



# Government Gazette Staatskoerant

REPUBLIC OF SOUTH AFRICA  
REPUBLIEK VAN SUID AFRIKA

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**PART 1 OF 4**

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**No FUTURE QUERIES WILL BE HANDLED IN CONNECTION WITH THE ABOVE.**

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government  
printing

Department:  
Government Printing Works  
REPUBLIC OF SOUTH AFRICA

## HIGH ALERT: SCAM WARNING!!!

### TO ALL SUPPLIERS AND SERVICE PROVIDERS OF THE GOVERNMENT PRINTING WORKS

It has come to the attention of the *GOVERNMENT PRINTING WORKS* that there are certain unscrupulous companies and individuals who are defrauding unsuspecting businesses disguised as representatives of the *Government Printing Works (GPW)*.

The scam involves the fraudsters using the letterhead of *GPW* to send out fake tender bids to companies and requests to supply equipment and goods.

Although the contact person's name on the letter may be of an existing official, the contact details on the letter are not the same as the *Government Printing Works*. When searching on the Internet for the address of the company that has sent the fake tender document, the address does not exist.

The banking details are in a private name and not company name. Government will never ask you to deposit any funds for any business transaction. *GPW* has alerted the relevant law enforcement authorities to investigate this scam to protect legitimate businesses as well as the name of the organisation.

Example of e-mails these fraudsters are using:

[PROCUREMENT@GPW-GOV.ORG](mailto:PROCUREMENT@GPW-GOV.ORG)

Should you suspect that you are a victim of a scam, you must urgently contact the police and inform the *GPW*.

*GPW* has an official email with the domain as [@gpw.gov.za](mailto:gpw@gpw.gov.za)

Government e-mails DO NOT have org in their e-mail addresses. All of these fraudsters also use the same or very similar telephone numbers. Although such number with an area code 012 looks like a landline, it is not fixed to any property.

*GPW* will never send you an e-mail asking you to supply equipment and goods without a purchase/order number. *GPW* does not procure goods for another level of Government. The organisation will not be liable for actions that result in companies or individuals being resultant victims of such a scam.

*Government Printing Works* gives businesses the opportunity to supply goods and services through RFQ / Tendering process. In order to be eligible to bid to provide goods and services, suppliers must be registered on the National Treasury's Central Supplier Database (CSD). To be registered, they must meet all current legislative requirements (e.g. have a valid tax clearance certificate and be in good standing with the South African Revenue Services - SARS).

The tender process is managed through the Supply Chain Management (SCM) system of the department. SCM is highly regulated to minimise the risk of fraud, and to meet objectives which include value for money, open and effective competition, equitability, accountability, fair dealing, transparency and an ethical approach. Relevant legislation, regulations, policies, guidelines and instructions can be found on the tender's website.

## Fake Tenders

National Treasury's CSD has launched the Government Order Scam campaign to combat fraudulent requests for quotes (RFQs). Such fraudulent requests have resulted in innocent companies losing money. We work hard at preventing and fighting fraud, but criminal activity is always a risk.

### How tender scams work

There are many types of tender scams. Here are some of the more frequent scenarios:

Fraudsters use what appears to be government department stationery with fictitious logos and contact details to send a fake RFQ to a company to invite it to urgently supply goods. Shortly after the company has submitted its quote, it receives notification that it has won the tender. The company delivers the goods to someone who poses as an official or at a fake site. The Department has no idea of this transaction made in its name. The company is then never paid and suffers a loss.

OR

Fraudsters use what appears to be government department stationery with fictitious logos and contact details to send a fake RFQ to Company A to invite it to urgently supply goods. Typically, the tender specification is so unique that only Company B (a fictitious company created by the fraudster) can supply the goods in question.

Shortly after Company A has submitted its quote it receives notification that it has won the tender. Company A orders the goods and pays a deposit to the fictitious Company B. Once Company B receives the money, it disappears. Company A's money is stolen in the process.

Protect yourself from being scammed

- If you are registered on the supplier databases and you receive a request to tender or quote that seems to be from a government department, contact the department to confirm that the request is legitimate. Do not use the contact details on the tender document as these might be fraudulent.
- Compare tender details with those that appear in the Tender Bulletin, available online at [www.gpwonline.co.za](http://www.gpwonline.co.za)
- Make sure you familiarise yourself with how government procures goods and services. Visit the tender website for more information on how to tender.
- If you are uncomfortable about the request received, consider visiting the government department and/or the place of delivery and/or the service provider from whom you will be sourcing the goods.
- In the unlikely event that you are asked for a deposit to make a bid, contact the SCM unit of the department in question to ask whether this is in fact correct.

Any incidents of corruption, fraud, theft and misuse of government property in the *Government Printing Works* can be reported to:

Supply Chain Management: Ms. Anna Marie Du Toit, Tel. (012) 748 6292.  
Email: [Annamarie.DuToit@gpw.gov.za](mailto:Annamarie.DuToit@gpw.gov.za)

Marketing and Stakeholder Relations: Ms Bonakele Mbhele, at Tel. (012) 748 6193.  
Email: [Bonakele.Mbhele@gpw.gov.za](mailto:Bonakele.Mbhele@gpw.gov.za)

Security Services: Mr Daniel Legoabe, at tel. (012) 748 6176.  
Email: [Daniel.Legoabe@gpw.gov.za](mailto:Daniel.Legoabe@gpw.gov.za)

# Closing times for **ORDINARY WEEKLY** **GOVERNMENT GAZETTE** **2021**

The closing time is **15:00** sharp on the following days:

- **24 December 2020**, Thursday for the issue of Thursday **31 December 2020**
- **31 December 2020**, Thursday for the issue of Friday **08 January 2021**
- **08 January**, Friday for the issue of Friday **15 January 2021**
- **15 January**, Friday for the issue of Friday **22 January 2021**
- **22 January**, Friday for the issue of Friday **29 January 2021**
- **29 January**, Friday for the issue of Friday **05 February 2021**
- **05 February**, Friday for the issue of Friday **12 February 2021**
- **12 February**, Friday for the issue of Friday **19 February 2021**
- **19 February**, Friday for the issue of Friday **26 February 2021**
- **26 February**, Friday for the issue of Friday **05 March 2021**
- **05 March**, Friday for the issue of Friday **12 March 2021**
- **12 March**, Friday for the issue of Friday **19 March 2021**
- **18 March**, Thursday for the issue of Friday **26 March 2021**
- **25 March**, Thursday for the issue of Thursday **01 April 2021**
- **31 March**, Wednesday for the issue of Friday **09 April 2021**
- **09 April**, Friday for the issue of Friday **16 April 2021**
- **16 April**, Friday for the issue of Friday **23 April 2021**
- **22 April**, Thursday for the issue of Friday **30 April 2021**
- **30 April**, Friday for the issue of Friday **07 May 2021**
- **07 May**, Friday for the issue of Friday **14 May 2021**
- **14 May**, Friday for the issue of Friday **21 May 2021**
- **21 May**, Friday for the issue of Friday **28 May 2021**
- **28 May**, Friday for the issue of Friday **04 June 2021**
- **04 June**, Friday for the issue of Friday **11 June 2021**
- **10 June**, Thursday for the issue of Friday **18 June 2021**
- **18 June**, Friday for the issue of Friday **25 June 2021**
- **25 June**, Friday for the issue of Friday **02 July 2021**
- **02 July**, Friday for the issue of Friday **09 July 2021**
- **09 July**, Friday for the issue of Friday **16 July 2021**
- **16 July**, Friday for the issue of Friday **23 July 2021**
- **23 July**, Friday for the issue of Friday **30 July 2021**
- **30 July**, Friday for the issue of Friday **06 August 2021**
- **05 August**, Thursday for the issue of Friday **13 August 2021**
- **13 August**, Friday for the issue of Friday **20 August 2021**
- **20 August**, Friday for the issue of Friday **27 August 2021**
- **27 August**, Friday for the issue of Friday **03 September 2021**
- **03 September**, Friday for the issue of Friday **10 September 2021**
- **10 September**, Friday for the issue of Friday **17 September 2021**
- **16 September**, Thursday for the issue of Thursday **23 September 2021**
- **23 September**, Thursday for the issue of Friday **01 October 2021**
- **01 October**, Friday for the issue of Friday **08 October 2021**
- **08 October**, Friday for the issue of Friday **15 October 2021**
- **15 October**, Friday for the issue of Friday **22 October 2021**
- **22 October**, Friday for the issue of Friday **29 October 2021**
- **29 October**, Friday for the issue of Friday **05 November 2021**
- **05 November**, Friday for the issue of Friday **12 November 2021**
- **12 November**, Friday for the issue of Friday **19 November 2021**
- **19 November**, Friday for the issue of Friday **26 November 2021**
- **26 November**, Friday for the issue of Friday **03 December 2021**
- **03 December**, Friday for the issue of Friday **10 December 2021**
- **09 December**, Thursday for the issue of Friday **17 December 2021**
- **17 December**, Friday for the issue of Friday **24 December 2021**
- **23 December**, Thursday for the issue of Friday **31 December 2021**

# LIST OF TARIFF RATES FOR PUBLICATION OF NOTICES

**COMMENCEMENT: 1 APRIL 2018**

## NATIONAL AND PROVINCIAL

Notice sizes for National, Provincial & Tender gazettes 1/4, 2/4, 3/4, 4/4 per page. Notices submitted will be charged at R1008.80 per full page, pro-rated based on the above categories.

Pricing for National, Provincial - Variable Priced Notices		
Notice Type	Page Space	New Price (R)
Ordinary National, Provincial	1/4 - Quarter Page	252.20
Ordinary National, Provincial	2/4 - Half Page	504.40
Ordinary National, Provincial	3/4 - Three Quarter Page	756.60
Ordinary National, Provincial	4/4 - Full Page	1008.80

## EXTRA-ORDINARY

All Extra-ordinary National and Provincial gazette notices are non-standard notices and attract a variable price based on the number of pages submitted.

The pricing structure for National and Provincial notices which are submitted as **Extra ordinary submissions** will be charged at **R3026.32** per page.

## GOVERNMENT PRINTING WORKS - BUSINESS RULES

The **Government Printing Works (GPW)** has established rules for submitting notices in line with its electronic notice processing system, which requires the use of electronic *Adobe Forms*. Please ensure that you adhere to these guidelines when completing and submitting your notice submission.

### CLOSING TIMES FOR ACCEPTANCE OF NOTICES

1. The *Government Gazette* and *Government Tender Bulletin* are weekly publications that are published on Fridays and the closing time for the acceptance of notices is strictly applied according to the scheduled time for each gazette.
2. Please refer to the Submission Notice Deadline schedule in the table below. This schedule is also published online on the Government Printing works website [www.gpwonline.co.za](http://www.gpwonline.co.za)

All re-submissions will be subject to the standard cut-off times.

**All notices received after the closing time will be rejected.**

Government Gazette Type	Publication Frequency	Publication Date	Submission Deadline	Cancellations Deadline
National Gazette	Weekly	Friday	Friday 15h00 for next Friday	Tuesday, 15h00 - 3 working days prior to publication
Regulation Gazette	Weekly	Friday	Friday 15h00 for next Friday	Tuesday, 15h00 - 3 working days prior to publication
Petrol Price Gazette	Monthly	Tuesday before 1st Wednesday of the month	One day before publication	1 working day prior to publication
Road Carrier Permits	Weekly	Friday	Thursday 15h00 for next Friday	3 working days prior to publication
Unclaimed Monies (Justice, Labour or Lawyers)	January / September 2 per year	Last Friday	One week before publication	3 working days prior to publication
Parliament (Acts, White Paper, Green Paper)	As required	Any day of the week	None	3 working days prior to publication
Manuals	Bi- Monthly	2nd and last Thursday of the month	One week before publication	3 working days prior to publication
State of Budget (National Treasury)	Monthly	30th or last Friday of the month	One week before publication	3 working days prior to publication
<i>Extraordinary Gazettes</i>	As required	Any day of the week	<i>Before 10h00 on publication date</i>	<i>Before 10h00 on publication date</i>
Legal Gazettes A, B and C	Weekly	Friday	One week before publication	Tuesday, 15h00 - 3 working days prior to publication
Tender Bulletin	Weekly	Friday	Friday 15h00 for next Friday	Tuesday, 15h00 - 3 working days prior to publication
Gauteng	Weekly	Wednesday	Two weeks before publication	3 days <b>after</b> submission deadline
Eastern Cape	Weekly	Monday	One week before publication	3 working days prior to publication
Northern Cape	Weekly	Monday	One week before publication	3 working days prior to publication
North West	Weekly	Tuesday	One week before publication	3 working days prior to publication
KwaZulu-Natal	Weekly	Thursday	One week before publication	3 working days prior to publication
Limpopo	Weekly	Friday	One week before publication	3 working days prior to publication
Mpumalanga	Weekly	Friday	One week before publication	3 working days prior to publication

## GOVERNMENT PRINTING WORKS - BUSINESS RULES

Government Gazette Type	Publication Frequency	Publication Date	Submission Deadline	Cancellations Deadline
Gauteng Liquor License Gazette	Monthly	Wednesday before the First Friday of the month	Two weeks before publication	3 working days <b>after</b> submission deadline
Northern Cape Liquor License Gazette	Monthly	First Friday of the month	Two weeks before publication	3 working days <b>after</b> submission deadline
National Liquor License Gazette	Monthly	First Friday of the month	Two weeks before publication	3 working days <b>after</b> submission deadline
Mpumalanga Liquor License Gazette	Bi-Monthly	Second & Fourth Friday	One week before publication	3 working days prior to publication

### EXTRAORDINARY GAZETTES

3. *Extraordinary Gazettes* can have only one publication date. If multiple publications of an *Extraordinary Gazette* are required, a separate Z95/Z95Prov *Adobe* Forms for each publication date must be submitted.

### NOTICE SUBMISSION PROCESS

4. Download the latest *Adobe* form, for the relevant notice to be placed, from the **Government Printing Works** website [www.gpwonline.co.za](http://www.gpwonline.co.za).
5. The *Adobe* form needs to be completed electronically using *Adobe Acrobat / Acrobat Reader*. Only electronically completed *Adobe* forms will be accepted. No printed, handwritten and/or scanned *Adobe* forms will be accepted.
6. The completed electronic *Adobe* form has to be submitted via email to [submit.egazette@gpw.gov.za](mailto:submit.egazette@gpw.gov.za). The form needs to be submitted in its original electronic *Adobe* format to enable the system to extract the completed information from the form for placement in the publication.
7. Every notice submitted **must** be accompanied by an official **GPW** quotation. This must be obtained from the *eGazette* Contact Centre.
8. Each notice submission should be sent as a single email. The email **must** contain **all documentation relating to a particular notice submission**.
  - 8.1. Each of the following documents must be attached to the email as a separate attachment:
    - 8.1.1. An electronically completed *Adobe* form, specific to the type of notice that is to be placed.
      - 8.1.1.1. For National *Government Gazette* or *Provincial Gazette* notices, the notices must be accompanied by an electronic Z95 or Z95Prov *Adobe* form
      - 8.1.1.2. The notice content (body copy) **MUST** be a separate attachment.
    - 8.1.2. A copy of the official **Government Printing Works** quotation you received for your notice. (*Please see Quotation section below for further details*)
    - 8.1.3. A valid and legible Proof of Payment / Purchase Order: **Government Printing Works** account customer must include a copy of their Purchase Order. **Non-Government Printing Works** account customer needs to submit the proof of payment for the notice
    - 8.1.4. Where separate notice content is applicable (Z95, Z95 Prov and TForm 3, it should **also** be attached as a separate attachment. (*Please see the Copy Section below, for the specifications*).
    - 8.1.5. Any additional notice information if applicable.

## GOVERNMENT PRINTING WORKS - BUSINESS RULES

9. The electronic *Adobe* form will be taken as the primary source for the notice information to be published. Instructions that are on the email body or covering letter that contradicts the notice form content will not be considered. The information submitted on the electronic *Adobe* form will be published as-is.
10. To avoid duplicated publication of the same notice and double billing, Please submit your notice **ONLY ONCE**.
11. Notices brought to **GPW** by “walk-in” customers on electronic media can only be submitted in *Adobe* electronic form format. All “walk-in” customers with notices that are not on electronic *Adobe* forms will be routed to the Contact Centre where they will be assisted to complete the forms in the required format.
12. Should a customer submit a bulk submission of hard copy notices delivered by a messenger on behalf of any organisation e.g. newspaper publisher, the messenger will be referred back to the sender as the submission does not adhere to the submission rules.

### QUOTATIONS

13. Quotations are valid until the next tariff change.
  - 13.1. **Take note:** **GPW**'s annual tariff increase takes place on **1 April** therefore any quotations issued, accepted and submitted for publication up to **31 March** will keep the old tariff. For notices to be published from 1 April, a quotation must be obtained from **GPW** with the new tariffs. Where a tariff increase is implemented during the year, **GPW** endeavours to provide customers with 30 days' notice of such changes.
14. Each quotation has a unique number.
15. Form Content notices must be emailed to the *eGazette* Contact Centre for a quotation.
  - 15.1. The *Adobe* form supplied is uploaded by the Contact Centre Agent and the system automatically calculates the cost of your notice based on the layout/format of the content supplied.
  - 15.2. It is critical that these *Adobe* Forms are completed correctly and adhere to the guidelines as stipulated by **GPW**.
16. **APPLICABLE ONLY TO GPW ACCOUNT HOLDERS:**
  - 16.1. **GPW** Account Customers must provide a valid **GPW** account number to obtain a quotation.
  - 16.2. Accounts for **GPW** account customers **must** be active with sufficient credit to transact with **GPW** to submit notices.
    - 16.2.1. If you are unsure about or need to resolve the status of your account, please contact the **GPW** Finance Department prior to submitting your notices. (If the account status is not resolved prior to submission of your notice, the notice will be failed during the process).
17. **APPLICABLE ONLY TO CASH CUSTOMERS:**
  - 17.1. Cash customers doing **bulk payments** must use a **single email address** in order to use the **same proof of payment** for submitting multiple notices.
18. The responsibility lies with you, the customer, to ensure that the payment made for your notice(s) to be published is sufficient to cover the cost of the notice(s).
19. Each quotation will be associated with one proof of payment / purchase order / cash receipt.
  - 19.1. This means that **the quotation number can only be used once to make a payment.**

**GOVERNMENT PRINTING WORKS - BUSINESS RULES****COPY (SEPARATE NOTICE CONTENT DOCUMENT)**

20. Where the copy is part of a separate attachment document for Z95, Z95Prov and TForm03
- 20.1. Copy of notices must be supplied in a separate document and may not constitute part of any covering letter, purchase order, proof of payment or other attached documents.
- The content document should contain only one notice. (You may include the different translations of the same notice in the same document).
- 20.2. The notice should be set on an A4 page, with margins and fonts set as follows:
- Page size = A4 Portrait with page margins: Top = 40mm, LH/RH = 16mm, Bottom = 40mm;  
Use font size: Arial or Helvetica 10pt with 11pt line spacing;
- Page size = A4 Landscape with page margins: Top = 16mm, LH/RH = 40mm, Bottom = 16mm;  
Use font size: Arial or Helvetica 10pt with 11pt line spacing;

**CANCELLATIONS**

21. Cancellation of notice submissions are accepted by **GPW** according to the deadlines stated in the table above in point 2. Non-compliance to these deadlines will result in your request being failed. Please pay special attention to the different deadlines for each gazette. Please note that any notices cancelled after the cancellation deadline will be published and charged at full cost.
22. Requests for cancellation must be sent by the original sender of the notice and must be accompanied by the relevant notice reference number (N-) in the email body.

