

Curriculum vitae: Mr JA HORN

Name : **HORN, JOHANNES ARNOLDUS**
Date of Birth : 29 January 1967
Profession/Specialisation : Tourism Consultant
Years with Firm : 7
Nationality : South African
Years experience : 23

Employment record

2006 - Present Managing Director: Areyeng Africa
2006 - 2005 Department of Economic Development, Environment and Tourism
1996 - 1999 Northern Province Department of Environment and Tourism
1993 - 1996 South African Tourism (Polokwane – office)
1990 - 1992 Mount Everest Game Reserve - Harrismith

Experience record

Areyeng Africa. Managing Director 2006/Present To support, advise and assist private sector establishments, community based ventures as well as government structures in destination marketing and product development strategies as well as strategic tourism planning support and tourism impact assessments.

Tourism projects over the last 5 years:

Vaalwater tourism destination development framework – client: Waterberg District Municipality (TOR: To reposition Vaalwater as a primary tourism & wildlife destination within the context of the Waterberg region)

Development of a hunting route in Limpopo – client: Trade and Investment, Limpopo (TOR: To develop a hunting route through Limpopo province with the objective of promoting hunting as a primary tourist attraction in Limpopo)

Tourism impact assessments for ESCOM high voltage lines in KZN – client: Eskom (TOR: To establish the potential impact of high voltage power-lines on the greater tourism region as well as individual product owners affected by the new lines)

Socio economic impact assessment (tourism) for Dinokeng and Cradle of Human Kind – client: Gauteng Tourism Authority (TOR: To measure the socio-economic impact of tourism within the study areas around the 2 anchor projects)

Conduct a tourism impact assessment (Digby Wells Professional Team) for the development of Thabametsi Coal Mine at Lephallale, Limpopo Province. Client: Exxaro

Conduct a tourism impact assessment (Digby Wells Professional Team) for the development of Dalyshope Coal Mine at Lephallale, Limpopo Province. Client: Anglo American

Department of Economic Development, Environment and Tourism. Manager Tourism Research and Planning. 2003/2005.

Responsibilities:

Product development, economic planning, destination development and capacity building as well as transformation strategies within the tourism sector. Assist local municipalities in tourism planning and assisting LED officers with developing sound tourism strategies.

Related projects:

Product development and marketing co-ordinator –African Ivory Route
(community based 4x4 safari route)

Scoping of provincial nature reserves:

Arrie was part of a provincial committee responsible for the scoping of all 54 provincial nature reserves in determining their ecological, conservation and tourism status as a guideline for the commercialization of these reserves. He was also a member of the steering committee assisting the Limpopo Parks and Tourism Board with the commercialization of some of these protected areas. I was part of a task team that facilitated

an investors conference on behalf of Limpopo Provincial Government – promoting mining, manufacturing and Eco- tourism opportunities. **Some of the Reserves scoped for commercialization:**

- Manyeleti nature reserve
- Andover nature reserve
- Letaba Ranch
- Rust de Winter dam
- Schuinsdraai nature reserve
- Blouberg nature reserve
- Nwanedi nature reserve
- Musina nature reserve
- Lekgalameetsi nature reserve
- George Masebe nature reserve
- Makuya Park nature reserve

Limpopo Provincial Tourism Growth Strategy, I was appointed project manager for the development of a provincial tourism growth and development strategy. This process **identified various tourism clusters**, each with its own opportunities and challenges. The **objective of doubling Limpopo tourism's contribution to the provincial GDP by 2008** were set as political goal posts and has a strong focus on SMME and BEE opportunities within the tourism sector. A further focus objective was to maintain the environmental integrity of provincial wildlife and wilderness areas. By implementing responsible **eco-tourism** development frameworks and ensuring economic growth and capacity building opportunities the Department wanted to position Limpopo as "The Preferred Eco-Tourism Destination in South Africa".

Northern Province Department of Environment and Tourism. Deputy Director Tourism Marketing. 1996/1999.

Establishment of the Limpopo Parks and Tourism Board - Destination marketing agency for Limpopo.

International marketing experience:

- **Tourism Indaba** - Durban 10 years
- **World Travel Market** - London 5 years
- **ITB** - Berlin 3 years
- **Antwerp Vakantie Salon** - Antwerpen 3 years
- **Utrecht / Amsterdam / Mechelen / Sydney** 1 or 2 years each

South African Tourism. Marketing co-ordination and Product Development Support. 1993/1996.

Co-ordination of marketing campaigns such as Durban Indaba, Getaway shows, Harare Expos, media tours.

- **Coordination of Limpopo marketing strategy and materials**
- **Coordination of provincial marketing tours and promo-videos**

Mount Everest Game Reserve. Marketing Manager. 1990/1992..

Arrie was responsible for tourism product development and marketing of the private nature reserve.

He facilitated the game experiences and hunting safaris on the reserve.

General reserve and wildlife management responsibilities.

Education

1987-90 : Business Economics and Business Psychology, University of the Orange Free State, South Africa

Professional affiliations

Former registered provincial tourist guide for Limpopo and Kruger National Park
Former registered professional hunter

Languages

	Reading	Writing	Speaking
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

References:

Sanri Rademeyer	Aurecon, Polokwane	0829268670
Dr. Jan Perold	Digby Wells, Gauteng	0827175663
Mr. Theo Venter	University, North West	0824159034
Dr. Pieter Botha	Aurecon, Pretoria	012-4272000

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CURRICULUM VITAE

BARRY MALCOLM CLARK

BORN: 25 August 1968; Livingstone, Zambia **AGE:** 45 YEARS

NATIONALITY: British, South African

ACADEMIC QUALIFICATIONS:

Ph.D. Marine Biology, 1997, University of Cape Town

BSc (Hons) Marine Biology, 1991, University of Cape Town

BSc Zoology and Ocean & Atmosphere Science, 1990, University of Cape Town

OTHER QUALIFICATIONS: Scientific diver, Diving supervisor, Small boat skipper

LANGUAGE PROFICIENCY: English (Excellent), Afrikaans (Good)

COUNTRY EXPERIENCE: South Africa, Namibia, Mozambique, Tanzania, Kenya, Mauritius, Angola,
Ghana, Cote d'Ivoire, Nigeria, Egypt, United Arab Emirates, Azerbaijan

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MOBILE: ++27-82 3730521

E-MAIL: barry@anchorenvironmental.co.za

FAX: +27 (0) 865428711

EMPLOYMENT HISTORY: 1991-1993 – Scientific Officer, University of Cape Town

2000-2002 – Marine Coordinator, Cape Peninsula National Park

1996-Present - Director, Anchor Environmental Consultants CC

2002-Present – Research Associate, University of Cape Town

SUMMARY PROFILE

Dr Barry Clark has twenty-one years experience in marine biological research and consulting on coastal zone and marine issues. He has worked as a scientific researcher, lecturer and consultant and has experience in tropical, subtropical and temperate ecosystems. His main area of scientific study involved fisheries management and the biology and ecology of marine and estuarine fishes. He is presently Director of an Environmental Consultancy firm (Anchor Environmental Consultants) and Research Associate at the University of Cape Town. As a consultant has been concerned primarily with conservation planning, monitoring and assessment of human impacts on estuarine, rocky shore, sandy beach and temperate and coral reef communities as well as coastal and littoral zone processes, aquaculture and fisheries. Dr Clark is the author of 27 scientific publications in class A scientific journals as well as numerous scientific reports and popular articles in the free press. Geographically, his main area of expertise is southern Africa (South Africa, Lesotho, Namibia, Mozambique, Tanzania, Mauritius and Angola), but he also has working experience from elsewhere in Africa (Cote d'Ivoire, Ghana, Nigeria), the Middle East (UAE) and Europe (Azerbaijan).

MEMBERSHIP OF PROFESSIONAL BODIES/ORGANISATIONS

Professional Natural Scientist, registered with the South African Council for Natural Scientific Professions (2004-)

Professional member of the South African Institute of Ecologists and Environmental Scientists (2000-)

South African representative to the SURVAS Network (Synthesis and Upscaling of Sea-level Rise Vulnerability Assessment Studies) (2000-)

Member of the International Association of Impact Assessors (IAIA) (2000-)

Member of the Subsistence Fisheries Task Group (1999-2000)

Member of the Subsistence Fisheries Advisory Group (2000-2002)

Member of the South African Network for Coastal and Oceanic Research (SANCOR) Economics Task Team

SELECTED PROJECT EXPERIENCE

Period	Country	Client	Project, Tasks
2013-2014	South Africa	iSimangaliso Wetland Park Authority	Assessment of the hydrological, hydrodynamic and ecological functioning of the Lake St Lucia Estuarine System and formulation of recommendations for rehabilitation and improved management of the system.
2013	Namibia	LL Namibia Phosphates	Review and update of a Scoping Report and Environmental Management Plan for prospecting for phosphorus deposits in Mining Licence Area 159 off the coast of Namibia
2012-2013	South Africa	Abagold (Pty) Lt	Project leader on an Environmental Impact Assessment for the construction and operation of a wave energy converter (WEC), pump assistance pond and effluent pipe turbine for the Abagold abalone farm.
2012-2013	South Africa	East London Industrial Development Zone	Feasibility study for the establishment of an Aquaculture and Biotechnology Business Incubator for the East London Industrial Development Zone.
2012	Mauritius	Mauritius Oceanography Institute	Survey coordinator for a alien species, and water and sediment quality assessment of Port Louis, Mauritius.
2012	Namibia	Ministry of Environment and Tourism	Project leader on a study to identify a set of Core National Environmental Indicators Network (NCEIS), Integrated State of Environment Baseline Report (ISoER) for Namibia's Protected Area Network (PAN), and Coastal and Marine Ecosystems.
2012	South Africa	uMkhanyakude District Municipality/ Nema	Marine/estuarine specialist assisting with the development of a District-Wide Environmental Management Framework for the uMkhanyakude District Municipality

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		Consulting	
2012	South Africa	Transnet National Ports Authority	Marine specialist appointed to assess potential impacts of iron ore oxide (Fe ₂ O ₃) on the marine flora and fauna of Saldanha Bay.
2012	South Africa	Department of Water Affairs/ Nema Consulting	Estuarine specialist on an Environmental Impact Assessment for the Ncwabeni OCS Dam on the Mzimkhulu estuary
2012	South Africa	East London Industrial Development Zone	Water quality specialist appointed to develop and implement a Seawater Quality Monitoring Program for aquaculture developments in the East London Industrial Development Zone
2012	South Africa	Transnet National Ports Authority/ Nema Consulting	Estuarine marine specialist on an Environmental Impact Assessment for the deepening, lengthening and widening of Pier 2 in the container terminal of the Port of Durban.
2011	South Africa	City of Cape Town	Co-leader on a study to develop water quality indices and related reporting tools for Inland and coastal waters of the City of Cape Town
2011	South Africa	Overstrand District Municipality/ SSI	Marine specialist on an impact assessment for a Waste Water Treatment Works in the Overstrand District Municipality
2010-2013	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Co-leader, marine ecology and aquaculture specialist on an EIA for four Marine Aquaculture Development Zones (MADZs) in the Eastern Cape, South Africa. Project tasks included identifying potential culture species and their characteristics that make them particularly suited or unsuited for culture at each of the selected sites, reviewing available technology and its suitability for use at each of the selected sites, identifying key risks and impacts that could arise from the culture of selected species on the sites including impacts on existing beneficial uses, and developing an Environmental Management and Monitoring Plan for each site as a whole as well as individual concession areas within each site.
2010	South Africa	Department of Agriculture, Forestry & Fisheries (DAFF)	Project leader on a Strategic Environmental Assessment (SEA) to identify potential sea-based finfish aquaculture development zones (ADZ) off the South African coastline. The study entailed identifying and applying a suite of quantitative site selection criteria in a geographical

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			information system (GIS) framework to identify suitable sites for seabased finfish culture in South Africa, taking account of environmental suitability, environmental sensitivity, and user conflict considerations.
2010	South Africa	Doug Jeffery Environmental Consultants	Marine specialist on an assessment of the potential impacts of an illegal tide pool constructed at Danger Point, Gansbaai.
2010	South Africa	Department of Environmental Affairs & Development Planning, Western Cape Government	Evaluation of boat launching sites in the Western Cape. Project leader on an assessment of all boat launching sites in the Western Cape designed to assess their legal status, possible impacts on the environment, socio-economic importance and provide recommendations as to which ones should be formally registered and which need to be closed.
2010	South Africa	Department of Environmental Affairs & Development Planning, Western Cape Government	Assessment of the effects of heavy metal accumulation from land based sources on the Diep River Estuary. Project leader on a study assessing trace metal pollution in the Diep estuary in the City of Cape Town, to investigate potential sources of pollution and to prepare management recommendations for addressing principal sources of pollution.
2010	South Africa, Namibia	UNDP-GEF Orange-Senqu Strategic Action Programme	Consultant appointed to assess the impact of changes in the flow regime of the Orange-Senqu River and its impacts on the degradation of the estuary and the broader Benguela Current System.
2010	Tanzania	BRL/ SWECO/ SADC	Assistant to the estuarine and freshwater ecologist on a baseline description and health assessment for the Rovuma Basin, Tanzania.
2010	South Africa	Water Research Commission, Department of Water Affairs	Co-leader on a project to assess and update methods for estimation of freshwater flow requirements for estuaries in South Africa.
2010	South Africa	Chand Environmental	Marine and coastal specialist appointed to assess the status and sensitivity of the coastal marine environment off Partridge Point on the Cape Peninsula, and likely impacts that would arise from development of the site.
2010	South Africa	Element Consulting Engineers (Pty) Ltd	Marine specialist appointed to assess possible impacts of a proposed residential and resort development at Trekoskraal on the marine environment.
2009-2011	South Africa	Various companies	Marine specialist on a series of environmental impact assessments for desalination plants at Sedgefield, Plettenberg Bay, Witsands, Saldanha Bay, and Port

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			Nolloth. (Five separate appointments.)
2009-2011	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.)/Cape Nature/Marine & Coastal Management (MCM)	Lead consultant appointed to develop a management plans for the Olifants, Berg, Uilkraals, and Great Brak Estuaries, South Africa. (Four separate appointments). Projects entailed preparing situation assessments and strategic management plans for the Olifants, Berg and Uilkraals estuaries that included recommendations for establishment of a new marine protected area, terrestrial protected area, zonation plans for each of these elements, visitor management plans, and recommendations for institutional development.
2009-2011	South Africa	WWF-SA, Lotto Programme	Project leader on a recreational fisheries monitoring programme coordinating a team of 20 fisheries monitors at 6 sites on the South and East coasts of South Africa.
2009-2010	Azerbaijan	United National Development Programme, Azerbaijan Country Office	International consultant appointed to prepare Project Identification Form (PIF) and Project Preparation Grant (PPG) for a GEF medium-size project on the expansion of the marine and coastal protected area network in Azerbaijan. Key tasks on the project included collation of information on the globally significant biodiversity of Azerbaijan, on the national protected area system and the representation of coastal/marine ecosystems in the PA system, and current and planned interventions in the protected area, and to prepare a proposal on how key shortcomings in the PA system can be addressed, and to cost these interventions.
2009-2010	South Africa	Department of Water Affairs & Forestry	Fish specialist on a project to assess the nature, distribution and value of aquatic ecosystem services of the Olifants, Inkomati And Usutu To Mhlatuze Water Management in South Africa.
2009-2010	South Africa	WWF-SA/Cape Action for People and the Environment (C.A.P.E.)	Project leader responsible for the preparation of marine and coastal spatial plans and socio-economic assessments for the Kogelberg Biosphere Reserve and Garden Route Initiative. The project involved mapping biodiversity pattern and processes in the marine and coastal environment, spatial mapping of economic value, good and services, and of threats to these ecosystems.
2009-2010	South Africa	Department of Water Affairs	Environmental Flow Assessment for the Berg Estuary. Project leader appointed to undertake an environmental flow assessment of the Great Berg estuary which including preparing scenario assessments of the likely environmental and socio-economic consequences variable fresh water allocation for the estuary.
2009	South	West Coast	Project leader on an assessment of the Jakkalsvlei

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	Africa	District Municipality, Jeffares & Green (Pty) Ltd	estuary, the purpose of which was to describe and assess the ecological impacts of illegal excavation and infilling activities that took place during July 2008, and to draft rehabilitation plan to mitigate any impacts.
2009	Global	UNDP	Researcher on an assessment of the impact of climate change on the Global Fisheries sector and opportunities and incentives required for adaptation
2009	South Africa	City of Cape Town	Project leader appointed to design of a Coastal Monitoring Programme for the City of Cape Town (City of Cape Town). The incumbent was appointed to prepare an overview report on the conservation status and sensitivity of the City of Cape Town Coast, to investigate and report on the status of all existing monitoring programmes on the City's coastline, and to provide recommendations on additional monitoring activities required for the City to meet its coastal management obligations.
2009	South Africa	Sturrock Shipping (Pty) Ltd	Marine ecological expert commissioned to undertake an evaluation of samples of growth present on the vessel, Rita Knutsen, for the purposes of evaluation the approximate date and location at which damage to the vessel was sustained.
2009	South Africa	Doug Jeffery Environmental Consultants	Consultant on an assessment of the status and sensitivity of the coastal marine environment off Oudekraal on the Cape Peninsula with an assessment of potential constraints relating to impacts to the marine environment on the development of the site.
2008-2011	South Africa	Century City Property Owners Association	Project leader on a study to assess the effectiveness of a fish eradication programme conducted in the Century City wetlands and canals using the ichthyocide rotenone, and for development of recommendation for future management of the system
2008-2009	Tanzania, Kenya	Programme for the Sustainable Management of the Coastal Zone of the Countries of the Indian Ocean	Consultant appointed to implement two separate training courses and workshops on Information for Fisheries Co-Management in Dar es Salaam, Tanzania and Mombassa, Kenya. The workshops covered techniques required to develop information system for fisheries co-management, practical guidance on the application of analytical tools developed specifically for small-scale fisheries, the development of a modified fisheries information profile appropriate to the needs of decision-making in a co-management environment, the design of a sampling regime, and the preparation of budget scenarios for its implementation.

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2008	South Africa	Water Research Commission, Fresh Water Consulting Group	Marine specialist on a project to develop a classification system for wetlands in South Africa.
2008	South Africa	Water Research Commission (WRC)	Researcher appointed to assist in the development of an integrated ecological-economic model to be used to assess freshwater flow requirements for the East-Kleinemonde estuary, a temporally open-closed estuary on the East coast of South Africa. The model was used to assess impacts of changing freshwater flows on the delivery of goods and services from the estuary.
2008	South Africa	DCD-Dorbyl (Pty) Ltd	Consultant appointed to undertake an environmental audit of Globe Engineering Works (Pty) Ltd, DCD-Dorbyl (Pty) Ltd and Natulis Marine (Pty) Ltd (Nautilus), three engineering companies based in the Port of Cape Town, South Africa
2008	Angola	Tullow Oil Plc	Consultant responsible for preparation of Environmental Impact Assessment, Environmental Overview and identification of Environmental Best Management Practise (BMP) required for seismic surveying and exploratory drilling for offshore oil and gas resources in Blocks 1, Angola.
2008	South Africa	Department of Environmental Affairs & Development Planning/SRK Consulting	Marine and coastal specialist contributing to the preparation of the State of the Environment Report (SoER) for the Western Cape Province, South Africa. The objective of the project was to provide information on the condition of the environment to various stakeholders in the public and private sectors, to assist them in dealing with and understanding environmental problems, and to set the basis for the development of policy and strategies, facilitate the monitoring (in terms of progress and performance) of implemented policy and programmes, and raise public awareness of environmental issues.
2008	South Africa	CSIR/Transnet National Ports Authority (Transnet-NPA)	Independent consultant appointed to review an Environmental Impact Assessment and Environmental Management Plan for dredging and dredge spoil disposal for the Ben Schoeman Dock, Port Of Cape Town.
2008	South Africa	Transnet National Ports Authority (Transnet-NPA)/SRK/PD	Independent consultant appointed to review Marine Specialist study components of an Environmental Impact Assessment for extension of the iron ore export terminal and associated ore handling facilities in Saldanha Bay, South Africa

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		Naidoo & Associates	
2007-2011	South Africa	Resource Ballast Technology (Pty) Ltd	Lead consultant appointed as independent assessor of efficacy of a newly developed ballast water treatment system and evaluation (risk assessment) of the residual toxicity of ballast water treated with the system. Project entailed verifying the efficacy of the ballast water treatment system as well as literature survey and laboratory toxicity testing to assess the residual acute and chronic toxicity of the treated ballast water to a variety of different organisms and potential risks posed by the treated ballast water to the environment and human health.
2007-2011	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Project leader of a shore based fisheries monitoring programme designed to assess levels of fishing mortality, stock abundance indices and to evaluate the effectiveness of management measures for the commercial and recreational linefishery, tuna pole and hake handline fishing in South African waters. Project leader was responsible for coordinating the deployment of a team of ten fishery observers at strategic landing sites around the country, the collation of all data collected and preparation of data reports.
2007-2011	South Africa	Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Project leader of an offshore, boat-based fisheries monitoring programme designed to supply and deploy aboard fishing vessels, competent, suitably trained and equipped scientific observers for the inshore trawl, hake longline and west coast rock lobster fisheries. Responsibilities of the project manager included ensuring that observers collected accurate data on the nature of fisheries operations (catch, effort, fishing area, gear used, etc.), catch composition, by-catch mortality, fish biology (length, sex, reproductive state, stomach fullness, fat index), and quantity and size range of discarded target species, and biological samples (e.g. stomachs, gonads, otoliths, and flesh samples) as required. Data were captured electronically and submitted to the client for use in stock assessment and resource management programme.
2007-2010	Ghana	Tullow Oil Plc	Consultant responsible for preparation of Environmental Impact Assessment, Environmental Overview and identification of Environmental Best Management Practise (BMP) required for seismic surveying and exploratory drilling for offshore oil and gas resources in

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			the Tano shallow water and Deep water blocks in Ghana. (Three separate EIA studies).
2007	South Africa	Shelley Point Breakwater (Pty) Ltd/Doug Jeffery Environmental Consultants	Marine ecology specialist on an Environmental Impact Assessment for the Shelly Point Small Craft Harbour. Responsible for preparation of specialist report and specialist input into the EIA and EMP for the project.
2007	South Africa	University of Cape Town	Project supervisor on a study on fish populations in three False Bay estuaries (Zandvlei, Eerste and Lourens), designed to assess fish populations in the estuaries and to relate recent (over the last 5-10 years) changes in management of these system to the status of their fish populations, with a view to improving management of estuaries generally.
2006-2011	Tanzania	International Conservation Union (IUCN)/Pangani Water Basin Office, Tanzania	International mentor of the Estuary Team for a project entitled "Flows for People and the Environment: Supporting Sustainable Land Management in the Pangani Basin (Tanzania)". The key objectives of the project included collecting and synthesising present knowledge on the Pangani River system and its users, and to develop an integrated approach to future water-allocation decisions. The estuary component of the project included conducting a health assessment of the Pangani estuary with the Tanzanian national team and the development of a flow assessment tool to guide allocation of freshwater flow in the system.
2006-2007	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.) and World Wildlife Foundation (WWF)	Project leader responsible for development of a fine scale conservation plan for the Agulhas Marine Bioregion. Three principal components of the project included collating and collecting necessary biophysical, biological, and socio-economic baseline data required to undertake fine scale conservation planning exercises and to support conservation planning interventions in the Agulhas (Marine) Bioregion of South Africa; providing recommendations for the establishment of a network of marine protected areas in the Cape Floristic Region that provides for biodiversity conservation, environmental education and research, and that contributes to sustaining fishing activities; and assessing the economic value of goods and services provided by MPAs in the Agulhas Bioregion.
2006-2007	South Africa	Department of Science and	Consultant appointed to lead the process of developing a data management facility for the South African National

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		Technology (DST) and the South African Environmental Observation Network (SAEON)	Antarctica Programme (SANAP) in consultation with the SANAP research and management community. The primary objectives of the node were to archive long-term observations and project derived data, exercising quality control over this data, facilitating the implementation of observational and management standards, making designated metadata and data accessible through the internet, packaging data for use by scientists, policy makers and the public, and networking with local and international role players.
2006	South Africa	Seaton Thompson and Associates and Tintswalo Atlantic (Pty) Ltd	Project leader on an assessment of the impacts on the marine environment anticipated to result from the proposed guest lodge development at Koelbaai, under Chapman's Peak Drive, in the Table Mountain National Park (TMNP)
2006	Mozambique	Ministry of Co-ordination of the Environment/ World Bank/European Union	Team leader (Expert level I) appointed to prepare a Country Environmental Profile for Mozambique. The task entailed prepare a profile for the country that covered the following aspects: policy and legal framework, pressures, current status and trends in the physical environment (air and climate, land, water and natural disaster risks), biological environment: biodiversity, ecosystems, biological resources of cultural, social or economic importance), economic causes of the environmental situation and trends, their consequences on human well-being and sustainable development.
2005-2008	South Africa	Port Nolloth Sea Farms (Pty) Ltd/ Department of Environmental Affairs and Tourism (DEAT)	Project leader on a study to assess the ecological impacts, and biological and economic viability of abalone ranching in South African west coast. Key issues considered in this study included factors affecting mortality (survival) and growth rates of seeded abalone, relationships between the seeding rate, yield (numbers and flesh weight of abalone) and potential financial returns per unit area of coastline under different conditions, and minimum viable area (length of coastline) for success of an abalone ranching operation.
2005-2007	Angola	BCLME Programme/ United Nation Development Programme (UNDP)/ UNOPS/Global	Project leader on a project aimed at assessing the status of biodiversity along the Angola coastline. The project entailed completing a series of field surveys at selected localities at approximately 100 km spacing along the Angolan coastline at which inshore fish, rock intertidal and sandy beach biota were surveyed. Data were analysed with a view to identifying biogeographic

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		Environment Facility (GEF)	patterns in Angolan coastal fauna and flora.
2005-2007	South Africa	Cape Action Plan for People & the Environment (C.A.P.E.), Cape Nature, and Department of Environmental Affairs & Tourism: Marine and Coastal Management (DEAT: MCM)	Co-leader for biodiversity and economic assessment and development of an integrated conservation plan for CAPE estuaries. The project comprised five components including filling estuary biodiversity data gaps (collection and collation of new botanical, fish and bird data for temperate South African estuaries), updating estuary biodiversity importance scores using these new data, developing of a reliable rapid method for preliminary assessment of estuary health, assessment of economic value of estuaries (development and piloting of a rapid method for estimating subsistence, recreational/tourism, nursery and existence value of all estuaries in the study area), and conducting a conservation planning exercise to identify a minimum set of estuary to be included in a national estuary protected area network.
2005-2007	Angola, Namibia, South Africa	BCLME Programme/ United Nation Development Programme (UNDP)/ UNOPS/Global Environment Facility (GEF)	Project leader on an assessment of human capacity, training and infrastructure available within the three countries bordering the BCLME – Angola, Namibia and South Africa. The focus of the study was on assessing capacity within each of the countries to fulfil their national obligations under the five priority action areas comprising the BCLME programme - Sustainable Management and Utilisation of Living Marine Resources, Assessment of Environmental Variability, Ecosystem Impacts and Improvement of Predictability, Management of Mining and Drilling Activities, Management of Pollution, and Maintenance of Ecosystem Health and Protection of Biological Diversity.
2007, 2005	South Africa	Transnet-National Ports Authority (Transnet NPA)	Project leader on ballast water, flora and fauna survey in the Ports of Durban and Port Elizabeth. Surveys were conducted in representative examples of all habitat types present in the Port of Durban and Port Elizabeth to identify all species present in the port, including all alien and potentially cryptogenic species.
2005	South Africa	Department of Environmental Affairs and Tourism (DEAT)	Marine and coastal specialist contributing to the preparation of the National State of the Environment Report (SoER) for South Africa. The objective of the project was to provide information on the condition of the environment to various stakeholders in the public and private sectors, to assist them in dealing with and understanding environmental problems, and to set the basis for the development of policy and strategies,

Period	Country	Client	Project, Tasks
			facilitate the monitoring (in terms of progress and performance) of implemented policy and programmes, and raise public awareness of environmental issues.
2005	South Africa	Department of Environmental Affairs and Tourism (DEAT)	Project leader on an assessment of the marine and coastal tourism potential for the Arniston fishing harbour. Key tasks on the project included identifying all existing coastal and marine based ecotourism initiatives and role players in and around the Arniston area, assessing the potential socio-economic impact of coastal and marine ecotourism in relation to the rest of the economy, particularly against the fishing industry, identifying potential threats and blockages that could prevent maximization of economic benefits of this sector in the area, and identifying potential coastal and marine based eco-tourism initiatives in the area.
2005	Angola, Namibia, South Africa	Benguela Current Large Marine Ecosystem (BCLME) Programme (UNDP/World Bank)	Co-leader on a project to develop and make operational, an affordable, sustainable and user-friendly State of Ecosystem Information System (SEIS) for the BCLME region (Angola, Namibia, South Africa) to complement other data, assessments, information and advice required by the Interim Benguela Current Commission (IBCC) and other users to enable informed decision making that will ensure the integrated management, sustainable development and protection of the Benguela Current Large Marine Ecosystem. The project entailed identification of a suite of indicators in four thematic areas (State of the Environment, State of Living Marine Resources, Negative or Adverse Ecosystem Impacts, and Ecosystem Indicators), and collation of appropriate time series data for each indicator for the three BCLME countries, and presentation of this data in an accessible and user-friendly manner (website).
2005	South Africa	National Empowerment Fund (NEF)	Project leader on a due diligence (feasibility) study to assess the feasibility of a proposed eel aquaculture and processing operation in the Eastern cape, South Africa, focussing on biological, ecological, logistic and legislative considerations of the proposed project.
2005	South Africa	Department of Environmental Affairs & Tourism	Supervisor on a project to assess the socio-economic value and ecological impacts of the subsistence fishery for sand and mud prawns, and fish in the Knysna estuary, South Africa
2004-2011	South Africa	Saldanha Bay Water Quality Forum Trust	Project leader of a team appointed to develop a series of "State of the Bay" Monitoring Programme and Reports for Saldanha Bay and Langebaan Lagoon in 2004, and

Period	Country	Client	Project, Tasks
		(SBWQMFT)	annually between 2008 and 2011. The project involved collation and analysis of historic data from a wide range of disciplines, identification of key indicators for the reporting system, as well as initiating new data collection and survey programmes, and the production of annual monitoring reports and five-yearly State of the Bay Reports.
2004-2008	South Africa	WWF-SA/South African National Parks	Project leader on a coastal monitoring programme for the Table Mountain National Park Marine Protected Area. The work entailed recruiting, training and deploying a team of monitors to undertake daily patrol of sanctuary and controlled use zones in the MPA with the objective of monitoring of the state of marine resources, the environment and the human use thereof. Key activities for which data were collected included commercial fisheries (boat-based line fishing, beach seine netting, commercial abalone diving and rock lobster fishing), recreational fisheries (boat and shore based line fishing, rock lobster fishing, invertebrate fisheries and bait collecting) and subsistence fisheries (for rock lobster and other invertebrates) and popular recreational activities such as walking, hiking, sunbathing, water sports (swimming, surfing, sailing, canoeing, windsurfing, waterskiing) and horse riding.
2004-2005	South Africa	Department of Environmental Affairs and Tourism (DEAT)	Project leader on a study to develop recommendations as to appropriate permit fees and permitting systems for recreational SCUBA divers and SCUBA diving tour operators in Aliwal Shoal, Pondoland, Bird Island, Tsitsikamma and Table Mountain National Park Marine Protected Areas (MPAs).
2004	South Africa	I & J	Project leader on a EIA for an abalone farm at Danger Point, Western Cape. The study includes assessment of impacts on the marine environment, vegetation, heritage resources and visual impacts.
2004	DRC, Angola, Namibia, South Africa, Mozamb., Tanz., Mauritius, Seychelles	EU-SADC MCS Fisheries Programme	Lead consultant tasked with production of instructional material and the holding of a seminar on the effects of pollutants, illegal fishing methods and the requirements of relevant conventions signed by the SADC states. The consultant was required to prepare a report on the status of illegal fishing, such as the use of explosives or poisons, and pollution of the seas in the coastal SDAC states (Democratic Republic of Congo, Angola, Namibia, South Africa, Mozambique, Tanzania, Mauritius, Seychelles)
2004	South	City of Cape	Marine and coastal specialist on an EIA to assess impacts

Period	Country	Client	Project, Tasks
	Africa	Town	of a coastal walkway between St James and Kalk Bay, in False Bay, South Africa.
2004	South Africa		Marine and coastal specialist on an EIA to assess impacts of an education centre and tidal pool, at Bordjiesrif in False Bay, South Africa.
2004	Mozambique	Southern African Development Community/ Government of Mozambique	Lead consultant appointed to prepare a policy document and strategy for fisheries Monitoring Control Surveillance in Mozambique. Preparation of the policy document entailed reviewing all components of the Mozambican fishery in terms of their nature (industrial, semi-industrial and artisanal), area of operation, type of vessels and gear, nature and locations of the landing sites, and economic value of their catch); running a series of workshops to obtain consensus on the objectives and strategic aim of the MCS policy, the potential partners and their roles and responsibilities, and the economic objectives of the project and means to ensure sustainability; and the drafting of the policy. The strategy document was compiled following on site inspections and discussions with key stakeholders in Mozambique.
2004	South Africa	Botanical Society of South Africa	Coastal and estuarine specialist contributing to the preparation of guidelines to assist environmental assessment practitioners in selecting biodiversity specialists for involvement in Environmental Impact Assessments and guiding specialists in the assessment of the nature, severity and significance of environmental impacts.
2004	Southern Africa	IPCC/ START Programme	Consultant appointed to undertake a desktop study on the likely impacts of climate change on estuaries in southern Africa. Predicted changes in freshwater flow for major river systems in the country generated using the ACRU Hydrological model as well predicted changes in mean sea level, atmospheric carbon dioxide, and UV irradiance were used to assess likely impacts on estuaries.
2004	South Africa	EKZN Wildlife Service/ Department of Environmental Affairs and Tourism (DEAT)	Consultant appointed to review the approach used for management of subsistence fisheries in KwaZulu-Natal, South Africa. The study include workshops and interview with managers and decision makers, compliance staff and fishers, and the production of a review report and recommendations for addressing shortcomings in the existing approach.
2003-2005	South Africa	Department of Water Affairs &	Project manager, estuarine coordinator and fisheries specialist on the Berg River Baseline Monitoring

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		Forestry (DWAF)	Programme. The objective of the baseline monitoring programme was to describe the natural and present state, including the natural variability, of those chemical, physical and biological characteristics of the river and its hydraulically linked systems (i.e. estuary, floodplains and groundwater) most likely to be affected by changes imposed after the construction of the Skuifraam Dam. The study spanned a period of three years and required a multidisciplinary approach involving specialists from a wide range of disciplines including hydrology, hydraulics, fluvial geomorphology, sediment transport, geohydrology, water quality, sociology, macroinvertebrates, fish, avifauna, vegetation and algae.
2003-2004	South Africa/ Namibia/ Angola	BCLME Programme/ UNDP/ UNOPS/ GEF	Project leader on a Capacity and Needs Assessment for the Benguela Current Large Marine Ecosystem (BCLME) Project involving three countries – Angola, Namibia and South Africa. The project entailed assessing organisational and institutional capacity for the implementation of the Strategic Action Plan for the programme comprising five policy action areas: Sustainable Management and Utilisation of Living Resources, Management of Mining and Drilling Activities, Assessment of Environmental Variability, Ecosystem Impacts and Improvement of Predictability, Management of Pollution and Maintenance of Ecosystem Health and Protection of Biodiversity.
2003-2004	South Africa	Makana Marine and Projects	Project leader on an Environmental Impact Assessment for the development of a new ship repair facility in the Port of Cape Town. The study included specialist assessment of impacts on marine ecology, noise, and air pollution.
2003-2004	South Africa	World Wildlife Fund, South Africa (WWF-SA)	Project leader of a team appointed to prepare a business plan for the proposed Kogelberg Marine Park. The business plan summarised available information on resource harvesting, resource availability, tourism capacity, and the value thereof in the park; presented three alternate financially sustainable scenarios for the establishment and management for the proposed park; identified skills and human resources required for implementation of the various scenarios; identified problems and critical requirements for successful establishment of the Park; and provided a five-year financial plan with flexible input parameters to aid “what if” scenario analysis for the park.

