8 HERITAGE SPECIALIST REPORT

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8.1. Introduction

Coastal and Environmental Services (CES) in Grahamstown on behalf of InnoWind (Pty) Limited requested that Umlando cc conduct a Phase 1 Archaeological Impact Assessment for the proposed Waainek Wind Energy Project to be located ~4km (south) west of Grahamstown.

The farms which will be occupied by the proposed project (all four layout alternatives have been included here) are the following:-

- Strowan
- Fancutts
- Farm 253, Sub 21
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The aim of this specialist study is to locate and map archaeological heritage sites and remains that may be negatively impacted by the planning, construction and implementation of the proposed project, to assess the significance of the potential impacts and to propose measures to mitigate against the impacts.

The extent of the proposed development (>12ha) falls within the requirements for an archaeological impact assessment as required by Section 38 of the South African Heritage Resources Act (No. 25 of 1999).

8.1.1. Terms of Reference

The terms of reference for the archaeological heritage study were to:

- Determine the likelihood of archaeological remains of significance in the proposed site(s);
- Identify and map (where applicable) the location of any significant archaeological remains;
- Assess the sensitivity and significance of archaeological remains in the site(s); and
- Identify mitigatory measures to protect and maintain any valuable archaeological sites and remains that may exist within the proposed site(s).

8.2. Study Approach

The extent of the proposed development falls within the requirements for an archaeological impact assessment as required by Section 38 of the South African Heritage Resources Act (No. 25 of 1999).

8.2.1. Legislative Requirements

The following section provides a brief overview of the relevant legislation with regard to the archaeology of the proposed project.

8.2.1.1. The National Heritage Resources Act (Act No. 25 of 1999)

The National Heritage Resources (NHR) Act requires that *"…any development or other activity which will change the character of a site exceeding 5 000m², or the rezoning or change of land use of a site exceeding 10 000 m², requires an archaeological impact assessment*"

The relevant sections of the Act are briefly outlined below.

Archaeology (Section 35 (4)): Section 35 (4) of the NHR stipulates that no person may, without a permit issued by Heritage Western Cape (HWC), destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object.

Burial grounds and graves (Section 36 (3)): Section 36 (3) of the NHR stipulates that no person may, without a permit issued by the South African Heritage Resources Agency (SAHRA), destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority.

In line with the above-mentioned legislation, a heritage impact assessment had to be conducted for the proposed project. The methods employed to allow collection of this data are discussed in Section 8.2.2 below.

8.2.2. Methodology

8.2.2.1. Desktop study

A desktop study of work conducted in Grahamstown and surrounding areas was undertaken. Databases from both Umlando and the Albany Museum in Grahamstown were consulted. It is important to note however that these databases tend to be restricted to archaeological and declared memorial sites, therefore consulting with the relevant authorities covers known battlefields and historical sites. Where necessay, a historical architect, palaeontologist, and an historian, were also consulted.

8.2.2.2. Ground survey

The approach followed in the archaeological study entailed a ground/foot survey of the proposed Waainek Wind Energy Project site and surrounds.During the survey, the significance of each recorded site was defined by grouping all sites according to low, medium and high significance for the purpose of this report. Sites of low significance have no diagnostic artefacts or features. Sites of medium significance have diagnostic artefacts or features and these sites tend to be sampled. Sampling includes the collection of artefacts for future analysis. Sites of high significance are excavated and/or extensively sampled. Those sites that are extensively sampled have high research potential, yet poor preservation of features.

Archaeological remains were recorded using a Garmin Gecko 201 GPS unit set on map datum WGS 84.

The site visit and assessment took place in September 2009.

8.2.2.3. Defining significance

Heritage sites vary according to significance and several different criteria relate to each type of site. However, there are several criteria that allow for a general significance rating of archaeological sites. It is not possible to rate these criteria as they are extremely subjective. Umlando has been using these criteria as guidelines since 1995 to determine general, and site specific, significance. The environmental significance of impact scale is also used when required it.

These criteria used to rate archaeological sites include:

1. State of preservation of:
1.1. Organic remains:
1.1.1. Faunal
1.1.2. Botanical
1.2. Rock art
1.3. Walling
1.4. Presence of a cultural deposit
1.5. Features:
1.5.1. Ash Features
1.5.2. Graves

1.5.3. Middens
1.5.4. Cattle byres
1.5.5. Bedding and ash complexes

2. Spatial arrangements:

2.1. Internal housing arrangements
2.2. Intra-site settlement patterns
2.3. Inter-site settlement patterns

3. Features of the site:

3.1. Are there any unusual, unique or rare artefacts or images at the site?
3.2. Is it a type site? That is, is the site the first one to be recorded of a specific feature or assemblage
3.3. Does the site have a very good example of a specific time period, feature, or artefact?

4. Research:

4.1. Providing information on current research projects
4.2. Salvaging information for potential future research projects

5. Inter- and intra-site variability

5.1. Can this particular site yield information regarding intra-site variability, i.e. spatial relationships between various features and artefacts?
5.2. Can this particular site yield information about a community's social relationships within itself, or between other communities?

6. Archaeological Experience:

6.1.1. The personal experience and expertise of the heritage practitioner should not be ignored. Experience can indicate sites that have potentially significant aspects, but need to be tested prior to any conclusions.

7. Educational:

7.1. Does the site have the potential to be used as an educational instrument?
7.2. Does the site have the potential to become a tourist attraction?

7.2.1. The educational value of a site can only be fully determined after initial test-pit excavations and/or full excavations.

8. Other Heritage Significance:

8.1. Palaeontological sites
8.2. Historical buildings
8.3. Battlefields
8.4. Graves and/or community cemeteries
8.5. Living Heritage Sites
8.6. Cultural Landscapes, that includes old trees, hills, mountains, rivers, etc related to cultural or historical experiences.

The more a site fulfills the above criteria, the more significant it becomes. Test-pit excavations are used to test the full potential of an archaeological deposit. This occurs in Phase 2. These test-pit excavations may require further excavations if the site is of significance (Phase 3). Sites may also be mapped and/or have artefacts sampled as a form of mitigation. Sampling normally occurs when the artefacts may be good examples of their type, but are not in a primary archaeological context. Mapping records the spatial relationship between features and artefacts.

8.2.3. Results and Discussion

8.2.3.1. Results of the desktop study

Based on desktop information provided by the Albany Museum Archaeological Department, it was determined that four archaeological sites exist 1km outside of the proposed project area, but no sites occur within the project area. The four sites are all caves and/or overhangs and have deposits dating to the Middle and Late Stone Ages. One site, Howiesans Poort Cave, is a type-site and has provided vital information into the understanding of the Middle Stone Age artefact sequence in southern Africa. The other sites contain archaeological deposit and artefacts, but do not appear to be as important.

All of the sites occur along the slopes of the affected hills and will not be affected by the proposed development.

8.2.3.2. Results of the field survey

The proposed project area had a very shallow natural soil deposit and only the koppies tended to retain some form of deposit. It was in these areas that few stone tools were observed. There was no evidence of any graves, old settlements or old buildings. The upper 10m of the geology appears to be of sandstone and thus unlikely to yield palaeontological remains.

No archaeological sites were recorded in the proposed project area. However, several isolated stone tools were observed. These consisted of about five stone tools scattered over the entire project area, and thus do not constitute an archaeological site by the specialist's definition.

The stone tools were mostly Late Stone Age flakes made from silcrete. Two Middle Stone Age flakes had been re-utilised by Late Stone Age people and modified to become an adze or a bipolar core.

The archaeological finds are of low significance and no further mitigation would be required.

8.3. Impact Assessment

8.3.1. Construction phase

8.3.1.1. Impact on Heritage Resources

Cause and Comment

The Phase 1 Archaeological Impact Assessment for the proposed Waainek Wind Energy Project has identified no significant impacts to important pre-colonial archaeological material that will need to be mitigated prior to proposed development activities.

The `Risk' of uncovering any important archaeology during the construction phase, is unlikely to occur. No evidence of any factory or workshop site, or the result of any human settlement was identified during the specialist study. Due to the ephemeral occurrence of the stone tools in the area the specialist would not record this as a site, and does not believe that a permit will be required from SAHRA.

Unmarked human burials may, however, be uncovered or exposed during earthmoving operations.

Mitigation and management

With regard to the proposed Waainek Wind Energy Project in Grahamstown, the following recommendations are made:

- Should any layers of sub-surface archaeological remains be exposed or uncovered during earthworks, these should immediately be reported to the consulting archaeologist or the South African Heritage Resources Agency (Dr A. Jerardino 021 462 4502).
- Should any unmarked human remains be disturbed, exposed or uncovered during earthworks, these should immediately be reported to the South African Heritage Resources Agency (Dr A. Jerardino, or Ms C. Scheermeyer 021 462 4502).

Significance statement

All Four Alternatives

Without mitigation
The impact on heritage in the construction phase would be **definite** and have ***slight*** short-term negative impacts. This would affect the *local area* and would be of LOW negative significance.

With mitigation
The impact on heritage in the construction phase is **definite** and will have ***slight*** short-term negative impacts. This would affect the *local area* and would be of LOW negative significance.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
ALL 4 OPTIONS										
Without Mitigation	Short	1	Localised	1	Slight	1	Definite	4	**7**	**LOW -**
With Mitigation	Short	1	Localised	1	Slight	1	Definite	4	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

8.4. Conclusion and Recommendations

Few archaeological sites exist in close proximity to the proposed project area. The survey only recorded a few isolated stone tools in the area. These tools are in a secondary context and have little, if any research, value.

Any changes to the precise locations of a wind turbine will not affect the outcome of this specialist study, provided that the locations are in the same affected area, e.g. along the same ridge.

There are no heritage issues that will inhibit the proposed development. However, the development still needs to define the location of the servitudes and these needs to be assessed. This can be undertaken as a desktop study, as the entire hill for each area has already been surveyed.

8 REFERENCES

ECOLOGICAL ASSESSMENT

Arnett, E.B., Schirmacher, M., Huso, M.M.P. and Hays,J.P. 2009. Effectiveness of changing wind turbine cut-in speed to reduce bat fatalities at wind facilities. 2008 Annual Report. Prepared for the Bats and Wind Energy Cooperative and the Pennsylvania Game Commission. Available at: http://www.wind-watch.org/documents/wp-content/uploads/curtailment_2008_final_report.pdf. Accessed 31/03/2010.

Burger, L.W. and Scorgie, Y. (1998). Assessment of potential deposition of contaminants at Coega saltworks due to future industry and development of a model for emission limit estimation. Environmental Management Services cc. Wierdapark 0149.

Branch, W.R. (1998). Terrestrial reptiles and amphibians. In: Field Guide to the Eastern and Southern Cape Coasts. Eds: Lubke, R.A. and de Moor, I. The University of Cape Town Press. ISBN: 1-919713-03-4. p 355 -366.

Cape Nature and Environmental Conservation Ordinance (1997). Ordinance No. 19 of 1974, Schedule 4, 11–18.

Coastal & Environmental Services, September 2009: *Avifaunal Impact Assessment; Proposed Waainek Wind Energy Project, Grahamstown, Eastern Cape*, CES, Grahamstown.

Coastal & Environmental Services (CES). 1997. Strategic Environmental Assessment of the Coega IDZ – Terrestrial Ecology Specialist Report. Coastal Environmental Services, Grahamstown

CEN. 1997. Feasibility study. Environmental impact report on a proposed harbour in the vicinity of Coega, Port Elizabeth. CEN Integrated Environmental Management Unit, Port Elizabeth.

Hilton-Taylor, C. 1996. *Red Data List of Southern African Plants.* National Botanical Institute, Pretoria.

IUCN (2009). Red List of Threatened Species. IUCN Species Survival Commission, Cambridge Available: http://www.iucnredlist.org/ (Accessed 12/10/2009).

Jacob, R.E., Mltha, V.R. and MacPherson, D. (2004). The kaolinitic clay deposits on Beaconsfield, north of Grahamstown. South African Journal of Science. 100: 560-564.

Mucina, L. and Rutherford, M.C. (Eds.) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Perrin, M.R. (1998). Terrestrial mammals. In: Field Guide to the Eastern and Southern Cape Coasts. Eds: Lubke, R.A. and de Moor, I. The University of Cape Town Press. ISBN: 1-919713-03-4. p 380-401.

Pierce, S. M. and Mader, A. D. 2006. The STEP Handbook. Integrating the natural environment into land use decisions at the municipal level: towards sustainable development. Centre for African Conservation Ecology (ACE). Report Number 47 (Second Edition). Nelson Mandela Metropolitan University, South Africa.

Rust IC (1998). Geology and geomorphology. In: Field Guide to the Eastern and Southern Cape Coasts. Eds: Lubke, R.A. and de Moor, I. The University of Cape Town Press. ISBN: 1-919713-03-4. p 10 -26.

Stone, A.W., Weaver, A.v.B. and West, W.O. (1998). Climate and weather. In: Field Guide to the Eastern and Southern Cape Coasts. Eds: Lubke, R.A. and de Moor, I. The University of Cape Town Press. ISBN: 1-919713-03-4. p 41-49.

Stone, A.W. (1988). Climate and weather. In: A field guide to the eastern Cape coast. Eds: Lubke, R.A., Gess, F.W. and Bruton, M. The Grahamstown Centre of the Wildlife Society of Southern Africa.

Van Wyk, A.E. & Smith, G.F. (2001). *Regions of Floristic Endemism in Southern Africa. A Review with Emphasis on Succulents*. Pretoria: Umdaus Press.

Victor, J. E., and Dold, A. P. 2003. Threatened plants of the Albany Centre of Floristic Endemism, South Africa. *South African Journal of Science,* 99: 437-446.

Vogts, M. 1982. South Africa's Proteaceae; Know them and grow them. C. Struik, Cape Town.
WESSA, 2008. Exploring the Tracks and Trails on the Rietberge of the southern Commomnage of Grahamstown. Grahamstown Branch, Wildlife and Environmetal Society of Southern Africa, Grahamstown.

AVIFAUNA ASSESSMENT

"Avian Interactions with Wind Energy Facilities: A Summary," Colson & Associates, January, 1995, Executive Summary, p. ii. American Wind Energy Association, Washington, D.C.

Asmus, P, 2005. Wind and wings: the environmental impact of windpower. Electric Perspectives 30 (3), 68–80 (May/June, 2005).

Barclay, R. M R., E. F. Baerwald, and J. C. Gruver. 2007. Variation in bat and bird fatalities at wind energy facilities: assessing the effects of rotor size and tower height. *Canadian Journal of Zoology*85:381–387.

Barnes, K.N. (ed.) (2000). The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa, Johannesburg, 169p.

Barrios, L. and E. Aguilar. 1995. Incidencia de las plantas de aerogeneradores sobre la avifauna en la comarca del campo de gibraltar. Draft report. R. Marti (ed). Sociedad Española de Ornitología (SEO/ BirdLife), Madrid. 110 pp.

Barrios, L., Rodriguez, A., 2004. Behavioral and environmental correlates of soaring bird mortality at onshore wind turbines. Journal of Applied Ecology 41, 72–81.

Benner, J. H. B., et al . 1992. "Impact of Wind Turbines on Birdlife: An Overview of Existing Data and Lacks in Knowledge in Order of the European Community," Benner, J. H. B., et al, Concept (Draft) Final Report, July, 1992, pp. 22-23. Consultants on Energy & the Environment (CEA), Rotterdam, The Netherlands.

BirdLife International (2008). *BirdLife's online World Bird Database: the site for bird conservation.* Version 2.1. Cambridge, UK: BirdLife International. Available: http://www.birdlife.org (accessed 30/3/2009)

Boone, D. Daniel et al., 2005. Landscape classification system: addressing environmental issues associated with utility-scale wind energy development in Virginia (The Environmental Working Group of the Virginia Wind Energy Collaborative, 2005).

Craig, A.J.F.K. 1988. Coastal birds. In: Lubke, R.A., Gess, F.W. & Bruton, M.N. (Eds). A field guide to the Eastern Cape coast. Grahamstown: Wildlife Society of Southern Africa. pp. 265–288.

Desholm, M. & Kahlert, J. 2005. Avian collision risk at an offshore wind farm. Biology Letters 1(3) 296-298. Desholm, M., Fox, A.D., Beasley, P. and Kahlert, J. 2006. Remote techniques for counting and estimating the number of bird-wind turbine collisions at sea: a review Ibis 148: S76-S89.

Devereux, C. L.; Denny, M. J. H.; Whittingham, M J. 2008, "Minimal effects of wind turbines on the distribution of wintering farmland birds", *Journal of Applied Ecology*, doi:10.1111/j.1365-2664.2008.01560.x

Erickson, W.P., Johnson, G.D., Strickland, M.D., Young, D. P., et al., 2001. Avian collisions with wind turbines: a summary of existing studies and comparisons to other sources of avian collision mortality in the United States, Report to the National Wind Coordinating Committee (Cheyenne, Wyoming: NWCC).

Everaert, J. 2003. Windturbines en vogels in Vlaanderen: voorlopige onderzoeksresultaten en aanbevelingen. *Natuur. Oriolus* 69:145–155.

Everaert, J., & Stienen, W., 2006. Impact of wind turbines on birds in Zeebrugge (Belgium): significant effect on breeding tern colony due to collisions. Biodiversity and Conservation 16 (12), 3345–3359.

Fielding, A.H., Whitfield, D. P. and McLeod, D. R. A., 2006. Spatial association as an indicator of the potential for future interactions between wind energy developments and golden eagles *Aquila chrysaetos* in Scotland.Biological Conservation, 131(3): 359-369.
Hodos, W. 2002. Minimization of motion smear: Reducing avian collisions with wind turbines. Unpublished subcontractor report to the National Renewable Energy Laboratory. NREL/SR 500-33249.

IUCN (2008). Red List of Threatened Species. IUCN Species Survival Commission, Cambridge Available: http://www.iucnredlist.org/ (Accessed 07/04/2009).

Jenkins, A. 2007. Eskom generation wind energy facility – Western Cape: Avifaunal Impact Assessment. Endangered Wildlife Trust.

Johnson, G. 2004. A review of bat impacts at wind farms in the US. In: Susan Schwartz (Ed.), Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts. Resolve, Washington, DC. September, 2004, pp. 46–50.

Johnson, M. R. & Le Roux F. G. 1994. *The geology of the Grahamstown area*. Council for Geoscience, Geological survey of South Africa. Government Printer, Pretoria. 41 pp.

Kemp, A & Kemp, M. 2006. *SASOL birds of prey of Africa and Its Islands*. Struik. Cape Town. 349 pp.

Kerlinger, P., 1997. A study of avian fatalities at the Green Mountain Power Corporation's Searsburg, Vermont, wind power facility (Burlington, VT: Vermont Department of Public Service).

Kerlinger, P. 2007. What Kills Birds? Available at: http://www.currykerlinger.com/birds.htm. Accessed October 2009.

Kingsley, A & Whittam. 2005. Wind turbines and birds – A background review for environmental assessment. Unpublished report for the Environment / Canadian Wildlife Service.

Kuvlesky, William P., Brennan, Leonard, Morrison, Michael, Boydston, Kathy, et al., 2007. Wind energy development and wildlife conservation: challenges and opportunities. Journal of Wildlife Management 71 (8), 2487–2498.

Lowther, St. 1998. The European perspective: some lessons from case studies, Proceedings of the National Avian Wind Power Planning Meeting III, San Diego, California, May, 1998 (King City, Ontario: LGL Limited, June, 2000), pp. 115–123.

Lubbers, F., 1988. Research program concerning the social and environmental aspects related to the windfarm project of Sep. Journal of Wind Engineering and Industrial Aerodynamics 27, 439–453.

Lubke, R.A. 1988. Descriptions of the coastal regions. In: A field guide to the eastern Cape coast. Eds: Lubke, R.A., Gess, F.W. and Bruton, M. The Grahamstown Centre of the Wildlife Society of Southern Africa.

Maclean, G. L. 1985. *Roberts' Birds of Southern Africa.* The trustees of the John Voelcker Bird Book Fund, Cape Town. 848 pp.

Maehr, D. S., et al. 1983. Bird Casualties at a Central Florida Power Plant, Florida Field Naturalist, 11:45-49,1983. Florida Ornithological Society.

Marris, E., and Fairless, D. 2007. ""Wind farms' deadly reputation hard to shift"". *Nature*. pp. 447 126. doi:10.1038/447126a.

Marsh, G, 2007. WTS: the avian dilemma. Renewable Energy Focus, 42–45 (July/August).

Mucina, L. & Rutherford, M. C. (eds). 2007. *The Vegetation of South Africa, Lesotho and Swaziland.* Strelitzia 19, South African National Biodiversity Institute (SANBI). 816 pp.

Osborn, R. G., Higgins, Kenneth, Usgaard, Robert, Dieter, Charles, Neiger, Reff, 2000. Bird mortality associated with wind turbines at the Buffalo Ridge Wind Resource Area, Minnesota. American Midland Naturalist 143 (1), 41–52.

Orloff, S. & Flannery, A. 1992. *Wind turbine effects on avian activity, habitat use, and mortality in Altamount Pass and Solano County Wind Resource Areas (1989-91). Final Report.* Planning departments of Alameda, Contra Costa and Solano Counties and the California Energy Commission, BioSystems Analysis Inc., Tiburon. CA.

Palmer, A.R. 2004. Makana LEAP: Livestock and Commonage Management: Grahamstown. ARC-Range and Forage Institute, Grahamstown.

Parkin, F., Shackleton, C. & Schudel, I. 2006. The effectiveness of schools-based National Arbor Week activities in greening of urban homesteads: A case study of Grahamstown, South Africa. *Urban Forestry & Urban Greening,* 5: 177-187.