**AMENDMENTS TO NOTICES**

23. With effect from 01 October 2015, **GPW** will not longer accept amendments to notices. The cancellation process will need to be followed according to the deadline and a new notice submitted thereafter for the next available publication date.

**REJECTIONS**

24. All notices not meeting the submission rules will be rejected to the customer to be corrected and resubmitted. Assistance will be available through the Contact Centre should help be required when completing the forms. (012-748 6200 or email [info.egazette@gpw.gov.za](mailto:info.egazette@gpw.gov.za)). Reasons for rejections include the following:
- 24.1. Incorrectly completed forms and notices submitted in the wrong format, will be rejected.
- 24.2. Any notice submissions not on the correct *Adobe* electronic form, will be rejected.
- 24.3. Any notice submissions not accompanied by the proof of payment / purchase order will be rejected and the notice will not be processed.
- 24.4. Any submissions or re-submissions that miss the submission cut-off times will be rejected to the customer. The Notice needs to be re-submitted with a new publication date.

**GOVERNMENT PRINTING WORKS - BUSINESS RULES****APPROVAL OF NOTICES**

25. Any notices other than legal notices are subject to the approval of the Government Printer, who may refuse acceptance or further publication of any notice.
26. No amendments will be accepted in respect to separate notice content that was sent with a Z95 or Z95Prov notice submissions. The copy of notice in layout format (previously known as proof-out) is only provided where requested, for Advertiser to see the notice in final Gazette layout. Should they find that the information submitted was incorrect, they should request for a notice cancellation and resubmit the corrected notice, subject to standard submission deadlines. The cancellation is also subject to the stages in the publishing process, i.e. If cancellation is received when production (printing process) has commenced, then the notice cannot be cancelled.

**GOVERNMENT PRINTER INDEMNIFIED AGAINST LIABILITY**

27. The Government Printer will assume no liability in respect of—
  - 27.1. any delay in the publication of a notice or publication of such notice on any date other than that stipulated by the advertiser;
  - 27.2. erroneous classification of a notice, or the placement of such notice in any section or under any heading other than the section or heading stipulated by the advertiser;
  - 27.3. any editing, revision, omission, typographical errors or errors resulting from faint or indistinct copy.

**LIABILITY OF ADVERTISER**

28. Advertisers will be held liable for any compensation and costs arising from any action which may be instituted against the Government Printer in consequence of the publication of any notice.

**CUSTOMER INQUIRIES**

Many of our customers request immediate feedback/confirmation of notice placement in the gazette from our Contact Centre once they have submitted their notice – While **GPW** deems it one of their highest priorities and responsibilities to provide customers with this requested feedback and the best service at all times, we are only able to do so once we have started processing your notice submission.

**GPW** has a 2-working day turnaround time for processing notices received according to the business rules and deadline submissions.

Please keep this in mind when making inquiries about your notice submission at the Contact Centre.

29. Requests for information, quotations and inquiries must be sent to the Contact Centre **ONLY**.
30. Requests for Quotations (RFQs) should be received by the Contact Centre at least **2 working days** before the submission deadline for that specific publication.

## GOVERNMENT PRINTING WORKS - BUSINESS RULES

### PAYMENT OF COST

31. The Request for Quotation for placement of the notice should be sent to the Gazette Contact Centre as indicated above, prior to submission of notice for advertising.
32. Payment should then be made, or Purchase Order prepared based on the received quotation, prior to the submission of the notice for advertising as these documents i.e. proof of payment or Purchase order will be required as part of the notice submission, as indicated earlier.
33. Every proof of payment must have a valid **GPW** quotation number as a reference on the proof of payment document.
34. Where there is any doubt about the cost of publication of a notice, and in the case of copy, an enquiry, accompanied by the relevant copy, should be addressed to the Gazette Contact Centre, **Government Printing Works**, Private Bag X85, Pretoria, 0001 email: [info.egazette@gpw.gov.za](mailto:info.egazette@gpw.gov.za) before publication.
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## GOVERNEMENT NOTICES • GOEWERMENTSKENNISGEWINGS

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 683

6 August 2021

**NOTICE OF AMENDMENT IN TERMS OF SECTION 11A (4) OF THE RESTITUTION OF LAND RIGHTS ACT, 1994 (ACT NO 22 OF 1994), AS AMENDED**

Notice is hereby given in terms of Section 11A (4) of the Restitution of Land Rights Act, 1994 (Act 22 of 1994), as amended, that an amendment is hereby made to gazette number 222270, notice No. 929 of 2001 to withdraw the farm Piesanghoek 244MT which was gazette and published as parent farm and **only** include Portions 6, 7, 8 and 9 of the farm Piesanghoek 244 MT in the amended gazette notice, situated within the Makhado Local Municipality, Vhembe District of the Limpopo Province.

The land claim was lodged by Mr. Mpfariseni Jonas Nekhahambe on the 13<sup>th</sup> of October 1998, on behalf of the Matshavhawe community.

Detailed information of the properties to be gazetted and published under the Matshavhawe land claim are as follows:

FARM NAME	PORTION	CURRENT OWNER AND TITLE DEED	EXTENT OF PROPERTY	OTHER ENDORSEMENT	HOLDER
1. Piesanghoek 244 MT	Portion 6	Piesanghoek Trust T19368/1990	302.7398	B145368/2004	ABSA BANK LTD
	Portion 7	Piesanghoek Trust T19368/1990	302.7398	B145368/2004	ABSA BANK LTD
	Portion 8	Piesanghoek Trust T19368/1990	302.7398	B145368/2004	ABSA BANK LTD
	Portion 9	Piesanghoek Trust T19368/1990	302.7398	B145368/2004	ABSA BANK LTD

All interested parties should take note that the office of the Regional Land Claims Commissioner, Limpopo is processing this land claim. Any party that has an interest in the above-mentioned property is hereby invited to submit in writing within **30** days of publication of this notice, any comment, and / or objection to this land claim to the Office of the Regional Land Claims Commissioner: Limpopo at the addresses set out below under claim reference: **KRP 378**.

The Regional Land Claims Commissioner: Limpopo  
Private Bag X9552  
Polokwane  
0700

Submissions can also be hand delivered to:  
61 Biccard Street  
Polokwane  
0700

  
MR. L.H. MAPHUTHA  
REGIONAL LAND CLAIMS COMMISSIONER

DATE: 20/07/2021

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 684

6 August 2021

## WITHDRAWAL OF NOTICE NO 506 OF 2009 IN THE GOVERNMENT GAZETTE NO 32231 DATED 15 MAY 2009

Notice is hereby given in terms of **Section 11A [2] of the Restitution of the Land Rights Act 1994 [Act 22 of 1994]** as amended, that the **Regional Land Claims Commissioner** is withdrawing Government Gazette No 32231 Notice 506 of 2009. The land claim for Restitution of Land Rights was lodged by **Stephen Jabulani Rakwena under Krp 12022** Emakhazeni Local Municipality, Nkangala District in Mpumalanga Province:

## PARTICULARS OF THE PROPERTIES

## 1. DOORNKOP 420 JT

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
Portion 1	De Wet Dirk Petrus Johannes [4805305027003]	T1677/1982	87.7132	None	None	1. K1115/1986RM in favour of De Jager Karel Pieter 2. K1962/1978RM in favour of De Jager Anna Catherina 3. K2846/1987RM in favour of De Wet Dirk Petrus Johannes 4. K430/1969RM
The Remaining extent of Portion 2	Doornkop Fish & Wildlife Reserve CC [199900710723]	T98272/1999	1220.1763	None	None	K2786/2002S
The Remaining extent of Portion 3	Kloppers Stephanus Bernardus	T97694/2007	590.2237	None	None	1. K1805/1973S 2. K3092/1977S

	[3712175018081]									3. K7643/1997S 4. VA2391/2003 in favour of Blake Oswald Homsby
The Remaining extent of Portion 4	Class A Trading 110 Pty Ltd [106401/2001]	T106401/2001	238.1426	B79506/2003	None	Investec Bank Ltd	K3568/1977S			
Portion 5	Class A Trading 110 Pty Ltd [106401/2001]	T106401/2001	372.7674	B79506/2003	None	Investec Bank Ltd	K2273/1978S			
Portion 6	Blake Beverly [521010] Blake Carlisle [5406105092088]	T45447/1973	263.8836	None	None	None				1. K6784/1992S 2. VA1650/1992
Portion 7	Doornkop Fish & Wildlife Reserve CC [199900710723]	T157785/2005	1.0810	None	None	None				None
Portion 8	Seikirk May Elizabeth [6405140082087]	T115319/2005	1.0376	None	None	None				None
Portion 9	Fine Asset Inv 61 Pty Ltd [200503269807]	T99782/2006	1.0521	B125867/2006	None	Absa Bank Ltd				None
Portion 10	Cornick Prop Pty Ltd [196601131307]	T313/2006	1.0124	B173665/2006	None	Standard Bank Ltd				None
Portion 11	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T134009/2002	1.0875	None	None	None				None
Portion 12	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T119933/2004	1.0030	None	None	None				None
Portion 13	Labuchagne Familie Trust [1103/1995]	T36297/2007	1.0924	None	None	None				None
Portion 14	Bisgaard Rolf [510108] Bisgaard Rhonwyn Anna	T18151/2008	1.0123	B16317/2008	8	Nedbank Ltd				None

Portion 15	[6405010040082] Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T134009/2002	1.0043	None	None	None	None
Portion 16	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T99061/2001	1.0749	None	None	None	None
Portion 17	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T157786/2000	1.0028	None	None	None	None
Portion 18	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T157787/2000	1.0900	None	None	None	None
Portion 19	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T134006/2002	1.0033	None	None	None	None
Portion 20	Dream Vacation Club	T52915/2004	1.0740	B3362/2006	First Rand Bank Ltd	None	None
Portion 21	Dream Vacation Club	T52915/2004	1.0321	B3362/2006	First Rand Bank Ltd	None	None
Portion 22	Valetin Ronald Sidney [6911255058184]	T62416/2005	1.0474	B67635/2005	Nedbank Ltd	None	None
Portion 23	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T157788/2000	1.0090	None	None	None	None
Portion 24	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T157789/2000	1.0308	None	None	None	None
Portion 25	Doornkop Fish & Wildlife Reserve Share Block Ltd	T157790/2000	1.0207	None	None	None	None

Portion 26	[200002804806] Intrax Inv 254 Pty Ltd [200201712907]	T1678/2008	1.0891	None	None	None	None
Portion 28	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T157792/2000	1.0211	None	None	None	None
Portion 29	Cupta Prop Pty Ltd [200100589507]	T99064/2001	1.0932	None	None	None	None
Portion 30	Jardine William Rodger [6509135220089]	T138111/2005	0.9988	None	None	None	None
Portion 31	Doornkop Fish & Wildlife Reserve CC [199900710723]	T88925.2001	10.5029	None	None	None	None
Portion 32	Caskinjem Creek CC [200103272323]	T88926/2001	1.0298	None	None	None	None
Portion 33	K G Prop Holding CC [199902887123]	T88927/2001	1.0407	B95371/20 01	Standard Bank Ltd	None	None
Portion 34	Wallie Lodge CC [200204162523]	T115708/2002	1.0544	B81941/20 02	Private Mortgages 2 Pty Ltd	None	None
Portion 35	Du Preeze Daniel Marthinus [7008305150084]	T120255/2002	1.0622	B84579/20 02	Absa Bank Ltd	None	None
Portion 36	Southwell Rober Deon [6601125229087] Southwell Charlotte Nigheanna	T156996/2004	1.0203	B135612/2 004	B135612/2004	None	None
Portion 38	Blue Nightingale Trading 305 Pty Ltd [200403054307]	T1505420/2006	1.0717	B188361/2 006	Nedbank Ltd	None	None
Portion 39	Bradley Jennifer Joan [4906240103006]	T145575/2002	1.0399	B100562/2 002	Nedcor Bank Ltd	None	None
Portion 40	Chris Roets Trust	T15644/2008	1.0883	None	None	None	None
Portion 41	Peters Allan Francis	T96021/2002	1.0021	None	None	None	None

Portion 72	[4402265072086] Peters Seth Aleric [7005215047087]	T1374/2003	1.0684	None	None	None	None
Portion 79	Zambezi Trust [4818/2002] Stal Trust [IT 2701/00]	T108057/2004	1.0025	B153695/2 007	Standard Bank Ltd	None	None
Portion 80	Doornkop 80 Trust [5362/2004]	T170150/2004	1.0273	B148307/2 004 B17626/20 05	Absa Bank Ltd Absa Bank Ltd	None	None
Portion 81	Holder Edmund William [7412255115081]	T144960/2006	1.0212	B182319/2 006	Standard Bank Ltd	None	None
Portion 82	Lindique Qisela [6607160091084]	T142204/2006	1.0162	None	None	None	K2786/2002S
Portion 83	Radomsky Aaron [7107155304088]	T176205/2004	1.0263	None	None	None	None
Portion 84	Doornkop Retreat Pty Ltd [200201608807]	T67766/2003	1.0406	B2297/200 9	FirstRand Bank Ltd	None	VA435/2009
Portion 85	Orsmond Christa [6605230077083]	T334652/2007	1.0729	B362936/2 007	Standard Bank Ltd	None	None
Portion 86	Aarow Creek 178 Pty Ltd [200801334207]	T13940/2008	1.0696	B13296/20 08	Nedbank Ltd	None	None
Portion 87	Gearing Inv & Development Pty Ltd [199400816107]	T40713/2005	1.0086	None	None	None	None
Portion 88	Couto Jose Augusto [6705105229080] Couto Isabel Maria Martins [6812040094080]	T158270/2003	1.0893	B106556/2 003	Absa Ltd	None	None
Portion 89	Jardine William Rodger [6509135229080]	T159152/2004	1.0590	None	None	None	K2786/2002S

Portion 90	Jardine Christa Lynne [620407] Doornkop Family Trust [10325/2004]	T52472/2005	1.0780	None	None	None	None
Portion 91	Gschawandner Dorothy Elizabeth [5304010041086] Meyers Wendy [5509260043083]	T89562/2007	1.0050	None	None	None	None
Portion 92	Taylor John Phillip [520821] Jones Barbara Ann [480807]	T123000/2005	1.0000	None	None	None	None
Portion 93	Stein Michael [7103265360086] Hughes Sheldon Graham [6904245050080]	T83438/2005	0.3331	B91493/2005	Absa Bank Ltd	None	None
Portion 95	Van Wyk Johan Hendrik [4309295035084]	T50717/2005	1.0249	None	None	None	None
Portion 102	Mykaprop 52 CC	T50716/2005	1.0100	None	None	None	None
Portion 103	Doornko Trust [2428/2005]	T57463/2005	1.0000	None	None	None	None
Portion 104	Mckenzie Michael Wayne [6208195243087]	T15272/2006	1.0010	B20122/2006	Standard Bank Ltd	None	None
Portion 105	Doornkop Fish & Wildlife Reserve Share Block Ltd [200002804806]	T94172/2005	1.0032	None	None	None	None
Portion 106	D & L Jolley Prop Pty Ltd [198100080207]	T157782/2004	1.0001	B7661/2008	Absa Bank Ltd	None	None
Portion 107	Verpoort Brian Rudy [6903265054089] Hughes Kim Eileen [7110230239089]	T165464/2004	1.0000	B363459/2007	Investec Bank Ltd	None	None

Portion 108	Herr Martin John [4906305031084] Herr Jo-Anne Claire [6306180121084]	T10627/2005	1.0000	None	None	None	None
Portion 109	Janse Van Rensburg Fredericks Arni [6205205014003]	T98640/2006	1.0076	None	None	None	None
Portion 110	Traynor Steward John [6409135081088] Traynor Lunette Gail [6604140047088]	T117265/2008	1.0086	B15544/20 04	None	None	None
Portion 111	Evans Michael Morgan [5805195164089] Evans Getrude Frances [5809180042086]	T98641/2006	1.0719ha	None	None	None	None
Portion 112	Kloppers Stephanus Bernardus – Trustees	▪ T62970/2005 ▪ T97694/2007	20.6849ha	None	None	None	None

## 2. UITKOMST 390 JT

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
The Remaining extent of Portion 4	SoundProps 1133 Inv Pty Ltd [91/04324/07]	T108367/1992	214.1330ha	B4470/1990	Landbou- Ontwikkelingsbank Van Suid Afrika	None