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2003-2004	South Africa	Department of Environmental Affairs and Tourism (DEAT)	Co-leader on a Strategic Environmental Assessment to guide the implementation of regulations promulgated under the National Environmental Management Act 1998: Control of Vehicles in the Coastal Zone. The consultant was required to carry out a Strategic Environmental Assessment to characterise the coastal zones in terms of their environmental sensitivity as well as historical, cultural and social aspects, identify defensible criteria for allowing/excluding vehicles from the coastal zone and to assist with the development of a GIS-based decision support model to guide implementation of the ORV regulations.
2003	South Africa	Globallast Programme/ IMO/UNDP/ GEF	Lead consultant for the Development of a Ballast Water Management Plan for the Port of Saldanha, South Africa. Project entailed the development of a model management plan for the Port of Saldanha to protect natural coastal resources from the threat of invasive alien species, designed to be replicated at other ports in South Africa.
2003	South Africa, Namibia and Angola	Global International Waters Assessment (GIWA) Programme/ GEF	Consultant contributing to the Global International Water Assessment (GIWA) for the Benguela region (South Africa, Namibia and Angola) during which issues of major concern (freshwater shortage, pollution, habitat and community modification, unsustainable use of resources, and global change) in the region were identified, assessed and prioritised for intervention.
2002-2003	South Africa	Cape Action for People and the Environment / World Bank/ UNDP	Lead consultant on the Marine and Coastal Component of the Cape Action for People and the Environment (C.A.P.E.) programme responsible for the developing components of the Project Concept Document (PCD) and Project Implementation Plan (PIP). The consultant was required to work in a team with staff of the C.A.P.E. Co-ordination Unit and key staff of executing agencies in preparing a description of the marine and coastal component for the 20 year program, in identifying critical risks and risk-mitigation measures, in developing a monitoring and evaluation framework for the programme, in evaluate institutional readiness for implementation, and in identifying significant environmental issues and affected stakeholders.
2002-2003	Namibia	Namdeb Diamond Company	Project leader on an Environmental Impact Assessment for the Wet Overburden Mining System in Mining Area 1, Oranjemund, Namibia. Responsible for the preparation of the environmental impact assessment (EIA),

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			environmental management programme report (EMPR) and coordination of specialist studies on socio-economic and ecological impacts of a new dredge mining project in the coastal zone.
2002-2003	South Africa	Department of Environmental Affairs & Tourism	Project leader of a study designed to establish the quantity of abalone caught by recreational fishers during the 2002/2003 fishing season, and to segregate catches by fishing stage and per fishing area. The study provided estimates of the total recreational abalone harvest, with 95% confidence levels, extrapolated from the interview results.
2002-2003	South Africa	Water Research Commission, Department of Water Affairs & Forestry	Co-leader on a project to improve understanding of the relative contribution and importance of individual estuaries to overall estuarine biodiversity in South Africa. The study entailed collection and analysis of invertebrate, fish and bird samples and/or data from a series of data-poor estuaries on the Cape South and East coast of South Africa.
2002-2003	South Africa	National Ports Authority/ Globalast Programme	Project leader for a baseline survey of subtidal reef biota and reef fish off Jaheel & St Croix Islands, Algoa Bay. The survey was designed to serve as a baseline against which potential changes arising from the construction of the new Port of Coega could be benchmarked.
2002	Africa	GEF/UNDP UNESCO/IOC/A COPS	Regional Technical Coordinator for the Working Group on Sustainable Use of Living Resources as part of Phase 2 of the GEF MSP Sub-Saharan Africa Project (GF/6010-0016): Development and Protection of the Coastal and Marine Environment in Sub-Saharan Africa. Appointed as project leader of a team of three experts to assist in the development of a series of project proposals forming the basis of a Programme of Interventions to address problems of regional priority in sub-Saharan Africa.
2002	South Africa	Department of Environmental Affairs & Tourism	Researcher on an acoustic tracking study of the West Coast rock lobster (<i>Jasus lalandii</i>) in the Hermanus Whale Sanctuary, on the south-west coast of South Africa. The purpose of the study was to gain understanding and experience of acoustic tracking of rock lobsters and to examine movement behaviour patterns displayed by rock lobsters
2002	Namibia	Namdeb Diamond Company	Project leader responsible for the conducting an environmental assessment of sandy beaches in Mining Area 1, Oranjemund, Namibia and an environmental baseline study in a previously unexploited area on the

Period	Country	Client	Project, Tasks
			coast. The study was commissioned in order to document the prevailing morphodynamic characteristics and faunal assemblages in this area prior to starting mining.
2002	South Africa	National Research Foundation	Consultant appointed to assist the National Research Foundation (NRF) to launch the Marine and Coastal Node of the South African Environmental Observatory Network (SAEON) programme, designed to assist South Africa to deal with consequences of long-term environmental change. Activities on the project included consulting with the scientific community in South Africa on potential host institution, establishing a central network office and associated research platforms (termed environmental observatories) to collect and process information on long-term environmental change and the likely effects of this change on society and the environment.
2002	South Africa	Department of Environmental Affairs & Tourism	Project leader on a study on sardine migration habitats off the East coast of South Africa. The study entailed following the movements of the sardine shoals up the coast and conducting systematic sampling of the sardine shoals as they moved along the Eastern Province and Kwa-Zulu Natal coasts.
2002	South Africa	Department of Environmental Affairs & Tourism	Project leader for a fisheries monitoring programme for an experimental hoop-net fishery for west coast rock lobster off Cape Hangklip, South Africa. A team of fisheries observers were trained and deployed on fishing vessels to monitor catch, effort, catch-per-unit-effort, size composition, and sex ratios of lobster caught during the fishing season.
2002	South Africa	University of Rhode Island/ History of Marine Animal Populations	Researcher commissioned to prepare a desktop assessment of the likely impacts of climate change on the ecosystem functioning and fisheries of the Benguela ecosystem, South Africa.
2002	Seychelles		Researcher appointed to prepare an assessment of the status of fisheries, fish stocks, and approaches to fisheries management in the Seychelles
2001-2002, 2009-2010	South Africa	Department of Environmental Affairs & Tourism	Project leader of a study designed to establish the quantity of west coast rock lobster caught by recreational fishers during the 2001/2002 and 2009/2010 fishing seasons, and to segregate catches by fishing stage and per fishing area. The study provided estimates of the total recreational rock lobster harvest, with 95%

Period	Country	Client	Project, Tasks
			confidence levels, extrapolated from the interview results.
2001-2003	South Africa	Department of Environmental Affairs & Tourism/ Rhodes University	Fisheries specialist contracted to assist with an Economic Sectoral Study of the South African Fishing Industry. The study involved collecting the requisite data to conduct a financial evaluation of the different components of the industry in order to identify their profitability per ton of fish landed on a per species basis, group of species or per fishery basis, for the purpose of calculating realistic options regarding resource rent that the state can recover from enterprises which participate in each industry component, and for calculating minimum quantities of fish required by different size classes of enterprises such they can operate viably as stable independent enterprises. The consultant was responsible for collecting requisite data on the rock lobster, linefish, seaweed and mariculture components of the industry.
2001-2002	South Africa	AECI/SYNEXUS	Specialist marine biologist contracted to undertake an assessment of risks to marine life and human health resulting from disposal of contaminated groundwater from the Umbogintwini waste disposal site. Assessment of risks to marine life was undertaken by comparing predicted concentrations of chlorinated hydrocarbon and trace metals contaminants to available information on toxic effect concentrations and to regulations and guidelines for maximum permissible and maximum recommended concentrations in the discharge environment. Risks to human health were examined through a study of harvesting and consumption patterns of marine life in the vicinity of the propose discharge point and of the potential of the various contaminants to bioaccumulate within tissues of these organisms.
2001	South Africa	GEF/UNDP/IMO Globalast Programme	Fish specialist on a ballast water surveys in the Port of Saldanha. The objective of the study was to survey representative examples of all habitat types present in the ports with a view to developing a full list of all species including all alien and potential cryptogenic species in the port.
2001	South Africa	Nitrogen Products	Marine specialist on an EIA to assess impacts of effluent disposal on the marine environment from a fertilizer factory.
2001	South Africa	Maribus Industries	Consultant to Maribus industries assisting with an application for a seawater lease and mariculture permit for a Gracilaria farm in St Helena Bay, South Africa

Period	Country	Client	Project, Tasks
2001	United Arab Emirates	Dubai Municipality/ Martin Mid-East	Researcher commissioned to assess impacts of effluent discharges and shipbuilding activities on Dubai Creek, UAE through an analysis of composition and abundance of foraminifera in sediment samples from the creek.
2000-2002	South Africa	South African National Parks	Marine Coordinator Cape Peninsula National Park, responsible for the design and development of a marine component for the newly established Cape Peninsula National Park. Key deliverables on this project included the initiation of specialist scientific, institutional and legal studies and the management of a public participation and consultation process required to enable the proclamation of a marine protected area, as well as the development of a use zone map, a management plan and interpretative and educational materials for the marine park.
2000-2002	South Africa	Freshwater Consulting Group	Freshwater fish specialist appointed to assess and monitor changes in the fish community of the Koekdou River following construction of a new dam on the system
2000-2001	Africa	GEF/UNDP UNESCO/IOC/A COPS	National coordinator for South Africa on Phase 1 of the GEF MSP Sub-Saharan Africa Project (GF/6010-0016): Development and Protection of the Coastal and Marine Environment in Sub-Saharan Africa. Appointed as project leader of a team of four experts to carry out the identification, characterisation and selection priority sources and causes of environmental degradation of marine and coastal areas in South Africa, to assess environmental and socio-economic impacts, and to identify the most appropriate areas and levels for intervention.
2000-2001	South Africa	SRK Consulting and PD Naidoo and Associates	Marine specialist appointed on an EIA to assess potential impacts of the extension of the iron ore handling facility in Saldanha Bay on the marine environment and mariculture activities.
2000	South Africa	City of Cape Town/ Southern Water Ecological Research and Consulting	Estuary specialist appointed to assess the impacts of the upgrade of a rubble weir and other mouth management options for the Zandvlei estuary.
2000	South Africa	On Track Developments/ Chand Environmental	Marine specialist on an EIA to assess potential impacts associated with the proposed redevelopment of the Sea Point Pavilion site, Cape Town
2000	South	City of Cape	Freshwater fish specialist on the Zeekoeivlei and

Period	Country	Client	Project, Tasks
	Africa	Town/ Southern Water Ecological Research and Consulting	Rondevlei restoration project. Objectives of the study were to examine the relevance of constructing and/or modifying existing fish ladders at the exit/entry points to the vleis, the merits of deliberately stocking the vleis with fish, and to assess the impacts of periodic draw-downs on fish populations with reference to the their impact on midge populations in the vleis.
2000	Africa	SURVAS	National representative on the SURVAS Network tasked with assessing Vulnerability & Adaptation to Impacts of Accelerated Sea-Level Rise in Africa. Commissioned to prepare a paper summarising available information on measured increases in sea level in South Africa as well as potential vulnerability to and impacts of sea level rise on this country.
1999- 2000	South Africa	United States Department of Energy/ Department of Environmental Affairs and Tourism, South Africa	Project leader on a study examining the effects of climate change on marine biodiversity in South Africa. The study entailed a detailed review and thorough examination of the possible effects of climate change on pelagic, estuarine, and rocky intertidal communities in the South African marine environment.
1999- 2000	South Africa	Foundation for Research Development	Co-leader on a project to assess the impacts of exploitation of wonderworm <i>Marphysa sanguinea</i> on bouldershore habitats on the Cape Peninsula, South Africa. The project included field surveys, literature review, statistical analysis of data and report production.
1999- 2000	South Africa	Department of Environmental Affairs & Tourism, South Africa	National Co-ordinator of the Subsistence Fisheries Programme designed to identify subsistence fishing communities in South Africa, to assess socio-economic profiles and resource harvesting techniques and to provide recommendations for the implementation of appropriate management systems for these fishers. Duties of the National Co-ordinator included co-ordination and supervision of a team of 14 fieldworkers collecting ground level information, and collating, analysing and summarising this data into report format.
1999	South Africa	Ridge Management/ Eric van den Honert Environmental Consulting	Marine specialist appointed to assess potential impacts of the Soetwater Mariculture Project (an abalone and seaweed aquaculture initiative) on the marine environment.
1999	South	City of Cape	Estuary specialist appointed to assess the impacts of the

Period	Country	Client	Project, Tasks
	Africa	Town/ Southern Water Ecological Research and Consulting	construction of a foot bridge over the Zandvlei estuary.
1999	South Africa	City of Cape Town/ Southern Water Ecological Research and Consulting	Estuary specialist appointed to assess the impacts of flood mitigation measures (artificial wetland) on the Silvermine estuary.
1999	South Africa	City of Cape Town/ Freshwater Consulting Group	Fish specialist appointed to assess the ecological importance of Zoarvlei (a freshwater wetland) for marine, estuarine and freshwater fish species.
1999	South Africa	City of Cape Town/ Southern Water Ecological Research and Consulting	Estuary specialist appointed to assess the impacts of upgrading the Zandvleit Wate Water Treatment Works on the Eerste estuary.
1999	South Africa	Jakobsbaai Abalone Farm	Researcher on a project to assess the application of anolytes to control red-tide dinoflagellates <i>Scripsiella trochoidea</i> in the mariculture industry.
1999	South Africa	Southern Water Ecological Research and Consulting	Fish specialist appoint to provide guidelines for stocking Capricorn Lake (a shallow dendritic lake in the Capricorn Science and Business Park Lake) with fish Guidelines were required in terms of appropriate species for stocking, stocking densities; and possible sources of fish.
1998- 1999	Mozam- bique	ARCO International Oil and Gas Company/ Austral	Project Marine Biologist responsible for specialist input into an Environmental Impact Assessment for onshore and offshore seismic exploration and exploratory drilling for oil and gas in Sofala Bay (Beira) area in Mozambique. The study involved an analysis of impacts on the marine environment and fisheries associated with 2-d and 3-d seismic surveys and well drilling exercises. An Environmental Baseline Report was prepared from field and literature survey work and into input was provided into an Environmental Management Plan for the seismic survey and drilling exercises.
1998- 1999	South Africa/ Namibia/	GEF/UNDP/ Benguela Current Large	Project leader responsible for the preparation of an "Integrated Overview of Diamond Mining in the Benguela Current Region" as part of the synthesis and assessment

Period	Country	Client	Project, Tasks
	Angola	Marine Ecosystem Programme (BCLME)	of information on the Benguela Current Large Marine Ecosystem (BCLME) project. The BCLME project was a regional initiative between Angola, Namibia and South Africa and involved synthesising information on mining techniques, operational practices, impacts on fisheries and ecosystems, mitigation measures, environmental management plans and the social and economic importance of the industry.
1998	Namibia	Government of Namibia/ Desert Research Foundation of Namibia	Marine specialists on an EIA for a new Fishing Port at Möwe Bay, Skeleton Coast, Namibia. Consultants appointed to assess likely impacts and to identify appropriate mitigation measures for a fishing harbour in Namibia.
1998	Namibia	Namdeb Diamond Company	Project leader responsible for the preparation of an Environmental Impact Assessment for the Elizabeth Bay Mine, Lüderitz, Namibia. The study was commissioned to examine the ecological effects of fine tailing disposal and marine diamond pumping operations on surf zone fish assemblages in the Lüderitz area. Recommendations were put forward to mitigate and/or minimise impacts on the affected environments.
1998	South Africa	Marine Diamond Mines Association/ Sue Lane & Robin Carter & Associates	Environmental Scientist responsible for input into a Generic Environmental Baseline Report on the status of the marine environment, fisheries and coastal utilisation in the South African west coast marine diamond 'a' concession areas, surf zone and admiralty strip. The project involved a synthesis of available information on the affected area and the identification of risk sources associated with mining activities.
1998	South Africa	Blaauberg Municipality/ World Wide Fund for Nature (WWF-SA)	Project leader on a study assessing the intensity and impact of bait collecting activities on the ecology of the Diep River estuary, South Africa. The study included surveys of 1st the stocks all bait species in the estuary and an assessment of the numbers of all organisms collected or disturbed by bait collectors per annum. A management plan was formulated for the long-term sustainable use of the estuary.
1998	South Africa	De Beers Namaqualand/ Gibb Africa	Marine/estuarine specialist on an EIA for the construction of a bridge across the Buffels estuary near Kleinzee. The study entailed an assessment of the likely impacts of bridge construction and identification of appropriate mitigation measures to minimise impacts on the estuary and marine environment.

Period	Country	Client	Project, Tasks
1998	South Africa	Blaauberg Municipality/World Wide Fund for Nature	Project leader on a study assessing the intensity and impact of bait collecting activities on the ecology of the Diep River estuary, South Africa. The study included surveys of the stocks all bait species in the estuary and an assessment of the numbers of all organisms collected or disturbed by bait collectors per annum. A management plan was formulated for the long-term sustainable use of the estuary.
1997-2012	Namibia	Namdeb Diamond Company	Project leader on a series of baseline and impact assessment studies for beach diamond mining in the Bogenfels Mining Licence Area in the Sperrgebiet, Namibia. Sequential appointment for studies undertaken in 1997, 1998, and annually from 2004-2011. Each study project included surveys and assessments of sandy beach macrofauna, rocky intertidal fauna and surf fish assemblages and considered possible effects of mining activities and mitigation measures to avoid or minimise impacts on the affected environment.
1997-1998, 2000-2001, 2009-2011	South Africa	Department of Environmental Affairs & Tourism/ Department of Agriculture, Forestry & Fisheries	Project leader of an offshore, boat-based fisheries monitoring programme designed to supply and deploy aboard fishing vessels, competent, suitably trained and equipped scientific observers for the offshore trawl, inshore trawl, hake longline and west coast rock lobster fisheries. Responsibilities of the project manager included ensuring that observers collected accurate data on the nature of fisheries operations (catch, effort, fishing area, gear used, etc.), catch composition, by-catch mortality, fish biology (length, sex, reproductive state, stomach fullness, fat index), and quantity and size range of discarded target species, and biological samples (e.g. stomachs, gonads, otoliths, and flesh samples) as required. Data were captured electronically and submitted to the client for use in stock assessment and resource management programme.
1997-1998	South Africa	Foundation for Research Development/ University of Cape Town	Project co-ordinator for a study looking at the enhanced utilisation and management of demersal fish resources off the east, south and west coasts of South Africa. The project was aimed at assessing discarding practices employed by the industry and involved co-ordinating a team of observers deployed aboard commercial fishing trawlers operating from various ports around the country.
1997	United Arab	Adnoc-Borealis Petrochemicals	Co-leader on Environmental Impact Assessment and Baseline Survey for a new petro-chemicals plant in Dubai,

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	Emirates	/Martin Mid-East	UAE. Baseline surveys were conducted for benthic macrofauna, reef fish and corals.
1996	South Africa	Rein's Nature Reserve	Project leader on a study to assess status of exploited marine species in a small marine reserve near Mossel Bay, South Africa. Field surveys were used to assess the status of exploited fish and invertebrate species in the reserve and recommendations were formulated, aimed at making optimal use of this marine reserves as management and conservation tool.
1994-1996	South Africa	Sea Fisheries Research Institute/ World-wide Fund for Nature (SA)	Project Marine Biologist on a study investigating the impact of commercial beach-seine netting on the fish and invertebrates in False Bay, South Africa. The study was undertaken over a two-year period in which commercial fishing operations were intensively monitored and experimental netting undertaken. Data collected in the study were used in the formulation of regulations and a comprehensive management plan for the fishery.
1990	South Africa	Seafarm Products	Project Marine Biologist on a study examining the impact of fish predation on the cultured mussel, <i>Mytilus galloprovincialis</i> , in the Seafarm Dam, South Africa. Major predators feeding on cultured mussels were identified and measures designed to curb their impact were formulated.

PUBLICATION RECORD

Thesis

Clark, B.M. 1997. Dynamics and utilization of surf zone habitats by fish in the south-western Cape, South Africa. PhD Thesis, University of Cape Town, 216 pp.

Scientific papers

- Clark, B.M. 2009. Introduction – The Berg River Baseline Monitoring Programme. Transactions of the Royal Society of South Africa 64(2): 95,
- Clark, B.M. & S. Taljaard. 2009. Historic changes in inorganic nutrient loading and its effects on water quality biota of the Berg estuary, South Africa. Transactions of the Royal Society of South Africa 64(1) In press
- Clark, B.M., Hutchings, K. & Lamberth, S.J. 2009. Long-term variations in composition and abundance of fish in the Berg estuary, South Africa. Transactions of the Royal Society of South Africa 64(2): 238–258.
- Clark, B.M., Impson, D. & J. Rall. 2009. Present status and historical changes in the fish fauna of the Berg River, South Africa. Transactions of the Royal Society of South Africa 64(2): 142–163
- Clark, B.M. 2005. Climate change: A looming challenge for fisheries management in southern Africa. Marine Policy 30 (1): 84-95.
- Clark, B.M., Hauck, M., Harris, J., Salo, K. and E. Russell. 2002. Identification of subsistence fishers, fishing areas, resource use and activities. South Africa Journal of Marine Science 24: 425-438.
- Clark, B.M. 1996. Variation in surf zone fish community structure across a wave exposure gradient. *Est. cstl. Shelf Sci.* 44: 659-674.
- Clark, B.M. 1996. Marine diamond mining activities off Namibia: do they really pose a threat to island biota? *S.A. Comm. Mar.* 5(3): 16.
- Clark, B.M. & B.A. Bennett 1993. Are juvenile fish an issue in the trek net controversy? *Fish, fishers and fisheries, Proc. 2nd Mar. Recreational Angling Symp., Durban, October 1992.* Beckley, L.E. & R.P. van der Elst (eds.) *Spec. Publ. oceanogr. Res. Inst. S. Afr.* 2: 157-159.
- Clark, B.M., B.A. Bennett & S.J. Lamberth 1994. A comparison of the ichthyofauna of two estuaries and their adjacent surf-zones, with an assessment of the effects of beach-seining on the nursery function of estuaries for fish. *S. Afr. J. mar. Sci.* 14: 121-131.
- Clark, B.M., B.A. Bennett & S.J. Lamberth 1994. Assessment of the impact of commercial beach-seine netting on juvenile teleosts in the surf-zone of False bay, South Africa. South Africa Journal of Marine Science 14: 255-262.
- Clark, B.M., B.A. Bennett & S.J. Lamberth 1996. Factors affecting spatial variability in seine net catches of fish in the surf-zone of False Bay, South Africa. *Mar. Ecol. Prog. Ser.* 131: 17-34.
- Clark, B.M., B.A. Bennett & S.J. Lamberth 1996. Temporal variations in surf-zone fish assemblages from False Bay, South Africa. *Mar. Ecol. Prog. Ser.* 131: 35-47.

- Branch, G.M. and **Clark, B.M.** 2006. Fish stocks and their management: The changing face of fisheries in South Africa. *Marine Policy* 30 (1): 3-17.
- Hutchings, K., **Clark, B.M.**, Atkinson, L.J. & C. G. Attwood. 2008. Evidence of recovery of the linefishery in the Berg River Estuary, Western Cape, South Africa, subsequent to closure of commercial gillnetting. *African Journal of Marine Science* 2008, 30 (3): 507–517.
- Napier V.R., J.K. Turpie & B.M. Clark. 2009. Value and management of the subsistence fishery at Knysna estuary, South Africa. *African Journal of Marine Science* In press
- Branch, G.M., May, J., Roberts, B., Russell, E., **Clark, B.M.** 2002. Case studies on the socio-economic characteristics and lifestyles of subsistence and informal fishers in South Africa. *South Africa Journal of Marine Science* 24: 439-462.
- Cockroft, A.C., Sauer, W., Branch G.M., **Clark, B.M.**, Dye, A. H. and E. Russell. 2002 - Assessment of resource availability and sustainability for subsistence fishers in South Africa with a review of resource management procedures. *South Africa Journal of Marine Science* 489-502.
- Griffiths, C. L., L. van Sittert, P. B. Best, A. C. Brown, **B.M. Clark**, P. A. Cook, R. J. M. Crawford, J. H. M. David, B. R. Davies, M. H. Griffiths, K. Hutchings, A. Jerardino, N. Kruger, S. Lamberth, R. Leslie, R. Melville-Smith, R. Tarr & C. D. van der Lingen, 2004. Impacts of human activities on marine animal life in the Benguela – An historical overview. *Oceanogr. Mar. Biol. Ann. Rev.* 42, 303-392.
- Harris, J.M., Branch, G.M., **Clark, B.M.**, Coetzee, C., Dye, A.H., Hauck, M., Johnson, A., Kati-Kati, L., SiqWano-Ndulo, N., and M. Sowman. 2002. Recommendations for the management of subsistence fishers in South Africa. *South Africa Journal of Marine Science* 24: 503-523.
- Harris, J.M., Sowman, M., Branch, G.M., **Clark, B.M.**, Cockroft, A.C., Coetzee, C., Dye, A.H., Hauck, M., Johnston, A., Kati-Kati, L., Maseko, Z., Salo, K., Sauer, W.H.H., Siqwana-Ndulo, N. and J. Beaumont. 2002. The process of developing a management system for subsistence fisheries in South Africa: recognizing and formalizing a marginalized fishing sector in South Africa. *South Africa Journal of Marine Science* 24: 405-424.
- Hauck, M., Sowman, M., Russel, E., **Clark, B.M.**, Harris, J.M., Venter, A., Beaumont, J. and Z. Maseko. 2002. Perceptions of subsistence and informal fishers in South Africa. *South Africa Journal of Marine Science* 24: 464-474
- Lamberth, S.J., B.A. Bennett & **B.M. Clark** 1994. The catch composition of commercial beach-seine fishermen in False Bay, South Africa. *S. Afr. J. mar. Sci.* 14: 69-78.
- Lamberth, S.J., B.A. Bennett & **B.M. Clark** 1995. The vulnerability of fish to capture by commercial beach-seine nets in False Bay, South Africa. *S. Afr. J. mar. Sci.* 15: 25-31.
- Lamberth, S.J., B.A. Bennett & **B.M. Clark** 1995. Seasonality of beach-seine catches in False Bay, South Africa, and implications for management. *S. Afr. J. mar. Sci.* 15: 157-167.
- Lamberth, S.J., B.A. Bennett & **B.M. Clark** 1995. The impact of beach-seine netting on the benthic fauna and flora of False Bay, South Africa. *S. Afr. J. mar. Sci.* 15: 157-167.
- Lamberth, S.J., Bennett, B.A. & **B.M. Clark**. 1995. It's nothing new. *S.A. Comm. Mar.* 2(4): 29.

- Lamberth, S.J. & **B.M. Clark**. 1995. Attempts to resolve the conflict between recreational anglers and beach-seine fishermen in False Bay, South Africa. In: *Proc. 1st Pan African Fisheries Congress, Nairobi, Kenya, July-August 1995. Fish Manage. Ecol.*
- Lamberth SJ, Branch GM & **BM Clark** 2010. Estuarine refugia and fish responses to a large anoxic, hydrogen sulphide, “black tide” event in the adjacent marine environment. *Est. cstl. Shelf Sci.* 86: 203-215
- Lamberth, S.J., W.H.H. Sauer, B.Q. Mann, S.L. Brouwer, **B.M. Clark** & C. Erasmus. 1997. The current status of the South African beach-seine and gill-net fisheries. *S. Afr. J. mar. Sci.* 18: 195-202
- Napier, V.R., Turpie, J.K. & **B.M. Clark**. 2009. Value and management of the subsistence fishery at Knysna Estuary, South Africa. *African Journal of Marine Science* 31(3): 297–310.
- Solanofernández, S., Attwood, C.G., Chalmers, R. **Clark, B.M.**, Cowley, P.D., Fairweather, T., Fennessy, S.T., Götz, A., Harrison, T.D., Kerwath, S.E., Lamberth, S.J., Mann, B.Q., Smale M.J. & L. Swart. 2012. Assessment of the effectiveness of South Africa's marine protected areas at representing ichthyofaunal communities. *Environmental Conservation* 39 (03): 259-270

Books/Book Chapters

- Turpie, J., **Clark, B.M.**, Knox, D., Martin, P., Pemberton, C. & C Savy. 2004. Contributions to Information Requirements for the Implementation of Resource Directed Measures for Estuaries. Volume 1. Improving the biodiversity importance rating of South African estuaries. JB Adams (Ed.). Report to the Water Research Commission by the Consortium for Estuarine Research and Management. WRC Report No. 1247/1/04.
- De Villiers CC, Brownlie S, **Clark B.M.**, Day EG, Driver A, Euston-Brown DIW, Helme NA, Holmes PM, Job N, Rebelo AB (2005) Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape. Fynbos Forum and Botanical Society of South Africa, Kirstenbosch. ISBN 0-620-35258-2
- Harris, J.M., Branch, G.M., **Clark, B.M.** & S.C. Sibiya. 2007. Redressing Access Inequities and Implementing Formal Management Systems for Marine and Estuarine Subsistence Fisheries in South Africa. In: T.R. McClanahan and J.C. Castilla (eds.) *Fisheries Management: Progress towards Sustainability*. Blackwell Press, pp. 112-138.
- Niang, I., Nyong, A., **Clark, B.M.**, Desanker, P., Din, N., Githeko, A., Jalludin, M., Osman, B. (2007) Vulnerability, Impacts and Adaptation to Climate Change. In: Otter, L., Olago, D.O. and Niang, I. (eds) *Global Change Processes and Impacts in Africa: A Synthesis*. START/East African Educational Publishers, Nairobi, pp. 226-249.

Curriculum vitae: Mr DJ VREY

Name : VREY, DEON JOHANN
 Date of Birth : 08 December 1967
 Profession/Specialisation : Electrical engineering
 Years with Firm : 14
 Nationality : South African
 Years of experience : 19

Key qualifications

Deon is a Technical Director and Electrical Engineer with Aurecon. Deon has expert knowledge in the electricity transmission and distribution industry, with emphasis on power system analysis, strengthening and expansion planning, refurbishment planning, power system reliability assessment, generation integration studies, power system feasibility and financial and economic analysis, socio-economic studies with emphasis on long-term electricity demand and energy forecasting, and rural electrification planning.

Deon has worked on engineering projects for utilities and industries in South Africa, the United States of America, Angola, Botswana, Lesotho, Mozambique, Namibia, Nigeria, Swaziland, Sierra Leone, Tanzania, and Zambia.

Employment record

1999 - Date Aurecon, Principal Electrical Engineering Consultant
 1994 - 1999 City Council of Pretoria, Sub-Transmission Planning Engineer

Management experience

03/2012 - Date Technical Director
 01/2009 - 03/2012 Business Unit Manager

Experience record

Review of the EDI Asset Status (DoE, South Africa) 02/2014 - 08/2014. Subject Matter Expert (SME). The Approach to Distribution Asset Management (ADAM – contained in SIP10) is regarded as perhaps one of the most critical projects in the sustainability of the electricity distribution industry. The DoE appointed Aurecon to review the electricity distribution industry's asset status report and update the 2008 ADAM Business Case; thereby enabling the DOE to effectively plan and prioritise the execution of the ADAM asset rehabilitation initiative within the electricity distribution sector, including both Eskom and Municipal Distributors. The project involved the assessment and update of the EDI asset backlog, the development of short-term prioritised projects and an associated implementation strategy as well as the update of the original business case and associated governance structure and funding strategy.
 (Department of Energy (DoE))

Chokwe 120MW Gas Fired Power Station Pre-Feasibility Study (Maputo, Mozambique) 02/2014 - 08/2014. Subject Matter Expert (SME). The objective of the proposed project Engco Mozambique (Engco) is a developer for a proposed 120 MW natural gas fired power station to be located at Chokwé, Mozambique. Engco have been granted ministerial approval from the Government of Mozambique to proceed with the development and have appointed Eaglestone for financial and legal advisory services on the project. Aurecon has been engaged by Engco as technical advisor for the project, with the scope of undertaking a pre-feasibility study for the power station and supporting infrastructure. The specific responsibility on this project was the development of the grid connection and power evacuation requirements. This involved the development of connection and evacuation options, the modelling and analysis of these and the concept design and budget cost estimates to enable the preferred connection and evacuation option.
 (Engco Group)

EU SE4All: Analysis and Re-design of the existing concept for Off-Grid Rural Electrification in South Africa (EU, Nicosia, Cyprus) 02/2014 - 08/2014. Subject Matter Expert (SME). A Non-Grid Highway report was produced on request by the Department of Energy (DoE), funded through

the European Commission's Technical Assistance Facility (TAF) within the Sustainable Energy for All programme. The report reviewed the current non-grid electrification programme within South Africa and identified a number of challenges and proposed a range of solutions to address these challenges. These proposals were largely untested in terms of their feasibility and their alignment with the DoE's non-grid electrification plans. In addition, the proposals, as they stood, were not in alignment with the TAF's implementation modalities in terms of the nature and duration of assistance proposed.

The objective of this project was to review the Non-Grid Highway report and to determine the feasibility of the recommendations contained within as well as ensuring alignment with DoE's non-grid plans. Once these conditions were met, the key task of this project was to 'repackage' the key proposals in a way that was more consistent with the TAF's implementation modalities. To this end, the project developed a number of ToRs (seven in total) which collectively address the full range of technical assistance required by the DoE in achieving a sustainable non-grid programme. (European Union, HCL Consultants Ltd)

Grid reinforcement works for increased access to electricity (Lusaka, Zambia) 11/2011 - 12/2013.

Planning Engineer and Subject Matter Expert (SME). The Government of Zambia appointed Aurecon to provide consultancy services to increase access to electricity services. The objective of the proposed project was to improve the efficiency and quality of the distribution system in targeted areas in Zambia. This was achieved by reinforcing existing distribution networks, intensifying existing grids in peri-urban areas, by energy efficiency and demand side management, and by access expansion like grid extension to rural areas. Responsible for the design review previously done by others, the development of a high-level area demand forecast and recommendation of a suitable network design. (Zambia Electricity Supply Commission (ZESCO))

Copperbelt Energy Corporation due diligence, Preliminary Assessment of CEC's Capacity to import 300MW from Kudu power project in Namibia. (Zambia) 08/2013 - 09/2013. The project's objective was to conduct a Market Assessment to determine whether adequate purchase and power supply agreements have been entered into between CEC and prospective customers as well as to assess potential infrastructure constraints which may hinder the ability of Kudu Power Project to evacuate the 300MW of power from the Namibia border to CEC's customers. As project director responsible for all aspects of the project.

Feasibility study for a 5GW solar corridor in South Africa with Phase 1 (1 GW) on the Prieska Solar Park (CEF, South Africa) 02/2013 - 12/2013. Stream lead: Site and Infrastructure. Following Cabinet approval of the South African's Policy-Adjusted Integrated Resource Plan (IRP) 2010, energy from renewable sources will be expected to make up a substantial 42% of all new electricity generation in South Africa over the next 20 years. In order to create efficiencies in both cost and effort and stimulate local manufacturing it has been proposed that a large scale 5 GW "Solar Corridor" be developed where centralised infrastructure can benefit a number of IPPs in the park. It has been proposed that the first 1 GW "Solar Park" be established near the town of Prieska in the Northern Cape. The Park would have centralised infrastructure which would supply a number of IPP's for a predetermined generation mix. Responsible for all site and infrastructure aspects relating to the Transmission Grid connection as well as the Internal Collector Grid.

Alignment of the Emergency Scope of Work for Freetown Transmission and Distribution Network to facilitate the integration of the Kissy HFO Power Plan (CEC Africa), Sierra Leone) 08/2013 - 11/2013.

Project Director: The object of this assignment was to assess the impact and viability of the current CEC Africa "Emergency Work" to enable the existing network to adequately evacuate the current installed generation. Secondly to develop a short-to medium-term strengthening, expansion and renewal strategy to integrate the Kissy 50 MW HFO plant into the Freetown Transmission and Distribution network. Lastly, to align the emergency scopes of work identified by CEC Africa (Sierra Leone), the World Bank (WB) as well as the Islamic Development Bank (IDB) with reference to the existing short-term emergency requirements. Responsible for all aspects of the project, including client liaison, modelling and analysis, strategic guidance, conclusions and recommendations to the client.

Maputo distribution network planning (Mozambique) 02/2013 - 08/2013. Project Director. The Government of India has granted Electricidade De Moçambique (EdM) a long-term loan towards the expansion and rehabilitation of the transmission and distribution networks within Maputo. The project involved the upgrading and expansion of existing 275kV transmission networks, the creation of new 275kV transmission lines and associated 275/66kV supply substations supplying the city, the upgrading and expansion of 66/11kV substations, the rebuilding of existing 11kV switching stations, the establishment of new 11kV switching stations and the upgrading and expansion of associated 11kV distribution networks. Responsible for the planning, design, tender documentation, tender evaluation and contractor appointment. Involved for 4 person-months. (Overseas Infratech Corp).

City Power Network master plan - Spatial Development Perspective (SDF) (Gauteng Province, South Africa) 10/2012 - 10/2013. *Project Director.* The City of Johannesburg developed a revised spatial development framework, aligning the long-term expansion and development of the City with key socio-economic strategies. The objective of this project was to review the existing bulk infrastructure plan and to align this plan to the revised Spatial Development Perspective. Responsible for all aspects of the project with specific guidance to the project team in both technical and strategic perspective. Involved for 2 person-months. (City Power Johannesburg).

Revised assessment on the generation capacity connection in 2016 of renewable energies throughout South Africa (Gauteng Province, South Africa) 01/2012 - 01/2013. *Project Director.* The project is in response to the South African Government's drive for renewable energy (RE) integration. Within the 2010 IRP, high levels of RE integration are expected to be connected onto the grid by 2027 as part of the new build program. However, in the short to medium term (up to 2019), 4200 MW (wind 3800 MW; solar 400 MW) must be connected. It is therefore necessary to determine the available transmission infrastructure to connect the proposed renewable energy sources to the grid. The availability of grid capacity to connect renewable energy sources will be a key input into determining what can be connected in the short-term (i.e. without backbone strengthening) and also in the long-term. This project assessed the grid connection capacity for the 2016 network Eskom Transmission network through modelling and analysis within PSS/E. Responsible for the development and delivery of the project, specific guidance to the modelling and analysis of the Eskom transmission network as well as the development of conclusion, recommendations and interaction with the client. Involved for 1 person-month. (Eskom Holdings SOC).

Eskom transmission Renewable Energy (RE) Independent Power Producer (IPP) integration (Gauteng Province, South Africa) 05/2012 - 07/2013. *Project Director.* The South African Integrated Resource Plan (IRP) is a 20 year electricity capacity plan. The plan aims to provide an indication of the country's electricity demand, how this demand will be supplied and what the associated cost will be. In terms of the IRP2010 the Government undertook to increase South Africa's total installed electricity capacity by 170% by 2030. The renewable portion of this capacity is set out as generation determinations governed by Section 34 of the Energy Regulation Act. The rollout of this capacity is done through generation determinations by which eligible IPP's bid within specific windows or timeframes for specific allocations. The objective of this project was to spatially identify all applications (more than 600) and to develop high-level network integration plans for each. Responsible for all aspects of the project, including client liaison, modelling and analysis, strategic guidance, conclusions and recommendations to the client. Involved for 2 person-months. (Eskom Holdings SOC).

Grid reinforcement works for increased access to electricity (Lusaka, Zambia) 11/2011 - 12/2013. *Planning Engineer and Subject Matter Expert (SME).* The Government of Zambia appointed Aurecon to provide consultancy services to increase access to electricity services. The objective of the proposed project was to improve the efficiency and quality of the distribution system in targeted areas in Zambia. This was achieved by reinforcing existing distribution networks, intensifying existing grids in peri-urban areas, by energy efficiency and demand side management, and by access expansion like grid extension to rural areas. Responsible for the design review previously done by others, the development of a high-level area demand forecast and recommendation of a suitable network design. Involved for 2 person-months. (Zambia Electricity Supply Commission (ZESCO)).

Network master plan for Eskom North Eastern Region: Hazyview and Nelspruit (Mpumalanga Province, South Africa) 02/2011 - 08/2012. *Project Leader and Subject Matter Expert (SME).* The project focused specifically on the identification, sizing and timing of long-term (20 year) sub-transmission electrical infrastructure requirements. Responsible for all technical, commercial and project management aspects of the project. Involved for 3 person-months. (Eskom Holdings, North Eastern Region).

Eskom Eastern Region (Pietermaritzburg Field Service Area (FSA)) network master plan (KwaZulu-Natal Province, South Africa) 02/2011 - 08/2012. *Project Leader and Subject Matter Expert (SME).* The project focused specifically on the identification, sizing and timing of long-term (20 year) sub-transmission electrical infrastructure requirements. Responsible for all technical, commercial and project management aspects of the project. Involved for 3 person-months. (Eskom Holdings, Eastern Region).

Mbombela infrastructure master plan (Mpumalanga Province, South Africa) 12/2011 - 06/2012. *Planning Engineer and Subject Matter Expert (SME).* Aurecon was appointed to develop a long-term (20-year) sub-transmission infrastructure master plan. Responsible for all aspects of the project, including information gathering, development perspective, demand forecast, network assessment, alternative selection, network analysis, investment options and project management. Involved for 3 person-months. (Mbombela Local Municipality).