Richardson, W. J. 2000. Bird migration and wind turbines: Migration timing, flight behaviour and collision risk. In proceedings of the National Avian-wind Power Planning Meeting III, San Diego, California, May 1998.

Sagrillo, M. 2003. Putting wind powers effect on birds in perspective. Available at: http://www.awea.org/faq/sagrillo/swbirds.html. Accessed 15 September 2009.
Sinclair, I, Hockey, P, and Tarboton, W. 2002. SASOL Birds of Southern Africa. Struik. Cape Town. 447 pp.

Shackleton, C. M., Gambiza, J. & Jones, R. 2007. Household fuelwood use in small electrified towns of the Makana District, Eastern Cape, South Africa. *Journal of Energy*, 18: 4-10.

Skead, C. J. 1987. Historical mammal incidence in the Cape Province (Volume 2), The eastern half of the Cape Province, including Ciskei, Transkei, and East Griqualand. The chief directorate Nature and Environmental Conservation of the Provincial Administration of the Cape of Good Hope. Private Bag 9086, Cape Town 8000, Republic of South Africa. 1121 pp.

Smallwood, K.S., Thelander, C.G., 2005. Bird mortality in the Altamont Pass Wind Resource Area (Golden, Colorado: NREL/SR-500-36973, August, 2005).

Smallwood, K.S., Thelander, C.G., 2008. Bird mortality in the Altamont Pass. Journal of Wildlife Management 72, 215–223.

Southern Africa (SA) Birding. 2009. Southern African Birding Spot Wiki. Available: http://wiki.sabirding.co.za/ (accessed 7/4/2009).

Sovacool, B. K. 2009. Contextualizing avian mortality: A preliminary appraisal of bird and bat fatalities from wind, fossil-fuel, and nuclear electricity. *Energy Policy,* 37: 2241–2248.

Thelander, C. G., 2004. Bird fatalities in the Altamont Pass Wind Resource Area: a case study, part 1. Pages 25–28 In: S. Savitt Schwartz, (Ed.), Proceedings of the Wind Energy and Birds/BatsWorkshop: Understanding And Resolving Bird And Bat Impacts, 18–19 May 2004. RESOLVE, Washington, D.C., USA.

Thelander, C. G., Rugge, L., 2000. Avian risk behavior and fatalities at the Altamont Wind Resource Area, March 1998–February 1999. National Renewable Energy Laboratory NREL/SR-500-27545, Golden, Colorado, USA.

Van Wyk, A.E. & Smith, G.F. (2001). *Regions of Floristic Endemism in Southern Africa. A Review with Emphasis on Succulents*. Pretoria: Umdaus Press.

Weir, R. D. 1976. Annotated bibliography of bird kills at manmade obstacles: a review of the state of the art and solutions. Canadian Wildlife Services, Ontario Region, Ottawa.

Wikipedia, 2010. "Tehachapi, California." *Wikipedia, The Free Encyclopedia*. Wikipedia, The Free Encyclopedia.

Winegrad, G., 2004.Wind turbines and birds. In: Susan Schwartz (Ed.), Proceedings of the Wind Energy and Birds/Bats Workshop: Understanding and Resolving Bird and Bat Impacts (Washington, DC: Resolve, September, 2004), pp. 22–28.

Winkelman, J. E. 1995. Bird/wind turbine investigations in Europe. In proceedings of the National Avian-wind Power Planning Meeting 1994.

VISUAL ASSESSMENT

CES, 2009. Draft Scoping Report - Proposed Waainek wind energy project, Grahamstown, South Africa: Coastal & Environmental Services. Available at: http://www.cesnet.co.za/downloads/Reports/Proposed%20Waainek%20Wind%20Energy%20Project/Waainek%20Windfarm%20Draft%20Scoping%20Report%20for%20Public%20Review%2015%20Sept%202009%20-%2016%20Oct%202009.pdf [Accessed October 4, 2009].

Degraw, S., 2009. Giant Wind Turbine. World's Toughest Fixes. Available at: http://channel.nationalgeographic.com/series/worlds-toughest-fixes/4218/Overview [Accessed February 1, 2010].

EDR, 2009. Shadow flicker modeling report for the Steuben Wind Project, Towns of Hartsville and Hornellsville, Steuben County, New York, Steuben County, New York: Environmental Design and Research, Landscape Architecture, Planning, Environmental Services, Engineering and Surveying, P. C. (EDR). Available at: http://www.eon.com/en/downloads/Appendix_M_Shadow_Flicker_Modeling_Report.pdf [Accessed October 17, 2009].

EMD, 2010. WindPRO. EMD. Available at: http://www.emd.dk/WindPRO/Introduction/ [Accessed January 21, 2010].

EWEA ed., 2009. Wind Energy - The Facts: A guide to the technology, economics and future of wind power, Earthscan. Available at: http://www.wind-energy-the-facts.org/.

Gipe, P., 1995. Design as if People Matter: Aesthetic Guidelines for the Wind Industry. Design as if People Matter: Aesthetic Guidelines for the Wind Industry. Available at: http://www.wind-works.org/articles/design.html [Accessed September 22, 2008].

GLVIA, 2002. Guidelines for Landscape and Visual Impact Assessment 2nd ed., United Kingdom: Spon Press.

Horner, MacLennan and Envision, 2006. Visual representation of windfarms, good practice guidance, Scotland: Scottish Natural Heritage.

Jacob, R.E., Mitha, V.R. & MacPherson, D., 2004. The kaolinitic clay deposits on Beaconsfield, north of Grahamstown. South African Journal of Science, 100(11), 560-564.

Johnston, A., 2001. Wind Energy Projects in SA. Environment South Australia. Available at: http://www.ccsa.asn.au/esa/wind.htm [Accessed September 4, 2008].

Lewis, C.A. ed., 2008. Geomorphology of the Eastern Cape: South Africa 2nd ed., South Africa: NISC.

Nielsen, A., 2003. Shadow-Flicker Modeling Wild Horse, WA, Wild Horse, WA: Zilkha Renewable Energy.

Oberholzer, B., 2005. Guideline for involving visual & aesthetic specialists in EIA processes, Cape Town: CSIR, Provincial Government of the Western Cape, Department of Environmental Affairs & Development. Available at: http://www.capegateway.gov.za/Text/2005/10/5_deadp_visual_guideline_june05.pdf.

Portwain, V., 2008. Wind Energy Questions - What is Wind Turbine Shadow Flicker? Wind Energy Planning. Available at: http://www.windenergyplanning.com/wind-energy-questions-what-is-wind-turbine-shadow-flicker/ [Accessed October 17, 2009].

Smith, N. & Wilson, S., 2002. Changing land use trends in the thicket biome: Pastoralism to Game Farming, Port Elizabeth: Terrestrial Ecology Research Unit, UPE. Available at: http://www.nmmu.ac.za/documents/ace/TERU%20Report%2038%20.pdf [Accessed October 17, 2009].

Stanton, C., 1996. The Landscape Impact and Visual Design of Windfarms, Edinburgh College of Art.

Vissering, J., 2005. Wind Energy and Vermont's Scenic Landscape, Vermont. Available at: http://publicservice.vermont.gov/energy-efficiency/ee_files/wind/vissering_report.pdf [Accessed September 4, 2008].

Voll, B., 2006. Black Springs wind farm shadow flicker study, Oberon, Australia: Energreen Wind Pty. Ltd. Available at: http://majorprojects.planning.nsw.gov.au/files/1883/Appendix%20C%20Shadow%20flicker%20study.pdf [Accessed October 13, 2009].

Wikipedia, 2009a. Wind energy software. Wikipedia, the free encyclopedia. Available at: http://en.wikipedia.org/wiki/Wind_energy_software [Accessed January 21, 2010].

Wikipedia, 2009b. WindPRO. Wikipedia, the free encyclopedia. Available at: http://en.wikipedia.org/wiki/WindPRO [Accessed January 21, 2010].

NOISE ASSESSMENT

Australia Environmental Protect Agency - Wind farms - environmental noise guidelines. July 2009.

Bell Acoustic Consulting. Low frequency noise and infrasound from

Wind turbine generators: A literature review. George Bellhouse. June 2004.

Coastal & Environmental Services, September 2009: Draft Scoping Report: Proposed Waainek Wind Energy Project, Grahamstown. CES, Grahamstown

DEFRA – United Kingdom A Review of Published Research on

Low Frequency Noise and its Effects. Geoff Leventhall. 2003

DTI – United Kingdom The measurement of low frequency noise at 3 UK Wind Farms. Hayes Mackenzie. 2006

Gold Coast Desalination Alliance (GCDA) – 2006 Environmental Impact Assessment Queensland

Desalination Plant (Chapter 11).

Infrasound Toxicological Summary November 2001- Infrasound -

Brief Review of Toxicological Literature
International Finance Corporation – 2007 General EHS Guidelines: Environmental Noise.

ISO 9613-2 - Acoustics – Attenuation of sound during propagation outdoors. Part 2 – General method of calculation.

Renewable Energy Research Laboratory - Department of Mechanical and Industrial Engineering. University of Massachusetts at Amherst. A White Paper on Wind Turbine Acoustic Noise. Authors: Anthony L.

Rogers, Ph.D. James F. Manwell, Ph.D. Sally Wright. Amended January 2006

South Africa - GNR.154 of January 1992: Noise control regulations in terms of section 25 of the Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989)

South Africa - GNR.155 of 10 January 1992: Application of noise control regulations made under section 25 of the Environment Conservation Act, 1989 (Act No. 73 of 1989)

South Africa - SANS 10210:2004 Edition 2.2 – Calculating and predicting road traffic noise

South Africa - SANS 10357:2004 Version 2.1 - The calculation of sound propagation by the Concawe method

South Africa - SANS 10103:2008 Version 6 - The measurement and rating of environmental noise with respect to annoyance and to speech communication.

Swedish Environmental Protection Agency – Noise Annoyance from Wind Turbines – a Review. Authors: Eja Pedersen, Högskolan i Halmstad. August 2003.

University of Groningen - 11th International Meeting on Low Frequency Noise and Vibration and its Control. Do wind turbines produce significant low frequency sound levels? GP. van den Berg. September 2003.

World Health Organization – Guidelines for Community Noise. 1999

APPENDICES

APPENDIX A: ISSUES AND RESPONSE TRAIL RELEVANT TO THE SPECIALIST STUDIES AS OBTAINED DURING THE SCOPING PHASE OF THE EIA

Record of issues and responses raised prior to release of the Draft Scoping Report for Public Review

Raised By:	Event & Date	Issue, Concern, Comment	Response
Electricity Supply Issues			
Nikki Kohly	Public Meeting (22.7.09)	How secure will this electricity supply be if the wind farm cannot store excess electricity?	The turbines will be connected onto the Eskom grid, therefore, if the turbines are not running or not running at full power (on less windy days), the power supply situation will be closer to what it is now. However, electricity usage is highest over cold periods, and this is also when it is very windy and the turbines will be running at full power. This is a natural off-set that will ensure Grahamstown has power at times of peak demand.
Br Andrew	Public Meeting (22.7.09)	There is a difference between Eskom load shedding, and the Municipality's load shedding- what will happen if the Municipality turns the electricity off?	The power will be fed into the Albany Substation, from where it will flow to the closest towns first. To give an example, it works like water in a stream, where the towns closest to the substation needing electricity will receive the flow first, and any excess will run on to the next town, etc. Therefore there should be no need for load shedding, through Eskom or the Municipality.
Jim Saunders	Public Meeting (22.7.09)	Will there be a dedicated supply going to Grahamstown, or will the power just be sold to Eskom to distribute?	See above response.
Grahamstown Resident	Public Meeting (22.7.09)	Some houses in Grahamstown are connected to the Municipal supply, and some to Eskom, (there is a divide between east and west). The prices for electricity are different (Municipal electricity is more expensive). Can we apply to InnoWind or Eskom for local Eskom distribution throughout the whole of Grahamstown?	We (InnoWind) are unsure of the Municipal tariffs, and will just be selling the electricity produced by the turbines to Eskom, as per current legislation stands, and it will be Eskom who will on-sell it to the Municipality. I think you would need to approach Eskom on this matter. Legislation could change in the future with the establishment of Regional Electricity Distribution companies.

Raised By:	Event & Date	Issue, Concern, Comment	Response
Mark Hazell	Public Meeting (22.7.09)	You say the Wind Farm will produce 20- 25 MW of power, and currently, Grahamstown needs 20MW at peak demands. Rhodes is planning to expand over the next couple of years, therefore we would need that extra 5 MW in the long term. Where does that spare capacity go?	The limiting factor on how much electricity is generated depends on the Eskom lines. Right now, they can take up to 25MW. The power will be fed into the Albany Substation, where it is distributed to the closest towns first. To give an example, it works like a stream, where the towns closest to the substation needing electricity will receive the flow first, and any excess will run on to the next town, etc. So if there is a higher need in Grahamstown, it will receive the power first.
Makana Municipality	Public Meeting (22.7.09)	I refer to the issue of electricity security. We would like to apply for another transmission line from the Albany substation (currently there are 2 lines). Would we apply to Eskom for this, or InnoWind?	InnoWind will upgrade what needs to be upgraded at the Albany substation. The relationship between Eskom and the Municipality will not change, therefore you would need to apply to Eskom for an additional line.
Noise Issues			
Grahamstown Resident	Public Meeting (22.7.09)	What about the vibration/ noise impacts?	This has been raised a few times in Europe and in America. It has been concluded that there are no vibration impacts, although there have been some rare cases of vibrations in the soil if the turbine has been poorly designed, however, turbine design and engineering has evolved and drastically improved over the years. Thousands of megawatts of wind farms have been erected in the vicinity of populated areas in France and Europe generally, the vast majority of which have by and large not created any noise problems. The noise generated by the turbines and the potential impacts will nevertheless be assessed in greater detail during the EIA.
F.F. Jacot-Guillarmod	Per Correspondence (16.7.09)	What are the noise implications of the proposed facility? Is there a possibility of simulating the noise levels of a set of turbines on a recording that could be played back to interested parties?	The noise impact will be modeled using dedicated software and recordings of the ambient/background noise levels (without the wind turbines). We will then produce a 'sound map' giving the noise increase in all surrounding areas, with a correspondent scale. For instance, a house situated 500m from the closest wind turbine may see an increase of 4dB from the prevailing ambient noise level without a wind turbine. This might add to typical

Raised By:	Event & Date	Issue, Concern, Comment	Response
			existing 45dB, and be similar to a low voice conversation. However during the detailed Environmental Impact Assessment (EIA), a detailed noise assessment will be conducted – one of the focus areas of this study will be to determine the significance of potential noise impacts on surrounding landowners in line with South African Noise Regulations.
Visual Issues			
F.F. Jacot-Guillarmod		What are the light flicker implications? Clearly the impact of this will depend on the precise location of the towers, but it could become extremely irritating for residents in the immediate vicinity	As with the potential noise implications discussed in (a) above, the light flicker implications will be modeled for the surrounding areas and assessed during the detailed visual specialist study that will be undertaken as part of the EIA Phase. As a result it will be possible to determine the number of hours each house (if any) will be affected by this phenomenon during the course of the year. In the European context, if the number of hours falls under a specific threshold then the impact of flicker is considered an insignificant. The layout of the wind farm will be designed using input from these models to minimize any impact on the environment, including nuisance from shadow flicker.
Global Issues			
Tony Fluxman	Public Meeting (22.7.09)	What will the effect be on global warming? For example, what reductions will there be in Carbon Dioxide emissions?	75 000 tons of CO_2 will not be emitted into the atmosphere when using wind energy. To put this into perspective, this is equivalent to 150 000 trips to Port Elizabeth, from Grahamstown (Based on a calculation of 1 MWh = 1 ton CO_2, 3000 hours/year at 25 MW output, 0.6 ton CO_2 emitted every 100 miles).
Geoff Antrobus	Public Meeting (22.7.09)	What about the disposal of the soil that needs to be excavated for the foundation of the turbines?	This is an issue that we will need to deal with

Raised By:	Event & Date	Issue, Concern, Comment	Response
Construction Issues			
F.F. Jacot-Guillarmod	Per Correspondence (16.7.09)	What sort, and frequency, of access will be required to construct the towers?	Preliminary civil works will comprise access roads, foundations etc. For one turbine the following will be required: a 4m wide access road, 25m inner radius in curve – crane platforms 40 m x 25 m and many trucks during the 10-day construction period. The erection of towers will take approximately 3 working days per tower in good weather. The construction phase is the most labor-intensive and requires the most machines on site. However, given the daily operation costs, it is also in our best interests to try and keep the length of the construction phase as short as is possible.
F.F. Jacot-Guillarmod	Per Correspondence (16.7.09)	And to maintain the towers?	Wind turbines require very little maintenance as compared to other power generators and generally no permanent staffing on-site. On average, a wind farm requires access by one light vehicle every 2 weeks. Every 5 years a more thorough servicing is required, but always using light vehicles, for a short period of time. In the event of a major repair (e.g. replacing of blades), a crawler crane is required
F.F. Jacot-Guillarmod	Per Correspondence (16.7.09)	And to decommission the towers?	This phase takes place at the end of the wind farm's operational lifetime, i.e. probably around 40 years. The decommissioning phase is very similar to the construction phase, thus it is quick to perform
Grahamstown Resident	Public Meeting (22.7.09)	And what about the life expectancy of the turbines?	Today, none of the turbines have reached their life span. It is estimated that they have a life span of approximately 40 years. You can then take them down and refurbish them, or you can re-power them by changing all the electrical parts. This will enable them to go on for several more years.

Raised By:	Event & Date	Issue, Concern, Comment	Response
Don Hendry	Per Correspondence (22.7.09)	A friend who works at Eskom tells me that the Darling wind farm is no longer operative. Apparently it has been closed down due to high maintenance costs and because there is simply insufficient wind, both in terms of wind velocity and windy days. My understanding is that Darling is one of the windiest places in the country. I assume a thorough testing of wind velocity/duration will be conducted to test the suitability of Waainek?	Prior to the establishment of the proposed Waainek wind farm, InnoWind (Pty) Limited will have to erect a temporary single 60m measurement mast to gather wind speed data and correlate these measurements with other meteorological data in order to produce a final wind model of the proposed project site. A measurement campaign of at least 12 months in duration is necessary to ensure that a bankable wind resource study can be produced as well as to validate the initial wind turbine mapping The met masts cannot be put up now as their establishment is a listed activity under the EIA regulations and they would therefore require an environmental assessment and environmental authorization from DWEA before they can be erected.
Financial Issues			
Grahamstown Resident	Public Meeting (22.7.09)	What is the financial life span?	Current guidelines for the establishment of a PPA indicate that Eskom would be required to sign a contract for 20 years at the least
Don Hendry		Do the estimated costs include the purchase of the land?	The land for the turbines will be rented.
Grahamstown Resident	Public Meeting (22.7.09)	So the wind power will still be linked to the grid, therefore we pay Eskom for the power, and Eskom buys the power from InnoWind which is the income stream for the project.	Yes, that is correct. Part of this profit will go into a BBBEE trust. There is quite a substantial difference between the price that Eskom buys electricity for, and the price that they sell it for, and this price will also increase over the next few years as the national and international price of power generation equipment and fuel has gone up substantially. From a local economic perspective, it will be good to get this project going as soon as possible.
Health and Safety Issues			
F.F. Jacot-Guillarmod	Per Correspondence (16.7.09)	If a tower fails, or rotors fall off, what processes would be followed to resolve the problem, and who would be responsible for damage, if any? What failure scenarios are likely?	Depending on the cause of the failure, InnoWind or the manufacturer will be responsible. During the service contract life, the manufacturer of the wind turbine is most likely to be responsible. Project Insurance for third party

Raised By:	Event & Date	Issue, Concern, Comment	Response
			damage is one of the common financial instruments used to cover these extremely rare eventualities.
Mark Hazell	Public Meeting (22.7.09)	What happens if a propeller takes off?	This is highly unlikely- the turbines used are Class-2 machines that can withstand 185km per hour gusts of wind.
Alan Stephenson	Public Meeting (22.7.09)	What about the vortex/ turbulence behind the turbines?	The Wind Farms are planned according to the wake they create. There typically needs to be a 800m radius (buffer) around each turbine.
F.F. Jacot-Guillarmod	Per Correspondence (16.7.09)	All technology has a useful life span. What is the lifespan of this equipment, and what happens to it when it is either irretrievably damaged, or wears out? i.e. who blows dismantles it and cuts it into small chunks of scrap metal? Also, when new the equipment should not prove problematic, but what happens as it ages?	At the present moment, no modern wind turbine has reached the end of its useful life. The machines are designed to operate for over 40 years with little maintenance. Upon decommissioning, each turbine is dismantled and the steel from the towers is sold for scrap to cover the decommissioning expenses, assuming no re-powering is desired. As wind turbines age, they require more maintenance, just like with an old car. We consider the end of the operational life of a turbine to have been reached when the maintenance costs outweigh the production costs whereby it makes more sense either to 're-power' the turbines (i.e. replace existing electrical equipment with new ones) or to build a new wind farm.
F.F. Jacot-Guillarmod	Per Correspondence (16.7.09)	What is the survivability of such equipment to freak weather conditions? What is the frequency of freak weather conditions in this area?	The wind turbines we are planning to erect can withstand winds of up to 51 m/s (or 185 km/h) for 5 seconds (Class-2 turbines) before bearing the risk of major damages or falling down. However, these scenarios have hardly ever happened since the beginning of wind farming as a commercial activity over 20 years ago. To date, there have been no fatalities linked to the breaking of a wind turbine, although approximately 100,000 wind turbines have been installed worldwide. The frequency of freak weather conditions will be determined by our wind measurement campaign.
Nikki Kohly	Public Meeting (22.7.09)	It would be worth contacting all those people who fly in the area with [regard to their safety]	Noted

Raised By:	Event & Date	Issue, Concern, Comment	Response
Adrienne Whisson	Per Correspondence (1.09.09)	What about the health issues – e.g. vertigo related to non-audible noise (infrasound) and effects on sleep?	These issues will be considered in the noise specialist report which will also have a health and safety component.
Other Issues			
Alan Stephenson	Public Meeting (22.7.09)	There are big Eagles that move along that ridge. If you are only looking at a 6 month study, what about the juvenile birds that move into the area at the other times of the year?	We will be contracting local experts who know the area very well, and can comment on the local situation and the other times of the year. You would also have an opportunity to review the study and to make any comments and suggestions. Your comments will be extremely valuable.
F.F. Jacot-Guillarmod	Per Correspondence (16.7.09)	Is there any impact on the surrounding ecosystem due to the operation of such equipment (i.e. oil leaks, disposal of items after maintenance, etc). I understand that the loss of bird life while not zero, will not be abnormal other than for birds following a migration path. However, there are several large raptors that are quite fond of hunting along that ridge (Grahamstown), and these will be affected.	During maintenance, attention is paid to not giving the wind farm a bad reputation by littering from maintenance / construction activities, as on any construction site. It is to be noted that wind farms do not discharge any effluents. Part of the EIA will focus on the avifauna (i.e. birds) to determine whether they could be significantly impacted by the construction of a wind farm or not, and if so, what mitigation measures need to be taken into consideration during design of the wind farm to ensure that this potential impact is negated as much as is possible. Based on previous experience, birds won't be affected more than by a normal tall building. We never find dead birds under our turbines in France as most of the birds appear to see the turbines and then avoid them. The fact that the towers we use are not lattice-type towers (but mono-pole towers) means that bird visits for nesting purposes is also minimized.
Site Issues			
Rhodes University	Public Meeting (22.7.09)	Isn't the EIA meant to allow us to find the best way forward for all involved? It seems that the sites have already been chosen. Shouldn't the scoping process ensure alternative sites?	Yes, and if you have any suggestions for alternative sites we would like to hear them. The geography and the environmental features of the chosen sites are ideal for the wind farms, however the EIA will need to deal with fundamental alternatives.
Grahamstown Resident	Public Meeting (22.7.09)	Is the substation next to Waainek?	There is an old substation in the area which will be upgraded. This substation is part of the Eskom grid. There are also 66KV lines running close to one of the properties.

