

# APPENDICES

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## **Appendix 1: Glossary of terms<sup>1</sup>**

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### **Air mass**

A meteorological term referring to an extensive body of air within which the conditions of temperature and moisture in a horizontal plane are essentially uniform. (AFAC)

### **Assets**

Anything valued by people which includes houses, crops, forests and, in many cases, the environment. (AFAC)

### **Atmospheric stability**

The degree to which the atmosphere resists turbulence and vertical motion. (AFAC)

### **Available fuel**

The portion of the total fuel that would actually burn under various environmental conditions. (AFAC)

### **Blow up**

Sudden increase in fireline intensity or rate of spread of a fire sufficient to preclude direct control or to upset existing suppression plans. Often accompanied by violent convection and may have other characteristics of a fire storm. (NWCG)

### **Burning program**

A program of prescribed burns scheduled these for a designated area over a nominated time, normally looking ahead over one fire season (for the coming spring to the following autumn), but can also look ahead five years or more. (AFAC)

### **Burning rotation**

The period between reburning of a prescribed area for management purposes. (AFAC)

### **Burning unit**

A specified land area for which prescribed burning is planned. (AFAC) (Often referred to as a "block".)

### **Canopy**

The crowns of the tallest plants in a forest – the overstorey cover. (AFAC)

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<sup>1</sup> Adapted from

- 2009 UNISDR Terminology on Disaster Risk Reduction. United Nations International Strategy for Disaster Reduction (UNISDR) Geneva, Switzerland, May 2009.
- National Veld and Forest Fire Act (NVFFA)
- the National Disaster Management Act and Framework (NDMA)
- ISO 31000
- Australian Fire and Emergency Services Authorities Council Wildfire Terminology at [http://knowledgeweb.afac.com.au/national\\_data\\_and\\_glossary#afac\\_glossaries](http://knowledgeweb.afac.com.au/national_data_and_glossary#afac_glossaries) on 19 January 2010 (AFAC)
- National Wildfire Coordinating Group 2006. Glossary of Wildland Fire Terminology. National Wildfire Coordinating Group, USA, PMS 205, October 2006, at <http://www.fire.uni-freiburg.de/literature/US-NFCG-Fire-Mgmt-Glossary-2006.pdf> on 19 January 2010 (NWCG)
- AS/NZS 4360:2004 : Definition of terms in Risk Management, Australian/New Zealand Standard, AS/NZ 4360:2004. (AS4360)

**Climate**

The atmospheric conditions of a place over an extended period of time. (AFAC)

**Cold front**

A cold front is the delineation between cold polar air moving towards the equator and undercutting warm tropical air moving poleward. The temperature differences across a cold front can be extreme and associated with strong winds. The warm tropical air is forced to rise and become unstable with the development of large cumuliform clouds. Severe weather such as thunderstorms, squall lines and severe turbulence may accompany these cold fronts. (AFAC)

**Combustion**

Rapid oxidation of fuels producing heat, and often light. (AFAC)

**Comparative risk assessment**

Comparative risk assessment (CRA) is a set of procedures, i.e. a protocol, for the simultaneous assessment and ranking of diverse risks. The term distinguishes this protocol from the procedures employed for univalent risk assessment, where risks arising from the exposure of, usually, humans to for example a toxic compound are assessed through a dose-response relationship; i.e. an "objective characterization of the distribution of possible outcomes"<sup>2</sup>.

**Controlled burning**

See: Prescribed burning

**Consequence:** an adverse effect to health, property, the environment, or other things of value.

**Convection**

As applied in meteorology, atmospheric motions that are predominantly vertical, resulting in vertical transport and mixing of atmospheric properties; distinguished from advection. 2. As applied in thermodynamics convection, along with conduction and radiation, is a principal means of energy transfer. (AFAC)

**Convection column**

The rising column of smoke, ash, burning embers and other particle matter generated by a fire. (AFAC)

**Convective activity**

General term for manifestations of convection in the atmosphere, alluding particularly to the development of convective clouds and resulting weather phenomena, such as showers, thunderstorms, squalls, hail, and tornadoes. (NWCG)

**Crown fire**

A fire that advances from top to top of trees or shrubs. (AFAC)

**Direct attack**

A method of fire attack where wet or dry firefighting techniques are used. It involves suppression action right on the fire edge which then becomes the fireline. (AFAC)

**Disaster risk** refers to the chance that there will be a harmful impact of some kind due to the interaction between natural or other hazards and conditions of vulnerability. (NDMA).

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<sup>2</sup> Slovic and Weber op. cit.

**Ecological burning**

A form of prescribed burning. Treatment with fire of vegetation in nominated areas to achieve specified ecological objectives. (AFAC)

**Ecosystem services (UNISDR)**

The benefits that people and communities obtain from ecosystems.

**El Niño-Southern Oscillation phenomenon (UNISDR)**

A complex interaction of the tropical Pacific Ocean and the global atmosphere that results in irregularly occurring episodes of changed ocean and weather patterns in many parts of the world, often with significant impacts over many months, such as altered marine habitats, rainfall changes, floods, droughts, and changes in storm patterns.

**Evacuation**

The temporary relocation of persons from dangerous or potentially dangerous areas to safe areas. (AFAC).

**Extreme fire behaviour**

A level of wildfire behaviour characteristics that ordinarily precludes methods of direct suppression action. One or more of the following is usually involved:

- high rates of spread
- prolific crowning and/or spotting
- presence of fire whirls
- a strong convective column.

Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously. (AFAC).

**Fine fuel**

Fuel such as grass, leaves, bark and twigs less than 6 mm in diameter that ignite readily and are burnt rapidly when dry. (AFAC)

**Fire activity**

A general term for the incidence, kind and behaviour of veldfire; see also fire regime.

**Fire behaviour**

The manner in which a fire reacts to the variables of fuel, weather and topography. (AFAC).

**Fire climate**

The composite pattern or integration over time of the fire weather elements that affect fire occurrence and fire behaviour in a given area. (AFAC).

**Fire-ecology type**

A class of vegetation types that is relatively uniform in terms of the fire regimes within the constituent vegetation types (this study).

**Fire danger**

Sum of constant danger and variable danger factors affecting the inception, spread, and resistance to control, and subsequent fire damage; often expressed as an index. (NWCG)

**Fire danger index (FDI)**

A relative number denoting an evaluation of rate of spread, or suppression difficulty for specific combinations of temperature, relative humidity, drought effects and wind speed. The numbers may range from 1 to 100. (AFAC).

**Fire danger rating**

A relative class denoting an evaluation of rate of spread, or suppression difficulty for specific combinations of temperature, relative humidity, drought effects and wind speed. Rated as low, moderate, high, very high or extreme, indicating the relative evaluation of fire danger. (AFAC).

**Fire danger region**

A region determined according to Section 9(3) of the National Veld and Forest Fire Act for the purposes of fire danger rating. (NVFFA).

**Fire ecology**

The study of the relationships between fire, the physical environment and living organisms. (AFAC).

**Fire environment**

The surrounding conditions, influences, and modifying forces of topography, fuel, and weather that determine fire behaviour. (NWCG).

**Fire frequency**

A general term referring to the recurrence of fire in a given area over time (NWCG). Also see: *Fire regime*

**Fire front**

The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified, the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smouldering combustion. (NWCG).

**Fire hazard**

A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control. (AFAC).

**Fire incidence**

The statistical occurrence of fire in a specified geographical area (this project).

**Fire intensity (also, Frontal fire intensity)**

The rate of energy release per unit length of fire front usually expressed in kilowatts per metre (Kw/m) (AFAC).

The rate of energy release per unit length of fire front, defined by the equation

$$I = Hwr, \text{ where}$$

I = fireline intensity (kW/m)

H = heat yield of fuel (kJ/kg)-16,000 kJ/kg

w = dry weight of fuel consumed (kg/m<sup>2</sup>) (mean total less mean unburnt)

r = forward rate of spread (m/s)

The equation can be simplified to

$$I = w r/2 \text{ where}$$

I = fireline intensity (kW/m)

w = dry weight of fuel consumed (tonnes/ha)  
r = forward rate of spread (m/hr)  
(AFAC)

**Fire management**

All activities associated with the management of fire prone land, including the use of fire to meet land management goals and objectives. (AFAC).

**Fire preparedness**

All activities undertaken in advance of wildfire occurrence to decrease its extent and severity and to ensure more effective fire suppression. (AFAC).

**Fire prevention**

All activities concerned with minimising the incidence of wildfire particularly those of human origin. (AFAC).

**Fire Protection Associations**

A local institution formed by landowners or their agents for the purpose of predicting, preventing, managing and extinguishing veldfires and established in terms of Section 3(1) of the National Veld and Forest Fire Act. (NVFFA).

**Fire regime**

The history of fire in a particular vegetation type or area including the frequency, intensity and season of burning. (AFAC).

**Fire risk scenario**

A particular fire hazard scenario relevant to one or more fire ecotypes defined to represent the plausible normative fire risk, and defined in terms of cause, season, fuel conditions, weather, fire behaviour, and potential consequence. (This project).

**Fire season**

The period during which wildfires are likely to occur, spread and do sufficient damage to warrant organised fire control. (AFAC).

**Fire severity**

The degree to which a fire is destructive of life, property or environmental values; this is usually a function of the duration (residence time) of a fire and its intensity.

**Fire storm**

Violent convection caused by a large continuous area of intense wildfire often characterised by destructively violent surface indrafts, a towering convection column, long distance spotting, and sometimes by tornado-like whirlwinds. (AFAC).

**Fire weather**

Weather conditions which influence fire ignition, behaviour, and suppression. (NWCG).

**Flame length**

The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface), an indicator of fire intensity. (NWCG)

**Flammability**

The ease with which a substance is set on fire. (AFAC)

**Flammable**

Capable of being ignited and of burning with a flame. (AFAC)

**Focus group**

A focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs and attitudes towards a product, service, concept, advertisement, idea, or packaging. Questions are asked in an interactive group setting where participants are free to talk with other group members. [Wikipedia]

**Forest**

An area, incorporating all living and non-living components, that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding 2 metres and with existing or potential crown cover of overstorey strata about equal to or greater than 20 per cent. (AFAC) This definition includes South Africa's diverse native forests, woodlands and plantations, regardless of age. (See National Forests Act)

**Forest fire**

A fire burning mainly in forest and/or woodland. (AFAC)

**Forward rate of spread (FROS)**

The speed with which a head fire moves in a horizontal direction across the landscape. (AFAC)

**Fuel**

Any material such as grass, leaf litter and live vegetation which can be ignited and sustains a fire. Fuel is usually measured in tonnes per hectare. Related Terms: Available fuel, Coarse fuel, Dead fuel, Ground fuel, Elevated dead fuel, Fine fuel Ladder fuels, Surface fuels, and Total fine fuel. (AFAC).

**Fuel age**

The period of time lapsed since the fuel was last burnt. (AFAC).

**Firebreak**

A natural or manmade change in fuel characteristics which affects fire behaviour so that fires burning into them can be more readily controlled. (AFAC).

**Fuel load**

The oven dry weight of fuel per unit area. Commonly expressed as tonnes per hectare. (AFAC). (Also known as fuel loading)

**Fuel moisture content**

The water content of a fuel expressed as a percent of the oven dry weight of the fuel particle. (% ODW). (AFAC).

**Fuel reduction burning**

The planned application of fire to reduce hazardous fuel quantities; undertaken in prescribed environmental conditions within defined boundaries. (AFAC).

**Fuel reduction**

Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control. (AFAC).

**Gross geographic value added**

The concept of Gross Geographic Value Added (GVA) is broadly similar to what is more generally known as Gross Geographic Product (GGP). In essence GVA (factor cost) is compensation of employees + gross operating surplus.

**Hazard**

A source of potential harm or a situation with potential to cause loss. (AFAC).

**Humus**

Layer of decomposed organic matter on the forest floor beneath the fermentation layer and directly above the soil. It is that part of the duff in which decomposition has rendered vegetation unrecognizable and mixing of soil and organic matter is underway. See Also: Duff & Litter. (AFAC).

**Ignition**

The beginning of flame production or smouldering combustion; the starting of a fire. (AFAC)

**Ignition source**

A source of energy sufficient to initiate combustion. (AFAC).