Refurbishment plan for Eskom North East Region (Mpumalanga Province, South Africa) 07/2011 - 12/2011. *Project Leader and Subject Matter Expert (SME).* The project involved the development of short- to medium-term refurbishment projects for the Eskom North East Region. Responsible for all technical, commercial and project management aspects of the project, including the development of refurbishment criteria, the assessment of sub-transmission and distribution networks and the recommendation of refurbishment projects. Involved for 2 person-months. (Eskom Holdings).

Eskom Transmission Generation Connection Capacity Assessment (GCCA) 2016 (Gauteng Province, South Africa) 03/2011 - 12/2011. *Principal Engineer.* The project comprised conducting the renewable Generation Connection Capacity Assessment (GCCA) for the entire Eskom Transmission grid for the year 2016. Responsible for all technical, commercial and project management aspects of the project, including building assessment models within Power System Simulator for Engineering (PSS/E), and conducting transfer limit analysis under steady-state and contingency conditions. Involved for 3 person-months. (Eskom Transmission).

Review of national electricity demand forecast (Gaborone, Botswana) 10/2010 - 05/2012. *Planning Engineer and Subject Matter Expert (SME).* Botswana Power Corporation, through consultant services, conducted a 10-year Transmission Development Plan in 2006 and a 10-year Distribution Development Plan in 2001. For each study, a review of the national demand forecast was done. A holistic update of the load forecast was required to review load forecast assumptions, capture new load that has been added and to take into account expected future load growth. Responsible for all technical, commercial and project management aspects of the project. Involved for 4 person-months. (Botswana Power Corporation (BPC)).

Distribution network reliability optimisation modelling for Eskom Distribution (South Africa) 02/2010 - 06/2011. *Principal Engineer.* Aurecon was appointed to provide distribution network reliability optimisation modelling for Eskom Distribution. This project's studies addressed the effect of Capital Expenditure (CAPEX) on the performance of sub-transmission networks. In addition, a simplified software module was developed as part of the exercise to aid engineers to calculate substation-related reliability parameters when planning, designing or refurbishing the sub-transmission networks. Responsible for all aspects of the project, including information gathering and review, concept development, network modelling and analysis, conclusions and recommendations and project management. Involved for 3 person-months. (Eskom Distribution).

Refurbishment Network Master Plan (NMP) for Eskom Southern Region (Eastern Cape Province, South Africa) 10/2010 - 12/2011. *Project Leader and Subject Matter Expert (SME).* The appointment entailed the development of a long-term equipment (3.3kV of up to 132kV) refurbishment plan, and to integrate the plan into the existing long-term Network Master Plan (NMP). Responsible for all technical, commercial and project management aspects of the project. Involved for 3 person-months. (Eskom Holdings, Southern Region).

Eskom DXNRDM (Gauteng Province, South Africa) 02/2010 - 11/2010. *Project Leader and Subject Matter Expert (SME).* The project involved developing reliability models for Eskom sub-transmission and substation to assess the relationship between capital investment and reliability improvements, including System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), and Frequency and Duration (F&D). Responsible for all technical, commercial and project management aspects of the project. Involved for 4 person-months. (EON Consulting).

Feasibility study for the rural electrification project in Niassa Province (Niassa Province, Mozambique) 05/2009 - 05/2012. *Principal Engineer.* The project involved a feasibility study of rural electrification in Niassa Province. The main objective was to evaluate the technical and financial feasibility of electrifying the capital districts of Mecula and Nipepe, including neighbouring towns through a connection to the national grid. The study specifically focused on the development of a 215km, 110kV transmission line from the existing Cuamba substations to a proposed new 110/33kV substation to be positioned at Marrupa. Responsible for all commercial and project management aspects of the project, including village site inspections, the development of a feasibility model, village demand forecast, electrification and transmission network modelling and analysis, feasibility modelling and analysis and project reporting. Involved for 6 person-months. (Electricidade de Moçambique (EDM)).

Eskom Western Region (Western West Coast Area) network master plan (Western Cape Province, South Africa) 10/2009 - 05/2012. *Project Leader and Subject Matter Expert (SME).* The project focused specifically on the identification, sizing and timing of long-term (20 year) sub-transmission electrical infrastructure requirements. Responsible for all technical, commercial and project management aspects of the project. Involved for 4 person-months. (Eskom Holdings, Western Region).

eThekwini Asset Management Plan (AMP), Phase 1 (KwaZulu-Natal Province, South Africa) 04/2009 - 05/2010. *Principal Engineer.* The appointment comprised the development of an Asset Management Plan (AMP) for the existing sub-transmission network's infrastructure assets, including financial forecasting and reporting. Responsible for all aspects of the long-term infrastructure development portion of the project. Involved for 2 person-months. (eThekwini Metropolitan Municipality).

Integrated infrastructure asset management and master planning for eThekwini Electricity (KwaZulu-Natal Province, South Africa) 04/2009 - 10/2010. *Project Leader and Subject Matter Expert (SME).* eThekwini Electricity initiated an asset management project to assist in achieving numerous deliverables. These included the analysis of asset failure modes and related risks; levels of service and key performance indicators relating to eThekwini Electricity assets; demand analysis and forecasting; asset maintenance and capital refurbishment options; asset financial cash flows and renewal/replacement strategies. Responsible for all technical, commercial and project management aspects of the project. Involved for 5 person-months. (eThekwini Metropolitan Municipality).

eThekwini Network Master Plan (NMP) (KwaZulu-Natal Province, South Africa) 04/2009 - 10/2010. *Project Leader and Subject Matter Expert (SME).* The appointment formed part of the eThekwini infrastructure asset management project, and comprised the development of a 20-year demand forecast and long-term (20-year) sub-transmission Network Master Plan (NMP). Responsible for all technical, commercial and project management aspects of the project. Involved for 5 person-months. (eThekwini Metropolitan Municipality).

Swaziland distribution study (Mbabane, Swaziland) 05/2009. *Principal Engineer.* The project involved the development of a distribution Network Master Plan (NMP) for Mbabane and the surrounding areas. Responsible for all technical, commercial and project management aspects of the project. Involved for 3 person-months. (Swaziland Electricity Board (SEB)).

Feasibility studies for the Piet Retief coal fired power station (Mpumalanga Province, South Africa) 04/2008 - 08/2009. *Principle Engineer.* Unión Fenosa, Kangra Coal (Pty) Ltd and the Shanduka Group, as joint developers, decided to submit a proposal in response to enquiries under Eskom's base load programme. Aurecon was approached by the developer to assist with feasibility related tasks in the development of a coal fired power station. Responsible for all aspects of the project, including data verification, network modelling, load flow, contingency, transient stability analysis, conclusions, recommendations, reporting and presentation to the client. Involved for 1.5 person-months. (Unión Fenosa/Kangra Coal).

Refurbishment plan for Eskom Central Region: Vereeniging (Gauteng Province, South Africa) 09/2008 - 09/2009. *Project Leader and Subject Matter Expert (SME).* The appointment comprised the development of a refurbishment plan for the sub-transmission network equipment within the Vereeniging Field Service Area (FSA). Responsible for all technical, commercial and project management aspects of the project. Involved for 2 person-months. (Eskom Holdings, Central Region).

Bushbuckridge (BBR) urban renewal project (Mpumalanga Province, South Africa) 11/2008 - 08/2009. *Planning Engineer.* Aurecon was appointed to develop a long-term (20-year) master plan in support of the Bushbuckridge (BBR) urban renewal programme. Responsible for all aspects of the project, including information gathering, demand forecast, network assessment, alternative selection, network analysis, investment options and project management. Involved for 2 person-months. (Bushbuckridge Local Municipality).

Upgrading of a master plan for the Rustenburg supply area (North West Province, South Africa) 10/2008 - 11/2009. *Principal Engineer.* Aurecon was appointed to develop a long-term (20-year) sub-transmission infrastructure master plan for the supply areas of Rustenburg, including mapping of the study area, geo-based load forecast, and analysis and optimisation of existing networks. Responsible for all aspects of the project, including information gathering, development perspective, demand forecast, network assessment, alternative selection, network analysis, investment options and project management. Involved for 3 person-months. (Rustenburg Local Municipality).

Lesotho Electricity Corporation (LEC) asset inventory and valuation project (Lesotho) 07/2008 - 05/2009. *Principal Engineer.* The project involved carrying out a comprehensive inventory (registering) and valuation (complying with IFRS) and the development of an asset register of the Lesotho Electricity Corporation's (LEC) assets (complying with IFRS). The project included an asset management strategy and the capturing of GPS and field data for the condition assessment of the main assets. Responsible for the

field inspection, assessment criteria development and condition assessment and asset valuation of all substations. Involved for 2 person-months. (Lesotho Electricity Corporation (LEC)).

DX 341 relationship between Capital Expenditure (CAPEX) and network performance for Eskom Distribution (South Africa) 11/2007 - 10/2009. Principal Engineer. Eskom Distribution needed to understand how much it would cost to achieve a range of improvements in network performance, and what would be the most cost-effective options to achieve these improvements. Aurecon was appointed to develop criteria and models; define and list infrastructure options; establishing costs; and developing an approach. Responsible for all technical, commercial and project management aspects of the project. Involved for 4 person-months. (Eskom Southern Region).

Master plan for energy supply for Margate Field Service Area (FSA) (KwaZulu-Natal Province, South Africa) 09/2007 - 05/2009. Project Manager. The study focussed on the evaluation and recommendation of a master plan for energy supply in the Eskom central region. The Margate master plan study area is bordered to the west by the mountain kingdom of Lesotho and to the east by the Indian Ocean. The north-western area borders on the Sehlabathebe National Park and the north-eastern border is the R603 road at the coastal town of Winkelspruit. The southern boundary is formed by the Tina River within the Eastern Cape Province. Responsible for all aspects of the project, including information gathering, development perspective, demand forecast, network assessment, alternative selection, network analysis, investment options and project management. Involved for 2 person-months. (Eskom).

Master plan for energy supply for Eskom Northern Region (Pretoria Field Service Area (FSA) (Gauteng Province, South Africa) 10/2007 - 03/2009. Project Leader and Subject Matter Expert (SME). The study focussed on the evaluation and recommendation of a master plan for energy supply in the Eskom Northern Region (Pretoria FSA). This region encompassed the area north of Tshwane, including District and Local Municipalities of Metsweding (Kungwini and Nokeng tsa Taemane), Bojanala (Moretele, Madibeng, Rustenburg and Moses Kotane), Nkangala (Thembisile) and Waterberg (Bela Bela). Responsible for all technical, commercial and project management aspects of the project. Involved for 4 person-months. (Eskom Holdings, Northern Region).

Evaluation and recommendation of a master plan for energy supply for Eskom Central Region (Sandton) (Gauteng Province, South Africa) 05/2007 - 02/2009. Project Leader and Subject Matter Expert (SME). The study focussed on the evaluation and recommendation of a master plan for energy supply in the Eskom Central Region in Sandton. The majority of the study area covered the north of Johannesburg. The western boundary covered a portion of Ekurhuleni Metropolitan Municipality, while the eastern boundary covered a small portion of Mogale City Local Municipality and the northern boundary covered a small portion of the City of Tshwane Metropolitan Municipality. Responsible for all technical, commercial and project management aspects of the project. Involved for 5 person-months. (Eskom Holdings, Central Region).

Development of a long-term strengthening and refurbishment master plan for Ekurhuleni network (Gauteng Province, South Africa) 09/2007 - 02/2009. Planning Engineer. The project involved the development of a long-term strengthening and refurbishment plan for the Ekurhuleni Metropolitan Municipality sub-transmission networks. The services entailed the description of actual services, developing a consolidated network schematic and geo-schematic for the previous nine municipalities in the area, and developing a demographic and economic perspective for the area. Responsible for all aspects of the project, including information gathering, development perspective, demand forecast, network assessment, alternative selection, network analysis, investment options and project management. Involved for 4 person-months. (Ekurhuleni Metropolitan Municipality (EMM)).

Margate field services network master plan (KwaZulu-Natal Province, South Africa) 09/2007 - 08/2009. Project Leader and Subject Matter Expert (SME). The project entailed the compilation of a network master plan to ensure proactive planning for the energy needs for the Margate Field Services Area (Margate FSA). Aurecon was commissioned to evaluate and recommend a master plan for energy supply within the study area. The Margate FSA area consists of the Southern portions of KwaZulu-Natal Province and the northern portions of the Eastern Cape Province. Responsible for all technical, commercial and project management aspects of the project. Involved for 3 person-months. (Eskom Holdings: Eastern Region).

Master plan for energy supply for Peninsula Field Service Area (FSA) (Western Cape Province, South Africa) 10/2007 - 03/2009. Project Manager. The study focussed on the evaluation and recommendation of a master plan for energy supply in the Eskom western region (Peninsula area). The Peninsula network master plan study area mainly consisted of the Cape Peninsula area (City of Cape Town), Drakenstein Municipal area, Stellenbosch Municipal area, the southern area of the Swartland Municipal area (including

Malmesbury and Riebeeck-West) and the western area of the Theewaterskloof Municipal area (Grabouw and Elgin). Responsible for all aspects of the project, including information gathering, development perspective, demand forecast, network assessment, alternative selection, network analysis, investment options and project management. Involved for 3.5 person-months. (Eskom Distribution: Gauteng Operating Unit).

Review and financial analysis for City Power network master plan (Gauteng Province, South Africa) 08/2007 - 05/2008. *Planning Engineer and Subject Matter Expert (SME).* The project focused specifically on the identification, sizing and timing of long-term (20 year) sub-transmission electrical infrastructure requirements. The primary drivers for this new infrastructure are typically growth in the existing electricity demand, expected future demand, infrastructure renewal requirements and network performance improvement requirements. Responsible for all technical, commercial and project management aspects of the project. Involved for 4 person-months. (City Power Johannesburg).

Eskom feasibility and Network Development Plans (NDPs): Wesizwe (North West Province, South Africa) 04/2007 - 02/2008. *Planning Engineer.* The appointment involved the development of a Network Development Plan (NDP) for the Wesizwe area; and the assessment of the network requirements to connect new mine loads to the Eskom transmission and sub-transmission network. Responsible for all technical, commercial and project management aspects of the project. Involved for 2 person-months. (Eskom Holdings: North West Region).

Integration of Kangra coal fired power station (KwaZulu-Natal Province, South Africa) 02/2007 - 03/2007. *Principal Engineer.* The appointment comprised the assessment of the feasibility of connecting a 600MW coal fired generation plant to the Eskom transmission network. Responsible for all integration studies, including transmission and generation network modelling and steady-state, contingency and transient stability analysis, transmission infrastructure requirements and cost estimates. Involved for 2 person-months. (Unión Fenosa).

Network master plan for Eskom Central Region (Gauteng Province, South Africa) 08/2006 - 07/2007. *Planning Engineer.* The appointment involved the development of a long-term network master plan for the Central Field Service Area (FSA). Responsible for all technical, commercial and project management aspects of the project. Involved for 5 person-months. (Eskom Holdings, Central Region).

Network master plan for Eskom Southern Region (Eastern Cape Province, South Africa) 11/2006 - 04/2007. *Planning Engineer.* The appointment involved the development of a long-term network master plan for the entire Southern Region. Responsible for all technical, commercial and project management aspects of the project. Involved for 6 person-months. (Eskom Holdings, Southern Region).

Infrastructure master plan for Rustenburg (North West Province, South Africa) 02/2006 - 06/2006. *Planning Engineer.* The appointment comprised the development of a long-term (20-year) sub-transmission infrastructure master plan. Responsible for all aspects of the project, including information gathering, development perspective, demand forecast, network assessment, alternative selection, network analysis, investment options and project management. Involved for 3 person-months. (Rustenburg Local Municipality).

Infrastructure master plan for Stellenbosch (Western Cape Province, South Africa) 04/2006 - 08/2006. *Planning Engineer.* The appointment entailed the development of a long-term (20-year) sub-transmission infrastructure master plan. Responsible for all aspects of the project, including information gathering, development perspective, demand forecast, network assessment, alternative selection, network analysis, investment options and project management. Involved for 4 person-months. (Stellenbosch Local Municipality).

Network master plan for Alexandra (Gauteng Province, South Africa) 05/2006 - 08/2006. *Planning Engineer.* The appointment involved the development of a short- to medium-term network rehabilitation and expansion plan for the Alexandra Renewal Project (ARP). Responsible for all aspects of the project, including information gathering, development perspective, demand forecast, network assessment, alternative selection, network analysis, investment options and project management. Involved for 2 person-months. (City Power).

Eskom feasibility and Network Development Plans (NDPs): Turnberry (North West Province, South Africa) 10/2006 - 11/2006. *Planning Engineer.* The appointment comprised the development of a Network Development Plan (NDP) for the Turnberry area and the assessment of the network requirements to connect new mine loads to the Eskom transmission and sub-transmission network. Responsible for all technical,

commercial and project management aspects of the project. Involved for 2 person-months. (Eskom Holdings, North West Region).

Connection of the Bulyanhulu and Buswagi plants (Mwanza, Tanzania) 11/2005 - 04/2006. Principal Engineer. The project involved the assessment of transmission network reinforcement requirements to connect the Bulyanhulu and Buswagi plants to the Tanzania Electric Supply Company's (TANESCO's) transmission network. Responsible for all option identification, selection, modelling and analysis of the plant integration. Involved for 2 person-months. (BEC Engineering).

Ekurhuleni Power Quality (PQ) programme (Gauteng Province, South Africa) 08/2005 - 12/2005. Principal Engineer. The appointment entailed identifying the most suitable locations for the installation of Power Quality (PQ) instruments within the municipality's network, for the purpose of recording and reporting power quality parameters in accordance to NRS048. Responsible for all technical, commercial and project management aspects of the project. Involved for 3 person-months. (Ekurhuleni Metropolitan Municipality (EMM)).

Williams Diamond Mine (Mwanza, Tanzania) 11/2005 - 12/2005. Principal Engineer. The project entailed the assessment of transmission network reinforcement requirements to connect the Williams Diamond plant to the Tanzania Electric Supply Company's (TANESCO's) transmission network. Responsible for all option identification, selection, modelling and analysis of the plant integration. Involved for 1 person-month. (De Beers Group Services (Pty) Ltd).

City Power asset valuation (Gauteng Province, South Africa) 04/2005 - 12/2005. Principal Engineer. The project involved conducting an asset valuation of City Power's transmission and distribution infrastructure to establish a comprehensive asset database that complies with financial and electricity industry standards and to compute a valuation for all power system resource assets. Responsible for the set-up of asset categories, valuation criteria, field inspection and the valuation of all transmission assets. Involved for 3 person-months. (City Power).

Academic experience

University of Pretoria, South Africa

- Post graduate lecturer - Power System Reliability course

Education

2000 : MEng Electrical (Cum Laude), University of Pretoria, South Africa
 1996 : BEng (Hons) Electrical, University of Pretoria, South Africa
 1994 : BEng Electrical, University of Pretoria, South Africa

Languages

	Reading	Writing	Speaking
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

Publications

Cameron MJ, Carter-Brown C, and Vrey DJ, 2008. "Cost and Performance Implications of Infrastructure Investment Options in the Eskom Distribution Network". Association of Municipal Electricity Utilities (AMEU) Convention, 27 - 29 October 2008, Buffalo City.

Vrey DJ, and Fourie L, 2008. "Investment Imperatives for Utilities to Ensure Sustainable Electrical Infrastructure Development". Association of Municipal Electricity Utilities (AMEU) Convention, Buffalo City.

Austria RR, Xiaokang XU, du Preez MEN, and Vrey DJ, 2001. "A New Probabilistic Approach for Reliability Assessment of Urban Networks". IEEE Power & Energy Society (IEEE PES) Summer Meeting, Vancouver, Canada.

Vrey DJ, and Schultz C, 1999. "Frequency and Duration Assessment of Failure Events for Different Substation Configurations". SA Power Quality Conference, Johannesburg.

Vrey DJ, and du Preez MEN, 1999. "Probabilistic Planning Applications to Evaluate Alternative Composite Network Options". Electric Power Engineers Association (EPEA) Conference, Johannesburg.

Vrey DJ, and Schultz C, 1998. "Enhancing Sub-Transmission Expansion Planning Through Incremental AM/FM Implementation". Association of Municipal Electricity Utilities (AMEU) Conference, Cape Town.

Hancke G, and Vrey DJ, 1994. "Electric Load Monitoring and Control in the Domestic Environment". Conference Proceedings 10th Anniversary IMTC94 Advanced Technologies in IM 1994 IEEE Instrumentation and Measurement Technology.

By my signature below I certify the correctness of the information above and my availability to undertake this assignment.



Signature of Staff Member

19/08/2014

Date

PUBLICATIONS (see attached list):

- Three refereed articles (S.A. Journal of Plant and Soil)
- Nine Congress papers/posters
- S.A. Soil Classification (1991) (Member of working group)
- Seven 1:250 000 Land Type Maps
- Three Land Type Memoirs
- More than 200 soil survey reports and/or maps

COURSES COMPLETED:

- Course in Project Management (University of Stellenbosch)
- Course in Junior Personnel Management (Dept of Agriculture)
- Course in Handling of Grievances and Complaints (Dept of Agriculture)
- Course in Marketing (ARC-ISCW)
- Course in National Qualifications Framework Assessment, ARC-CO
- Training Course in Ground Penetrating Radar (GSSI, USA)
- Introduction to ArcGIS 8, GIMS, 2004

PROFESSIONAL STATUS:

- Registered Natural Scientist: Soil Science (SA National Council for Natural Scientific Professions) – registration number 400463/04
- Member of South African Soil Classification Working Group, 1990-present
- Convenor of South African Soil Classification Working Group, 2013-
- Member of Soil Science Society of South Africa (1982-present)
- President of Soil Science Society of South Africa (2005-2007)
- Member of South African Soil Survey Organisation (2000-present)
- Council Member of South African Soil Survey Organisation (2002-2003)
- Member of International Erosion Control Association
- Scientific Referee, S.A. Journal for Plant and Soil
- External Examiner, University of Pretoria, University of Witwatersrand, University of Venda

AWARDS:

Best article on Soil Science, South African Journal for Plant and Soil, 2011

MISCELLANEOUS:

- Editor, Soil Science Society newsletter, 1993-present
- Member, Clapham High School (Pretoria) Governing Body 1998-2002
- Member, Northern Gauteng Football Referee's Association
- Committee Member, Rosslyn Golf Club (Club Champion 2002 and 2007)

INTERESTS:

Sport, especially golf and soccer; wildlife; reading; music

REFEREES:

Mr T.E. Dohse, ARC-Institute for Soil, Climate and Water.
Tel: 082 324 5389

Prof Robin Barnard, ARC-Institute for Soil, Climate and Water
Tel: 012 310 2549

Prof M.C. Laker (retired), (012) 361-2900; 082 785 5295

PUBLICATIONS LIST:

Refereed Articles:

BÜHMANN, C., KIRSTEN, W.F.A., PATERSON, D.G. & SOBCZYK, M.E., 1993. Pedogenic differences between two adjacent basalt-derived profiles. 1. Textural and chemical characteristics. *S. Afr. J. Plant & Soil*, 10: 155-161

BÜHMANN, C., KIRSTEN, W.F.A., PATERSON, D.G. & SOBCZYK, M.E., 1994. Pedogenic differences between two adjacent basalt-derived profiles. 2. Mineralogical characteristics. *S. Afr. J. Plant & Soil*, 11: 5-11

PATERSON, D.G. & LAKER, M.C., 1999. Using ground penetrating radar to investigate spoil layers in rehabilitated mine soils. *S. Afr. J. Plant & Soil*, 16:131-134.

PATERSON, D.G., BÜHMANN, C., PIENAAR, G.M.E. & BARNARD, R.O., 2011. Beneficial effect of palm geotextiles on inter-rill erosion in South African soils and mine dam tailings: a rainfall simulator study. *S. Afr. J. Plant & Soil*, 28: 181-189.

PATERSON, D.G. & BARNARD, R.O., 2011. Beneficial effect of palm geotextiles on inter-rill erosion in South African soils. *S. Afr. J. Plant & Soil*, 28: 190-197.

BHATTACHARRYA, R., FULLEN, M.A., BOOTH, C.A., KERTESZ, A., TOTH, A., SZALAI, Z., JAKAB, G., KOZMA, K., JANKAUSKAS, B., JANKAUSKIENE, G., BÜHMANN, C., PATERSON, D.G., MULIBANA, N.E., NELL, J.P., VAN DER MERWE, G.M.E., GUERRA, A.J.T., MENDONCA, J.K.S., GUERRA, T.T., SATHLER, R., BEZERRA, J.F.R., PERES, S.M., ZHENG YI, LI YONGMEI, TANG LI, PANOMTARANICHAGUL, M., PEUKRAI, S., THU, D.C., CUONG, T.H., TOAN, T.T., 2011. Effectiveness of biological geotextiles for soil and water conservation in different agro-environments. *Land Degradation and Development*, 22: 495-504.

FULLEN, M.A., SUBEDI, M., BOOTH, C.A., SARSBY, R.W., DAVIES, K., BHATTACHARRYA, R., KUGAN, R., LUCKHURST, D.A., CHAN, K., BLACK, A.W., TOWNROW, D., JAMES, T., POESEN, J., SMETS, T., KERTESZ, A., TOTH, A., SZALAI, Z., JAKAB, G., JANKAUSKAS, B., JANKAUSKIENE, G., BÜHMANN, C., PATERSON, D.G., MULIBANA, N.E., NELL, J.P., VAN DER MERWE, G.M.E., GUERRA, A.J.T., MENDONCA, J.K.S., GUERRA, T.T., SATHLER, R., BEZERRA, J.F.R., PERES, S.M., ZHENG YI, LI YONGMEI, TANG LI, PANOMTARANICHAGUL, M., PEUKRAI, S., THU, D.C., CUONG, T.H., TOAN, T.T., JONSYN-ELLIS, F., SYLVA, J.T., COLE, A., MULHOLLAND, B., DERALOVE, M., CORKILL, C. & TOMLINSON, P., 2011. Utilising biological geotextiles: introduction to the Borassus Project and global perspectives. *Land Degradation and Development*, 22: 453-462.

SMETS, T., POESEN, J., BHATTACHARRYA, R., FULLEN, M.A., SUBEDI, M., BOOTH, C.A., KERTESZ, A., SZALAI, Z., TOTH, A., JANKAUSKAS, B., JANKAUSKIENE, G., GUERRA, A.J.T., BEZERRA, J.F.R., ZHENG YI, PANOMTARANICHAGUL, M., BÜHMANN, C. & PATERSON, D.G., 2011. Evaluation of biological geotextiles for reducing runoff and soil loss under various environmental conditions using laboratory and field data. *Land Degradation and Development*, 22: 480-494.

NETHONONDA, L.O., ODHIAMBO, J.J.O. & PATERSON, D.G., 2012. Indigenous knowledge of climatic conditions for sustainable crop production under resource-poor farming conditions using participatory techniques. *Sustainable Agriculture Research*, 2 (1), 26-31.

NETHONONDA, L.O., ODHIAMBO, J.J.O. & PATERSON, D.G., 2012. Assessment of spatial variability of selected soil chemical properties in a communal irrigation scheme under resource-poor farming conditions in Vhembe District of Limpopo Province, South Africa. *African J. Agric. Res.* 7 (39), 5445-5492.

PATERSON, D.G., SMITH, H.J. & VAN GREUNEN, A., 2013. Evaluation of soil conservation measures on a highly erodible soil in the Free State province, South Africa. *S. Afr. J. Plant & Soil*, 30: 213-217.

PATERSON, D.G., TURNER, D.P., WIESE, L.D., VAN ZIJL, G.M., CLARKE, C.E. & VAN TOL, J., 2014. Spatial soil information in South Africa – situational analysis, limitations and challenges. *S. Afr. J. Science* (in press).

Books:

PATERSON, D.G. & MUSHIA, N.M., 2012. Chapter 32. Soil databases in Africa. *In: Handbook of Soil Science: Resource Management and Environmental Impacts (2nd Edn)*. Eds. P.M. Huang, Y Li & M.E. Sumner. CRC Press, Boca Raton FL.

SOIL CLASSIFICATION WORKING GROUP*, 1991. Soil classification. A taxonomic system for South Africa. Institute for Soil, Climate & Water, Pretoria.

* Co-author as member of Working Group

Theses:

PATERSON, D.G., 1998. The use of ground penetrating radar to investigate subsurface features in selected South African soils. Unpublished MSc Thesis, University of Pretoria.

PATERSON, D.G., 2014. The use of palm leaf mats in soil erosion control. Unpublished PhD Thesis, University of Pretoria.

Congress Papers:

PATERSON, D.G., 1987. The relationship between geology and soil type in the northern Kruger National Park. 14th Congress of the Soil Science Society of S.A. Nelspruit, 14-17 July 1987.

PATERSON, D.G., 1990. A study of black and red clay soils on basalt in the northern Kruger National Park. 16th Congress of the Soil Science Society of S.A. Pretoria, 9-12 July 1990.

PATERSON, D.G., 1992. The potential of ground penetrating radar as an aid to soil investigation. 17th Congress of the Soil Science Society of S.A. Stellenbosch, 28-30 Jan. 1992.

PATERSON, D.G., 1995. The complex soil mantle of South Africa. ARC Wise Land Use Symposium, Pretoria, 26-27 Oct. 1995

PATERSON, D.G. & LAKER, M.C., 1998. Locating subsoil features with ground penetrating radar. 21st Congress of the Soil Science Society of S.A. Alpine Heath, 20-22 Jan. 1998.

PATERSON, D.G., 2000. Mapping rehabilitated coal mine soils in South Africa using ground penetrating radar. Eighth International Conference on Ground Penetrating Radar, Gold Coast, Australia, 23-26 May 2000.

PATERSON, D.G. & VAN DER WALT, M., 2003. The soils of South Africa from the Land Type Survey. 24th Congress of the Soil Science Society of S.A., Stellenbosch, 20-24 Jan. 2003.

Land Type Maps:

PATERSON, D.G., 1990. 1:250 000 scale land type map 2230 Messina. Dept. Agriculture, Pretoria.

PATERSON, D.G. & HAARHOFF, D., 1989. 1:250 000 scale land type map 2326 Ellisras. Dept. Agriculture, Pretoria.

PATERSON, D.G., PLATH, B.L. & SMITH, H.W., 1987. 1:250 000 scale land type map 2428 Nylstroom. Dept. Agriculture, Pretoria.

PATERSON, D.G. & ROSS, P.G., 1989. 1:250 000 scale land type map 2330 Tzaneen. Dept. Agriculture, Pretoria.

PLATH, B.L. & PATERSON, D.G., 1987. 1:250 000 scale land type map 2426 Thabazimbi. Dept. Agriculture, Pretoria.

Land Type Memoirs:

PATERSON, D.G., PLATH, B.L. & SMITH, H.W., 1988. Field Investigation. In: *Land types of the maps 2426 Thabazimbi & 2428 Nylstroom. Mem. Agric. Nat. Res. S. Afr.* No. 10. Dept. Agriculture, Pretoria.

PATERSON, D.G., SCHOEMAN, J.L., TURNER, D.P., GEERS, B.C. & ROSS, P.G., 1989. Field Investigation. In: *Land types of the maps 2330 Tzaneen & 2430 Pilgrim's Rest. Mem. Agric. Nat. Res. S. Afr.* No. 12. Dept. Agriculture, Pretoria.

PATERSON, D.G., 1999. 1:250 000 land type survey of the former Ciskei (Unpublished). ISCW Report GW/A/99/24.

Also:

PATERSON, D.G., 1992. Ground penetrating radar applications in USA and South Africa. Report on an official study tour to USA, 13-29 July, 1991. ISCW Report GW/A/92/8.

PATERSON, D.G., 2000. Report on official overseas visit to GPR2000 Conference, Broadbeach, Australia, 23-26 May, 2000. ISCW Report GW/A/2000/40.

Plus ARC-ISCW Reports on:

- Ground penetrating radar investigations in: Kruger National Park; Enseleni, Natal; Weatherly, Maclear; Kleinkopje Mine
- Soil survey investigations at: Roodeplaat, Kathu, Steelpoort River, Palala River, Zeekoegat (Roodeplaat), Limpopo River, Lydenburg, Kendal, Clewer Sand (Witbank), Botha Sand (Witbank), Balmoral Colliery, Bafokeng (Rustenburg), Towoomba (Warmbaths), Hoefeld Stene (Middelburg), Quality Bricks (Witbank), Visagie Sand (Middelburg), Rosslyn, Coalbrook (Sasolburg), Stewart Coal (Delmas), Forzando Coal (Hendrina), Vaalgro (Vereeniging), Ratanda (Heidelberg), Elspark (Boksburg), Thorncliffe

Mine (Steelpoort), Jan Smuts Quarry (Boksburg), Ennerdale (Phase I & II), Thokoza, North Riding, Natalspruit (Alberton), Arnot, Kroondal (Phase I & II), Ga-Rankuwa, Hartebeespoort Dam, Kosmos, Assen, Grasmere, Magalies Moot (Pretoria), Valpre (Paulpietersburg), Cargo Carriers (Sasolburg), Waterval (Rustenburg), Rayton, Bronkhorstspuit, Zwavelpoort (Pretoria), Pietersburg, Trojan Mine (Steelpoort), Platinum Highway (Rustenburg), Moutse, Centurion, Salique (Klaserie), Northam, Greenside Colliery (Witbank), South Deep Mine (Westonaria), Bank Colliery, Steelpoort Platinum, Gautrain Route (Pta/Jbg), Rietspruit Mine (Ogies), Potgietersrus Platinum, Atok Mine (Lebowa), Blue Ridge Mine (Groblersdal), Ngodwana, Estancia (Breyton), Twickenham Mine (Steelpoort), Marikana.

CURRICULUM VITAE

Dr Cairns A R Bain (Pr.Sci.Nat.)

- Previous position:** Chief Scientist - Environmental Management
SHEQ Department Necsa at Pelindaba Retired 2009
- Qualifications:** BSc (hons) 1964, MSc(Physics) 1967, PhD(Oceanography) 1992 - University of Cape Town
Registered professional scientist (Pr.Sci.Nat.)
Various courses in Radiation Protection, Risk Assessment, Dose assessment, HAZOP, Environmental Management and auditing.
- Experience:** More than 45 years experience in nuclear and environmental matters , covering radiation protection, radioactive tracers in industry and environment, chemical & radiological environmental monitoring, public dose assessment modelling, environmental management of nuclear facilities, related nuclear license requirements, coastal oceanography and marine dispersion, radiological environmental impact of mining industry, radon hazard in housing, nuclear siting investigations (Koeberg NPS, Gouriqua, Vaalputs nuclear waste repository, PBMR facilities), evaluation of nuclear waste disposal facilities, environmental performance and standards review, safety & environmental assessment of chemical plants, investigation of safety/environmental events, environmental impact assessments (EIA) of chemical plants and new nuclear facilities including Fuel Plant for Pebble Bed Modular Reactor, communication with public, proficient in wide ranging legal & regulatory matters, liaison with authorities for water licence, air quality certificate and environmental approval of projects, preparation & review of documents for SHEQ system, quality system & nuclear industry, mentoring of students, supervision of several students for MSc degrees, moderator for MSc and MTech dissertations, serving on SABS/ISO 14001 environmental management technical committees, served on Advisory Committee Environmental Sciences (chairman) Tshwane University of Technology, Moderator for TUT Environmental Science BTech exams and projects.
- Employment** since 1967 with Necsa (then called AEB), firstly based at Southern Universities Nuclear Institute at Faure, Western Cape (now called iTemba Labs) then transferred to Pelindaba near Pretoria in 1985. Retired in 2009 as consulting Chief Scientist for Corporate Environmental Management at Necsa. Duties included radiation protection, dose assessment, nuclear and environmental licensing.
- Numerous scientific papers and conference contributions.
- Currently:** Retired with ad hoc consulting for nuclear industry and academic institutions. My most complex environmental project from the early 2000's was leading the Necsa EIA process for the Fuel Plant aspect of the Pebble Bed Modular Reactor (PBMR). I was part of the combined Eskom team that participated in all public meetings for the PBMR in major centres throughout South Africa and was chief reviewer of all EIR specialist reports for the PBMR Fuel Plant. '**Nuclear – 1**' Tasks undertaken include preparation and review of nuclear license documents for chapters of Site Safety Reports (SSR) including review of Ch 8 Emergency Planning for Thyspunt in Nov 2011 and Review of Ch 7 Potential Radiological Impact on Public and the Environment (PRIPE) in July 2013. Other activities have included assessment of Environmental Monitoring procedures for Nuclear – 1, Siting Reports, public dose assessment and public issues, critical review of Integrated Resource Plan for Electricity (IRP), presentation for COP17 and review of draft IAEA safety documents.

CONTACT: bainclan@vodamail.co.za cell 082 584 6666

June 2014

Albertus WC Marais - TECHNICAL DIRECTOR

CORE SKILLS

- Mining related hydrogeological investigations;
- Groundwater contaminant studies;
- Modelling impacts on the groundwater regime in terms of flow and contaminant transport;
- Hydro-geochemical characterisations;
- Mine dewatering studies and design;
- Engineering related groundwater modelling studies;
- Environmental management program reports;
- Groundwater monitoring programmes and hydrochemical analyses;
- Groundwater and aquifer assessments;
- Water-balance studies.

Details

Qualifications

MSc (Geohydrology), IGS (UFS)
Bloemfontein, SA, 1997

BSc (Hons) (Geology), UFS
Bloemfontein, SA, 1993

BSc (Geology, Geochemistry), UFS
Bloemfontein, SA, 1992

Memberships

MGSSA Member Geological
Society of SA;

International Mine Water
Association;

Water Institute of Southern Africa
(Mine Water);

Pr Sci Nat (40001206).

Languages

English - Fluent

Afrikaans - Fluent

Countries worked in

South Africa, Botswana, Niger,
Ghana, Burkina Faso, Democratic
of Congo (DRC), Malawi,
Madagascar, Russia

PROFILE

Alkie WC Marais is a specialist in groundwater services and manages the Water Group as Technical Director. The Water Group has specialist in terms of hydrology, contaminant site management, water resources and management undertaking

He has 19 years' experience and specialises in Mining related hydrogeological investigations, Groundwater contaminant studies, Modelling impacts on the groundwater regime in terms of flow and contaminant transport, Hydro-geochemical waste studies, Mine dewatering studies and design, Engineering related groundwater modelling studies, Environmental management program reports, Groundwater monitoring programmes and hydrochemical analyses, Groundwater and aquifer assessments and Water-balance studies.