Portion	Owner	T	Area	Other	First Bank	National	None
Portion 6	Davies Izak Schalk Petrus [5708205071080]	T2832/1977	256.9596ha	B41404/1981 B46052/1983 B61016/1989	None	None	None
Portion 7	Davies Williem Andiaan Jacobus [4606055004006]	T2834/1977	256.9596ha	None	None	None	<ul style="list-style-type: none"> <li>▪ K19/1950RM</li> <li>▪ K6288/2002S</li> <li>▪ K7698/1993S</li> <li>▪ KJ886/1962S</li> </ul>
Portion 8	Crawford Gerald Alexandra [5002135118082] Crawford Barbara Elizabeth [4907150094086]	T8295/2008	256.9596ha	None	None	None	<ul style="list-style-type: none"> <li>▪ K1449/1994S</li> <li>▪ VA1088/2008 in favour of Hesilton Jennifer Margaret</li> </ul>
The Remaining extent of Portion 10	Van Niekerk Anton Andriaan [5301075034089] Van Niekerk Catharina Johanna	T112032/2007	57.1021ha	None	None	None	<ul style="list-style-type: none"> <li>▪ K2632/1994S</li> <li>▪ K4037/2007S</li> </ul>
The remaining extent of Portion 11	Stefan Weich Trust [7990/1995]	T82180/1997	195.7790ha	None	None	None	<ul style="list-style-type: none"> <li>▪ K2827/1994</li> <li>▪ K2978/1998S</li> </ul>
The Remaining extent of Portion 12	Lenie Olivier Testamentere Trust [20312/2004]	T26868/2007	86.8766ha	None	None	None	<ul style="list-style-type: none"> <li>▪ K1574/1994S</li> <li>▪ K7144/1997S</li> </ul>
Portion 13	Galencia Inv 1034 Pty Ltd [200201426507]	T14017/1998	256.9596ha	None	None	None	None
The Remaining	Kingsfisher Trout	T14017/1998	113.0622ha				K918/1999S

extent of Portion 14	Lodge Pty Ltd [97/21262/07]												
Portion 16	Galencia Inv 1034 Pty Ltd [200201426507]	T14017/1998	4.5825ha	None	None	None	None	None	None	None	None	None	None
Portion 17	Clements Marlene	T33322/2007	57.1021ha	None	None	None	None	None	None	None	None	K4132/1992R M	
Portion 18	Doyle Stephen Anthony	T148410/2001	57.1021 ha	B102730/1996	Standard Bank LTD							<ul style="list-style-type: none"> <li>▪ K493/1990RM in favour of Hattongh Johannes Carel</li> <li>▪ K787/2002S</li> </ul>	
Portion 19	Vermaak Jan Andriaan Cornelius	T30736/1967	1.7131ha	None	None	None	None	None	None	None	None	None	
Portion 20	Mare Jan Pieter [430811504500] Mare Hendirka Catherina [5104140049003]	T10062/1996	2.1421ha	None	None	None	None	None	None	None	None	K96/1950S	
The Remaining extent of portion 21	SoundProps 1133 Inv Pty Ltd [91/04324/07/]	T108366/1992	239.8489ha	None	None	None	None	None	None	None	None	K1067/1981PC	
Portion 22	Devis Johannes Nicolaas [4105135062084]	T2835/1977	258.4598ha	None	None	None	None	None	None	None	None	K7061/1994S	
Portion 23	Mare Jan Pieter [430811504500] Mare Hendirka Catherina [5104140049003]	T10062/1996	29.4804ha	None	None	None	None	None	None	None	None	K4077/1997S	
Portion 24	Mark Dimitrios & George CC [90/30123/23]	T83465/1990	48.8266ha	B4399/1998	Nedcor Bank Ltd							None	
Portion 25	Schoonspruitvalley	T8639/1973	29.1517ha	None	None	None	None	None	None	None	None	VA797/1988-	

	Pty Ltd [72/11307/07]						T8669/73
Portion 26	Mare Jan Pieter [430811504500] Mare Hendirka Catherina [5104140049003]						
Portion 27	Stevenson anna Johanna Jelena Catherina [3107010038008]	T599/1970	59.9572ha	None	None	None	<ul style="list-style-type: none"> <li>▪ K4713/1998S</li> <li>▪ K4911/2001S</li> <li>▪ K7697/1993S</li> </ul>
Portion 28	Kingsfisher Trout Lodge Pty Ltd [97/21262/07]	T14017/1998	62.3005ha	None	None	None	None
Portion 29	Rauch Wilhemina [4109150071004]	T50459/1983	282.8662ha	<ul style="list-style-type: none"> <li>▪ B103415/1992</li> <li>▪ B11010/1985</li> </ul>	Absa Bank Trust	K1181/1987 in favor of Catherine Johanna Gertruida	

## 3. Waterval 331 JT

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
The Remaining extent of Portion 1	Sumare Farming CC [921211723]	T77744/1992	165.5649ha	None	None	V/A22444/2000
The Remaining	Sappi Manufacturing	T23137/1998	598.0771ha	None	None	K8062/1995RM



Portion 26	Four Arrows Inv 142 Pty Ltd [200402315507]	T60269/2005	120.7995ha	<ul style="list-style-type: none"> <li>▪ B47346/2007</li> <li>▪ B65563/2005</li> </ul>	<ul style="list-style-type: none"> <li>▪ Standard Bank Ltd</li> <li>▪ Standard Bank Ltd</li> </ul>	Elizabeth None
Portion 27	Arbeidsrus Boendery Pty Ltd [92/01334/07]	T46768/1994	104.34351ha	None	None	None

The Regional Land Claims Commissioner, Mpumalanga Province hereby gives a notice of withdrawal of Government Gazette No 32231 Notice 506 of 2009 in terms of Section 11A of the Restitution Act. Any party interested in the above-mentioned properties is hereby invited to submit within **30 [thirty days]** from the date of publication of this notice any comments, or further information to:

**Commissioner for Restitution of Land Rights**

Private Bag X7201

Witbank

1035

or Shop No. E 8  
Saveways Crescent Centre  
Cnr OR Tambo and Mandela Street

Witbank

1035

TEL NO: 013 – 655 1000

FAX NO: 013 – 690 3438

**CHECKED BY: MS. THOBILE MATHEBULA**  
**RESTITUTION ADVISOR**

DATE: 19/04/2021

**MR. L.H. MAPHUTHA**  
**REGIONAL LAND CLAIMS COMMISSIONER**  
**MPUMALANGA PROVINCE**

DATE: 2021/05/10

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 685

6 August 2021

## GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED

Notice is hereby given in terms of Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended, that a land claim for Restitution of Land Rights has been lodged by Mr. Japie Sgubudu Maziya [ID No. 531223 5652 082] on behalf of the Maziya Family on the properties mentioned hereunder situated in Albert Luthuli Local Municipality under Gert Sibande District Municipality in the Mpumalanga Province: [KRP:11366]

## CURRENT PARTICULARS OF THE PROPERTY

## VERGELEGEN 728 JT

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
Rem Ext of Portion 2	Nkomazi Prop Pty Ltd (200700669807)	T337037/2007	342.6128 ha	None	None	• None
Portion 4	Nkomazi Prop Pty Ltd (200700669807)	T337037/2007	471.0587 ha	None	None	• K562/1981S
			The affected hectares for both portions are 138.6513			

1

**GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED**

Notice is hereby given in terms of **Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended**, that a land claim for **Restitution of Land Rights** has been lodged by **Mr. Japie Sgubudu Maziya [ID No. 531223 5652 082]** on behalf of the **Maziya Family** on the properties mentioned hereunder situated in **Albert Luthuli Local Municipality under Gert Sibande District Municipality in the Mpumalanga Province: [KRP:11366]**

The Restitution of Land Rights, Mpumalanga Province will investigate all the claims in terms of the provisions of the Act, any party interested in the above mentioned property is hereby invited to submit within **30 [thirty days]** from the date of publication of this notice to submit any comments, or further information to:

**Commissioner for Restitution of Land Rights**

Private Bag X 11330

Nelspruit

1200

Or 30 Samora Machel Drive

Restitution House

Nelspruit

1200

TEL NO: 013 756 6000

FAX NO: 013 752 3859



**MR. L. H. MAPHUTHA**

**REGIONAL LAND CLAIMS COMMISSIONER**

**DATE:** 2021/06/18

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 686

6 August 2021

## GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED

Notice is hereby given in terms of Section 11[1] of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended, that a land claim for Restitution of Land Rights has been lodged by Ms Mnisi Lontombi Betty (Identity Number No 2211200118082) on behalf Mnisi Family on the property mentioned hereunder situated in the City of Mbombela Local Municipality under Ehlanzeni District Municipality in the Mpumalanga Province as per reference KRP's: 2358

## CURRENT PARTICULARS OF THE PROPERTY/S

CAMISSA 992 JU

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
Portion 0 of the farm Camissa 992 JU	REPUBLIC OF SOUTH AFRICA	T5075/2015	(Extent of claimed land is 37.7235 ha) Extent of the farm (837.9920 ha)	None	None	None

The Regional Land Claims Commissioner, Mpumalanga Province will investigate all the claims in terms of the provisions of the Act, any party interested in the above mentioned property is hereby invited to submit within 30 [Thirty days] from the date of publication of this notice to submit any comments, or further information to:

**Commissioner for Restitution of Land Rights**

Private Bag X11330

Nelspruit

1200

Or 30 Samora Machel Drive

Nelspruit

1200

Tel No: 013 756 6000

Fax No: 013 752 3859

CHECKED BY: MRS CAROLINE FIPAZA SINGH  
CHIEF RESTITUTION ADVISOR

DATE:



MR L H MAPHUTHA  
THE REGIONAL LAND CLAIMS COMMISSIONER  
MPUMALANGA PROVINCE

DATE: 2021/08/31

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 687

6 August 2021

## GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED

Notice is hereby given in terms of Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994], as amended, that a land claim for Restitution of Land Rights has been lodged by Mr. Daniel Ncongwane [ID No.5201095673082] on behalf of the Ncongwane Family on the properties mentioned hereunder situated in Albert Luthuli Local Municipality under Gert Sibande District Municipality in the Mpumalanga Province: [KRP:2368]

## CURRENT PARTICULARS OF THE PROPERTY

NKOMAZI 772 JT

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
Remaining extent of the farm Nkomazi 772 JT	NKOMAZI GAME RESERVE PTY LTD (200700668907)	T9181/2008	12155.9544 ha (the affected hectors are 44.6843)	None	None	<ul style="list-style-type: none"> <li>• I-2069/2012C IN FAVOUR OF 46/2009-20120727</li> <li>• K147/1952RM</li> <li>• K1477/1992RM IN FAVOUR OF GRIQUALAND EXPLORATION &amp; FINANCE CO LTD</li> <li>• K1518/1981PC</li> <li>• K1547/1967S</li> <li>• K1819/1978S</li> <li>• K2090/1980S</li> <li>• K2091/1980S</li> <li>• K2093/1980S</li> <li>• K2141/1980S</li> </ul>



**GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED**

Notice is hereby given in terms of Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended, that a land claim for **Restitution of Land Rights** has been lodged by Mr. Daniel Ncongwane [ID No.5201095673082] on behalf of the Ncongwane Family on the properties mentioned hereunder situated in **Albert Luthuli Local Municipality under Gert Sibande District Municipality in the Mpumalanga Province:[KRP:2368]**

<ul style="list-style-type: none"> <li>• K2733/1977RM IN FAVOUR OF POTGIETER MARIA PETRONELLA</li> <li>• K2718/1989S</li> <li>• K2882/1976PC IN FAVOUR OF AFRICAN SELECTION TRUST EXPLORATION PTY LTD</li> <li>• K2995/1985S</li> <li>• K2952/1992RM IN FAVOUR OF HART MATTHYS JACOBUS</li> <li>• K2908/1991RM IN FAVOUR OF BECKETT ALICE MAUDE</li> <li>• K3019/1987RM IN FAVOUR OF MERWE MARTHA CATHERINE VAN DER</li> <li>• K3123/1989S</li> </ul>						
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**GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED**

Notice is hereby given in terms of Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended, that a land claim for **Restitution of Land Rights** has been lodged by Mr. Daniel Ncongwane [ID No.5201095673082] on behalf of the Ncongwane Family on the properties mentioned hereunder situated in **Albert Luthuli Local Municipality under Gert Sibande District Municipality in the Mpumalanga Province:[KRP:2368]**

							<ul style="list-style-type: none"> <li>• K3227/1974RM IN FAVOUR OF MESURIER PHYLLIS DAPHNE MARYLE</li> <li>• K3383/1980PC</li> <li>• K3326/1975S IN FAVOUR OF BECKETT THOMAS WILLIAM</li> <li>• K3417/1984RM IN FAVOUR OF DAVEL ANNA SUSANNA</li> <li>• K362/1978S</li> <li>• K3643/1986RM IN FAVOUR OF GAYNOR GEORGE HERBERT</li> <li>• K3879/1977RM IN FAVOUR OF BECKETT KATHERINE JOY</li> <li>• K3892/1984RM IN FAVOUR OF DAVIS SHEENA ROSEMARY</li> </ul>
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**GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED**

Notice is hereby given in terms of Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended, that a land claim for Restitution of Land Rights has been lodged by Mr. Daniel Ncongwane [ID No.5201095673082] on behalf of the Ncongwane Family on the properties mentioned hereunder situated in Albert Luthuli Local Municipality under Gert Sibande District Municipality in the Mpumalanga Province: [KRP:2368]

• K3860/1991RM						
• K4049/2002S						
• K4057/1993RM IN FAVOUR OF THOMAS ANN ELIZABETH						
• K4041/1986RM IN FAVOUR OF KLERK JOSEPH ADRIAAN DE						
• K4355/1993RM IN FAVOUR OF LITTLE JOHN B-E						
• K4356/1993RM IN FAVOUR OF LITTLE GRACE VILLIERS B-E						
• K479/1980PC						
• K4799/2000S						
• K4864/1990RM IN FAVOUR OF HART SOPHIA MARIA B-E						





**GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED**

Notice is hereby given in terms of **Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended**, that a land claim for **Restitution of Land Rights** has been lodged by Mr. Daniel Ncongwane [ID No.5201095673082] on behalf of the Ncongwane Family on the properties mentioned hereunder situated in **Albert Luthuli Local Municipality under Gert Sibande District Municipality in the Mpumalanga Province:[KRP:2368]**

The Restitution of Land Rights, Mpumalanga Province will investigate all the claims in terms of the provisions of the Act, any party interested in the above mentioned property is hereby invited to submit within **30 [thirty days]** from the date of publication of this notice to submit any comments, or further information to:

**Commissioner for Restitution of Land Rights**

Private Bag X 11330

Nelspruit

1200

Or 30 Samora Machel Drive

Restitution House

Nelspruit

1200

TEL NO: 013 756 6000

FAX NO: 013 752 3859

**MR. L. H. MAPHUTHA  
REGIONAL LAND CLAIMS COMMISSIONER**

DATE: 2021/08/03

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 688

6 August 2021

## GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED

Notice is hereby given in terms of Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended, that a land claim for Restitution of Land Rights has been lodged by Mr. Beisa Petrus Masina [ID No. 540515 5282 086] on behalf of the Masina & other group of families' on the properties mentioned hereunder situated in Albert Luthuli Local Municipality under Gert Sibande District Municipality in the Mpumalanga Province: [KRP: 11473]

## CURRENT PARTICULARS OF THE PROPERTY

## NKOMAZI 772 JT

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
Remaining Extent of the farm Nkomazi 772 JT	NKOMAZI GAME RESERVE PTY LTD (200700668907)	T9181/2008	12155.9544 ha (the estimated affected extent is 60 hectares)	None	None	<ul style="list-style-type: none"> <li>• I-2069/2012C IN FAVOUR OF 46/2009-20120727</li> <li>• K147/1952RM</li> <li>• K1477/1992RM IN FAVOUR OF GRIQUALAND EXPLORATION &amp; FINANCE CO LTD</li> <li>• K1518/1981PC</li> <li>• K1547/1967S</li> <li>• K1819/1978S</li> <li>• K2090/1980S</li> <li>• K2091/1980S</li> <li>• K2093/1980S</li> <li>• K2141/1980S</li> </ul>

1

<ul style="list-style-type: none"> <li>• K2286/1978S</li> <li>• K2488/1995RM IN FAVOUR OF BECKETT DINAH KATHLEEN</li> <li>• K2408/1995RM IN FAVOUR OF COERTZEN JOHANNES FREDERICK STEFANUS</li> <li>• K247/1993RM IN FAVOUR OF TOERIEN MARGARET ANN</li> <li>• K250/1991RM IN FAVOUR OF HART SOPHIA MARIA B-E</li> <li>• K2595/2000S</li> <li>• K276/1978RM IN FAVOUR OF BECKETT AILEEN MARY</li> <li>• K2719/1989S</li> <li>• K2733/1977RM IN FAVOUR OF POTGIETER MARIA PETRONELLA</li> <li>• K2718/1989S</li> </ul>						
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<ul style="list-style-type: none"> <li>• K2882/1976PC IN FAVOUR OF AFRICAN SELECTION TRUST EXPLORATION PTY LTD</li> <li>• K2995/1985S</li> <li>• K2952/1992RM IN FAVOUR OF HART MATHYS JACOBUS</li> <li>• K2908/1991RM IN FAVOUR OF BECKETT ALICE MAUDE</li> <li>• K3019/1987RM IN FAVOUR OF MERWE MARTHA CATHERINE VAN DER</li> <li>• K3123/1989S</li> <li>• K3227/1974RM IN FAVOUR OF MESURIER PHYLLIS DAPHNE MARYLE</li> <li>• K3383/1980PC</li> <li>• K3326/1975S IN FAVOUR OF BECKETT THOMAS WILLIAM</li> </ul>						
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<ul style="list-style-type: none"> <li>• K3417/1984RM IN FAVOUR OF DAVEL ANNA SUSANNA</li> <li>• K362/1978S</li> <li>• K3643/1986RM IN FAVOUR OF GAYNOR GEORGE HERBERT</li> <li>• K3879/1977RM IN FAVOUR OF BECKETT KATHERINE JOY</li> <li>• K3892/1984RM IN FAVOUR OF DAVIS SHEENA ROSEMARY</li> <li>• K3860/1991RM</li> <li>• K4049/2002S</li> <li>• K4057/1993RM IN FAVOUR OF THOMAS ANN ELIZABETH</li> <li>• K4041/1986RM IN FAVOUR OF KLERK JOSEPH ADRIAAN DE</li> <li>• K4355/1993RM IN FAVOUR OF LITTLE JOHN B-E</li> <li>• K4356/1993RM IN FAVOUR OF LITTLE GRACE</li> </ul>						
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<p>VILLIERS B-E</p> <ul style="list-style-type: none"> <li>• K479/1980PC</li> <li>• K4799/2000S</li> <li>• K4864/1990RM IN FAVOUR OF HART SOPHIA MARIA B-E</li> <li>• K5187/1998RM IN FAVOUR OF HART TOBIAS MYNHARDT</li> <li>• K5188/1998RM IN FAVOUR OF OUPA JAMES CC</li> <li>• K5785/1996RM IN FAVOUR OF BECKETT CAROLE MARIE</li> <li>• K6/1987S</li> <li>• K6118/2000S</li> <li>• K678/1978S</li> <li>• K670/1979S</li> <li>• K6877/1997RM IN FAVOUR OF HARTFELL CC</li> </ul>																																																																																																																																																	
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<ul style="list-style-type: none"> <li>• K7709/1995S</li> <li>• K799/1948RM</li> <li>• K8/1987S</li> <li>• K9/1987S</li> <li>• VA10838/2006 IN FAVOUR OF GRAND VALLEY ESTATES PTY LTD</li> <li>• VA10837/2006 IN FAVOUR OF GRAND VALLEY ESTATES PTY LTD</li> <li>• VA1091/2004 IN FAVOUR OF COERTZEN JOHANNES FREDERICK STEFANUS</li> <li>• VA8446/2002 IN FAVOUR OF KOMATI LANDGOED PTY LTD</li> </ul>							
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Notice is hereby given in terms of Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended, that a land claim for Restitution of Land Rights has been lodged by Mr. Beisa Petrus Masina [ID No. 540515 5282 086] on behalf of the Masina & other group of families' on the properties mentioned hereunder situated in Albert Luthuli Local Municipality under Gert Sibande District Municipality in the Mpumalanga Province: [KRP: 11473]