**Key informant**

A particular subject who is an especially useful source of information, be repeatedly interviewed, and thus earn designation as a key informant (Blackwell Encyclopaedia of Anthropology).

**Likelihood**

The chance of something happening. Note that in risk management terminology, "likelihood is used with the intent that it should have the same broad interpretation as the term "probability" has in many languages other than English. In English "probability" is often narrowly interpreted as a mathematical term. (ISO 31000 Risk management – Principles and guidelines, First edition 2009-11-15)

**Linguistic scale**

A scale defined in words, such as high, medium, low, or probable, likely, unlikely, or rare; a verbal scale. (This project)

**Mean living level**

MLL is defined as "the minimum monthly income needed to sustain a household". This numerical indicator varies according to household size; i.e. the larger the household, the higher the income required to keep its members out of poverty. MLL includes the following items: food, clothing, compulsory payments to local authorities in respect of rent, miscellaneous services, water and electricity, fuel and energy for lighting and heating, washing and cleaning materials, education, transport, contributions to medical funds and medical and dental expenses, replacement of household equipment, taxes and support of relatives. The poverty indicator is based on the Bureau of Market Research's Minimum Living Level. It seeks to identify the absolute number of people living below the minimum living level. Other than being a mere indication of the percentage of people living below this line, which can hide the extent of the



developmental challenge in especially high-population areas, MLL provides the absolute number of people living below this level, which is useful for planning purposes. (Bureau of Market Research. Research report 3/19 on Minimum Living Levels. UNISA, Pretoria).

**Megafires**

A veldfire or concurrent series of veldfires that is in the upper percentile of the fire regime. (This project)

**Mitigation:** any risk management measure that reduces risk, including fuel reduction burning, other prevention measures, preparedness and so on. (This project)

**Non-natural deaths**

include all deaths that were not due to, or may not have been due to, natural causes and that in terms of the Inquests Act are subject to medico-legal investigation. We have grouped these non-natural deaths by external cause of death and apparent manner of death. (This project)

**Normative fire risk**

The characterised fire risk that determines the fire risk management plan for a given management area (e.g. Local Municipality). (This project)

**Numerical scale**

A scale that uses numbers, such as 1 to 5, or 1 to 10. May be quantitative scale or a semi-quantitative scale. Usually associated with verbal descriptions or definitions attached to each number. (This project)

**Peat**

An amorphous organic material formed by anaerobic decomposition which usually means that the area is seasonally or permanently inundated with water. Peat fires burn by smouldering combustion and generate very high amounts of energy per unit area. (AFAC)

**Preparedness**

All activities undertaken in advance of the occurrence of an incident to decrease the impact, extent and severity of the incident and to ensure more effective response activities. (AFAC)

**Prescribed burn**

A fire utilized for Prescribed burning. (AFAC)

**Prescribed burning**

The controlled application of fire under specified environmental conditions to a predetermined area and at the time, intensity, and rate of spread required to attain planned resource management objectives. It is undertaken in specified environmental conditions. (AFAC)

**Prescribed fire**

Any fire ignited by management actions to meet specific objectives. A written, approved burn plan must exist, and approving agency requirements (where applicable) must be met, prior to ignition. (AFAC)

**Prevention**

All activities concerned with minimising the occurrence of incidents, particularly those of human origin. (AFAC)

**Probability**

A measure of the chance of occurrence expressed as a number between 0 and 1, for a specified time period, and set of conditions. (AS/NZS 4360)

**Quantitative scale**

A scale that quantifies a variable in a way that allows meaningful calculations within itself, such as adding and subtracting, or multiplying and dividing by another factor.

**Rate of spread (ROS)**

The speed with which a fire moves in a horizontal direction across the landscape at a specified part of the fire perimeter. See also Forward rate of spread. (AFAC)

**Reaction time**

The time taken between the report of a fire or incident, and the departure of the crew. See also Response time. (AFAC)

**Recovery**

The coordinated process of supporting emergency affected communities in reconstruction of the physical infrastructure and restoration of emotional, social, economic and physical wellbeing. (AFAC)

**Resilience**

The capacity of an ecosystem to recover after disturbance (this project)

**Residence time**

The time required for the flaming zone of a fire to pass a stationary point; the width of the flaming zone divided by the rate of spread of the fire. (AFAC)

**Residual risk**

The risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained. (UNISDR)

**Response**

Actions taken in anticipation of, during, and immediately after an incident to ensure that its effects are minimised, and that people affected are given immediate relief and support. (AFAC)

**Risk**

The exposure to the possibility of such things as economic or financial loss or gain, physical damage, injury or delay, as a consequence of pursuing a particular course of action. The concept of risk has two elements, i.e. the likelihood of something happening and the consequences if it happens. (AS/NZS 4360)

**Risk analysis**

A systematic use of available information to determine how often specific events may occur and the magnitude of their likely consequences. (AFAC)

**Risk assessment**

The overall process of *risk identification*, *risk analysis*, and *risk evaluation*. (AS/NZS 4360)

**Risk evaluation**

Process of comparing the level of risk against risk criteria. (AS/NZS 4360)

**Risk factor**

A risk factor is an underlying natural or human cause of a given level of risk. (AS/NZS 4360)

**Risk identification**

The process of determining what, where, when, why and how something could happen. (AS/NZS 4360)

**Risk management**

The culture, processes and structures that are directed towards realizing potential opportunities whilst managing adverse effects. Application of available resources in such a way that overall risk is minimized. (AS/NZS 4360)

**Risk management process**

The systematic application of management policies, procedures and practices to the tasks of communicating, establishing the context, identifying, analysing, evaluating, treating, monitoring and reviewing risk. (AS/NZS 4360)

**Risk management framework**

Set of elements of an organization's management system concerned with managing risk. (AS/NZS 4360)

**Risk mitigation**

An alternate expression for risk reduction.

**Risk reduction**

Actions taken to lessen the likelihood, negative consequences, or both, associated with a risk. (AS/NZS 4360)

**Rural**

Any area wherein residences and other developments are scattered and intermingled with forest, range, or farm land and native vegetation or cultivated crops. (AFAC)

**Specific risk scenario**

A written description of the specific risk that contains all the necessary information, to make a justifiable risk evaluation, described in a way that is meaningful and unambiguous. (This project)

**Spot fire**

Isolated fire started ahead of the main fire by sparks, embers or other ignited material, sometimes to a distance of several kilometres. (AFAC)

**Spotting**

Behaviour of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire. (NWCG)

**Unintentional injury deaths**

include all other unintentional non-transport injuries such as those due to burns, falls, poisoning and drowning.

**Urban-rural interface (URI)**

The line, area, or zone where structures and other human development adjoin or overlap with undeveloped bush land.

**Values at risk**

The natural resources or improvements that may be jeopardised if a fire occurs.

**Veldfire**

A vegetation fire outside the urban-rural interface; a general term to describe fire in vegetation. (This study)

**Vulnerability**

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. (UNISDR)

**Wildfire**

An unplanned vegetation fire. A generic term which includes grass fires, forest fires and scrub fires.

**Wildland Urban Interface (WUI)**

See: Urban-Rural Interface



## Appendix 2: Workshop participants and key informants

Workshop	Participant	Affiliation	Sector
<i>Bloemfontein</i>	Greg Forsyth	CSIR	Research ( <i>Study team member</i> )
	Fred Kruger	Consultant	Research ( <i>Study team member</i> )
	Mbulelo Kelly	DAFF	National Government
	Moses Khangale	DAFF	National Government
	M. Dladla	DAFF	National Government
	Q. Ndabankulu	DAFF	National Government
	Borrie Erasmus	WRSA	Game Farming
	Weitz Botes	Lejwelepulswa DC	Local Government
	A. Jordaan	UFS - Dimtec	Academic
	S. Rossouw	Working on Fire	National Government
	Malcolm Procter	DAFF	National Government
<i>Pretoria</i>	Greg Forsyth	CSIR	Research ( <i>Study team member</i> )
	Fred Kruger	Consultant	Research ( <i>Study team member</i> )
	Mbulelo Kelly	DAFF	National Government
	Moses Khangale	DAFF	National Government
	Le-Roy Pretorius	Tlokwe Fire Department	Local Government
	L.P. Edwards	Tlokwe Disaster Management	Local Government
	A.J Fouché	ABSA Insurance Co	Insurance
	G.J. Stapelberg	ABSA Insurance Co	Insurance
	Pumeza Tunzi	DAFF	National Government
	Leon Fritz	DAFF	National Government
	Andries Wiese	Mutual and Federal	Insurance
	Paul van Rensburg	Agri - Cullinan	Agriculture
	Freek Tomlinson	Agri - Gauteng	Agriculture
	Nic Opperman	Agri - SA	Agriculture
	Karen Frerichs	Santam	Insurance
	Elané Strauss	Santam	Insurance
	Pierre Rossouw	Santam	Insurance
	Julius Kgomanyane	DAFF – Forestry	National Government
	Jenny Kock	DAFF	National Government
	Solly Mabasa	Working on Fire	Public Entity
	Mpho Pila	DAFF – Agri DRM	National Government
	David Makote	DAFF – Agri DRM	National Government
	Kentse Setshedi	DAFF – Agri DRM	National Government
	Luke Radebe	DAFF – Fire Advisor	National Government
	Mmaphaka Tau	NDMC (COGTA)	National Government
	Thabo Mashepe	DAFF	National Government
	Linda Qwabe	DAFF – Legal Services	National Government
<i>Mbombela (Nelspruit)</i>	Greg Forsyth	CSIR	Research ( <i>Study team member</i> )
	Mbulelo Kelly	DAFF	National Government
	Moses Khangale	DAFF	National Government
	Andre Scheepers	Lowveld FPA / Mpumalanga Umbrella FPA	Fire Protection Association
	Trevor Philips	Letaba FPA	Fire Protection Association
	Mashao Esrom	DAFF	National Government
	Douglas Olen	Working on Fire	Public Entity
	Piet van der Merwe	Working on Fire	Public Entity
	Nick Zambatis	SAN Parks	Protected Area Management
	Gunter Prigge	Mkhondo FPA	Protected Area Management
	Stuart McPhail	Mondi	Forest
	Chris Swanepoel	SAPPI	Forest
	Mgidi Moses	DAFF	National Government

Workshop	Participant	Affiliation	Sector
	N.K. Mavhunga	DAFF	National Government
	Z. Mtotywe	DAFF	National Government
<i>Pietermaritzburg</i>	Greg Forsyth	CSIR	Research ( <i>Study team member</i> )
	Mbulelo Kelly	DAFF	National Government
	Ian M. Stewart	Grocane Fire Insurance	Insurance
	Trevor Wilson	Zululand FPA	Fire Protection Association
	Simon Thomas	KZN Umbrella FPA	Fire Protection Association
	Mike Chettiar	DAFF	National Government
	Gareth Smallbones	Safire Insurance	Insurance
	Ruth Bezuidenhout	Safire Insurance	Insurance
	Jurgen Scutte	Safire Insurance	Insurance
	Colin Smith	ICFR	Forest
	Hakkem Mahlatsi	Ezingoleni Municipality	Local Government
	Keith Archibald	Amatikulu / Ennoyeni Mill Group	Fire Protection Association
	Barry Symons	Umtshezi FPA	Fire Protection Association
	Will Endcumbe	SA Forestry Magazine	Forest
<i>King Williams Town</i>	Greg Forsyth	CSIR	Research ( <i>Study team member</i> )
	Mbulelo Kelly	DAFF	National Government
	J. Spangenberg	Cacadu District Municipality	Local Government
	Andre van Deventer	Amatole Forest Company	Forest
	M.C. Botha	Greater Stutterheim FPA	Fire Protection Association
	S.A. (Jan) Venter	Eastern Cape Parks	Protected Area Management
	Thabo Nokoyo	DAFF – Fire Advisor	National Government
	W.M. Neete	DAFF	National Government
	M. Malgas	DAFF	National Government
	Mandisa Nohashe	Cacadu District Municipality	Local Government
	T.K. Pitso	Ukhahlamba District Municipality	Local Government
	B.E. Malgas	DAFF	National Government
	M.R. Dinga	DAFF – Fire Advisor	National Government
	V. Sam	Makana Fire Department	Local Government
	T. Mangxila	DAFF	National Government
	K.G. Mashologu	DAFF	National Government
	S. Christian	Amatole District Municipality	Local Government
<i>Stellenbosch</i>	Greg Forsyth	CSIR	Research ( <i>Study team member</i> )
	David le Maitre	CSIR	Research ( <i>Study team member</i> )
	Fred Kruger	Consultant	Research ( <i>Study team member</i> )
	Mbulelo Kelly	DAFF	National Government
	Moses Khangale	DAFF	National Government
	Dallen Lotter	CSIR	Research
	Charl du Plessis	Greater Cedarberg FPA	Fire Protection Association
	Paul Gerber	DAFF – Fire advisor	National Government
	Zane Erasmus	CapeNature	Protected Area Management
	Guy Denichaud	Santam	Insurance
	Pierre Combrink	Working on Fire	Public Entity
	Louisa Hackland-Hartwig	University of Cape Town – Masters student	Academic
	Braam du Preez	MTO Forestry	Forestry
	Philip Prins	Table Mountain National Park	Protected Area Management
	Joel Syphus	DAFF – Fire Advisor	National Government
	Ailsa Holloway	University of Cape Town	Academic
	Lorena Pasquini	Working on Fire	Public Entity
	Ian Schnetler	City of Cape Town	Local Government