Key project experience

PROFESSIONAL EXPERIENCE

- **Molo Graphite Project, Madagascar, Energizer, Present.** Undertaking the groundwater and hydro-geochemical components of the Bankable Feasibility Study. Managing the hydrological and dam yield analysis components.
- **Kayelekera Uranium Mine, Malawi, Paladin, 2013 to 2014.** Geochemical assessment of waste rock, tailings and marginal ore facilities. The study includes geochemical testing modelling and radio-active analysis.
- **Nkomati Mine Dewatering Study, South Africa, ARM & Norilsk Nickel, 2007 to 2014.** Design and management of the Nkomati Mine open pit section groundwater dewatering. Groundwater model simulations and design of future mine dewatering requirements.
- **Nkomati Mine Hydro-geochemical Studies, South Africa, ARM - Norilsk , 2007 to 2014.** Evaluated the ARD and leach potential of waste rock and tailings, followed by detailed hydro-geochemical modelling, advised the client and engineering team in terms of construction material, mitigation measures and water management. Groundwater flow and contaminant transport modelling were used as part of these studies.
- **Bomi Hills Iron Project IA, Liberia, Vedanta, 2013.** The Impact Assessment and water management study for the proposed iron ore feasibility project. Groundwater numerical modelling was undertaken as part of the IA.
- **Vaal River Operations Tailings Source Term Study, Anglo Gold Ashanti, 2012 .** Managing the geochemical test work and seepage modelling for the West Wits Tailings Complex source term study. Evaluating different closure scenarios in terms of potential impacts.
- **Dukwe Coal Project: Geochemical Scoping Assessment, Botswana (2010).** Geochemical testing and Scoping Phase review.
- **Modikwa Mine Dewatering Model, South Africa (2009).** Groundwater numerical model simulations of dewatering at proposed open pit mine.
- **Review of hydrogeological and geochemical components of the Stora Sahavaara and Tapuli Iron Ore Projects, 2009, Sweden.** Review of Feasibility Study and gap analysis.

- **Mmamabula Power Station and Coal Mine Botswana EIA, Botswana, 2007 - 2009.** The project involved an environmental impact assessment of mining and power station activities located near the town of Mmaphashalala. Environmental geochemical assessment of mine and power station residue material. Assessment of long-term ARD backfill scenario.
- **Bugdainskoye Project, Russia, Norilsk(2009).** Environmental groundwater and geochemical review for feasibility study.
- **Fortier Mine: Identification of Groundwater Dewatering Target Sites, DRC, FQM, 2008.** Identification of optimal dewatering sites for the Fortier Mine open pit.
- **Sheba's Ridge Project, South Africa, Ridge Mining, 2008,** Bankable Feasibility Study for proposed nickel and PGE project. Groundwater and geochemical investigation. Evaluation of mitigation measures, including liner – no liner options.
- **Kayelekera Uranium Project, Malawi, Paladin, 2006.** The project was aimed to produce a bankable feasibility study document for the Kayelekera Uranium Project in Malawi. It involved a baseline data study and site management. Development of a conceptual and numerical model of the site to identify and quantify potential impacts and to assist in water resource management.
- **Ambatovy Nickel Project, Madagascar, 2004 – 2006.** The project involved various phases, including an environmental impact assessment, bankable feasibility study, mitigation measures design and detailed design study. Two areas of investigation included the surface mine (Ambatovy) and the tailings storage facility (Toamasina). A field investigation was undertaken to characterise the baseline hydrogeology. Waste characterisation and seepage modelling were undertaken for the tailings storage facility. An impact assessment was undertaken. Mitigation measures investigated included geochemical source alteration and containment (liner, drain. pump-back system and grout curtain scenarios).

Jacobus Marthinus Nel - PRINCIPAL HYDROGEOLOGIST

CORE SKILLS

- Fractured rock aquifer characterisation;
- Recharge mechanisms in semi-arid and arid areas;
- Groundwater flow conceptualization;
- Groundwater flow and transport modelling;
- Groundwater drinking water protection from contamination;
- Surface Water/Groundwater interaction;
- Density dependent flow;
- Saltwater intrusion.

Details

Qualifications

Doctor of Philosophy (Hydrogeology),
University of the Western Cape, 2011

Master of Science (Geohydrology),
University of the Free State, 2001

Bachelor of Science Honours
(Geohydrology), University of the Orange
Free State, 1995

Bachelor of Science, University of the
Orange Free State, 1994

Memberships

Chairman of Western Cape Groundwater
Division – 2009 to 2011

External reviewer for Hydrogeology
Journal.

External M.Sc. examiner for University of
the Free State Hydrogeology Students.

A member of the Water Research
Commission steering committees on
many water related projects.

A lecturer on groundwater courses for the
University of the North West – 2003

Languages

English – fluent

Afrikaans - fluent

Countries worked in

South Africa, Zimbabwe, Argentina,
Mozambique, Democratic Republic of the
Congo (DRC), Namibia, Tanzania.

PROFILE

Jacobus Marthinus Nel is a Principal Hydrogeologist with 18 years experience. He specialises in Fractured rock aquifer characterisation; Recharge mechanisms in semi-arid and arid areas; Groundwater flow conceptualization; Groundwater flow and transport modelling; Groundwater drinking water protection from contamination; Surface Water/Groundwater interaction; Density dependent flow and Saltwater intrusion

Jacobus has specialist skills in the following areas:

- Fractured rock aquifer characterisation;
- Recharge mechanisms in semi-arid and arid areas;
- Groundwater flow conceptualization;
- Groundwater flow and transport modelling;
- Groundwater drinking water protection from contamination;
- Surface Water/Groundwater interaction;
- Density dependent flow;
- Saltwater intrusion.

Key project experience

PROFESSIONAL EXPERIENCE

PROJECT EXPERIENCE

- **GROUNDWATER RESOURCE PROTECTION:** Research into the protection of groundwater systems from over-abstraction and water quality deterioration from natural as well as human induced contaminants. Evaluation of protection zoning methodologies and implementation of National Water Act.
- **CATCHMENT MANAGEMENT STUDIES:** Involvement in the establishment of the institutions needed for the management of water resources in the Crocodile West/ Marico Water Management Area. Establishment of Water User Associations in the Bo-Molopo area.
- **RESOURCE POTENTIAL:** Evaluation of the groundwater resource characteristics and potential with special reference to recharge evaluation and optimising of monitoring networks.
- **POLLUTION PREVENTION:** Assessment of groundwater abstraction related capturing of brine and high salinity surface water from natural and industrial deposits. Regulatory oversight regarding licence applications of potential pollution sites and the protection measures implemented to prevent groundwater pollution.

MODELLING EXPERIENCE

- 2012 - current: Wellfield development and sustainability models. Inland seawater abstraction for industrial water supply. Mining related dewatering and contaminant transport.
- 2005 - 2011: Groundwater resource characterisation lecturing and supervision of post graduate students using a variety of modelling tools. Modelling approaches included: Borehole scale 2D finite difference (BORE II); Analytic element (WhAEM); Soil physics based unsaturated zone finite element (Hydrus 1D/2D); 2D/3D finite difference modelling (MODFLOW), High salinity water movement through ash disposal sites; Seawater and land based salinity at small municipalities along South African Atlantic coast.
- 1996 – 2005: 1) Modelling and characterisation of various regional dolomitic aquifer systems as part of strategic water resource assessments (Grootfontein, Molopo, Zeerust, Uitvalgrond compartments; Sishen mine dewatering). 2) Local scale detail models to evaluate the impact

of engineering structures on groundwater flow (TUVA channel upgrade, S2 Dam rehabilitation); 3) Steering committee guidance role on Water Research Commission projects related to resource modelling; 4) Licence application reviewer of mining and pollution rehabilitation modelling by consultants; 5) Freelance modelling consulting firms related to groundwater contaminant transport modelling to establish monitoring networks and conduct risk assessments.

PUBLICATIONS

Peer Review Papers:

- 2013 Muchingami I, Nel J, Xu Y, Steyl G, Reynolds K (2013) On the use of electrical resistivity methods in monitoring infiltration of salt fluxes in dry coal ash dumps in Mpumalanga, South Africa. *WaterSA* Vol 39 No 4 Pages: 491 – 498.
- 2012 Muchingami I, Hlatywayo DJ, Nel JM, Chuma C (2012) Electrical resistivity survey for groundwater investigations and shallow subsurface evaluation of the basaltic-greenstone formation of the urban Bulawayo aquifer. *Physics and Chemistry of the Earth* 50–52 (2012) 44–51.
- 2010 Williams CR, Leaner JJ, Nel JM, Somerset VS (2010) Mercury concentrations in water resources potentially impacted by coal-fired power stations and artisanal gold mining in Mpumalanga, South Africa. *Journal of environmental science and health Part A Toxic/hazardous substances environmental engineering* Volume: 45, Issue: 11, Pages: 1363-1373
- 2009 Nel J, Xu Y, Batelaan O and Brendonck L Benefit and Implementation of Groundwater Protection Zoning in South Africa. *Water Resources Management*, Springer
- 2004 Conrad, J, Nel, J., and Wentzel J. The challenges and implications of assessing groundwater recharge: A case study - northern Sandveld, Western Cape, South Africa. *Water SA* Vol. 30 No. 5 (Special edition). Pretoria.

Chapters in Books:

- 2010: Xu Y, Kanyerere T, Braune E, Nel J, Hobbs P, Bradbury K, Robins N (2010) Best practice for groundwater quality protection. In: Xu Y and Braune E (Eds). *Sustainable groundwater Resources in Africa*. CRC Press. Leiden.
- 2013: du Preez M; van der Merwe M; le Roux W; Nel J; Meyer J; Murray K; Paramoer E; Steyl G; Velly C (2013) Investigation of the fate and transport of selected microorganisms in two simulated aquifer conditions in the laboratory and in the field. *Water Research Commission Report 1905/1/13*.

Recent Conference Papers:

- 2013: Nel JM, Maliki My A. (2013) Comparison of analytical and numerical estimation of groundwater drawdown evolution for open pit dewatering. GWCE 2013 Groundwater Conference Sep 2013 Durban .
- 2011: Nel JM, Xu Y, Batelaan O. (2011) Water quality deterioration due to a drop in regional water level Leipoldtville case study. GWC2011 International Groundwater Conference. 19-21 Sep 2011, Pretoria.
- 2010: Dustay S, Nel JM, Xu Y, Massone H. (2010) Implementation of aquifer protection zoning; GEOSUR 2010, 22-26 Nov 2010, Mar del Plata, Argentina.
- 2010: Nel JM, Xu Y, Batelaan O. (2010) Characterization of complexity of fractured rock aquifers. GEOSUR 2010, 22-26 Nov 2010, Mar del Plata, Argentina.
- 2009: Lasher, C, Nel, JM, Xu, Y, October, AG, Dlamini, L, Reynolds, K. (2009) The Use of Geophysics to Determine Salt Capturing and Fluid Transport Properties of Ash Dumps. WOCA Conference, Kentucky, Lexington.
- 2009 October: AG, Nel, JM, Reynolds, K, Lasher, C and Dlamini, L (2009) Hydraulic and Transport Properties of Ash Dumps. WOCA Conference, Kentucky, Lexington.
- 2009: Nel J.M., Reynolds, K and Xu, Y (2009) Comparison between the geohydrological properties of wet and dry ash disposal sites. WOCA Conference, Kentucky, Lexington.

CURRENT RESEARCH PROJECTS (in collaboration with University of the Western Cape)

GW Source Protection:

- Delineation and benefit of land use zoning in fractured rock environments.
- NRF bi-lateral mobility collaboration between UWC and Argentina, focusing on groundwater protection zoning policy.
- Groundwater protection zoning case study at the UWC Gevonden research site.

Ash Dump Research:

- Eskom book on the current knowledge of ash disposal sites.

Fracture Rock Research:

- Development and characterisation research at various UWC and DWA fractured rock research sites.
- Surface Water, groundwater, vadose zone interactions in selected pristine catchments in the Kruger National Park. Collaboration with UKZN.

Curriculum vitae: Ms E WEIDEMAN

Name : **WEIDEMAN, ELMIE**
Date of Birth : 28 September 1984
Profession/Specialisation : Landscape Architecture
Years with Firm : 6
Nationality : South African
Years experience : 7

Key qualifications

Elmie is currently working as a professional landscape architect in Aurecon's environmental and advisory services unit. She has gained valuable experience in various aspects related to landscape architecture. This include report writing, research/data collection and analysis, fieldwork, conceptual design, urban planning and design, master planning, sketch plans, planting design, working/technical drawings, detailed design, 3D modelling, graphic presentations and photo montages.

She is proficient in technical design (from conceptual stage through to detailed design and graphic presentations) as well as the environmental part of landscape architecture where she mostly dealt with site rehabilitation, environmental management programmes (EMPs), environmental auditing/monitoring and visual impact assessments (VIA's). She has also recently been involved in various green building projects.

Elmie has played a leading role in various national and international projects which also included other professionals such as environmental practitioners, civil and structural engineers and town and city planners. She also has experience writing proposals and tenders as well as presenting and liaising with clients.

Elmie has worked on various international projects in Nigeria, Kenya, Angola, Malawi, Liberia, Guinea and Mozambique. Typical projects included environmental auditing, landscape rehabilitation, the design of urban open spaces, commercial landscapes and private gardens.

Elmie holds a Master's and an Honours degree in Landscape Architecture, both which she obtained from the University of Pretoria in South Africa.

Employment record

06/2010 - Date	Aurecon, Professional Landscape Architect
01/2009 - 05/2010	DDV Design Group, Candidate Landscape Architect
01/2007 - 04/2007	Newtown Landscape Architects (NLA), Student
01/2006 - 01/2006	Eco Consult, Student
01/2004 - 01/2004	InSite Landscape Architects, Student

Experience record

MTC Boulevard (Gauteng Province, South Africa) 06/2014 - 06/2015. *Professional Landscape Architect.* This project is an extension of the MTC building's landscape, it includes a dedicated green walkway from the new MTC building to the crossing with the Midrand Gautrain station. Responsible for the landscape layout, bill of quantities (BoQ) and specifications. Involved for 12 person-months. (Growthpoint).

Nacala a Velya yard (Mozambique) 06/2014. *Professional Landscape Architect.* Aurecon was approached by Worley Parsons to design the landscape around various buildings located within the Nacala railway yard. Different rehabilitation strategies were also proposed in order to minimise soil erosion. Responsible for the landscape layout, specifications and measuring. Involved for 1 person-month. (CLN, Mozambique).

Taung Skull integrated management plan (North West Province, South Africa) 05/2014 - Date. *Professional Landscape Architect.* Aurecon was appointed by the North West Provincial Department of Economic Development, Environment, Conservation and Tourism (DEDECT) to update the 2010 draft integrated management plan for the Taung Skull World Heritage Site. Responsible for the review and the update of the existing management plan. Involved for 7 person-months. (Department of Economic Development, Environment, Conservation and Tourism (DEDECT)).

Upington Solar Park (Northern Cape Province, South Africa) 01/2014. *Visual Impact Specialist.*

Aurecon has been appointed by Lidwala Specialist Solutions as visual sub consultant on both the scoping and environmental impact assessment phase for the construction of a new solar farm in the Northern Cape. Responsible for the visual impact assessment during the scoping phase of the project. Involved for 2 person-months. (Eskom).

Sasko Woodmead wetland rehabilitation (KwaZulu-Natal Province, South Africa) 01/2014 - 02/2014. *Environmental Practitioner.* Aurecon South Africa has been appointed to compile a wetland delineation plan and wetland rehabilitation plan after construction spoil material was placed within the riparian zone. This involved specifications with regards to re seeding and shaping in order to return the wetland to its original pre construction state. Responsible for compiling the rehabilitation plan, forming part of the documentation that were sent to the relevant department. Involved for 2 person-months. (Pioneer Food Group).

Polokwane Local Municipality: Upgrade of Seshego Stadium (Limpopo Province, South Africa) 10/2013 - Date. *Professional Landscape Architect.* Aurecon was appointed by Polokwane Local Municipality for the upgrade of the Seshego Stadium this involved the upgrade of the soccer pitch and the athletics track. The scope also included the upgrade of the irrigation system, as well as the parking area in front of the stadium. Responsible for measuring and the bill of quantities (BoQ). Involved for 1 person-month. (Polokwane Local Municipality).

Working for Wetlands Plan 2014-2017 (Western Cape Province, South Africa) 06/2013 - Date. *Environmental Practitioner.* Aurecon South Africa has been appointed by SANBI to compile, amongst other deliverables, various wetland rehabilitation reports. The Working for Wetlands programme weaves together the wise use of wetlands with employment creation and poverty alleviation. Using the rehabilitation of wetlands as a vehicle to achieve these outcomes, the programme follows an approach that centres on cooperative government and partnership creation with landowners, communities, civil society and the private sector. Responsible for the rehabilitation plan. Involved for 5 person-months. (South African National Biodiversity Institute (SANBI)).

Turffontein and Empire-Perth corridor frameworks (Gauteng Province, South Africa) 04/2013 - 11/2014. *Professional Landscape Architect.* Johannesburg Development Agency has appointed Aurecon South Africa to undertake various studies in order to do a development framework. The development framework was based on the Corridors of Freedom concept, a new vision where the focus will be on well planned transport arteries, mixed use development, high density accommodation, supported by office buildings, retail development and opportunities for leisure and recreation. Individual involvement included an urban context analysis and the compilation for the urban vision and principles for green and open spaces within the framework. Further involvement included the urban design for certain focus areas, which included various passive and recreational green open spaces. Responsible for the analysis and visual presentation of various areas within the greater Johannesburg. Involved for 6 person-months. (Johannesburg Development Agency (JDA)).

Planning and infrastructure programme for Malange (Malanje Province, Angola) 04/2013 - 07/2015. *Professional Landscape Architect.* Aurecon Angola is involved with the design of infrastructure for an existing housing estate in Malange, located in the north of Angola. Involvement included a conceptual design for typical safe pedestrian walkways and green open space. Responsible for the conceptual layout. Involved for 1 person-month. (Geo Data Services).

Liberty conditional assessments (Gauteng Province, South Africa) 01/2013 - Date. *Professional Landscape Architect.* Various Liberty Life Properties owned buildings in Gauteng were assessed. Proposals were made which allows for a more sustainable landscape and irrigation system. Responsible for landscape site audits at various Liberty owned properties. Involved for 3 person-months. (Liberty Life Properties).

Nelson Mandela Square condition assessment (Gauteng Province, South Africa) 10/2012 - 06/2015. *Professional Landscape Architect.* A multi-disciplinary engineering building condition assessment, health and safety assessment and asset care management was undertaken for the Liberty Properties facility at Nelson Mandela Square. (Liberty Life Properties).

MTC, Midrand (Gauteng Province, South Africa) 06/2012 - Date. *Professional Landscape Architect.* The project involved the construction of a new building for Gautrain's head offices. The building was assessed by the Green Building Council of South Africa (GBCSA) for green building design and as-built status. Responsible for the xeriscape landscape design around the building. The landscape design was conducted according to the WAT - 03 credit as determined by the Technical Manual Green Star S.A - v1. Involved for 3 person-months. (Growth Point).

Saldanha tank farm (Western Cape Province, South Africa) 03/2012 - 03/2013. *Visual Impact specialist.* Aurecon was appointed as visual sub consultant on both the scoping and environmental impact assessment phase for an extension to the existing oil tank farm located close to Saldanha Bay. Responsible for the visual impact assessment. Involved for 6 person-months. (WorleyParsons).

Grundfos warehouse and offices (Gauteng Province, South Africa) 01/2012 - 07/2015. *Professional Landscape Architect.* Aurecon was appointed to provide engineering services, environmentally sustainable design (ESD) and act as the principal agent for a new warehouse of approximately 6 300 m² and an office building of approximately 3 300 m² for Grundfos. The office block is currently pursuing a green star certification through the Green star Office V1 rating scheme. The landscape was designed, based on xeriscaping principles this assists in the reduction of potable water by using plants which requires minimal amounts of water. Responsible for the design, bill of quantities (BoQ) and specifications. Involved for 3 person-months. (Growthpoint).

St Helena Wind Farm (Western Cape Province, South Africa) 10/2011 - Date. *Environmental Specialist.* In this project, Aurecon was appointed to undertake a visual impact assessment (VIA) for the construction of a wind farm on an existing farm 47 km south of St Helena Bay, on the west coast of the Western Cape Province. Responsible for compiling the VIA. Involved for 1 person-month. (Just Energy).

Master plan and engineering services for a development site in Lagos (Lagos, Nigeria) 09/2011 - Date. *Candidate Landscape Architect.* Aurecon was approached to conduct a master plan and related engineering services. The development site stretches over 240 ha and the project involved a high end mixed-use urban development. Responsible for open space planning and visual presentation.

Master plan for a new town development in Ondjiva (Ondjiva, Angola) 07/2011 - Date. *Candidate Landscape Architect.* Ondjiva is situated in the southern part of Angola. Aurecon was approached by the National Director for Urbanism and Housing to compile a master plan for a new town development situated close to the existing town. The overall concept was based on sustainable development, including economic, environmental and social aspects. Responsible for the design (master plan level) and visual presentation (including a 3D model) of open green spaces which included allotment gardens, playgrounds, sport facilities and a formal market area. Involved for 12 person-months. (Ministry of Urbanism and Construction/National Directorate for Urbanism and Housing).

Detailed engineering design (FEL 4) for Nacala Port (Mozambique and Malawi) 10/2011 - 11/2013. *Candidate Landscape Architect.* Aurecon was appointed to plan the railway and related infrastructure projects. This included substantial rehabilitation along the railway from Moatize in the western interior of Mozambique, through Malawi, to Nacala on the east coast. Aurecon's involvement also extended to the landscape planning of five main facilities and four Type 2 facilities along the alignment, as well as the compilation of the vegetation rehabilitation plan along the corridor. Specific emphasis was placed on sustainable and low-maintenance landscapes. Responsible for a landscape rehabilitation plan (including a full bill of quantities (BoQ)), and various sketches and detailed plans pertaining to the different railway facilities. Involved for 18 person-months. (Vale Moçambique Limitada).

Detailed design (FEL 4) of the Nacala Railway Corridor (Mozambique, Malawi) 05/2011 - 05/2015. *Professional Landscape Architect.* Aurecon was appointed as a multi-disciplinary team for the planning of the Nacala port on the eastern coast of Mozambique. Responsible for providing input into the landscape planning and species selection around the main administration buildings. Involved for 1 person-month. (Vale Moçambique Limitada).

Ebony and Ivory Park planning and design (Gauteng Province, South Africa) 04/2011 - Date. *Candidate Landscape Architect.* The project is situated within an informal settlement and involved urban design and planning, focusing specifically on sustainable and environmentally viable materials and construction techniques. The planning and design of open spaces was done in conjunction with the local community. Responsible for various 3D conceptual sketches, as well as the conceptual master planning for open urban spaces. Involved for 2 person-months. (Ekurhuleni Municipality).

Unifying standards for highway engineering practices (Abu Dhabi) 04/2011 - Date. *Candidate Landscape Architect.* The project entailed the unification of standards for highway engineering practices in Abu Dhabi. Responsible, as part of the team which reviewed various documents for the Department of Transport of Abu Dhabi, for working on a road landscape manual. Involved for 6 person-months. (Department of Transport of Abu Dhabi).

Simandou Iron ore project front end loading (FEL) 1 and 2 (Liberia and Guinea) 03/2011 - 10/2011.

Landscape Architect. This project involves the construction of a railway line from Zogota Mine in Guinea to the coast of Liberia. Responsible for compiling the vegetation rehabilitation plan along the railway corridor. Involved for 6 person-months. (Vale (VBG -Vale BSGR Guinea) or VBG Logistics (Vale BSGR Logistics) Corp in Liberia).

Eastgate site analysis, Bedfordview (Gauteng Province, South Africa) 03/2011. *Candidate Landscape Architect.* Eastgate is a shopping mall situated in the East Rand of Johannesburg. Responsible for conducting a detailed site analysis and proposing best practice measures in order for the building to attain Green Building status. Involved for 1 person-month. (Eastgate).

Sumbe conceptual layout and zoning (Angola) 03/2011. *Candidate Landscape Architect.* The town of Sumbe is situated on the west coast of Angola, bordering the Atlantic Ocean. This project involved the conceptual layout (to determine feasibility) and zoning of a proposed mixed-use and residential area. Responsible for the conceptual zoning and layout plan forming part of the initial feasibility studies. Involved for 1 person-month.

Eskom: Sigma - Theta power station power line (KwaZulu-Natal Province, South Africa) 12/2010 - Date. *Environmental Specialist.* In this project, Aurecon was appointed to complete an environmental impact assessment (EIA) and environmental management plan (EMP) for the proposed power line from Albert Falls in the Natal Midlands to Empangeni for the establishment of two 400 kV power lines, approximately 150 km in length, to link the Sigma substation and the Theta substation. Responsible for the visual impact assessment (VIA). Involved for 3 person-months. (Eskom).

Square Kilometre Array (SKA) Meerkat (Northern Cape Province, South Africa) 12/2010 - Date. *Candidate Landscape Architect.* Following the initial identification of sites suitable for the SKA by the SKA Steering Committee in 2006, southern Africa and Australia are the finalists. The proposed SKA project site is situated close to Britstown in the Northern Cape Province of South Africa. This region is also renowned for its unique biodiversity and high visual quality. Responsible for designing the landscape between the various buildings. Other details included rooftop gardens and detailed planting plans. Involved for 1 person-month. (Square Kilometre Array (SKA) South Africa).

Environmental management plan (EMP) for the 11 kV substation at the Automotive Supplier Park (Gauteng Province, South Africa) 11/2010 - 06/2011. *Environmental Control Officer (ECO).* This project entailed the construction of a new 11 kV substation within the Automotive Supplier Park in Rosslyn. Responsible for the compilation of an environmental management plan (EMP), as well as weekly environmental auditing of the construction of the new substation. Involved for 4 person-months. (Automotive Supplier Park).

Aurecon water course management plan (South Africa) 11/2010 - 01/2011. *Environmental Specialist.* This project comprised a water course management plan for Aurecon. Responsible for compiling a water course management plan for the new Aurecon Lynnwood Bridge office building. The management plan applied to both the construction as well as the operational phase of the building. The management plan was compiled according to the Green Star SA office standards. Involved for 2 person-months.

Environmental auditing at the Ford Black Economic Empowerment (BEE) building in Silverton (Gauteng Province, South Africa) 2010 - 2011. *Environmental Control Officer (ECO).* As part of Ford's skills development and community upliftment programme, the company constructed a new incubator facility at its main offices in Silverton. Responsible for carrying out monthly site audits, as well as compiling a monthly environmental audit report for the new facility. Involved for 8 person-months. (Automotive Supplier Park).

Environmental auditing for MSSL Global, Rosslyn (Gauteng Province, South Africa) 2010 - 2011. *Environmental Control Officer (ECO).* The Gauteng Provincial Government initiated the Blue IQ concept as a mechanism for the upliftment of the provincial economy. One of the major components of this initiative was the establishment of the Gauteng automotive cluster, including the development of the Automotive Supplier Park and the expansion of the Ford Motor Company South Africa. Responsible for carrying out monthly site audits and compiling a monthly environmental report for a new factory building within the Automotive Supplier Park. Involved for 8 person-months. (Automotive Supplier Park).

Environmental auditing for Faurecia in Rosslyn (Gauteng Province, South Africa) 2010 - 2011. *Environmental Control Officer (ECO).* Responsible for carrying out monthly site audits and compiling monthly environmental audit reports for an extension of the existing factory building within the Automotive Supplier Park. Involved for 3 person-months. (Automotive Supplier Park).

Nova Vida master plan and presentation (Luanda Province, Angola) 08/2010 - 09/2010. Candidate Landscape Architect. The Angolan government initiated the first phase of the Nova Vida township project in the late nineties. Nova Vida is a model of engineering and construction excellence aimed at improving the lives of impoverished communities. Responsible for the master plan design and presentation for the whole town, which included proposals for playgrounds, sport fields, road reserves and an office park precinct. Involved for 2 person-months. (Imogistine).

Universidade Cato'lica master plan presentation (Luanda Province, Angola) 08/2010 - 09/2010. Candidate Landscape Architect. Responsible for the master plan presentation for the university campus, which included a variety of typical educational facilities. Involved for 1 person-month. (Universidade Cato'lica).

Matla Coal Mine expansion, Kriel (Mpumalanga Province, South Africa) 06/2010. Candidate Landscape Architect. Matla Coal Mine, owned by Exxaro, is situated 20 km west of Kriel in the Mpumalanga Province in South Africa. This project involved the expansion of the existing mine which included the construction of various facilities. Responsible for the design of the landscape around administration offices, accommodation facilities and maintenance buildings. This also involved the rehabilitation of disturbed areas and the compilation of a full bill of quantities (BoQ). Involved for 1 person-month. (Exxaro).

Middelburg Water Reclamation Project (MWRP) (Mpumalanga Province, South Africa) 05/2010 - 06/2014. Candidate Landscape Architect. The project comprised the establishment of a water treatment plant (WTP); water collection system; distribution system; waste disposal system and bulk electrical supply for the treatment of water from the Middelburg Mine Services. Responsible for designing a detailed planting plan and compiling a full bill of quantities (BoQ) for landscaped areas around the main administration building, holding dams and purification plant. Involved for 1 person-month. (BHP Billiton Energy Coal South Africa (BECSA)).

Master planning and detailed planting design for Bryanston, Extension 88 (Gauteng Province, South Africa) 04/2010 - Date. Candidate Landscape Architect. This project involved a modern office building and landscaping next to the National Route 1 (N1) highway. Responsible for assisting with the sketch plan, visual presentation and planting design. Involved for 1 person-month. (Barrow construction).

Moatize to Nacala railway (FEL3) study (Mozambique and Malawi) 04/2010 - 08/2011. Candidate Landscape Architect. Aurecon was appointed by Vale to conduct the FEL3 study for the Nacala Railway Corridor project. This entailed the upgrade and design of infrastructure and basic engineering. This included substantial rehabilitation along the railway from Moatize in the western interior of Mozambique, through Malawi, to Nacala on the east coast. Aurecon's involvement extended to the landscape planning of five depots along the alignment, as well as the compilation of the vegetation rehabilitation plan along the corridor. Specific emphasis was placed on sustainable and low-maintenance landscapes. Responsible for a landscape rehabilitation plan (including a full bill of quantities (BoQ)), and various sketch plans pertaining to the different facilities. Involved for 6 person-months. (Vale Moçambique Limitada).

Master planning, detailed design and cost estimates for the Allenridge urban upgrade (Free State Province, South Africa) 04/2010 - 05/2010. Candidate Landscape Architect. The Free State Government was upgrading several Eastern Free State townships. This project included streetscaping, lighting and the design of open green spaces. Responsible for the conceptual design, proposals for sustainable street furniture and the main intersections. Also responsible for recommending plant species and urban guidelines for Allenridge and surrounding townships. Involved for 1 person-month. (Free State Provincial Government).

Master planning and cost estimates of soccer fields for informal settlements (South Africa) 01/2010 - Date. Landscape Architect. FIFA had committed itself to financing various soccer fields for previously disadvantaged communities in certain key areas across South Africa. Responsible for designing a generic beach pitch soccer field. Involved for 1 person-month. (KfW Entwicklungsbank).

Kriel Power Station (Mpumalanga Province, South Africa) 11/2009 - 04/2015. Environmental Specialist. In this project, Aurecon was appointed to compile an environmental impact assessment (EIA) and environmental management plan (EMP) for an extension to the existing ash dam facilities. Responsible, as a member of the specialist team, for compiling a visual impact assessment (VIA) focusing on two alternative sites. Involved for 3 person-months. (Eskom).

Master planning, the integration of various facilities and detailed design of Kado Lakes mixed-use

development (Abudja, Nigeria) 09/2009 - Date. *Landscape Architect.* The project was concerned with a new mixed-use development including a hotel, shopping centre, apartments, a water world theme park, a parkland space, an amphitheatre and an adventure golf component. Responsible for being involved with master planning the open green space and various cost estimates. Involved for 2 person-months. (Urban Shelter).

Master planning, detailed design and urban guidelines for Beitbridge border post (Matabeleland South Province, Zimbabwe) 08/2009 - Date. *Landscape Architect.* This expansive project involved changing vehicular and pedestrian circulation, whilst maintaining the existing infrastructure as well as adding various facilities. Responsible for assisting with the conceptual design of the truck stop and overnight facilities, as well as the visual presentation. Involved for 1 person-month.

Master planning and detailed design of the Erand Parkland development for Galencia, Midrand (Gauteng Province, South Africa) 08/2009 - Date. *Landscape Architect.* This project involved a residential development bordering a wetland system and stream. Responsible for the detailed design of the environmentally sensitive area, conceptual design of a timber boardwalk, guidelines for the parkland and visual presentation. Involved for 1 person-month. (Galencia Properties (Pty) Ltd).

Golf course design, urban design, detailed design and tender documentation for Thika Greens Golf and Lifestyle Estate (Thika, Kenya) 08/2009 - 03/2010. *Landscape Architect.* This project was one of the first of its kind in Kenya and is situated 30 km from Nairobi. The golf course is designed as an 18-hole true African grassland championship golf course which straddles the natural drainage lines and allows for spectacular water holes where development is otherwise limited. Responsible for being involved with the conceptual design of the cultural centre, sport fields, entrance gate, general golf course landscaping, and cut and fill calculations. Involved for 1 person-month. (Thika Greens LTD).

Master planning, urban guidelines and detailed design of Perry's Farm in Hazyview (Mpumalanga Province, South Africa) 07/2009 - Date. *Landscape Architect.* Situated on the banks of the Crocodile River in the heart of Hazyview's development hub, this mixed-use development consists of a hotel, various open green structures, a shopping centre and a residential component. Responsible for being involved with the full development proposal, master planning for the hotel, landscape infrastructure guidelines, open green spaces as well as the visual presentation. Involved for 1 person-month. (Perry's Bridge Developments (Pty) Ltd).

Master planning and detailed design for the Innovation Hub's Enterprise Building number two in Tshwane (Gauteng Province, South Africa) 06/2009 - 10/2009. *Landscape Architect.* This addition to the Innovation Hub complex included full landscape design with detailed design of the formal water feature and central courtyard. The building and landscape were designed according to the Green Star rating tool. Responsible for sketch plans, detailed design and visual presentation. Involved for 2 person-months. (The Innovation Hub Management Company).

Sketch plan and detailed design for House Bungane in Vereeniging (Gauteng Province, South Africa) 06/2009 - Date. *Landscape Architect.* House Bungane is located in an upmarket housing estate next to the Vaal River. Responsible for the sketch plan and visual presentation. Involved for 2 person-months. (Mr KJ Bungane).

Master planning, detailed design and working drawings for the Grasslands wedding venue in Bethal (Mpumalanga Province, South Africa) 06/2009 - 10/2009. *Landscape Architect.* The project consisted of a chapel and conference venue with terraces leading down to a dam with constructed water features and an island. Responsible for being involved with various detailed designs and working drawings for the decking, water features and outdoor function areas. Involved for 2 person-months. (Grasslands Conference and Wedding Venue).

Site development plan (SDP) and landscape guidelines for the Strelitzia and Malakite Developments in Kempton Park (Gauteng Province, South Africa) 03/2009 - Date. *Landscape Architect.* Situated alongside Greenstone Mall in Kempton Park, this combination of office parks and housing developments boasts a full site development plan (SDP) landscape design, plant selection and landscape guidelines. Responsible for the SDP and visual presentation. Involved for 1 person-month. (Balwin Properties).

Plettenbergbay Magistrate Court (Western Cape Province, South Africa) 03/2009 - Date. *Professional Landscape Architect.* The Department of Justice (DoJ) identified the need to construct a Magistrate's Court in the Plettenberg Bay area. This facility had to be constructed by the DoJ in keeping with its mandate to dispense justice in the country. Aurecon, in a joint venture (JV) with Khulemani-Masingita Holdings, was

appointed to provide professional engineering services. Architectural services and quantity surveying were sub-contracted to B2 Architects and LDM Quantity Surveyors respectively. Involved with the design of the landscape, focusing on water efficient plants endemic to the area. Responsible for the design, specifications and bill of quantities for tender purposes. Involved for 12 person-months. (Independent Development Trust (IDT)).

Golf course design, urban design and detailed design for Maloney's Eye in Muldersdrift (Gauteng Province, South Africa) 01/2009 - 07/2009. *Landscape Architect.* Situated near the Cradle of Humankind, Maloney's Eye is a mixed-use development which consists of a residential component, a golf course and a tourist section with an aqua-tainment centre on the northern border next to the banks of the Magalies River. Responsible for being partly involved in the conceptual design of fly fishing dams, streams and picnic areas. Involved for 1 person-month. (Redhouse 8 (Pty) Ltd).

Golf course design, detailed design and cost estimates for Bankenveld Golf Course in Witbank (Mpumalanga Province, South Africa) 2009 - 02/2010. *Landscape Architect.* This golf estate is situated next to Witbank Dam with an abundance of game and other wildlife. The project upgraded the existing portion of the estate and provided urban design of the new portion, which involved detailed roadscaping and landscape design for the entrances and clubhouse. Responsible for the detailed design of turning circles, planting design for the entrance gate, calculating bulk earthworks and cost estimates. Involved for 1 person-month. (Private Client).

Multi-use, community-based, open green system (Free State Province, South Africa) 2009 - 2010. *Candidate Landscape Architect.* This initiative established a platform whereby a community's social, economic and environmental needs are met on various levels. It is a sustainable structure that ensures a higher quality of life, offering work, living and play opportunities close together. Responsible for designing a visual organogram that takes into account the initial concept, process and intended outcome. Involved for 1 person-month.

Education

2008 : Master in Landscape Architecture, University of Pretoria, South Africa
 2007 : BSc (Hons) Landscape Architecture, University of Pretoria, South Africa
 2006 : BSc Landscape Architecture, University of Pretoria, South Africa

Career enhancing courses

2013 : Basic introduction to Project Management, Aurecon in-house training, South Africa
 2012 : Portugues Lingua Estrageira - Nivel 1, Alliance Française
 2011 : Basic Guidelines for Ecological Rehabilitation and Mine Closure, Centre of Environmental Management (CEM)
 2011 : Green Star SA Office Building v1 Accredited Professional Course, Green Building Council of South Africa (GBCSA)
 2010 : Academic International English Language Test (IELTS), British Council

Professional affiliations

Professional Landscape Architect, Institute of Landscape Architects of South Africa (ILASA)
 Professional Landscape Architect, South African Council for Landscape Architectural Professionals (SACLAP)

Languages

	Reading	Writing	Speaking
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

Research projects

Weideman E, 2008. "An evaluation of contemporary and historical theories in order to apply modern, technologically advanced, regenerative design principles on a small-scale urban site. The execution of the study is a new approach towards spatial integration". The University of Pretoria's South Campus.

Honours and awards

2008 - Cave Klapwijk prize for most ecologically responsible work of a final year student in the Landscape Architecture programme

2005 - Golden Key Honorary Award for Academic Excellence

Publications

Weideman E, 2008. "Designing for living systems, a living laboratory for the University of Pretoria's South Campus". Dissertation publication.