The Restitution of Land Rights, Mpumalanga Province will investigate all the claims in terms of the provisions of the Act, any party interested in the above mentioned property is hereby invited to submit within 30 [thirty days] from the date of publication of this notice to submit any comments, or further information to:

**Commissioner for Restitution of Land Rights**

Private Bag X 11330

Nelspruit

1200

Or 30 Samora Machel Drive

Restitution House

Nelspruit

1200

TEL NO: 013 756 6000

FAX NO: 013 752 3859



**MR. L. H. MAPHUTHA**  
**REGIONAL LAND CLAIMS COMMISSIONER**

DATE: 2021/06/03

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 689

6 August 2021

## GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED

Notice is hereby given in terms of **Section 11[1]** of the **Restitution of the Land Rights Act 1994 [Act 22 of 1994]** as amended, that a **Land claim** for **Restitution of Land Rights** has been lodged by **Ms Windy Mmaphefo Motseta ID. NO. 6506061789087** on behalf of the **Motseta family** on the property mentioned hereunder situated in Dr. JS Moroka Local Municipality, Nkangala District in Mpumalanga Province: KRP: 9271

## CURRENT PARTICULARS OF THE PROPERTY PANKOPPEN 36 JR

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
Remaining Extent of Portion 1	National Government of the Republic of South Africa	T1096/2017	1102.0169ha (Extent of claimed land 221.0285)	None	None	VA129/2017 in favour of South Africa Native Trust

The Regional Land Claims Commissioner, Mpumalanga Province will investigate all the claims in terms of the provisions of the Act, any party interested in the above-mentioned property is hereby invited to submit within **30 [thirty days]** from the date of publication of this notice to submit any comments, or further information to:

Notice is hereby given in terms of **Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994]** as amended, that a **Land claim** for **Restitution of Land Rights** has been lodged by **Ms Windy Mmaphefo Motseta ID. NO. 6506061789087** on behalf of the **Motseta family** on the property mentioned hereunder situated in Dr. JS Moroka Local Municipality, Nkangala District in Mpumalanga Province: KRP: 9271

**Commissioner for Restitution of Land Rights**

Private Bag X7201  
Witbank  
1035

Or

Shop No. E 8  
Saveways Crescent Centre

Cnr OR Tambo and Mandela Street  
Witbank  
1035

TEL NO: 013 – 655 1000  
FAX NO: 013 – 690 3438

CHECKED BY: MS.R. SINGH  
RESTITUTION ADVISOR  
DATE: 7/6/2021

MR. L.H. MAPHUTHA  
REGIONAL LAND CLAIMS COMMISSIONER  
MPUMALANGA PROVINCE  
DATE: 2021/06/30

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 690

6 August 2021

## GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED

Notice is hereby given in terms of Section 11[1] of the Restitution of the Land Rights Act 1994 [Act 22 of 1994] as amended, that a Land claim for Restitution of Land Rights has been lodged by Mr. Johannes Theodorus Oosthuizen ID. NO. 25120450320020n behalf of the Prinsloo family on the property mentioned hereunder situated in Thembiile Hani Local Municipality, Nkangala District in Mpumalanga Province: KRP: 5270

## CURRENT PARTICULARS OF THE PROPERTY

LEEUFONTEIN 228 JS

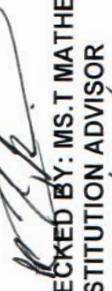
Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
Portion 4	National Government of the Republic of South Africa	T33635/1985	151,4063	None	None	<ul style="list-style-type: none"> <li>• C590/1972/23696/36T MPU</li> <li>• K1068/1985RMMPU in favour of BEHRMAN DARRYL GREIG</li> </ul>

The Regional Land Claims Commissioner, Mpumalanga Province will investigate all the claims in terms of the provisions of the Act, any party interested in the above-mentioned property is hereby invited to submit within **30 [thirty days]** from the date of publication of this notice to submit any comments, or further information to:

Shop No. E 8  
Saveways Crescent Centre  
Cnr OR Tambo and Mandela Street  
Witbank  
1035

TEL NO: 013 – 655 1000

FAX NO: 013 – 690 3438

  
**CHECKED BY: MS.T MATHEBULA  
RESTITUTION ADVISOR**

**DATE: 20/04/2021**

  
**MR. L.H. MAPHUTHA  
REGIONAL LAND CLAIMS COMMISSIONER  
MPUMALANGA PROVINCE**

**DATE: 20/07/14**

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 691

6 August 2021

## GENERAL NOTICE IN TERMS OF RESTITUTION OF LAND RIGHTS ACT, 1994 [ACT 22 OF 1994] AS AMENDED

Notice is hereby given in terms of Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994], as amended, that a land claim for **Restitution of Land Rights** has been lodged by **MIR Mfambele Jona Zulu ID No. 310102 5354 088** on behalf of **Zulu Family and other group of families** on the following property mentioned hereunder situated under **Albert Luthuli Local Municipality, Gert Sibande District, Mpumalanga Province: KRP 409**

## GROENVALLEI 701 JT

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
The Remaining Extent of the farm 701 JT	Lereko Prop CO Pty Ltd [200503829507]	T18146/2008	2210.4693h <b>(HECTARES AFFECTED BY THE CLAIM IS 392.0961)</b>	None	None	I-1770/2008LG I829/2011C K236/1990RM in favour of Johan van Niekerk Trust K237/1990RM

## DOYERSHOEK 702 JT

Description of property	Owner of Property	Title Deed Number	Extent of Property	Bonds	Bond Holder	Other Endorsements
Portion 1	Lereko Prop CO Pty Ltd [200503829507]	T18146/2008	760.0337h <b>(HECTARES AFFECTED BY THE CLAIM IS 109.2796)</b>	None	None	K236/1990RM in favour of Johan van Niekerk Trust K237/1990RM

**TOTAL NUMBER OF HECTARES: 2970.503HA**  
**TOTAL NUMBER OF AFFECTED HECTARES: 501.3757HA**

Notice is hereby given in terms of Section 11(1) of the Restitution of the Land Rights Act 1994 [Act 22 of 1994], as amended, that a land claim for **Restitution of Land Rights** has been lodged by **MR Mfanibele Jona Zulu ID No. 310102 5354 088** on behalf of **Zulu Family and other group of families** on the following property mentioned hereunder situated under **Albert Luthuli Local Municipality, Gert Sibande District, Mpumalanga Province: KRP 409**

The Regional Land Claims Commissioner, Mpumalanga Province will investigate all the claims in terms of the provisions of the Act, any party interested in the above mentioned property is hereby invited to submit within **30 [thirty days]** from the date of publication of this notice to submit any comments, or further information to:

**Commissioner for Restitution of Land Rights**

**Private Bag X11330**

**Nelspruit**

**1200**

**Or 30 Samora Machel Drive**

**Nelspruit**

**1200**

**Tel No: 013 756 6000**

**Fax No: 013 752 3859**



**MR L H MAPHUTHA**  
**THE REGIONAL LAND CLAIMS COMMISSIONER**  
**MPUMALANGA PROVINCE**

**DATE:**

*2021/06/03*

## DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT

NO. 692

6 August 2021

PLANT IMPROVEMENT ACT, 1976  
(ACT No. 53 OF 1976)

## SOUTH AFRICAN SEED CERTIFICATION SCHEME: AMENDMENT

I, Angela Thokozile Didiza, Minister of Agriculture, Land Reform and Rural Development, acting under section 23 of the Plant Improvement Act, 1976 (Act No. 53 of 1976), after consultation with the Minister of Finance, hereby substitutes the Scheme in the Schedule for the South African Seed Certification Scheme published under Government Notice No. R.2566 of 25 November 1983, as amended.

  
MRS ANGELA THOKOZILE DIDIZA  
MINISTER FOR AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT  
DATE: 22-04-2021

## SCHEDULE

**Definition**

1. In this Schedule, "the Scheme" means the South African Seed Certification Scheme published by Government Notice No. R. 2566 of 25 November 1983, as amended by Government Notices No. R. 1196 of 30 May 1985, R. 1660 of 26 July 1985, R. 2352 of 14 November 1986, R. 16 of 8 January 1988, R. 1388 of 30 June 1989, R. 2093 of 29 September 1989, R. 121 of 26 January 1990, R. 2708 of 23 November 1990, R. 994 of 3 April 1992, R. 1494 of 29 May 1992, R. 2333 of 21 August 1992, R. 2230 of 26 November 1993, R. 1074 of 10 June 1994, R. 1781 of 17 November 1994, R. 1222 of 2 October 1998, R. 1326 of 12 November 1999, R. 1560 of 13 December 2002, R. 55 of 2 February 2007, R. 623 of 20 July 2007 and R. 519 of 18 June 2010.

*Substitution of the Scheme*

2. This Scheme is hereby substituted for the Scheme as published under Government Notice No.R.2566 of 25 November 1983.

## SOUTH AFRICAN SEED CERTIFICATION SCHEME

*Definitions*

1. In this Scheme, unless the context indicates otherwise -

**"Analysis Report"**

means the test report issued by a seed testing laboratory which has been registered in terms of the Act;

- "authorized person"  
means a person authorized in terms of section 3(3) of this Scheme to carry out specific tasks in terms of recognised Schemes;
- "basic seed"  
means seed which has been certified in terms of an applicable recognised Scheme as basic seed, or in the case of AOSCA as "Registered Seed";
- "breeder seed"  
means seed of a particular generation of an inbred line or a variety which has been produced under the supervision of the breeder thereof, the person to whom the rights therein have been transferred, or another person who maintains the generation concerned;
- "bulking"  
means combining unprocessed seed of the same variety from different origins before conditioning and packaging takes place, and "bulked" has a corresponding meaning;
- "certificate of registration"  
means the certificate of registration which was issued in terms of section 6 of the Scheme in respect of the unit concerned;
- "Certification Standing Committee"  
means a body consisting of technical experts in seed certification of the various crop groups;
- "certified seed"  
means seed which has been certified in terms of a recognised Scheme as certified seed;
- "closed system"  
means that the plants intended for seed production are protected in such a way that contamination by pollen from unwanted sources and/or pathogens is prevented and includes structures such as greenhouses;
- "coated seeds"  
means seeds covered with material that may contain pesticides, fungicides, dyes or other additives. The following types of coated seeds are defined:
- (a) Encrusted seed – units more or less retaining the shape of the seed with the size and weight changed to a measurable extent.
  - (b) Seed granules – units, more or less cylindrical, including types with more than one seed per granule.
  - (c) Seed mats – broad sheets of material, such as paper or other degradable material, with seeds placed in rows, groups or at random throughout the sheets.
  - (d) Seed pellets – more or less spherical units, usually incorporating a single seed with the size and shape of the seed no longer readily evident.
  - (e) Seed tapes – narrow bands of material, such as paper or other degradable material, with seeds spaced randomly, in groups or in a single row.
- "cross"  
means the first generation of seed which has been obtained by controlled pollination between plants of -
- (a) an inbred line and another inbred line (single cross);
  - (b) an inbred line and a cross (three-way cross);
  - (c) an inbred line and a variety (top cross);
  - (d) a cross and another cross (double cross);
  - (e) a cross and a variety (top cross); or
  - (f) a variety and another variety (inter varietal cross),  
of the same or related kind of plant;

"deviating plant"

means a plant of a particular variety which does not correspond to the official recognised description of a typical plant of that variety;

"field"

means a specified portion or portions of a farm which is intended for registration as a unit, i.e. a seed production area enclosed by natural borders such as ditches, contours, roads, buildings, fences, tree lines, or a minimum of 3 meter tilled, cut or clean break.

"hybrid"

means seed which is the first generation of a cross between Basic seed of a female parent and a male parent, which is intended for the production of crops for purposes other than seed production.

"inbred line"

means a breeding line which has become homozygotic through inbreeding and selection;

"mixture"

means a lot consisting of seed of various varieties of the same or different species which, with a view to its usefulness for agricultural purposes, is obtained by mixing such varieties in particular proportions;

"open-pollinated variety"

for the purpose of this Scheme, means any non-hybrid variety where pollination occurs naturally, such as open-pollinated varieties, self-pollinated varieties, synthetic varieties, and apomictic varieties.

"owner of a variety"

means the applicant/holder/local distributor of a variety, as indicated against the denomination of the specific variety in the applicable varietal list.

"post control sample"

means a quantity of seed obtained from a registered unit in order to verify the varietal purity and identity;

"pre-basic seed"

means seed that has been certified as pre-basic seed in terms of an applicable recognised Scheme, or in the case of AOSCA as "Foundation Seed", and is the seed –

- (a) of generations preceding 'basic seed'; and
- (b) of the generations between 'breeder seed' and 'basic seed' if such seed have been produced in accordance with the stipulations of the Scheme and comply with the minimum requirements of 'basic seed' for the specific crop;

"premises"

means a premises which has been registered in terms of the Act;

"pure seed"

means seed free from inert matter and free from other seed distinguishable by appearance or by test;

"recognised Scheme"

means the following seed certification schemes, standards and/or protocols:

- (a) The South African Seed Certification Scheme;
- (b) the Organization of Economic Cooperation and Development (OECD) Seed Schemes;
- (c) the Association of Official Seed Certifying Agencies (AOSCA) Seed Certification Standards; and
- (d) The Southern African Development Community (SADC) Seed Certification Protocol;

"restricted weed seed"

means seed of the following plant species:

- (a) *Cuscuta* spp. – Dodder;
- (b) *Datura* spp. – Thorn apple/Stinkolieboom;
- (c) *Solanum elaeagnifolium* Cav – Silverleaf bitter apple/Silwerblaarbitterappel; and
- (d) *Stipa* spp. excluding *S. capensis* Thunb. and *S. dregeana* Steud.- Serrated Tussock, Nasella/Saagtandpolgras, Nasella-polgras

"seed"

means seed intended for cultivation;

"seed grower"

means a person to whom the certificate of registration in respect of a unit has been issued;

"seed lot"

means a specified quantity of seed that is physically and uniquely identifiable;

"the Act"

means the Plant Improvement Act, 1976 (Act No 53 of 1976), and the regulations made thereunder;

"the authority"

means the authority designated in section 3 of this Scheme;

"the Minister"

means the Minister responsible for the Act;

"traces"

means, with regard to the physical purity of seed, any fraction less than 0.05 percent and which will be indicated on an Analysis Report as "TR";

"treated seed"

means seed that has been subjected to the application of a compound including film coatings, polymers, pesticides, fungicides, biologicals, identifying colourants, dyes and other additives, which have not resulted in a significant change in size, shape or addition to the weight of the original seed.

"unit"

means a field which is registered in terms of this Scheme, and on which seed is multiplied in terms of a recognised Scheme;

"varietal association"

means the association (mixture) of certified seed of a hybrid variety dependent on a specified pollinator with certified seed of one or more specified pollinator varieties; mechanically combined in proportions determined by the persons responsible for their maintenance, with such combination having been notified to the Authority.

"varietal identity"

means that all plants cultivated from the seed concerned correspond to the description of a plant of the variety concerned, and are clearly distinguishable from plants of any other variety of the same kind of plant; resulting from a given genotype or combination of genotypes;

"varietal list"

means the current version of the varietal list kept in terms of the Act; as well as the SADC Regional Variety Catalogue and the OECD Seed Schemes List of Varieties Eligible for Seed Certification;

**“varietal purity”**

means the percentage of plants or seed within the population that conforms to the official recognised description of the variety concerned. Plants or seeds are considered as deviating (off-types) when they are obviously different from the variety;

**“visually free”**

means that –

- (a) the authorized person has, without using a microscope or magnifying glass, found that the unit concerned is free from disease-infected plants, or that the plant or seed concerned is free from pathogens; or
- (b) where a plant or seed which has been visually identified as disease-infected, the results of a laboratory test, examination or analysis conducted by a registered laboratory, does not confirm such visual identification.

**“Wild Oats”**

means plants or seed of the species *Avena fatua*, *A. barbata* and *A. sterilis*

**NAME OF SCHEME**

2. This Scheme shall be known as the South African Seed Certification Scheme.

**DESIGNATION OF AUTHORITY**

- 3.(1) The South African National Seed Organization (SANSOR), a voluntary organisation which is a juristic person by virtue of a provision to this effect in its statute, is hereby designated, at own expenses, as authority to exercise the powers, perform the functions and carry out the duties conferred upon, assigned to or imposed upon the authority under this Scheme and all the recognized Schemes and has no recourse against the State for any expenses thus incurred. The authority will be supported and advised in decision making by the Certification Standing Committee.
- 3.(2) The authority referred to in subsection (1), shall exercise its powers, perform its functions and carry out its duties subject to the directions of the Registrar of Plant Improvement designated by the Minister under section 3(1) of the Act.
- 3.(3) The authority designated in terms of subsection (1), may in terms of section 24(2)(a) of the Act, authorise a person to exercise the powers, perform the functions and carry out the duties conferred upon that authority.
- 3.(4) The authority determines the requirements and conditions according to which a person contemplated in subsection (3) is authorised.

**APPLICATION OF SCHEME**

- 4.(1) This Scheme shall apply to seed of -
  - (a) those varieties of the kinds of plants specified in column 1 of Table 1, the denominations of which are entered in the varietal list;
  - (b) multiplication of generations of pre-basic and basic seed of varieties in process of examination for the purpose of varietal listing;
  - (c) those inbred lines and crosses which are used in the production of seed of the varieties referred to in paragraph (a); and
  - (d) varieties of kinds of plants which are eligible for certification in terms of a recognised Scheme.
- 4.(2) The provisions of the applicable recognised Scheme shall be binding on the seed grower as from the date of registration of the unit concerned.