Raised By:	Event & Date	Issue, Concern, Comment	Response
Br Andrew	Public Meeting (22.7.09)	Wind farms are very big, there are many more open spaces that are less intrusive to surrounding land owners. Why did you pick Waainek as your site?	Waainek was determined to be the best area due to many environmental factors (vegetation, slope, etc) and due to its proximity to the existing substation and availability and consistency of wind.
General Issues			
Br Andrew	Public Meeting (22.7.09)	We can't get ADSL out there, our only option is wireless	We can assure you that we will find a way to get internet to you should the communication be disrupted. The Wind Farms electronics will need to be connect to the internet as well.
Br Andrew	Public Meeting (22.7.09)	We have wireless internet at the Monastery. Will the Wind Farms interfere with the transmission?	In France, we do have some issues with inference with Hz TV reception. In those cases, we install cable internet or T.V for the concerned people.
Ken Ried	Per Correspondence (16.7.09)	Well done to Rhodes and Grahamstown, I hope you get the necessary approval and can start the project very soon	Noted
Liesl Knott	Per Correspondence (28.7.09)	Sounds amazing	Noted
Khanya Ngonyama	Per Correspondence (22.7.09)	I think this project can be a catalyst for the Eastern Cape in alternative energy.	Noted
Geoff Antrobus	Public Meeting (22.7.09)	Something will need to be done about the state of the roads in the highlands area. Negotiations will also need to take place with the Roads Authority to upgrade the regional roads in the area.	InnoWind will cover the expenses linked to the upgrading of the roads in the area. We have very specific guidelines about the roads leading to the Wind Farms in terms of turns, width etc.
F.F. Jacot-Guillarmod	Per Correspondence (16.7.09)	What servitudes will be necessary in order to connect these towers to Eskom? Will Eskom have any additional environmental requirements to support connections to the towers?	We will run buried cables between 0.8 and 1.2 meters deep from the wind farm to an Eskom connection point, which may be a substation or the existing power lines. The connection will be virtually invisible, so should not require any further environmental requirements. Eskom will be responsible for adapting its grid protections to connect to the turbines
Nikki Kohly	Public Meeting (22.7.09)	I can send this information out to the environmental listserv if you like?	Thank you
Br John	Public Meeting (22.7.09)	Will we be notified every time we can comment on the EIA?	Yes, we have registered the Monastery as an I&AP and will keep you notified

Raised By:	Event & Date	Issue, Concern, Comment	Response
John Gant	Per Correspondence (25.7.09)	I am a consulting electrical engineer in Port Elizabeth, and with the current state of affairs with Eskom and the local municipalities, I believe that this is a viable solution. I have been looking into possible wind energy solutions to developments in the E/Cape I look forward to seeing the wind turbines on the horizon	Noted

Original Issues and Comments received following release of Draft Scoping Report

-----Original Message-----
From: Geoffrey Gordon Antrobus [mailto:G.Antrobus@ru.ac.za]
Sent: 16 October 2009 04:59 PM
To: info@cesnet.co.za
Subject: EIA Waainek Wind Energy project

Dear CES

Congratulations on a comprehensive report.

A few minor details on the report
1. Figure 2.1 on p7 and Fig 3 on p 58 do not coincide 2. A page is missing of signatures of persons at the City Hall meeting, whereas pp 79 and 80 are duplicated. 4. Brother Andrew's surname is incorrectly spelt (p 85 top line) 5. Under the entry Geoff Antrobus Landowner the spelling of 'Auckland' is incorrect.

Yours sincerely

Geoff Antrobus
Professor of Economics

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Tax Reference Number: 9104/546/15/6

11 October 2009

Mr. Kevin Whittington-Jones
Coastal & Environmental Services
PO Box 934
Grahamstown 6140

Dear Kevin,

Having studied the Scoping Report for the Proposed Waainek Wind Energy Project and following a most interesting and enlightening visit here at the monastery with Mr. Kevin Minkoff of Innowind, I am writing to you to express our profound concern and indeed objections to the construction of such a farm in our area. Clearly, we need to find alternatives to expensive, fossil fuel production of electricity. However, reports I have read indicate that the jury is still out on the long range effectiveness of wind farms. Indeed, some areas are rethinking the idea. I enclose copies of some of these articles. Your own handouts address the issues of noise, visual pollution and effects on wildlife which, we believe need to be taken very seriously in the case of the proposed Waainek installation.

As I understand the principal goal of the project is to produce electricity for sale to Eskom. I also understand that at present there are no regulations requiring Eskom to purchase the electricity and that unless such legislation is enacted, the project will not go forward. There is talk about the advantages such electricity production will have for Grahamstown. Yet, Mr. Minkoff acknowledges that such advantages are dependent upon the Grahamstown Municipality's upgrading and maintenance of the city's electrical grid. There is no guarantee that this will happen. Thus, it seems to me, what is envisioned is a private "electricity factory" to produce power for sale to Eskom. It also seems to me that we may be asked to pay a heavy price in terms of the quality of life in this area.

I am aware that one of the "perks" for Grahamstown is the establishment of the "Makana Winds of Change Educational Trust". This trust will receive 20% of the profits generated by the sale of electricity to Eskom. Such an initiative is laudable and desperately needed, but at what cost to overall quality of life for the community? Certainly such wind towers could be placed in a less obtrusive location with the same benefits to the education of our children.

I am not competent to talk about the potential effect of the project on things like real estate or tourism, though I would imagine that such huge structures, visible from afar could not help but have a negative impact on these industries as well as our local ecology. What I would like to bring as our principal objection is what I will call "the ecology of the human spirit."

Like any ecology, the human spirit needs a healthy environment in which to flourish. And, as we are seeing only too painfully in our atmosphere, flora and fauna, we

humans will wither if our environment is polluted or destroyed. One needs only to look at the history of our country for enough evidence of this. Benedictine monks who live very closely to these realities have made a positive contribution to the maintenance of this environment for many centuries. An example of this in South Africa is Inkamana Abbey High School in Vryheid, one of the finest schools in the country with a 100% matric rate. Over the years the monks of Inkamana have stood firm against the demands of the former government. They have a flourishing farm and operate parishes throughout the region. Indeed, in the past centuries when areas were depressed, monastic communities were invited to be centres to help uplift the life in a holistic way that addressed the full person.

Such a tradition is no less true for our monastic community, the Order of the Holy Cross. In 1989 we were invited by then Archbishop Desmond Tutu to establish a foundation in South Africa as a model of inclusive and healthy community life. The integrity of our life is the teaching that people see more than anything we might say. In 1998 we came to this hillside monastery which has been a place of prayer and hospitality since 1965 to take up our life and to follow where God leads us. We inherited a property almost totally covered by alien vegetation. Our neighbourhood was rife with domestic violence, poverty, poor education and all the afflictions of rural life. Because our prayer calls us to respond to the environmental and human ecology we began by upgrading our guest facilities and the grounds, to make them comfortable and attractive places for guests to appreciate the stunning beauty of these hills and this valley.

Soon the monastery became a place where people could safely walk the trails and take a break from the demands and incursions of the mechanised life in which dominates urban life. In partnership with Albany Working for Water we have spent 10 years working diligently to eliminate alien vegetation from the property. Bird life and indigenous vegetation returned in abundance offering us one of the richest varieties of bird life in the area. Even birds such as the Knysna Lourie live here along with various raptors and migrating birds. We fear the birds will leave (see attached article) due to the wind towers. We intervened in domestic issues and have served as advocates for residents threatened with eviction from their homes. We addressed the alcohol problems, transporting people to AA meetings in town. And, we have served as pastors to many who come for counselling, spiritual direction and a safe place to be. The children especially tell us that here they feel safe to be children.

Shortly after our arrival three unattended babies were struck by a passing train, killing two of them. This tragedy prompted us to found the Holy Cross Scholarship Fund to see that rural children are cared for in pre-schools and primary education. What started as a local initiative has now grown to include some 45 youngsters ranging from Grade R to tertiary education. Most of these young people are rural and are the first ever in their families to have any education, much less at places like Graeme College and Victoria High School; Rhodes University and Nelson Mandela Universities.

Four years ago we founded an after school programme to help young people with their homework. We soon discovered that more was needed in the way of remedial, foundational learning. Two teachers qualified and experienced in teaching previously deprived children were hired, and along with American and South African volunteers and the monks, they are making a difference in these kids' lives. Just within the last week we have been given permission by the Department of Education to begin a primary school on the monastery property for rural Grade R thorough Grade 3 children.

Page Three

Everything I have outlined has been our commitment to re-establishing the balance of the "human ecology" in the Waainek region. Any environment is delicate and requires vigilance to make certain the holistic cooperation and stewardship of all are respected and enhanced. We feel that the intrusion of the proposed wind farm which quite literally would surround our property on the top of the neighbouring ridges would jeopardise our ministry and indeed possibly the continued presence of the monks on this property. Mr. Minkoff stated to me during our tour of the property that our life would be the most impacted by the project and the environment would be changed dramatically, primarily through visual impact and noise pollution. We monks, like the rest of nature, must have an environment in which to flourish, and if that is polluted, then we, too, might have to move on. This we most certainly have no wish to do. Our community is here. Our life is here, and we are very much a positive presence in the re-establishing of a holistic environment that enables so many human beings to flourish.

Faithfully yours,

Timothy, OHC

Br. Timothy Jolley, OHC
Prior

Enc:

Please note that following the above correspondence a focus group meeting was held between the EAP, InnoWind (Pty) Limited and the Monks on 15 October 2009 to discuss the potential visual impacts and potential alternative layouts.

APPENDIX B: THE SPECIALIST STUDY PROCESS

APPENDIX B-1: SHORT *CURRICULUM VITAE* OF EACH OF THE LEAD SPECIALISTS INVOLVED IN THE PROPOSED WAAINEK WIND ENERGY PROJECT EIA

SPECIALIST STUDY	NAME OF SPECIALIST	DETAILS OF EXPERTISE (SHORT CV)
ECOLOGICAL	PROF ROY LUBKE	**CURRICULUM VITAE - PROF ROY ALLEN LUBKE** Date of birth: 22 July 1940 **QUALIFICATIONS** BSc (Hons.) (Rhodes), M.Sc. (University of Keele), PhD (Univ. Western Ontario) **ASSOCIATIONS** • Member of the South African Institute of Ecologists • Registered with the S.A. Council of Natural Scientists • South African Association for Advancement of Science (since 1962) • International Association of Plant Taxonomy (since 1966) • Association for the Taxonomic Study of the Flora of Tropical Africa (since 1970) • South African Association of Botanists (since 1970) • Botanical Society of Southern Africa (since 1975) • South African Institute of Ecologists and Environmental Scientists ○ (Founder Member since 1980) • European Union for Coastal Conservation (since 1991) **PROFESSIONAL EXPERIENCE** 1964 - 1968: Laboratory/Tutorial Asst (P/T): University of Western Ontario 1970 - 1974: Lecturer: University of Witwatersrand 1975 - 1976: Lecturer: Rhodes University 1977 - 1983: Senior Lecturer: Rhodes University 1984 -1999: Associate Professor: Rhodes University 2000 – present: Associate Professor and Head of Department of Botany: Rhodes University

1990 – present: Director of Coastal & Environmental Services

RESEARCH INTERESTS

Over the last 25 years, Professor Roy Lubke has been involved in the study and research of coastal dune systems in the Cape, specialising in stabilisation and rehabilitation of dune systems. He has worked along coasts from Western Cape through eastern South Africa to Mozambique and Kenya and has a fuller understanding of Southern and East African coastal systems. These studies include availability of plant pathogens and vesicular-arbuscular mycorrhiza in dune systems and on dune plants; plant succession and dynamics of dune systems; the effects of potentially invasive species on dune systems and stabilisation and restoration of dune environments. Professor Lubke has held CSIR and FRD national programme funded projects in South Africa, and is currently managing a European Union-funded project on marram grass, in association with colleagues from the Netherlands, the United Kingdom and Botswana. He has travelled widely in Europe and North America and visited and consulted on similar projects in the USA and the Netherlands.

POST GRADUATE STUDENT SUPERVISION TO DATE

30 Honours students, 16 MSc students and 8 PhD students.

CONSULTING EXPERIENCE

Project management experience includes:

Principal consultant for the specialist studies for the Environmental Impact Assessments of proposed dune mining on the Eastern Shores of Lake St Lucia.

Project manager for a five-year rehabilitation programme of Samancor's Chemfos mine on the West Coast.

Other projects and studies include:

Ecological specialist reports for Billiton's TiGen mineral sand mining EIA in Mozambique.

A position paper on the current ecological knowledge of the Eastern Cape Provincial Coastline: implications for planning and research.

Ecological specialist report for the Coega Industrial Development Zone Strategic Environmental Assessment.

Numerous small-scale Environmental Impact Assessments along the South African coastline.

A pre-feasibility Environmental Impact Assessment of Gencor's mineral sand mining project in Mozambique

Ecological baseline survey of the Cuango River area, Angola for NSR Environmental, Australia.

Initial Environmental assessment and drafting Terms of Reference of a mineral sand mine along the Kenyan coast for Tiomin Resources, Canada.

The vegetation and floristics of the habitat of the Brenton Blue butterfly, for Endangered Wildlife Trust.

Numerous vegetation surveys in South Africa.

		COMMUNITY INVOLVEMENT **Albany Museum** Board of Trustees: Member 1976-1999 Chairman of Natural History sub-committee: 1979-81; 1985 Deputy Chairman of the Board: 1982-84 **Wildlife Society of Southern Africa - Grahamstown Branch** Vice-chairman 1981-1981 and 1982-1983 Chairman 1981-1982 Chairman: Publications Committee 1982 - present **Co-ordinating Council for Nature Conservation in the Eastern Cape** Representative of Rhodes University Biological Sciences since 1979 Chairman 1982-1985 **School Science Convention Committee** Member 1983 - 1997 Chairman 1991 - 1997 **SELECTED RECENT PUBLICATIONS** Lubke, R.A. and Avis, A.M. (1998) A review of the concepts and application of rehabilitation following heavy mineral dune mining. *Marine Pollution Bulletin* 37: 8-12 Hertling, UM and Lubke, R.A. (1999) Indigenous and *Ammophila arenaria* – dominated dune vegetation in the South African Cape Coast. *Applied Vegetation Science* 2: 157 - 168 Lubke, R.A., Avis, A.M., Steinke, T.D. & Bowker, C.B. (1998) Coastal vegetation. In: Cowling, R.M. & D. Richardson (Eds.) *Vegetation of South Africa*. Cambridge University Press, Cape Town. Lubke, R.A. and de Moor, I. (Eds.) (1998) Field Guide to Eastern and Southern Cape Coasts. Wildlife Society and UCT Press, Cape Town.
	MS. LEIGH-ANN DEWET	**LEIGH-ANN ROBYNNE DE WET** Date of birth: 01 September 1982 **QUALIFICATIONS**

		2004 - BSc (Botany and Entomology) Rhodes University 2005 – BSc (Hons) with Distinction (Botany) Rhodes University 2007 – MSc (Botany) Rhodes University **THESIS** Pollinator mediated selection in *Pelargonium reniforme* Curtis (Geraniaceae): patterns and processes. **PROFESSIONAL EXPERIENCE** 2007 - 2009: NERC Research Assistant, Rhodes University, Grahamstown The position involved the set-up, maintenance and conducting of a large common or garden experiment determining the effects of global climate change and specifically drought, on grasses. **NOTABLE ACHEIVEMENTS** - SRC representative on the Rhodes University Environmental Committee (2006) - Group Leader of the youth branch of the Jane Goodall Institute, Roots & Shoots (2005 – 2006) - Best young botanist second prize for a presentation entitled: "Population biology and effects of harvesting on *Pelargonium reniforme* (Geraniaceae) in Grahamstown and surrounding areas" at the SAAB conference (2005) -The Putterill Prize for conservation in the Eastern Cape **SELECTED PRESENTATIONS** South African Association of Botanists (SAAB) conference, Bloemfontein. 10-14 January 2005 - Population biology and effects of harvesting on *Pelargonium reniforme* (Geraniaceae) in Grahamstown and surrounding areas, Eastern Cape, South Africa. Thicket Forum, Grahamstown, May 2005 - Harvesting of *Pelargonium reniforme* in Grahamstown; what are the implications for populations of the plant? South African Association of Botanists (SAAB) conference, Port Elizabeth 16-19 January 2006 - Pollinator-mediated selection in *Pelargonium reniforme* as described by Inter Simple Sequence Repeat markers. Southern African Society for Systematic Biology (SASSB) conference, Kruger National Park 14 - 17 July - Pollinator-mediated selection of *Pelargonium reniforme* and two floral morphs described by inter simple

		sequence repeat markers. Population biology of *Pelargonium reniforme*. Annual general meeting. Botanical Society of South Africa, Albany branch. 17th July 2004 Harvesting of *Pelargonium reniforme* in Grahamstown; what are the implications for populations of the plant? Annual general meeting Botanical society of South Africa, Albany branch. 30th July 2005 **SELECTED PUBLICATIONS** L. de Wet. (2005). Is *Pelargonium reniforme* in danger? The effects of harvesting on *Pelargonium reniforme*. Veld & Flora. December. 182-184. L. de Wet, NP Barker and CI Peter (2006). Beetles and Bobartia: an interesting herbivore-plant relationship. Veld & Flora. September. 150-151. de Wet LR and Botha CEJ. Resistance or tolerance: An examination of aphid (*Sitobion yakini)* phloem feeding on Betta and Betta-Dn wheat (*Triticum aestivum* L.) (2007). South African Journal of Botany 73(1): 35-39. Ripley BS, de Wet L and Hill MP (2008). Herbivory-induced reduction in photosynthetic productivity of water hyacinth, *Eichhornia crassipes* (Martius) Solms-Laubach (Pontederiaceae), is not directly related to reduction in photosynthetic leaf area. African Entomology 16(1): 140-142. de Wet LR, Barker NP and Peter CI (2008). The long and the short of gene flow and reproductive isolation: Inter-Simple Sequence Repeat (ISSR) markers support the recognition of two floral forms in *Pelargonium reniforme* (Geraniaceae). Biochemical Systematics and Ecology 36: 684-690.
AVIFAUNA	**PROF ADRIAN CRAIG**	**CURRICULUM VITAE – ADRIAN J.F.K. CRAIG** Born 22 January 1951, Mossel Bay, South Africa Married (1976), two children Home address: 3 Florence Street, Grahamstown, 6139, South Africa Telephone: H +27 46 622 7515 W +27 46 603 8526 Fax +27 46 622 8959 E-mail: a.craig@ru.ac.za Work address: Department of Zoology & Entomology, Rhodes University, Grahamstown, 6140, South Africa I attended the University of Cape Town from 1968, where I completed a BSc majoring in Zoology in 1970, and BSc (Hons) in Zoology (first class) in 1971. Working under Prof. G.J. Broekhuysen, an ornithologist with a special interest in animal behaviour, I submitted my MSc in 1973, a study of the behaviour of the Red Bishop *Euplectes orix*, and graduated *in absentia.*

From September 1973 until December 1974 I was at the University of Bielefeld, Germany, working under Professor Klaus Immelmann, with a bursary from the Deutsche Akademische Austauschdienst.