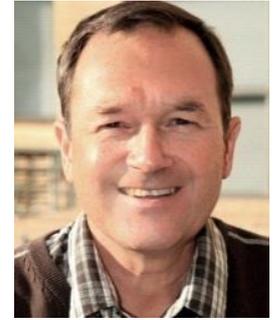
Referees

Company	Contact Person	Telephone nr.
DDV Design Group	Dino de Abreu	+27 (0)82 380 2313
NLA	Graham Young	+27 (0)82 462 1491

By my signature below I certify the correctness of the information above and my availability to undertake this assignment.

Signature of Staff Member

Date



Hein Stander

Senior Executive/Specialist - SA West

Education

M. Eng (Transportation), University of California, Berkeley, USA, 1982

Hon.B.Eng (Transportation), University of Pretoria, South Africa, 1981

Hon.B.Eng (Civil), , University of Stellenbosch, South Africa, 1973

Professional Registration

Professional Engineer, Engineering Council of South Africa, Registration Number 760367

Years of Experience

With BKS/AECOM: 35

With Other Firms: 5

Professional Memberships

South African Institution of Engineers, Fellow 2000

Institute of Transportation Engineers, 1996

Transportation Research Board, Access Management Committee, 2011 – present

Date of Birth

16 March 1951

Nationality

South African

HDI Status

White male, no disabilities

Between January 1974 and April 1979, Hein Stander was employed by the Provincial Roads Authority of the Orange Free State where he was involved in the construction and design of rural roads.

In May 1979, he joined BKS (now known as AECOM) in Pretoria, where he was involved in numerous transportation planning and traffic engineering projects. This includes traffic impact studies, development of traffic master plans, regional transportation planning, urban transport projects, capacity analyses, research in traffic engineering, traffic signal phasing and design of signal systems.

In January 1991 he was put in charge of the Transportation Planning and Traffic Engineering Section of the Pretoria office and he became a Director of the firm in July of the same year. He joined the Cape Town office (situated in Bellville) in 1995.

Activities performed (BKS/Aecom – 1995 to present)

Responsible for all traffic engineering and transportation planning work in the Western and Eastern Cape Regions. Recent projects include:

- With RHDHV responsible for development of Integrated Transport Plan (ITP), as well as Integrated Public Transport Network (IPTN) for City of Cape Town
- Responsible for traffic investigations for elimination of four level rail crossings in bigger Cape Town area (PRASA).
- Responsible for traffic investigations for Phase 2 of the Cape Town International Convention Centre
- Responsible for all traffic investigations for the upgrading of the N7 to freeway standards between Cape Town and Malmesbury
- Responsible for development of Provincial Land Transport Framework for the Provincial Government of the Western Cape
- Provision of traffic input into tender for redevelopment of Velodrome site in Bellville. With tender being awarded to team, responsible for traffic engineering related to this major (200 000m²+) development
- Responsible for traffic work related to LUPO process for the SANRAL new offices at N1/Durban Road interchange in Bellville
- Team leader for development and implementation of 2010 Soccer World Cup Transport Operational Plan for the City of Cape Town
- Responsible for all transportation planning and design related to new 68 000 spectator Green Point Stadium for 2010 Soccer World Cup in Cape Town
- Preparation of an Arterial Management Plan for Main Road 27 (R44) between Stellenbosch and Klappmuts
- Responsible for transportation and traffic analysis for proposed upgrading of Waterfront Road through Knysna for provincial government.
- Responsible for technical investigation into rail link to Cape Town International Airport (from existing line) for Metrorail
- Completion of Access Application Report and preliminary design for proposed new interchange between the R300 and Bottelary Road
- Preparation of new Access Management Guidelines for Nelson Mandela Bay Municipality – also commented on Draft National Guidelines on behalf of NMBM (2010)

- Final planning, design, implementation and monitoring of the bus and minibus taxi lane on the N2, the first preferential lane on a freeway in South Africa
- Completion of a master plan for Cape Town International Airport in co-operation with Mott MacDonald of the UK
- Transportation input into Precinct Planning at Cape Town International Airport – as such involved in Contextual Framework and eventual completion of a Development Framework
- Traffic investigation for motivation of an additional half diamond interchange on the N1 Freeway at Hume Road (now Carl Cronje Drive)
- Traffic impact assessments for various developments, including: Tyger Waterfront Office and Retail Development Bellville, McIntyre Street Redevelopment Parow, SYFIN Office Development Parow, Cape Town International Airport Precincts, Proposed Tigergate Office and Retail Development in Bellville, University of Stellenbosch Business School Site Bellville, Paarl Regional Shopping Centre, Jamestown Regional Shopping Centre, Proposed Shopping Centre Robertson, Stikland Hospital Site, Die Boord Residential Development Stellenbosch, International School Hout Bay, Tyger Two Office Development Tygervalley, SANRAL Office buildings at N1/Durban Road interchange
- Preparation of a road access policy for Port Elizabeth. Also development of an Access Management Plan for William Moffet Avenue
- Preparation of a Transportation Master plan for the planned new harbour and industrial zone at Coega in the Eastern Cape
- Transportation planning for re-alignment of Durban Road in Bellville
- Investigation into operational feasibility of the 9000 car parking structure at Century City
- Design and preparation of contract documentation for construction of extensions to apron at Cape Town International Airport (5 stands for Type E aircraft)
- Transportation planning input into Tygerberg Spatial Development Framework
- Investigation into the feasibility of realigning and tolling the N7 between Piketberg and Klawer
- Transportation aspects of Blue Downs Structure Plan
- Preparation of National Road Access Management Guidelines – Draft document completed in October 2001
- Investigation into technical feasibility of underground rail link in Cape Town CBD
- Transportation study for Culemborg Development Framework
- Transportation planning for extension of Khayelitsha Commuter Rail Line, including life cycle cost analysis.
- Traffic and parking study for Stellenbosch Campus of the University of Stellenbosch.
- Traffic and Public Transport Study for Coega Industrial Development Zone, Coega Development Corporation.
- Traffic Study for Ndabakazi Development Node, Butterworth, Former Transkei – done for Amathole District Municipality.
- Current Public Transport Record (CPTR) for Rail Services in Cape Town Metropole, done for City of Cape Town and SARCC
- Updating of elements (road network and trip generation data) of the EMME/2 Traffic Demand Model of the City of Cape Town
- Determination of Bulk Service Contributions for proposed new green field developments in the Oostenberg and Langeberg areas, for the City of Cape Town.

BKS (Pty) Ltd, Head, Transportation Section, Pretoria Office (1991 to 1995)

Responsible for overhead managing and technical execution of all projects of the Pretoria Transportation Section. This includes: metropolitan and regional transport planning (Metroplan, PWV Consortium), KwaNdebele transport study, Akasia transport study, extensive traffic observation (CTO-projects), national road traffic management. (Trafplan Consortium), traffic signals (Verwoerdburg and Johannesburg), manage research programme for Department of Transport (Navplan Consortium) and execution of research projects in the transport planning and traffic engineering fields.

Transportation and Traffic Engineering

From 1991 to 1993 responsible for institutional and infrastructure aspects of PWV Public Transport Study. Presented results at a number of meetings with interest groups and acted as leader of discussion groups at these meetings.

From 1988 to 1995 involved in the management of the Department of Transport research program. During 1993 to 1995 convenor of five research panels including those on traffic engineering, traffic safety and commuter transport. Also partly responsible for the completion of a number of research projects – see below.

Completed Witbank CBD Traffic Study in 1993 and responsible for other traffic studies in Witbank including the Heuwel Shopping Complex and Klipfontein Business Area.

Responsible for a number of projects for the previous East Rand Regional Services Council, including an investigation into solid waste management in Vosloorus (1994) and an assessment of freight routes on the East Rand (1994/95).

Expert witness in culpable homicide case (Regional Court) after fatal accident at signal controlled intersection (1992/93). Advice provided on operation of traffic signal resulted in acquittal of defendants.

Design of alterations to parking areas at Sandton City Shopping Complex in order to improve circulation and allow for entrance control (1995).

Responsible for traffic impact study and other traffic engineering work, including application for land use rights, for new developments at Gallagher Estate, Midrand (1994/95)

Lecturing

Lectured part-time at the Pretoria Technikon in Traffic Engineering, Geometric Design, Transportation Engineering and Transportation Planning from 1993 to 1995.

Since 1999 external examiner for both the Peninsula Technikon (Cape Town) and the University of Stellenbosch.

Professional Activities

Serving on committee of Transportation Division of South African Institute of Civil Engineers since 1993. Elected Chairman for 1996 and 1997.

Friend status of TRB Committee A3A10 (Highway Capacity Manual).

Active member of Institute of Transportation Engineers (ITE).

Elected member of TRB Committee AHB70 in 2011 (Access Management).

Received the Chairman's Award for outstanding service to the Transportation Engineering Profession from the SAICE Division of Transportation Engineering in 2014.

BKS (Pty) Ltd, Associate, Transportation Section, Pretoria Office (1983 to 1990)

Between 1979 and 1991 member of the Metroplan-consortium which assisted the Department of Transport in matters related to urban transport planning. In this capacity author (or co-author) of the following reports:

- "Area traffic control systems", a report on all aspects of area traffic control systems;
- "Parking standards", a report setting out parking standards and parking requirements for various land uses;
- "Preferential lanes on freeways and arterials", a report providing guidelines for the implementation and evaluation of preferential lanes for buses and other high occupancy vehicles;
- "Guidelines for off-street loading facilities", a report proposing guidelines for the provision of off-street loading facilities for goods vehicles in urban areas;
- "Ekangala transportation study", a report describing a transportation study undertaken for Ekangala with special reference to the internal transport system and mass transport links to Pretoria and the East Rand;
- "Transporting people to CBD's and surrounding work complexes", a report giving guidelines for planning and providing sufficient transport facilities to central business districts, with special reference to the applicability of the various transport modes;
- "Guidelines for the economic, financial and socio-technical evaluation of public transport projects", a report providing guidelines for the overall evaluation of public transport projects;
- "Policy regarding goods vehicles in urban areas", a report which, as a result of certain existing problems, proposes policies regarding the transport of goods in urban areas;
- "Speed-flow relationships on urban roads in South Africa" - a report describing the results of an investigation into the speed-flow relationships on seven different road types in urban areas;
- "Freeway surveillance and mainline control" - a report describing the role, cost and benefits of freeway surveillance systems. Potential freeways for such systems have been identified;
- "Guidelines for the application of traffic signal phasing and control equipment" - a report providing guidelines for the determination of traffic signal phasing, the application of different control strategies and describing the functioning of different types of traffic controllers.

Feasibility studies, financial and economic analyses

Between 1984 and 1988 a member of the Tolplan-consortium which assisted the Department of Transport in all matters concerning planning of modern toll roads.

In this capacity responsible for the following two feasibility studies as well as various other investigations regarding toll roads:

- "Proposed Krugersdorp-Springs toll road - feasibility study update", a report describing traffic surveys and traffic, economic and financial analyses carried out for this project;
- "Feasibility study for tolling PWV9 and PWV1/PWV3/PWV2", similar to the one mentioned above, analysing the feasibility of this project.

Traffic planning new Pretoria Academic Hospital - since 1984 responsible for traffic planning aspects of this project.

Assisted during 1985 to put together the proposals for the TOLLWAY consortium to the Department of Transport for possible privatisation of the proposed Krugersdorp-Springs toll road.

Between 1986 and 1989 responsible for the traffic, toll strategy and toll tariff analyses of further proposals by TOLLWAY for the privatisation of the Krugersdorp-Springs toll Road.

During 1988 involved in a traffic study for the Sandton municipal area. Responsible for data collection, processing and the creation of origin-destination matrices.

Traffic Engineering

Since 1979 responsible for traffic impact studies for various developments, including the following:

- Proposed sports stadium in Witbank
- Numerous filling stations in PWV-area
- Sections of the PWV1 freeway
- Woodlands business development in Sandton
- Several office developments in Hatfield
- Office and business development in Silverton
- Proposed office development in Lynnwood Ridge
- Proposed business development in Erasmuskloof, Pretoria, including presenting traffic engineering aspects at Townships Board Hearing
- Proposed recreation facility and filling station in Rustenburg
- Proposed Pick 'n Pay development in Windhoek
- Proposed Highveld City Development in Verwoerdburg

Since 1983 responsible for the design of traffic signals, phasing, etc. for the following municipalities:

- Municipality of Vanderbijlpark: optimise phasing, upgrading traffic signal equipment
- Municipality of Sandton: optimise phasing, upgrading traffic signal equipment, tender documents and supervision for installation of new equipment, adjusting existing phasing (design and implementation)
- Municipality of Kempton Park: optimise phasing, upgrading traffic signal equipment
- Municipality of Potchefstroom: optimise phasing, upgrading traffic signal equipment
- Municipality of Alberton: planning new traffic lights, upgrading traffic signal equipment, providing initial phasing
- Municipality of Johannesburg: involved in pre-feasibility study for upgrading of traffic signal system to UTC. Also responsible for operation of new pilot UTC system
- Municipality of Verwoerdburg: optimise phasing, upgrading traffic signal equipment

Research

Completed research projects as part of the Department of Transport's previous Research and Development program (referred to as RDAC at the time).

Author or co-author of the following documents, which have been completed between 1988 and 1995:

- Guidelines for traffic impact studies: a document providing guidelines for the execution of traffic impact studies.
- Application of traffic signal control strategies: a project to determine the applicability of fixed time, semi VA and full VA traffic signal operation.
- Saturation flow rates at signalised intersections in South Africa: a project to determine South African saturation flow rates for through and turning movements as well as start and end lost times.
- South African Trip Generation Rates (Second Edition): a project to enhance present knowledge on trip generation rates in South Africa.
- Applicability of Adopt A Highway in South Africa: an investigation into the feasibility of the Adopt-A-Highway principle in South Africa.

BKS (Pty) Ltd, Engineer, Transportation Section, Pretoria Office (1979 to 1982)**Transport Planning**

The PWV transportation study - during 1979 and 1980 involved in traffic assignment and evaluation of land use and transport demand models.

Verwoerdburg City transport planning - during 1980 and 1981 involved in drawing up a road master plan as well as in general transport planning for the new Verwoerdburg central business district together with town planners, landscape architects, etc.

Richards Bay transport study - during 1980 completed a sketch plan transportation study for the Richards Bay/Empangeni region (trip generation, trip distribution, modal split, trip assignment).

Gold Reef toll road - during 1980 and 1981 completed the traffic surveys and analyses for the first feasibility study for a toll road in Southern Africa - the proposed toll road between Krugersdorp and Springs.

Roads Division, Provincial Administration of the Orange Free State, First engineer, Roads Division, Bloemfontein and Senekal (1974 to 1979)**Road construction and geometric design**

Between January 1974 and April 1979 on the staff of the Roads Department of the Orange Free State Provincial Administration, doing geometric design and road construction. Responsible for the geometric design (horizontal and vertical alignment, drainage, road markings, signs, intersection layout, etc) of Senekal-Winburg, Bethlehem-Harrismith and other main roads.

During 1975 and 1976 in charge of a Provincial road construction unit at Senekal. During this time busy with the reconstruction of the Senekal Winburg road. Also doing supervision over a contract for the widening of a number of bridges on this route. Annual expenditure at that stage R1-million and total personnel 200.

Papers Delivered:

1. *Annual Transportation Convention (Sandton)*. 1983. Off-street loading facilities
2. *CSIR Course on Traffic Systems Management (Pretoria)*. 1983. Handling of goods vehicles
3. *Annual Transportation Convention (Pretoria)*. 1985. Mass transit in perspective
4. *Annual Transportation Convention (Pretoria)*. 1989. Timing of amber and all-red at traffic signals
5. *Annual Transportation Convention (Pretoria)*. 1989. Financing of Pretoria Freeway System
6. *Green Congress - The Human, the Arts and the Environment HSRC (Pretoria)*. 1990. The Civil Engineer and the Environment
7. *Annual Transportation Convention (Pretoria)*. 1990. Application of traffic signal control strategies
8. *VIAED Symposium on Traffic Signal Control (Pretoria)*. 1991. Traffic Signal Timing
9. *Annual Transportation Convention (Pretoria)*. 1991. Guidelines for Traffic Impact Studies
10. *Annual Transportation Convention (Pretoria)*. 1993. Appropriate and safe design of the Intergreen Interval
11. *Annual Transportation Convention (Pretoria)*. 1993. Visual assessment of operating conditions on national road network
12. *Second International Symposium on Highway Capacity (Sydney)*. 1994. Highway Capacity Research in South Africa
13. *Annual Transportation Convention (Pretoria)*. 1995. Application of Adopt-A-Highway in South Africa
14. *Annual Transportation Convention (Pretoria)*. 1995. South African Trip Generation Rates-updating of the 1989 trip generation document
15. *International Road Federation Regional Conference: African Highways – The Road Ahead (Sandton)*. 1995. Public Liability - Functional Standards for Roads in South Africa
16. *ITE Regional Conference - Transport and Livable Cities (Melbourne)*. 1996. Public Liability - Functional and Safety Standards for Roads in South Africa
17. *8th International HOV Conference (Pittsburgh)*. 1996. Cape Town BMT-Lane: Pilot Freeway HOV Facility
18. *3rd African Road Safety Congress (Pretoria)*. 1997. Pedestrian Safety on the N2 in Cape Town
19. *South African Transport Conference (Johannesburg)*. 1997. Cape Town BMT Lane: Pilot freeway HOV facilit.
20. *South African Transport Conference (Johannesburg)*. 1997. Pedestrian Safety on the N2 in Cape Town
21. *Third International Symposium on Highway Capacity (Copenhagen)*. 1998. *Evaluation of Weaving on Freeways with Sub-standard Geometric Characteristics*.
22. *ITE 69th Annual Meeting (Las Vegas)*. August 1999. Access Management on Urban Roads in South Africa
23. *Third National Conference on Environmental Engineering (Kwa-Maritane)*. 1999. Effects of Noise Reduction Measures

- at Cape Town International Airport
24. *South African Transport Conference (Pretoria)*. 2000. Road user taxation and external costs (Do South African road users receive a fair deal?).
 25. *South African Institution of Civil Engineering – Annual Symposium Railway and Harbour Engineering Division (Johannesburg)*. 2001. Technical Feasibility of Underground Rail Link in Cape Town CBD.
 26. *Second Annual Road Infrastructure Management and Investment Forum (Johannesburg)*. 2002. Toll Roads and the cost-effectiveness of National Infrastructure
 27. *South African Transport Conference – IRF Session (Pretoria)* 2002. Perspectives on Freight Movement by Road and Rail in South Africa
 28. *PIARC World Road Congress (Durban)*. 2003. Reducing fatalities and injuries on rural and urban roads through operational enhancements
 29. *SAICE Transportation Quadrennial (Sun City)*. September 2004. Road Congestion Cost and Alleviation of Poverty
 30. *South African Transport Conference (Pretoria)*. 2005. Land Freight Issues in South Africa
 31. *ITE 75th Annual Meeting (Melbourne)*. 2005. South African Experience with Traffic Impact Assessments
 32. *Road Safety on Four Continents (Warsaw)*. 2005. Road Safety in Developing Countries – A South African Perspective
 33. *South African Transport Conference (Pretoria)*. July 2006. Organiser and co-presenter of ITE's Practical Traffic Operations Engineers (PTOE) Refresher Course
 34. *3rd IRF/SARF Regional Conference for Africa (Durban)*. September 2006. Perspectives on the externalities of road usage in South Africa
 35. *South African Transport Conference (Pretoria)*. July 2007. Organiser and chairperson of SAICE Symposium on Transportation and 2010 Soccer World Cup
 36. *South African Transport Conference (Pretoria)*. July 2008. Road Access Management in practice: The Port Elizabeth Case
 37. *South African Transport Conference (Pretoria)*. July 2008. Organiser and chairperson of SAICE Symposium on Transportation and 2010 Soccer World Cup
 38. *South African Transport Conference (Pretoria)*. July 2009. Organiser and chairperson of SAICE Symposium on Transportation and 2010 Soccer World Cup
 39. *Road Pavement Forum (Pretoria)*. November 2009. South African Readiness for 2010 FIFA World Cup – Transportation perspective
 40. *South African Road Federation, Preserving our Road Network Seminar (Johannesburg)*, Legal consequences of inadequate road maintenance, July 2011.
 41. *South African Transport Conference (Pretoria)*. Aug 2010. Organiser and chairperson of SAICE Symposium on Highway Capacity Manual (Presenter P Ryus, USA)
 42. *First International Conference on Access Management (Athens)*. June 2011. Road Access Management: Classification of Activity Routes
 43. *Transportation Research Board – Access Management Committee (Washington)*. January 2012. Successfully presented bid for International Conference on Access Management in South Africa in 2016
 44. *South African Transport Conference (Pretoria)*. July 2012. Perspectives on Sustainable Transport
 45. *Transportation Research Board (Washington)*. January 2013. Access Management and Real World – South African Perspective

Courses:

Developed and presented three-day courses (Cape Town and Johannesburg) on traffic signals on behalf of South African Road Federation in 1989, 1991, 1993, 1995, 1997 and 1999.

Ilse Aucamp
Social Scientist

Summary	<p>Ilse Aucamp holds a Masters degree in Environmental Management (Cum Laude) from the Potchefstroom University for Christian Higher Education which she obtained in 2004. Prior to that she completed a BA degree in Social Work at the University of Pretoria. Ms. Aucamp is currently busy with a PhD in Social Sciences at the University of Pretoria. Her topic is: Social Impact Assessment in a South African Context: An integrated Social and Environmental Sciences Approach.</p> <p>Ms. Aucamp is an experienced facilitator, trainer and lecturer and present modules on social impact assessment and public participation on several short courses. She is also a guest lecturer for honours and masters degree students at a number of universities across South Africa. She is past chair person of the sections coordinating committee of the International Association for Impact Assessment (IAIA) having been section chair for the SIA section before. She has served on the National Executive Committee of IAIA's South African affiliate for a number of years.</p> <p>Ms. Aucamp has managed and conducted several public participation processes during her career. She currently specialises in Social Impact Assessments, but often advises on public consultation processes. Ms. Aucamp has conducted numerous social impact assessments during the last twelve years. These include assessments on different kinds of projects, from housing developments, energy projects, transport projects, to mining and recreational projects. Her experience includes facilitation and training, strategic assessments, social management and monitoring plans and social development initiatives.</p>
Qualifications	<ul style="list-style-type: none"> • 1994, BA (Social Work), University of Pretoria • 2004, Masters degree in Environmental Management (Cum Laude), Potchefstroom University for Christian Higher Education • Ms. Aucamp is currently busy with a PhD in Social Sciences at the University of Pretoria. Her topic is: Social Impact Assessment in a South African Context: An integrated Social and Environmental Sciences Approach.
Registration(s)	<ul style="list-style-type: none"> • South African Council for Social Service Professions(Registration number: 10 – 16558) • CCETSW (British Social Work Council)
Further training 2001- 2013	<ul style="list-style-type: none"> • Introduction to SIA - Burdge • Sustainable Livelihoods Training – Khanya Development Trust • Achieving the full potential of SIA – Vanclay & Esteves • Involuntary Resettlement – Appleby, Rawa & Rivas de Neffa
Affiliations	<ul style="list-style-type: none"> • International Association for Impact Assessment (South Africa) – National

	Executive Committee member 2005 - 2010 <ul style="list-style-type: none"> • International Association for Impact Assessment – Chair of Section Coordinating committee 2009 – 2010 • International Association for Impact Assessment – Chair of Social Impact Assessment Section 2005 – 2008 • LEAD Fellow: Cohort 12 • Advisory panel member: socialimpactassessment.net 			
Countries of work experience	South Africa; Swaziland, Taiwan, United Kingdom, Angola, Namibia, Mozambique, Zambia			
Nationality	South African			
Years of experience	18			
Date of birth	18 January 1973			
Languages		Speaking	Reading	Writing
	Afrikaans	Excellent	Excellent	Excellent
	English	Excellent	Excellent	Excellent

PROFESSIONAL EXPERIENCE

Social Impact Assessment 2001 - 2014	<ul style="list-style-type: none"> • Solar Park Integration Project • New Largo Coal Mine • Phola-Kusile Coal Conveyor • Camden Ash Dump • Sishen Mine: Western Waste Rock Dumps • Sephaku Chemical Plant • Ferrometals Storm Water Management • Khanyisa Power Station • Eskom Camden-Theta Transmission lines • Sishen Complex Mining Right Application • Expansion of the Port of Lüderitz Feasibility Study • Soweto Integration Power Lines • Biotshopei Landfill • Sishen Mine: expansion of Lylyveld South Pit • Expansion of the Port of Saldanha • Strategic Socio-economic analysis N2/R72 • Terrain suitability study Palabora Mining Company • Smokey Hills Mine • Coal 3 and 4 Power Stations • Rietpoort Residential Development • Kalplats Mine • Westridge Mall • Lebone II College of the Royal Bafokeng • Vaal South power station
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- Doornkuil Residential Development
- Fleurhof Residential Development
- Klapmuts Residential Development
- Shallcross & Stanger Filling Stations
- Bushbuck Ridge bypass road
- Mamelodi Hatherley transmission lines
- Burnstone Mine
- Waterberg power stations
- Uranium plant – Welkom
- Eskom Landfill Lephalale
- Hoedspruit Ethanol Plant
- Social and Labour Plan Kalplats Mine
- Social aspects of Social & Environmental Management System: Kelvin Power
- Westonaria South Housing Development
- Integrated Management Plan: Vredefort Dome World Heritage Site
- Perle de Fleuve residential development
- Ubombu Sugar
- Eskom Tabor-Spencer power line
- Kalahari Mine
- Karoo Array Telescope
- Coastal Livelihood Assessment Paternoster & Melkhoutfontein
- Royal Maluti Golf Estate
- Social and Labour Plan Kalahari Mine
- Social and Labour Plan Highveld Crushers
- Eskom Kudu power line
- Viking Bay
- Garona/Aries power line
- Northern Golf Courses
- West Rand Casino
- Huddle Park
- Celebration Northriding
- De Beers/Eskom Voorspoed Mine power line
- Rustenburg Mall
- Lizard Point Golf Estate
- The Ponds Golf Estate
- Putfontein township development
- Klipfontein township development
- Vlakfontein township development
- Duduza township development
- Chief Alfred Lithuli township development
- Rooikop Station township development
- Payneville township development
- Etwatwa township development

	<ul style="list-style-type: none"> • Mayfield township development
Social Audits/Due diligence 2001-2014	<ul style="list-style-type: none"> • Kelvin Power • EnviroServ • Shoprite Angola
Social Management Implementation: 2009 –ongoing	<ul style="list-style-type: none"> • Mokolo Crocodile Water Augementation Project • Upgrade of Staff infrastructure in Etosha National Park
Public Consultation 2001 – 2014	<ul style="list-style-type: none"> • Facilitation of DWA National Estuarine Monitoring Programme workshop • Public participation on numerous small projects, e.g. Naschem Explosives Factory, Witwatersrand Gold Refinery, Middleburg Ferrochrome, Watervalboven Chemicals • Establishment of a Water Users association – Grootegeluk mine • Grootegeluk Coal Mine • Stuart Coal Colliery • Gauteng Government Precinct • Thabeng Eco reserve and Golf Estate • Mogol Club, Lephhalale • Leeuwpan Environmental education centre • Ponds Golf Estate • Manzengwenya Dive Camp, St.Lucia • Kalahari Mine • Huddle Park Golf Estate • De Beers/Eskom Voorspoed Mine power line • Eskom Tabor-Spencer power line • Colombus Stainless • Lebone II College of the Royal Bafokeng
Training 2001-2014	<ul style="list-style-type: none"> • Presented and facilitated course on social entrepreneurship in partnership with the University of Pretoria, Unisa, SAVF and Future Families • Facilitated and coordinated the Population, Environment and Development (PED) Nexus course for the international non-government organisation Leaders in Environment and Development (LEAD), the United Nations Population Fund and the Department of Social Development • Presenting module on Social Impact Assessment and Public Participation to Masters Degree Students in environmental management at the University of the Orange Free State • Presenting module on Social Impact Assessment and Public Participation to honours' degree students in environmental management at the University of South Africa • Presenting module on Social Impact Assessment to final year students in environmental management at the Tshwane University of Technology • Presenting module on Social/Community Issues in Risk Assessment for the

	<p>Environmental Risk Assessment course at the Centre for Environmental Management at the University of the Northwest</p> <ul style="list-style-type: none"> • Presenting training courses in Environmental Management topics and Social Impact Assessment at the Centre for Environmental Management at the University of the Northwest • Presenting training in Social Impact Assessment to Masters Degree students in the Department of Geography and Environmental Sciences at University of the Northwest • Presenting training in Social Impact Assessment to final year engineering students in the Department of Engineering at University of Pretoria • Presenting training in Social Impact Assessment to Masters Degree students in the Department of Social Work at University of Pretoria • Presenting modules in Masters Degree in Social Impact Assessment at the Department of Sociology, University of Johannesburg • Presenting training in Social Impact Assessment and Environmental Impact Assessment for the NGO Leaders in Environment and Development and the Department of Social Development • Drafted Guidelines for Socio-economic Impact Assessment for the Integrated Environmental Management Series Guidelines, Department of Environmental Affairs and Tourism • Present SIA course at the Centre for Environmental Management. • Present SIA course at Eskom.
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PROFESSIONAL HISTORY

Date	Company	Position
2013 -current	Equispectives Research and Consulting Services	Director
2006 -current	Ptersa Environmental Management Consultants	Director
2005 - 2006	Strategic Environmental Focus	Public participation Co-ordinator & Social Scientist
2004 - 2005	EIMS	Manager: Stakeholder Engagement Unit
2004	Clean Stream Environmental Services	Senior Environmental Practitioner
2002 -2003	Ptersa Environmental Management Consultants	Social Scientist
2001 - 2002	Joy School of Teaching, Taichung, Taiwan	Teacher
1999 - 2000	RS Locums. United Kingdom of England	Locum Social Worker

1995 - 1999	South African National Defence Force	Senior Social Worker
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PAPERS AND PUBLICATIONS

- The Legal Mandate for SIA in South Africa - Paper presented at the annual conference of the International Association for Impact Assessment 2012 in Porto, Portugal
- Social Experts, a necessity not a luxury –Paper presented with L van der Merwe at the annual conference of the International Association for Impact Assessment 2012 in Porto, Portugal
- Do you know who I am? - Paper presented at the annual conference of the International Association for Impact Assessment 2011 in Puebla, Mexico
- Moving beyond social impact assessment to social sustainability - Paper presented at the annual conference of the International Association for Impact Assessment 2011 in Puebla, Mexico
- Challenges to SIA in a South African Context - Paper presented at the annual conference of the International Association for Impact Assessment 2009 in Accra, Ghana.
- Social Impact Assessment as a planning tool - can social tools tango? – Paper presented at the annual conference of the South African Affiliate of the International Association for Impact Assessment 2006 at Kwa Maritane, North West Province.
- Power to the people – lessons learned from Social Impact Assessment for linear projects - Paper presented at the annual conference of the International Association for Impact Assessment 2006 in Stavanger, Norway
- Social Impact Assessment – A prickly pear in the toolbox – Paper presented at the annual conference of the South African Affiliate of the International Association for Impact Assessment 2004 at Champagne Castle, Kwazulu-Natal
- Social Impact Assessment in South Africa – Paper presented at the annual conference of the International Association for Impact Assessment 2005 in Cambridge, Boston, USA
- Social Impact Assessment and Housing Developments – Paper presented at the World Congress on Housing 2005 in Pretoria, South Africa.
- Member of technical advisory committee for World Congress on Housing 2005. Transforming Housing Environments through design
- Conference coordinator – IAIA 2009 annual conference
- Member of international SIA steering group in IAIA developing guidelines for SIA
- Advisory member for the Centre for Environmental Rights

Izak Rust
Franschhoek
Short CV

Professor Izak C Rust retired from academia in 1996, having originally joined the Geology Department, Univ Stellenbosch, in 1960, and later moving to the University of Port Elizabeth in 1970, where he became that university's first professor of Geology and head of the newly formed Department of Geology.

His main research interest was in sedimentology and stratigraphy. While teaching at the then UPE (now Nelson Mandela Metropolitan University) his research focused on coastal sedimentological processes and coastal landscape evolution and he was the research leader of a number of masters and doctoral students.

Since 1997 he is based in Franschhoek, Western Cape, where he pursues various aspects of geotourism, more specifically offering small-group guided nature hikes with emphasis on earth heritage. He is chairman of the Advisory Board of the Mont Rochelle Nature Reserve located in the Franschhoek mountainland, part of the World Heritage Site: Cape Floral Region Protected Areas. He is a member of the Field Guides Association of Southern Africa and a registered tourist guide. He writes a monthly column for the local newspaper and occasionally speaks on scientific subjects on the local community radio. He was a member of the permitting committee of the South African Heritage Resources Agency. He received the Havenga Prize awarded by the Suid-Afrikaanse Akademie for excellence in geoscience. He is a Fellow of the Geological Society of South Africa. He has been awarded the prestigious Draper Memorial medal by the Geological Society of South Africa for 2013.

Curriculum Vitae

Updated Nov 2012

Name:	Izak C Rust
Profession:	Professor of Geology emeritus, University of Port Elizabeth, retired 1996
Affiliation:	Private Consultant Earth Scientist
Highest Qualification:	DSc Geology (University of Stellenbosch) 1967.
Citizenship:	RSA
Language	Afrikaans, English, German (read); Dutch (read)
Registered Scientist	South African Council for Natural Scientists, #401309/83

Professional Societies South African Geological Society (Fellow); Field Guides Association of Southern Africa; SASQUA (Life member); Western Cape South African Tourist Guide WC0706

Professional Awards: SA Akademie vir Wetenskap&Kuns Havenga Prize for Geology 1996; GSSA Honorary Award 1999; GSSA Draper Memorial Medal 2014

Employment University of Stellenbosch: Senior Lecturer (1960-1969); University of Port Elizabeth: Professor of Geology, HoD Dept Geology (1970-1995); Dean, Faculty of Science, UPE (1991-1996); Private Earth Science Consultant (1965-present)

Current activities Koringberg Toere CC - earth heritage ecotourism development and customised educational tours and guided nature hikes; field guide training as associate of The Nature College; Earth Science consultant; public speaker; local newspaper columnist; introductory speaker on "World Heritage Sites and Geotourism in South Africa" - a conference on geotourism, Pretoria

Consultations (last 4 years) Project reviewer for the Council for Geoscience, Pretoria, and others on various reports to ESKOM on potential nuclear power plant sites
Audit consultant to the Council for Geoscience, Pretoria
Consultant to Meepong Resources, Gabarone, Botswana on neotectonic risk at Mmamabula coal-fired power plant
Presenter of a semester course on Sedimentology & Stratigraphy, University of Stellenbosch
Various groundwater projects with Metsi Metseng Geological Services, Clarens.
Professional Fieldschool "SEDPLETT" for Gold Fields of South Africa
Professional Fieldschool "SEDPLETT" for American Association of Petroleum Geologists, International Conference, Cape Town
Translator of "HOW ON EARTH" by Terence McCarthy for Random House Struik Publishers

Personal Healthy, fit

Key Skills

- DIVERSE SCIENTIFIC AND ACADEMIC PROJECT MANAGEMENT, 1965-1996
- RESEARCH EQUIPMENT PROCUREMENT AND MANAGEMENT AT UPE, 1975-1996
- TERTIARLY LEVEL ACADEMIC TRAINING AND MANPOWER DEVELOPMENT, ESPECIALLY RESEARCH DEVELOPMENT & SUPERVISION, 1965-1996
- RESEARCH LEADER ON PALAEOZOIC SEDIMENTOLOGY & STRATIGRAPHY, 1965-1996
- RESEARCH LEADER ON FLUVIAL, ESTUARINE & AEOLIAN SEDIMENTOLOGY and COASTAL ZONE GEOMORPHOLOGY & LANDSCAPE EVOLUTION, 1979-1996

Assignments include:

MASTERS RESEARCH: Sedimentology of the Molteno Sandstone (1958), Univ Stellenbosch

DOCTORAL RESEARCH: Sedimentology and stratigraphy of the Table Mountain Sandstone (1967) under Professor MS Taljaard, Stellenbosch University; discoverer of the fossiliferous zones of the Cedarberg Shale Formation

NATIONAL PROJECTS: Founder member, later chairman, of the South African Committee on Stratigraphy, 1970; member and/or chairman of several national scientific management committees, 1970-1996

TEACHING SPECIALITIES: Stratigraphy, Sedimentology, Engineering Geology, Mineralogy, Palaeontology, Geological Surveying & Mapping, Structural Geology, Petroleum Geology, Gemmology

PROJECT DEVELOPER & RESEARCH LEADER: Research on Sedimentation in Estuaries (ROSIE) 1979-1987, South African National Committee for Oceanographic Research,

EXTERNAL EXAMINER & REFEREE: External examiner to several South African universities; referee for many scientific and other publications & reports

INSTITUTE FOR COASTAL RESEARCH, UPE: Project leader & Exco member 1983-1996 - responsible for earth science-based projects in the fields of estuarine sedimentology, beach sedimentology, dune dynamics & sedimentology, shallow marine dynamics, & coastal landscape evolution

POSTGRADUATE STUDENT SUPERVISION 1979-1998 in the fields of sedimentology, especially fluvial dynamics, dunefield dynamics, estuarine dynamics & morphology in the Eastern Cape, coastal zone landscape evolution and geomorphology - in all about 25 masters students & 13 doctoral students

PUBLICATIONS: Approximately 60 scientific and general publications.

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External lecturer, Sheffield University courses in Sound and Vibration Control, and British Open University summer schools.

74-77 *Noise and vibration consultant*, Greater London Council Environmental Protection Department, England. Noise/acoustics consultancy concerned with noise control (automotive, factory, building services) and acoustic quality in buildings. Expert witness at planning hearings and member of national standards committee for acoustics. Open University summer schools visiting lecturer. Simultaneously obtained Masters Degree in Applied Acoustics at London University.

68-74 *Dynamics engineer* at British Aerospace, Bristol, England. Signal Analysis development for modal analysis, Dynamics of aircraft and spacecraft. Vibration testing of whole and part structures. Flight testing and noise/vibration reduction for comfort and external noise standards. Computer modeling.