### ***Key Informants Consulted Post Consultative Workshops***

- SAFIRE Insurance Company (Ruth Bezuidenhout)
- ICFR (National Forestry Protection Strategy) (Colin Dyer)
- SA Forestry (Reports on forest plantation fires) (Mike Peter)
- National Disaster Management Centre, Department of Cooperative Governance and Traditional Affairs (National Risk Profile and the soon to be promulgated National Fire Brigade Framework) (Mmaphaka Tau and Jurgens Dysse)
- Thomas W. Swetnam, Director of Dendrochronology University Arizona
- Neville Sweijd, CSIR Competency Area Manager for Coasts and Oceans (Current status of climate change research in South Africa)
- Francois Engelbrecht, CSIR, Natural Resource and the Environment (Climate change in South Africa)
- Dr Hugo Bezuidenhout, Head: Arid Ecosystems Research Unit, South African National Parks

## **Appendix 3: Specific veldfire risk scenarios and risk analyses.**

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In order to perform the veldfire risk analysis, fires developed specific veldfire risk scenarios for each fire-ecology type. These describe the main source of danger against which to take precaution. These scenarios are plausible descriptions of possible wildfire events, which define the kind of event that must determine a cost-effective but affordable risk management strategy for a region such as the local municipality and would be the desired standard or norm for a given situation. It should be normative in the sense that if the strategy were implemented, people would feel reasonably safe in that environment, and economic development would proceed under conditions of manageable risk, while environmental values are protected and ecosystem services sustained.

Thus, the specific veldfire risk scenarios define possible extreme events that would cause much harm to people, property, and the natural world, without risk management.

We derived these scenarios from information provided by key informants, news and other reports, and expert experience.

Each scenario specified the following:

- Context: the fire-ecology type, its state, and a broad indication of land use.
- A description of assets and values vulnerable to fire: social, economic, and environmental
- Time of year
- Prevailing weather conditions
- Fuel type structure and state
- Terrain
- Fire behaviour (rate of forward spread, flame length, spotting).

### **1. SOUR GRASSLAND FIRE RISK SCENARIOS**

#### **1.1 Mpumalanga highveld and escarpment<sup>3</sup>**

- On sour grassland on margin of Mpumalanga plateau.
- Assets vulnerable:
  - Social: dispersed rural settlements, employees, visiting tourists, and others
  - Economic:
    - Rural industries and centres (sawmills, other factories); recreational resorts and other tourism infrastructure
    - Emergent farmers
    - Livestock
    - Fodder banks
    - Vehicles, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - Environmental:

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<sup>3</sup> Compiled using inputs provided by participants in the Nelspruit consultative workshop (see Appendix 2).



- Biodiversity and ecosystems services; low vulnerability
- Time of year: August or September.
- Prevailing weather conditions: 10 - 20 km/hr NW wind, gusting to gale force (70 - 140 km/hr), hot (30° C plus, daytime relative humidity 8 - 20%), after 21 days of high fire danger, no preceding rain
- Fuel type structure and state: accumulated grass biomass from prior above-average wet season, 4–6 tonnes/ha, 0.8 m depth, beneath sparse tree cover, fully cured
- Terrain: rolling hill slopes, average gradient about 10%.
- Fire behaviour: 4 km/hr forward rate of spread, up to 10 km/hr; 3 - 5 m flame length; fire fronts vary from 3 to 10 kilometres; a single fire grows to 20,000 ha in 24 hours.

**Risk analysis:**

**Likelihood:** Likely

**Consequence:**

- Social: serious injury and death: **Catastrophic**
- Economic: loss of forest resources, livestock; loss of plant, equipment and sawmills as well as homesteads and sawmills: **Major**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, rapid full recovery: **Minor**

**Risk level:** Extreme social; Extreme economic; Medium environmental. **Overall = Extreme**

**Risk description:**

In this scenario, one or more fires ignite in the grassland under conditions of high air temperatures, low daytime relative humidity and strong gusting changeable winds ahead of an advancing cold front and quickly exceed the local capacity to respond; the fire spreads rapidly on a front several kilometres wide, growing quickly in size and not containable until weather conditions change; community members, tourists, fire-fighters and other personnel and resource users from local communities are exposed to injury and death; industrial facilities (e.g. sawmills), vehicles and equipment may be damaged or lost, but since the grassland ecosystems are fire-dependent there is little effect on environmental values; soils are little affected by the fast-moving fires.

**1.2 South-eastern Seaboard<sup>4</sup>**

- Context: Sour grassland in a large pastoral area after a good rainy season.
- Assets vulnerable:
  - Social: dispersed rural settlements, most households under the mean living level (MLL); employees, visiting tourists, and others
  - Economic:
    - Rural industries and centres (sawmills, other factories); recreational resorts and other tourism infrastructure
    - Emergent farmers
    - Livestock
    - Fodder banks
    - Vehicles, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - Environmental:
    - Biodiversity and ecosystems services
- Time of year: August and September.
- Prevailing weather conditions: 10 - 20 km/hr NW wind, gusting to gale force, hot (30° C plus, daytime relative humidity 8 - 20%), after 21 days of high fire danger, no preceding rain.

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<sup>4</sup> Compiled using inputs provided by participants in the Pietmaritzburg consultative workshop (see Appendix 2).

- Fuel type structure and state: accumulated grass biomass from prior above-average wet season, 4–6 tonnes/ha, 0.8 m depth, beneath sparse tree cover, fully cured
- Terrain: rolling hill slopes, average about 10% gradient.
- Fire behaviour: 4 km/hr forward rate of spread, up to 10 km/hr; 3 - 5 m flame length; fire fronts vary from 3 to 10 kilometres a single fire grows to 20,000 ha in 24 hours.

**Risk analysis:**

**Likelihood:** Likely

**Consequence:**

- Social: serious injury and death: **Catastrophic**
- Economic: loss of emergent farmers' assets; loss of forest resources, livestock; loss of plant, equipment and sawmills as well as homesteads and sawmills: **Major**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, rapid full recovery: **Minor**

**Risk level:** Extreme social; Extreme economic; Medium environmental. **Overall = Extreme**

**Risk description:**

In this scenario, one or more fires ignite in the grassland under conditions of high air temperatures, low daytime relative humidity and strong gusting changeable winds ahead of an advancing cold front and quickly exceed the local capacity to respond; the fire spreads rapidly through stock farms, communal grazing lands, scattered rural settlements, woodlots and scattered forest plantations on a front several kilometres wide, growing quickly in size and not containable until weather conditions change; scattered settlements, community members, tourists, fire-fighters and other personnel and resource users from local communities are exposed to injury and death; vehicles and equipment may be damaged or lost, but since the grassland ecosystems are fire-dependent there is little effect on environmental values; soils are little affected by the fast-moving fires.

**1.3 Commercial pine plantations on Mpumalanga escarpment or KwaZulu/Natal Midlands<sup>5</sup>**

- Context: Pine plantation forest embedded in extensive sour grasslands.
- Assets vulnerable:
  - o Social: employees, homesteads
  - o Economic:
    - Plantation forest resources
    - Sawmills, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - o Environmental:
    - Soils, catchment values
- Time of year: August and September.
- Prevailing weather conditions: 40 km/hr NW wind, hot (25° C plus, midday relative humidity 15% and less)
- Fuel type structure and state: pine plantation with 10 tonnes/ha litter, with adjacent grassland with 4 tonnes/ha, fully cured fuel bed.
- Terrain: rolling hill slopes, average about 30% gradients.
- Fire behaviour: 2 km/hr, 5 m flame length prevalent with crown fires, and spotting, grows to 1,500 ha in plantation within 12 hours and spreads to adjoining properties.

**Risk analysis:**

**Likelihood:** Possible

**Consequence:**

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<sup>5</sup> Compiled using inputs from Trevor Wilson, Zululand FPA and Simon Thomas KwaZulu/Natal Umbrella FPA. Also applies to Inland areas of Zululand such as Babanango.

- Social: serious injury or death: **Catastrophic**
- Economic: extensive loss of timber resource, sawmills, machinery and equipment, buildings: **Catastrophic**
- Environmental: loss of topsoil; erosion; water resource degrade; spread of alien invasive plant species: **Major**

**Risk level:** Extreme social; Extreme economic; High environmental. **Overall = Extreme**

**Risk description:**

In this scenario, which is exemplified by recent cases, a wildfire under late winter berg wind conditions in advance of a cold front exceeds landowners' capacity to respond, requiring regional support, but under the conditions of severe weather and high loads of flammable fuels, cannot be contained within 12 hours; the wildfire destroys resources as set out above, and in most recent cases, causes at least some human mortality and injury; combustion of heavy, dry ground fuels within the forest plantations destroys surface soils horizons, resulting in subsequent erosion and loss of catchment values; burnt plantations sites and patches of invasive species in grasslands become costly sources of further invasions.<sup>6</sup>

## **2. SWEET GRASSLANDS FIRE RISK SCENARIO**

### **2.1 Sweet grassland in the Free State<sup>7</sup>**

- Context: Sweet grasslands in Free State in areas having less than 650 mm of rain
- Assets vulnerable:
  - o Social: employees, homesteads
  - o Economic:
    - Fodder banks
    - Livestock
    - Farming infrastructure, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - o Environmental:
    - Soils, catchment values
- Time of year: September
- Prevailing weather conditions: Hot and dry (daytime temperatures 30° C plus, RH < 15%) with strong (20 - 60 km/hr) north-westerly winds
- Fuel type structure and state: Perennial grasses up to a 0.6 m tall. Dead material typically only accumulates after high rainfall during the growing season (2 - 3 tonnes/ha). Fully cured. In normal rainfall years most of the grass material is grazed leaving little fuel for fires.
- Terrain: Flat plains and gently undulating hills, koppies and rocky areas have a greater shrub and tree cover.
- Fire behaviour: 4 km/hr forward rate of spread (walking speed), 2 m flame length, and spotting, grows to 20,000 ha in size and burns a day spreads to adjoining properties.

**Risk analysis:**

**Likelihood:** Possible

**Consequence:**

- Social: medical treatment required with full recovery: **Moderate**
- Economic: Loss of fodder bank, some livestock, machinery and equipment, and damage to buildings: **Moderate**

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<sup>6</sup> Scott 1993.

<sup>7</sup> Compiled using inputs provided by participants in the Bloemfontein consultative workshop (see Appendix 2). Additional information from Malcolm Procter, DAFF Fire Advisor for the Free State.

- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, rapid full recovery: **Insignificant**

**Risk level:** High social; High economic; Low environmental. **Overall = High**

**Risk description:**

In this scenario, which is possible in this region after good spring and summer rains, a wildfire under late winter berg wind conditions in advance of a cold front exceeds landowners' capacity to respond, requiring neighbour and regional support. The fire spreads rapidly, growing quickly in size and is not containable until weather conditions change because of limited local fire fighting resources. Because this is sweet grass pasturage farmers rely on fodder banks for their stock and fires diminish these fodder banks. Exclusion of fire can lead to karoo bush encroachment in south.