**CONDITIONS FOR CERTIFICATION**

5. Seed may be certified in terms of a recognised Scheme if -

- (a) the field on which it was produced, is registered by the authority in terms of section 6 of this Scheme as a unit;
- (b) it has, subject to the provisions of sections 8 and 16 of this Scheme, been produced by the seed grower to whom the certificate of registration in respect of the unit concerned has been issued;
- (c) the seed which was used to establish the plants from which it has been produced, complies with the requirements referred to in section 11 of this Scheme, and was planted in accordance with the establishment requirements referred to in that section;
- (d) the unit on which it was produced has been isolated in accordance with the isolation requirements referred to in section 12 of this Scheme, or if it has been produced in terms of another recognised Scheme, in accordance to the requirements of the applicable Scheme; provided that productions that are done in closed systems are exempt from any isolation requirements. Such a closed system must be confirmed by the authorized person as such.
- (e) The plants from which it was produced, comply with the requirements referred to in section 12 of this Scheme, and have been inspected in accordance with the provisions of section 13 of this Scheme, or if it has been produced in terms of another recognised Scheme, in accordance to the requirements of the applicable Scheme;
- (f) it complies with the physical requirements referred to in section 14 of this Scheme, or if it has been produced in terms of another recognised Scheme, in accordance to the requirements of that Scheme;
- (g) the containers thereof comply with the requirements set out in section 18 of this Scheme, and are labelled as required in that section, or if it has been produced in terms of another recognised Scheme, in accordance to the requirements of that Scheme;
- (h) it is presented for certification in accordance with the provisions of section 19 of this Scheme, or if it has been produced in terms of another recognised Scheme, in accordance to the requirements of the applicable Scheme; and
- (i) all the other provisions of this Scheme, or if it has been produced in terms of another recognised Scheme, in accordance to the requirements of the applicable Scheme with regard to the seed concerned and the processes in connection with the production thereof have been complied with.

## REGISTRATION OF UNITS

- 6.(1) An application for the registration of a field as a unit shall be made on a form which is obtainable from the authority or has been approved by the authority for this purpose.
- 6.(2) Such a form shall –
- (a) be completed by the person who intends to produce seed for certification in terms of a recognised Scheme on the field concerned, who may be either the grower or the seed company for which the seed is being produced for under contract;
  - (b) be lodged with the authority; be it in hard copy or electronic. In the last-mentioned case, a signed hard copy must be produced to the authority on request;
  - (c) in the case of a field on which plants of a perennial crop are established which have also been used for the production of seed for certification in terms of a recognised Scheme during the preceding growing season, be thus lodged after the seed crop of the preceding growing season has been removed therefrom, but not before regrowth of the plants concerned can be observed;
  - (d) otherwise be thus lodged within 28 days of the date on which the establishment of seed or planting material on the field concerned has commenced;
  - (e) be accompanied by the applicable amount determined by the authority, or proof of payment of the amount concerned, and
  - (f) produce on request a locality map or locality information which clearly indicates where the field concerned is situated.
- 6.(3) The authority may, in the case of an application for the registration of a field which is intended for the production of seed of an inbred line or cross referred to in section 4(1)(c) of this Scheme or a variety referred to in sections 4(1)(b) and 4(1)(d) of this Scheme, regardless in terms of which recognised Scheme the seed will be certified, require that the recognised description of a typical plant of that inbred line, cross or variety be furnished, and

- such application shall be considered only if the authority is satisfied that the description concerned is sufficient to determine whether the plants of that inbred line, cross or variety –
- (a) are by reason of a conspicuous characteristic clearly distinguishable from the plants of any other inbred line, cross or variety of the same kind of plant;
  - (b) are sufficiently homogeneous having regard to the particular features of the reproduction thereof;
  - (c) are stable with regard to the essential characteristics thereof, and remain true to the description thereof after repeated propagation; and
  - (d) are identified by a denomination which can be linked by the authority to a specific line, cross or variety.
- 6.(4) In the case where application is made for the registration of a field for the production of a specific variety, where the owner of the variety concerned is not the applicant, the authority will only approve the application for the certification of that variety if the owner of the variety concerned provide written approval for such application.
- 6.(5) Separate applications shall be submitted in terms of this section in respect of different fields on the same farm on which seed of different varieties is to be produced.
- 6.(6) If the authority approves an application, the field concerned shall be registered as a unit, and the authority shall confirm it as such.
- 6.(7) A field shall not be registered as a unit if the authority or authorised person is satisfied that –
- (a) the seed used to establish the unit concerned does not comply with the requirements as determined in section 11(1) of this Scheme or another recognised Scheme;
  - (b) the field concerned -
    - (i) does not comply with the field requirements referred to in section 10 and isolation requirements in section 12 of this Scheme;
    - (ii) is situated in an area which does not lend itself to the production of seed of the variety concerned which will be suitable for certification in terms of a recognised Scheme; or
    - (iii) cannot at all times readily be reached for the purpose of inspection;
  - (c) in the case of an application referred to in subsection 6(3), the description submitted does not comply with the provisions of that subsection; or
  - (d) the application concerned contains a material misrepresentation.

#### **TERM OF REGISTRATION**

7. The registration of a unit shall, subject to earlier termination in terms of this Scheme, be valid only from the date of issue of the certificate of registration concerned to the removal from the unit concerned of the seed crop of the growing season to which such registration relates.

#### **TRANSFER OF REGISTRATION**

- 8.(1) The certificate of registration which has been issued to a seed grower in respect of a unit shall not be transferable to any other person.
- 8.(2) If a seed grower transfers his right of disposal in the plants which have been established on a unit, to another person, he shall forthwith notify the authority thereof in writing.
- 8.(3) If a person to whom a right of disposal referred to in subsection (2) has been transferred, desires to continue with participation in this Scheme in respect of the unit concerned, he shall, notwithstanding the provisions of section 6(2)(c) or 6(2)(d) of this Scheme, forthwith lodge an application in accordance with section 6 of this Scheme for the registration of that unit in his name.

#### **TERMINATION OF REGISTRATION**

- 9.(1) The registration of a unit shall lapse if the seed grower concerned transfers his right of disposal referred to in section 8(2) of this Scheme, to another person.
- 9.(2) The registration of a unit may at any time be withdrawn if the authority is satisfied that –

- (a) the applicable provisions of this Scheme with regard to the unit concerned, the plants established thereon or the seed produced thereon, have not been complied with; or
  - (b) circumstances prevail or information has come to light which, if it had prevailed or come to light earlier, would have resulted in a refusal to register the unit concerned.
- 9.(3) The authority shall withdraw the registration of a unit which is intended for the production of certified seed if the seed or vegetative propagating material which was used to establish plants thereon –
  - (a) was seed in respect of which an approval referred to in section 11(2) of this Scheme was issued, and such approval has since then been withdrawn; or
  - (b) was pre-basic or basic seed, and the certification thereof has since then been withdrawn in terms of section 21 of the Scheme.
- 9.(4) If the withdrawal of the registration of a unit in terms of subsection (2) arises from a deficiency which could in the opinion of the authority possibly be rectified through the application of a particular treatment, the authority and/or authorised person shall advise the seed grower concerned of such deficiency and treatment.
- 9.(5) A seed grower who applied a treatment referred to in subsection (4) may request that the authority and/or authorised person re-inspect the unit concerned with a view to revoke the withdrawal of the registration thereof.
- 9.(6) If an application referred to in subsection (5) is approved, the authority may require that the amount determined by it, be paid by the seed grower concerned.

#### FIELD REQUIREMENTS

- 10.(1) A field on which plants of a kind specified in column 1 of Table 1 are established, may be registered as a unit if it complies with the field requirements as set out in the Annexure of which the number is specified in column 2 of the said Table opposite the name of the kind of plant concerned, or if it has been produced in terms of another recognised Scheme, in accordance to the requirements of the applicable Scheme.
- 10.(2) A unit shall, while the registration thereof remains in force, comply with the requirements referred to in subsection (1) or if it has been produced in terms of another recognised Scheme, in accordance to the requirements of the applicable Scheme.

#### PARENTAL SOURCE REQUIREMENTS

- 11.(1) The seed which is used to establish plants on a unit for certification purposes shall –
  - (a) in the case of the intended production of pre-basic seed, be breeder seed or pre-basic seed;
  - (b) in the case of the intended production of basic seed, be breeder seed or pre-basic seed;
  - (c) in the case of the intended production of 1st generation certified seed, subject to the provisions of subsection (2), be certified basic seed; and
  - (d) in the case of the intended production of 2nd generation certified seed, be 1st generation certified seed.
  - (e) in the case of a recognised Scheme where the generations are identified differently, then according to the provisions of the Scheme concerned.
- 11.(2) The authority may on application of a seed grower approve in writing that seed other than basic seed may be used to establish plants for the production of certified seed.
- 11.(3) An application referred to in subsection (2) shall be submitted in writing to the authority by the seed grower concerned, and shall state the reasons for such application, and supply any other information requested by the authority in this regard.
- 11.(4) An approval referred to in subsection (2) –
  - (a) shall be granted only if the authority is satisfied that the seed concerned was produced in accordance with a method which renders it suitable for use in terms of this Scheme in the place of basic seed and if all requirements of the authority were complied with; and
  - (b) may at any time be withdrawn if the authority is satisfied that the plants which have been established from the seed concerned, are not true to variety.

- 11.(5) All labels and seals on containers of seed which are planted with a view to the production of seed in terms of a recognised Scheme shall be retained until those labels and seals have on request been produced to the authority or authorised person, or the seed which was produced from that seed has been certified, whichever may be the earlier date.
- 11.(6) Seed established on a unit intended for certification shall be planted in accordance with the planting requirements as set out for the specific crop in the recognised Scheme concerned.

#### ISOLATION AND PLANT REQUIREMENTS

- 12.(1) A unit on which plants are established for certification in accordance of a recognised Scheme, shall be isolated in accordance with the isolation requirements as set out for the specific crop in the recognised Scheme concerned.
- 12.(2) The plants which are established on a unit shall –
- (a) be cared for in a manner which is conducive to the production of seed of a high quality;
  - (b) not be overgrown by weeds; and
  - (c) comply with the requirements for plants of the kind concerned as set out for the specific crop in the recognised Scheme concerned.
- 12.(3) A seed grower shall remove all plants which are or appear to be deviating, or the pollen-shedding or seed-bearing parts of such plants, from the unit on a continuous basis: Provided that the authority or authorised person may, at the time of inspection in terms of this Scheme, direct a seed grower or a person acting on instructions from a seed grower, to suspend such removal for the duration of inspection concerned.
- 12.(4) A seed grower shall notify the authorised person and/or authority forthwith of –
- (a) the occurrence of any harmful insect pest or pathogen on the plants which are established on a unit; or
  - (b) any damage to such plants through climatological or other factors.
- 12.(5) Subject to the provisions of subsection (7), no person shall –
- (a) establish on a unit any plants other than plants of a variety which is intended for the production of seed in terms of a recognised Scheme; or
  - (b) use any plant or part or yield of a plant which is established on a unit, for any purpose other than the production of seed in terms of this Scheme.
- 12.(6) On recommendation from the authorised person, the authority may exempt a seed grower in writing from compliance with the provisions of subsection (5).
- 12.(7) An application for an exemption referred to in subsection (6) shall be submitted in writing to the authorised person by the seed grower concerned, and shall state the reasons for such application.
- 12.(8) An exemption referred to in subsection (6) -
- (a) shall only be granted if the authority is satisfied that the quality of the seed to be harvested from the plants on the unit concerned will not be detrimentally affected by such exemption; and
  - (b) shall be subject to such conditions as the authority may in each case determine.

#### INSPECTION REQUIREMENTS

- 13.(1) (a) The plants which are established on a unit shall be inspected by a person authorised as such by the authority, on the times and methods in accordance with the inspection requirements as set out for the specific crop in the recognised Scheme concerned;
- (b) The authority may require that the amount determined by it, be paid by the seed grower concerned in respect of each inspection referred to in paragraph (a).
- 13.(2) The authorised person must carry out as many additional inspections as may be deemed necessary for the purposes of subsection (1)(a).
- 13.(3) If the authorised person fails to carry out the required inspections referred to in subsection (1)(a) in respect of a unit due to circumstances beyond his/her control, the certification of the seed produced thereon shall not be refused solely on account thereof. The authority may in such cases set additional conditions.
- 13.(4) Reporting in respect of each inspection referred to in subsection (1)(a) must be done in a manner that has been approved by the authority.

### PHYSICAL REQUIREMENTS FOR SEED

- 14.(1) Seed harvested from plants which were established for certification in terms of a recognised Scheme, shall comply with the physical requirements as set out for the specific crop in the recognised Scheme concerned.
- 14.(2) Notwithstanding the provisions of subsection (1), basic seed which does not comply with the physical requirements referred to in that subsection may also be certified as basic seed if –
- (a) all the other applicable provisions of this Scheme with regard to the seed concerned have been complied with; and
  - (b) the authority is of the opinion that the genetic value thereof justifies such deviation.
- 14.(3) Seed which has been produced in a unit on which plants visually infected with a seed-borne disease have occurred, for which there are requirements prescribed in this regard in the specific requirements for the crop concerned in this Scheme, shall only be considered for certification after it has been treated for that disease with a substance that has been registered for this purpose.
- 14.(4) Seed of the same variety and generation which was produced on different units may, prior to the presentation thereof for certification, only be bulked with the written approval of the authorised person, after which the particulars must be supplied to the authority. The requirements for bulking are determined by the authority.

### HARVESTING, THRESHING AND STORAGE

- 15.(1) Equipment which is used in connection with the harvesting or threshing of seed which has been produced in terms of a recognised Scheme shall be cleaned beforehand in order to prevent the admixing of any other seed with the seed concerned.
- 15.(2) Seed which has been produced in terms of a recognised Scheme shall be kept in containers which are sound and clean.
- 15.(3) The containers in which seed which has been produced in terms of a recognised Scheme is kept prior to the cleaning thereof shall be marked in clearly legible symbols, letters and figures with, or be provided with labels on which are likewise indicated –
- (a) the words "uncleaned seed";
  - (b) the name of the kind of plant to which that seed belongs;
  - (c) the denomination which identify the variety of that seed;
  - (d) the code number which is used by the seed grower concerned for the identification of the unit on which that seed was produced; and
  - (e) the name of the seed grower by whom that seed was produced.
- 15.(4) Seed which has been produced in terms of a recognised Scheme shall at all times be stored in such a manner that –
- (a) it is protected against damage by insects and rodents;
  - (b) excessive humidity and high temperatures which may affect it adversely are avoided;
  - (c) it is kept separately from anything else, including other seed intended for certification, by storing it in a separate store, or by separating it from anything else by means of solid partitions or by means of open spaces of at least one metre wide;
  - (d) has efficient lighting so that any marks, printing or writing on containers of propagating material or on labels attached to such containers may readily be read;
  - (e) access thereto can readily be obtained; and
  - (f) the admixing thereof with other seed is prevented.
- 15.(5) The provisions of subsection (4) shall *mutatis mutandis* apply to the storage of vegetative material which are intended for use in connection with the production of seed in terms of a recognised Scheme.

### MOVEMENT OF SEED

- 16.(1) A seed grower may prior to the certification of the seed which has been produced by him in terms of a recognised Scheme –
- (a) remove such seed to another premises in order to clean it there or to present it there for certification.

- (b) remove such seed to a premises where seed is cleaned in order to have it cleaned there; or
  - (c) subject to the provisions of subsection (2), sell such seed to the owner or occupier of premises where seed is cleaned or prepacked for sale, or where seed is sold.
- 16.(2) Seed may be sold in terms of subsection (1)(c) only if the buyer concerned has furnished an undertaking on a form which is obtainable from the authority, or approved by the authority, for this purpose, to comply, as from the date on which such seed is delivered or sold to him, with the provisions of the recognised Scheme concerned.
- 16.(3) the provision of subsection (2) is *mutatis mutandis* applicable on seed being moved from one premises to another.
- 16.(4) An undertaking referred to in subsection (2) –
- (a) shall be lodged with the authority within 14 days of the sale concerned; and
  - (b) shall have the effect that the buyer of the seed concerned shall in the application of a recognised Scheme be deemed to be the seed grower in respect of that seed.

### CLEANING OF SEED

- 17.(1) Seed which has been produced in terms of a recognised Scheme shall be cleaned before being presented for certification.
- 17.(2) The premises where the seed referred to in subsection (1) is cleaned, and/or graded and/or treated with the purpose to present it for certification, must be registered in terms of the Act as a cleaner of seed.
- 17.(3) Equipment which is used in connection with the cleaning of seed shall be cleaned beforehand to prevent the admixing of any other seed with the seed which is to be presented for certification.

### CONTAINERS AND LABELLING OF SEED

- 18.(1) The containers in which seed which has been produced in terms of this Scheme is presented for certification, shall –
- (a) be new and not previously have been used for another purpose; and
  - (b) be closed up in such a manner that entry to the seed therein can only be obtained by forcible opening, or leaving evidence that the container was opened, or by the removal of the seals that were affixed to such containers in terms of section 19 of this Scheme.
- 18.(2) (a) Each container shall be provided with a label that is obtainable on request from the authority – only labels that have been obtained from the authority may be used for this purpose. Such labels are identified with a unique number. Different labels will be supplied for seed that is being certified under the various recognized Schemes.
- (b) The amount determined by the authority for this purpose shall be payable in respect of labels thus issued.
  - (c) The labels for the various generations shall be identified with -
    - (i) in the case of pre-basic seed, a white label with a diagonal purple band;
    - (ii) in the case of basic seed, a white label;
    - (iii) in the case of certified seed, 1st generation, a blue label; and
    - (iv) in the case of certified seed, 2nd generation, a red label.
  - (d) In the case of mixtures of seed of different varieties and/or species, regardless of the generations contained in the mixture, the label shall be green.
  - (e) In the case of varietal associations, the label shall be blue with a diagonal green band.
  - (f) In the case where seed referred to in section 16(1) where a certification label is attached to the containers, the label shall be grey.
  - (g) In the case of a recognised Scheme where the labels are identified differently, then according to the provisions of the Scheme concerned.
  - (h) Complete records must be kept on the use of every certification label received from the authority and annual returns thereof must be submitted to the authority.

- 18.(3) After the applicable particulars have been entered on the labels referred to in subsection (2), it must be affixed to the containers of the seed concerned in such manner as the authority may determine.
- 18.(4) The letters and figures which are used to indicate the particulars concerned on such labels shall –
- (a) be of a letter type which can easily be read;
  - (b) be of a colour which is clearly contrasting to the colour of the labels on which they appear
  - (c) be entered indelibly in black type by using a printer with colour-fast ink.
- 18.(5) (a) All labels referred to in subsection (2), shall indicate –
- (i) the words “Spesie:” and/or “Specie:” followed by the Botanical name of the kind of plant to which such seed belongs;
  - (ii) the words “Soort:” and/or “Kind:” followed by the recognised common name of the kind of plant to which such seed belongs;
  - (iii) the words “Variëteit:” and/or “Variety:” followed the recognised name of the variety of the plant to which such seed belongs;
  - (iv) the words “Klas Nr.:  - (v) the words “Verwysings Nr.:  - (vi) the words “Sertifikaat Nr.:  - (vii) the words “Netto Massa:” and/or “Nett Mass:” followed by the nett mass, in kilograms, of the seed in the container concerned; and/or the words “Aantal sade per houer:” and/or “Number of seeds per container:” followed by the number which represent the calculated number of seeds in the container concerned;
  - (viii) the words “S.A. Gesertifiseerde (Generasie) Saad” and/or “S.A. Certified (Generation) Seed” with the applicable generation to which the seed belongs inserted respectively where (Generasie) and/or (Generation) is indicated; and in the case of seed referred to section 16(1), the words “Nie-Finaal Gesertifiseerde Saad” and/or “Not-Finally Certified Seed” followed by the Generation to which the seed belongs; and
  - (ix) the name of the Designated Authority.
- (b) in the case where seed is certified according to the provisions of another recognised Scheme, information required by the Scheme concerned must be indicated.
- 18.(6) Any space not occupied by the information required in subsection (5)(a) may be used for additional information, provided the information –
- (a) is in letters not larger than those used for the prescribed information;
  - (b) contain no advertising matter;
  - (c) do not create or could create a false or misleading impression relating to the possible certification of the seed concerned;
  - (d) do not qualify the possible certification of the seed concerned or are not in conflict therewith; or
  - (e) are not false, derogatory, inaccurate or vague in relation to any seed or seed grower.