On my return to South Africa, I started a PhD on the comparative breeding biology of the Red Bishop and other *Euplectes* species in 1975, under the supervision of Prof. Gordon Maclean at the University of Natal in Pietermaritzburg. The degree was awarded in 1978, and I lectured in Zoology at the University of Natal in temporary positions until I was appointed as lecturer in Zoology at Rhodes University in Grahamstown, from January 1980.

Since 1981 I have been an honorary curator of birds at the Albany Museum in Grahamstown, and I have served as chairman of the Diaz Cross Bird Club since 1986. I have given popular talks on birds to groups ranging from pre-primary school children to senior citizens, and repeat invitations suggest that these have been well received.

Since 1990 I have been a rated scientist with research support from the National Research Foundation, and I have reviewed the applications by other candidates for research support from the NRF (South Africa), the National Research Council of Belgium, Earthwatch, and BirdLife International.

As an active bird-ringer, I have been involved in the organisation of two national bird-ringing workshops. In 1987 I was scientific organiser for an international symposium on "Birds of Evergreen Forest", which attracted key-note speakers from France, USA and Australia. I served for 12 years as editor of the scientific journal *Ostrich*, and co-edited the proceedings of the 9th Pan-African Ornithological Congress, held in Ghana in 1996. At the 10th PAOC in 2000, I was elected to the congress committee, and chaired the scientific programme committee for the 11th PAOC, which was held in Tunisia in November 2004. I have also edited the proceedings for this meeting; they will be published in 2007. I continued to serve on the scientific programme committee for the 12th PAOC, held in South Africa in September 2008, and at that meeting was elected to chair the Pan-African Ornithological Congress Committee until the 2012 congress.

TEACHING AT RHODES UNIVERSITY

1980-1984 Lecturer in Zoology
1984-1992 Senior Lecturer in Zoology
1992- 2003 Associate Professor in Zoology
2004- Professor of Zoology
Head of Department, Zoology & Entomology, July 2000-June 2005.

Editor of scientific journal *Ostrich* for 12 years (1985-1997)
Editorial board of *African Zoology, Journal of Afrotropical Zoology*

Referee for journals: *African Entomology, Auk, Annals of the South African Museum, Biological Conservation, Biological Journal of the Linnean Society, Cimbebasia, Condor, Durban Museum Novitates, Emu, Evolution, Journal of Tropical Ecology, Landscape and Urban Planning, Navorsinge van die Nasionale Museum Bloemfontein, Ostrich, Proceedings of the Royal Society Series B, South African Journal of Science, South African Journal of Wildlife Research, South African Journal of Zoology* (now

African Zoology), *Tauraco, Wilson Bulletin*.

MEMBERSHIP OF SCIENTIFIC SOCIETIES

American Ornithologists' Union (since 1980)
British Ornithologists' Union (since 1975)
Cooper Ornithological Society (since 1995)
Deutsche Ornithologen-Gesellschaft (since 1974)
Royal Australasian Ornithologists' Union (Birds Australia) (since 1985)
Southern African Ornithological Society (now BirdLife South Africa) [joined 1973];
Council member 1985-1990, 1992-1998; Honorary Life Member 1998.
Zoological Society of Southern Africa (1972-1982; 2005-)

POST-GRADUATE STUDENT SUPERVISED IN THE PAST 3 YEARS

B. Bonnevie, Information Technology, Rhodes University. MSc awarded by Rhodes University in 2005.

Research topic: Biology of the Olive Thrush in the Eastern Cape.

D. Ogada, Kenya, Ph.D. awarded by Rhodes University in 2008.

Research topic: Conservation of Mackinder's Eagle Owl in an agricultural landscape.

M Van Niekerk, National Parks Board, M.Sc. student. (current)

Research topic: Habitat use and impact of cranes on agriculture.

A. Schultz, PhD student. (current)

Research topic: Avian malaria and African Penguins in Algoa Bay.

CONFERENCES ATTENDED IN THE PAST 5 YEARS

2005 32nd conference of the Zoological society of southern Africa, Grahamstown, South Africa. Poster presentation; chair of a session; judge of student presentations.

2005 40th meeting of the Société Française pour l'Etude du Comportement Animal (French Society for the Study of Animal Behaviour), Rennes, France. Poster presentation

2006 24th International Ornithological Congress, Hamburg, Germany. Poster presentations, Round Table Discussion.

2008 12th Pan-African Ornithological Congress, Goudini Spa, South Africa. Oral and poster presentations, co-chair of two sessions.

PUBLICATIONS IN THE PAST 5 YEARS

(a) Peer-reviewed journal articles

Lunt, N., Hulley, P.E. & Craig, A.J.F.K. 2004. Active anting in captive Cape White-eyes *Zosterops pallidus.* Ibis 144: 360-362.

Bonnevie,B.T., Craig, A.J.F.K. & Hulley, P.E. 2004. Additional morphological characteristics of Olive Thrushes and Karoo Thrushes. Ostrich 75: 75-76.

Hulley, P.E., Craig, A.J.F.K., Underhill, G.D., Bonnevie, B.T., Nuttall, R.J. & De Swardt, D.H. 2004. Timing of moult and breeding in the Cape White-eye *Zosterops pallidus* from three different geographical regions in South Africa. Emu 104: 353-358.

Craig, A.J.F.K. & Hulley, P.E. 2004. Iris coloration in passerine birds. Why be bright-eyed? South African Journal of Science 100: 584-588.

Craig, A.J.F.K., Hulley, P.E. & Parker, D. 2005. A re-assessment of the avifauna of the Mountain Zebra National Park. Koedoe 48: 95-113.

Hodgson, A.N. & Craig, A.J.F.K. 2005. A century of Zoology and Entomology at Rhodes University, 1905 to 2005. Transactions of the Royal Society of South Africa 60: 1-18.

Hulley, P.E. & Craig, A.J.F.K. 2007. The status of the Southern Ground-Hornbill in the Grahamstown region, Eastern Cape. Ostrich 78: 89-92.

(b) Contributions in books

Craig, A.J.F.K. 2004. Family Ploceidae: pp 48-77; 101-137, 140-142, 148-151, 153-164, 170-196; 204-251. In Fry, C.H., Keith, S. (Eds). The Birds of Africa. Vol. VII. Christopher Helm: London. 666pp.

Craig, A.J.F.K. 2005. Rare weavers (Aves: Ploceidae): are some *Ploceus* species hybrids? Pp 279-286. In: Huber, B.A., Sinclair, B.J. & Lampe, K-H. (eds) ***African biodiversity***. Springer: New York.

Craig, A.J.F.K. 2005. Starlings and Oxpeckers pp 960-974; Weavers, queleas and bishops pp 1011-1036. In: Hockey, P.A.R., Dean, W.R.J. & Ryan, P.G. (Eds). ***Roberts – Birds of southern Africa.*** VIIth Ed. The Trustees of the John Voelcker Bird Book Fund: Cape Town. 1296pp.

Mann, C., Craig, A. & Skeen, J. 2006. ***Lifelines.*** University of KwaZulu-Natal Press: Pietermaritzburg. 108pp. [poems on animals by Chris Mann, zoological commentary by Adrian Craig, artwork by Julia Skeen]

MR. NIC DAVENPORT

NICHOLAS ASHBURY DAVENPORT

Date of birth: 18 March 1983

QUALIFICATION

BSc (Zoology and Environmental Science)	Rhodes University
BSc Honours (Environmental Science)	Rhodes University
MSc (Environmental Science)	Rhodes University

THESIS

The contribution of municipal commonage to local peoples' livelihoods in small South African towns

EMPLOYMENT

2009 ENVIRONMENTAL CONSULTANT CES

Working mainly in the terrestrial ecological field, reporting for projects in South Africa as well as other African countries, but also involved in facilitating sustainable development, public participation and budget management.

2009 CONSULTANT (R3G)

Survey in the Zuurberg on behalf of Rhodes Restoration Research Group for the Addo Elephant National Park. Work involved setting up plots and recording plant species, so as to test herbicide treatments on *Acacia mearnsii* infestations.

2009 SUB-CONSULTANT (EDUTOURISM)

Survey for the Makana EduTourism Partnership on behalf of McIntosh Xaba and Associates (MXA) as part of a feasibility study. Also had to assist in organising the Imbizo and co-ordinate the scribes, which included producing

		collated minutes and a summary of the Imbizo. **2006 – 2008 GRADUATE ASSISTANT (Rhodes University)** Bursary • Environmental Science Department • Responsibilities included: • Data capture • Tutoring undergraduate students • Fieldwork • Administrative duties **2006 EIA CERTIFICATE** Certificate of competence, April 2006: Introduction to Environmental Impact Assessment Procedures. One week course offered by Rhodes University in conjunction with Coastal & Environmental Services which included; EIA processes and techniques; Environmental management; Environmental law; Social Impact Assessment; Public Participation; Resettlement; Environmental Management Plans; Strategic Environmental Assessment. **PUBLICATIONS** **2009 PUBLISHED PAPER** Davenport, N. A. and Gambiza, J. 2009. Municipal commonage policy and livestock owners: Findings from the Eastern Cape, South Africa. Land Use Policy, 26: 513-520. **2008 PRESENTATION (Thicket Forum)** Davenport, N.A. 2008. The contribution of municipal commonage to local peoples' livelihoods in small South African towns within the Thicket biome. (Presentation) Annual Thicket Forum, Thomas Baines, 20-22 August. **2007 POSTER PRESENTATION (Thicket Forum)** Best poster: Davenport, N. & Gambiza, J. 2007. Livestock in Municipal Commonage: What is really happening in the Makana local Municipality? (Poster). 42nd Annual Thicket Forum, Rhodes University, Grahamstown, 16-20 July.
HERITAGE	**MR. GAVIN ANDERSON**	**GAVIN ANDERSON**

CURRICULUM VITAE

1. **PERSONAL DETAILS:**
   - 1.1. **Name:** Gavin Craig Anderson
   - 1.2. **Address**: PO Box 102532, Meerensee, 3901
   - 1.3. **Telephone**: (035) 7531785; 0836585362 **Fax**: (035) 7531785
   - 1.4. **email**: umlando@mtnloaded.co.za
   - 1.5. **Current Employment**: Member of Umlando: Archaeological Tourism and Resource Management cc.
   - 1.6. Registered with South African Heritage Resources Agency and KZN Heritage as a Principle Investigator with expertise status in Iron Age, Stone Age and Rock art
2. **EDUCATION & TRAINING**
   - 2.1. National Senior Certificate - passed with matric exemption. 1986.
   - 2.2. B.A.(Soc.Sci), U.C.T. Majors: Archaeology, Psychology, Sociology. 1990.
   - 2.3. B.A.(Hons) in Archaeology, 1991, U.C.T.
   - 2.4. M. Phil in Archaeology/Social Psychology: 1996, UCT.
   - 2.5. Attended 2 day Natal Provincial Administration (NPA) Group Facilitation Course 1997
   - 2.6. Attended 1 week NPA Junior Management course. – 1997
   - 2.7. St John's Levels 1, 2 and 3 First Aid Course, 1997
   - 2.8. KB Consultancy: Occupational Health, Safety and Environment Induction Training course, 2003 - 2005
   - 2.9. RBM and Ticor safety induction training, since 1998.

3. **EXPERIENCE**

3.1. FIELDWORK EXPERIENCE:

3.1.1. **Undergraduate training:**

3.1.2. **1988-1990**: Excavations at Dune Field Midden, Elands Bay area.

3.1.3. **1989**: Historical archaeology excavation of various features at Paradise, Newlands.

3.1.4. **1988 - 1990**: Rock art reconnaissance in the Cedarberg, for the Spatial Archaeology Research Unit, U.C.T.

3.2. **Post-graduate fieldwork:**

3.2.1. **1991**: Excavation and sorting of material at Verloren Vlei Village Midden, Elands Bay.

3.2.2. **1991**: Tracing rock art at Andriesgrond Cave for my Honours project.

3.2.3. **1991**: Excavations at Dune Field Midden.

3.2.4. **1992 - 1994**: Tracing and inking in of rock art (colonial and pre-colonial rock art) and general site reconnaissance in the Koue Bokkeveld for my Masters thesis

3.2.5. **1993 - 1994:** On site sorting and excavation theory and practice at Steenboksfontein, Lamberts Bay,

3.2.6. **1994**: Sorting of material at Scorpion Shelter

3.2.7. **1994**: Excavation and sorting of material at Spoegrivier Cave, NW Cape coast.

3.3. CRM contract work:

3.3.1. **1987 - 1990:** Sorting and excavation of various features in the Castle, Cape Town

3.3.2. **1989** : Excavation and sorting at Barrack Street Well, Cape Town.

3.3.3. **1989**: Excavation and sorting of a Bee Street house, Cape Town

3.3.4. **1992:** Survey of rock art sites with SARU.

3.3.5. **1993**: Surveying and mapping, of the Glencairn Glass Factory, Cape Town
3.3.6. **1993**: General site reconnaissance in the Roosendal, Ceres
3.3.7. **1994**: Excavation of Muizenberg battory, Cape Town.
3.3.8. **1994**: Rescue excavation of shell midden at Deurspring, near Lamberts Bay.

3.4. Institute for Cultural Resource Management, Natal Museum (1995 – 2004)

3.4.1. **1995:** Assessment of archaeological sites in KwaZulu-Natal for National Monuments status, for the National Monuments Council.
3.4.2. **1995:** General reconnaissance along the banks of the Pongola River for Stone and Iron Age sites, contracted by the Department of Water Affairs and Forestry.
3.4.3. **1995**: General reconnaissance along the new N2-Mtunzini road, for Department of Transport.
3.4.4. **1995:** Excavation of two Early Iron Age sites and one Late Iron Age site near Umhlanga and Mt Edgecombe. Contracted by Tongaat-Hulett.
3.4.5. **1995-2003**: Survey, collection of artefacts and excavations of archaeological sites in the Richards Bay Minerals mining leases. Involvement with the creation of an interpretative centre and educational material.
3.4.6. **1996:** General survey, mapping, excavations, and rock art tracings for the Bivane/Paris Dam, Vryheid area.
3.4.7. **1996:** Survey and excavations for AECI at the Umbogintwini factory.
3.4.8. **1996:** Survey of archaeological sites between Mtunzini and Richards Bay for Yskor Pty (Ltd).
3.4.9. **1995-1997:** Desktop analyses and archaeological surveys for various afforestation permits.
3.4.10. **1995-1998:** Desktop analyses and archaeological surveys for various ESKOM transmission lines and substations. New Germany and Mkhondeni Offices (contact person; Bruce Burger)
3.4.11. **1996-1997:** Excavation of Early Iron Age site, Pentrich, Pietermaritzburg, for Eskom.
3.4.12. **1996-1998**: Desktop analyses for various development applications near the Drakensberg.
3.4.13. **1996:** Desktop analyses of the Durban Greater Metropolitan area, for the Durban TLC.
3.4.14. **1996:** Survey of archaeological sites from the proposed Tugela-Warden National Road.
3.4.15. **1997:** Excavations of Early Iron Age shell midden, Westbrook Beach, Tongaat.
3.4.16. **1997:** Survey of Ngwadini Dam for SWK Planning and Development Resources.
3.4.17. **1997:** Desktop analyses for the Durban Beachfront development proposal, for Environmental Design Partnership.
3.4.18. **1997:** Survey of the Umgeni Water Northern Feeder Line, for Walmsley Environmental Consultants.
3.4.19. **1997:** Survey of proposed toxic waste area, near Verulam, for Walmsley Environmental Consultants.
3.4.20. **1997:** Survey of land owned by Moreland Estates, Umhlanga River to Mvoti River.
3.4.21. **1998:** Four desktop analyses and historical Deeds Office search for proposed land developments.

3.4.22. **1998:** Mapping and excavating a stone-walled settlement near Estcourt, for Eskom.
3.4.23. **1998.** Survey of the proposed Jana and Klip Dams on the Tugela River.
3.4.24. **1998:** Excavations of three Iron Age sites near Esikhaweni, for Iscor Heavy Minerals.
3.4.25. **1998:** Desktop survey and management plan for potential development in the Port Edward area.
3.4.26. **1998:** Desktop survey and Deeds office search for proposed casino development near Pietermaritzburg, Newcastle and Natal Midlands
3.4.27. **1998:** Archaeological .survey for Mondi KZN, Tongaat area.
3.4.28. **1998:** Archaeological survey and mapping of an Historical period site, Pongola, for Eskom. Pongola-Vergenoeged Line (New Germany)
3.4.29. **1998:** Archaeological survey at Hluhluwe Game Reserve for, KwaZulu-Natal Nature Conservation Services.
3.4.30. **1999:** Various surveys for Eskom (New Germany and Mkhondeni) (contact person Bruce Burger)
3.4.31. **1999:** Survey and excavations for Tongaat-Hulett (Moreland) Pty. Ltd.
3.4.32. **2000**:Archaeological survey of the Umhlatuzana Sewer Extension
3.4.33. **2000:** Archaeological survey of the Mooi River for the Mearns and Spring Grove Dams
3.4.34. **2000:** Archaeological survey of the Siphumele Housing Proposal, Durban Metro Council.
3.4.35. **2000:** Archaeological survey and excavation of an Iron Smelting site, Tongaat. Durban Metro Waste
3.4.36. **2000:** Archaeological excavations at Zimbali Golf Course. Moreland Developments.
3.4.37. **2000:** Archaeological surveys and excavations of EIA and LIA shell middens, settlements, and iron smelting areas for Richards Bay Minerals.
3.4.38. **2000:** Archaeological survey of proposed African Oceans Casino Site.
3.4.39. **2001:** Archaeological surveys and excavations of sites in the Greater St Lucia Wetland Park (GSLWP), KwaZulu-Natal. Sites to be affected by the new roads
3.4.40. **2001:** Archaeological survey of La Lucia Ridge, KwaZulu-Natal, North Coast, Moreland (Pty) Ltd.
3.4.41. **2001:** Archaeological excavation of a LIA/Historical Period site, Sheffield Beach development, KwaZulu-Natal, North Coast.
3.4.42. **2001:** Archaeological survey of sites along the Mt. Fletcher- Ketekete Road, Eastern Cape.
3.4.43. **2001:** Archaeological survey for the ESKOM Ntabankulu transmission line, KwaZulu-Natal. (Mkondeni)
3.4.44. **2001:** Archaeological survey of Historical Period houses at Bishopstowe, KwaZulu-Natal.
3.4.45. **2001:** Archaeological survey for the ESKOM Nseleni transmission line, KwaZulu-Natal (New Germany)
3.4.46. **2001:** Archaeological survey for the Mhlatuze Water pipeline, Mtunzini-Gingindlovu area, KwaZulu-Natal, for Dept. Water Affairs and Forestry (DWAF)...
3.4.47. **2001:** Archaeological survey for the Somkele Mine, Hluhluwe area, KwaZulu-Natal.
3.4.48. **2001:** Archaeological survey of Iron Age sites for the Raising of the Hazelmere Dam, KwaZulu-Natal, Dept of Water Affairs and Forestry.

3.4.49. **2001:** Archaeological survey of Iron Age sites for the ESKOM NB11 & NB14 lines, Hluhluwe, KwaZulu-Natal.(New Germany)
3.4.50. **2001:** Archaeological scoping survey of Iron Age and Rock Art sites of the Wakkerstroom area, Mpumalanga.
3.4.51. **2001:** Archaeological survey for the St. James Substation, Dundee-Nquthu area, Eskom (Mkhondeni)
3.4.52. **2001:** Archaeological survey of Iron Age sites for the ESKOM Emmaus-Driel transmission line, Kwazulu-Natal. (Mkhondeni)
3.4.53. **2001:** Archaeological survey of Iron Age sites for the proposed development on a portion of Beverly Sugar Estate, Ballito, KwaZulu-Natal.
3.4.54. **2001:** Excavations and rock art tracing for the Raising of the Mearns Dam, DWAF, Nottingham Road, Kwazulu-Natal.
3.4.55. **2001:** Archaeological survey for the Mhlatuze Water pipeline, for DWAF, Mtunzini- Gingindlovu area, Kwazulu-Natal.
3.4.56. **2002:** Archaeological survey for the Nzimakwe Housing Project, for Lee, Walker & Cele, Port Edward/Leisure Bay area, South Coast, Kwazulu-Natal.
3.4.57. **2002:** Archaeological survey for the Malangeni Housing Project, for Lee, Walker & Cele, Sezela/Esperanza area, South Coast, Kwazulu-Natal.
3.4.58. **2002:** Archaeological survey for an afforestation permit on Beaufort Farm, for Juluka Forestry Services, Vryheid-area, KwaZulu-Natal.
3.4.59. **2002:** Archaeological excavation and on site sorting of a LSA midden, (Recorder's site no. STM), in the RBM mining lease area.
3.4.60. **2002:** Archaeological survey of a water pipeline for Stewart Scott, UGU District Municipality, Harding/Weza area, Kwazulu-Natal.
3.4.61. **2002:** Archaeological survey and excavations of the Golokodo Trunk Sewer for GAEA Projects, Amanzimtoti area, Kwazulu-Natal.
3.4.62. Archaeological excavation of Late Iron Age sites for the Malangeni Housing Project, for DA Thomas Development & Construction, Kwazulu-Natal, South Coast.
3.4.63. **2002:** Archaeological survey of the new KwaGuqa road, Ngome-area, for Henwood Nxumalo Consulting, Kwazulu-Natal.
3.4.64. **2002:** Archaeological excavation of an Early Iron Age site, at Hillendale Mine, for TICOR, eSikhaweni/Empangeni area, Kwazulu-Natal.
3.4.65. **2002:** Archaeological survey of the Ambleton Low Cost Housing Development, for UDIDI Environmental, Planning & Development Consultants, Pietermaritzburg, Kwazulu-Natal.
3.4.66. **2002:** Archaeological survey of the Harry Gwala Low Cost Housing, Matatiele, for UDIDI Environmental, Planning & Development Consultants, Pietermaritzburg, Kwazulu-Natal.
3.4.67. **2002**: Archaeological survey of Mkuze Municipal Offices, for GAEA Projects, Mkuze-area, Kwazulu-Natal
3.4.68. **2002**: Archaeological survey of the ESKOM Pongola-Normandie transmission line, for Stemela Bosch Africa Ltd., Pongola-area, Kwazulu-Natal & Mpumalanga
3.4.69. **2002**: Archaeological excavation of LIA human skeletal remains, for Moreland Development, Umhlanga-area, KwaZulu-Natal.
3.4.70. **2002**: Archaeological survey and excavations of Cornubia & Gateway Substations, for GAEA Projects, Umhlanga-area, KwaZulu-Natal.
3.4.71. **2002**: Archaeological excavation and monitoring of Iron Age Smelter, for Durban Metro Waste, Folweni/Amanzimtoti-area, Kwazulu-Natal.