### **3. COASTAL GRASSLANDS FIRE RISK SCENARIOS**

#### **3.1 Coastal grassland of Zululand<sup>8</sup>**

- Context: Moist coastal grasslands along the coastline of Zululand in KwaZulu/Natal
  - Assets vulnerable:
    - Social: Dispersed rural settlements, most households under the mean living level (MLL); employees, visiting tourists, and others
    - Economic:
      - Rural industries and centres (sawmills, other factories); recreational resorts and other tourism infrastructure
      - Commercial timber plantations
      - Sugarcane
      - Emergent farmers
      - Livestock
      - Fodder banks
      - Vehicles, machinery and equipment
      - Infrastructure: power lines, telecommunications
    - Environmental:
      - Biodiversity and ecosystems services; low vulnerability
  - Time of year: Throughout the year
  - Prevailing weather conditions: average 40 km/hr NE wind – gusting 80 km/hr to SW wind, hot (30° C plus, RH 15% and less) not quite extreme Fire Danger Indices (Lowveld) but regular instances of fire on low to mid-Orange days
  - Fuel type structure and state: accumulated grass biomass of 4 tonnes/ha, 0.7 m depth, never fully cured (semi-cured)
  - Terrain: relatively flat sandy coastal plains with average gradient about 5%.
  - Fire behaviour: 5 km/hr forward rate of spread; a fire rarely burns for more than a day.

**Risk analysis:**

**Likelihood:** Likely

**Consequence:**

- Social: Occasional medical treatment required but full recovery: **Moderate**

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<sup>8</sup> Compiled using inputs provided by participants in the Pietermaritzburg consultative workshop (see Appendix 2). Additional inputs from Trevor Wilson of the Zululand Fire Protection Association.

- Economic: Localised damage to property; loss of emergent farmers' assets; loss of forest resources, livestock; damage and loss of equipment as well as homesteads and sawmills: **Moderate**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, rapid full recovery: **Insignificant**

**Risk level:** High social; High economic; Low environmental. **Overall = High**

**Risk description:**

In this scenario, one or more fires ignite in the grassland under conditions of high air temperatures, low day time relative humidity and strong gusting changeable dry winds ahead of an advancing cold front and quickly exceed the local capacity to respond; the fire spreads rapidly on a front several kilometres wide, growing quickly in size but with regional resources; scattered settlements, community members, tourists, fire-fighters and other personnel and resource users from local communities are exposed to injury and death; vehicles and equipment may be damaged or lost, but since the grassland ecosystems are fire-dependent there is little effect on environmental values; soils are little affected by the fast-moving fires.

### **3.2 Commercial Eucalyptus plantation near Zululand Coast<sup>9</sup>**

- Context: Eucalyptus plantation forest
- Assets vulnerable:
  - o Social: employees, homesteads
  - o Economic:
    - Plantation forest resources
    - Sawmills, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - o Environmental:
    - Soils, catchment values
- Time of year: September
- Prevailing weather conditions: average 40 km/hr NE wind gusting to 80 km/hr, hot (30° C plus, RH 15% and less)
- Fuel type structure and state: Eucalyptus plantation with 5 - 8 tonnes/ha litter, with adjacent grassland with 4 tonnes/ha, semi cured fuelbed.
- Terrain: relatively flat, average about 5% gradient.
- Fire behaviour: 5 km/hr, 5 m flame length prevalent with occasional crown fires and torching, and spotting, grows to 1,000 ha in plantation within 12 hours.

**Risk analysis:**

**Likelihood:** Possible

**Consequence:**

- Extensive injuries to people in the scenario, requiring emergency hospitalisation and affecting work capacity; or, evacuation required.: **Major**
- Economic: extensive loss of timber resource (damage to 80% of trees – fell to waste and replant), sawmills, machinery and equipment, buildings: **Major**
- Environmental: loss of topsoil; erosion; water resource degrade; spread of alien invasive plant species: **Major**

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<sup>9</sup> Compiled with inputs from Trevor Wilson of the Zululand Fire Protection Association.

**Risk level:** High social; Extreme economic; High environmental. **Overall = High**

**Risk description:**

In this scenario, as exemplified by recent cases, a wildfire under *late winter berg wind* conditions in advance of a cold front exceeds landowners' capacity to respond, requiring regional support, but under the conditions of severe weather and high loads of flammable fuels, cannot be contained within 12 hours; the wildfire enters the plantation from adjoining grasslands and destroys resources as set out above burnt plantations sites and patches of invasive species in grasslands become costly sources of further invasions.

**3.3 Coastal grassland of Pondoland (Mkambati Nature Reserve)<sup>10</sup>**

- Context: Moist coastal grasslands along the coastline of Pondoland in the Eastern Cape.
  - Assets vulnerable:
    - Social: Dispersed rural settlements, most households under the mean living level (MLL); employees, visiting tourists, and others
    - Economic:
      - Rural industries and centres (sawmills, other factories); recreational resorts and other tourism infrastructure
      - Commercial timber plantations
      - Sugarcane
      - Emergent farmers
      - Livestock
      - Fodder banks
      - Vehicles, machinery and equipment
      - Infrastructure: power lines, telecommunications
    - Environmental:
      - Biodiversity and ecosystems services; low vulnerability
  - Time of year: June and July
  - Prevailing weather conditions: Strong north-westerly winds, hot (low daytime relative humidity 8 - 20%), Fuel type structure and state: accumulated grass biomass never fully cured. Older than two years.
  - Terrain: rolling hill slopes.
  - Fire behaviour: Flame lengths vary one to two metres; a fire can burn from one to four days.

**Risk analysis:**

**Likelihood:** Likely

**Consequence:**

- Social: Occasional medical treatment required but full recovery: **Moderate**
- Economic: Localised damage to property; loss of emergent farmers' assets; loss of forest resources, livestock; damage and loss of equipment as well as homesteads: **Moderate**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, rapid full recovery: **Minor**

**Risk level:** High social; Medium economic; Low environmental. **Overall = High**

**Risk description:**

In this scenario, one or more fires ignite in the grassland under conditions of high air temperatures, low daytime relative humidity and strong gusting changeable dry winds ahead of an advancing cold front. They quickly exceed the local capacity to respond; the fire spreads rapidly, growing quickly in size, burning from one to four days and is not containable until weather conditions change; scattered

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<sup>10</sup> Compiled using inputs from Vuyani Mapiya the manager of the Mkambati Nature Reserve.

settlements, community members, tourists, fire-fighters and other personnel and resource users from local communities are exposed to serious injury; vehicles and equipment may be damaged or lost as thatching grass and grazing. Since the grassland ecosystems are fire-dependent there is little effect on environmental values; soils are little affected by the fast-moving fires; some fynbos elements in the Pondoland coastal grasslands are sensitive to too frequent burning.

## **4. MOIST WOODLAND FIRE RISK SCENARIOS**

### **4.1 Moist woodland fire risk scenario: Lowveld protected area<sup>11</sup>**

- Context: Moist woodland in a large protected area after a good rainy season.
- Assets vulnerable:
  - Social: employees, visiting tourists, and others
  - Economic:
    - Protected area infrastructure
    - Vehicles, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - Environmental:
    - Biodiversity and ecosystems services; low vulnerability
- Time of year: August and September.
- Prevailing weather conditions: 10 - 20 km/hr NW wind, gusting to gale force, hot (30° C plus, daytime relative humidity 15 - 20% and less), after 21 days of high fire danger, no preceding rain
- Fuel type structure and state: accumulated grass biomass from prior above-average wet season, 4 - 9tonnes/ha, 0.8 m depth, beneath sparse tree cover, fully cured
- Terrain: rolling hill slopes, average about 10% gradient.
- Fire behaviour: 4 km/hr forward rate of spread, 3 - 5 m flame length, grows to 20,000 ha in 24 hours.

#### **Risk analysis:**

**Likelihood:** Likely

**Consequence:**

- Social: serious injury and death: **Catastrophic**
- Economic: limited to the cost of containment, with possible losses of equipment and vehicles: **Moderate**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, rapid full recovery: **Minor**

**Risk level:** Extreme social; High economic; Low environmental. **Overall = Extreme**

#### **Risk description:**

In this scenario, one or more fires ignite under conditions of high air temperatures, low daytime relative humidity and strong gusting changeable winds ahead of an advancing cold front and quickly exceed the local capacity to respond; the fire spreads rapidly on a front several kilometres wide, growing quickly in size and not containable until weather conditions change; fire-fighters and other personnel and resource users from local communities are exposed to injury and death; vehicles and equipment may be damaged or lost, but since the savanna ecosystems are fire-dependent there is little effect on environmental values.

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<sup>11</sup> Drawn in part from Ngobeni Commission of Inquiry. Commission of Inquiry into the Fire at the Pretoriuskop Area in the Kruger National Park that broke out on 4 September 2001. First and Final Report.

#### **4.2 Moist woodland fire risk scenario: Waterberg farmland<sup>12</sup>**

- Context: Moist woodland in a region of stock farms and safari ranches after a good rainy season.
- Assets vulnerable:
  - Social: employees, visiting tourists, fire services personnel, and others
  - Economic:
    - Farm and safari infrastructure
    - Vehicles, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - Environmental:
    - Biodiversity and ecosystems services; low vulnerability
- Time of year: August and September.
- Prevailing weather conditions: 10 - 20 km/hr NW wind, gusting to gale force, hot (30° C plus, daytime relative humidity 15 - 20% and less), after period of high fire danger, no preceding rain
- Fuel type structure and state: accumulated grass biomass from prior above-average wet season, 3–5 tonnes/ha, 0.5 m depth, beneath sparse tree cover, fully cured
- Terrain: rolling hill slopes and mountains, average about 20% gradient.
- Fire behaviour: 2 - 4 km/hr forward rate of spread, 2 - 4 m flame length, grows to 20,000 ha in 24 hours.

#### **Risk analysis:**

Likelihood: Likely

Consequence:

- Social: serious injury and death: **Catastrophic**
- Economic: loss of homes, infrastructure, stock, wildlife: **Moderate**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, of little environmental consequence, rapid full recovery: **Minor**

**Risk level:** Extreme social; High economic; Low environmental. **Overall = Extreme**

#### **Risk description:**

In this scenario, one or more fires ignite under conditions of high air temperatures, low daytime relative humidity and strong gusting changeable winds ahead of an advancing cold front and quickly exceed the local capacity to respond; the fire spreads rapidly on a front several kilometres wide, growing quickly in size and not containable until weather conditions change; fire-fighters, farm personnel and visitors are exposed to injury and death; loss of stock and wildlife affect farms and safari operations; vehicles and equipment may be damaged or lost; but since the savanna ecosystems are fire-dependent there is little effect on environmental values.

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<sup>12</sup> Drawn from News24, Veld fire kills Limpopo worker, 2 September 2008; Department of Local Government and Housing, Limpopo Provincial Government: Status of veld fire incidents in the Limpopo Province, 2 September 2008; see [http://www.fire.uni-freiburg.de/GFMCnew/2008/09/0901/20080829\\_bots.htm](http://www.fire.uni-freiburg.de/GFMCnew/2008/09/0901/20080829_bots.htm) and other subsequent posts at the Global Fire Monitoring Centre



## 5. ARID WOODLAND FIRE RISK SCENARIO

### 5.1 Kuruman Scenario<sup>13</sup>

- Grass with scattered trees and open to moderately dense shrub land, with more trees in drainage lines growing on a range of soil types.
- Assets vulnerable:
  - Social: Small rural towns and settlements, land owners and employees
  - Economic:
    - Stock and game farming; tourism infrastructure
    - Emergent farmers
    - Livestock
    - Fodder banks
    - Vehicles, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - Environmental:
    - Biodiversity and ecosystems services;
- Time of year: October - December
- Prevailing weather conditions: Local winds associated with thunderstorms, hot (30 – 40° C plus, daytime relative humidity > 15%)
- Fuel type structure and state: mixture of annual and perennial grass biomass from prior above-average wet season, 0.9 – 1.1 m depth, beneath sparse tree cover (more trees in drainage lines, fully cured)
- Terrain: Undulating with gentle to moderate slopes and extensive plateau areas with rocky koppies and hills.
- Fire behaviour: 4 km/hr forward rate of spread, up to 10 km/hr; 3 - 5 m flame length; fire fronts vary from 3 to 10 kilometres a single fire grows to 20,000 ha in 24 hours.