#### **PRESENTATION FOR CERTIFICATION**

- 19.(1) (a) The total mass of seed which has been produced in terms of a recognised Scheme on a unit during a particular growing season shall be presented for certification within 18 months of being harvested, unless the authority, after consideration of a written request by the seed grower concerned, determines otherwise.
- (b) In cases where the total mass of seed mentioned in paragraph (a) which is presented for certification exceeds the maximum mass of a seed lot allowed for the species concerned by the current Rules of the International Seed Testing Association (ISTA); the seed shall be sub-divided into separate, identifiable seed lots which do not exceed the maximum seed lot size, each of which shall be identified by a separate unique reference number and Certificate number. This also applies to seed lots of which the seed has been coated.

- (c) Every container of a seed lot presented for certification must be readily reachable for sampling and sealing purposes.
- 19.(2) (a) The authorised person must ensure that as soon as possible after the date of which he has been notified that the seed is ready for certification –
- (i) examine the containers of the seed concerned in order to determine whether the provisions of section 18 of this Scheme, or in the case where the seed was produced in terms of another recognised Scheme, the provisions of the Scheme concerned, have been complied with in connection therewith;
  - (ii) a person that has been authorised as such, must take a sample of the seed in accordance to the methods as determined by the International Seed Testing Association (ISTA); and affix a seal to each such container, where the sealing method provides for it.
  - (iii) Only seals supplied by the authority may be used for this purpose. Such seals are identified by a unique identification number.
  - (iv) Complete records must be kept and annual returns must be submitted on the use of all certification seals received from the authority.
- (b) Such seal shall -
- (i) be of a type which cannot be removed or reused without becoming damaged; and
  - (ii) be affixed in such a manner that a label affixed to a container in terms of section 18(2) of this Scheme can be removed only by removing or damaging the seal concerned in the process.
- 19.(3) (a) The authorised person shall obtain an Analysis Report in respect of a sample which was taken in terms of subsection (2)(a)(ii).
- (b) An Analysis Report referred to in paragraph (a) shall be issued by the responsible analyst of a test laboratory for seed which is registered in terms of the Act.
- (c) Such an Analysis Report shall contain at least the following particulars:
- (i) The respective dates on which the seed lot was sampled and when the sample of the seed concerned was received at the laboratory.
  - (ii) The name and authorisation number of the authorised sampler who took the sample concerned;
  - (iii) The kind of seed of the sample concerned as indicated on the containers or on labels attached to the containers from which the sample was taken;
  - (iv) The name of the variety of the seed concerned, as indicated on the containers or on labels attached to the containers from which the sample was taken;
  - (v) The number of containers and the total weight of the seed lot concerned from which the sample was taken;
  - (vi) The serial numbers of the labels attached to the containers, as contemplated in section 18(2)(a),
  - (vii) The serial numbers of the seals attached to the containers, as contemplated in subsection (2)(a),
  - (viii) The weight of the submitted sample;
  - (ix) The name and address of the owner of the seed lot concerned;
  - (x) The reference number allocated to the seed lot concerned, of which the first part must contain the code number of the unit on which the seed was produced, as it was registered with the authority;
  - (xi) The certificate number, as provided by the authority and allocated by the owner to the seed lot concerned;
  - (xii) The laboratory reference number which was allocated by the person referred to in paragraph (b) to the sample concerned;
  - (xiii) The date on which the testing, examination or analysis of the sample concerned was concluded; and
  - (xiv) The results of the test, examination or analysis of the sample concerned in which the applicable particulars are indicated.
- (d) The authority and/or authorised person may require that the seed grower concerned reimburse him/her for any expenses incurred to obtain such Analysis Report.
- 19.(5) (a) An authorised person must obtain a sample from seed produced on a registered unit for the purpose of determining the varietal purity and identity according to procedures determined by the authority. Such sample must be submitted to the authority before

- the deadline for the submission of post control samples for the crop concerned expires.
- (b) The authority may plant such sample as a post control, or have it planted or otherwise tested in order to determine the varietal purity and/or identity.
- 19.(6) (a) The authority or authorised person may require that the amount determined by the authority, be paid by the applicant concerned in respect of the performance of the acts referred to in subsection (3)(a).
- (b) The amount determined by the authority shall be payable to it by the applicant concerned in respect of seals attached to the containers of seed as contemplated in subsection (2)(a).
- (c) The authority may, in the case of the determination of the varietal purity and/or identity of seed of a specie, require that the amount determined by it, be paid to it by the applicant concerned.

### CERTIFICATION OF SEED

- 20.(1) A seed lot may be certified if the authority is satisfied that –
- (a) the applicable Analysis Report referred to in section 19(3)(a) of this Scheme, confirms that the seed lot concerned complies with the applicable seed requirements referred to in section 14 of this Scheme, or in the case where the seed was produced in terms of another recognised Scheme, the requirements of the Scheme concerned. The date between the sampling of the seed lot and submission of the Analysis Report to the authority may not exceed six months; and
- (b) all the other applicable provisions of the Scheme concerned have been complied with in relation to that seed.
- 20.(2) The certification of seed in terms of a recognised Scheme shall be confirmed by a certificate in which such particulars as the authority may deem necessary are indicated, or prescribed by a recognised Scheme, as well as whether that seed is certified as pre-basic seed, basic seed or 1st or 2nd generation certified seed.
- 20.(3) Such a certificate is identified by a unique number allocated by the owner and which must be obtained from a list of numbers provided by the authority annually. Such certificate number must be indicated on each container or on a label attached to the containers of the seed lot concerned to which the certificate relates to.
- 20.(4) Such certificate shall only be issued after the applicant concerned has paid to the authority all amounts due by him in terms of this Scheme.
- 20.(5) If the authority refuses to certify seed which has been presented for certification in terms of a recognised Scheme, that seed may be sold in terms of section 13(1) of the Act for purposes of cultivation, or for any other purpose only after the seed grower concerned has removed the labels referred to in section 18(2) of this Scheme and the seals referred to in section 19(2) of this Scheme from the containers of that seed.
- 20.(6) If a refusal to certify seed arises from a deficiency, which could in the opinion of the authority possibly be rectified through the application of a particular treatment, the authority shall advise the applicant concerned of such deficiency and treatment.
- 20.(7) An applicant who applied a treatment referred to in subsection 20(6) may request that the authority re-examine the seed concerned with a view to revoke the refusal to certify that seed.
- 20.(8) If the authority approves an application referred to in subsection 20(7), the provisions of sections 18 and 19 of this Scheme shall *mutatis mutandis* apply to the representation of the seed concerned for certification.
- 20.(9) A certificate may also be issued on request in terms of a recognised Scheme for seed lots of different varieties of the same and/or different species that have been mixed, provided all the constituent seed lots of the mixture concerned, individually complied with the provisions of the Scheme concerned. The requirements for such mixtures are determined by the authority.

**WITHDRAWAL OF CERTIFICATION**

- 21.(1) The certification of seed in terms of a recognised Scheme may at any time be withdrawn if the authority is satisfied that –
- (a) the seed concerned is not true to variety;
  - (b) the seed concerned no longer complies with the applicable physical requirements referred to in section 14 of this Scheme; or in the case where the seed was produced in terms of another recognised Scheme, the provisions of that Scheme; or
  - (c) any other provision of a recognised Scheme with regard to the seed concerned has not been complied with.
- 21.(2) The authority shall, after considering reasons furnished by the applicant in terms of subsection (4) and still being convinced that certification must be withdrawn, notify the applicant in writing of the withdrawal of the certification of seed, and such applicant shall thereupon forthwith –
- (a) remove the labels referred to in section 18(2) of this Scheme and the seals referred to in section 19(2)(a) of this Scheme from the containers of the seed concerned which is still in his custody;
  - (b) notify each person to whom one or more containers of the seed concerned have been delivered, in writing of the withdrawal of the certification thereof and request such persons to remove the labels referred to in section 18(2) and seals specified in section 19(2)(a) from the containers of that seed; and
  - (c) furnish the authority with a copy of each such notice issued by him.
- 21.(3) The authority may publish a notice in the Government Gazette or an applicable publication in which the relevant particulars of the withdrawal of the certification of seed and the name of the applicant affected thereby, are indicated.
- 21.(4) Prior to issuing a notice as contemplated in subsection (2), the Authority shall notify the applicant in writing of the Authority's intention to withdraw the certification and the reasons for such intended withdrawal and afford the applicant 30 days within which to furnish reasons why the certification should not be withdrawn.

**POWERS OF INSPECTION**

- 22.(1) The powers of inspection specified in section 25 of the Act are hereby for the purpose of the application of this Scheme granted to the authority, as well as to any person authorized in writing by the authority to enforce any provision of this Scheme and any other recognised Scheme, or to conduct specific tasks in terms of the Scheme concerned.
- 22.(2) An inspection in terms of the recognised Scheme concerned shall be carried out in accordance with the methods determined by the authority.
- 22.(3) The number of plants which are inspected on a unit and the quantity of seed which is taken as a sample shall for the purpose of the application of the recognised Scheme concerned be deemed to be representative respectively of all the plants which have been established on the unit concerned, and of all the seed from which the sample concerned has been taken.
- 22.(4) The authority and a person authorized as contemplated in subsection (1) may require that an applicant or his employee, agent or manager shall render to him all reasonable assistance which he may require to enable him to carry out an inspection in terms of the recognised Scheme concerned.
- 22.(5) No compensation shall be payable in respect of assistance rendered in terms of subsection (4).

**DISCRETIONARY POWER OF THE AUTHORITY**

- 23.(1) The authority may consider any application or request made in terms of the recognised Scheme concerned, and may make any investigation or enquiry in connection therewith which he may deem necessary, and may for the purposes of such investigation or enquiry require that the applicant concerned submit to him such other documents or evidence as he may require.
- 23.(2) A permission or an approval or authorisation by the authority in terms of a recognised Scheme may –

- (a) be made subject to such conditions as the authority may in each case determine in writing; and
  - (b) in a particular case, be amended or withdrawn by the authority in writing if he deems it necessary.
- 23.(3) If the authority by virtue of a discretionary power vested in him by this or another recognised Scheme –
- (a) refuses to approve an application or a request which has been submitted to him in writing;
  - (b) amends or withdraws a permission or an approval or authorisation;
  - (c) withdraws the registration of a unit; or
  - (d) refuses to certify seed which has been presented for certification in terms of section 19 of this Scheme or in terms of a stipulation of another recognised Scheme, the authority shall notify the applicant or person concerned in writing of his decision and of the grounds on which it is based.

### APPEALS

24. The provisions of section 32 of the Act shall *mutatis mutandis* apply with regard to any person who feels aggrieved by any decision or action taken by the authority in terms of this and other recognised Schemes.

### PAYMENT OF FEES

- 25.(1) Postage on and delivery costs of any application, notice, appeal or other document which is submitted in terms of this and other recognised Schemes, as well as on or of anything else pertaining thereto, shall be prepaid by the sender thereof.
- 25.(2) Any amount which is payable in terms of this Scheme to the authority shall be paid by bank deposit or by electronic funds transfer in favour of SANSOR.
- 25.(3) An amount paid in terms of this and other recognised Schemes shall not be refundable.

### ADDRESSES FOR THE SUBMISSION OF DOCUMENTS AND PAYMENT OF FEES

- 26.(1) Any application, notice or other documents, as well as anything else pertaining thereto, which in terms of this and other recognised Schemes is required to be submitted to the authority, and any fees which are payable to the authority in terms of other recognised Schemes shall –
- (a) when forwarded by post, be addressed to the Technical Manager, South African National Seed Organization, P.O. Box 72981, Lynnwood Ridge, 0040; and
  - (b) when submitted by hand, be delivered at the office of the Technical Manager, South African National Seed Organization, 5 Glenwood Road, Lynnwood Glen, Pretoria 0081.
- 26.(2) The document by means whereof an appeal referred to in section 24 is lodged, shall –
- (a) when forwarded by post, be addressed to the Director-General: Department of Agriculture, Land Reform and Rural Development, Private Bag X250, Pretoria, 0001; and
  - (b) when submitted by hand, be delivered at the office of the Director-General: Department of Agriculture, Land Reform and Rural Development, Agriculture Place, 20 Steve Biko Street, Arcadia, Pretoria, 0001.

**TABLE 1**  
**KINDS OF PLANTS AND NUMBERS OF ANNEXURES**

Kind of plant		Number of Annexure in which specific requirements are set out
Botanical name	Common name	
Column 1		Column 2
<i>Allium cepa</i> L.	Onion	1
<i>Allium fistulosum</i> L. x <i>A. cepa</i> L.	New Bunching onion	2
<i>Allium fistulosum</i> L.	Bunching onion	3
<i>Allium porrum</i> L.	Leek	4
<i>Anthephora pubescens</i> Nees	Bottle Brush Grass	5
<i>Arachis hypogaea</i> L.	Groundnut	6
<i>Avena sativa</i> L.	Oats	7
<i>Avena nuda</i> L.	Naked Oats	7
<i>Avena strigosa</i> Schreb.	Black Oats	7
<i>Beta vulgaris</i> L. subsp. <i>vulgaris</i> var. <i>conditiva</i> Alef.	Garden beet	8
<i>Beta vulgaris</i> L. subsp. <i>vulgaris</i> var. <i>flavescens</i> A.DC	Swiss chard	9
<i>Brassica napus</i> L. var. <i>oleifera</i> Delile	Oil Seed Rape	10
<i>Brassica napus</i> L. x <i>B. rapa</i> L.	Intraspecific Hybrid Oil Seed Rape	10
<i>Brassica napus</i> L. var. <i>napobrassica</i> (L.) Rchb.	Forage rape and Swede	11
<i>Brassica oleracea</i> L.	Fodder Cale, Borecole	11
<i>Brassica oleracea</i> L. convar. <i>botrytis</i> (L.) Alef. var. <i>cymosa</i> Duch.	Broccoli	12
<i>Brassica oleracea</i> L. convar. <i>botrytis</i> (L.) Alef. var. <i>botrytis</i> L.	Cauliflower	12
<i>Brassica oleracea</i> L. var. <i>capitata</i> L.	Cabbage	12
<i>Brassica rapa</i> L.	Oil Seed Rape	10
<i>Brassica rapa</i> L.	Fodder Rape	11
<i>Bromus catharticus</i> Vahl.	Rescue grass	13
<i>Cajanus cajan</i> (L.) Millsp.	Pigeon Pea	14
<i>Capsicum</i> spp.	Chillies, Sweet Pepper, Paprika	15
<i>Cenchrus ciliaris</i> L.	Buffalo grass	16
<i>Chloris gayana</i> Kunth	Rhodes grass	17
<i>Citrullus lanatus</i> (Thunb.) Matsumura et Nakai	Watermelon	18

Kind of plant		Number of Annexure in which specific requirements are set out
Botanical name	Common name	
Column 1		Column 2
<i>Coriandrum sativum</i> L.	Coriander	19
<i>Cucumis melo</i> L.	Sweet melon	20
<i>Cucumis sativus</i> L.	Cucumber	21
<i>Cucurbita maxima</i> Duch.	Pumpkin & Squash	22
<i>Cucurbita moschata</i> (Duch.) Duch ex Poir	Pumpkin & Squash	22
<i>Cucurbita pepo</i> L.	Squash	22
<i>Dactylis glomerata</i> L.	Cocksfoot	23
<i>Daucus carota</i> L.	Carrot	24
<i>Digitaria eriantha</i> Steud.	Smuts Finger grass	25
<i>Dolichos biflorus</i> L.	Dolichos	68
<i>Echinochloa crus-galli</i> (L.) P. Beauv.	Japanese Millet	26
<i>Eleusine corocana</i> L.	Finger Millet	27
<i>Eragrostis curvula</i> (Schrad.) C.G. Nees	Weeping Love Grass	28
<i>Eragrostis tef</i> (Zucc.) Trotter	Teff	29
<i>Fagopyrum esculentum</i> Moench	Buckwheat	30
<i>Festuca arundinacea</i> Schreb	Tall Fescue	31
* <i>Festulolium</i> Asch. & Graebn.	Festulolium	31
<i>Foeniculum vulgare</i> Mill.	Fennel	32
<i>Glycine max</i> L. Merrill	Soybean	33
<i>Gossypium hirsutum</i> L.	Cotton	34
<i>Gossypium hirsutum</i> L. x <i>G. barbadense</i>	Intraspecific Hybrid Cotton	34
<i>Helianthus annuus</i> L.	Sunflower	35
<i>Hordeum vulgare</i> L. subsp. <i>vulgare</i>	Barley	36
<i>Kummerowia striata</i> (Thunb.) Schindl.	Common Lespedeza	37
<i>Lablab purpureus</i> (L.) Sweet	Lab-lab beans	68
<i>Lactuca sativa</i> L.	Lettuce	38
<i>Lespedeza cuneata</i> (Dum. Cours.) G. Don	Chinese Lespedeza	37
<i>Lespedeza striata</i> (Thunb.) Hook. & Arn	Common Lespedeza	37
<i>Lolium multiflorum</i> Lam.	Italian & Westerwold Ryegrass	39
<i>Lolium rigidum</i> Gaudin	Annual Ryegrass, Rigid Ryegrass	39
<i>Lolium perenne</i> L.	Perennial Ryegrass	40
<i>Lolium ×hybridum</i> Hausskn.	Hybrid Ryegrass	40