3.4.72. **2002**: Archaeological monitoring, and excavations of uShaka Island Marine Park Development, for Moreland Development, Durban, KwaZulu-Natal.
3.4.73. **2002**: Archaeological survey of Waterloo Low Cost Housing Development, for SciVest, Tongaat-area, KwaZulu-Natal.
3.4.74. **2002**: Excavation of Historical Period village (Bamboo Square/BAM1) at uShaka Island, for Moreland Development, Durban, Kwazulu-Natal.
3.4.75. **2003**: Archaeological survey of the Bay Hill Development site, for Buk'indalo Consultancy, Shelly Beach/ Margate-area, Kwazulu-Natal, South Coast.
3.4.76. **2003**: Archaeological survey of the Louisiana Slum Clearance project, for Buk'indalo Consultancy, Margate- area, Kwazulu-Natal, South Coast.
3.4.77. **2003**: Archaeological survey and excavation of the Freeland Park Extension site, for Buk'indalo Consultancy, Scottburgh, Kwazulu-Natal, South Coast.
3.4.78. **2003**: Archaeological survey of the Umbilo Sewer Extension, for EDP (Environmental Planning & Design), Umbilo/Durban-area, Kwazulu-Natal.
3.4.79. **2003**: Archaeological survey of the Ugu District Municipality pipeline, for Stewart-Scott, Harding/Weza-area, Kwazulu-Natal.
3.4.80. **2003**: Archaeological survey of the Beverly Sugar Estate extension site, for Guy Nicholson Consulting, Ballito-area, Kwazulu-Natal.
3.4.81. **2003**: Archaeological survey of the Hawaan Forest Development site, for Guy Nicholson Consulting, Umhlanga-area, Kwazulu-Natal.
3.4.82. **2003**: Archaeological survey of the Sezela Outfall sewer pipeline, for SciVest, Sezela, Kwazulu-Natal.
3.4.83. **2003**: Archaeological survey of the Mawelewele Low Cost Housing site, for Guy Nicholson Consulting, Durban, Chatsworth- area, Kwazulu-Natal.
3.4.84. **2003**: Archaeological survey of the St Chad's/ Umbulwane Water Supply System, for Stewart Scott, Emnambithi/Ladysmith- area, Kwazulu-Natal.
3.4.85. **2003**: Archaeological survey of the Waterloo Housing Development Extension, for GAEA Projects, Verulam-area, Kwazulu-Natal.
3.4.86. **2003**: Archaeological survey of the proposed eSikhawini Police Station and Singles
3.4.87. **2003**: Archaeological survey of three proposed substations and the Edwin Swales switching station, for Durban Metro Electricity, Bluff-area, Durban, Kwazulu-Natal.
3.4.88. **2003**: Archaeological excavation of historical sites (BAM A; BAM-B; BAM C; CAN 1) at uShaka Island, for Moreland Development, the Point, Durban, Kwazulu-Natal.
3.4.89. **2003**: Archaeological monitoring of canal construction at uShaka Island, for Moreland Development, the Point, Durban, Kwazulu-Natal.
3.4.90. **2003**: Archaeological survey of Umkomaas Memorial Park, for Walmsley Environmental Consultants, Craigieburn, Kwazulu-Natal.
3.4.91. **2003**: Archaeological survey of the Cedarville Low Cost Housing Project, for S'Dumo Trust, Cedarville, Kwazulu-Natal.
3.4.92. **2003**: Archaeological survey of the Killarney Isles Game Ranch, for Mr. A. Pulvirenti, Tala Valley, Kwazulu-Natal.
3.4.93. **2003**: Archaeological survey of the proposed Hibberdene Small Craft Harbour, for Guy Nicolson Consulting, Hibberdene, Kwazulu-Natal.
3.4.94. **2003**: Archaeological survey and excavations of the proposed N2 Interchange for Sun International (Sibaya Casino), Umhlanga, Kwazulu-Natal.
3.4.95. **2003:** Archaeological survey and excavations for the Simbithi Eco-estate
3.4.96. **2003:** Archaeological survey for the Luneberg MTN masts.

4. Umlando: Archaeological Tourism and Resource Management

4.1.1. **2004:** Archaeological survey excavations Late Stone Age sites for Braamhoek Pumped Water Scheme (to continue in 2005 – 2006).

4.1.2. **2004:** Archaeological survey for the Zithulele mission road, Transkei.

4.1.3. **2004:** Archaeological surveys for the Ekubo Eco-Estate, Port Shepstone.

4.1.4. **2004:** Archaeological survey for the Umhlatuze Water supply scheme, Hluhluwe – Sibaya.

4.1.5. **2004:** Archaeological survey of land near Mtunzini, for Ticor KwaZulu-Natal, South Africa.

4.1.6. **2004:** Archaeological surveys and excavations for Richards Bay Minerals, Richards Bay.

4.1.7. **2004:** Archaeological survey at Leopard Mountain Reserve for Kwa-Zulu Natal Heritage

4.1.8. **2004**: Various surveys for Environmental Planning and Design

4.1.9. **2004**: Archaeological survey and excavations for Eskom Braamhoek Pumped Water Scheme, Free State

4.1.10. **2004** Various surveys for Buk'Indalo Consultancy, KwaZulu-Natal South Coast

4.1.11. **2005**: Various surveys for Geomeasure Group, KwaZulu-Natal South Coast

4.1.12. **2005**: Archaeological surveys and excavations for Richards Bay Minerals –Zulti north and Zulti South mining leases.

4.1.13. **2005** Archaeological survey for Cornubia Substation, Env. Planning and Design.

4.1.14. **2005** Archaeological surveys for Arcus Gibb, KwaZulu-Natal. Including: the Ottowa electricty transmission line, Umgeni River canalisation

4.1.15. **2005** Archaeological surveys for GAEA Projects

4.1.16. **2005** Archaeological survey for Ticor, Hillendale

4.1.17. **2005:** Archaeological monitoring of the north and south entrance of the Durban harbour entrance

4.1.18. **2005:** Archaeological survey of the proposed Royal Big 6 Golfing Estate, Swaziland.

4.1.19. **2006**: Various surveys, excavations and monitoring for Richards Bay Minerals

4.1.20. **2006**: Various surveys, excavations and monitoring for Ticor, Hillendale Mine

4.1.21. **2006**: Excavations of Late Stone Age site for the Eskom Braamhoek Pumped Water Scheme (2004 – 2006). These excavations took up most of the time for 2004 – 2006 and involved ~5 mothns excavations and 1 year lab work.

4.1.22. **2006**: Excavations and monitoring for the Ekubo Eco Estate, Port Edward. Excavations of alleged survivor camp site from the Saoa Jao shipwreck.

4.1.23. **2006**: Archaeological survey for the Kwambonambi Bulk Water Supply Scheme, Richards Bay.

4.1.24. **2006**: Archaeological survey of 2 erven in Upper Ferncliffe, Pietermaritzburg- residential rezoning purpose

4.1.25. **2006**: Archaeological survey of 2 erven on Halkirk Farm, Hillcrest.

4.1.26. **2006:** Archaeological monitoring at Berth 306 at Port of Richards Bay: removal of palaeontological remains.

4.1.27. **2006**: Archaeological survey at Phinda Private Game Reserve. This has expanded into a repeated survey to establish heritage sites and potential tourism aspects.
4.1.28. **2006**: Archaeological survey for prefeasability stage of Nozalela Mine
4.1.29. **2007**: Desktop Study and site visits for the Petronet line: Durban – Jameson Park, for Mark Wood & Associates
4.1.30. **2007**: Monthly archaeological surveys for Richards Bay Minerals
4.1.31. **2007**: Monthly archaeological surveys for Exxaro (Pty) Ltd
4.1.32. **2007**: Excavations at Shark Tooth Midden (January, April November) For Richards bay Minerals.
4.1.33. **2007** Archaeological survey for prefeasability stage of Nozalela Mine, for Richards Bay Minerals
4.1.34. **2007** Update of Mananga Heritage Centre, for Richards Bay Minerals.
4.1.35. **2007**: Excavation of AMS9, Skeleton 4, for Richards Bay Minerals
4.1.36. **2007**: Overseas Student training & Experience program: 2.5 months. Visiting various sites, undertaken surveys and excavations, lab work.
4.1.37. **2007:** Living Heritage Study of selected areas in the Okahlamba Buffer Zone, for Ezemvelo KZN.
4.1.38. Archaeological survey of the Mabibi water project.
4.1.39. **2007:** Phinda archaeological survey.
4.1.40. **2007**: Archaeological survey of the Nozalela Mineral Sands servitudes for services, for SKR & Richards Bay Minerals.
4.1.41. **2007**: Heritage survey for the Elitheni mine, E. Cape, for Savannah Environmental (Pty) Ltd.
4.1.42. **2007/2008:** Arcaeological survey of the Port Durnford State Forest, for Exxaro (Pty) Ltd.
4.1.43. **2008:** Monthly archaeological surveys for Richards Bay Minerals: Includes surveys and excavations
4.1.44. **2008:** Monthly archaeological surveys for Exxaro (Pty) Ltd
4.1.45. **2008:** Heritage survey for the Durban-Heidelberg Transnet (Pty) Ltd. Pipeline, for Mark Wood Consultancy
4.1.46. **2008**: Archaeological survey of the Eskom Mfolozi-Ncwane Line, for Earth Consulting cc
4.1.47. **2008:** Archaeological survey of the Eskom Okuku-Hlabisa Line, for Earth Consulting cc
4.1.48. **2008:** Archaeological and Historical survey of the Ladysmith development, for Swahina Investments
4.1.49. **2008:** Heritage survey of the John Ross Interchange for Metallon Properties (Pty) Ltd.
4.1.50. **2008:** Heritage survey of the Nseleni Interchange for Metallon Properties (Pty) Ltd.
4.1.51. **2008:** Heritage survey of the Mtubatuba develolpment for Metallon Properties (Pty) Ltd.
4.1.52. **2008:** Heritage survey of the Mtubatuba Interchange
4.1.53. **2008:** Heritage survey of Erf 953, Brickfields. For B'ukindalo Consultancy.
4.1.54. **2008:** Heritage survey of the proposed Transnet Durban to Jameson Park trunkline.
4.1.55. **2008:** Removal of rock art panels for the Ingula Pumped Storage Scheme

4.1.56. **2008:** Heritage survey for the Nseleni bulk water scheme
4.1.57. **2008:** Heritage survey for Thembe community development, for Exigent cc
4.1.58. **2008:** Various small surveys in Richards Bay, for Exigent Environmental.
4.1.59. **2008:** Heritage survey for Umzimkulu Municiplaity.
4.1.60. **2008:** Heritage survey for Kerry Seppings Environmental Services
4.1.61. **2008:** Heritage survey for Port of Richards Bay, road extension
4.1.62. **2008:** Heritage survey for the Exxaro mining extensions, KZN
4.1.63. **2008:** Project Archaeologist for the Ingula Pumped Storage Scheme, Eskom, and surveys and audit
4.1.64. **2009:** Project Archaeologist for the Ingula Pumped Storage Scheme, Eskom, and surveys and audit
4.1.65. **2009:** Various Vodakom towers for Environmental Planning Services
4.1.66. **2009:** Monthly archaeological surveys for Richards Bay Minerals: Includes surveys and excavations
4.1.67. **2009:** Monthly archaeological surveys for Exxaro, Hillendale.
4.1.68. **2009:** Survey of the Peregrine Dunes Golf Estate, East London, for Coastal and Environmental Services.
4.1.69. **2009:** Survey of the proposed mariculture development in East London IDZ, East London, for Coastal and Environmental Services.
4.1.70. **2009:** Survey of the Toboshane Estate, East London, for Coastal and Environmental Services.
4.1.71. **2009:** Survey of the Nkanya Lodge, East Cape, for Coastal and Environmental Services.
4.1.72. **2009:** Survey of the Hluleka quarries and borrow pits, East Cape, for Coastal and Environmental Services.
4.1.73. **2009:** Survey of the Proud Heritage Lodge, East Cape, for Coastal and Environmental Services.
4.1.74. **2009:** Assessment of damaged graves near St Faiths for TPA.
4.1.75. **2009:** Heritage survey of the proposed Ngamakwe water reticulation, E. Cape. For Aurecon
4.1.76. **2009:** Heritage survey of the proposed Mncwasa Dam E. Cape. For Aurecon
4.1.77. **2009:** Heritage survey of the proposed Chris Hani Municiplaity water reticulation, E. Cape. For Maluti Water
4.1.78. **2009:** Heritage survey of the proposed Ladysmith airport development

5. Teaching Experience:

5.1.1. Tutor for: Prof John Parkington and Prof Andy Smith - first year archaeology courses (1992-1994).
5.1.2. Tutor for Prof Judy Sealy - third year stone tool practicals (1994).
5.1.3. Tutor for Centre of African Studies (Chris Giffard) - contemporary African social issues (1994).

6. Laboratory experience

6.1.1. Identifying faunal remains from Verloren Vlei Village Midden – 1990.
6.1.2. Sorting excavated material from Elands Bay Cave and Dune Field Midden 1998 – 1991

7. PUBLICATIONS, REPORTS AND MEDIA RELEASES

7.1. 1991. Andriesgrond Revisited. Unpub. BA (Hons) thesis. UCT.
7.2. 1996 The social and gender identity of gatherer-hunters and herders in the southwestern Cape. Unpub. M.Phil thesis. UCT.
7.3. G. Anderson. 1997. Digging for History. *Review Magazine*, 1997
7.4. G. Anderson. 1998. Fingers and Finelines: Paintings and gender identity in the southwestern Cape. *In* L. Wadley (ed.) *Our Gendered Past*. WITS University Press: WITS.
7.5. 1998. Co-author and technical advisor for *Bushman Art of the Drakensberg* – a popular paperback on rock art of the Drakensberg, Art Publishers.
7.6. Media release for AECI, Umbogintwini - 1996.
7.7. Media release for cultural resource management work at the Natal Museum, Natal Witness - 1997
7.8. Media release for excavation at the Slangspruit site, Natal Witness - 1996.
7.9. Interview with Radio 702 for the Slangspruit archaeological site, 1996
7.10. Media release for archaeological work at Richards Bay Minerals, Natal Witness, The Mercury, Sowetan, Ilanga, Mining World Magazine; Environmental Planning & Management magazine, SABC radio, Zululand Observer - 1997.
7.11. Media release for Natal witness: *Who were the Strandlopers?* 1998
7.12. Media release for Natal Witness, 1 Feb 2001, Excavations in Ashburton
7.13. Several Titania articles in 2001 – 2002 relating to RBM and archaeology work.
7.14. Press release for Golokodo Excavations in the Natal Witness, Daily News, and other national newspapers 2002..
7.15. Radio interview for Golokodo excavations with SAfm 2002
7.16. TV appearance on SABC1/2/3 news for Golokodo excavations 2002
7.17. Provincial and national newspaper coverage of human skeletal excavations for the Durban Marine Theme Park. 2002 – 2003
7.18. 1997. Anderson. G and Wahl. E. bushman Art of the Drakensberg. Art Publishers: Durban
7.19. 2003. Anderson. G. Bushman Rock Art: South Africa. Art Publishers: Durban

8. ASSOCIATIONS, SOCIETIES AND COMMITTEES

8.1. Member of the Archaeology Workshop (UCT) 1992-1994: A group of post-graduate students at UCT who are concerned about archaeology and the public/education.
8.2. Member of the South African Archaeological Society - 1993 – 2006.
8.3. Member of the South African Association of Archaeologists - 1995 – 2006.
8.4. Member of the South African Association of Archaeologists, CRM Section 1998 - 2006.
8.5. Secretary of the South African Association of Archaeologists - 1996-1998.
8.6. Honorary Officer for the Natal Parks Board, Drakensberg Division. 1996 - 1998
8.7. Involved with Bergwatch in the development of archaeological resources in the Mweni area, Drakensberg, 1996 – 1997

9. **CONFERENCES ATTENDED AND CONTRIBUTIONS:**

9.1. Attended the 1992 SA3 Conference, Cape Town.
9.2. Attended the 1995 Pan-African Congress for Prehistory and Related Studies, Harare.
9.3. Attended and presented a paper at the 1996 SA3 Conference, Bloemfontein. **Title:** CRM at Richards Bay Minerals.

		9.4. Attended and presented a paper at the 1997 KhoiSan Identities and Cultural heritage Conference, University of the Western Cape. **Title:** Finger paintings and fineline paintings of the Southwestern Cape. 9.5. Attended the Industrial Archaeology Workshop, Cape Town, 1998. 9.6. Attended the World Archaeological Conference (WAC4), Cape Town, 1999. 9.7. Attended and presented a paper at the 2000 SA3 Conference, Johannesburg. **Title:** Iron Age Studies at Richards Bay Minerals.
VISUAL	**MR. HENRY HOLLAND**	**HENRY JAMES HOLLAND** Date of birth: 26 December 1968 **QUALIFICATIONS** BSc (Hons.) (UOFS), MSc (Rhodes) **PROFESSIONAL EXPERIENCE** 2005-present: GIS Consultant, Map (this) GIS Consultancy 2000-2004: GIS Consultant, Self employed 1996-1999: GIS Manager, SDM **CONSULTING EXPERIENCE** I have consulted in South Africa and Mozambique. Environmental consulting experience, in no particular order, includes: **Remote Sensing** • Established a baseline for monitoring effects of mining activities on vegetation using change detection techniques on multi-temporal SPOT satellite imagery, Corridor Sands Limitada, Mozambique **Visual Impact Assessment** • Kouga Windfarm VIA, Jeffreysbay • Boschfontein VIA, Chicken Broiler Housing, Uitenhage • Telkom tower replacement, Elarduspark, Pretoria • Loerie VIA, Chicken Broiler Housing **GIS Coordinator** • Kromme River Analysis • Amahlathi SEA • Ngqushwa SEA • Madiba Bay Leisure Resort • WMA12 SEA

Cartographic Support

- Amahlathi AWRM Phase II
- Elitheni Coal Mining EMP Phase 3A
- Numerous Geotechnical Projects
- Mentorskraal Estate Scoping, Eastern Cape
- Amahlathi AWRM
- Izizwe AWRM
- Amanzi Estate ERA
- Madiba Bay EIA
- Hunters Development, Knysna, Eastern Cape
- Environmental Plan for Prospecting Rights - Guba Hoek, Eastern Cape
- Wells Estate Water Pipeline, Eastern Cape
- Pierpoint Development, Knysna, Eastern Cape 2004
- Simola Phase II, Eastern Cape
- Kelvin Jones Wastewater Treatment Plant, Port Elizabeth, Eastern Cape
- Cola Beach ERA, Sedgefield, Eastern Cape
- Various maps for publication in journals, Department of Statistics, Rhodes University

Visibility Analysis

- Krommensee Visibility Study (Site Selection)
- Seaview EIA Site selection
- Hydra Gamma project
- Coffee Bay Site selection
- Eskom Breyten strengthening project
- Eskom Eiland project
- Eskom Everest - Simplon project
- Eskom Matimba - Witkop No 2 400 kV Transmission line - December 2003 alternative alignment
- Eskom Matimba - Witkop No 2 400 kV Transmission line – alternative alignment
- Eskom Ikaros project
- Eskom Matimba - Witkop project
- Eskom Coega - Grassridge project
- N2 Wild Coast Toll Road Project

Other GIS projects

- River bank migration rate and erosion study - Ingleside Estate, Eastern Cape
- River bank migration rate and erosion study - Colchester, Eastern Cape

		• Ridge/dune migration and erosion study - Sedgefield, Eastern Cape • GreatKei SEA, Eastern Cape 2003 • Baviaanskloof Wetland Identification Project
NOISE	**MR. BRETT WILLIAMS**	BRETT WILLIAMS **Born:** April, 21, 1963 **Nationality:** South African **Identity Number, SA:** 6304215081084 **Work:** Managing Member, Safetech, PO Box 27607, Greenacres 6057, Mobile: 0825502137, brett.williams@safetechsa.co.za Brett Williams has been involved in Health Safety and Environmental Management since 1987, and has been measuring noise related impacts since 1996. Brett is the owner of Safetech who have offices in Pretoria and Port Elizabeth. He has consulted to many different industries including, mining, chemical, automotive, food production etc. He is registered with the Department of Labour and Chamber of Mines to measure environmental stressors, which include chemical monitoring, noise and other physical stresses. He has also been trained by the United States Environmental Protection Agency on air pollution measurement and dispersion modelling. He has submitted a doctoral thesis through the University of Pretoria for examination on the relationship between polluting organisations and the receiving community. **TERTIARY EDUCATION** • National Diploma Health & Safety Management • Bachelor of Arts (UPE) • United States EPA Pollution Measurement course conducted at the University Of Cincinnati (EPA Training Centre) • US EPA Air Dispersion Modelling Training Course • Master of Business Administration (University of Wales) with dissertation on environmental reporting in South Africa. • PhD - Currently registered at University of Pretoria. The thesis has been submitted for external examination and graduation is possible in 2009. • Various Health & Safety Courses. • Environmental Auditor (ISO 14001:2004) **KEY EXPERIENCE** The Table below presents an abridged list of Brett Williams' project experience relevant to this proposal:

		• Crown Chickens – The independent report review of a noise specialist report conducted as part of an EIA to establish a new broiler farm • BMW – The evaluation of the impact of the Rosslyn production facilities on the surrounding community. • Victory Race Track - Specialist noise report conducted as part of an EIA to establish a new stock car racing track. • Continental Tyre - The evaluation of the impact of production facilities on the surrounding community. • Media 24 – The measurement portion of an investigation on the impact of a printing press on a local community. The main study was conducted by the University of Stellenbosch. • Zwartebosh Quarry - Specialist noise report conducted as part of an EIA to establish a new quarry. • Milo Granite - Specialist noise report conducted as part of an EIA to establish a new quarry. • Dunlop Tyres - The evaluation of the impact of production facilities on the surrounding community. • Sasol Secunda - Independent report review of a noise specialist report conducted to determine the impact of production facilities on the surrounding community. • Barlow World Coatings - The evaluation of the impact of production facilities on the surrounding community. • Western Platinum Refinery - The evaluation of the impact of production facilities on the surrounding community. • CSIR – Noise Impact Study of Namwater Desalination Plant • CSIR - Kouga Wind Turbine Project – Background Noise Measurements

APPENDIX B-2: SHORT *CURRICULUM VITAE* OF THE PERSONS WHO COMPILED AND REVIEWED THIS SPECIALIST VOLUME

ROLE	NAME OF PERSON	DETAILS OF EXPERTISE (SHORT CV)
PROJECT LEADER AND REPORT REVIEWER	**DR. KEVIN WHITTINGTON-JONES**	**DR. KEVIN WHITTINGTON-JONES** Born: 17 January 1972 Phone: 046 622 2364 Nationality: South African Email: k.whittington-jones@cesnet.co.za **ACADEMIC QUALIFICATIONS** **2005** Post-Graduate Diploma in Higher Education (Rhodes University) **2000** PhD in Biotechnology (Rhodes University). **1997** M.Sc (Zoology – Marine Ecology), Rhodes University **1994** B.Sc Hons. (Marine Biology) with distinction, Rhodes University **1993** B.Sc (Microbiology & Zoology), Rhodes University **EMPLOYMENT HISTORY** **March 2009 – Present** Director at Coastal and Environmental Services **January 2006 – February 2009** Principal Consultant at Coastal and Environmental Services and Senior Lecturer at the Rhodes Investec Business School. ***January 2004 - Present*** Senior Lecturer in the Department of Environmental Science and Rhodes Investec Business School (Rhodes University) and coordinator of the Environmental Management Elective Programme for the Rhodes MBA. Associate Senior Consultant at Coastal and Environmental Services. ***January 2002 – January 2004*** Lecturer in Biotechnology (Dept. Biochemistry, Microbiology & Biotechnology, Rhodes University, Grahamstown); responsibilities included coordination of the Environmental Biotechnology Masters Degree Course and a 3-week short course in Industrial Environmental Management. Lectured environmental biotechnology, bioremediation, environmental & waste management. Acting Head of Biotechnology from March – December 2003. **2001**

Research Assistant and course coordinator for Environmental Biotechnology MSc Programme (Dept. Biochemistry, Microbiology & Biotechnology, Rhodes University).

COURSES ATTENDED

- Certificate course in Integrating ISO 14001, ISO 9001: 2000 & OHSAS 18001, IIR Training, Cape Town, October 2001
- Certificate in Industrial Environmental Management, Rhodes University, February 2001
- Environmental Law and Policy Course (Rhodes University), November 1996

RESEARCH & CONSULTING EXPERIENCE

Research:
Have supervised research at the PhD and MSc level and have published work on bioremediation and environmental management in peer-reviewed journals. A full list of articles is available upon request.

Current projects include: an investigation of sewage sludge management and beneficiation opportunities in the Nelson Mandela Metropolitan and Makana Municipalities; assessment of waste management in the Jeffrey's Bay storm water catchment; development and application of technology assessment methodologies to bioremediation technologies and the assessment of sanitation technologies in Buffalo City Municipality.

Completed projects have included a survey of the performance sewage treatment facilities in the Eastern Cape, integrated waste management opportunities at East London dry dock, development of algal ponding technology for low-cost sanitation and development of a bioprocesses for the remediation of distillery effluent and mine drainage water (Rhodes BioSURE® process).

Consulting:

- Responsible for specialist management and waste management specialist study for the Kalagadi Manganese Smelter (Zone 6, Coega IDZ)
- Development of an Integrated waste management plan for the Port of Mossel Bay
- Waste management specialist studies for international mining projects including El Burulus Sands (Egypt) and Toliara Sands (Madagascar)
- Waste management specialist study for the Rabai Power station (Kenya).
- Management of the EIA for the regional general and hazardous waste disposal facility
- Amendment of the EMPR for the Cerebos Sundays River operation
- Internal environmental assessment report and exemption applications for the Cerebos PVD plant and the Southern Cross precision strip mill (Coega IDZ)
- Feasibility study for the Grown Energy Biofules project in Mozambique
- Asset environmental liability assessment for the port of Durban

		• Review of South African hazardous waste legislation for URS Environmental Consultants (Australia), 2004 • Review of Scoping Report for proposed upgrading of Central Sewage Treatment Works in East London (Legal Resources Centre, Grahamstown), 2004 • Participated in internal ISO 14001 audits at SAB Ibhayi Brewery (2001-present) • Development of a Decision Support System for improved operation of small sewage treatment facilities (Water Research Commission) • Development and auditing of the Rhodes EnviroSafe Audit Scheme for management of safety, health & environmental impacts at small mines (2003 – 2004) **SKILLS** Include the development of research proposals; development and management of projects; management of research teams and support staff; preparation and management of budgets in excess of R1 million; report writing; environmental auditing; use of software for statistical analysis; wide range of laboratory analytical techniques. **AWARDS** • Ian MacKenzie Scholarship for Environmental Studies (1996) • Rhodes University Masters Scholarship (1994) • Full Academic Colours (1993) • Rhodes University Honours Scholarship (1992) **PROFESSIONAL MEMBERSHIP** • Institute of Environmental Management & Assessment (IEMA) (No. 0014994) • The Water Institute of Southern Africa (WISA) (No. 22295) • The International Water Association (IWA), London, UK • The Institute of Waste Management of South Africa (IWMSA) (No. 40105035) • The South African Council for Natural Scientific Professions (SACNASP): Environmental Scientist (No. 400027/07)
PROJECT MANAGER AND REPORT COMPILATION	**MS. JULIANA KEIRUNGI**	**JULIANA KEIRUNGI** Date of birth: 15 August 1981 **QUALIFICATIONS** BSc (Rhodes), BSc (Hons. Cum Laude, Rhodes), MSc (Rhodes)

MEMBERSHIP

- Chair of the Uganda Solid Waste Management Platform 2006 (Uganda Environment Protection Forum, Kampala City Council and National Environmental Management Authority)
- Certified Environmental Impact Assessment Practitioner, Uganda

PROFESSIONAL EXPERIENCE

September 2009- Date: Senior Environmental Consultant, Coastal & Environmental Services, Grahamstown, South Africa
August 2007-August 2009: Environmental Consultant, Coastal & Environmental Services, Grahamstown, South Africa
January 2007-July 2007: Senior Environmentalist, Kampala Water-National Water and Sewerage Corporation, Uganda
September 2006-January 2007: Disposal Engineer/Environmentalist, Bugolobi Sewage Treatment Works, Kampala Water-National Water and Sewerage Corporation, Uganda
April 2005: Senior Partner, Atacama Consulting Company, Kampala, Uganda

CONSULTING EXPERIENCE

To date, I have been involved in consulting projects in Uganda, South Africa and Mozambique. Some of the projects I have been involved in no particular order include but are not limited to:

At CES, South Africa (Environmental Consultant)

- Project Manager for the Phase 2B Order of Magnitude Study for Rio Tinto Mining and Exploration Ltd., Mozambique (on-going)
- Project Manager for the Phase 2A Order of Magnitude Study for Rio Tinto Mining and Exploration Ltd., Mozambique (on-going)
- Project Manager for Phase 1 Biophysical Order of Magnitude Studies for Rio Tinto Mining and Exploration Ltd., Mozambique (December 2007)
- Environmental Consultant and Waste Management specialist for development of an Integrated Waste Management Plan for the Port of Mossel Bay (on-going).
- Project Team Member for the Due Diligence of Zone 5, Coega Industrial Development Corporation, South Africa (on-going).
- EIA Specialist Manager for the proposed South African National Roads Agency Limited (SANRAL) Kynsna N2 Toll Highway, South Africa (on-going).
- Wastewater treatment specialist for the upgrade of the sewage treatment system of the Mpekweni Beach Resort, South Africa (February 2008).

		• Wastewater treatment specialist for the upgrade of the Engcobo sewerage treatment works, South Africa (on-going). • Environmental Consultant responsible for designing an Environmental Management Plan for the GaRankuwa bulk and Internal Water Network Project, South Africa (November, 2007). • Environmental Consultant responsible for designing an Environmental Management Plan for the Mapobane Bulk and Internal Water Network Project, South Africa (November, 2007). ***At Atacama Consulting, Uganda*** (Senior Partner) • Principal Consultant for the Development of an environmental audit manual for Uganda's fish processing sector in line with conditions stipulated by Uganda's National Environment Management Authority (2007). • Principal Consultant for a proposed tourist resort development on Zinga Island, Mukono district, Uganda (2006). • Principal Consultant for a proposed sugar factory in Masindi district of Uganda (2007). • Specialist responsible for designing a wastewater treatment facility for the Nyamitanga Diary Farm, Uganda (2007). **SELECTED PUBLICATIONS** • Shackelton, C., Guthrie, G., Keirungi, J. and Stewart, J. 2003. *Fuel-wood Availability in the Richtersveld National Park, South Africa*. Koedoe Scientific Journal, December 2003. • Keirungi, J. and Fabricius, C. 2005. *Selecting medicinal plants for cultivation at Nqabara on the Eastern Cape Wild Coast*. South African Journal of Science, December 2005.

APPENDIX B-3: DECLARATION OF INDEPENDENCE OF EACH OF THE SPECIALISTS INVOLVED IN THE PROPOSED WAAINEK WIND ENERGY PROJECT EIA

DECLARATION OF SPECIALISTS INDEPENDENCE	
ECOLOGICAL SPECIALISTS	I **Prof Roy Lubke** declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Waainek Wind Energy Project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work. **SIGNATURE:** 
	I **Ms Leigh-Ann DeWet** declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Waainek Wind Energy Project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work. **SIGNATURE:** 
NOISE SPECIALIST	I **Mr Brett Williams** declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Waainek Wind Energy Project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work. **SIGNATURE:** 
VISUAL SPECIALIST	I **Mr Henry Holland** declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Waainek Wind Energy Project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such

DECLARATION OF SPECIALISTS INDEPENDENCE	
	work. **SIGNATURE:** 
HERITAGE SPECIALIST	I **Mr Gavin Anderson** declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Waainek Wind Energy Project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work. **SIGNATURE:** 
AVIFAUNA SPECIALISTS	I **Prof Adrian Craig** declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Waainek Wind Energy Project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work. **SIGNATURE:** 
	I **Mr Nic DavenPort** declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Waainek Wind Energy Project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work. **SIGNATURE:** 

APPENDIX C: ECOLOGICAL

Appendix C-1: Plant species list for the proposed Waainek Wind Energy Project site.

Assemblage	Family	Species Name
Monocotyledon	POACEAE	*Alloteropsis semialata* (R.Br.) Hitchc
Dicotyledon	RUBIACEAE	*Anthospermum aethiopicum* L.
Monocotyledon	IRIDACEAE	*Aristea anceps* Eckl. & Klatt
Dicotyledon	FABACEAE	*Aspalathus* sp. L.
Dicotyledon	ASTERACEAE	*Berkheya* sp. Ehrh.
Monocotyledon	IRIDACEAE	*Bobartia orientalis*. J.B. Gillett
Monocotyledon	IRIDACEAE	*Bobartia* sp. L.
Dicotyledon	RUBIACEAE	*Burchellia bulbalina* (L.f.) Sims
Dicotyledon	RUBIACEAE	*Canthium* sp. Lam.
Dicotyledon	ASTERACEAE	*Chrysanthemoides monilifera* (L.) Norl.
Dicotyledon	ASTERACEAE	*Chrysocoma ciliata* L.
Dicotyledon	CRASSULACEAE	*Crassula* sp. L
Dicotyledon	ARALIACEAE	*Cussonia spicata* Thunb.
Monocotyledon	POACEAE	*Cymbopogon marginatus* (Steud.) Stapf ex Burtt Davy
Dicotyledon	THYMELAEACEAE	*Dais cotinifolia* L.
Monocotyledon	IRIDACEAE	*Dierama pendulum* (L.f.) Baker
Dicotyledon	EBENACEAE	*Diospyros lycioides* Desf.
Dicotyledon	EBENACEAE	*Diospyros scabrida* (Harv. Ex Hiern) De Winter
Monocotyledon	DRACAENACEAE	*Dracaena* sp. L.
Gymnosperm	ZAMIACEAE	*Encephalartos latifrons* Lehm.
Dicotyledon	ERICACEAE	*Erica cerinthoides* L.
Dicotyledon	ERICACEAE	*Erica chamissonis* Klotzsch ex Benth.
Dicotyledon	ASTERACEAE	*Gazania* sp. Gaertn.
Dicotyledon	THYMELAEACEAE	*Gnidia* sp. L.
Dicotyledon	THYMELAEACEAE	*Grewia occidentalis* L.
Dicotyledon	CELASTRACEAE	*Gymnosporia buxifolia* (L.) Szyszyl.
Dicotyledon	SCROPHULARIACEAE	*Halleria lucida* Thunb.
Dicotyledon	ASTERACEAE	*Helichrysum anomalum* Less
Dicotyledon	ASTERACEAE	*Helichrysum nudifolium* (L.) Less
Monocotyledon	POACEAE	*Heteropogon contortus* (L.) Roem. & Schult.
Monocotyledon	HYACINTHACEAE	*Ledebouria* sp. Roth
Dicotyledon	PROTEACEAE	*Leucadendron salignum* P.J. Bergius
Dicotyledon	LOBELIACEAE	*Lobelia* sp. L.
Dicotyledon	CELASTRACEAE	*Maytenus* sp. Molina
Dicotyledon	MYRICACEAE	*Myrica* sp L.
Dicotyledon	MORINGACEAE	*Myrsine melanophloeos* (L.) R.Br.
Dicotyledon	ASTERACEAE	*Oldenburgia grandis* (Thunb.) Baill.
Dicotyledon	OLEACEAE	*Olea woodiana* Knobl.
Dicotyledon	ASTERACEAE	*Osteospermum* sp. L.
Dicotyledon	SANTALACEAE	*Osyris compressa* (P.J.Bergius) A.DC.
Monocotyledon	POACEAE	*Pentaschistis curvifolia* (Schrad.) Stapf.
Dicotyledon	LAMIACEAE	*Plectranthus* sp. L'Her
Dicotyledon	PROTEACEAE	*Protea cynaroides* (L.) L.
Dicotyledon	PROTEACEAE	*Protea repens* (L.) L.
Dicotyledon	FABACEAE	*Psoralea* sp L.
Dicotyledon	RUBIACEAE	*Psychotria capensis* (Eckl.) Vatke
Pteridophyta	DENNSTAEDTIACEAE	*Pteridium aquilinum* Gled. ex Scop.
Monocotyledon	RESTIONACEAE	*Restio sejunctus* Mast.
Dicotyledon	VITACEAE	*Rhoicissus digitata* (L.f.) Gilg & M. Brandt.

Dicotyledon	ANACARDIACEAE	*Rhus chirindensis* Baker f.
Dicotyledon	ANACARDIACEAE	*Rhus lucida* L.
Dicotyledon	ANACARDIACEAE	*Rhus* sp. L.
Dicotyledon	RHAMNACEAE	*Scutia myrtina* (Burm.f.) Kurtz
Dicotyledon	SCROPHULARIACEAE	*Selago corymbosa* L.
Dicotyledon	ASTERACEAE	*Senecio quinquelobus*. (Thunb.) DC.
Dicotyledon	ASTERACEAE	*Senecio* sp. L.
Dicotyledon	ASTERACEAE	*Senecio speciosus* Willd.
Dicotyledon	ASTERACEAE	*Syncharpha* sp. DC.
Monocotyledon	POACEAE	*Themeda triandra* Forssk.
Monocotyledon	IRIDACEAE	*Watsonia* sp. Mill.
Dicotyledon	RUTACEAE	*Zanthoxylum capense* (Thunb.) Harv.

Appendix C-2: Animal species that may occur in the study area with the IUCN categories, according to the species conserved in the Addo Elephant National Park.

Kingdom - Animalia		
Order: Insectivora		
Common Name	Species Name	SSC
Lesser dwarf Shrew	*Suncus varilla*	Least Concern
Least dwarf shrew	*Suncus infinitesimus*	Least Concern
Forest shrew	*Myosorex varius*	Least Concern
Round-eared elephant shrew	*Macroscelides proboscideus*	Least Concern
Greater musk shrew	*Crocidura flavescens*	Least Concern
Duthie's golden mole	*Chlorotalpa duthieae*	Vulnerable
Sclater's golden mole	*Chlorotalpa scalteri*	
Hottentot golden mole	*Amblysomus hottentotus*	Least Concern
Southern African hedgehog	*Atelerix frontalis*	Least Concern
Order: Chiroptera		
Common Name	Species Name	SSC
Straw-coloured fruit bat	*Eidolon helvum*	Near Threatened
Egyptian fruit bat	*Rousettus aegypticus*	
Geoffrey's horseshoe bat	*Rhinolophus clivosus*	Least Concern
Cape horseshoe bat	*Rhinolophus capensis*	Least Concern
Temminck's hairy bat	*Myotis tricolor*	Least Concern
Cape serotine bat	*Eptesicus capensis*	Least Concern
Common slit-faced bat	*Nycteris thebaica*	Least Concern
Giant yellow house bat	*Scotophilus nigrita*	Least Concern
Schreiber's long-fingered bat	*Miniopterus schreibersi*	Near Threatened
Tomb bat	*Taphozous mauritianus*	Least Concern
Angola free-tailed bat	*Tadarida condylura*	Least Concern
Wahlberg's epaulated bat	*Epomophorus wahlbergi*	Least concern
Banana bat	*Pipistrellus nanus*	Least Concern
Egyptian free-tailed bat	*Tadarida aegyptiaca*	Least Concern
Lesser woolly bat	*Kerivoula lanosa*	Least Concern
Order: Primata		
Common Name	Species Name	SSC
Vervet monkey	*Cercopithecus aethiops*	
Chacma baboon	*Papio ursinus*	Least Concern
Order: Carnivora		
Family: Protelidae		
Common Name	Species Name	SSC
Aardwolf	*Proteles cristata*	Least Concern
Family: Hyenidae		
Common Name	Species Name	SSC
Brown Hyena	*Parahyaena brunnea*	Near Theatened
Spotted Hyena	*Crocuta crocuta*	Least Concern
Family: Canidae		
Common Name	Species Name	SSC
Bat-eared fox	*Otocyon megalotis*	Least Concern
Cape fox	*Vulpes chama*	Least Concern
Blackbacked Jackal	*Canis mesomelas*	Least Concern
Family: Mustelidae		
Common Name	Species Name	SSC
Striped polecat	*Ictonyx striatus*	Least Concern
Striped weasel	*Poecilogale albinucha*	Least Concern

Honey badger	*Mellivora capensis*	Least concern
Cape clawless otter	*Aonyx capensis*	Least Concern
Family: Viverridae		
Common Name	Species Name	SSC
Small-spotted genet	*Genetta genetta*	Least Concern
Large-spotted genet	*Genetta tigrina*	Least Concern
Family: Herpestidae		
Common Name	Species Name	SSC
Small grey mongoose	*Galerella pulverulenta*	Least Concern
Large grey mongoose	*Herpestes ichneumon*	Least Concern
Water mongoose	*Atilax paludinosus*	Least Concern
Suricate / Meerkat	*Suricata suricatta*	Least Concern
Family: Felidae		
Common Name	Species Name	SSC
African Wildcat	*Felis lybica*	
Black-footed cat	*Felis nigripes*	Vulnerable
Caracal / Rooikat	*Felis caracal*	
Lion	*Panthera leo*	Vulnerable
Leopard	*Panthera pardus*	Near Threatened
Order: Tubulidentata		
Common Name	Species Name	SSC
Antbear / Aardvark	*Orycteropus afer*	Least Concern
Order: Hyracoidea		
Common Name	Species Name	SSC
Rock Hyrax / Dassie	*Procavia capensis*	Least Concern
Tree Dassie	*Dendrohyrax arboreus*	Least Concern
Order: Lagomorpha		
Common Name	Species Name	SSC
Cape hare	*Lepus capensis*	Least Concern
Scrub hare	*Lepus saxatilis*	Least Concern
Smith's Red Rock Rabbit	*Pronolagus rupestris*	Least Concern
Order: Rodentia		
Common Name	Species Name	SSC
Common mole rat	*Cryptomys hottentotus*	Least Concern
Cape mole rat	*Georychus capensis*	Least Concern
Porcupine	*Hystrix africae-australis*	
Cape springhare	*Pedetes capensis*	Least Concern
Woodland dormouse	*Graphiurus murinus*	Least Concern
Spectacled dormouse	*Graphiurus ocularis*	Least Concern
Grey climbing mouse	*Dendromus melanotis*	Least Concern
Pouched mouse	*Saccostomus campestris*	Least Concern
Dwarf mouse	*Laggada minutoides*	
House mouse	*Mus domesticus*	Least Concern
Namaqua rock mouse	*Aethomys namaquensis*	Least Concern
Multimammate mouse	*Mastomys natalensis*	Least Concern
Pygmy mouse	*Mus minutoides*	Least Concern
Brant's climbing mouse	*Dendrmus mesomelas*	
Woodland mouse	*Grammomys dolichurus*	Least Concern
House rat	*Rattus rattus*	Least concern
Striped fieldmouse	*Rhabdomys pumilio*	Least concern
Vlei rat	*Otomys irroratus*	Least Concern
Angoni vlei rat	*Otomys angoniensis*	Least Concern
Hairy-footed gerbil	*Gerbillus paeba*	