#### Risk analysis:

**Likelihood:** Possible

#### Consequence:

- Social: Serious injuries requiring hospitalisation occasionally occur: **Moderate**
- Economic: Some loss of livestock; damage to fencing; extensive loss of fodder banks as well as occasional damage to farm buildings: **Major**
- Environmental: combustion of grass cover and scorching of trees and shrubs, of little environmental consequence, full recovery could be delayed because of lack of rainfall following a fire: **Insignificant**

**Risk level:** High social; High economic; Low environmental. **Overall = High**

#### Risk description:

In this scenario, one or more fires ignite under conditions of high air temperatures, low daytime relative humidity and strong gusting changeable winds associated with summer thunderstorms. These fires quickly exceed the local capacity to respond; the fire spreads rapidly on a front several kilometres wide, growing quickly in size and not containable until weather conditions change; fire-fighters, farm personnel and dispersed rural communities are exposed to serious injury; loss of grazing and stock affects farms (emergency assistance may be required); vehicles and equipment may be damaged or lost; but since the savanna ecosystems are fire-dependent there is little effect on environmental values.

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<sup>13</sup> Drawn from disaster management report compiled by P de Wet/ J.P. Rossouw for fires that burnt in the Kuruman District from 12 October to 18 October 2003.

## 6. SPARSE ARID WOODLAND FIRE RISK SCENARIO

### 6.1 Kgalagadi National Park<sup>14</sup>

- Grass with scattered trees and open shrubland, with more trees in drainage lines, growing on sandy Kalahari soils.
- Assets vulnerable:
  - Social: Isolated small rural settlements, employees, visiting tourists, and others
  - Economic:
    - Stock and game farming; Kgalagadi National park and other tourism infrastructure
    - Emergent farmers
    - Livestock – goats, sheep and some cattle and Game
    - Fodder banks
    - Vehicles, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - Environmental:
    - Biodiversity and ecosystems services; low vulnerability
- Time of year: September and October (Check fire reports)
- Prevailing weather conditions: Local winds associated with thunderstorms, hot (30 - 40° C plus, daytime relative humidity > 15%)
- Fuel type structure and state: annual grass biomass from prior above-average wet season, 0.9–1.1 m depth, beneath sparse tree cover (more trees in drainage lines) up to 8 m tall, fully cured
- Terrain: undulating dunes up to 100 m high.
- Fire behaviour: 4 km/hr forward rate of spread, up to 10 km/hr; 3 - 5 m flame length; fire fronts vary from 3 to 10 kilometres a single fire grows to 20,000 ha in 24 hours.

#### Risk analysis:

**Likelihood:** Possible

#### **Consequence:**

- Social: deaths and serious injury have not been recorded: **Minor**
- Economic: Some loss of livestock and game; damage to fencing; loss of fodder banks and farmer infrastructure (fencing) as well as occasional damage to farm and park buildings: **Minor**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, full recovery could be delayed because of lack of rainfall following a fire: **Insignificant**

**Risk level:** Medium social; Medium economic; Low environmental. **Overall = Medium**

#### **Risk description:**

In this scenario, one or more fires ignite (lightning) occurs in late winter or spring under conditions of high air temperatures, low day time relative humidity and strong local winds and exceeds the local capacity to respond; The fire return period varies from 10 to 15 years and depends on there being enough rainfall during the preceding summer to allow for sufficient annual grass fuel (e.g. *Schmidtia kalahariensis*) to grow to carry a fire. In most years there is insufficient rainfall to allow for this. Due to the low human population in this area there is limited human exposure to these fires however farming and nature conservation infrastructure is occasional damaged and fodder banks destroyed. These occasional fires do not seem to have a lasting detrimental effect on environmental values.

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<sup>14</sup> Compiled using inputs from Dr Hugo Bezuidenhout, Head: Arid Ecosystems Research Unit, South African National Parks.

## **7. GRASSY NAMA KAROO FIRE RISK SCENARIO**

### **7.1 Grassy Nama Karoo: Cradock district<sup>15</sup>**

- Context: Grassy Nama Karoo in farmland in the mountainous areas between Cradock and Graaff-Reinet including the Mountain Zebra National Park.
- Assets vulnerable:
  - Social: farmers, families and employees, visiting tourists, and others
  - Economic:
    - Farm and protected area infrastructure e.g. fences and buildings
    - Vehicles, machinery and equipment
    - Infrastructure: power lines, telecommunications
    - Domestic stock and game
    - Fodder banks (ranging in this fire ecotype is especially vulnerable as the low economic returns to the land are easily lost)
  - Environmental:
    - Biodiversity and ecosystems services;
- Time of year: August and October.
- Prevailing weather conditions: 20 - 60 km/hr NW wind, gusting to gale force, hot (30° C plus, daytime relative humidity 15 - 20% and less), little preceding rain.
- Fuel type structure and state: accumulated grass biomass from prior above-average wet season, 2 – 3 tonnes/ha, (M. Procter, Tainton, Grootfontein ) 0.8 m depth, predominantly grass with scattered shrubs, fully cured, Acacia Karoo in drainage lines,
- Terrain: Broken, steep, stony hill slopes, mountain slopes and plateau, average 5% and 40%.
- Fire behaviour: 4 km/hr forward rate of spread (walking speed), 1 m flame length, grows to 10,000 - 20,000 ha in 24 hours.

#### **Risk analysis:**

**Likelihood:** Possible

#### **Consequence:**

- Social: **Minor**
- Economic: Death of live stock and loss of fodder bank. cost of containment, possible losses of equipment and vehicles and occasionally houses: **Minor**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, rapid full recovery: **Insignificant**

**Risk level:** Medium social; Medium economic; Low environmental. **Overall = Medium**

#### **Risk description:**

In this scenario, one or more fires ignite under conditions of high day time air temperatures, low daytime relative humidity and strong (up to gale force) gusting winds (berg winds) ahead of an advancing cold front and quickly exceed the local capacity to respond and burns many farms; the fire spreads rapidly on a front several kilometres wide, growing quickly in size and is not containable until weather conditions change because of limited local fire fighting resources. Because this is sweet grass pasturage farmers rely on fodder banks for their stock and fires diminish these fodder banks.

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<sup>15</sup> Drawn from News24 and inputs from Malcolm Procter, DAFF Fire Advisor for the Free State.

## 8. FYNBOS FIRE RISK SCENARIOS

### 8.1 Mountain fynbos [Boland scenario]<sup>16</sup>

- Context: Mountain fynbos in rugged high mountains
- Assets vulnerable:
  - o Social: employees, homesteads
  - o Economic:
    - Plantation forest resources
    - Vineyards and orchards
    - Buildings, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - o Environmental:
    - Soils, catchment values
- Time of year: January – March
- Prevailing weather conditions: 50 km/hr SE wind gusting to 70 km/hr, hot (30° C plus, RH 15% and less), following 10 days high FDI
- fuel type structure and state: fynbos, 15 yr old, with 8 or more tonnes/ha available fuel, sparse to dense protea canopy, 1.5 m fuel bed depth, available fuel fully cured.
- Terrain: steep mountainous.
- fire behaviour: 1 - 2 km/hr rate of spread, 5 - 6 m flame length, erratic front, grows to 1,000 to 2,000 ha within 24 hours.

#### Risk analysis:

**Likelihood:** Possible

#### Consequence:

- Social: **Moderate**
- Economic: cost of containment, possible losses of equipment and vehicles, scorching of vineyards and orchards, and occasional loss of houses: **Minor**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, rapid full recovery: **Insignificant**

**Risk level:** High social; Medium economic; Low environmental. **Overall = High**

#### Risk description:

In this scenario, as exemplified by many recent cases, a wildfire under hot dry windy summer conditions exceeds the landowners' capacity to respond, requiring neighbour, municipal and regional support. Under the conditions of severe weather and high loads of flammable fuels, the fire cannot be contained within 12 hours; the wildfire destroys resources as set out above. Occasionally (not every year) fires cause at least some serious human injury or mortality. Combustion of heavy, dry ground fuels within areas invaded by woody alien plants species such as pine or hakea destroys surface soils horizons, resulting in subsequent erosion and loss of catchment values; burnt plantations sites and patches of invasive species in fynbos become sources of seed for further invasions.

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<sup>16</sup> Compiled using inputs provided by participants in the Stellenbosch consultative workshop (see Appendix 2).

## 8.2 Mountain fynbos [Southern Cape scenario]<sup>17</sup>

- Context: Mountain fynbos in high SE mountains
- Assets vulnerable:
  - Social: employees, homesteads
  - Economic:
    - Plantation forest resources
    - Orchards
    - Buildings, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - Environmental:
    - Soils, catchment values
- Time of year: July
- prevailing weather conditions: 40 km/hr NW wind gusting to 65 km/hr, hot (35° C plus, RH 10% and less), following 3 days high FDI
- Fuel type structure and state: fynbos, 20 yr old, with 12 tonnes/ha available fuel, medium protea canopy, 2 m fuel bed depth, available fuel fully cured.
- Terrain: steep mountainous.
- Fire behaviour: 1 - 2 km/hr rate of spread, 6 - 8 m flame length, erratic front, grows to 2,000 ha within 24 hours.

### Risk analysis:

**Likelihood:** Possible

### Consequence:

- Social: **Moderate**
- Economic: cost of containment, possible losses of equipment and vehicles and occasionally houses: **Minor**
- Environmental: combustion of grass cover and scorching and killing of trees and shrubs, as well as possible loss of animals, of little environmental consequence, rapid full recovery: **Insignificant**

**Risk level:** High social; Medium economic; Low environmental. **Overall = High**

### Risk description:

In this scenario, which currently is likely in this region as exemplified by many recent cases, a wildfire under hot dry winter berg wind conditions occurring ahead of a cold front exceeds landowners' capacity to respond, requiring neighbour, municipal and regional support. Under the conditions of severe weather and high loads of flammable fuels, the fire cannot be contained within 12 hours; the wildfire destroys resources as set out above. Occasionally (not every year) fires cause at least some serious human injury or mortality. Combustion of heavy, dry ground fuels within areas invaded by woody alien plants species such as pine or hakea destroys surface soils horizons, resulting in subsequent erosion and loss of catchment values; burnt plantations sites and patches of invasive species in fynbos become sources of seed for further invasions.

## 8.3 Western Cape (Jonkershoek) commercial pine plantation<sup>18</sup>

- Context: Pine plantation forest (spp: *Pinus radiata*) embedded in fynbos in mountainous terrain.
- Assets vulnerable:
  - Social: employees, homesteads
  - Economic:
    - Plantation forest resources
    - Buildings, machinery and equipment

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<sup>17</sup> Compiled using inputs provided by participants in the Stellenbosch consultative workshop (see Appendix 2)

<sup>18</sup> Compiled using inputs from Braam du Preez, Risk Manager, MTO Forestry

- Infrastructure: power lines, telecommunications
- o Environmental:
  - Soils, catchment values
- Time of year: November to March but especially February and March.
- Prevailing weather conditions: 30 - 50kph SE wind; Temp= 30 - 35 ° C; RH = 25 - 40
- Fuel type structure and state: pine plantation with ± 15 – 20 tonnes/ha litter, with adjacent fynbos with 15 - 30 tonnes/ha (variable depending on age and aspect).
- Terrain: mountainous with deep valleys average about 40% gradient.
- Fire behaviour: 2 km/hr and variable (Note that rate of spread will vary considerably depending on slope steepness, aspect fuel moisture, head or backfires etc.), 10 - 15 m flame length prevalent with crown fires, and spotting, grows to 1,500 ha in plantation within 12 hours.

#### Risk analysis:

**Likelihood:** Possible

**Consequence:**

- Social: No deaths or serious injury; evacuation of housing complex. **Moderate**
- Economic: Ecotourism negatively affected for period up to 1 year after fire; potential loss of livelihoods and jobs if sawmill has to close. Scorch to deciduous orchards and vineyards and other crops , Plantation = 350 ha damaged ; premature harvesting(felling) and burnt trees need to be salvaged(harvested) within ± 6 months to avoid decay & serious loss; Infrastructure e.g. Damage to buildings and irrigation could result; Area not so dependent on forest and forest products industry. **Moderate**
- Environmental: Impact on biodiversity range from positive in case of fires in fynbos > 8 - 15 yrs to negative in fynbos < 5 yrs; Fynbos is fire climax vegetation and should recover fully; Depending on intensity of fire followed by a flood(s), serious erosion could take place.