Kind of plant		Number of Annexure in which specific requirements are set out
Botanical name	Common name	
Column 1		Column 2
<i>Lupinus albus</i> L.	White Lupin	41
<i>Lupinus angustifolius</i> L.	Narrow Leaf Lupin	41
<i>Lupinus luteus</i> L.	Yellow Lupin	41
<i>Medicago littoralis</i> Rohde ex Loisel	Strand medic	42
<i>Medicago polymorpha</i> L.	Burr medic	42
<i>Medicago rugosa</i> Desr.	Gama medic	42
<i>Medicago sativa</i> L.	Lucerne	43
<i>Medicago scutellata</i> (L) Miller	Snail medic	42
<i>Medicago truncatula</i> (Gaertn.)	Barrel medic	42
<i>Megathyrsus maximus</i> (Jacq.) B.K.Simon & S.W.L.Jacobs (Synonym <i>Panicum maximum</i> Jacq.)	White Buffalo grass	44
<i>Melilotus albus</i> Medik.	White sweet clover	45
<i>Nicotiana tabacum</i> L.	Tobacco	46
<i>Ornithopus compressus</i> L.	Yellow Serradella	47
<i>Ornithopus sativus</i> Brot.	French Serradella	47
<i>Oryza sativa</i> L.	Rice	48
<i>Panicum coloratum</i> L.	Small Buffalo grass	44
<i>Paspalum dilatatum</i> Poir.	Paspalum	49
<i>Paspalum notatum</i> Früggé	Paspalum	49
<i>Pennisetum glaucum</i> L. R.Br	Pearl Millet	50
<i>Phaseolus coccineus</i> L.	Kidney Bean	51
<i>Phaseolus vulgaris</i> L.	Dry Bean	51
<i>Phaseolus vulgaris</i> L.	Dwarf & Runner Garden Bean	52
<i>Pisum sativum</i> L. <i>sensu lato</i>	Dry Pea & Garden Pea	53
<i>Raphanus sativus</i> L.	Garden & Fodder Radish	54
<i>Raphanus sativus</i> var. <i>oleiferus</i>	Oil Seed Rape	10
<i>Secale cereale</i> L.	Rye	55
<i>Solanum lycopersicum</i> L.	Tomato	56
<i>Solanum melongena</i> L.	Eggplant, Brinjal	57
<i>Sorghum alnum</i> L. Parodi	Columbus grass	58
<i>Sorghum bicolor</i> (L.) Moench subsp. <i>bicolor</i>	Grain Sorghum	59

Kind of plant		Number of Annexure in which specific requirements are set out
Botanical name	Common name	
Column 1		Column 2
<i>Sorghum bicolor</i> (L.) Moench subsp. <i>drummondii</i> (Steud.) de Wet ex Davidse (syn. <i>Sorghum sudanense</i> (Piper) Stapf)	Sudan grass	58
<i>Sorghum vulgare</i> Pers.	Grain Sorghum, Broomcorn	59
<i>Sorghum</i> spp.	Annual Fodder Sorghum Hybrids	60
<i>Sorghum</i> spp.	Perennial Forage Sorghum	61
<i>Sporobolus fimbriatus</i> (Trin.) Nees	Bushveld Dropseed Grass	62
<i>Trifolium repens</i> L.	White Clover	63
<i>Trifolium vesiculosum</i> Savi	Arrow Leaf Clover	64
× <i>Triticosecale</i> L. Witt.	Triticale	65
<i>Triticum aestivum</i> L. subsp. <i>aestivum</i>	Wheat	66
<i>Triticum turgidum</i> L. subsp. <i>durum</i> (Desf.) van Slangeren	Durum wheat	66
<i>Vicia faba</i> L.	Broad Bean	67
<i>Vigna unguiculata</i> L. Walp.	Cowpea	68
<i>Zea mays</i> L.	Grain Maize	69
<i>Zea mays</i> L. var. <i>saccharata</i> Baily	Sweetcorn	70

**SOUTH AFRICAN SEED CERTIFICATION SCHEME****ANNEXURES FOR SPECIFIC REQUIREMENTS FOR SPECIES AS SPECIFIED IN TABLE 1**

**N.B.: REDISTRIBUTION OR ADDITION WITH THE SAME PLANT MATERIAL IS NOT CONSIDERED TO BE GAP-FILLING**

**ANNEXURE 1****REQUIREMENTS RELATING TO ONION (*Allium cepa* L.)****1 Field requirements**

A field may be registered as a unit only if no plants of any *Allium* spp. have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

**2 Planting requirements**

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows is not permissible.

2.3 In the case of the intended production of seed of a hybrid variety -

2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and

2.3.2 rows containing plants of the pollen parent shall be clearly marked.

2.4 If it is intended to produce seed by the seed-to-seed method, at least 500 plants of the variety concerned shall be established specially with a view to evaluating the bulbs thereof before the seed concerned is presented for certification.

**3 Isolation requirements**

3.1 Subject to the provisions of paragraph 3.3 and 3.4, a unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed of -

3.1.1.1 an open-pollinated variety, is at least 2 000 metres wide; and

3.1.1.2 a hybrid variety, is at least 3 000 metres wide; and

3.1.2 in the case of the intended production of certified seed of -

3.1.2.1 an open-pollinated variety, is at least 1 000 metres wide; and

3.1.2.2 a hybrid variety, at least 1 500 metres wide.

3.1.3 in the case of the intended production of white and straw-coloured onion varieties, the isolation distance to red onions, be at least 5 000 meters wide: Provided that the isolation areas between the different red onion varieties shall apply as indicated in paragraphs 3.1.1 and 3.1.2.

3.1.4 in the case of white onions which have been established in the proximity of straw-coloured onions and vice versa, at least 3 000 meters wide.

3.2 Such isolation area shall be free from plants of any other *Allium* spp. or onion variety which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of 2nd generation certified seed, they have been established from 1st generation certified pre-basic seed or basic seed of the same variety.

3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -

3.3.1 a common pollen parent is used; and

3.3.2 a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

**4 Requirements for plants**

4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants and bulbs on a unit shall -

- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
- 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
- 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen susceptible flowers; and
- 4.2.1.2 in the case of the intended production of certified seed not exceed 0,5 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers;
- 4.2.2 the number of deviating plants of the seed parent on a unit shall –
- 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the of the plants of the seed parent; and
- 4.2.2.2 in the case of the intended production of certified seed not exceed 1,0 percent of the plants of the seed parent; and
- 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
- 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and
- 4.2.3.2 in the case of the intended production of certified seed not exceed 2,0 percent of the plants of the seed parent.

## 5 Inspection requirements

- 5.1 Plants and bulbs which were established on a unit with a view to obtaining bulbs to be used for the production of seed shall be inspected during the mature stage thereof.
- 5.2 Such bulbs shall be inspected not more than 30 days before they are established on a unit and the number of deviated bulbs shall -
- 5.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not to exceed 0,2 percent; and
- 5.2.2 in the case of the intended production of certified seed, not to exceed 0,5 percent.
- 5.3 Plants which are established on a unit from such bulbs shall be inspected -
- 5.3.1 before the flowering stage thereof;
- 5.3.2 during the flowering stage thereof; and
- 5.3.3 during the full seed stage thereof; and
- 5.3.4 in the case of a hybrid variety, after the seed heads of the plants of the pollen parent have been removed.
- 5.4 If plants of a hybrid variety have been established on a unit -
- 5.4.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -
- 5.4.1.1 the plants of the seed parent are expected to start flowering; and
- 5.4.1.2 the seed heads of the pollen parent are to be removed; and
- 5.4.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.3.4 has been carried out.

## 6 Physical requirements

- Seed shall -
- 6.1 have a germination percentage of at least 80;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

**ANNEXURE 2****REQUIREMENTS RELATING TO NEW BUNCHING ONION (*Allium cepa* L. x *A. fistulosum* L.)****1 Field requirements**

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any *Allium* spp. have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 Plants established on a unit registered for the production of certified basic seed or of certified seed, may, after the establishment thereof, be used for such purpose for a period of not more than three years, provided the unit concerned is registered annually for the production of certified basic seed or certified seed, as the case may be.

**2 Planting requirements**

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

**3 Isolation requirements**

A unit shall be surrounded by an isolation area which -

3.1 in the case of all generations of an open pollinated variety of new bunching onion and any other *Allium* spp., is at least 1000 metre wide.

**4 Requirements for plants**

The number of deviating plants on a unit shall -

4.1 in the case of the intended production of certified pre-basic seed or basic seed; not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 If male sterility is used in the seed parent of a hybrid variety -

4.2.1 The number of deviating pollen-shedding plants of the pollen parent on a unit shall -

4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and

4.2.1.2 In the case of the intended production of certified seed, not exceed 0,5 percent of the plant of the pollen parent at the stage at which 5 percent or more of the plants of the seed parent have pollen-susceptible flowers.

4.2.2 the number of deviating plants of the seed parent on a unit shall -

4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and

4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and

4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -

4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and

4.2.3.2 in the case of the intended production of certified seed, not exceed 2,0 percent of the plants of the seed parent.

**5 Inspection requirements**

5.1 Seedlings shall be inspected before they are established on a unit.

5.2 Plants which are established on a unit from such seedlings shall be inspected during -

5.2.1 before the flowering stage thereof;

5.2.2 during the flowering stage thereof; and

5.2.3 during the full seed stage thereof.

**6 Physical requirements**

Seed shall -

6.1 have a germination percentage of at least 80;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed; and

- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

### ANNEXURE 3

#### REQUIREMENTS RELATING TO BUNCHING ONION (*Allium fistulosum* L.)

##### 1 Field requirements

A field may be registered as a unit only if no plants of any *Allium* spp. have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

##### 2 Planting requirements

- 2.1 Plants shall be established in rows on a unit.
- 2.2 Gap-filling in rows shall not be permissible.

##### 3 Isolation requirements

3.1 Subject to the provisions of paragraph 3.3 a unit shall be surrounded by an isolation area that in the case of all generations of -

- 3.1.1 different varieties of open pollinated early/ normal bolter bunching onion, be at least 1 000 metres wide; and
- 3.1.2 different varieties of open pollinated late bolter bunching onion is at least 1 500 metres wide; and
- 3.1.3 between varieties of open pollinated open pollinated early/ normal bolter and late bolter bunching onion is at least 1 500 metres wide; and
- 3.1.3 a hybrid variety of both types, is at least 1 500 metres wide.
- 3.1.4 The isolation area between onion and bunching onion shall -
- 3.1.4.1 in the case of the intended production of certified pre-basic seed or basic seed of -
- 3.1.4.1.1 an open-pollinated variety, is at least 1 000 metres wide; and
- 3.1.4.1.2 a hybrid variety, is at least 3 000 metres wide; and
- 3.1.4.2 in the case of the intended production of certified seed of -
- 3.1.4.2.1 an open-pollinated variety, is at least 1 000 metres wide; and
- 3.1.4.2.2 a hybrid variety, at least 3 000 metres wide.

3.2 Such isolation area shall be free from plants of any other *Allium* spp. or bunching onion variety which flower at the same time as the plants on the unit concerned, unless -

- 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.
- 3.2.3 in the case of the intended production of 2nd generation certified seed, they have been established from 1st generation certified pre-basic seed or basic seed of the same variety.
- 3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
- 3.3.1 a common pollen parent is used; and
- 3.3.2 a distance of a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

##### 4 Requirements for plants

- 4.1 The number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed; not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
- 4.2.1 The number of deviating pollen-shedding plants of the pollen parent on a unit shall -
- 4.2.1.1 In the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and

4.2.1.2 In the case of the intended production of certified seed, not exceed 0,5 percent of the plant of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.

4.2.2 the number of deviating plants of the seed parent on a unit shall -

4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and

4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and

4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -

4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and

4.2.3.2 in the case of the intended production of certified seed, not exceed 2,0 percent of the plants of the seed parent.

## 5 Inspection requirements

5.1 Seedlings shall be inspected before they are established on a unit.

5.2 Plants which are established on a unit from such seedlings should be inspected -

5.2.1 before the flowering stage thereof;

5.2.2 during the flowering stage thereof;

5.2.3 during the full seed stage thereof; and

5.2.4 in the case of a hybrid variety, after the heads of the plants of the pollen parent have been removed.

5.3 If plants of a hybrid variety have been established on a unit -

5.3.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -

5.3.1.1 the plants of the seed parent are expected to start flowering; and

5.3.1.2 the seed heads of the pollen parent are to be removed; and

5.3.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.2.4 has been carried out.

## 6 Physical requirements

Seed shall -

6.1 Have a germination percentage of at least 80;

6.2 Have at least 98.0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 4

### REQUIREMENTS RELATING TO LEEK (*Allium porrum* L.)

#### 1 Field requirements

A field may be registered as a unit only if no plants of any *Allium* spp. have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

#### 2 Planting requirements

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

#### 3 Isolation requirements

3.1 Subject to the provisions of paragraph 3.3 a unit shall be surrounded by an isolation area that in the case of all generations of -

3.1.1 an open pollinated variety of a leek be at least 500 metres wide; and

3.2 such isolation area shall be free from plants of any leek variety which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.

3.2.3 in the case of the intended production of 2nd generation certified seed, they have been established from 1st generation certified pre-basic seed or basic seed of the same variety.

3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -

3.3.1 a common pollen parent is used; and

3.3.2 a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

#### 4 Requirements for plants

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed; not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 If male sterility is used in the seed parent of a hybrid variety -

4.2.1 The number of deviating pollen-shedding plants of the pollen parent on a unit shall -

4.2.1.1 In the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and

4.2.1.2 In the case of the intended production of certified seed, not exceed 0,5 percent of the plant of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers;

4.2.2 the number of deviating plants of the seed parent on a unit shall -

4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and

4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and

4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -

4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and

4.2.3.2 in the case of the intended production of certified seed, not exceed 2,0 percent of the plants of the seed parent.

#### 5 Inspection requirements

5.1 Seedlings shall be inspected before they are established on a unit.

5.2 Plants which are established on a unit from such seedlings should be inspected -

5.2.1 before the flowering stage thereof;

5.2.2 during the flowering stage thereof;

5.2.3 during the full seed stage thereof; and

5.2.4 in the case of a hybrid variety, after the heads of the plants of the pollen parent have been removed.

5.3 If plants of a hybrid variety have been established on a unit -

5.3.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -

5.3.1.1 the plants of the seed parent are expected to start flowering; and

5.3.1.2 the seed heads of the pollen parent are to be removed; and

5.3.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.2.4 has been carried out.

#### 6 Physical requirements

Seed shall -

6.1 Have a germination percentage of at least 80;

6.2 Have at least 98.0 percent pure seed; and

6.3 Not contain more than -

6.3.1 0,1 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 5

### REQUIREMENTS RELATING TO BOTTLE BRUSH GRASS (*Antheophora pubescens* Nees)

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -

1.1.1 no plants of any species of *Antheophora* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or

1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.

1.2 A field which is intended for the production of certified basic seed or certified seed of a particular bottle brush grass variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season;

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

#### 2 Planting requirements

2.1 Seed may be sown or be established in rows on a unit.

2.2 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.

#### 3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -

3.1.1.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and

3.1.1.2 is at least 100 metres wide where the area of the unit concerned is more than two hectares; and

3.1.2 in the case of the intended production of certified seed -

3.1.1.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and

3.1.1.2 is at least 50 metres wide where the area of the unit concerned is more than two hectares.

3.2 Such isolation area shall be free from plants of any bottle brush grass variety which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

#### 4 Requirements for plants

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.1.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

#### 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering stage thereof; and

- 5.3 during the full seed stage thereof.
- 6 Physical requirements  
Seed shall -
- 6.1 have a germination percentage of at least 20;
- 6.2 in the case of coated seed, have a germination percentage of at least 30;
- 6.3 have at least 98,0 percent pure seed; and
- 6.4 not contain more than -
- 6.4.1 0,1 percent other seed; and
- 6.4.2 2,0 percent other material.
- 6.4.3 Notwithstanding the provisions of paragraph 6.4.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 6

### REQUIREMENTS RELATING TO GROUNDNUTS (*Arachis hypogaea* L.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of *Arachis* spp., have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 1.2 A field which is intended for the production of certified basic seed or certified seed of a particular groundnut variety may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements  
Plants shall be established in rows on a unit.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which is at least five metres wide.
- 3.2 Such isolation area shall be free from plants of any groundnut variety.
- 4 Requirements for plants
- 4.1 The number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre- basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 The number of disease-infected plants on a unit shall -
- 4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 5,0 percent; and
- 4.2.2 in the case of the intended production of certified seed, not exceed 10,0 percent.
- 4.3 For the purposes of paragraph 4.2 "disease-infected plants" shall mean plants which are not visually free from the pathogen *Chalara elegans* (previous name *Thielaviopsis basicola*).
- 5 Inspection requirements
- 5.1 Plants which are established on a unit shall be inspected -
- 5.1.1 before the flowering stage thereof;
- 5.1.2 during the flowering stage thereof; and
- 5.1.3 during the lifting thereof.
- 5.2 A seed grower shall notify the authorised person at least 10 days prior to the date on which plants are to be lifted.

- 6 Physical requirements  
Seed shall -
- 6.1 have a germination percentage of at least 70;
  - 6.2 have at least 98,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,05 percent other seed;
    - 6.3.2 0,2 percent seed of deviating plants; and
    - 6.3.3 2,0 percent seed of other material.
    - 6.3.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 7

### REQUIREMENTS RELATING TO OATS, NAKED OATS & BLACK OATS (*Avena sativa* L., *A. nuda* L. & *A. strigosa* Schreb.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Avena* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
  - 1.2 A field which is intended for the production of basic seed or certified seed of a particular oat variety may also be registered as a unit, if -
    - 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season;
    - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements  
Seed may be sown or be established in rows on a unit.
- 3 Isolation requirements
- 3.1 The isolation area surrounding a unit shall be at least 5 meters wide.
  - 3.2 Such isolation area shall be free from plants of any oat species.
- 4 Requirements for plants
- 4.1 The number of deviating plants on a unit shall -
    - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
    - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
  - 4.2 Methods for determination of deviating plants shall be as determined by the Authority.
- 5 Inspection requirements  
Plants which are established on a unit shall be inspected -
- 5.1 before the booting stage thereof;
  - 5.2 during the flowering stage thereof; and
  - 5.3 during the ripening thereof.
- 6 Physical requirements
- 6.1 Seed shall in the case of *Avena sativa* and *A. strigosa* -
    - 6.1.1 have a germination percentage of at least 80.
    - 6.1.2 have at least 99,0 percent pure seed; and
    - 6.1.3 not contain more than -
      - 6.1.3.1 0,3 percent other seed, but not more 0,02 percent weed seed; and
      - 6.1.3.2 1,0 percent other material.

6.1.3.3 Notwithstanding the provisions of paragraph 6.1.3.1, not more than one seed of wild oats may occur in a 400 g seed sample, and not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

6.2 Seed shall in the case of *Avena nuda* -

6.2.1 have a germination percentage of at least 80.