**CLIENTS:**

Afrox  
Electricidade de Mozambique  
Envirolink  
Group 5 Construction  
Precious Metals Refinery  
Rand Refinery  
Rand Water  
SIMRAC  
Ster Kinekor Cinemas  
ESKOM  
Silentor  
Eagle Quarries  
EIMS  
NISSAN SA  
IMAX Cinemas  
MOZAL  
De Beers  
Eco Assessments  
GAUTRAIN Project  
De Beers Kimberley Mines  
Rossing Uranium Mine, Namibia  
NAMDEB, Namibia  
Prime Resources  
WSP Consulting  
The Billion Property Group  
Exigent Environmental  
CT Environmental  
TWP Consulting

Debtech  
Swedpower  
ISCOR Elisras  
ALUSAF  
Howden Safanco  
Hatch Associates  
MONDI  
Keeley Granite  
CSIR Miningtek  
Smiths Manufacturing  
Gauteng Legislature  
Old Mutual Properties  
BCL, Botswana  
Anglo Coal  
DRA Mine Consulting  
INGWE COAL  
Anglo Technical Services  
Strategic Environmental Focus  
Ceramic Industries  
Flour Daniel  
Umbogintwini Operations Services  
First National Bank  
Golder Associates  
Redefine Properties  
Platinum Group Metals  
Aurecon  
Sibanye Gold

**PUBLICATIONS:**

J.R. Hassall and K. Zaveri, Acoustic Noise Measurements. 5th edn June 1988. Bruel & Kjaer publications.

Contributing Author: Mechanical Vibration and Shock Measurements. 2<sup>nd</sup> edn 1984 Bruel & Kjaer publns.

Contributing Author: The Handbook of Noise Control. Edited by C. Harris 1990.

Translator: Noise Control - Principles and Practice. The Swedish Workers Protection Fund. Bruel & Kjaer publications 1986.

An Array-based STSF System for Noise Control Investigations in the Automotive Industry. Paper presented at the Noise and Vibration Conference 1995, Pretoria.

A Trackside Non-Intrusive Vibration-Based System for Monitoring the Development of Wheel Flats on Rolling Stock at Normal Train Speeds. Presented at the Noise and Vibration Conference 1995, Pretoria.

Leak Location by Acoustic Correlation, South African Mech. Engineer, Vol 45, Sept. 1995.

A number of papers at national and international Conferences, and many data sheets, brochures, and instruction manuals for instrumentation systems.

### **FIELDS OF EXPERTISE**

Environmental Impact Assessments

Noise measurement for industrial hearing damage assessment and noise zoning.

Expert witness for environmental impact assessment and noise nuisance cases.

Architectural acoustics, building acoustics and room treatments.

Human vibration measurements, assessment and control

Noise and vibration control of mechanical services and machinery.

Machine condition monitoring and diagnosis

Modal analysis of structures, Vibration and structural testing, Frequency Analysis

### **PROFESSIONAL SOCIETIES:**

Fellow of the Southern African Acoustics Institute, Member of the Institute of Acoustics (UK), the Aeronautical Society of South Africa, and Royal Aeronautical Society (UK).

# CURRICULUM VITAE

J P BOTHA

## Personal information

Full name: Johannes Petrus Botha

Date of birth: 4 October 1949

Age: 64 years

ID number: 4910045022080

Address: 309 Anthony street

Waterkloof Glen

Pretoria

Contact details tel 012 998 6959

Cell: 084 5860698

## Academic qualifications

University of the Free State: B Com (1971)

B Com (Hons) (1972)

M Com (1974)

University of Pennsylvania: MA Economics (1976)

MA Regional Science (1977)

University of Johannesburg D Com (1982)

## Work experience

University of the Free State (1973): Department of Economics -  
Temporary Lecturer

Economic Advisory Council of the Prime Minister (1978 – 1979):  
Economic Planner

University of the Free State (1979 – 1980): Department of  
Economics - Lecturer

North West University (1980 – 1981): Department of Economics  
- Senior Lecturer

North West University (1982 – 1990): Department of Economics  
Professor

(1985): School of Administration and  
Management - Deputy Dean

(1986 – 1989): School of Administration  
and Management - Dean

University of Pennsylvania (1987): Department of Economics –  
Visiting Scholar

Drexel University Philadelphia (1987): Department of  
Economics - Visiting Lecturer

Central Economic Advisory Service (1990 – 1996) Chief Director  
Macroeconomic Analysis. Responsible for macroeconomic  
modelling and analysis, sectoral economic and cost-benefit  
analysis

Standard Bank (1996 – 2012): Senior Economist. Responsible  
for economic forecasting, public finance and property market  
research. An important facet of my employment was to conduct  
economic briefings and presentations to a variety of clients,  
prospective clients, the press, international bodies and  
institutions. More than one thousand briefings and presentations  
were conducted over the sixteen year period.

University of Pretoria (2006 -2007): Department of Economics -  
part-time lecturer at honours and masters degree level.

Monash University South Africa (2013): School of Information  
Technology – part-time lecturer.

Monash University South Africa (2013): Faculty of Business and  
Economics – part-time lecturer.

### **Membership of committees and advisory bodies**

Board of the Institute for Development Research, North West  
University

Council North West University

Civil Engineering Advisory Council

Building Industries Advisory Council

Venda Economic Advisory Council (Chairman)

National Economic Forum

National Economic Development and Labour Council

Modelling Group Energy Research in Transportation

Development Bank of Southern Africa: Panel of experts on Evaluation of Regional Industrial Development Programme

Department Human Settlements: Member Advisory Panel of Minister of Human Settlements Minister Tokyo Sexwale

### **Study Tours and visits**

Visit Chile Central Bank and Department of Finance (1994).

Visit World Bank and IMF in Washington for talks on economic programming (1994).

Visit National Institute for Social and Economic Research, London (1994).

Visits to Malaysia (1995) Department of Finance and Department of Economic development with Minister in Presidency.

Visit to Indonesia (1995) Planning Department and Institute of Technology.

Malaysia/World Bank training course (1995)

Visit Australia (1995) Federal Department of Finance Canberra.

### **Reports and publications**

Botha, J P (1980): "The random walk model and the behaviour of gold prices", *Investment Analysts Journal*, vol 15.

Botha, J P (1982): Manpower needs forecasting in micro and macro econometric models. *National Manpower Commission*. Pretoria.

Botha, J P (1982): Comments and guidelines following from "Econometric issues in forecasting manpower needs". *National Manpower Commission*. Pretoria.

Botha, J P (1984): "The Wharton Annual and Industry and Forecasting Model predictions and ARIMA type model prediction", *Studies in Economics and Econometrics*, no 18, pp 5-14.

Botha, J P (1984): "Specification errors and a two-phase approach to forecasting: a Monte Carlo experiment", *Studies in Economics and Econometrics*, no 20, pp 40-55.

Botha, JP and S J S Louw (1985): Thaba Nchu manpower facility: a needs analysis, *Department of Manpower*. Pretoria.

Botha J P (1987): "Data: its nature, quality and use", *Studies in Economics and Econometrics*, Vol 11, no 3, pp 83-109.

Botha, J P (1986): Determinants of the maize price. *Agricultural Market Board*. Pretoria.

Botha J P (1985): The Staley model applies to South Africa. *National Institute for Transport and Road Research, CSIR*, Pretoria.

R I Mirrelees and J P Botha (1984): The use of energy in Transport: a proposed modelling framework. *National Institute for Transport and Road Research, CSIR*, Pretoria.

Botha, J P and S J H Louw (1986): *Department of Mineral and Energy Affairs* Pretoria.

Botha, J P and S J H Louw (1986): A social cost-benefit analysis of the proposed sugar cane fuel project, *Department of Mineral and Energy Affairs* Pretoria.

Botha, J P and S J H Louw (1986): A social cost-benefit analysis of the proposed AECl synfuel project, *Department of Mineral and Energy Affairs* Pretoria.

Botha, J P and S J H Louw (1986): A social cost-benefit analysis of the proposed synfuel projects, *Department of Mineral and Energy Affairs* Pretoria.

Botha, J P (1987): Cost-Benefit analysis of training, *National Training Board* Pretoria.

Co-author (1992): The Restructuring of the South African Economy. *Central Economic Advisory Service*, Pretoria.

Co-author (2013): Update of a Manual for Cost Benefit Analysis in South Africa with Specific Reference to Water Resource Development, *Water Research Commission*, Pretoria.

Co-author (2014): Proposed Mozambique Liquid Natural Gas Project – A Macroeconomic Analysis. Study conducted on behalf of Standard Bank.



# CURRICULUM VITAE

## *Martinus Anthonius van Nierop*

**Home Address:** Plot 147  
Alewynspoort  
Johannesburg

**Telephone No.:** Home: None  
Work: (011) 472 3112  
Fax: 086 650 0581  
Cell: 083 395 2923

**Postal Address:** P.O. Box 786  
EIKENHOF  
1872

**Email:** mvnierop@ananzi.co.za

### PERSONAL DATA

**Surname :** Van Nierop

**First Names :** Martinus Antonius

**Preferred Name :** Martin

**Date of Birth :** 15 September 1964

**ID Number :** 640915 5182 089

**Marital Status :** Married with five children (born : 06/04/1992, 28/12/1993, 14/04/1998  
30/11/2005 and 19/09/2008)

**Nationality :** South African

**Home Language :** English

**Other Languages :** Dutch (speak, read and understand)  
Afrikaans (fluent)

**Health :** Excellent

### EDUCATIONAL QUALIFICATIONS

#### **Secondary Education :**

**School :** Christian Brothers' College, Welkom (1978-1982)

**Certificate :** O.F.S. Senior Certificate (1982)

Matriculated with a Second Class Pass

**Subjects :** English - 1st Language (H.G.)  
Afrikaans - 2nd Language (H.G.)  
Mathematics (H.G.)  
Physical Science (H.G.)  
Biology (H.G.)  
Latin (H.G.)

**Distinctions Obtained :** Mathematics  
Physical Science

**Prizes and Awards :** Honours Blazer (Academic) (1982)  
O.F.S. Science Olympiad (1981), 11<sup>th</sup> place  
Biology Olympiad (1982), 78%  
National Youth Science Week (1982), 53<sup>rd</sup> place  
Veld & Vlei Adventure Course Certificate (1981)

### **Tertiary Education :**

**University Attended :** University of South Africa  
(1983, 1985-1988)

**Degree Obtained :** Bachelor of Arts

**Major subjects :** Sociology  
Psychology

**Other Subjects :** Communications  
Philosophy  
Sesotho

**University Attended :** University of the Witwatersrand  
(1984, 1991-1993)

**Degree Obtained :** Bachelor of Science (Engineering) Chemical

**Distinctions obtained :** Applied Maths IIB  
Chemistry II  
Engineering Concepts  
Engineering Applied Computing  
Intro. to Chemical Reactor Theory and Process Control  
Heat Transfer  
Chemical Eng. Plant Design  
Process Control  
Solid Fluid Systems  
Systems Management

**Prizes and Awards :** Merit Certificate - Applied Maths IIB (1991)  
Sasol Management Principles Prize - for highest mark in  
course on Management Principles (4th yr.) (1993)

**University Attended :** University of the Witwatersrand

(1994-1995[full-time];1996-2002[part-time])

**Degree Obtained :** Doctor of Philosophy (Engineering) Chemical

Thesis: Characterisation of the load behaviour of an industrial grinding mill

**Courses Attended:**

1997: Creative Problem Solving – H. Scott Fogler

1999: Recent Advances in Comminution – John Herbst

2005: Implementing Air Quality in a Changing Regulatory Environment

2005: Its my tender course - Online

**PUBLICATIONS**

***Accredited Journals***

Moys,M.H. & van Nierop,M.A., 1996, Determination of Column Flotation Parameters from Batch Testwork, *S.A. Journal of Chemical Engineering*, Vol. 8, 1:1-18.

Moys,M.H., Van Nierop,M.A. & Smit,I., 1996, Progress in Measuring and Modelling Load Behaviour in Pilot and Industrial Mills, *Minerals Engineering*, 9 (12):1201-1214.

Van Nierop,M.A. & Moys,M.H., 1997, Measurement of Load Behaviour in an Industrial Grinding Mill, *Control Engineering Practice*, 5 (2):257-262.

Van Nierop, M.A. & Moys, M.H., 1997, The effect of overloading and premature centrifuging on the power of an autogenous mill, *J. S. Afr. Inst. Min. Metall.*, 97 (7):313-317.

Van Nierop, M.A. & Moys, M.H., 1998, Premature Centrifuging, Oscillation and Axial Mixing of an Industrial Grinding Mill Load, *Minerals Engineering*, 11 (5): 437-445.

Van Nierop, M.A., Glover, G., Hinde, A.L. & Moys, M.H., 2001, A Discrete Element Method Investigation of the Charge Motion and Power Draw of an Experimental Two-dimensional mill, *Int. J. Miner. Process.*, 61 (2):77-92.

Van Nierop, M.A. & Moys, M.H., 2001, Exploration of mill power modelled as a function of load behaviour, *Minerals Engineering*, 14 (10):1267-1276.

Hlungwani, M.O., Van Nierop, M.A. and Moys, M.H., 2001, Experimental validation of 2D DEM prediction of load motion in a '2D' laboratory mill, Submitted for publication in *Int. J. Miner. Process.*

Van Nierop, M.A. & Moys, M.H., 2002, Axial Mixing of an Autogenous Grinding Mill, *Int. J. Miner. Process*, 65 (3-4):151-164.

### **Conferences**

Moys, M.H. & Van Nierop, M.A., 1993, Determination of Column Flotation Parameters from Batch Testwork, Presented at Minerals Engineering '93 Conference, Cape Town, August 1993 (also *S.A. Journal of Chemical Engineering*, 1996).

Van Nierop, M.A. & Moys, M.H., 1995, Insights into an Industrial Mill through Measurements of Load Behaviour, Presented at SAIMM 14<sup>th</sup> Ann. Miner. Process. Symp., Somerset West, 3-4 August.

Van Nierop, M.A. & Moys, M.H., 1995, Measurement of Load Behaviour in an Industrial Grinding Mill, Preprints 8<sup>th</sup> IFAC International Symposium on Automation in Mining, Mineral & Metal Processing (MMM95), Sun City, 29-31 August 95, pp.249-254 (also *Control Engineering Practice*, 1997).

Moys, M.H., Van Nierop, M.A. & Smit, I., 1995, Progress in Measuring and Modelling Load Behaviour in Pilot and Industrial Mills, Plenary Lecture: Mineral Processing: Recent Advances and Future Trends, Kanpur India, 11-15 December, pp.171-185 (also *Minerals Engineering*, 1996).

Van Nierop, M.A., Nesbit, P.Q. & Moys, M.H., 1996, Facets of Load Behaviour in an Industrial Grinding Mill, Proc Minerals and Materials '96, SAIMM, Somerset West, 31 July - 2 August, pp.151-159.

Van Nierop, M.A. & Moys, M.H., 1996, Measurement of Load Behaviour in an Industrial Mill, Proc. 2nd Int. Conf. on Autogenous and Semiautogenous Grinding, SAG96, Vancouver, 6-9 October, pp.657-670.

Van Nierop, M.A. & Moys, M.H., 1997, The effect of overloading and premature centrifuging on the power of an autogenous mill, Proc. Extraction Metallurgy Africa '97, SAIMM, Mintek Johannesburg, 25-26 June (also *J. S. Afr. Inst. Min. Metall.*, 1997).

Van Nierop, M.A. & Moys, M.H., 1997, Axial Mixing of an Industrial Grinding Mill, SAIMM 16<sup>th</sup> Annual Mineral Processing Symposium, Cape Town, 7-8 August.

Van Nierop, M.A. & Moys, M.H., 1997, Axial Mixing of an Industrial Grinding Mill, 6<sup>th</sup> ICRA Workshop, Bad Neuenahr, 19-21 September (also *Int. J. Miner. Process*, 1999).

- Van Nierop, M.A. & Moys, M.H., 1997, Load Orientation, Oscillation and Premature Centrifuging in an Industrial Grinding Mill, Proc. XX International Mineral Processing Congress, Aachen, 21-26 September, pp.211-218.
- Van Nierop, M.A., Glover,G., van Tonder, J.C. & Moys, M.H., 1998, 2D DEM verification: Load behaviour and forces on a lifter bar, Proc. Extraction Metallurgy Africa '98, SAIMM, Johannesburg, 5-6 November, pp. 47-49; and *J. S. Afr. Inst. Min. Metall.*, 99 (2):93-96.
- Van Nierop, M.A., Maruping, P., van Tonder, J.C. & Moys, M.H., 1999, Prediction of the three dimensional milling process using a two-dimensional Discrete Element Method simulation, Mineral Processing '99, Cape Town, 5-6 August.
- Moys, M.H. & van Nierop, M.A., 1999, DEM validation Research at Wits University, 8<sup>th</sup> ICRA Workshop, Pilanesberg South Africa, 7-9 August.
- Van Nierop, M.A., Glover, G., van Tonder, J.C. & Moys, M.H., 1999, Forces on a Lifter: Implications for Discrete Element Method Simulations, Proc. Metallurgy Africa '99, Johannesburg, 1-2 November, pp.87-91.
- Moys, M.H. & van Nierop,M.A., 2000, Applying the "Discrete Element Method" to design grinding mills and liner profiles and to simulate their behaviour, Proc. 2<sup>nd</sup> Annual Crushing and Grinding in Mining Conf., Johannesburg, 14-15 February.
- Moys, M.H., van Nierop, M.A., van Tonder, J.C. and Glover, G., 2000, Validation of the Discrete Element Method (DEM) by comparing predicted load behaviour of a grinding mill with measured data, Proc. XXI IMPC, Rome, 23-28 July, pp.C3-39-C3-44.
- Hlungwani,, M.O., van Nierop, M.A. and Moys, M.H., 2000, Laboratory mill load shape measurement for 2D DEM verification, Mineral Processing 2000, Cape Town, 24-25 August.
- Van Nierop, M.A. and Moys, M.H., 2000, Validation of the Discrete Element Method (DEM) for modelling particulate processes, Proc. SAChE 9<sup>th</sup> National Meeting, Secunda, 9-12 October, pp.454-462.
- Van Nierop, M.A. and Moys, M.H., 2000, Exploration of mill power modelled as a function of load behaviour, Minerals Engineering 2000, Cape Town, 13-15 November.
- Dong, H., Hlungwani, O.M., van Nierop, M.A. and Moys, M.H., 2000, Particle density plots and trajectories for quantitative DEM validation, Minerals Engineering 2000, Cape Town, 13-15 November.
- Moys, M.H. and van Nierop, M.A., 2001, Measurement and Simulation of Load Behaviour in Industrial Grinding Mills for Design and Control, Proc. 3<sup>rd</sup> Annual Crushing and Grinding in Mining Conf., Johannesburg, 21-22 February.

Hlungwani, O.M., van Nierop, M.A. & Moys, M.H., 2001, DEM Parameter Estimation from Photographed Mill Load Behaviour, Mineral Processing 2001, Cape Town, 2-3 August, PP04.

Van Nierop, M.A. and Moys, M.H., 2001, The impact of load oscillation on power in an industrial autogenous mill – an experimental and DEM study, Proc. 3rd Int. Conf. on Autogenous and Semiautogenous Grinding, SAG2001, Vancouver, 30 September-3 October, pp. IV-272-IV283.

Kalala, J.T., Moys, M.H. and van Nierop, M.A., 2003, Discrete Element Method modelling of forces and wear on ball mill liners, South African Chemical Engineering Congress, Sun City, 3-5 September and XIth International Comminution Research Association Workshop, Lanzerac, South Africa, September 2003.

Van Nierop, M.A. and van Nierop, U.G., 2004, Natural Family Planning Teaching in the Private Sector, 1<sup>st</sup> AFLF / 4<sup>th</sup> FERMASA Conference, Johannesburg, 24-25 April.

Piketh, S.J. and van Nierop, M.A., 2005, Air Pollution in RSA and Air Pollution Hot Spots, ORF and SACEPA Environmental Conference, Matla Power Station, 11 August.

Van Nierop, M.A., Rautenbach, C, Piketh, S.J., 2005, Ambient Air Quality Monitoring, IQPC Implementing the Air Quality Act, Johannesburg, 24-25 October.

Walton, N.M., Liebenberg-Enslin, H., Thomas, R.G. and van Nierop, M.A., 2007, Priority Area Air Quality Management Plan: Vaal Triangle Airshed – Baseline Air Quality, NACA Conference, Drakensberg, 10-12 October.

Van Nierop, M.A. and Piketh, S.J., 2007, Domestic and international practices in dealing with zero shift and drift on ambient air quality monitoring data, NACA Conference, Drakensberg, 10-12 October.

Thomas, R.G., Liebenberg-Enslin, H., Walton, N.M. and van Nierop, M.A., 2007, Vaal Triangle Air-shed priority area AQMP – Baseline characterisation, NACA Conference, Drakensberg, 10-12 October.

### **Other**

Van Nierop, M.A. & Moys, M.H., 1992, Investigation into the Behaviour of an Industrial Scale Bubbler: The Effect of Frother Concentration, Gas Rate and Water Rate, Internal Report for Multotec Cyclones (Pty.) Ltd.

Moys, M.H., Rajamani, R.K. & van Nierop, M.A., 1996, DEM Simulation : Eskom Mill,

Internal Report for Eskom.

Moys, M.H. & Van Nierop, M.A., 1997, Discrete Element Modelling of Load Behaviour in Grinding Mills, Internal Report for Eskom, Report No. TRR/E/97/EL256.

Van Nierop, M.H. & Moys, M.H., 1997, Load Behaviour and Torque Drawn by a 2D Laboratory Mill, Internal Report for Mintek.

Van Nierop, M.A. & Moys, M.H., 1998, Discrete Element Method Verification: Forces on a Lifter Bar, Load Behaviour, Eskom internal report, Report No. TRR/E/98/EL128.

Van Nierop, M.A. & Moys, M.H., 1998, Discrete Element Method Validation: Review of Past Work; Requirements for Future Work, De Beers Research Laboratories internal report.

Moys, M.H. & van Nierop, M.A., 1999, 1999 DEM Development Overview, Eskom Internal report, Report No. RES/PR/99/00180.

Van Nierop, M.A. & Moys, M.H., 1999, Discrete Element Method Simulations: Predicting Grinding Mill Load Behaviour, *Chemical Technology*, Nov/Dec:3-5.

Van Nierop, M.A., Hlungwani, O.H. & Moys, M.H., 2000, Development of Crusher Modelling: Literature Review, DebTech Internal Report.

Van Nierop, M.A., Dong, H., Hlungwani, O.H. & Moys, M.H., 2000, DEM 2000: Development and validation, Eskom Internal Report, Report No.

Van Nierop, M.A. & Moys, M.H., 2000, Gasifier Coal Feed Behaviour: A DEM Study, Report for Sasol.

Moys, M.H. & van Nierop, M.A., 2000, Proposal for an Investigation into Scrubber Load Behaviour, DebTech Internal Report.

Van Nierop, M.A. & Moys, M.H., 2001, Load Behaviour in an Industrial Grinding Mill, *Chemical Technology*, Nov/Dec:19-22.

Moys, M.H., Hlungwani, O.M. & van Nierop, M.A., 2001, DEM Prediction of Scrubber Load Motion and Power, DebTech Internal Report.

Van Nierop, M.A., Monama, G.M., Dong, H., Bwalya, M.M., Van Nierop, A.M. & Moys, M.H., 2001, DEM Development 2001: 2D to 3D, Eskom Internal Report, Report No RES/RR/01/15725.

Van Nierop, M.A., Hlungwani, M.O., Rikhotso, J.C., Bwalya, M.M., Monama, G.M., Van Nierop, A.M. and Moys, M.H., 2001, Discrete Element Method Research 2001, Eskom Internal Report, Report No. RES/RR/01/15726.

Moys, M.H., Monama, G.M., van Nierop, A.M., Bwalya, M.M., Sarracino, R., Dong, H., Netshidongololwe, T.R. and van Nierop M.A., 2002, DEM Progress Report 1, Eskom Internal Report, Report No. RES/RR/02/17694

Moys, M.H., Monama, G.M., van Nierop, A.M., Bwalya, M.M., Sarracino, R., Dong, H., Netshidongololwe, T.R., Couvas, C., Kalala, J. and van Nierop, M.A., 2002, DEM 2002 Progress Report 2, Eskom Internal Report, Report No. RES/RR/02/17695.

Piketh, S.J., Otter, L.B., Burger, R.P., Walton, N., van Nierop, M.A., Bigala, T., Chiloane, K.E. and Gwaze, P, 2004, The Cape Town Brown Haze II Project, Unpublished Report to SAPIA and City of Cape Town.

Thomas, R.G., Liebenberg-Enslin, H., Walton, N.M. and van Nierop, M.A., 2007, Vaal Triangle Airshed Priority Area Air Quality Management Plan, Report to DEAT

## **EMPLOYMENT HISTORY**

**Position :** Managing Director (2004 - present)  
Gondwana Environmental Solutions (Pty) Ltd.

Responsibilities:

1. Administration of projects, including project proposal formulation, meeting co-ordination, client liaison.
2. Financial administration (ensuring efficient invoicing of clients, salary payments, project expenditure, etc) and budgeting.
3. Company Public Officer.
4. Company strategic development.
5. Staff supervision
6. Project Manager

Projects:

1. More than 350 projects with a total value of more than R80million

**Position :** Director (2003 - 2011)  
Facilitating Innovative Research Environments [FIRE] (Pty) Ltd.

Responsibilities:

1. Administration of projects, including project proposal formulation, meeting co-ordination, government funding applications, client liaison.
2. Financial administration (ensuring efficient invoicing of clients, salary payments, project expenditure, etc) and budgeting.
3. Company Public Officer.
4. Company strategic development.

**Position :** Partner (2003 - 2004)  
FIRE Consulting [Partnership].

Responsibilities:

1. Administration and co-ordination of projects, including project proposal formulation, meeting co-ordination, government funding applications, client liaison.
2. Partnership financial administration (ensuring efficient invoicing of clients, salary payments, project expenditure, etc) and budgeting.
3. Partnership strategic development.

Projects:

1. THRIP Project 2100: "Development, optimisation and implementation of novel techniques and technologies for material, energy and processes to ensure the sustainability and growth of South Africa's industries", (2001-2003), Project Value: R56million.
2. Cape Town Brown Haze II Project: "Characterisation of the Brown Haze over Cape Town: An Overview", (2004), Project Value: R1.8million.

**Position :** Research Manager (2000 - 2002)  
Centre of Materials and Process Synthesis  
University of the Witwatersrand

Responsibilities:

1. Administration of projects, including project proposal formulation, meeting co-ordination, government funding applications, client liaison.
2. Financial administration (ensuring efficient invoicing of clients, salary payments, project expenditure, etc) and budgeting.
3. Contributing to project as engineer: Data analysis, supervision of research personnel, report writing.
4. Assist in the development of consulting group structures and take part in strategic planning.

**Position :** Research Officer (1995 - 1999)  
School of Process and Materials Engineering  
University of the Witwatersrand

Projects:

1. Supervision of JKPendulum experimental work.  
Responsibilities include liaison with clients, supervising technician who does experimental work, and preparing data for analysis by JKTech, Australia.
2. DEM (Discrete Element Modelling) Project with Prof. Rajamani of University of Utah.  
My responsibility was to work closely with Prof. Rajamani during the experimental work and to help with some data analysis, including DEM (Discrete Element Method) simulations. The experimental work included using a high speed digital camera to record motion of steel balls in a 2D mill.
3. ESCOM DEM project  
My responsibility was to do the DEM simulations, analyse the results and produce a comprehensive report.
4. De Beers DEM project  
My responsibility is to do the DEM simulations, analyse the results and produce a comprehensive report.
5. Mintek DEM Project.  
My responsibility was to commission and upgrade the experimental 2D mill, conduct the torque measurement and media motion recording experiments,

and produce a report including data analysis.

**Position :** Warden (1993-1996) (Part-time)  
Trinity House  
Johannesburg College & University Catholic Chaplaincy & Residence  
Roman Catholic Diocese of Johannesburg

Responsibilities:

1. Supervising Cleaning Staff
2. Maintenance of building and equipment
3. All administrative and financial functions, including collection of fees and advertising
4. Liaison with residents' including discipline
5. Organisation of practical aspects of annual Theological Summer School

**Position :** National Serviceman (1989-1990)  
3. S.A.D.F.  
4. Chaplains Clerk responsible for the Coffee Room at Wonderboom Military Base

**Position :** Research Assistant (1987-1988) (Vacation work : 1990, 1991,1992)  
to Dr. M.H. Moys  
Department of Chemical Engineering  
University of the Witwatersrand

Projects:

1. Experimental programme at the Steelpoort Winterveld Mine on an industrial scale flotation column on the effect of baffles on flotation efficiency
2. Experimental work on industrial flotation column bubblers
3. Experimental work on the determination of flotation rate parameters
4. Experimental work on the effect of baffles on a laboratory scale flotation column.
5. Experimental work on the use of temperature to investigate froth behaviour.

## **GENERAL**

**Interests:** Squash, Bird Watching (Recreational)

**Community Involvement:**

Natural Family Planning: teaching interested couples (certified by Couple to Couple League [CCL] USA), treasurer of local structure, 1993-2007

Playing Guitar at Church (1986-1991, 2000-present)

**Network Marketing:** Developing self-awareness and people skills through building a network (1997-1999)

**Computer Literacy:** Windows, MS Office, Corel Draw 7, Turbo Pascal 7

**Professional Memberships:** National Association for Clean Air (NACA) (2005-

Present)

**REFEREES**

1. Prof. S.J. Piketh  
University of the North West  
Tel : (018) 299 1582

Updated : 01 November 2013

CV - M Van Nierop.doc

# Robin George Heard

2014-06-12



Address: Unit 5, 510 Atterbury Road, 0081 Pretoria, South Africa

Mobile: +27 (0) 82 689 0282

Email: rheard2000@yahoo.com

Birth Date: 24<sup>th</sup> June 1950

Place of Birth: Bloemfontein, South Africa

Nationality: South African

Marital Status: Married

Current Employer: Self Employed

Previous Employer: International Atomic Energy Agency (2005 to 2012)

## SUMMARY

Mr Heard has a wide ranging experience in the Nuclear industry and has worked in South Africa and Internationally for 35 years. While at Necsa, he worked with Eskom on waste management issues and has worked on High Level and Low level waste disposal, nuclear power plant siting, and other general radioactive waste management projects (detailed below).

## EDUCATION

**MBA (1993)** – at the University of the Witwatersrand with electives in Advanced Information Systems, Developing Management Skills, Business of the Environment, Economics and Taxation. (4 years of study).

**Diploma in Datametrics (1985)** at the University of South Africa – a computer science diploma majoring in programming up to third year level. (3 years of study).

**B.Sc.(Hons) (1972)** – Rhodes University Grahamstown, South Africa. (Geology). (1 year of study).

**B.Sc. (1971)** – Rhodes University Grahamstown, South Africa (Geology and Geography) (4 years of study).

**Cape Senior Certificate (1968)** (University Exemption) obtained at Queens College in Queenstown, South Africa. (12 years of study).

## EXPERIENCE

Worked for the IAEA Technical Cooperation Department on an interregional project (INT9176) for short periods (up to 6 months) in 2013 and 2014. Assisted the staff of the IAEA in planning and implementation of this project. Have reviewed the Policies and Strategies for radioactive waste management of eight (8) countries during this time. Peer reviewed six (6) papers that are to be presented at the INMM conference in Atlanta, Georgia during July 2014. Many duty travels were undertaken to Member States. Also worked as a private consultant to South African Mining Companies and a Swedish Company.

In July 2012, retired from the International Atomic Energy Agency (IAEA) where spent six (6) years in the Waste Technology Section (WTS) and two (2) years in the Waste Safety Section (WES). Promoted to Unit Head of the Source Management Unit. Projects in radioactive waste management and disposal were managed by the incumbent. Previously with the South African Nuclear Energy Corporation Ltd (Necsa). **Have over 35 years' experience in the nuclear sector** with a wide ranging expertise in many technical and management areas, including:-

***Management of Disused Sealed Radioactive Sources (DSRS)*** – Manager of the team at the IAEA responsible for the disposition of high active disused sealed radioactive sources in Member States. Many repatriation and removal projects conducted in numerous countries throughout the world. Assisted the Member States in developing their technical and regulatory infrastructure for the control of sealed radioactive sources. Extensive knowledge of the IAEA Safety Standards developed during the eight years at the IAEA. Particular emphasis on the disposal of disused sources in a borehole.

***Environmental Impact Assessment of the Smelter at Necsa*** – Manager of the project team that started the smelter project at Necsa. The first EIA was drawn up by the team and their EIA contractor and submitted to the authorities. Many challenges by NGOs followed and only now is

the smelter being constructed after more than 10 years.

**Radioactive Waste Management** – Manager of the technical team at Necsa responsible for technical solutions for a wide variety of waste management problems. Developed the “Mobile Hot Cell” and the “Borehole Disposal Concept” for the IAEA at this time. Other high profile work included investigation of Koeberg leaking drums at Vaalputs, re-licensing the Vaalputs repository, the long term safety assessment of Vaalputs, remediation of the Thabana “disposal” site at Pelindaba, decommissioning of contaminated land and buildings at Pelindaba etc.

**Nuclear Power Plant (NPP) Siting** – Have been part of the project team that carried out the siting of NPPs in South Africa during the late eighties and early nineties. The sites identified at that time included those currently being investigated (Bantamsklip, Thyspunt, Brazil, Schulpfontein). The projects managed by the AEC (now Necsa) on behalf of ESKOM.

**Vaalputs LILW siting project** – Team member of the siting team and have knowledge of all aspects leading up to selection of the Vaalputs site. Work done in the early eighties.

**Low and Intermediate Level Radioactive Waste Disposal** – Involved in the Vaalputs LILW operations from 1994 to 2004 and have knowledge of technical and operational aspects of LILW disposal.

**International Liaison** – Negotiating with international donors to the IAEA. Selection of expert international teams to accomplish projects in developing countries. Negotiation with IAEA Member States to plan and implement projects for the recovery of sources. Organizing international meetings at the IAEA. Project coordinator for the AFRA<sup>1</sup> project on Waste Management. Interaction with thirty three AFRA members of the project.

**Nuclear Security** – Have worked closely with the Office of Nuclear

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<sup>1</sup> African Regional Cooperative Agreement for. Research, Development and Training related to Nuclear Science and Technology

Security of the IAEA to improve the security of sealed radioactive sources in many Member States. Knowledge in the international nuclear security instruments, synergy between safety and security as well as detection instruments.

***High Level Waste Disposal and Storage***– Managed the project to drill boreholes at Vaalputs for the characterization of deep geology under the Vaalputs site. Vaalputs initial siting studies (early 80's) included the possibility for HLW disposal. Involved in the first proposal for dry storage of spent fuel at Vaalputs.

***Nuclear Site Environmental Monitoring*** – Managed the environmental monitoring team at Necsa.

***Uranium Resources and Production*** – Involved during the early part of career in the forecasting of uranium resources and production for South Africa and Namibia.

***Geological Mapping in Antarctica*** – Worked for the South African Department of Transport to map an unexplored area of the Kirwanweggen. This involved travelling over the ice from the main SANAE base to the interior where the team camped for the winter and then travelling further to work in the summer months.

***Mining Geology and Exploration*** – Spent 8 years with SA Managanese Ltd working at Hotazel on mining geology and exploration for manganese and iron ore.

## AREAS OF EXPERTISE

- Financial and Personnel Management
- Project Management and Planning
- Pre-disposal Management of Radioactive Waste and Sources
- Disposal of Low, Intermediate and High Level Radioactive Waste
- Team Leadership
- Delivering technical presentations
- Technical report writing
- Planning and budgeting
- Mentoring younger professionals

- International liaison at diplomatic Level
- Developing and Delivering Training Workshops Internationally

### COMMUNITY INVOLVEMENT

Have been a member of a Rotary Club for over 20 years where served two terms as President and have been involved with community projects in the rural areas to the north of Brits. Leader of a vocational exchange team to the Netherlands.

### AWARDS

Three merit awards from IAEA (2006, 2008 and 2010).

Distinguished Service Award from DG of IAEA for exceptional service (2010).

Nobel Peace Prize (2005) shared by staff of the IAEA and the DG.

Three Paul Harris awards for Community Service from Rotary International.

## Curriculum vitae: Mr R HEYDENRYCH

Name : **HEYDENRYCH, REUBEN**  
Date of Birth : 27 October 1969  
Profession/Specialisation : Environmental Management  
Years with Firm : 5  
Nationality : South African  
Years experience : 23

### Key qualifications

Reuben is employed as an environmental assessment practitioner in Aurecon's Tshwane office. He has extensive experience in the project management of various small and large-scale infrastructural and environmental projects.

He has been involved in environmental impact assessment (EIA) processes in South Africa and in various other African countries, as required by relevant national legislation and in terms of international requirements as EIA team leader and team member. These projects have included exemptions, scoping, and full EIAs for projects such as rezoning, filling stations, water and sewage pipelines, roads (national, provincial and municipal), residential developments, game lodges, telecommunications structures, mines, infrastructure in sensitive environments and industrial processes.

Reuben also has experience in environmental advisory services and strategic environmental management, including strategic environmental assessments (SEAs), environmental scans, environmental feasibility studies and environmental management frameworks (EMFs); environmental management programmes (EMPRs) for the construction and operational phases of infrastructure developments and environmental auditing, including due diligence assessments, ISO 14001 systems development and auditing, legal compliance and waste management audits.

He obtained a Masters in Philosophy: Environmental Management from the University of Cape Town (UCT), South Africa in 1993 and a Bachelors' Degree in Landscape Architecture from the University of Pretoria, South Africa, in 1991. Reuben is registered as a professional landscape architect with the South African Council for the Landscape Architectural Profession (SACLAP).

### Employment record

|                   |                                                                                        |
|-------------------|----------------------------------------------------------------------------------------|
| 04/2014 - Date    | Aurecon, Associate and Environmental Practitioner                                      |
| 04/2013 - 03/2014 | GIBB, Project Leader: Mega Projects                                                    |
| 07/2011 - 03/2013 | Aurecon, Associate and Environmental Practitioner                                      |
| 06/2008 - 06/2011 | Arcus GIBB, Senior Environmental Scientist and Associate                               |
| 03/2004 - 05/2008 | Strategic Environmental Focus, Senior Project Manager, Unit Manager and Project Leader |
| 08/2003 - 02/2004 | Strategic Environmental Focus, Senior Environmental Manager                            |
| 1999 - 08/2003    | Environomics cc, Senior Consultant                                                     |
| 05/1998 - 11/1999 | Nissan South Africa, Group Environmental Manager                                       |
| 01/1996 - 04/1998 | Department of Environmental Affairs and Tourism, Landscape Architect                   |
| 07/1993 - 12/1995 | Cave Klapwijk and Associates (CKA), Landscape Architect                                |

### Management experience

|                   |                                                                                      |
|-------------------|--------------------------------------------------------------------------------------|
| 06/2009 - 06/2011 | Second-in-command of the Sunninghill Environmental Business Unit of Arcus GIBB       |
| 2004 - 2006       | Manager of the Environmental Impact Assessment Unit of Strategic Environmental Focus |

### Experience record

**Khanyisa Power Station (Mpumalanga Province, South Africa) 02/2015 - Date.** *Environmental Assessment Practitioner.* The project involved the application for amendment of an existing environmental authorisation for the expansion of the authorised capacity of 450 MW to 600 MW. Responsible for the

management of the environmental impact assessment process (EIA), amendment report and all specialist reports. Involved for 2 person-months. (ACWA Power).