**Moderate**

**Risk level:** High social; High economic; High environmental. **Overall = High**

#### Risk description:

In this scenario, which currently is likely in this region as exemplified by recent cases, a wildfire under hot dry windy summer conditions exceeds the landowners' capacity to respond, requiring neighbour, municipal and regional support. Under the conditions of severe weather and high loads of flammable fuels, the fire cannot be contained within 12 hours; the wildfire destroys resources as set out above. Serious human injury and even mortality is more likely in such fires than those in the surrounding fynbos. Combustion of heavy, dry ground fuels within the forest plantations destroys surface soil horizons, resulting in subsequent erosion and loss of catchment values; burnt plantations sites become seed sources for invasion of surrounding fynbos.

#### 8.4 Knysna / Tsitsikamma commercial pine plantation<sup>19</sup>

- Context: Mid-aged pine plantation forest primarily *Pinus elliottii* embedded in fynbos in mountainous terrain.
- Assets vulnerable:
  - o Social: employees, homesteads
  - o Economic:
    - Plantation forest resources
    - Buildings, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - o Environmental:
    - Soils, catchment values
- Time of year: May to September.

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<sup>19</sup> Compiled using inputs from Braam du Preez, Risk Manager, MTO Forestry

- Prevailing weather conditions: 30 - 40 km/hr NE-NW winds and changing to SW gusting to 100 km/hr, warm to hot (25° C plus, RH 20 - 50% and less), after 2 - 3 days of high FDI (Orange and Red ; > 61), nor preceding rain
- Fuel type structure and state: pine plantation (*P.elliottii* / *P.radiata*) with 10 - 20 tonnes/ha litter, with adjacent fynbos with 15 - 40 tonnes/ha, fuelbed.
- Terrain: rolling hill slopes, mountainous terrain with deep valleys, average about 30% gradients.
- Fire behaviour: blow-up fire, 2 km/hr, 5 - 15 m flame length prevalent with crown fires, 3 - 10 km front, and spotting, grows to 1,000 ha in plantation within 24 hours.

**Risk analysis:**

**Likelihood:** Possible

**Consequence:**

- Social: serious injury or death: job losses, loss of houses and livelihoods;  
**Catastrophic**
- Economic: extensive loss of timber resource, sawmills, machinery and equipment, buildings: major; towns and villages exposed and could be affected as well as agricultural; Forest and timber industry more prominent here than in the west and the timber resource is more closely linked to eco-tourism. **Major**
- Environmental: Biodiversity negatively effected in case of too frequent fires resulting in local loss of species; loss of topsoil due to erosion during heavy rains (flooding) follows severe fires; water resource degraded; spread of alien invasive plant species: **High**

**Risk level:** Extreme social; High economic; High environmental. **Overall = Extreme**

**Risk description:**

In this scenario, which currently is likely in this region as exemplified by recent cases, a wildfire under late winter berg wind conditions in advance of a cold front exceeds the landowners' capacity to respond, requiring neighbour, municipal and regional support. Under the conditions of severe weather and high loads of flammable fuels, the fire cannot be contained within 12 hours; the wildfire destroys resources as set out above. Serious human injury and even mortality is more likely in such fires than those in the surrounding fynbos. Combustion of heavy, dry ground fuels within the forest plantations destroys surface soil horizons, resulting in subsequent erosion and loss of catchment values; burnt plantations sites become seed sources for invasion of surrounding fynbos.

## 9. RENOSTERVELD FIRE RISK SCENARIOS

### 9.1 Mountain Renosterveld near Touwsrivier<sup>20</sup>

- Context: Mountain Resnosterveld in the central mountains of the south-western Cape bordering on the Succulent and Nama Karoo
- Assets vulnerable:
  - o Social: Farming homesteads
  - o Economic:
    - Small stock (goats and sheep)
    - Fodder banks
    - Fencing
    - Buildings, machinery and equipment
    - Infrastructure: power lines, telecommunications
  - o Environmental:

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<sup>20</sup> Compiled using own inputs but and information from Rutherford 1978.

- Soils, catchment values
- Time of year: December - March
- Prevailing weather conditions: 20 - 50 km/hr SE, hot (day time 30° C plus, RH 15% and less), following 10 or more days high FDI
- Fuel type structure and state: renosterveld, 20 yr old , with 4 tonnes/ha available, sparse to dense fine leaved shrub overstorey with herbaceous often grassy understorey, 0.75 m fuel bed depth, available fuel mostly cured.
- Terrain: rolling to steep mountainous.
- Fire behaviour: 1 - 2 km/hr rate of spread, 1 - 2 m flame length, erratic front, grows to 500 ha within 24 hours.

**Risk analysis:**

**Likelihood:** Possible

**Consequence:**

- Social: **Minor**
- Economic: **Minor**
- Environmental: **Insignificant**

**Risk level:** Medium social; Medium economic; Low environmental. **Overall = Medium**

**Risk description:**

In this scenario, which currently is possible in this region, a wildfire under windy summer conditions (this could also during winter berg wind conditions in advance of a cold front), would exceed a single landowner's capacity to respond, requiring support from neighbours and municipalities. These fires are likely to be contained within 24 hours due to the high variation in the fuel bed and the existence of sparsely vegetated rocky areas. The main impact of the wildfire is the loss of grazing and damage to fences. However if the regenerating vegetation is grazed too soon, this can result in the loss of the palatable species. Farmers are aware of the potential loss of grazing and actively combat fires.



## Appendix 4: Tabular summary of specific veldfire risk scenarios for each fire ecotype with assessed risk levels for the three endpoints of social, economic and environmental consequences.

Province	District Municipality Code	District Municipality Name	Local Municipality Code	Local Municipality Name	Veldfire risk			
					Low	Medium	High	Extreme
Eastern Cape	DC10	Cacadu	EC107	Baviaans	73.7%	5.9%	20.4%	0.0%
			EC102	Blue Crane Route	69.1%	9.5%	2.3%	19.1%
			EC101	Camdeboo	56.6%	43.4%	0.0%	0.0%
			EC103	Ikwezi	99.0%	0.0%	1.0%	0.0%
			EC108	Kouga	66.0%	2.2%	26.1%	5.7%
			EC109	Kou-Kamma	12.6%	0.0%	76.0%	11.4%
			EC104	Makana	57.5%	0.0%	0.0%	42.5%
			EC105	Ndlambe	100.0%	0.0%	0.0%	0.0%
			ECDMA10	Groendal Wilderness Area	69.0%	0.0%	31.0%	0.0%
			ECDMA10	Rietbron - Aberdeen Rural	99.2%	0.0%	0.8%	0.0%
			EC106	Sundays River Valley	100.0%	0.0%	0.0%	0.0%
				<b>DC10 Total</b>	<b>72.9%</b>	<b>8.7%</b>	<b>10.1%</b>	<b>8.3%</b>
	DC12	Amatole	EC124	Amahlathi	1.0%	0.5%	0.0%	98.5%
			EC125	Buffalo City	60.6%	12.6%	0.0%	26.8%
			EC123	Great Kei	11.1%	0.0%	0.0%	88.9%
			EC121	Mbhashe	0.0%	1.8%	1.6%	96.6%
			EC122	Mnquma	5.5%	10.0%	1.1%	83.4%
			EC126	Ngqushwa	56.0%	27.0%	0.0%	17.0%
			EC127	Nkonkobe	38.7%	3.6%	0.0%	57.7%
			EC128	Nxuba	16.7%	4.3%	0.0%	79.0%
				<b>DC12 Total</b>	<b>19.8%</b>	<b>6.2%</b>	<b>0.3%</b>	<b>73.7%</b>
	DC13	Chris Hani	EC136	Emalahleni	0.0%	5.8%	0.0%	94.2%
			EC137	Engcobo	0.0%	1.9%	0.0%	98.1%
			EC133	Inkwanca	0.0%	27.4%	6.5%	66.1%

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Province	District Municipality Code	District Municipality Name	Local Municipality Code	Local Municipality Name	Veldfire risk			
					Low	Medium	High	Extreme
			EC135	Intsika Yethu	8.3%	0.0%	0.0%	91.7%
			EC131	Inxuba Yethemba	1.6%	97.8%	0.0%	0.6%
			EC134	Lukanji	1.6%	1.7%	0.0%	96.7%
			EC138	Sakhisizwe	0.0%	0.0%	0.0%	100.0%
			EC132	Tsolwana	0.0%	48.9%	0.0%	51.1%
				<b>DC13 Total</b>	<b>1.4%</b>	<b>44.7%</b>	<b>0.7%</b>	<b>53.2%</b>
	DC14	Ukhahlamba	EC141	Elundini	0.0%	0.0%	0.0%	100.0%
			EC144	Gariep	0.0%	78.1%	6.6%	15.3%
			EC143	Maletswai	0.0%	0.0%	31.9%	68.1%
			EC142	Sengu	0.0%	0.0%	0.0%	100.0%
				<b>DC14 Total</b>	<b>0.0%</b>	<b>27.7%</b>	<b>6.3%</b>	<b>66.0%</b>
	DC15	O.R. Tambo	EC157	King Sabata Dalindyebo	1.7%	5.6%	0.0%	92.7%
			EC151	Mbizana	0.0%	0.0%	13.8%	86.2%
			EC156	Mhlontlo	0.0%	5.9%	0.0%	94.1%
			EC153	Ngquza Hill	0.0%	4.8%	16.0%	79.2%
			EC152	Ntabankulu	0.0%	12.8%	0.0%	87.2%
			EC155	Nyandeni	0.0%	3.2%	3.5%	93.4%
			EC154	Port St Johns	5.8%	0.0%	14.7%	79.4%
				<b>DC15 Total</b>	<b>0.6%</b>	<b>4.6%</b>	<b>6.1%</b>	<b>88.7%</b>
	DC44	Alfred Nzo	EC441	Matatiele	0.0%	0.0%	0.0%	100.0%
			EC442	Umzimvubu	0.0%	0.0%	0.0%	100.0%
				<b>DC44 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100.0%</b>
	NMA		NMA	Nelson Mandela Bay	74.4%	4.7%	16.2%	4.8%
				<b>Eastern Cape Total</b>	<b>27.8%</b>	<b>18.8%</b>	<b>5.3%</b>	<b>48.2%</b>
Free State	DC16	Xhariep	FS162	Kopanong	1.2%	3.2%	95.6%	0.0%
			FS161	Letsemeng	46.7%	9.1%	44.3%	0.0%
			FS163	Mohokare	0.0%	3.8%	57.8%	38.5%
				<b>DC16 Total</b>	<b>14.6%</b>	<b>5.1%</b>	<b>70.5%</b>	<b>9.7%</b>
	DC17	Motheo	FS172	Mangaung	1.5%	0.0%	94.8%	3.8%
			FS173	Mantsopa	0.0%	0.0%	7.2%	92.8%
			FS171	Naledi	0.0%	1.5%	73.5%	25.0%

