species with extremely restricted distribution.

3.5 No consideration of distributional effects – who benefits, who bears the costs, in short or in long term; effects on vulnerable parties

3.5.1 Water resources

- 305 Note that the statements under point 3.5.2 below relating to groundwater apply to this particular section too.

3.5.2 Groundwater

- 306 It is of the utmost importance that Shell internalise all water-resource extraction and fluid-waste treatment / sequestration costs, as a precondition for licensing by DWA.

3.5.3 Socio-ecological sustainability, livelihoods and rural development

- 307 There is no explicit analysis of who would benefit and who would bear the costs and negative effects of the proposed activity, in the short, medium and long term. Without this analysis, there are serious question marks with regard to the justification for the proposed activity in a wider socioeconomic context, particularly given the vulnerability of affected sectors of society.
- 308 Very few jobs will be created during the exploration stage; much of the work is highly technical and beyond the scope of local communities to supply.
- 309 Exploration could jeopardise the building of sustainable livelihoods based on agriculture and tourism in the long term, for the people of the Karoo. Pollution and/ or environmental degradation could undermine the reputational advantage of agriculture brands linked to the Karoo (e.g. Karoo lamb), translating into financial losses for local producers and indirectly leading to the undermining of one of the fundamental pillars of the Karoo rural economy.
- 310 It is arguable that the value of immovable property situated in the Karoo has already been subject to a significant reduction based solely on the potential negative impact and consequences of the proposed fracking.

3.5.4 Public health

- 311 The report is silent on distributional effects. It is the poor residents of the area who will suffer the consequences of water shortages and, amongst other things, an increase in sexually transmitted infections.

3.5.5 Heritage, astronomy, biodiversity

- 312 Heritage, astronomy and biodiversity are embedded in the sense of place characteristics of the Karoo, and provide opportunities for socioeconomic development primarily through the growth of tourism. The distribution of costs and benefits of the proposed activity compared with that of the 'no project' option or current development path of the Karoo are not addressed. An analysis of the equity and environmental justice implications must be undertaken if the NEMA principles are to be met.

3.6 Poor capability and institutional capacity of government to check or enforce mitigation

3.6.1 Water resources

- 313 Note that the statements under point 3.6.2 below relating to groundwater apply to this particular section too.
- 314 The capacity of the DWA is extremely poor; the Department currently has less than a third of the officials it needs to enforce compliance with water quality and pollution laws¹⁴⁷. This fact aggravates any water-related risks of the proposed activity.

3.6.2 Groundwater

- 315 The current institutional capacity of DWA to establish and verify the necessary conditions of licence is doubtful.
- 316 Provision for independent, third party, peer review of both the impact assessment and of technical conditions of water licences is essential.
- 317 The specific capacity of DWA for independent, on-site, supervision of the drilling, construction and completion of all borehole / production-well infrastructure, requires urgent development.
- 318 Enforcement procedures must be developed that provide a rapid and effective response to concerns.

3.6.3 Socio-ecological sustainability, livelihoods and rural development, public health

- 319 The poor capacity within DWA to monitor and enforce compliance with water law and standards poses a significant threat to livelihoods and rural development.
- 320 There is a paucity of skills within the regulator to assess health risk assessments.
- 321 Shell should accept a higher level of liability for managing waste than handing responsibility to a third party, given the history of poor waste management by supposedly 'reputable' contractors.
- 322 The capacity of the State is weak with regard to checking and enforcement of existing waste management provisions. That applies to health as well as environmental exposures. While heavy metals are relatively easy to monitor, there are few laboratories that can measure benzene and xylene properly. If responsibility for monitoring and surveillance is left to the

¹⁴⁷ Response by Minister of Water and Environmental Affairs to Parliamentary Question. 24 November 2010.

State, the likelihood is either that it would not happen or that the taxpayer would end up subsidising Shell's operation and profits.

3.6.4 Biodiversity

323 There is a lack of compliance monitoring, enforcement and/ or policing of illegal activities affecting the natural environment and biodiversity in the southern Karoo. It follows that if the law enforcement personnel in the Karoo lack the experience, training and confidence to deal with minor transgressions of environmental law, it is highly unlikely that they will be able to deal with major transgressions.

4. CONCLUSION

4.1 The relevance of Part B of this Critical Review

324 Part B of this Critical Review highlighted the numerous deficiencies in the EMP from the perspective of both consistency with strategic land use and planning tools, and addressing the required spectrum of potentially significant issues at sufficient depth to provide enough reliable information for decision-making purposes.

325 This Part raised relatively detailed concerns about the proposed activity and the draft EMP in relation to water resources (including groundwater), social-ecological sustainability, livelihoods and rural development, public health, heritage, astronomy and biodiversity.

326 Of paramount importance, input from our specialists confirmed the following points:

326.1 An evaluation of the proposed activity's compatibility and consistence with higher order developmental policy, planning and strategy is missing;

326.2 The proposed activity is, in many respects, incompatible with the current energy context and direction in South Africa;

326.3 The information provided does not satisfy a number of the MPRDA requirements, and does not give sufficient assurance that the NEMA principles would be upheld. Information about the proposed activities is incomplete; information about sources of water is absent; information on chemicals to be used in fracking is missing; information on wastes disposal and public health is inadequate. There is thus a high level of uncertainty and unreliability in impact prediction associated with this unprecedented action in the Karoo;

- 326.4 Mitigation measures are generic and vague; it is assumed that mitigation could and would be successful and effective. These assumptions are unfounded and deeply flawed;
- 326.5 Consideration of the ecological, socioeconomic and equity implications of alternative land and resource uses, including the ‘status quo’ or ‘no development’ option of pursuing the current development path, is lacking;
- 326.6 The approach to assessing and evaluating significance in the draft EMP is flawed and presents an unreliable and inaccurate indication of the implications to society, the environment and affected parties;
- 326.7 Many of the attributes of the Karoo are considered irreplaceable; the interdependence between the natural resources and socioeconomic development is a crucial consideration in determining the resilience of social-ecological systems and their sustainability. Any significant disruption, deterioration or irreversible loss for short-term gains would have severe ramifications for this region in the long term;
- 326.8 The distributional effects of the proposed activity are not considered: who would benefit, who would bear the costs, and what are the equity and environmental justice implications; and
- 326.9 The capacity of government to evaluate the proposed activity, and to monitor and enforce compliance should it go ahead, is in serious doubt.

4.2 Our concluding request based on Parts A and B of this Critical Review

- 327 In the light of the above Parts A and B of this Critical Review, we conclude by requesting that the South African government put an immediate end to the Application.
- 328 We also request that the South African government disallow any future fracking exploration or related activities in the Karoo, as proposed to be carried out by Shell or any other entity. This request is based on, amongst other things:
- a. an inconsistency with Constitutional provisions, norms and values;

- b. a lack of evaluation against the ‘bigger picture’ strategic context for sustainable development and/ or of land use alternatives that could better meet sustainable development objectives;
 - c. insufficient information to make informed rational decisions in the best interests of sustainable development in South Africa;
 - d. inadequate information on the distributional effects and the equity and environmental justice implications, with particular regard for vulnerable parties;
 - e. uncertainties, unknowns and gaps in information that pose unacceptable risks to water resources in a water stressed region, and to health of both communities and ecosystems; and
 - f. negative impacts on the rural livelihoods and the sense of place of the Karoo.
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