Order: Artiodactyla		
Family: Suidae		
Common Name	Species Name	SSC
Bushpig	*Potamochoerus porcus*	Least Concern
Warthog	*Phacochoerus africanus*	Least Concern
Family: Hippopotamidae		
Common Name	Species Name	SSC
Hippopotamus	*Hippopotamus amphibius*	Vulnerable
Family: Bovidae		
Common Name	Species Name	SSC
Common duiker	*Sylvicapra grimmia*	Least Concern
Cape grysbok	*Raphicerus melanotis*	Least Concern
Steenbok	*Raphicerus campestris*	Least Concern
Klipspringer	*Oreotragus oreotragus*	Least Concern
Springbok	*Antidorcas marsupialis*	Least Concern
Mountain reedbuck	*Redunca fulvorufula*	Least Concern
Grey rhebok	*Pelea capreolus*	Least Concern
Gemsbok	*Oryx gazella*	Least Concern
Red hartebeest	*Alcelaphus buselaphus*	Least Concern
Bushbuck	*Tragelaphus scriptus*	Least Concern
Greater kudu	*Tragelaphus strepsiceros*	Least Concern
Eland	*Taurotragus oryx*	
Buffalo	*Syncerus caffer*	Least Concern
Order: Perissodactyla		
Family: Rhinocerotidae		
Common Name	Species Name	SSC
Black Rhinoceros	*Diceros bicornis bicornis*	
Family: Equidae		
Common Name	Species Name	SSC
Burchell's/Plains zebra	*Equus burchelli*	Least Concern
Mountain zebra	*Equus zebra*	Vulnerable
Order: Proboscoidea		
Common Name	Species Name	SSC
Elephant	*Loxodonta africana*	Near Threatened
Order: Squamata		
Snakes		
Common Name	Species Name	SSC
Cape cobra	*Naja nivea*	
Puffadder	*Bitis arietans*	
Albany adder	*Bitis albanica*	very rare
Night adder	*Causes rhombeatus*	
Bergadder	*Bitis atropos*	
Horned adder	*Bitis cornuta*	
Boomslang	*Dispholidus typus*	
Rinkhals	*Hemachatus hemachatus*	
Herald/Red-lipped snake	*Crotaphopeltis hotamboeia*	
Olive house snake	*Lamprophis inornatus*	
Night snake	*Lamprophis aurora*	
Brown house snake	*Lamprophis fuliginosus fuliginosus*	
Speckled house snake	*Homoroselaps lacteus*	
Wolf snake	*Lycophidion capense*	
Spotted harlequin snake	*Philothamnus semivariegatus*	
Speckled bush snake	*Bitis atropos*	

Green water snake	*Philothamnus hoplogaster*	
Natal green watersnake	*Philothamnus natalensis occidentalis*	
Shovel-nosed snake	*Prosymna sundevalli*	
Mole snake	*Pseudapsis cana*	
Slugeater	*Duberria lutrix lutrix*	
Common eggeater	*Dasypeltis scabra scabra*	
Dappled sandsnake	*Psammophis notosticus*	
Crossmarked sandsnake	*Psammophis crucifer*	
Black-bellied watersnake	*Lycodonomorphus laevissimus*	
Common/Red-bellied watersnake	*Lycodonomorphus rufulus*	
Tortoises/terrapins		
Common Name	Species Name	SSC
Angulate tortoise	*Chersina angulata*	
Leopard tortoise	*Geochelone pardalis*	
Green parrot-beaked tortoise	*Homopus areolatus*	
Marsh/Helmeted terrapin	*Pelomedusa subrufa*	
Tent tortoise	*Psammobates tentorius*	
Lizards/geckoes/skinks		
Common Name	Species Name	SSC
Rock Monitor Lizard/Leguaan	*Varanus niloticus niloticus*	
Water Monitor Lizard/Leguaan	*Varanus exanthematicus albigularis*	
Tasman's Girdled Lizard	*Cordylus tasmani*	
Cape Girdled Lizard	*Cordylus cordylus*	
Southern Rock Agama	*Agama atra*	
Burrowing Skink	*Scelotes anguina*	
Golden Legless Skink	*Acontias meleagris orientalis*	
Tasman's Burrowing Skink	*Acontias percivali tasmani*	
Slendertailed Legless Skink	*Acontias gracilicauda gracilicauda*	
Smith's Striped Skink	*Mabuya homalocephala smithii*	
Cape Skink	*Mabuya capensis*	
Common Skink	*Mabuya varia*	
Striped Skink	*Mabuya striata*	
Cape Grass Lizard	*Chamaesaura anguina*	
Marico Gecko	*Pachydactylus mariquensis mariquensis*	
Spotted Gecko	*Pachydactylus maculatus maculatus*	
Essex's Leaf-toed Gecko	*Goggia essexi*	
Peringuey's Gecko	*Phyllodactylus peringueyi*	
Puffadder Gecko	*Phyllodactylus maculatus*	
Common Cape Gecko	*Phyllodactylus capensis*	
Smith's Dwarf Chameleon	*Microsaura taenibroncha*	
Gray's Dwarf Chameleon	*Microsaura ventralis*	
Dwarf Chameleon	*Bradypodion ventralis*	
Class: Amphibia		
Common Name	Species Name	SSC
Common platanna	*Xenopus laevis*	Least Concern
Karoo toad	*Bufo gariepensis*	Least Concern
Raucous toad	*Bufo rangeri*	Least Concern
Leopard/Giant toad	*Bufo pardalis*	Least Concern
African bullfrog	*Pyxicephalus adspersus*	Least Concern
Common river frog	*Rana angolensis*	
Cape/Giant riverfrog	*Rana fuscigula*	
Striped rana	*Rana fasciata*	

Clicking stream frog	*Rana grayi*	
Bubbling kassina/Running frog	*Kassina senegalensis*	
Southern/rattling kassina	*Kassina wealii*	
Common caco/Dainty frog	*Cacosternum boettgeri*	Least Concern
Coastal/Bronze caco	*Cacosternum nanum nanum*	
Striped pyxie	*Tomopterna delalandii*	Least Concern
Puddle frog	*Phrynobatrachus natalensis*	Least concern
Painted reed frog	*Hyperolius marmoratus*	Least Concern
Yellow-striped reed frog	*Hyperolius semidiscus*	Least Concern
Armoured reed frog	*Hyperolius viridiflavus*	Least concern
Bushveld rain frog	*Breviceps adspersus pentheri*	
FISH - Order:Perciiforms		
Family: Anabantidae		
Common Name	Species Name	SSC
Eastern Cape Rocky	*Sandelia bainsii*	Endangered

Appendix C-3: IUCN Categories (Source: www.iucnredlist.org)

EXTINCT (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

EXTINCT IN THE WILD (EW)

A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make

positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE)

A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

APPENDIX D: AVIFAUNA

APPENDIX D-1: BIRD SPECIES WHICH MAY BE PRESENT ON SITE

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
1	Common Ostrich	*Struthio camelus*	R-C		1	
8	Little Grebe	*Tachybaptus ruficollis*	R-C		47	
55	White-breasted Cormorant	*Phalacrocorax lucidus*	R-C		27	
58	Reed Cormorant	*Phalacrocorax africanus*	R-C		44	
60	African Darter	*Anhinga rufa*	R-C		36	
62	Grey Heron	*Ardea cinerea*	R-C		31	
63	Black-headed Heron	*Ardea melanocephala*	R-C		61	
64	Goliath Heron	*Ardea goliath*	R-U			
65	Purple Heron	*Ardea purpurea*	R-U		1	
66	Great Egret	*Egretta alba*	R-C			
67	Little Egret	*Egretta garzetta*	R-C		1	
68	Yellow-billed Egret	*Egretta intermedia*	R-U			
71	Cattle Egret	*Bubulcus ibis*	R-C		25	
72	Squacco Heron	*Ardeola ralloides*	R/NBM-U			
76	Black-crowned Night-Heron	*Nycticorax nycticorax*	R-C		6	
78	Little Bittern	*Ixobrychus minutus*	R/NBM-U		1	
81	Hamerkop	*Scopus umbretta*	R-C		26	
83	White Stork	*Ciconia ciconia*	NBM-C		6	
84	Black Stork	*Ciconia nigra*	R-U/R	NT	5	
90	Yellow-billed Stork	*Mycteria ibis*	NBM/R-LC	NT		
91	African Sacred Ibis	*Threskiornis aethiopicus*	R-C		22	
93	Glossy Ibis	*Plegadis falcinellus*	R-U			
94	Hadeda Ibis	*Bostrychia hagedash*	R-A		86	
95	African Spoonbill	*Platalea alba*	R(n)-C		11	
101	White-backed Duck	*Thalassornis leuconotus*	R-U		2	
102	Egyptian Goose	*Alopochen aegyptiacus*	R-A		76	

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
103	South African Shelduck	*Tadorna cana*	E-C		37	
104	Yellow-billed Duck	*Anas undulata*	R-A		66	
105	African Black Duck	*Anas sparsa*	R-U		9	
106	Cape Teal	*Anas capensis*	R-C			
107	Hottentot Teal	*Anas hottentota*	R-C			
108	Red-billed Teal	*Anas erythrorhyncha*	R-C		3	
112	Cape Shoveler	*Anas smithii*	Er-C		2	
113	Southern Pochard	*Netta erythrophthalma*	R-C		1	
116	Spur-winged Goose	*Plectropterus gambensis*	R-VC		26	
117	Maccoa Duck	*Oxyura maccoa*	R-U			
118	Secretarybird	*Sagittarius serpentarius*	R-U	NT	17	
122	Cape Vulture	*Gyps coprotheres*	E-LC	Vu		
126.1	Yellow-billed Kite	*Milvus aegyptius*	BM-C		4	
127	Black-shouldered Kite	*Elanus caeruleus*	R(n)-C		38	x
128	African Cuckoo Hawk	*Aviceda cuculoides*	R-U			
131	Verreaux's Eagle	*Aquila verreauxii*	R-U		3	
136	Booted Eagle	*Hieraaetus pennatus*	R/NBM-C		1	
140	Martial Eagle	*Polemaetus bellicosus*	R-U	Vu	11	
141	African Crowned Eagle	*Stephanoaetus coronatus*	R-U	NT	21	
148	African Fish-Eagle	*Haliaeetus vocifer*	R-C		26	
149	Steppe Buzzard	*Buteo vulpinus*	NBM-C		23	x
150	Forest Buzzard	*Buteo trizonatus*	E-U		1	
152	Jackal Buzzard	*Buteo rufofuscus*	E-C		32	xx
155	Rufous-chested Sparrowhawk	*Accipiter rufiventris*	R-U			
157	Little Sparrowhawk	*Accipiter minullus*	R-C		2	
158	Black Sparrowhawk	*Accipiter melanoleucus*	R-C		1	
160	African Goshawk	*Accipiter tachiro*	R-C		2	
161	Gabar Goshawk	*Melierax gabar*	R-C			
162	Southern Pale Chanting Goshawk	*Melierax canorus*	Er-C		22	

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
165	African Marsh-Harrier	*Circus ranivorus*	R-C	Vu	1	
167	Pallid Harrier	*Circus macrourus*	NBM-R	NT		
168	Black Harrier	*Circus maurus*	E-U	Vu	11	x
169	African Harrier-Hawk	*Polyboroides typus*	R-C		13	
171	Peregrine Falcon	*Falco peregrinus*	R/NBM-R	NT		x
172	Lanner Falcon	*Falco biarmicus*	R-C	NT	7	
173	Eurasian Hobby	*Falco subbuteo*	NBM-U		1	
180	Amur Falcon	*Falco amurensis*	NBM-C			x
181	Rock Kestrel	*Falco rupicolis*	R-C		37	xx
183	Lesser Kestrel	*Falco naumanni*	NBM-VC	Vu		
190	Grey-winged Francolin	*Scleroptila africanus*	E-C		6	
192	Red-winged Francolin	*Scleroptila levaillantii*	R-C		6	xx
198	Red-necked Spurfowl	*Pternistis afer*	R-LC		30	
200	Common Quail	*Coturnix coturnix*	R/BM/NBM-C		12	xx
203	Helmeted Guineafowl	*Numida meleagris*	R-VC		44	
208	Blue Crane	*Anthropoides paradisea*	E-U	Vu	11	
209	Grey Crowned Crane	*Balearica regulorum*	R-C	Vu	1	
210	African Rail	*Rallus caerulescens*	R/BM-C			
213	Black Crake	*Amaurornis flavirostris*	R-C		1	
215	Baillon's Crake	*Porzana pusilla*	R-C		1	
217	Red-chested Flufftail	*Sarothrura rufa*	R-C			
218	Buff-spotted Flufftail	*Sarothrura elegans*	R-C			
221	Striped Flufftail	*Sarothrura affinis*	R-U	Vu		
223	African Purple Swamphen	*Porphyrio madagascariensis*	R-C			
226	Common Moorhen	*Gallinula chloropus*	R-C		26	
228	Red-knobbed Coot	*Fulica cristata*	R-A		26	
229	African Finfoot	*Podica senegalensis*	R-U	Vu	1	
230	Kori Bustard	*Ardeotis kori*	R-R	Vu		
231	Denham's Bustard	*Neotis denhami*	R-U	Vu	12	

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
239	Southern Black Korhaan	*Eupodotis afra*	E-VC		23	
240	African Jacana	*Actophilornis africanus*	R-VC		6	
242	Greater Painted Snipe	*Rostratula benghalensis*	R-U	NT	1	
248	Kittlitz's Plover	*Charadrius pecuarius*	R-C		7	
249	Three-banded Plover	*Charadrius tricollaris*	R-C		28	
255	Crowned Lapwing	*Vanellus coronatus*	R-C		41	
257	Black-winged Lapwing	*Vanellus melanopterus*	R/BM-LC	NT	2	
258	Blacksmith Lapwing	*Vanellus armatus*	R-VC		48	
264	Common Sandpiper	*Actitis hypoleucos*	NBM-C		2	
266	Wood Sandpiper	*Tringa glareola*	NBM-C		3	
269	Marsh Sandpiper	*Tringa stagnatilis*	NBM-C		3	
270	Common Greenshank	*Tringa nebularia*	NBM-C			
274	Little Stint	*Calidris minuta*	NBM-C		2	
284	Ruff	*Philomachus pugnax*	NBM-C			
286	African Snipe	*Gallinago nigripennis*	R-LC		3	
295	Black-winged Stilt	*Himantopus himantopus*	R-C		1	
297	Spotted Thick-knee	*Burhinus capensis*	R-C		30	
298	Water Thick-knee	*Burhinus vermiculatus*	R-C			
338	Whiskered Tern	*Chlidonias hybridus*	R(n)-LC		1	
348	Rock Dove	*Columba livia*	R-A		6	
349	Speckled Pigeon	*Columba guinea*	R-C		31	x
350	African Olive-Pigeon	*Columba arquatrix*	R-LC		16	
352	Red-eyed Dove	*Streptopelia semitorquata*	R-C		52	
354	Cape Turtle-Dove	*Streptopelia capicola*	R-VC		88	
355	Laughing Dove	*Streptopelia senegalensis*	R-VC		49	
356	Namaqua Dove	*Oena capensis*	R-VC		2	
358	Emerald-spotted Wood-Dove	*Turtur chalcospilos*	R-C		31	
359	Tambourine Dove	*Turtur tympanistria*	R-C		4	
360	Lemon Dove	*Aplopelia larvata*	R-C			

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
361	African Green-Pigeon	*Treron calva*	R-C			
370	Knysna Turaco	*Tauraco corythaix*	E-C		30	
377	Red-chested Cuckoo	*Cuculus solitarius*	BM-C		3	
378	Black Cuckoo	*Cuculus clamosus*	BM-C		10	
382	Jacobin Cuckoo	*Clamator jacobinus*	BM-C		2	
384	African Emerald Cuckoo	*Chrysococcyx cupreus*	R/BM-C			
385	Klaas's Cuckoo	*Chrysococcyx klaas*	R/BM-C		12	
386	Diderick Cuckoo	*Chrysococcyx caprius*	BM-VC		14	
391	Burchell's Coucal	*Centropus burchellii*	R-C		16	
392	Barn Owl	*Tyto alba*	R-C		1	
394	African Wood-Owl	*Strix woodfordii*	R-C			
395	Marsh Owl	*Asio capensis*	R-C			
396	African Scops-Owl	*Otus senegalensis*	R-C			
400	Cape Eagle-Owl	*Bubo capensis*	R-U			
401	Spotted Eagle-Owl	*Bubo africanus*	R-C		2	
404	European Nightjar	*Caprimulgus europaeus*	R-U			
405	Fiery-necked Nightjar	*Caprimulgus pectoralis*	R/BM-C			
411	Common Swift	*Apus apus*	NBM-C			
412	African Black Swift	*Apus barbatus*	R-C		2	
415	White-rumped Swift	*Apus caffer*	BM-VC		18	x
416	Horus Swift	*Apus horus*	BM-LC		3	
417	Little Swift	*Apus affinis*	R/BM-VC		2	
418	Alpine Swift	*Tachymarptis melba*	BM-C		2	xx
424	Speckled Mousebird	*Colius striatus*	R-C		69	
426	Red-faced Mousebird	*Urocolius indicus*	R-C		40	
427	Narina Trogon	*Apaloderma narina*	R-U			
428	Pied Kingfisher	*Ceryle rudis*	R-C		28	
429	Giant Kingfisher	*Megaceryle maxima*	R-U		24	
430	Half-collared Kingfisher	*Alcedo semitorquata*	R-U	NT	5	

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
431	Malachite Kingfisher	*Alcedo cristata*	R-C		10	
435	Brown-hooded Kingfisher	*Halcyon albiventris*	R-C		55	
446	European Roller	*Coracias garrulus*	NBM-C			
451	African Hoopoe	*Upupa africana*	R(n)-C		61	
452	Green Wood-Hoopoe	*Phoeniculus purpureus*	R-C		44	
455	Trumpeter Hornbill	*Bycanistes bucinator*	R-C			
460	Crowned Hornbill	*Tockus alboterminatus*	R-C		29	
463	Southern Ground-Hornbill	*Bucorvus leadbeateri*	R-LC	Vu		
464	Black-collared Barbet	*Lybius torquatus*	R-C		56	
465	Acacia Pied Barbet	*Tricholaema leucomelas*	Er-C		22	
469	Red-fronted Tinkerbird	*Pogoniulus pusillus*	R-C		37	
474	Greater Honeyguide	*Indicator indicator*	R-U		7	
475	Scaly-throated Honeyguide	*Indicator variegatus*	R-U			
476	Lesser Honeyguide	*Indicator minor*	R-LC		19	
478	Brown-backed Honeybird	*Prodotiscus regulus*	R-U			
480	Ground Woodpecker	*Geocolaptes olivaceus*	E-LC		1	
484	Knysna Woodpecker	*Campethera notata*	E-U	NT	14	
486	Cardinal Woodpecker	*Dendropicos fuscescens*	R-C		16	
488	Olive Woodpecker	*Dendropicos griseocephalus*	R-C		6	
489	Red-throated Wryneck	*Jynx ruficollis*	R-C		22	
494	Rufous-naped Lark	*Mirafra africana*	R-C		20	xx
495.2	Eastern Clapper Lark	*Mirafra fasciolata*	Er-C		18	
507	Red-capped Lark	*Calandrella cinerea*	R(n)-C		8	
518	Barn Swallow	*Hirundo rustica*	NBM-A		25	x
520	White-throated Swallow	*Hirundo albigularis*	BM-C		36	
523	Pearl-breasted Swallow	*Hirundo dimidiata*	R/BM-C		13	
526	Greater Striped Swallow	*Hirundo cucullata*	BM-C		21	
527	Lesser Striped Swallow	*Hirundo abyssinica*	R/BM-C		25	
529	Rock Martin	*Hirundo fuligula*	R-C		35	x