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Province	District Municipality Code	District Municipality Name	Local Municipality Code	Local Municipality Name	Veldfire risk			
					Low	Medium	High	Extreme
				<b>DC17 Total</b>	<b>0.7%</b>	<b>0.4%</b>	<b>62.6%</b>	<b>36.4%</b>
	DC18	Lejwelepuntswa	FS181	Masilonyana	0.0%	0.0%	94.4%	3.6%
			FS184	Matjhabeng	2.0%	0.0%	93.5%	4.4%
			FS185	Nala	14.2%	0.0%	85.8%	0.0%
			FS182	Tokologo	4.5%	0.0%	95.5%	0.0%
			FS183	Tswelopele	6.6%	0.0%	93.4%	0.0%
				<b>DC18 Total</b>	<b>4.9%</b>	<b>0.0%</b>	<b>93.9%</b>	<b>1.2%</b>
	DC19	Thabo Mofutsanyane	FS192	Dihlabeng	0.0%	0.0%	0.0%	100.0%
			FS194	Maluti a Phofung	0.0%	0.0%	0.0%	100.0%
			FS193	Nketoana	0.0%	0.0%	3.6%	96.4%
			FS195	Phumelela	0.0%	0.0%	0.0%	100.0%
			FS191	Setsoto	0.0%	0.0%	2.9%	97.1%
				<b>DC19 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>1.3%</b>	<b>98.7%</b>
	DC20	Fezile Dabi	FS205	Mafube	0.0%	0.0%	0.0%	100.0%
			FS204	Metsimaholo	7.2%	0.0%	32.6%	60.2%
			FS201	Moqhaka	0.0%	0.0%	85.0%	15.0%
			FS203	Ngwathe	0.0%	0.0%	74.9%	25.1%
				<b>DC20 Total</b>	<b>0.7%</b>	<b>0.0%</b>	<b>61.2%</b>	<b>38.1%</b>
				<b>Free State Total</b>	<b>5.2%</b>	<b>1.4%</b>	<b>59.3%</b>	<b>34.1%</b>
Gauteng	DC42	Sedibeng	GT421	Emfuleni	0.0%	0.0%	100.0%	0.0%
			GT423	Lesedi	0.0%	0.0%	41.1%	58.9%
			GT422	Midvaal	0.0%	0.0%	48.5%	51.5%
				<b>DC42 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>60.7%</b>	<b>39.3%</b>
	DC46	Metsweding	GT462	Kungwini	0.0%	0.0%	0.0%	100.0%
			GT461	Nokeng tsa Taemane	0.0%	0.0%	11.1%	88.9%
				<b>DC46 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>7.0%</b>	<b>93.0%</b>
	DC48	West Rand	GT481	Mogale City	0.0%	0.0%	16.2%	83.8%
			GT482	Randfontein	0.0%	0.0%	47.0%	53.0%
			GT483	Westonaria	0.0%	0.0%	34.5%	65.5%
				<b>DC48 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>21.4%</b>	<b>78.6%</b>
	EKU		EKU	Ekurhuleni	0.0%	0.0%	46.3%	53.7%

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Province	District Municipality Code	District Municipality Name	Local Municipality Code	Local Municipality Name	Veldfire risk			
					Low	Medium	High	Extreme
	JHB		JHB	City of Johannesburg	9.4%	0.0%	10.5%	80.1%
	TSH		TSH	City of Tshwane	0.0%	0.0%	9.3%	90.7%
				<b>Gauteng Total</b>	<b>1.4%</b>	<b>0.0%</b>	<b>27.5%</b>	<b>71.1%</b>
KwaZulu / Natal	DC21	Ugu	KZN215	Ezingoleni	0.0%	0.0%	0.0%	100.0%
			KZN216	Hibiscus Coast	0.0%	0.0%	71.4%	28.6%
			KZN212	Umdoni	0.0%	0.0%	100.0%	0.0%
			KZN214	UMuziwabantu	0.0%	0.0%	0.0%	100.0%
			KZN213	Umzumbe	0.0%	0.0%	30.5%	69.5%
			KZN211	Vulamehlo	0.0%	0.0%	49.3%	50.7%
				<b>DC21 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>38.9%</b>	<b>61.1%</b>
	DC22	Umgungundlovu	KZN224	Impendle	0.0%	0.0%	0.0%	100.0%
KZN226			Mkhambathini	0.0%	0.0%	0.0%	100.0%	
KZN223			Mpofana	0.0%	0.0%	0.0%	100.0%	
KZN227			Richmond	5.7%	0.0%	0.0%	94.3%	
KZNDMA22			Kamberg - Mkhomazi area	0.0%	0.0%	0.0%	100.0%	
KZN225			The Msunduzi	0.0%	0.0%	0.0%	100.0%	
KZN222			uMngeni	0.0%	0.0%	0.0%	100.0%	
KZN221			uMshwathi	0.4%	0.0%	0.0%	99.6%	
				<b>DC22 Total</b>	<b>0.6%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>99.4%</b>
	DC23	Uthukela	KZN232	Emnambithi/Ladysmith	0.0%	0.0%	0.0%	100.0%
KZN236			Imbabazane	0.0%	0.0%	0.0%	100.0%	
KZN233			Indaka	26.7%	0.0%	0.0%	73.3%	
KZN235			Ukhahlamba	0.0%	0.0%	0.0%	100.0%	
KZNDMA23			Drakensberg - Cathedral Peak to Gaint's Castle	0.0%	0.0%	0.0%	100.0%	
KZN234			Umtshezi	10.9%	0.0%	0.0%	89.1%	
KZNDMA23			Royal Natal Drakensberg Park	0.0%	0.0%	0.0%	100.0%	
				<b>DC23 Total</b>	<b>3.3%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>96.7%</b>
	DC24	Umzinyathi	KZN241	Endumeni	0.0%	0.0%	0.0%	100.0%
KZN244			Msinga	14.7%	18.4%	0.0%	66.9%	
KZN242			Nqutu	0.0%	0.0%	0.0%	100.0%	

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Province	District Municipality Code	District Municipality Name	Local Municipality Code	Local Municipality Name	Veldfire risk			
					Low	Medium	High	Extreme
			KZN245	Umvoti	0.0%	1.9%	1.9%	96.2%
				<b>DC24 Total</b>	<b>4.5%</b>	<b>6.3%</b>	<b>0.6%</b>	<b>88.6%</b>
	DC25	Amajuba	KZN254	Dannhauser	0.0%	0.0%	0.0%	100.0%
			KZN253	Emadlangeni	0.0%	0.0%	0.0%	100.0%
			KZN252	Newcastle	0.0%	0.0%	0.0%	100.0%
				<b>DC25 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100.0%</b>
	DC26	Zululand	KZN263	Abaqulusi	0.0%	0.0%	0.0%	100.0%
			KZN261	eDumbe	0.0%	0.0%	0.0%	100.0%
			KZN265	Nongoma	0.0%	0.0%	11.5%	88.5%
			KZN266	Ulundi	0.0%	0.0%	7.5%	92.5%
			KZN262	UPhongolo	0.0%	0.0%	18.4%	81.6%
				<b>DC26 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>8.9%</b>	<b>91.1%</b>
	DC27	Umkhanyakude	KZN274	Hlabisa	0.0%	0.0%	10.2%	89.8%
			KZN272	Jozini	0.0%	0.0%	10.9%	89.1%
			KZNDMA27	Imfolozi - Hluhluwe	0.0%	0.0%	37.2%	62.8%
			KZN275	Mtubatuba	0.0%	0.0%	38.0%	62.0%
			KZNDMA27	iSimangaliso Wetland Park (incl. St. Lucia and Mkhuzi)	4.1%	0.0%	61.1%	34.8%
			KZN273	The Big 5 False Bay	5.9%	0.0%	54.6%	39.5%
			KZN271	Umhlabuyalingana	0.0%	0.0%	61.8%	38.2%
				<b>DC27 Total</b>	<b>1.5%</b>	<b>0.0%</b>	<b>46.0%</b>	<b>52.5%</b>
	DC28	uThungulu	KZN281	Mbonambi	0.0%	0.0%	24.2%	75.8%
			KZN285	Mthonjaneni	6.3%	0.0%	0.0%	93.7%
			KZN286	Nkandla	2.4%	16.0%	0.0%	81.7%
			KZN283	Ntambanana	0.0%	0.0%	18.6%	81.4%
			KZN282	uMhlathuze	0.0%	0.0%	70.3%	29.7%
			KZN284	uMlalazi	6.8%	2.9%	30.3%	60.0%
				<b>DC28 Total</b>	<b>3.0%</b>	<b>3.9%</b>	<b>21.4%</b>	<b>71.7%</b>
	DC29	iLembe	KZN292	KwaDukuza	0.0%	0.0%	94.1%	5.9%
			KZN291	Mandeni	0.0%	0.0%	87.1%	12.9%
			KZN294	Maphumulo	0.0%	0.0%	11.6%	88.4%

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					Low	Medium	High	Extreme
			KZN293	Ndwedwe	0.0%	0.0%	17.9%	82.1%
				<b>DC29 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>58.8%</b>	<b>41.2%</b>
	DC43	Sisonke	KZN433	Greater Kokstad	0.0%	0.0%	0.0%	100.0%
			KZN431	Ingwe	0.0%	0.0%	0.0%	100.0%
			KZN432	Kwa Sani	0.0%	0.0%	0.0%	100.0%
			KZNDMA43	Drakenberg - Lotheni to Bushmans Neck (incl. Sani Pass)	0.0%	0.0%	0.0%	100.0%
			KZN434	Ubuhlebezwe	0.0%	0.0%	0.0%	100.0%
			KZN435	Umzimkhulu	0.0%	0.0%	0.0%	100.0%
				<b>DC43 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100.0%</b>
	ETH		ETH	Ethekwini	0.3%	0.0%	55.0%	44.7%
				<b>KwaZulu/Natal Total</b>	<b>1.3%</b>	<b>0.9%</b>	<b>13.7%</b>	<b>84.1%</b>
Limpopo	DC33	Mopani	LIM334	Ba-Phalaborwa	0.0%	0.0%	100.0%	0.0%
			LIM331	Greater Giyani	0.0%	0.0%	59.2%	40.8%
			LIM332	Greater Letaba	0.0%	0.0%	6.1%	93.9%
			LIM333	Greater Tzaneen	0.0%	0.0%	49.2%	50.8%
			LIM335	Maruleng	0.0%	0.0%	62.8%	37.2%
			LIMDMA33	Kruger National Park (North)	0.0%	0.0%	96.3%	3.7%
				<b>DC33 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>75.5%</b>	<b>24.5%</b>
	DC34	Vhembe	LIM344	Makhado	0.0%	0.0%	46.4%	53.6%
			LIM341	Musina	0.0%	0.0%	94.1%	5.9%
			LIM342	Mutale	0.0%	0.0%	23.2%	76.8%
			LIM343	Thulamela	0.0%	0.0%	42.7%	57.3%
				<b>DC34 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>64.5%</b>	<b>35.5%</b>
	DC35	Capricorn	LIM352	Aganang	0.0%	0.0%	19.7%	80.3%
			LIM351	Blouberg	0.0%	0.0%	53.5%	46.5%
			LIM355	Lepele-Nkumpi	0.0%	0.0%	13.0%	87.0%
			LIM353	Molemole	0.0%	0.0%	47.1%	52.9%
			LIM354	Polokwane	0.0%	0.0%	0.0%	100.0%
				<b>DC35 Total</b>	<b>0.0%</b>	<b>0.0%</b>	<b>36.2%</b>	<b>63.8%</b>
	DC36	Waterberg	LIM366	Bela-Bela	2.8%	0.0%	34.1%	63.1%

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			LIM362	Lephalale	0.0%	0.0%	33.5%	66.5%
			LIM365	Modimolle	0.0%	0.0%	4.2%	95.8%
			LIM367	Mogalakwena	0.0%	0.0%	16.5%	83.5%
			LIM364	Mookgopong	1.2%	0.0%	30.6%	68.1%
			LIM361	Thabazimbi	0.0%	0.0%	31.8%	68.2%
			<b>DC36 Total</b>		<b>0.2%</b>	<b>0.0%</b>	<b>27.1%</b>	<b>72.6%</b>
	DC47	Greater Sekhukhune	LIM472	Elias Motsoaledi	0.0%	0.0%	20.5%	79.5%
			LIM474	Fetakgomo	0.0%	0.0%	0.0%	100.0%
			LIM471	Greater Marble Hall	0.0%	0.0%	9.7%	90.3%
			LIM475	Greater Tubatse	0.0%	0.0%	0.0%	100.0%
			LIM473	Makhuduthamaga	5.9%	0.0%	0.0%	94.1%
			<b>DC47 Total</b>		<b>1.1%</b>	<b>0.0%</b>	<b>5.5%</b>	<b>93.3%</b>
			<b>Limpopo Total</b>		<b>0.2%</b>	<b>0.0%</b>	<b>43.2%</b>	<b>56.6%</b>
Mpumalanga	DC30	Gert Sibande	MP301	Albert Luthuli	0.0%	0.0%	0.0%	100.0%
			MP306	Dipaleseng	0.0%	0.0%	37.5%	62.5%
			MP307	Govan Mbeki	0.0%	0.0%	80.9%	19.1%
			MP305	Lekwa	0.0%	0.0%	68.4%	31.6%
			MP303	Mkhondo	0.0%	0.0%	0.0%	100.0%
			MP302	Msukaligwa	0.0%	0.0%	8.4%	91.6%
			MP304	Seme	0.0%	0.0%	0.0%	100.0%
			<b>DC30 Total</b>		<b>0.0%</b>	<b>0.0%</b>	<b>23.5%</b>	<b>76.5%</b>
	DC31	Nkangala	MP311	Delmas	0.0%	0.0%	13.6%	86.4%
			MP316	Dr JS Moroka	1.6%	0.0%	49.7%	48.8%
			MP314	Emakhazeni	0.0%	0.0%	0.8%	99.2%
			MP312	Emalahleni	0.0%	0.0%	0.0%	100.0%
			MP313	Steve Tshwete	0.0%	0.0%	2.2%	97.8%
			MP315	Thembisile	0.0%	0.0%	7.4%	92.6%
			<b>DC31 Total</b>		<b>0.2%</b>	<b>0.0%</b>	<b>10.5%</b>	<b>89.3%</b>
	DC32	Ehlanzani	MP325	Bushbuckridge	0.0%	0.0%	55.9%	44.1%
			MP322	Mbombela	0.0%	0.0%	0.0%	100.0%
			MP324	Nkomazi	0.0%	0.0%	58.1%	41.9%