**Netcare Energy Policy (South Africa) 02/2015 - 05/2015.** *Policy Writer.* The project entailed drafting an energy management policy for Netcare, a health service provider, towards the development of their environmental management system. Responsible for the drafting of policy. Involved for 0.1 person-months. (Netcare Limited).

**Klipplaats 400 kV line deviation (Mpumalanga Province, South Africa) 01/2015 - Date.** *Environmental Reviewer.* The project entailed environmental studies, water use license application and preliminary design for the Klipplaats 400 kV line deviation at the Tweefontein Coal Mine, the registered land owner of the farm Klipplaats 14IS in Mpumalanga. Responsible for the review and quality control of the basic assessment report and environmental management programme. (Glencore Xstrata Coal South Africa (Glencore South Africa (Pty) Ltd)).

**National Transport Master Plan (NATMAP) (South Africa) 01/2015 - Date.** *Reviewer.* The project involved the revision of the National Transport Master Plan, a strategic plan for transport development in South Africa developed by the Department of Transport. The initial draft document was developed in 2007 and was required to be revised to be accepted by the Department of transport and Cabinet. Responsible for data collection, presentation of the current status quo and revision of Chapter 8 (Energy and Environment). Involved for 0.5 person-months. (Department of Transport).

**Feasibility study for Southern Energy's 2x330 MW coal fired power plant project (Zimbabwe) 01/2015.** *Environmental Reviewer.* The project entailed a review of a feasibility study report for the construction of a proposed new 660 MW coal-fired power station near Hwange in Zimbabwe. Responsible for the review of the feasibility study against the performance standards of international development finance institutions. Involved for 0.1 person-months. (Southern Energy).

**Uganda's detailed strategic implementation plan (SIP) (Uganda) 10/2014 - Date.** *Environmental Specialist.* As a land-locked country, Uganda depends on regional road, rail and inland water transport systems for the transportation of goods. Majority of the import and export traffic passes through the Northern corridor to Mombasa, little using the Central corridor to Dar-es-Salaam in Tanzania. In order to strengthen the use of the Central Corridor, the National Transport Masterplan (NTMP) was implemented and adopted a multi-modal approach. Responsible for the compilation of report on environmental and social issues to be considered in project prioritisation. Involved for 0.2 person-months. (Ministry of Works and Transport (Uganda)).

**ISO 14001 internal audit for the Matimba Power Station (Limpopo Province, South Africa) 08/2014.** *Environmental Auditor.* The project comprised a second party internal environmental management systems (EMS) audit of the coal-fired Matimba Power Station in Lephalale. Responsible for environmental auditing against ISO 14001 and audit management system requirements. Involved for 0.25 person-months. (Eskom Generation: Matimba Power Station).

**Environmental control officer (ECO) services for the construction of the KDS-Homestead power line (Northern Cape Province, South Africa) 07/2014 - Date.** *Environmental Assessment Practitioner.* The project comprised the environmental monitoring of construction of the KDS-Homestead distribution power line in Kimberley. Responsible for the management and review of environmental monitoring deliverables. Involved for 0.1 person-months. (Eskom Distribution).

**Environmental impact assessment (EIA) at the Komati Mill (Mpumalanga Province, South Africa) 06/2014 - Date.** *Environmental Assessment Practitioner.* The project entailed environmental authorisation application and water use licence application (WULA) for the establishment of new cane fields at TSB Sugar's sugar mill near Malalane. Responsible for the management of the environmental impact assessment process (EIA). Involved for 2 person-months. (TSB Sugar).

**Feasibility (FEL 3) development for the construction of a second Overvaal tunnel (Part 1) and the complete engineering (FEL 4) for Part 2 (Mpumalanga Province, South Africa) 06/2014 - Date.** *Reviewer.* Aurecon was appointed for the feasibility (FEL 3) development in respect of the construction of the second Overvaal tunnel as well as the complete engineering (FEL 4) thereof. In addition to the development of the tunnel, Transnet SOC required to reinstate, upgrade and/or construct a ventilation system for the existing tunnel. The new tunnel needs to accommodate a double electrified signalled track. Responsible for the review of the environmental and social management plan (ESMP). Involved for 0.1 person-months. (Transnet SOC Johannesburg).

**Environmental screening and general environmental advice to SAIL Mining (Gauteng Province, South Africa) 05/2014 - Date.** *Environmental Advisor.* The project entailed environmental screening to determine the need for any environmental authorisations as well as providing general advice regarding the management of environmental risks on the site in Rosslyn (chrome, waste, stormwater and dust) and management of a dust monitoring programme. Responsible for drafting of an environmental screening report and provision of ad hoc environmental advice. Involved for 2 person-months. (SAIL Mining).

**Bankable feasibility study (BFS) for a small hydropower scheme on the Nithi River in Central Kenya (Tharaka-Nithi County (Mt Kenya), Kenya) 04/2014 - 04/2014.** *Environmental Impact Assessment (EIA) Reviewer.* The project entailed an environmental impact assessment (EIA) for the proposed hydro-electric project on the Nithi River, Mount Kenya. Responsible for reviewing the EIA deliverables of a local consultant appointed to undertake an EIA in order to ensure compliance with the requirements of the International Finance Corporation (IFC) and the Equator Principles (EPs). Involved for 2 person-months. (Frontier Investment Management).

**Feasibility study investigating the upgrading the 98 km Thaba Tseka – Taung - Mokhotlong road to a bituminous surfacing standard (Lesotho) 04/2014 - 07/2014.** *Environmental Specialist.* The project entailed a pre-feasibility assessment of the proposed upgrading of the Thaba Tseka - Mokhotlong dirt road to a tarred road. Responsible for reviewing the environmental issues relevant to the proposed upgrading of the road, including a site visit and a review of an environmental impact assessment (EIA) undertaken on the same project in 2006. Involved for 0.5 person-months. (Lesotho Ministry of Public Works and Transport).

**Contamination assessment of selected Transnet properties (Regional, South Africa) 03/2014 - 03/2015.** *Environmental Reviewer.* The project comprised contamination assessment of various sites to identify environmental contamination as well as compile site assessment reports and financial model for the closure and rehabilitation of these sites - included various specialist studies. Responsible for the review and quality control of the contaminated site Assessment report. Involved for 0.1 person-months. (Transnet SOC).

**Foskor integrated water and waste management plan (IWWMP) (KwaZulu-Natal Province, South Africa) 03/2014.** *Internal Reviewer.* The project involved an internal review of a draft integrated water and waste management plan (IWWMP) for the installation of a proposed expansion to the phosphate handling facilities in Richards Bay. Responsible for conducting an internal review. Involved for 0.1 person-months. (Foskor).

**Feasibility study of the Nyamagasani II Hydropower Project (Kasese Province, Uganda) 02/2014 - 12/2014.** *Environmental Impact Assessment (EIA) Reviewer.* The project comprises a feasibility study and environmental and social impact assessment (ESIA) for the 5 MW Nyamagasani II Hydropower Project, located on the Nyamagasani River. The feasibility study includes geotechnical; hydrological (daily flows and floods); environmental and social, including resettlement action plan (RAP) and environmental management plan (EMP); civil and hydraulics; mechanical, electrical and interconnection, flow measurements and economic studies. Responsible for reviewing the EIA deliverables of a local consultant appointed to undertake the EIA in order to ensure compliance with the requirements of the International Finance Corporation (IFC) and the Equator Principles (EPs). Involved for 2 person-months. (Frontier Investment Management).

**AFGRI Mill ISO 14001 certification audit (Mpumalanga Province, South Africa) 11/2013 - 06/2014.** *Lead Environmental Auditor.* The project entailed a third party Stage 1 ISO 14001 certification audit for AFGRI Mill in Kinross. Responsible for conducting the Stage 1 ISO 14001 certification audit of the environmental management system (EMS). Involved for 0.1 person-months. (AFGRI Milling).

**Port of Saldanha Expansion Project (Western Cape Province, South Africa) 11/2013 - 03/2014.** *Project Leader.* The project involved environmental impact assessment (EIA) processes and atmospheric emission licence for the installation of a third tippler at the Port of Saldanha. The project also included a scoping and environmental impact report (EIR) process for the expansion of the port (the latter was suspended prior to submission of the draft scoping report). Responsible for the finalisation and submission of the basic assessment report (BAR) for the third tippler, responding to the interested and affected parties' (I&AP's) comments and authority liaison to ensure a timeous authorisation, and post-authorisation amendment of the authorisation and response to appeals by interested parties. Involved for 4 person-months. (Transnet SOC Limited).

**Epol Rustenburg Feed Mill ISO 14001 certification audit (North West Province, South Africa) 09/2013.**

*Lead Environmental Auditor.* The project entailed a third party Stage 1 ISO 14001 certification audit for the Epol Feed Mill in Rustenburg. Responsible for conducting the Stage 1 ISO 14001 certification audit of the environmental management system (EMS). Involved for 0.1 person-months. (Epol).

**Ekurhuleni smart metering feasibility study (Gauteng Province, South Africa) 09/2013 - 10/2014.** *Environmental Specialist.* The project entailed a feasibility study for the implementation of a smart grid project, entailing the installation of smart electricity meters for a pilot project of 3 000 users for Ekurhuleni Metropolitan Municipality (EMM). Responsible for undertaking an environmental screening exercise to identify potential environmental and social impacts and review environmental authorisation requirements. Involved for 0.25 person-months. (Ekurhuleni Metropolitan Municipality (EMM)).

**Third party ISO 14001 audit reports (Various provinces, South Africa) 04/2013 - 03/2014.** *Internal Reviewer.* The project comprised an internal review of a range of third party ISO 14001 audit reports for various clients throughout South Africa. Involved for 0.1 person-months. (Various clients).

**Nuclear-1 environmental impact assessment (EIA) (Western and Eastern Cape Provinces, South Africa) 04/2013 - 03/2014.** *Project Leader.* The project entailed an environmental impact assessment (EIA) process for the proposed Nuclear-1 Power Station. Responsible for project management, responding to stakeholder comments, and authority liaison, review of approximately 30 specialist reports and providing overall strategic guidance of the EIA process. Involved for 10 person-months. (Eskom Generation).

**Visual assessment of Springfontein Wind Farm (Free State Province, South Africa) 06/2012.** *Visual Impact Assessment (VIA) Specialist.* The project entailed a visual impact assessment (VIA) of the proposed wind farm near Springfontein. Responsible for the site visit, quality control of deliverables and revision of the VIA report. Involved for 0.5 person-months. (Savannah Environmental (Pty) Ltd).

**Nuclear-1 environmental impact assessment (EIA) (Western and Eastern Cape Provinces, South Africa) 06/2012 - 04/2013.** *Senior Environmental Scientist.* The project entailed an environmental impact assessment (EIA) for a proposed Generation III nuclear power station with a maximum generation capacity of 4 000 MW to be located at one of three alternative sites in the Eastern and Western Cape. Aurecon was contracted to assist GIBB with the revision of the revised draft environmental impact report (EIR) and to respond to stakeholder comments on this report. Responsible for the revision of the EIR, responding to stakeholder comments, and authority liaison. Involved for 5 person-months. (Arcus GIBB).

**Environmental advice for the construction of a remote apron stand at OR Tambo International Airport (ORTIA) (Gauteng Province, South Africa) 04/2012 - 05/2012.** *Senior Environmental Scientist.* The project involved providing environmental advice regarding the interpretation of legal requirements for the commencement of construction of the remote apron stand at OR Tambo International Airport (ORTIA) in Kempton Park. Responsible for the review of legal requirements and drafting of a report on the recommended way forward. Involved for 0.5 person-months. (Airports Company South Africa (ACSA)).

**ABSA Project X (Gauteng Province, South Africa) 04/2012 - 11/2013.** *Due Diligence Assessor.* Aurecon was part of a professional team involved in the conversion and upgrading of an existing factory building and office block of 24 000 sqm in Waltloo into a call centre, administration building, canteen, two large gate houses and security buildings and a data centre. Aurecon provided structural, civil, fire, wet services, roads and landscaping services on the project. Responsible for the site visit and the compilation of the environmental due diligence assessment (EDDA). Involved for 0.25 person-months. (ABSA).

**Port of Richards Bay capacity expansion conceptual study (FEL 1) (KwaZulu-Natal Province, South Africa) 03/2012 - 11/2012.** *Reviewer.* The port facilities in Richards Bay reached operational capacity necessitating expansion. The key objectives of the conceptual (FEL 1) and pre-feasibility (FEL 2) studies were to determine the requirements for all land, rail, terminal, port and marine service engineering options to facilitate the expansionary development of the terminal ports. Aurecon's services included rail infrastructure, bulk materials handling (BMH), civil and structural infrastructure, port structural engineering, marine and berth engineering, earthworks, geotechnical and electrical engineering, utilities, health and safety, environmental and solid waste. Responsible for the internal review of report deliverables, including an environmental and community interface report and a sustainability report. Involved for 0.5 person-months. (Transnet SOC).

**Environmental audit of the Matola Coal Terminal (TCM) (Maputo, Mozambique) 03/2012.** *Environmental Audit Team Leader.* The project entailed an environmental audit of the operation of the Matola Coal Terminal (TCM) in Maputo. Responsible for one site audit and the compilation of the audit report. Involved for 0.25 person-months. (Grindrod Limited).

**Saldanha Tank Farm (Western Cape Province, South Africa) 03/2012 - 03/2013.** *Visual Impact Assessment (VIA) Specialist.* The project involved a visual impact assessment (VIA) for a proposed oil storage facility at Saldanha. Responsible for project management and quality control of deliverables. Involved for 1 person-month. (WorleyParsons).

**Ingula pumped storage scheme (Gauteng Province, South Africa) 12/2011 - Date.** *Environmental Reviewer.* The project comprised environmental compliance audits against the requirements of the Ingula pumped storage scheme's water use licence (WUL) and integrated water use licence (IWUL). Responsible for the review of integrated waste and water management plan (IWWMP). Involved for 0.1 person-months. (Eskom Holdings SOC).

**Visual opinion for Witberg (Western Cape Province, South Africa) 11/2011 - 01/2012.** *Visual Impact Assessment (VIA) Specialist.* The project involved giving an opinion on the visual impact of an access road to the proposed Witberg Wind Farm near Matjiesfontein. Responsible for the site visit and the compilation of a brief opinion on the expected visual impacts. Involved for 0.25 person-months. (Arcus GIBB).

**Pre-feasibility study of Mulepe-1 Diamond Mine (Lunda Norte Province, Angola) 11/2011 - 05/2012.** *Senior Environmental Scientist.* Aurecon was appointed to carry out the pre-feasibility study of the hydropower potential in three rivers surrounding De Beers' Mulepe-1 Concession. The project consisted of the measurement of flows in the rivers, rainfall/runoff hydrological modelling, environmental fatal flaw analysis, site reconnaissance, preliminary geological evaluation and determination of the hydropower potential. Aurecon determined the optimal and most cost effective solution for the supply of reliable clean energy to the mine. Responsible for the compilation of the screening report. Involved for 0.5 person-months. (De Beers Consolidated Mines (DBCM)).

**Revision of the initial report for Langehoogte Wind Farm (Western Cape Province, South Africa) 10/2011.** *Senior Environmental Scientist.* The project entailed the revision of the visual impact assessment (VIA) for the Langehoogte Wind Farm near Caledon. Responsible for report revision based on peer review comments. Involved for 0.5 person-months. (Arcus GIBB).

**Engineering design (FEL 4) for Nacala Port (Nampula Province, Mozambique) 10/2011 - 11/2013.** *Senior Environmental Scientist.* Aurecon was appointed for the complete on-shore port front-end-engineering design (FEED) for the Nacala Port, consisting of bulk materials handling (BMH), bulk earthworks, rail embankment and utilities and transportation infrastructure. Aurecon undertook a number of general functions during its detailed design, including verifying and updating the design criteria documents generated during the Nacala Port front-end loading 3 (FEL 3) study and the engineering design to achieve the requirements for the construction phase. Responsible for review of engineering reports and designs and strategic advice on environmental issues and implications of the design for the environmental authorisation. Involved for 1 person-month. (Vale Moçambique Limitada).

**Environmental impact assessment (EIA) for St. Helena Wind Farm (Western Cape Province, South Africa) 09/2011 - 11/2011.** *Senior Environmental Scientist.* The project comprised a visual impact assessment (VIA) of the St. Helena Wind Farm near Saldanha as part of the environmental impact assessment (EIA) phase. Responsible for project management and quality control of deliverables. Involved for 0.5 person-months. (Arcus GIBB).

**Environmental impact assessment (EIA) for the Nuclear-1 Power Station (Eastern and Western Cape Provinces, South Africa) 08/2011 - Date.** *Senior Environmental Scientist.* The project entailed an environmental impact assessment (EIA) for the Nuclear-1 Power Station. Responsible for presentation to the Department of Environmental Affairs and Tourism's (DEAT's) independent review panel. Involved for 0.5 person-months. (Arcus GIBB).

**Environmental basic assessment for the return water pipeline at Mponeng Gold Mine (Gauteng Province, South Africa) 07/2011 - 02/2013.** *Senior Environmental Scientist.* Aurecon was appointed to do the tender design for the replacement of the existing return water pipeline that feeds into the Mponeng process plant in Carletonville. The project included a 4 km pipeline with a 400 mm diameter. Responsible for project management and quality control of deliverables. Involved for 1 person-month. (AngloGold Ashanti).

**Scoping phase for St. Helena Wind Farm (Western Cape Province, South Africa) 01/2011 - 06/2011.** *Senior Environmental Scientist.* During the scoping phase of this project, a visual impact assessment (VIA) was prepared for the St. Helena Wind Farm near Saldanha. Responsible for project management and quality control of deliverables. Involved for 1 person-month. (Just Energy).

**Scoping phase for Langehoogte Wind Farm (Western Cape Province, South Africa) 01/2011.** *Senior Environmental Scientist.* The project entailed a visual impact assessment (VIA) for the Langehoogte Wind Farm near Caledon. Responsible for report based on peer review comments. Involved for 1 person-month. (SAGIT Energy Ventures).

**Scoping phase for Wolseley Wind Farm (Western Cape Province, South Africa) 01/2011.** *Senior Environmental Scientist.* This project entailed a visual impact assessment (VIA) for the proposed Wolseley Wind Farm near Wolseley. Involved for 1 person-month. (SAGIT Energy Ventures).

**Tau Tona pipeline basic assessment (BA) (Gauteng Province, South Africa) 07/2010 - 04/2012.** *Senior Environmental Scientist.* The project entailed an environmental basic assessment (BA) for a pipeline at Tau Tona Gold Mine in Carletonville. Responsible for project management and quality control of deliverables. Involved for 1 person-month. (AngloGold Ashanti).

**Visual impact assessment (VIA) for Langebaan boathouse for the 4 Special Forces Regiment (Western Cape Province, South Africa) 07/2010 - 09/2010.** *Senior Environmental Scientist.* The project entailed an environmental impact assessment (EIA) and a visual impact assessment (VIA) for the National Environmental Management Act (NEMA), Section 24G, application for the authorisation of a boathouse construction for the 4 Special Forces Regiment at Langebaan. Responsible for the compilation of VIA. Involved for 2 person-months. (Department of Public Works (DPW)).

**Basic assessment (BA) and Section 24G rectification assessment of the Vaal River pipeline (North West Province, South Africa) 11/2009 - 03/2014.** *Senior Environmental Scientist.* The project entailed an environmental basic assessment (BA) for the installation of a water pipeline on the Vaal River Gold Mine in Orkney. Responsible for project management and quality control of deliverables. Involved for 1 person-month. (AngloGold Ashanti).

**Lesotho MCA Health Infrastructure Programme 2010 (Maseru, Lesotho) 10/2009 - Date.** *Health, Safety and Environment (HSE) and Environmental Management (EM) Manager.* This project involved the provision of programme management, construction supervision and environmental management services for the health infrastructure programme in Lesotho. This included the design of the National Reference Laboratory (NRL) and blood transfusion centre, the design of student and staff hostels at existing Lesotho Hospital, and the construction of 138 new health centres and 14 new outpatient departments (OPDs). Responsible for liaising between client and contractor to facilitate resolution of outstanding construction to address health, safety and environmental (HSE) issues. Involved for 2 person-months. (Millennium Challenge Account (MCA) - Lesotho).

**Mokolo Crocodile Water Augmentation Project (MCWAP) (Limpopo Province, South Africa) 09/2009 - Date.** *Reviewer.* The project entailed comprehensive engineering services for the Mokolo Crocodile Water Augmentation Project (MCWAP), including the construction of two major bulk raw water transfer systems and associated infrastructure. The MCWAP supplies raw water to meet the demands of the new power station in Lephalale, mines and industry, and domestic users. The main components of the scheme are abstraction weirs, pump stations, pipelines and balancing storage. Responsible for the independent review of a draft basic assessment report (BAR). Involved for 0.25 person-months. (Trans-Caledon Tunnel Authority (TCTA)).

**Independent engineering audits for the South African National Roads Agency Limited (SANRAL) and the N3 Toll Concession (N3TC) (Regional, South Africa) 09/2009 - Date.** *Environmental Specialist.* The South African National Roads Agency Limited (SANRAL) signed a 30-year concession contract with the N3 Toll Concession (N3TC) to maintain and upgrade the section of National Route 3 (N3) between Cedara and Heidelberg. Aurecon was appointed as the independent engineer to oversee and audit the contract, including reviewing all designs, audit construction work, maintenance work and the toll plaza operations as well as environmental audits of the environmental system implementation. Responsible for auditing and monitoring of the environmental system. (South African National Roads Agency Limited (SANRAL) and N3 Toll Concession (Pty) Ltd (N3TC)).

**De Hoek Cement Factory (Western Cape Province, South Africa) 2009.** *Senior Environmental Scientist.* The project entailed basic assessments (Bas) for upgrades to the Pretoria Portland Cement's (PPC's) De Hoek Cement Factory in Malmesbury. Responsible for project management and quality control of deliverables. Involved for 2 person-months. (Pretoria Portland Cement (PPC)).

**Mulilo Coal-fired Power Station (Limpopo Province, South Africa) 2009.** *Senior Environmental Scientist.*

The project involved an environmental impact assessment (EIA) process of the proposed Mulilo Coal-fired Power Station near Musina. Responsible for project management and quality control of deliverables. Involved for 2 person-months. (Mulilo Power (through Parsons Brinkerhoff)).

**Watershed-Mmabatho distribution power line (North West Province, South Africa) 2009.** *Senior Environmental Scientist.* The project entailed an environmental basic assessment (BA) for the Watershed-Mmabatho distribution power line. Responsible for project management and quality control of deliverables. Involved for 1 person-month. (Eskom Distribution).

**Apollo-Lepini distribution power line (Gauteng Province, South Africa) 2009.** *Senior Independent Reviewer.* The project entailed an environmental impact assessment (EIA) of the Apollo-Lepini distribution power line. Responsible for reviewing applicable legislation and projects against EIA legislation requirements. Involved for 1 person-month. (Envirolution Consulting).

**Medupi Landfill Site Project (Limpopo Province, South Africa) 2009.** *Senior Independent Reviewer.* The project entailed an environmental impact assessment (EIA) of the Medupi Landfill Site Project in Lephalale. Responsible for the review of EIA documentation. Involved for 1 person-month. (Envirolution Consulting).

**Tumelo distribution power line (Gauteng Province, South Africa) 2009.** *Senior Environmental Scientist.* The project entailed an environmental impact assessment (EIA) process of the Tumelo distribution power line near Kagiso. Responsible for project management and quality control of deliverables. Involved for 1 person-month. (Eskom Distribution).

**OR Tambo International Airport (ORTIA) Midfield Development (Gauteng Province, South Africa) 2009.** *Senior Environmental Scientist.* The project entailed the provision of a strategic advisory team (SAT) to the Airports Company South Africa (ACSA) for the Midfield Development at OR Tambo International Airport (ORTIA) in Kempton Park. Involved for 1 person-month. (Airports Company South Africa (ACSA)).

**Westgate-Tarlton-Kromdraai distribution power line (Gauteng Province, South Africa) 2009.** *Senior Environmental Scientist.* The project entailed an environmental impact assessment (EIA) of the Westgate-Tarlton-Kromdraai distribution power line. Responsible for project management and quality control of deliverables. Involved for 2 person-months. (Eskom Distribution).

**Mokopane Integration Project (Limpopo Province, South Africa) 2008 - 2009.** *Senior Independent Reviewer.* The project entailed an environmental impact assessment (EIA) of the Mokopane Integration Project, including transmission lines and substations. Responsible for the independent review of the EIA documentation and the compilation of a review report. Involved for 1 person-month. (Savannah Environmental (Pty) Ltd).

**Greater Port Harcourt (Rivers State, Nigeria) 2008 - 2010.** *Senior Environmental Scientist.* The project comprised a strategic environmental assessment (SEA), generic environmental management plan (EMP) and the development of terms of reference (TOR) for the environmental impact assessments (EIAs) for Greater Port Harcourt. Responsible for the compilation of the SEA. Involved for 3 person-months. (Rivers State Government of Nigeria and Greater Port Harcourt Development Authority (GPHDA)).

**Second party ISO 14001 environmental management systems (EMSs) audits (Mpumalanga and Western Cape Province, South Africa) 2008 - 2010.** *Environmental Auditor.* The project entailed second party ISO 14001 environmental management systems (EMSs) audits, including three-day second party comprehensive EMSs audits of coal-fired power stations in Mpumalanga, a pumped storage scheme in KwaZulu-Natal and gas turbine plants in the Western Cape. Responsible for environmental auditing. Involved for 2 person-months. (Eskom Generation).

**Namakwa Sands basic assessment processes for co-generation power plants (South Africa) 2008 - 2009.** *Senior Environmental Scientist.* The project involved basic assessment processes for the installation of co-generation power plants at mines and industrial facilities across South Africa, for the generation of electricity from waste gas. The projects enable the project initiator to earn carbon credits through the clean development mechanism (CDM) in terms of the Kyoto Protocol under the United Nations Framework Convention on Climate Change (UNFCCC). Responsible for project management and quality control of deliverables. Involved for 2 person-months. (Promethium Carbon/Prana Energy).

**Kalukundi Copper-Cobalt Project (Katanga Province, Democratic Republic of the Congo) 2008 - 2009.** *Senior Environmental Manager.* The project entailed environmental services for the proposed copper and

cobalt mine in the Kolwezi District in the Eastern Democratic Republic of the Congo (DRC). Responsible for field surveys, an environmental impact assessment (EIA) and an environmental management plan (EMP). Involved for 3 person-months. (Africo Resources).

**Nuclear power station (Eastern and Western Cape Provinces, South Africa) 2008 - 2009.** *Senior Environmental Scientist.* The project, implemented by the Generation Division of Eskom Holdings Limited, entailed a detailed environmental impact assessment (EIA), including the screening and selection of a suitable site for the nuclear plant, and a scoping process. The project also included social and biophysical specialist studies, public consultation and legal and nuclear technology studies. Responsible for the compilation of the environmental impact report (EIR) and environmental management plan (EMP). Involved for 9 person-months. (Eskom Generation).

**Environmental management programme (EMPR) for Finsch Mine (Northern Cape Province, South Africa) 2008 - 2009.** *Project Leader/Senior Environmental Scientist.* The project entailed updating the environmental management programme (EMPR) to consolidate various guidelines and operating procedures. Responsible for the updating of the EMPR. Involved for 1 person-month. (De Beers).

**Development of a master plan for Matjhabeng (Welkom) Local Municipality (Free State Province, South Africa) 2008 - 2009.** *Senior Environmental Scientist.* The project involved the compilation of the environmental portion of the status quo assessment, critical interventions and master plan for the municipality. Responsible for the development of environmental components of the master plan. Involved for 2 person-months. (Latitude Management Services).

**Strategic environmental technical support team for the Gautrain Project (Gauteng Province, South Africa) 2008 - 2009.** *Senior Environmental Scientist.* The project entailed the provision of a strategic environmental technical support team to the Gauteng Provincial Government (GPG) for the R20 billion Gautrain Project. Technical support was provided during the construction and operational phases of this flagship transport service project. Responsible for the environmental monitoring of contractor activities; the review of the environmental snag list; attendance and advice to the monthly provincial environmental committee (PEC) and the environmental management committee (EMC) meetings and coordination and management of annual external environmental audits. Involved for 6 person-months. (Gautrain).

**Environmental management plan (EMP) for Eskom Transmission (Western Cape Province, South Africa) 2008.** *Senior Environmental Scientist.* The project comprised the compilation of an environmental management plan (EMP) for the construction and operational phases of the Perseus-Gamma, and Hydra-Gamma 765 kV transmission power lines, an extension to the Hydra Substation, turn-ins of the Beta-Hydra 765 kV transmission power line to Perseus and the upgrading of the Perseus Substation. Responsible for the review of project documentation and the EMP. Involved for 1 person-month. (Eskom Transmission).

**Eskom Komati Water Scheme pipeline and power line project (Mpumalanga Province, South Africa) 2008.** *Project Manager.* The project entailed scoping and an environmental impact assessment (EIA) for the proposed Eskom Komati Water Scheme pipeline and power line project. Responsible for the EIA. Involved for 3 person-months. (Eskom Generation).

**Crude acrylic acid (CAA) tank (Free State Province, South Africa) 2008.** *Project Manager.* The project entailed a scoping and an environmental impact assessment (EIA) process for the installation of a crude acrylic acid (CAA) tank at Sasol's site in Sasolburg. Responsible for project management and quality control of deliverables. Involved for 1 person-month. (Sasol).

**Alluvial Diamond Prospecting (Northern Cape Province, South Africa) 2008.** *Reviewer.* Pico Diamonds environmental management plan (EMP) for Alluvial Diamond Prospecting in the Richtersveld National Park. Responsible for review of scoping and environmental impact assessment (EIA) reports. Involved for 1 person-month. (South African National Parks (SANParks) through Cameron Cross Inc.).

**Kliprivier Nature Estate (Limpopo Province, South Africa) 2008.** *Reviewer.* The project comprised a scoping report for the proposed Kliprivier Nature Estate on Portions 4 and 8 of the farm Kliprivier 464 KQ, and Portion 10 of the farm Rhenosterfontein 465 KQ. Responsible for review of scoping and environmental impact assessment (EIA) reports. Involved for 1 person-month. (Dabchick Consultancy Limited).

**Delta Apron at OR Tambo International Airport (ORTIA) (Gauteng Province, South Africa) 2008.** *Project Leader/Senior Environmental Scientist.* The project comprised a basic assessment for the upgrading of the Delta Apron at OR Tambo International Airport (ORTIA) in Kempton Park. Responsible for the environmental impact assessment (EIA). Involved for 2 person-months. (Airports Company South Africa).

(ACSA)).

**Millsite Development in Krugersdorp (Gauteng Province, South Africa) 2007 - 2008.** *Project Manager.* The project comprised scoping and an environmental impact assessment (EIA) for the proposed Millsite Development in Krugersdorp. Responsible for client liaison, team management, financial management and quality control. Involved for 2 person-months. (Rand Leases).

**Hendrina-Prairie-Marathon transmission line (Mpumalanga Province, South Africa) 05/2007 - 06/2008.** *Project Manager.* The project comprised an environmental impact assessment (EIA) for the proposed 185 km-long, 400 kV Hendrina-Prairie-Marathon transmission line between Hendrina and Nelspruit. Responsible for project management and quality control of deliverables. Involved for 43 person-months. (Eskom Transmission).

**Backlog of the environmental impact assessment (EIA), scoping and exemption applications in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989) (Limpopo and Mpumalanga Provinces, South Africa) 2007 - 2008.** *Reviewer.* The project involved the backlog of the environmental impact assessment (EIA), scoping and exemption applications in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989), on behalf of the Limpopo Department of Economic Development, Environment and Tourism (LDEDET) and the Mpumalanga Department of Agriculture and Land Administration (MDALA). Responsible for the review of environmental scoping and impact assessment reports. Involved for 2 person-months. (Department of Environmental Affairs and Tourism (DEAT)).

**Mmamabula-Delta 400 kV transmission lines (Limpopo Province, South Africa) 05/2007.** *Reviewer.* The project entailed an environmental impact assessment (EIA) process for the four proposed 400 kV Mmamabula-Delta transmission lines in Lephalale. Responsible for site visits, review of EIA documentation, client liaison and general project management. Involved for 1 person-month. (Haygon Safaris (Pty) Ltd).

**Extension of Sunderland Ridge wastewater treatment works (WWTW) (Gauteng Province, South Africa) 01/2007 - 12/2011.** *Senior Environmental Scientist.* Aurecon was appointed to provide the engineering services for the extension of the Sunderland Ridge wastewater treatment works (WWTW) to 95 Ml/d. The purpose of the project was to provide a feasibility study for the 30 Ml/d extension; licence applications; environmental impact assessments (EIAs) and the relevant authorisations for the 30 Ml/d extension and process design of the extension. Responsible for project management and quality control of deliverables. Involved for 0.5 person-months. (City of Tshwane Metropolitan Municipality (CTMM)).

**Dome Paradise Township (North West Province, South Africa) 2007.** *Reviewer.* The project entailed scoping and environmental impact assessment (EIA) reports for the proposed Dome Paradise Township on Portions 19 and 37 of the Farm Rietpoort 518 IQ. Responsible for the review of scoping and EIA reports. Involved for 1 person-month. (Advocate Jaco Venter).

**Orlando Dam Intersection in Soweto (Gauteng Province, South Africa) 2007.** *Project Leader/Senior Environmental Manager.* The project entailed environmental scoping for the proposed Orlando Dam Intersection, a mixed-use redevelopment at the former Orlando Power Station site in Soweto, including an environmental impact assessment (EIA). Responsible for client liaison, team management, financial management and quality control. Involved for 2 person-months. (Johannesburg Property Company (JPC)).

**Development of Comet in Boksburg (Gauteng Province, South Africa) 2007.** *Project Manager.* The project comprised scoping and an environmental impact assessment (EIA) for the proposed Comet Extension, including eight commercial and light industrial developments. Responsible for client liaison, team management, financial management and quality control. Involved for 2 person-months. (Urban Dynamics).

**Abattoir Waste Management Guideline Manual (AWM Guideline Manual) document and standard environmental management plan (EMP) (South Africa) 2007.** *Project Manager.* The project involved the provision of an Abattoir Waste Management Guideline Manual (AWM Guideline Manual) and a standard environmental management plan (EMP) for the evaluation of environmental impact assessment (EIA) applications. Responsible for client liaison, team management, financial management, quality control and presentations to stakeholders. Involved for 2 person-months. (Gauteng Department of Agriculture and Rural Development (GDARD)).

**Limpopo Wildlife Estate (Limpopo Province, South Africa) 2007.** *Reviewer.* The project entailed a scoping report for the proposed Limpopo Wildlife Estate on portions of the farms Modena 13 MS, Parma 40 MS and Pontdrift 12 MS in Limpopo. Responsible for the review of scoping and environmental impact assessment (EIA) reports. Involved for 1 person-month. (South African National Parks (SANParks) through

Cameron Cross Associates).

**Lesotho rehabilitation and conservation strategy (Lesotho) 2007.** *Project Manager.* The project entailed supplemental field studies and beneficiary analysis related to a proposed rehabilitation and conservation strategy for the wetlands in the highlands of Lesotho, including an environmental impact assessment (EIA). Responsible for client liaison, team management and financial management. Involved for 2 person-months. (Lesotho Department of Water Affairs).

**Shopping centre and residential development on the Farm Klipriviersdal (Gauteng Province, South Africa) 2007.** *Reviewer.* The project involved a scoping and an environmental impact assessment (EIA) application for a proposed shopping centre and residential development on the Farm Klipriviersdal 371 in Meyerton. Responsible for the review of EIA documentation and report writing. Involved for 1 person-month. (Rand Merchant Bank (RMB)).

**Emalahleni integrated municipal environmental programme (IMEP) (Mpumalanga Province, South Africa) 2007.** *Senior Environmental Scientist.* The project entailed the auditing of legal compliance for the Emalahleni Local Municipality's integrated municipal environmental programme (IMEP) in Witbank. Responsible for an audit of environmental legal compliance. Involved for 0.5 person-months. (Emalahleni Local Municipality).

**Senqu Sources Protected Area strategic environmental assessment (SEA) (Lesotho) 2006 - 2008.** *Project Leader/Senior Environmental Manager.* The project entailed a strategic environmental assessment (SEA) for the proposed Senqu Sources Protected Area with the aim of establishing a network of formally protected areas in the Maloti Drakensberg Region. Responsible for client liaison, team management, financial management, quality control and fieldwork. Involved for 2 person-months. (Maloti Drakensberg Transfrontier Project (MDTP)).

**Flood control of the Apies River in Pretoria (Gauteng Province, South Africa) 2006 - 2007.** *Project Manager.* The project comprised environmental scoping for proposed flood control berms in the Apies River floodplain between Wonderboompoort and the Bon Accord Dam. Responsible for client liaison, team management, financial management and quality control. Involved for 2 person-months. (BKS Group (Pty) Ltd).

**K'Shani Golf and Nature Reserve near Nelspruit (Mpumalanga Province, South Africa) 2006 - 2007.** *Project Manager.* The project entailed an environmental impact assessment (EIA) process in terms of the National Environmental Management Act's (NEMA's) EIA regulations for the proposed 2 300 ha K'Shani Golf and Nature Reserve near Nelspruit. Responsible for project management and quality control of deliverables. Involved for 4 person-months. (K'Shani Golf and Nature Reserve (Pty) Ltd).

**Eskom Kudu Integration Project (South Africa and Namibia) 2006 - 2007.** *Project Leader/Senior Environmental Scientist.* The project entailed an environmental impact assessment (EIA) for the Eskom Kudu Integration Project for a proposed 400 km-long, 400 kV electricity transmission line from the Kudu Combined Cycle Gas Turbine (CCGT) power station in Oranjemund, Namibia, through the Northern Cape, to Vredendal in the Western Cape, South Africa. Responsible for leading the EIA, client liaison, team management, financial management and quality control. Involved for 3 person-months. (Eskom).

**Ispat brick making plant (South Africa) 2006.** *Project Manager.* The project entailed an environmental impact report (EIR) for a brick making plant at Ispat Iscor site. Responsible for client liaison, team management, financial management and quality control. Involved for 1 person-month. (Clay Fusion Technologies (Pty) Limited).

**Upgrade of Ispat Galvanising plant in Vanderbijlpark (Gauteng Province, South Africa) 2006.** *Project Manager.* The project entailed environmental scoping for the upgrading of the galvanising plant at Ispat Iscor. Responsible for client liaison, team management, financial management and quality control. Involved for 1 person-month. (Isacor).