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
530	Common House-Martin	*Delichon urbica*	NBM-LC		7	
532	Sand Martin	*Riparia riparia*	NBM-C			
533	Brown-throated Martin	*Riparia paludicola*	R-C		14	
534	Banded Martin	*Riparia cincta*	BM-U		1	
536	Black Saw-wing	*Psalidoprocne holomelaena*	E-LC		20	
538	Black Cuckooshrike	*Campephaga flava*	R-U		3	
540	Grey Cuckooshrike	*Coracina caesia*	R-U		2	
541	Fork-tailed Drongo	*Dicrurus adsimilis*	R-C		79	
543	Eurasian Golden Oriole	*Oriolus oriolus*	NBM-U			
545	Black-headed Oriole	*Oriolus larvatus*	R-C		60	
547	Cape Crow	*Corvus capensis*	R-C		62	x
548	Pied Crow	*Corvus albus*	R-A		2	
550	White-necked Raven	*Corvus albicollis*	R-C		33	xxx
551	Grey Tit	*Parus afer*	E-U		3	
554	Southern Black Tit	*Parus niger*	Er-C		29	
557	Cape Penduline-Tit	*Anthoscopus minutus*	Er-C		4	
568	Dark-capped Bulbul	*Pycnonotus tricolor*	R-VC		80	
569	Terrestrial Brownbul	*Phyllastrephus terrestris*	R-C		9	
572	Sombre Greenbul	*Andropadus importunus*	R-C		64	
577	Olive Thrush	*Turdus olivaceus*	R-C		42	
581	Cape Rock-Thrush	*Monticola rupestris*	E-C		12	
588	Buff-Streaked Chat	*Oenanthe bifasciata*	Er-C			
589	Familiar Chat	*Cercomela familiaris*	R-C		31	
593	Mocking Cliff-Chat	*Thamnolaea cinnamomeiventris*	R-C		6	
595	Anteating Chat	*Myrmecocichla formicivora*	E-C		16	
596	African Stonechat	*Saxicola torquata*	R-VC		36	xxx
598	Chorister Robin-Chat	*Cossypha dichroa*	E-LC		1	
601	Cape Robin-Chat	*Cossypha caffra*	R-C		65	
606	White-starred Robin	*Pogonocichla stellata*	R(lm)-LC			

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
613	White-browed Scrub-Robin	*Cercotrichas leucophrys*	R-C		8	
614	Karoo Scrub-Robin	*Cercotrichas coryphoeus*	E-C		20	
616	Brown Scrub-Robin	*Cercotrichas signata*	E-LC		1	
619	Garden Warbler	*Sylvia borin*	NBM-C			
621	Chestnut-vented Tit-Babbler	*Parisoma subcaeruleum*	Er-C		12	
631	African Reed-Warbler	*Acrocephalus baeticatus*	BM-C		1	
633	Marsh Warbler	*Acrocephalus palustris*	NBM-C			
634	Sedge Warbler	*Acrocephalus schoenobaenus*	NBM-C			
635	Lesser Swamp-Warbler	*Acrocephalus gracilirostris*	R-C		9	
638	Little Rush-Warbler	*Bradypterus baboecala*	R-C		7	
639	Barratt's Warbler	*Bradypterus barratti*	E-LC		1	
643	Willow Warbler	*Phylloscopus trochilus*	NBM-VC		4	
644	Yellow-throated Woodland-Warbler	*Phylloscopus ruficapilla*	R-C			
645	Bar-throated Apalis	*Apalis thoracica*	R-C		43	
648	Yellow-breasted Apalis	*Apalis flavida*	R-C		10	
651	Long-billed Crombec	*Sylvietta rufescens*	R-C		14	
657	Green-backed Camaroptera	*Camaroptera brachyura*	R-C		14	
661	Cape Grassbird	*Sphenoeacus afer*	E-LC		1	xx
664	Zitting Cisticola	*Cisticola juncidis*	R-VC		2	
666	Cloud Cisticola	*Cisticola textrix*	R-C		1	x
667	Wing-snapping Cisticola	*Cisticola ayresii*	R-C			
669	Grey-backed Cisticola	*Cisticola subruficapillus*	Er-C		11	
670	Wailing Cisticola	*Cisticola lais*	R-C			xxx
677	Levaillant's Cisticola	*Cisticola tinniens*	R-C		12	
679	Lazy Cisticola	*Cisticola aberrans*	R-C		7	xx
681	Neddicky	*Cisticola fulvicapillus*	R-C		74	x
683	Tawny-flanked Prinia	*Prinia subflava*	R-C		20	
686	Karoo Prinia	*Prinia maculosa*	E-C		27	
689	Spotted Flycatcher	*Muscicapa striata*	NBM-C		7	

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
690	African Dusky Flycatcher	*Muscicapa adusta*	R-C		13	
694	Southern Black Flycatcher	*Melaenornis pammelaina*	R-C		21	
698	Fiscal Flycatcher	*Sigelus silens*	E-C		69	
700	Cape Batis	*Batis capensis*	R-C		26	
701	Chinspot Batis	*Batis molitor*	R-C		23	
706	Fairy Flycatcher	*Stenostira scita*	E-C		1	
708	Blue-mantled Crested Flycatcher	*Trochocercus cyanomelas*	R-U			
710	African Paradise-Flycatcher	*Terpsiphone viridis*	BM-C		29	
711	African Pied Wagtail	*Motacilla aguimp*	R-C		1	
712	Mountain Wagtail	*Motacilla clara*	R-U		2	
713	Cape Wagtail	*Motacilla capensis*	R-C		75	
714	Yellow Wagtail	*Motacilla flava*	NBM-U		1	
716	African Pipit	*Anthus cinnamomeus*	R-C		36	
717	Long-billed Pipit	*Anthus similis*	R-C		4	
718	Plain-backed Pipit	*Anthus leucophrys*	R-C		1	xx
727	Cape Longclaw	*Macronyx capensis*	E-C		31	xx
732	Common Fiscal	*Lanius collaris*	R-C		83	x
733	Red-backed Shrike	*Lanius collurio*	NBM-C		2	
736	Southern Boubou	*Laniarius ferrugineus*	E-C		45	
740	Black-backed Puffback	*Dryoscopus cubla*	R-C		5	
742	Southern Tchagra	*Tchagra tchagra*	E-U		12	
746	Bokmakierie	*Telophorus zeylonus*	Er-C		50	x
748	Orange-breasted Bush-Shrike	*Telophorus sulfureopectus*	R-C		1	
750	Olive Bush-Shrike	*Telophorus olivaceus*	Er-LC		11	
751	Grey-headed Bush-Shrike	*Malaconotus blanchoti*	R-C		3	
757	Common Starling	*Sturnus vulgaris*	R-VC		41	
759	Pied Starling	*Spreo bicolor*	E-C		39	
760	Wattled Starling	*Creatophora cinerea*	R(n)-LA		6	
764	Cape Glossy Starling	*Lamprotornis nitens*	Er-C		81	

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
769	Red-winged Starling	*Onychognathus morio*	R-VC		61	x
773	Cape Sugarbird	*Promerops cafer*	E-C		3	
775	Malachite Sunbird	*Nectarinia famosa*	R-C		34	
783	Southern Double-collared Sunbird	*Cinnyris chalybea*	E-C		16	
785	Greater Double-collared Sunbird	*Cinnyris afra*	E-C		49	
789	Grey Sunbird	*Cyanomitra veroxii*	R-C		6	
792	Amethyst Sunbird	*Chalcomitra amethystina*	R-C		39	
793	Collared Sunbird	*Hedydipna collaris*	R-C		8	
796	Cape White-eye	*Zosterops virens*	E-VC		54	
801	House Sparrow	*Passer domesticus*	R-VC		35	
803	Cape Sparrow	*Passer melanurus*	Er-VC		6	
804	Southern Grey-headed Sparrow	*Passer diffusus*	Er-C		33	
805	Yellow-throated Petronia	*Petronia superciliaris*	R-U		3	
807	Thick-billed Weaver	*Amblyospiza albifrons*	R-C		6	
808	Dark-backed Weaver	*Ploceus bicolor*	R-LC		8	
810	Spectacled Weaver	*Ploceus ocularis*	R-C		8	
811	Village Weaver	*Ploceus cucullatus*	R-VC		32	
813	Cape Weaver	*Ploceus capensis*	E-C		54	
814	Southern Masked-Weaver	*Ploceus velatus*	R-C		19	
817	Yellow Weaver	*Ploceus subaureus*	R-LC		4	
821	Red-billed Quelea	*Quelea quelea*	R(n)-LA		4	
824	Southern Red Bishop	*Euplectes orix*	R-C		22	
827	Yellow Bishop	*Euplectes capensis*	R(n)-LC		6	xx
831	Red-collared Widowbird	*Euplectes ardens*	R(n)-LC		4	xx
832	Long-tailed Widowbird	*Euplectes progne*	R(n)-C		4	x
840	African Firefinch	*Lagonosticta rubricata*	R-C		12	
846	Common Waxbill	*Estrilda astrild*	R-C		16	
850	Swee Waxbill	*Estrilda melanotis*	Er-LC		3	
852	African Quailfinch	*Ortygospiza atricollis*	R-C		15	xx

Roberts no.	English name	Scientific name	Status***	IUCN RDB**	SABAP %*	Mountain drive****
857	Bronze Mannikin	*Lonchura cucullata*	R-VC		1	
860	Pin-tailed Whydah	*Vidua macroura*	R(n)-C		28	
864	Dusky Indigobird	*Vidua funerea*	R(n)-LC		1	
869	Yellow-fronted Canary	*Serinus mozambicus*	R-C		43	
872	Cape Canary	*Serinus canicollis*	R-VC		36	x
873	Forest Canary	*Serinus scotops*	E-LC		4	
877	Brimstone Canary	*Serinus sulphuratus*	R(n)-U		21	
878	Yellow Canary	*Serinus flaviventris*	Er-C		2	
879	White-throated Canary	*Serinus albogularis*	Er-C		2	
881	Streaky-headed Seedeater	*Serinus gularis*	R-C		32	
884	Golden-breasted Bunting	*Emberiza flaviventris*	R-U		21	
885	Cape Bunting	*Emberiza capensis*	R-C		5	
886	Cinnamon-breasted Bunting	*Emberiza tahapisi*	R(n)-LC		3	x

* SABAP % refers percentage of the total cards for the map unit 3326 AD submitted to the South African Bird Atlas Project on which this species was recorded.

****IUCN RDS refers to the IUCN red data status of species.**

CR	Critically Endangered	VU	Vulnerable
EN	Endangered	NT	Near Threatened

*****Status refers to the occurrence status of species**

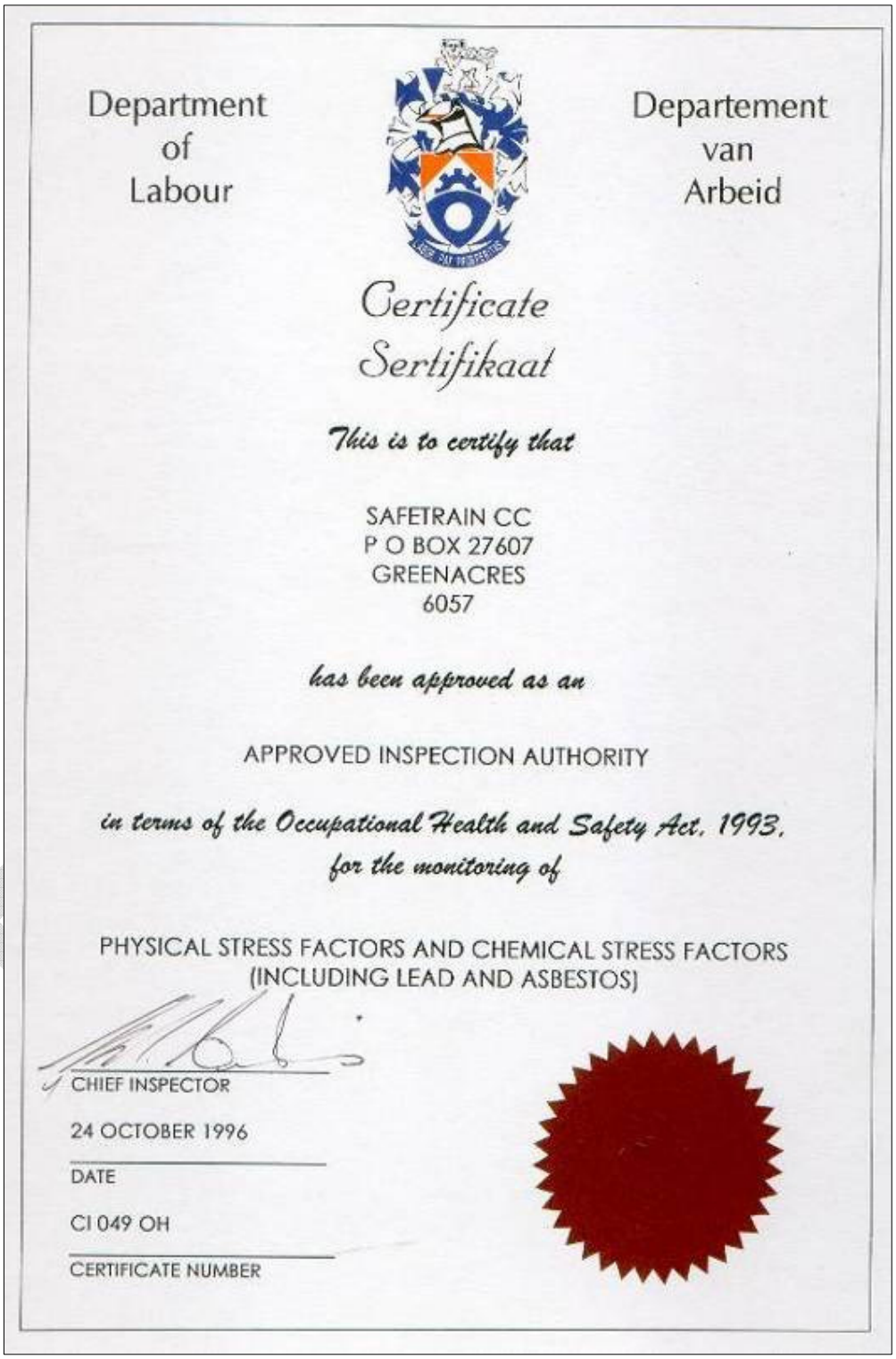
R=Resident	A=Abundant
E=Endemic	VC=Very Common
BM=Breeding Migrant	C=Common
NBM=Non-Breeding Migrant	U=Uncommon
V=Vagrant	R=Rare

**** Galpin's list

XXX = Good Chance
XX = Chance
X = Small Chance

APPENDIX E: NOISE

APPENDIX E-1: AIA Certificate



Department of Labour

Departement van Arbeid

Certificate
Sertifikaat

This is to certify that

SAFETRAIN CC
P O BOX 27607
GREENACRES
6057

has been approved as an

APPROVED INSPECTION AUTHORITY

in terms of the Occupational Health and Safety Act, 1993,
for the monitoring of

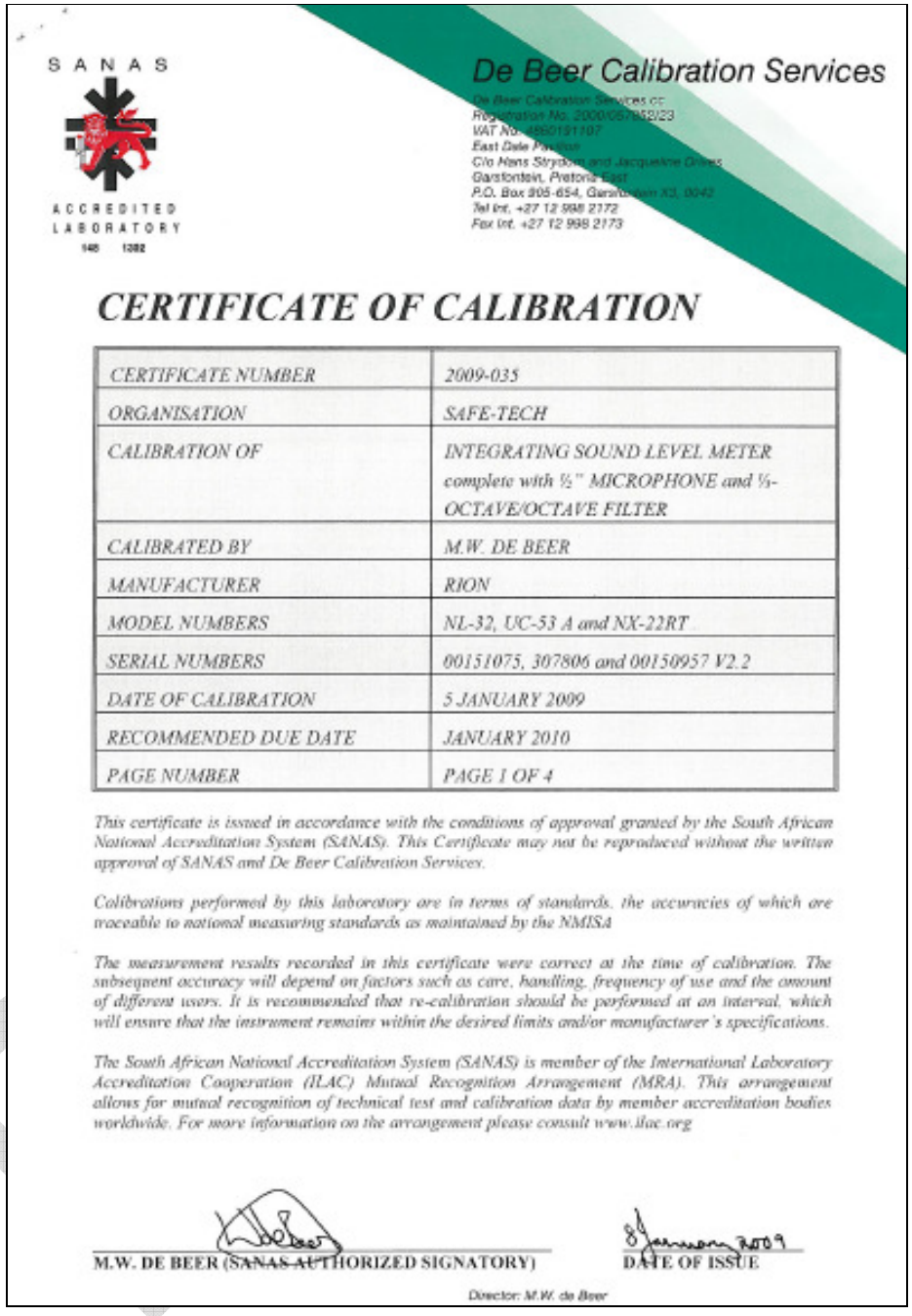
PHYSICAL STRESS FACTORS AND CHEMICAL STRESS FACTORS
(INCLUDING LEAD AND ASBESTOS)

CHIEF INSPECTOR

24 OCTOBER 1996
DATE

CI 049 OH
CERTIFICATE NUMBER

APPENDIX E-2: Calibration Certificate



SANAS
ACCREDITED
LABORATORY
1145 1282

De Beer Calibration Services

De Beer Calibration Services cc
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CERTIFICATE OF CALIBRATION

CERTIFICATE NUMBER	2009-035
ORGANISATION	SAFE-TECH
CALIBRATION OF	INTEGRATING SOUND LEVEL METER complete with ½" MICROPHONE and ⅓-OCTAVE/OCTAVE FILTER
CALIBRATED BY	M.W. DE BEER
MANUFACTURER	RION
MODEL NUMBERS	NL-32, UC-53 A and NX-22RT
SERIAL NUMBERS	00151075, 307806 and 00150957 V2.2
DATE OF CALIBRATION	5 JANUARY 2009
RECOMMENDED DUE DATE	JANUARY 2010
PAGE NUMBER	PAGE 1 OF 4

This certificate is issued in accordance with the conditions of approval granted by the South African National Accreditation System (SANAS). This Certificate may not be reproduced without the written approval of SANAS and De Beer Calibration Services.

Calibrations performed by this laboratory are in terms of standards, the accuracies of which are traceable to national measuring standards as maintained by the NMISA

The measurement results recorded in this certificate were correct at the time of calibration. The subsequent accuracy will depend on factors such as care, handling, frequency of use and the amount of different users. It is recommended that re-calibration should be performed at an interval, which will ensure that the instrument remains within the desired limits and/or manufacturer's specifications.

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M.W. DE BEER (SANAS AUTHORIZED SIGNATORY)

8 January 2009
DATE OF ISSUE

Director: M.W. de Beer

APPENDIX E-3: Typical Sound Power and Sound Pressure Levels

Acoustic Power	Degree		Pressure Level	Source
32 GW	Deafening		225 dB	12" Cannon @ 12ft in front and below
25 to 40 MW			195 dB	Saturn Rocket
100 kW			170 dB	Turbojet engine with afterburner
10 kW			160 dB	Turbojet engine, 7000lb thrust
1 kW			150 dB	4 Propeller Airliner
100 W			140 dB	Artillery Fire
10 W	Threshold of pain		130 dB	Pneumatic Rock Drill
				130 dB causes immediate ear damage
3 W			125 dB	Small aircraft engine
1.0 W			120 dB	Thunder
100 mW			110 dB	Close to train
10 mW	Very Loud		100 dB	Home lawn mower
1 mW			90 dB	Symphony or a Band
				85 dB regularly can cause ear damage
100 uW	Loud		80 dB	Police whistle
10 uW			70 dB	Average radio
1 uW	Moderate		60 dB	Normal conversational voice
100 nW			50 dB	Quiet stream
10 nW	Faint		40 dB	Quiet conversation
1 nW			30 dB	Very soft whisper
100 pW	Very faint		20 dB	Ticking of a watch
10 pW	Threshold of hearing		10 dB	
1 pW			0 dB	Absolute silence

APPENDIX E-4: Sound Perception

Change in Sound Level	Perception
3 dB	Barely perceptible
5 dB	Clearly perceptible
10 dB	Twice as loud