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					Low	Medium	High	Extreme
			MPDMA32	Kruger National Park (South)	0.0%	0.0%	87.4%	12.6%
			MP321	Thaba Chweu	0.0%	0.0%	0.0%	100.0%
			MP323	Umjindi	0.0%	0.0%	0.0%	100.0%
			<b>DC32 Total</b>		<b>0.0%</b>	<b>0.0%</b>	<b>47.3%</b>	<b>52.7%</b>
			<b>Mpumalanga Total</b>		<b>0.1%</b>	<b>0.0%</b>	<b>29.0%</b>	<b>70.9%</b>
Northern Cape	DC45	Kgalagadi	NC453	Gamagara	0.0%	0.0%	100.0%	0.0%
			NC452	Ga-Segonyana	0.0%	0.0%	100.0%	0.0%
			NC451	Moshaweng	0.0%	0.0%	93.1%	6.9%
			NCDMA45	Van Zylsrust to Hotazel	0.0%	19.5%	80.5%	0.0%
			<b>DC45 Total</b>		<b>0.0%</b>	<b>8.2%</b>	<b>89.5%</b>	<b>2.3%</b>
	DC6	Namakwa	NC065	Hantam	90.1%	7.7%	2.2%	0.0%
NC064			Kamiesberg	78.3%	11.5%	10.2%	0.0%	
NC066			Karoo Hoogland	80.8%	19.2%	0.0%	0.0%	
NC067			KhFi-Ma	100.0%	0.0%	0.0%	0.0%	
NC062			Nama Khoi	97.2%	0.3%	2.4%	0.0%	
NC061			Richtersveld	98.3%	0.0%	1.7%	0.0%	
NCDMA06			Tanqua Karoo	100.0%	0.0%	0.0%	0.0%	
NCDMA06			Upper Karoo - Springbok to Williston	100.0%	0.0%	0.0%	0.0%	
<b>DC6 Total</b>			<b>91.1%</b>	<b>7.0%</b>	<b>1.9%</b>	<b>0.0%</b>		
	DC7	Pixley ka Seme	NC073	Emthanjeni	46.5%	53.5%	0.0%	0.0%
NC074			Kareeberg	89.4%	10.6%	0.0%	0.0%	
NC075			Renosterberg	28.1%	68.5%	3.4%	0.0%	
NC078			Siyancuma	20.9%	0.4%	78.7%	0.0%	
NC077			Siyathemba	93.0%	0.4%	6.5%	0.0%	
NCDMA07			N of Orange River (Groblershoop to Griekwastad)	19.9%	2.2%	77.8%	0.0%	
NCDMA07			S of Orange River (Copperton)	100.0%	0.0%	0.0%	0.0%	
NC076			Thembehle	91.2%	2.6%	6.2%	0.0%	
NC071			Ubuntu	2.5%	97.5%	0.0%	0.0%	
NC072			Umsobomvu	0.1%	98.0%	1.9%	0.0%	
<b>DC7 Total</b>			<b>51.1%</b>	<b>35.8%</b>	<b>13.1%</b>	<b>0.0%</b>		



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					Low	Medium	High	Extreme
	DC8	Siyanda	NC084	!Kheis	92.7%	2.0%	5.4%	0.0%
			NC083	//Khara Hais	87.6%	12.4%	0.0%	0.0%
			NC082	Kai !Garib	100.0%	0.0%	0.0%	0.0%
			NC086	Kgatelopele	0.0%	0.0%	100.0%	0.0%
			NC081	Mier	20.3%	79.7%	0.0%	0.0%
			NCDMA08	Kenhardt rural districts	100.0%	0.0%	0.0%	0.0%
			NCDMA08	Kgalagadi National Park	0.0%	100.0%	0.0%	0.0%
			NCDMA08	North of Upington to Botswana border	19.2%	68.0%	12.8%	0.0%
			NC085	Tsantsabane	0.6%	0.0%	99.4%	0.0%
<b>DC8 Total</b>					<b>45.2%</b>	<b>41.8%</b>	<b>12.9%</b>	<b>0.0%</b>
	DC9	Francis Baard	NC092	Dikgatlong	0.0%	0.0%	100.0%	0.0%
			NC093	Magareng	0.0%	0.0%	100.0%	0.0%
			NC094	Phokwane	19.1%	0.0%	80.9%	0.0%
			NC091	Sol Plaatjie	4.4%	0.0%	95.6%	0.0%
			NCDMA09	West of Kimberley	0.0%	0.0%	99.0%	1.0%
			<b>DC9 Total</b>					<b>1.1%</b>
<b>Northern Cape Total</b>					<b>57.3%</b>	<b>24.3%</b>	<b>18.2%</b>	<b>0.2%</b>
North West	DC37	Bojanala	NW374	Kgetlengrivier	0.0%	0.0%	2.9%	97.1%
			NW372	Local Municipality of Madibeng	0.0%	0.0%	18.1%	81.9%
			NW371	Moretele	1.6%	0.0%	58.2%	40.2%
			NW375	Moses Kotane	0.0%	0.0%	33.8%	66.2%
			NW373	Rustenburg	0.0%	0.0%	18.7%	81.3%
			<b>DC37 Total</b>					<b>0.2%</b>
	DC38	Ngaka Modiri Molema	NW384	Ditsobotla	3.0%	0.0%	47.6%	49.4%
			NW383	Mafikeng	2.0%	0.0%	71.0%	27.1%
			NW385	Ramotshere Moiloa	0.0%	0.0%	38.3%	61.7%
			NW381	Ratlou	4.3%	0.0%	91.1%	4.6%
			NW382	Tswaing	8.1%	0.0%	91.9%	0.0%
			<b>DC38 Total</b>					<b>3.2%</b>
	DC39	Dr Ruth Segomotsi Mompoti	NW394	Greater Taung	0.0%	0.0%	94.3%	5.7%

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					Low	Medium	High	Extreme
			NW391	Kagisano	0.4%	0.0%	98.0%	1.7%
			NW396	Lekwa-Teemane	0.0%	0.0%	98.7%	1.3%
			NW393	Mamusa	4.8%	0.0%	90.9%	4.3%
			NW395	Molopo	0.3%	0.0%	98.4%	1.2%
			NW392	Naledi	0.0%	0.0%	99.3%	0.7%
			<b>DC39 Total</b>		<b>0.5%</b>	<b>0.0%</b>	<b>97.4%</b>	<b>2.1%</b>
	DC40	Dr Kenneth Kaunda	NW404	Maquassi Hills	0.8%	0.0%	99.2%	0.0%
			NW403	City of Matlosana	0.0%	0.0%	88.7%	11.3%
			NW405	Merafong City	0.0%	0.0%	0.0%	100.0%
			NW402	Tlokwe City Council	0.0%	0.0%	5.8%	94.2%
			NW401	Ventersdorp	0.0%	0.0%	32.8%	67.2%
			<b>DC40 Total</b>		<b>0.2%</b>	<b>0.0%</b>	<b>57.6%</b>	<b>42.2%</b>
			North West Total		1.1%	0.0%	69.0%	29.8%
<b>Western Cape</b>	CPT		CPT	City of Cape Town	15.1%	2.7%	82.1%	0.0%
	DC1	West Coast	WC013	Bergrivier	26.7%	3.2%	70.1%	0.0%
			WC012	Cederberg	13.0%	1.8%	85.2%	0.0%
			WC011	Matzikama	56.6%	3.4%	39.9%	0.0%
			WC014	Saldanha Bay	23.8%	2.4%	73.7%	0.0%
			WCDMA01	Bitterfontein area including coast	92.2%	0.6%	7.2%	0.0%
			WCDMA01	Swartland	44.7%	23.8%	31.5%	0.0%
			WCDMA01	Cedarberg Wilderness Area	0.0%	0.0%	100.0%	0.0%
			WCDMA01	West Coast National Park	10.3%	0.0%	89.7%	0.0%
			<b>DC1 Total</b>		<b>46.5%</b>	<b>3.4%</b>	<b>50.1%</b>	<b>0.0%</b>
	DC2	Cape Winelands	WC026	Breede River/Winelands	0.0%	28.6%	71.4%	0.0%
			WC025	Breede Valley	2.1%	21.6%	76.3%	0.0%
			WC023	Drakenstein	18.7%	0.0%	81.3%	0.0%
			WCDMA02	Ceres Karoo to north of Barrydale	45.6%	11.2%	43.2%	0.0%
			WC024	Stellenbosch	0.0%	0.0%	100.0%	0.0%
			WC022	Witzenberg	0.0%	1.9%	98.1%	0.0%
			<b>DC2 Total</b>		<b>28.7%</b>	<b>12.3%</b>	<b>59.0%</b>	<b>0.0%</b>
	DC3	Overberg	WC033	Cape Agulhas	5.2%	18.0%	76.8%	0.0%

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			WCDMA03	De Hoop Nature Reserve	0.0%	0.0%	100.0%	0.0%
			WC032	Overstrand	0.0%	0.0%	100.0%	0.0%
			WC034	Swellendam	2.2%	55.4%	42.5%	0.0%
			WC031	Theewaterskloof	9.5%	18.9%	71.7%	0.0%
				<b>DC3 Total</b>	<b>4.8%</b>	<b>29.2%</b>	<b>66.0%</b>	<b>0.0%</b>
	DC4	Eden	WC044	George	0.0%	0.0%	41.4%	58.6%
			WC042	Hessequa	19.0%	9.5%	71.4%	0.0%
			WC041	Kannaland	63.9%	2.8%	33.2%	0.0%
			WC048	Knysna	0.0%	0.0%	35.0%	65.0%
			WC043	Mossel Bay	4.2%	0.0%	76.2%	19.7%
			WC045	Oudtshoorn	47.9%	0.8%	49.3%	2.0%
			WC047	Bitou	0.9%	0.0%	76.5%	22.5%
			WCDMA04	Uniondale area - north of Outeniqua	7.6%	6.3%	84.9%	1.2%
				<b>DC4 Total</b>	<b>27.2%</b>	<b>4.1%</b>	<b>61.2%</b>	<b>7.5%</b>
	DC5	Central Karoo	WC053	Beaufort West	73.3%	26.7%	0.0%	0.0%
			WC051	Laingsburg	55.1%	21.3%	23.6%	0.0%
			WC052	Prince Albert	82.3%	4.0%	13.6%	0.0%
			WCDMA05	Murraysburg area	27.0%	73.0%	0.0%	0.0%
				<b>DC5 Total</b>	<b>63.5%</b>	<b>29.3%</b>	<b>7.2%</b>	<b>0.0%</b>
				<b>Western Cape Total</b>	<b>41.7%</b>	<b>15.3%</b>	<b>41.8%</b>	<b>1.2%</b>
				<b>South Africa Total</b>	<b>26.4%</b>	<b>11.7%</b>	<b>31.3%</b>	<b>30.6%</b>