**Environmental implementation plan (EIP) for Pretoria (Gauteng Province, South Africa) 2006.** *Project Manager.* The project entailed the development of a second edition environmental implementation plan (EIP), in terms of the National Environmental Management Act (NEMA) (No. 107 of 1998). Responsible for client liaison, team management, financial management and quality control. Involved for 1 person-month. (Department of Trade and Industry (DTI)).

**Environmental impact assessment (EIA) regulations training manual (Gauteng Province, South**

**Africa) 2006.** *Senior Environmental Manager.* The project entailed the development of a presentation for a series of information seminars on environmental impact assessment (EIA) regulations in terms of the National Environmental Management Act (NEMA) (No. 107 of 1998) in Pretoria. Responsible for preparation of presentations and interpretation of legal requirements. Involved for 1 person-month. (Department of Environmental Affairs and Tourism (DEAT)).

**Viking Bay Development (Gauteng Province, South Africa) 2006.** *Project Manager.* The project comprised an environmental impact assessment (EIA) for the new hotel, residential golf estate and game farm development at Viking Bay, adjacent to the Vaal Dam. Responsible for client liaison, team management, financial management and quality control. Involved for 1 person-month. (Tribid Investments).

**Variant alignment for the Gautrain (Gauteng Province, South Africa) 2006.** *Reviewer.* The project entailed several environmental impact assessment (EIA) reports and the environmental management plan (EMP) for the proposed variant alignment of the Gautrain through the Centurion area. Responsible for the review of the EIA reports, the EMPs and other related documents, quality control, client liaison and financial management. Involved for 3 person-months. (Centurion Association for a Reasonable Environment (WeCARE)).

**ISO 14001 auditing (Various venues, South Africa) 2005 - 2011.** *Technical Expert.* The project comprised ISO 14001 auditing for the South African National Accreditation System (SANAS), including witnessing of the conduct of the ISO 14001 Certification Body auditors during audits and the assessment of certification body management systems and documentation. Responsible for the assessment of the competence of accredited environmental auditors. Involved for 3 person-months. (South African National Accreditation System (SANAS)).

**Huddle Park Golf & Recreation Estate (Gauteng Province, South Africa) 2005 - 2008.** *Project Leader/Senior Environmental Scientist.* The project entailed an environmental impact assessment (EIA) for the Huddle Park Golf & Recreation Estate in Johannesburg. Responsible for the EIA, client liaison, team management, financial management and quality control. Involved for 4 person-months. (Tiyani Consortium).

**Menlyn Roads Project: upgrading of the National Route 1 (N1) highway in the eastern part of Pretoria (Gauteng Province, South Africa) 2005 - 2006.** *Project Manager.* The project entailed an environmental impact assessment (EIA) for the Menlyn Roads Project, including the upgrading of municipal roads and the National Route 1 (N1) highway in the eastern part of Pretoria. Responsible for project management and quality control of deliverables for the municipal and national road upgrades. Involved for 4 person-months. (City of Tshwane Metropolitan Municipality/South African National Roads Agency Limited (SANRAL)).

**Water pipeline between the Vaal Dam and Secunda (Gauteng and Mpumalanga Provinces, South Africa) 03/2005 - 07/2005.** *Project Manager.* The project was concerned with an environmental impact assessment (EIA) for a 115 km, 1.9 m diameter water pipeline between the Vaal Dam and Secunda, as part of the Vaal River Eastern Subsystem Augmentation Project (VRESAP). Responsible for client liaison, team management, financial management and quality control. Involved for 2 person-months. (Trans-Caledon Tunnel Authority (TCTA)).

**Widening of Addo Road in Port Elizabeth (Eastern Cape Province, South Africa) 2005.** *Project Manager.* The project entailed environmental scoping for the widening of Addo Road (Road MR 450) in Port Elizabeth. Responsible for client liaison, team management, financial management and quality control. Involved for 1 person-month. (PD Naidoo & Associates (PNA)).

**Widening of 14th Avenue in Johannesburg (Gauteng Province, South Africa) 2005.** *Project Manager.* The project entailed environmental scoping for the widening of 14th Avenue in Johannesburg. Responsible for client liaison, team management, financial management and quality control. Involved for 2 person-months. (Arup).

**Statue of Freedom in Port Elizabeth (Eastern Cape Province, South Africa) 2005.** *Environmental Manager.* The project comprised environmental feasibility/risk assessment for the Statue of Freedom in Port Elizabeth. Responsible for report writing and assessment of alternative sites. Involved for 1 person-month. (KPMG Consortium - GAPP Architects).

**Socio-Economic Impact Assessment and Risk Management, Integrated Environmental Management Information Series 22 and 23 (Gauteng Province, South Africa) 2005.** *Editor and Project Manager.* The project entailed the editing and project management of the Integrated Environmental Management Information Series 22 and 23 documents, namely the Socio-Economic Impact Assessment and the Risk

Management documents, for the Pretoria area. Responsible for management of sub-consultants, quality and financial management and report writing. Involved for 1 person-month. (Department of Environmental Affairs and Tourism (DEAT)).

***Environmental Assessment of International Agreements, Integrated Environmental Management Information Series 19 (South Africa) 2005.*** *Co-author with James Cross.* The project involved compiling the Environmental Assessment of International Agreements, Integrated Environmental Management Information Series 19 document. Responsible for management of sub-consultants, quality and financial management and report writing. Involved for 0.5 person-months. (Department of Environmental Affairs and Tourism (DEAT)).

***Water pipeline from Driefontein Dam to Duvha Power Station (Mpumalanga Province, South Africa) 2004.*** *Environmental Manager.* The project comprised environmental scoping for a water pipeline from Driefontein Dam to Duvha Power Station in Emalehleni. Responsible for site visits, environmental impact assessments (EIAs), report writing and public participation. Involved for 3 person-months. (Eskom).

***Development of a lodge for the Automotive Supplier Park (ASP) (Gauteng Province, South Africa) 2004.*** *Project Leader/Environmental Manager.* The project entailed environmental considerations for the development of a lodge at the Automotive Supplier Park (ASP) in Rosslyn. Responsible for client liaison, team management, financial management and quality control. Involved for 2 person-months. (PD Naidoo & Associates (PNA)).

***Desilting of Alberton Dam (Gauteng Province, South Africa) 2004.*** *Project Leader/Environmental Manager.* The project involved environmental scoping and an environmental management plan (EMP) for the desilting of the Alberton Dam. Responsible for client liaison, team management, financial management and quality control. Involved for 2 person-months. (SRK Consulting).

***Extensions to Clover Hill in Bronkhorstspuit (Gauteng Province, South Africa) 2004.*** *Environmental Manager.* The project entailed environmental scoping for the Clover Hill Extensions 1 - 4, adjacent to the Bronkhorstspuit Dam. Responsible for public participation (stakeholder engagement) and report writing. Involved for 2 person-months. (Clover Hill Developments (Pty) Ltd).

***Development of a shopping centre on agricultural holdings (Gauteng Province, South Africa) 2004.*** *Environmental Manager.* The project entailed environmental scoping for the development of a shopping centre on Holdings 34 and 35 in Kempton Park, Pretoria. Responsible for report writing, site assessment of alternative sites and the public participation process (PPP). Involved for 2 person-months. (AJP Group).

***Access road for The Innovation Hub (Gauteng Province, South Africa) 2003.*** *Environmental Manager.* The project involved environmental scoping for the access road to the Innovation Hub in Pretoria. Responsible for report writing, site assessment and public participation process (PPP) meetings. Involved for 3 person-months. (Arup).

***Dunkeld West Filling Station in Johannesburg (Gauteng Province, South Africa) 2003.*** *Environmental Manager.* The project entailed environmental scoping for a filling station in Dunkeld West, Johannesburg. Responsible for site visits, environmental impact assessments (EIAs), report writing and public participation. Involved for 3 person-months. (Seedprop Consolidated Investments).

***Environmental scoping for the upgrading of the Sinter Plant at Iscor (Gauteng Province, South Africa) 2003.*** *Environmental Manager.* The project entailed environmental scoping for the upgrading of the Sinter Plant at Iscor in Vanderbijlpark. Responsible for site visits, environmental impact assessments (EIAs), report writing, public participation and sub-consultant management. Involved for 3 person-months. (Iscor Flat Steel).

***Electricity supply cables between Pretoria North Substation and Annlin Extension 19 (Gauteng Province, South Africa) 2003.*** *Environmental Manager.* The project involved environmental scoping for the installation of electricity supply cables between Pretoria North Substation and the proposed Annlin Extension 19. Responsible for report writing, site assessment of alternative sites and the public participation process (PPP). Involved for 2 person-months. (Moolman Group).

***National environmental management bills (South Africa) 2003.*** *Assistant/Report Writer.* The project involved costing of the promulgation of a series of six national environmental management bills, including the Air Quality Amendment Bill, the Biodiversity Bill, the Protected Areas Amendment Bill and the National Environmental Management Act's (NEMA's) 1st and 2nd Amendment Bills. Responsible for the management

of sub-consultants, report writing and stakeholder liaison. Involved for 2 person-months. (Department of Environmental Affairs and Tourism (DEAT)).

**Telecommunications tower for the Council of Scientific and Industrial Research (CSIR) (Gauteng Province, South Africa) 2003.** *Environmental Control Officer (ECO).* The project entailed an environmental management plan (EMP) for the construction of a 40m-tall concrete microwave telecommunications tower at the Council for Scientific and Industrial Research (CSIR). Responsible for on-site monitoring of environmental effects of construction work. Involved for 1 person-month. (Telkom).

**Development of an environmental management system (EMS) for Nelspruit (Mpumalanga Province, South Africa) 2003.** *Project Leader/Environmental Manager.* The project was concerned with the development of an environmental management system (EMS) for the Mbombela Local Municipality in Nelspruit. Responsible for client liaison, team management, financial management, quality control and training of client representatives. Involved for 2 person-months. (Mbombela Local Municipality).

**Revision of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) (South Africa) 2003.** *Environmental Manager.* The project included the revision of Chapter 5 of the National Environmental Management Act (NEMA) (Act No 107 of 1998), which deals with environmental impact assessment (EIA) and integrated environmental management (IEM) procedures. Responsible for report writing, stakeholder engagement, preparation of presentations and other project documentation. Involved for 1 person-month. (Department of Environmental Affairs and Tourism (DEAT)).

**Development of an environmental policy for Nelspruit (Mpumalanga Province, South Africa) 2003.** *Project Leader/Environmental Manager.* The project entailed the development of an environmental policy for the Mbombela Local Municipality in Nelspruit. Responsible for client liaison, team management, financial management and quality control. Involved for 0.5 person-months. (Mbombela Local Municipality).

**Alexandra Renewal Project (ARP) in Johannesburg (Gauteng Province, South Africa) 2002.** *Environmental Manager.* The project delivered a report on the environmental management framework (EMF) for the Alexandra Renewal Project (ARP) in Johannesburg. Responsible for field data. Involved for 1 person-month. (Gauteng Department of Agriculture and Rural Development (GDARD)).

**Environmental management framework (EMF) for Centurion (Gauteng Province, South Africa) 2002.** *Project Assistant.* The project comprised the development of an environmental management framework (EMF) for the Loch Vaal region in Centurion. Responsible for field work and report writing. Involved for 2 person-months. (Gauteng Department of Agriculture and Rural Development (GDARD)).

**Rehabilitation of cutting (South Africa) 2002.** *Environmental Manager.* The project involved the rehabilitation of a cutting at the house of Mr Naas Grimbeek at the Hartebeespoort Dam. Responsible for site inspections and the development of a rehabilitation plan. Involved for 1 person-month. (Naas Grimbeek).

**Road upgrades for Madikwe Game Reserve (North West Province, South Africa) 2002.** *Environmental Manager.* The project included fieldwork, public participation, the development of an environmental management plan (EMP) and environmental scoping of roads and the bulk water supply system at Madikwe Game Reserve. Responsible for fieldwork assessment, public participation (stakeholder engagement) and report writing. Involved for 2 person-months. (Eco Assessments CC).

**Brits/Doreen Roads filling station in Pretoria (Gauteng Province, South Africa) 2002.** *Environmental Manager.* The project entailed the development of a filling station on the corner of Brits Road and Doreen Road in Akasia, Pretoria. Responsible for fieldwork assessment, public participation (stakeholder engagement) and report writing. Involved for 2 person-months. (Gerneke & Potgieter).

**Buffer Zone projects (South Africa) 2002.** *Environmental Manager.* This project entailed Phases 1 and 2 of the Buffer Zone projects for the Gauteng Department of Agriculture and Rural Developments (GDARD), which provides guidelines for the authorisation of developments in proximity to activities that cause pollution, including landfill sites, sewage treatment plants (STPs), industries and mine dumps. Responsible for report writing and fieldwork. Involved for 2 person-months. (Gauteng Department of Agriculture and Rural Development (GDARD)).

**Marion Island research base in the South Atlantic Ocean (Western Cape Province, South Africa) 2002.** *Environmental Manager.* The project entailed environmental scoping for the research base on Marion Island. Responsible for public participation (stakeholder engagement), report writing and the development of an environmental management plan (EMP). Involved for 1 person-month. (Department of Environmental

Affairs and Tourism (DEAT)).

**National Forest Inventory (NFI) for the Eastern Cape (Eastern Cape Province, South Africa) 2002.** *Environmental Assistant.* The project entailed data gathering and database population of the National Forest Inventory (NFI). Responsible for data gathering and capturing and stakeholder liaison. Involved for 1 person-month. (Department of Water Affairs (DWA)).

**Gauteng Communication Network Strategy (GAUCONS) (Gauteng Province, South Africa) 2002.** *Environmental Manager.* The project entailed the development of the Gauteng Communication Network Strategy (GAUCONS), a decision-support and administration system for the authorisation of telecommunications masts in Johannesburg. Responsible for report writing and stakeholder liaison. Involved for 3 person-months. (Gauteng Department of Agriculture and Rural Development (GDARD)).

**Declaration of the Prince Edward Islands (PEI) as a world heritage site (Prince Edward Islands (PEI)) 2001.** *Environmental Manager.* The project entailed a motivation report for the declaration of the Prince Edward Island (PEI) as a world heritage site (WHS). Responsible for report writing and management of consultants. Involved for 2 person-months. (Department of Environmental Affairs and Tourism (DEAT)).

**Environmental management framework (EMF) for the Loch Vaal area (Gauteng Province, South Africa) 2001.** *Environmental Manager.* The project included a report on data gathering and fieldwork, and an environmental management framework (EMF) for the Loch Vaal area in Centurion. Responsible for the compilation of the EMF document. Involved for 2 person-months. (Aurecon).

**Makgabetlwane water pipeline (North West Province, South Africa) 2001.** *Environmental Manager.* The project entailed environmental scoping of a water pipeline at Makgabetlwane. Responsible for public participation (stakeholder engagement) and report writing. Involved for 1 person-month. (Munayi Malaka Engineers).

**Development of Alberton Waterfront (Gauteng Province, South Africa) 2001.** *Environmental Manager.* The project entailed environmental scoping for the development of the Alberton Waterfront. Responsible for fieldwork assessment, public participation (stakeholder engagement) and report writing. Involved for 2 person-months. (Odyssey Development and Construction).

**Midrand Estates Development (Gauteng Province, South Africa) 2000.** *Environmental Manager.* The project entailed an environmental impact assessment (EIA) of the proposed Midrand Estates development. Responsible for fieldwork, site assessment and report writing. Involved for 2 person-months. (Eco Assessments).

**Cellular phone mast sites for Cell C (National, South Africa) 1999 - 2002.** *Environmental Manager.* The project entailed exemption applications of approximately 300 cell phone mast sites for the Cell C network. Responsible for site visits, assessments and reporting. Involved for 6 person-months. (Aurecon).

**Development of a Cell Phone Code of Practice (South Africa) 1999.** *Assistant.* The project entailed the development of a South African Code of Practice, including environmental considerations for the planning and management of telecommunications structures. Responsible for report writing and providing of general project assistance. Involved for 2 person-months. (South African Bureau of Standards (SABS)).

**Nissan environmental management system (EMS), Pretoria (Gauteng Province, South Africa) 1998 - 1999.** *Group Environmental Manager.* The project entailed the implementation and certification of ISO 14001 compliant environmental management system (EMS). Responsible for company-wide coordination of EMS implementation, environmental auditing, training, general advice, strategic review of EMS performance and reporting to top management. Involved for 18 person-months. (Nissan South Africa).

**Information management system (IMS) directorate for Pretoria (Gauteng Province, South Africa) 1998.** *Project Assistant.* The project comprised the development of an information management system (IMS) directorate, namely the Forest Regulation of the Department of Water Affairs (DWA). Responsible for report writing, conducting interviews, reporting and the monitoring of templates. Involved for 2 person-months. (Department of Water Affairs (DWA)).

**Environmental management system (EMS) for Johannesburg (Gauteng Province, South Africa) 1998.** *Project Leader and Senior Environmental Manager.* The project entailed the development of an ISO 14001 environmental management system (EMS) for the De Beers Research and Development Centre (DebTech). Responsible for client liaison, team management, financial management, quality control and initial review of

client's environmental impacts and aspects. Involved for 1 person-month. (De Beers Research and Development Company (DebTech)).

**National strategy for the development of integrated environmental management (IEM) (South Africa) 1998.** *Assistant.* The project involved the development of a discussion document, namely a national strategy for the development of integrated environmental management (IEM). Responsible for report writing and management of sub-consultants and stakeholders. Involved for 3 person-months. (Department of Environmental Affairs and Tourism (DEAT)).

**Environmental impact assessment (EIA) for Marion Island (Western Cape Province, South Africa) 1997 - 1998.** *Environmental Manager.* The project comprised an environmental impact assessment (EIA) of the proposed tourism to Marion Island. Responsible for site visits, data collection, specialist study coordination and report writing. Involved for 3 person-months. (Department of Environmental Affairs and Tourism (DEAT)).

**ISO 14001 certification and surveillance audits (Various provinces, South Africa) 1997 - 1998.** *Environmental Auditor.* The project entailed ISO 14001 certification and surveillance audits of four companies in various provinces of South Africa. Responsible for environmental auditing. Involved for 0.5 person-months. (South African Bureau of Standards (SABS)).

**Environmental management system (EMS) for Antarctica (Antarctica) 1995.** *Environmental Auditor.* The project entailed the development of an environmental management system (EMS) for the South African National Antarctic Expedition's (SANAE's) IV Base. Responsible for environmental auditing. Involved for 0.5 person-months. (Department of Environmental Affairs and Tourism (DEAT)).

**Environmental impact assessment (EIA) for Letsibogo Dam (Botswana) 1994 - 1995.** *Environmental Assistant.* The project entailed an environmental impact assessment (EIA) of the Letsibogo Dam on the Motloutse River in north eastern Botswana. Responsible for report writing, quality control and review of the sub-consultant's deliverables. Involved for 4 person-months. (Cave Klapwijk & Associates (CKA)).

**Open cast coal mining rehabilitation (Mpumalanga Province, South Africa) 11/1991 - 01/1992.** *Researcher.* The project entailed fieldwork for the rehabilitation of open cast coal mining, including vegetation monitoring and soil compaction monitoring on Amcoal's open cast coal mines. Responsible for the collection of field data. Involved for 2 person-months. (Amcoal).

### Research supervision

2005: External Examiner for a Landscape Architectural Masters Dissertation, University of Pretoria

### Education

1993 : MPhil Environmental Management, University of Cape Town (UCT), South Africa  
1991 : BL Landscape Architecture, University of Pretoria, South Africa

### Career enhancing courses

2012 : Project Management, Aurecon  
2007 : Implementation of ISO 17021 (Conformity Assessment), South African National Accreditation System (SANAS)  
2005 : Certification Body Assessor Workshop, South African National Accreditation System (SANAS)  
1998 : Waste Management, Technikon Pretoria, South Africa  
1996 : Environmental Auditing, University of Potchefstroom, South Africa  
1996 : Environmental Law, University of Potchefstroom, South Africa  
1996 : Environmental Management System, University of Potchefstroom, South Africa  
1993 : Introduction to Public Participation, Environmental Evaluation Unit

### Professional affiliations

Professional Landscape Architect, South African Council for the Landscape Architectural Profession (SACLAP)

## Languages

|           | <b>Reading</b> | <b>Writing</b> | <b>Speaking</b> |
|-----------|----------------|----------------|-----------------|
| English   | Excellent      | Excellent      | Excellent       |
| Afrikaans | Excellent      | Excellent      | Excellent       |

## Publications

Heydenrych R, and Nortje E, 2013. "An EIA for a Nuclear Power Station in a Sensitive but Degraded Natural and Cultural Environment". Paper presented at the International Association for Impact Assessment (IAIA) South Africa National Conference, Thaba Nchu, Free State, September 2013.

Heydenrych R, 2007. "Lessons learnt in the implementation of the new EIA regulations". Paper presented at the Assessing Environmental Impacts Conference. The Business Zone.

Heydenrych R, 2007. "Lessons Learnt in the Implementation of the New EIA Regulations". Paper presented at the Assessing Environmental Impacts Conference. The Business Zone.

Heydenrych R, and Heunis M, 2006. "The Role of Geographical Information Systems (GIS) in EIAs under the New Regulations". Paper at International Quality and Productivity Center (IQPC) Conference "Successfully conduction Environmental Impact Assessments".

Claassen P, and Heydenrych R, 2002. "Environmental Considerations for the Planning and Management of Telecommunications Structures". Assistant Author SABS 0262-0 Draft Code of Practice.

Heydenrych R, 1999. "Using an Internationally Recognised EMS to Open Doors to Global Market Opportunities and Promote a Chain of Environmentally Conscious Business Partnership". Paper at Environmental Management Conference. 3 February 1999. AIC Conferences.

Heydenrych R, 1998. "EMS in the Automotive Industry". Paper at the Southern African Auditor and Training Certification Association's (SAATCA's) Auditors Conference.

Heydenrych R, and Claassen P, 1998. "A National Strategy for Integrated Environmental Management in South Africa". Discussion document. Pretoria Department of Environmental Affairs and Tourism (DEAT).

Heydenrych R, 1997. "Do the Right Thing - An Introduction to Environmental Auditing". Conserva, 12 (1): 20 - 21.

Heydenrych R, 1997. "Current Environmental Policy Framework and Strategy for Environmental Management Systems in South Africa". Joint paper with Ingrid Coetzee. South African Quality Institute (SAQI) Convention on Quality and the Environment.

Heydenrych R, 1996. "ISO 14001 Environmental Management System Standard". Conserva. 11 (4): 24 - 25.

## Referees

| <b>Company</b>                | <b>Contact Person</b> | <b>Telephone nr.</b>                     |
|-------------------------------|-----------------------|------------------------------------------|
| Arcus GIBB                    | Mervin Olivier        | +27 43 706 3656 /<br>molivier@gibb.co.za |
| Strategic Environmental Focus | Dave Rudolph          | +27 12 349 1307 /<br>dave@sefsa.co.za    |

By my signature below I certify the correctness of the information above and my availability to undertake this assignment.

\_\_\_\_\_  
Signature of Staff Member

\_\_\_\_\_  
Date

# Stephan Gaigher

4/19/2014

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(015) 516 1561, 073 752 6583  
stephan@gaheritage.co.za  
www.gaheritage.co.za

## OBJECTIVES

To function as a best practice heritage practitioner for the southern African region and to promote archaeological research in southern Africa internationally.

## EDUCATION

University of Pretoria

1992 - 1994

Town and Regional Planning

Ancient Cities studies

Course on determining *Genius Loci* (Sense of Place)

1994 – 1996

BA – Philosophy (*Cum Laude*) with specialization in *Aesthetics and Ethics*

BA – Archaeology (*Cum Laude*)

1996 – 1998

BA Hons. – Archaeology (*Cum Laude*)

2010 – Present

MA – Archaeology

## EMPLOYMENT

Junior Lecturer | University of Venda

1998 - 2000

Lecturing of pre-graduate courses in Archaeology, Forensic Archaeology and Forensic Anthropology

Principal Investigator | Archaeo-Info Northern Province

1998 - 2005

Managing Director and Principal Investigator

- Over 2000 Heritage Impact Studies performed during this time
- Over 2500 Graves Repatriated

Principal Investigator | G&A Heritage

2005 - Present

Managing Director and Principal Investigator

Director of Archaeological Research | Lajuma Research Centre

2005 – Present

### OTHER EXPERIENCE AND AFFILIATION

- Cultural Advisor for the UNESCO Vhembe Biosphere Reserve
- Presenter for the American University (AU), Washington's *Environment and Development* and *World Capitals Programs*
- Research Affiliate with the University of Illinois, Chicago's *Evolutionary Biology Research Program*
- Research Affiliate for the Durham University, England's *Evolutionary Anthropology Research Program*
- Program Director for the Mapungubwe World Heritage Site *Archaeological Rehabilitation Project*
- Compilation of the West Coast National Park, *Cultural Resource Management Plan*
- Extensive experience in the management of the heritage component of the environmental management process of Eskom Power Lines, Roads, Pipelines and other developments.
- Member of the Association of South African Professional Archaeologists (ASAPA, membership no 42) with Field Director Accreditation since 2008.
- South African Heritage Resource Agency (SAHRA) accredited heritage practitioner.
- Member of the Archaeological Institute of America.

### SKILLS

- Extensive Experience in Heritage Impact Assessments and Archaeological Impact Assessments
- Extensive Experience in Grave Repatriation (both recent graves, archaeological graves and Section 36 C graves).
- Course on *Animal Bone Identification* (Archaeo-zoology Department, South African Flagship Institute)
- Advanced Course in Animal Bone Identification* (Archaeo-zoology Department, South African Flagship Institute)
- Course in Facial Reconstruction under Dr. Richard Neave, England
- Course in Forensic Archaeology
- Paleo-Art Field Services course in Rock Art Site Identification and Documentation
- Advanced off-road driving
- Advanced Course in SCUBA diving

### LANGUAGES

- English – Fluent
- Afrikaans – Fluent
- Venda – Basic

- German – Basic
- Dutch – Conversant
- Portuguese – Basic

### **RELEVANT FIRST PHASE PROJECTS**

- 400+ Heritage Impact Assessments
- Camden- Mbewu 400 KVA Power Line
- Camden Ash Dam Facility
- Tutuka Waste Disposal Study
- Tabor Substation
- Ingula Cemetery Study
- Devon Waste Disposal Study

### **SECOND PHASE PROJECTS**

- Mapungubwe Hill Rehabilitation 2003
- Mapungubwe Hill Rehabilitation 2004
- Mapungubwe Hill Rehabilitation 2005
- Shroda EIA site rehabilitation 2005
- Pons 5 EIA site rehabilitation 2005
- Sagole Road Deviation Project 2006
- MUT 12, MUT 27, MUT 41, MUT 2 and MUT 12 (1999 – 2002)

### **GRAVE REPATRIATION PROJECTS**

- Nandoni dam grave relocation project 1998
- Xikundu weir grave relocation project 1999
- Kutama grave relocation project 2007
- K2 Infant Grave rescue excavation (field worker) 2004

# THEO PRETORIUS

## CURRICULUM VITAE

### PERSONAL DETAILS:

Full Name: Theodor Gustav Pretorius  
Date of Birth: 22/06/1963  
Identity Number: 6306225098081  
Nationality: South African  
Languages: Afrikaans, English  
Current Position: Professional Town and Regional Planner  
Partner (PLAN Associates)  
Marital Status: Married (3 Children)  
Gender: White male

### ACADEMIC QUALIFICATIONS:

1991 BS&S (UP): Town and Regional Planning  
1989 MSc (RAU): Urban Satellite Remote Sensing  
1987 BSc-Hons (RAU): Biogeography, Climatology  
1985 BSc-Ed (RAU): Geography, Botany

### EMPLOYMENT RECORD:

1995 - date Partner (Plan Associates)  
1992 - 1995 Town Planner (Plan Associates)  
1991 - 1992 Senior Planner (Office for Regional Development, currently the Dept of Land Affairs)  
1988 - 1990 Researcher (CSIR) Satellite Remote Sensing  
1986 - 1988 Teacher (TED) Geography, Biology

### SKILLS AND EXPERIENCE:

Mr Pretorius is a professional Town and Regional Planner registered with the South African Council for Town and Regional Planners and the South African Planning Institute. He holds a Masters Degree in Urban Satellite Remote Sensing as well as a BSc and BSc-Hons, and a degree in Town and Regional Planning.

Mr Pretorius specialises in six main development disciplines: Strategic Land Use Planning, Housing, Transportation Studies, Integrated Development Planning, Municipal Administration and Community Participation and Facilitation and he has been Project Manager to more than 300 town planning projects over the past 20 years.

### PROFESSIONAL CAREER:

1992 - date: Professional Town and Regional Planner: Plan Associates  
Became Partner of the firm in 1995.

Involved in:

#### a) Land Use Planning:

Mr Pretorius specialises in strategic land use planning and has been the project leader to the following land use planning exercises in the recent past:

- Formulation of Guidelines for the Compilation of Rural Spatial Development Frameworks and Precinct Plans (RDLR:2014)
- Formulation of future land use forecasts for the six metropolitan areas in South Africa on behalf of the South African Rail Commuter Corporation (2005/2006) and during review of PRASA Commuter Master Plan (2011)
- Ekurhuleni Metropolitan Spatial Development Framework (2003) (including urban renewal projects for the CBD's of Alberton, Germiston, Benoni, Boksburg, Kempton Park, Brakpan and Springs)
- Greater Johannesburg Spatial Development Framework and Formalisation of Urban Edge (2002)
- Johannesburg International Airport Development Framework (2002)
- Polokwane CBD Development Framework (2005) and Development Frameworks for Mankweng (2013), SDA 1 and SDA 3 (2007)
- Emalahleni CBD Development Framework (2006)
- Brooklyn Node Development Framework (2006) and Menlyn Development Framework (2009)
- Rhodesfield-Kempton Park CBD Development Framework (2002)
- Cosmo City, Diepsloot, Olievenhoutbos Spatial Development Framework (2006)
- Kempton Park Densification Strategy (2001)
- Steve Tshwete Local Municipality Spatial Development Framework (2010)
- Nkangala District Spatial Development Framework (2010)
- Bojanala District Spatial Development Framework (2011)
- Sekhukhune District Municipality SDF (2008)
- Capricorn District Spatial Development Framework (2011)
- Demarcation and implementation of a statutory Urban Edge in Gauteng Province (on behalf of Provincial

Department of Development Planning and Local Government) (2001 and review in 2007)

- Township Regeneration Strategies for Atteridgeville, Tembisa-Hammanskraal, Mabopane and Olievenhoutbosch (2011)
- Township Regeneration Strategies for Thohoyandou, Sibasa and Malamulele (2010)
- Township Regeneration Strategy for Munsieville (2010)
- Mkhondo Municipality Spatial Development Framework (2010)
- Bushbuckridge Spatial Development Framework (2010)
- Burgersfort Spatial Development Framework (2011)
- Lebowakgomo Spatial Development Framework and Land Information System (2013)
- Brakpan East SDF (2007), Kirkney-Andeon Suiderberg SDF (2008), Roodepoort and Eldorado Park CBD SDF (2008)
- CBD Revitalisation Strategy for Mokopane, Mookgophong, Thabazimbi and Lephalale CBDs (2010 to 2013)
- Compilation of Thabazimbi Municipality SDF (2014)
- Moses Kotane Local Municipality SDF (2008) and (2010) on behalf of RDLR
- Nkangala District Municipality Spatial Development Framework (2014)
- Gert Sibande District Municipality Spatial Development Framework(2011) 2014
- West Rand District Municipality Spatial Development Framework(2014)

#### **b) Housing:**

Mr Pretorius also has extensive experience in low cost/ informal housing. He has been the project leader in the following housing related projects during the past few years:

- Gauteng Top 20 PTP Programme for Refilwe, Rethabiseng, Actonville, Wattville and KwaThema (2008), as well as Ekangala, Tembisa-Hammanskraal, Mabopane, Winterveld, GaRankuwa and Khutsong (2011)
- Compilation of the Emalahleni Municipal Housing Development Plan (2007)
- Compilation of the Tshwane Municipal Housing Development Plan (2006 and 2011))
- Compilation of the Metsweding Municipal Housing Development Plan (2006)
- Compilation of the Ekurhuleni Municipal Housing Development Plan (2011)
- Compilation of the Sedibeng Municipal Housing Development Plan (2011)
- Compilation of the City of Joburg Municipal Housing Development Plan (2012)
- Restructuring and planning of the informal settlement of Mmakau (10 000 units) (1996)
- The formulation of a housing strategy to deal with mining related informal settlement in Greater Rustenburg Area (30 000 units) (2001)
- Ekurhuleni Eastern and Western Mining Belt Housing Strategy (2005)
- Compilation of Housing Framework for Linbro Park (2009)
- Compilation of IDP Housing Chapters for 25 Municipalities in Limpopo Province (2008)
- Compilation of the Mpumalanga Human Settlement Master Plan (2013)

#### **c) Community Participation and Facilitation:**

Mr Pretorius personally facilitates the community participation component of all his projects. Due to this experience and his educational background he has all the necessary skills to communicate effectively with communities/audiences, and to facilitate processes of planning and negotiations with various groupings. By virtue of these skills, he has been appointed on several occasions by various municipalities to facilitate workshops and public participation programmes on their behalf.

#### **d) Transportation Studies:**

Mr Pretorius has been involved in various transportation studies over the past ten years, with major emphasis on the integration of land use and transportation. He was a member of the PWV Consortium, an advisory body which assisted the Gauteng Province: Department of Roads and Public Works in transportation planning matters for the entire Gauteng Province.

Specific projects in this regard which Mr Pretorius has been involved are:

- Compilation of the Gauteng Integrated Transport Master Plan (2013)
- Land Use Planning inputs to the City of Tshwane Bus Rapid Transit System (2013)
- Land Use Forecasts towards the compilation of the Gauteng Transportation Study and the Development of a Gauteng Strategic Public Transport Network (1992-2010)
- Negotiations between Gautrans and local authorities in Gauteng Province regarding the strategic road network in their areas of jurisdiction (1992-2005)
- Route determination, preliminary design and detail design of various provincial/urban roads in Gauteng Province (1992-2005)
- Formulation of a Toll Road Strategy for Gauteng Province (2001)
- Formulation of Guidelines on the Integration of Land Use and Transportation (1999)
- Formulation of guidelines regarding transportation inputs to IDP's (1997)
- Pilot study on the development of the Tembisa-Kempton Park Development Corridor (1998)
- Performed as expert witness to Gautrans in five tribunal cases
- Investigation into a Route Classification System for Gauteng Province

- Formulation of National Road Access Management Guidelines for South Africa (2001)

Mr Pretorius has also been involved in various other local authority transportation projects:

- Detailed land use, transportation and implementation (funding) strategy for the following roads in Greater Pretoria: Michael Brink (K16), Zambezi Drive (K14), Soutpansberg Road and Boom and Bloed Streets
- Compilation of an Integrated Transport Plan for Greater Pretoria
- Study on the Optimisation of the Ring Rail System in Greater Pretoria
- Design of a system of Activity Spines, Activity Streets and Mobility Spines for Greater Pretoria
- Development Framework for the R59 Development Corridor (2004 and review in 2010)

#### e) Integrated Development Planning:

Mr Pretorius' next field of specialisation is Integrated Development Planning for local authorities. He served as project leader to about 25 IDP processes over the past decade and conducted IDP Training to all municipalities in South Africa during the period 2001 to 2003).

He was project leader to the project team who completed the first Integrated Development Plan (IDP) in terms of new legislation in South Africa. The client (Greater Pretoria Metropolitan Council) won the Gauteng Province award for the best IDP in Gauteng Province for two consecutive years (1997 and 1998).

The following is a summary of the IDP processes which Mr Pretorius managed as project leader during the past fifteen years:

| LOCAL AUTHORITY                                                        | 97-02 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------------------------------------------------------------------------|-------|------|------|------|------|------|------|------|------|------|------|
| 1. Greater Pretoria Metropolitan Council (Tshwane Metro)               | X     |      |      |      | X    | X    | X    |      |      |      |      |
| 2. Centurion Town Council                                              | X     |      |      |      |      |      |      |      |      |      |      |
| 3. Pretoria City Council                                               | X     |      |      |      |      |      |      |      |      |      |      |
| 4. Akasia Town Council                                                 | X     |      |      |      |      |      |      |      |      |      |      |
| 5. NMLC (Randburg)                                                     | X     |      |      |      |      |      |      |      |      |      |      |
| 6. EGSC/Ekurhuleni                                                     | X     |      |      |      |      |      |      |      |      |      |      |
| 7. Rustenburg District Municipality/<br>Bojanala District Municipality | X     |      |      |      |      |      |      |      |      |      |      |
| 8. Highveld District Council/ Nkangala District Municipality           | X     | X    | X    | X    | X    |      |      |      |      |      |      |
| 9. Rustenburg Local Municipality                                       | X     |      |      |      |      |      |      |      |      |      |      |
| 10. Pietersburg-Polokwane Local Municipality                           | X     |      |      |      |      |      | X    |      |      |      |      |
| 11. Sabie/Thaba Chweu Local Municipality                               | X     |      |      |      |      |      |      |      |      |      |      |
| 12. Thembisile Municipality                                            |       |      |      |      | X    | X    |      |      |      |      |      |
| 13. Groblersdal (Elias Motsoaledi) Municipality                        |       |      |      |      | X    |      | X    |      |      |      |      |
| 14. Emalahleni Municipality                                            |       |      |      |      | X    | X    | X    | X    |      |      |      |
| 15. Gert Sibande District Municipality                                 |       |      |      |      |      | X    | X    |      |      |      | X    |
| 16. Mkhondo Local Municipality                                         |       |      |      |      |      |      |      |      | X    |      |      |
| 17. Midvaal Local Municipality                                         |       |      |      |      |      |      | X    |      |      | X    |      |

In the process Mr Pretorius gained a vast amount of experience on Integrated Development Planning – to such a degree that he is currently widely regarded as an IDP specialist.

- 1990 - 2013** Part-time lecturer on environmental analysis, strategic land use and urban restructuring and Integrated Development Planning (IDPs) for the Department Town and Regional Planning at the University of Pretoria, the Tshwane University of Technology: Department Civil Engineering, and UNISA: Department Civil Engineering.
- 1991 - 1992** Senior Planner: Department of Regional and Land Affairs
- Responsible for co-ordination of actions of all developers/institutions responsible for development in Development Region A
  - Extensive contact with the Regional Development Advisory Committee (RDAC) for Region A, Regional Services Councils and all local authorities in the area
  - Commented on various Guide Plans, Structure Plans and the National Regional Development Programme
- 1988 - 1990** Researcher: Council for Scientific and Industrial Research (CSIR) in South Africa (EMATEK and BOUTEK)
- Research on detection of Urban sprawl via satellite by using quantitative image processing techniques
- 1986 - 1988** School teacher at Roodepoort High School (Biology and Geography).