6.2.2 have at least 99,5 percent pure seed; and

6.2.3 not contain more than -

6.2.3.1 0,3 percent other seed, but not more than traces of weed seed; and

6.2.3.2 0,5 percent other material.

6.2.3.3 Notwithstanding the provisions of paragraph 6.2.3.1, not more than one seed of wild oats may occur in a 400 g seed sample, and not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 8

### REQUIREMENTS RELATING TO GARDEN BEET

(*Beta vulgaris* L. subsp. *vulgaris* var. *conditiva* Alef.)

#### 1 Field requirements

A field may be registered as a unit only if no plants of any species of a *Beta* spp. have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

#### 2 Planting requirements

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

#### 3 Isolation requirements

3.1 Subject to the provisions of paragraph 3.3 a unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed of -

3.1.1.1 an open pollinated variety, is at least 3 000 metres wide; and

3.1.1.2 a hybrid variety, is at least 3 000 metres wide; and

3.1.2 in the case of the intended production of certified seed of -

3.1.2.1 an open-pollinated variety, is at least 2 000 metres wide; and

3.1.2.2 a hybrid variety, is at least 2 000 metres wide; and

3.1.3 in the case of garden beet, which has been established in the proximity of swiss chard, is at least 5 000 meters wide.

3.1.3 in the case of beet of different colours, is at least 5 000 meters wide.

3.2 Such isolation area shall be free from plants of any *Beta* spp. which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of a variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

3.3 In the case of red beet, the isolation between different red beet varieties -

3.3.1 in the case of the intended production of certified pre-basic seed or basic seed, shall be at least 2 000 metres wide; and

3.3.2 in the case of the intended production of certified seed, shall be at least 1 000 metres wide.

#### 4 Requirements for plants

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
- 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
- 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage on which 2,0 percent or more of the plants of the seed parent has pollen-susceptible flowers; and
- 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the pollen parent at the stage on which 5,0 percent or more of the plants of the seed parent has pollen-susceptible flowers.
- 4.2.2 the number of deviating plants of the seed parent on a unit shall -
- 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and
- 4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and
- 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
- 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and
- 4.2.3.2 in the case of the intended production of certified seed, not exceed 2,0 percent of the plants of the seed parent.
- 4.3 The number of disease-infected plants on a unit shall -
- 4.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent; and
- 4.3.2 in the case of the intended production of certified seed, not exceed 1,0 percent.
- 4.4 For the purposes of paragraph 4.3 "disease-infected plants" shall mean plants which are not visually free from the pathogen *Perenospora schachtii* Fckl.
- 5 Inspection requirements
- 5.1 Beets shall be inspected before it is established on a unit.
- 5.2 Plants of such beets which are established on a unit shall be inspected -
- 5.2.1 before the flowering stage thereof;
- 5.2.2 during the flowering stage thereof; and
- 5.2.3 during the full seed stage thereof.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 70;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 9

### REQUIREMENTS RELATING TO SWISS CHARD (*Beta vulgaris* L. subsp. *vulgaris* var. *flavescens* A.DC.)

- 1 Field requirements
- A field may be registered as a unit only if no plants of any species of a *Beta* spp., have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 2 Planting requirements
- 2.1 Plants shall be established in rows on a unit.
- 2.2 Gap-filling in rows shall not be permissible.

- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, is at least 3 000 metres wide;
- 3.1.2 in the case of the intended production of certified seed, is at least 2 000 metres wide; and
- 3.1.3 in the case of garden beet, which has been established in the proximity of swiss chard, is at least 5 000 meters wide.
- 3.1.3 in the case of swiss chard of different colours, is at least 5 000 meters wide.
- 3.2 Such an isolation area shall be free from plants of any swiss chard variety or species of *Beta* which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of certified basic seed, it have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants
- 4.1 The number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 The number of disease-infected plants on a unit shall -
- 4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent; and
- 4.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent.
- 4.3 For the purposes of paragraph 4.2 "disease-infected plants" shall mean plants which are not visually free from the pathogen *Perenospora schachtii* Fckl.
- 5 Inspection requirements
- 5.1 Seedlings shall be inspected before they are established on a unit.
- 5.2 Plants which are established on a unit from such seedlings shall be inspected -
- 5.2.1 before the flowering stage thereof;
- 5.2.2 during the flowering stage thereof; and
- 5.2.3 during the full seed stage thereof.
- 6 Physical requirements
- Seed shall
- 6.1 have a germination percentage of at least 70;
- 6.2 have at least 98.0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 10

### REQUIREMENTS RELATING TO OIL SEED RAPE

(*Brassica napus* L. var. *oleifera*; *Brassica rapa* L.; *Raphanus sativus* var. *oleiferus*)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Brassica* or *Raphanus* or *Brassica* as the case may be, have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof.

- 1.2 Only in the case of an open-pollinated variety, a field which is intended for the production of basic seed or certified seed of a particular oil seed rape variety, may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season;
  - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
  - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

## 2 Planting requirements

- 2.1 Seed shall be established in rows on a unit.
- 2.2 Gap-filling in rows shall not be permissible.
- 2.3 In the case of the intended production of seed of a hybrid variety -
  - 2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and
  - 2.3.2 the rows containing the plants of the pollen parent shall be clearly marked.

## 3 Isolation requirements

- 3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -
  - 3.1.1 in the case of the intended production of certified pre-basic and basic seed of -
    - 3.1.1.1 an open-pollinated variety, is at least 300 metres wide; and
    - 3.1.1.2 a hybrid variety, is at least 3 000 metres wide; and
  - 3.1.2 in the case of the intended production of certified seed -
    - 3.1.2.1 of an open-pollinated variety, is at least 200 metres wide; and
    - 3.1.2.2 of a hybrid variety, is at least 2 000 metres wide.
- 3.2 Such isolation area shall be free from plants of any *Brassica* or *Raphanus* related variety which flower at the same time as the plants on the unit concerned, unless -
  - 3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and
  - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
  - 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
  - 3.3.1 a common pollen parent is used; and
  - 3.3.2 a distance of a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

## 4 Requirements for plants

- 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -
  - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent; and
  - 4.1.2 in the case of the intended production of certified seed, not exceed 0,3 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
  - 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
    - 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen-susceptible flowers;
    - 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.
  - 4.2.2 the number of deviating plants of the seed parent on a unit shall -
    - 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the seed parent; and
    - 4.2.2.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the seed parent; and
  - 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
    - 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the seed parent at the stage at which 2,0 percent or more of the plants of

the seed parent has pollen-susceptible flowers: Provided that the aggregate of the number of pollen-shedding flowers found during inspections shall not exceed 0,5 percent of the plants of the seed parent; and

4.2.3.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the seed parent at the stage at which 5,0 percent or more of the plants of the seed parent has pollen-susceptible flowers. Provided that the aggregate number of plants with pollen-shedding flowers found during inspections shall not for the three inspections showing the highest incidence of such plants, exceed 1,0 percent of the plants of the seed parent.

## 5 Inspection requirements

5.1 Plants which are established on a unit shall be inspected -

5.1.1 before the flowering stage thereof;

5.1.2 during the flowering stage thereof;

5.1.3 during the full seed stage thereof; and

5.1.4 in the case of a hybrid variety, after the plants of the pollen parent have been removed.

5.2 If plants of a hybrid variety have been established on a unit -

5.2.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -

5.2.1.1 the plants of the seed parent are expected to start flowering; and

5.2.1.2 the pollen parent to be removed; and

5.2.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.1.4 has been carried out.

## 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 70;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,2 percent other seed;

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and

6.4 Not contain more than 0,2 percent sclerotia of *Sclerotinia sclerotiorum* in a 1000 gram sample.

## ANNEXURE 11

### REQUIREMENTS RELATING TO ALL BRASSICA SPECIES UTILISED FOR FODDER, INCLUDING FORAGE RAPE, SWEDE, FODDER KALE, BORECOLE, & FODDER TURNIP [*Brassica napus* L. var. *napobrassica* (L.) Rchb., *Brassica oleracea* L. & *Brassica rapa* L.]

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of the Brassicaceae family have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular *Brassica* variety, may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

#### 2 Planting requirements

Plants may be sown or be established in rows on a unit.

- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, is at least 2 500 metres wide; and
    - 3.1.2 in the case of the intended production of certified seed, is at least 1 000 metres wide.
  - 3.2 Subject to the provisions of paragraph 3.3, such isolation area shall be free from plants of a species of *Brassica* which flower at the same time as the plants on the unit concerned, unless -
    - 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
    - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.
    - 3.2.3 in the case of the intended production 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants

The number of deviating plants on a unit shall –

  - 4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
  - 4.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 5 Inspection requirements

Plants which are established on a unit shall be inspected -

  - 5.1 before the flowering stage thereof;
  - 5.2 during the flowering stage thereof; and
  - 5.3 during the full seed stage thereof.
- 6 Physical requirements

Seed shall -

  - 6.1 have a germination percentage of at least 75;
  - 6.2 have at least 98,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,1 percent other seed; and
    - 6.3.2 2,0 percent other material;
    - 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and
  - 6.4 Not contain more than 0,2 percent sclerotia of *Sclerotinia sclerotiorum* in a 1000 gram sample.

## ANNEXURE 12

### REQUIREMENTS RELATING TO CAULIFLOWER, CABBAGE & BROCCOLI [*Brassica oleracea* L. var. *capitata* L., *Brassica oleracea* L. convar *botrytis* (L.) Alef. var. *botrytis*] & [*Brassica oleracea* L. convar *botrytis* (L.) Alef. var. *cymosa* Duchense]

- 1 Field requirements

A field may be registered as a unit only if no plants of any *Brassica* spp., have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 2 Planting requirements
  - 2.1 Plants shall be established in rows on a unit.
  - 2.2 Gap-filling in rows shall not be permissible.
- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed of -
      - 3.1.1.1 an open-pollinated variety, is at least 3 000 metres wide; and

- 3.1.1.2 a hybrid variety, is at least 3 000 metres wide; and
- 3.1.2 in the case of the intended production of certified seed -
  - 3.1.2.1 of an open-pollinated variety, is at least 1 500 metres wide; and
  - 3.1.2.1 of a hybrid variety, is at least 1 500 metres wide
- 3.2 Such an isolation area shall be free from plants of any *Brassica* variety or species of *Brassica* which flower at the same time as the plants on the unit concerned, unless -
  - 3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and
  - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
  - 3.2.3 in the case of the intended production of a variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

#### 4 Requirements for plants

- 4.1 The number of deviating plants on a unit shall -
  - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
  - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
  - 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
    - 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage on which 2,0 percent or more of the plants of the seed parent has pollen susceptible flowers;
    - 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the pollen parent at the stage on which 5,0 percent or more of the plants of the seed parent has pollen-susceptible flowers.
  - 4.2.2 the number of deviating plants of the seed parent on a unit shall -
    - 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed not exceed 0,5 percent of the plants of the seed parent; and
    - 4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and
    - 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
      - 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the seed parent at the stage at which 2,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate of the number of pollen-shedding flowers found during inspections shall not exceed 0,5 percent of the plants of the seed parent; and
      - 4.2.3.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the seed parent at the stage at which 5,0 percent or more of the plants of the seed parent has pollen-susceptible flowers. Provided that the aggregate number of plants with pollen-shedding flowers found during inspections shall not for the three inspections showing the highest incidence of such plants, exceed 1,0 percent of the plants of the seed parent.

#### 5 Inspection requirements

- 5.1 Seedlings shall be inspected before they are established on a unit.
- 5.2 Plants which are established on a unit from such seedlings shall be inspected –
  - 5.2.1 before the flowering stage thereof;
  - 5.2.2 during the flowering stage thereof;
  - 5.2.3 during the full seed stage thereof; and
  - 5.2.4 in the case of a hybrid variety, after the plants of the pollen parent have been removed.
- 5.3 If plants of a hybrid variety have been established on a unit -
  - 5.3.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -
    - 5.3.1.1 the plants of the seed parent are expected to start flowering; and
    - 5.3.1.2 the pollen parent to be removed; and
  - 5.3.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.2.4 has been carried out.

#### 6 Physical requirements

Seed shall -

- 6.1 have a germination percentage of at least 75;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
  - 6.3.1 0,1 percent other seed; and
  - 6.3.2 2,0 percent other material.
  - 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 13

### REQUIREMENTS RELATING TO RESCUE GRASS (*Bromus catharticus* Vahl.)

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
    - 1.1.1 no plants of any species of *Bromus* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or
    - 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed of the same variety, as the case may be.
  - 1.2 A field which is intended for the production of -
    - 1.2.1 pre-basic seed, be registered as a unit for two consecutive growing seasons if breeder seed of the same variety is annually established thereon;
    - 1.2.2 basic seed, be registered as a unit for two consecutive growing seasons if pre-basic seed of the same variety is annually established thereon: Provided that such field may also be registered as a unit if pre-basic seed of the same variety has been produced thereon during the preceding growing season;
    - 1.2.3 certified seed, be registered as a unit for no more than two consecutive growing seasons if basic seed of the same variety is annually established thereon: Provided that such field may also be registered as a unit if basic seed of the same variety has been produced thereon during the preceding growing season.
    - 1.2.4 2<sup>nd</sup> generation certified seed, be registered as a unit for no more than one growing season if 1<sup>st</sup> generation certified seed of the same variety is established thereon: Provided that such field may also be registered as a unit if 1<sup>st</sup> generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
  - 2.1 Seed may be sown or be established in rows on a unit.
  - 2.2 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -
      - 3.1.1.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and
      - 3.1.1.2 is at least 100 metres wide where the area of the unit concerned is more than two hectares; and
    - 3.1.2 in the case of the intended production of certified seed -
      - 3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and
      - 3.1.2.2 is at least 50 metres wide where the area of the unit concerned is more than two hectares.
  - 3.2 Such isolation area shall be free from plants of any *Bromus* which flower at the same time as the plants on the unit concerned, unless -
    - 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
    - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

#### 4 Requirements for plants

4.1 Plants established on a unit may be grazed, provided that the livestock must be timely withdrawn at a stage that will optimize seed production as determined by the breeder of the particular variety

4.2 The number of deviating plants on a unit shall –

4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.2.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

#### 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

#### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 55% or a viability percentage of at least 75%;

6.2 have at least 95,0 percent pure seed;

6.3 not contain more than -

6.3.1 0,5 percent other seed; and

6.3.2 5,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the species being tested.

## ANNEXURE 14

### REQUIREMENTS RELATING TO PIGEON PEA [*Cajanus cajan* (L.) Millsp.]

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any pigeon pea variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of certified basic seed or certified seed of a particular pigeon pea variety may also be registered as a unit, if-

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

#### 2 Planting requirements

Plants shall be established in rows on a unit.

#### 3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, is at least 400 metres wide;

3.1.2 in the case of the intended production of certified seed, is at least 200 metres wide; and

3.2 Such isolation area shall be free from plants of any pigeon pea variety.

- 4 Requirements for plants
  - 4.1 The number of deviating plants on a unit shall -
    - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
    - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 5 Inspection requirements  
Plants which are established on a unit shall be inspected -
  - 5.1 before the flowering stage thereof;
  - 5.2 during the flowering to pod stage thereof; and
  - 5.3 during the full pod stage thereof; and
- 6 Physical requirements  
Seed shall -
  - 6.1 have a germination percentage of at least 70;
  - 6.2 have at least 98,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,05 percent other seed; and
    - 6.3.2 2,0 percent other material.
    - 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.
  - 6.4 Not contain more than 0,2 percent sclerotia of *Sclerotinia sclerotiorum* in a 1000 gram sample.

## ANNEXURE 15

### REQUIREMENTS RELATING TO PAPRIKA, PEPPER & CHILLI (*Capsicum* spp.)

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any *Capsicum* spp. have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
  - 1.2 A field which is intended for the production of basic seed or certified seed of a particular pepper variety may also be registered as a unit, if -
    - 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.
  - 1.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 2 Planting requirements
  - 2.1 Plants shall be established in rows on a unit.
  - 2.2 Gap-filling in rows shall not be permissible.
- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, is at least 100 metres wide; and
    - 3.1.2 in the case of the intended production of certified seed, is at least 10 metres wide.
  - 3.2 Such isolation area shall be free from plants of any *Capsicum* spp.
- 4 Requirements for plants
  - 4.1 The number of deviating plants on a unit shall -
    - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
    - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

- 4.2 A unit on which plants of a sweet pepper variety are established shall be free from plants of hot pepper varieties, and *vice versa*.
- 4.3 The number of plants on a unit contaminated with the pathogen *Corynebacterium michiganense* Smith, Jensen, shall -
- 4.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 2,0 percent; and
- 4.3.2 in the case of the intended production of certified seed, not exceed 5,0 percent.
- 4.4 The number of plants on a unit infected with tobacco mosaic virus shall -
- 4.4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 5,0 percent; and
- 4.4.2 in the case of the intended production of certified seed, not exceed 10,0 percent.
- 4.5 The number of plants on a unit infected with the pathogen *Xanthomonas vesicatoria* (Doidge) Dow, shall -
- 4.5.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 5,0 percent; and
- 4.5.2 in the case of the intended production of certified seed, not exceed 10,0 percent.
- 5 Inspection requirements
- 5.1 Plants which are established on a unit shall be inspected
- 5.1.1 during the seedling stage thereof;
- 5.1.2 during the flowering stage of the plants thereof; and
- 5.1.3 during the full ripe stage of the fruit thereof.
- 5.2 No fruit may be harvested before the inspection referred to in paragraph 5.1 has been carried out.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 75;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 16

### REQUIREMENTS RELATING TO BLUE BUFFALO GRASS (*Cenchrus ciliaris* L.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
- 1.1.1 no plants of any species of *Cenchrus* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or
- 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed, basic seed or certified seed, as the case may be.
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular blue buffalo grass variety may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
- 2.1 Seeds may be sown or be established in rows on a unit.

2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.

3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which is at least five metres wide.

3.2 Such isolation area shall be free from plants of any buffalo grass variety.

4 Requirements for plants

The number of deviating plants on a unit shall -

4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof; and

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

6 Physical requirements

Seed shall -

6.1 have a germination or viability percentage of at least 20;

6.2 in the case of coated seed, have a germination percentage of at least 20;

6.3 have at least 98,0 percent pure seed; and

6.4 not contain more than -

6.4.1 0,1 percent other seed; and

6.4.2 2,0 percent other material.

6.4.3 Notwithstanding the provisions of paragraph 6.4.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 17

### REQUIREMENTS RELATING TO RHODES GRASS (*Chloris gayana* Kunth.)

1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -

1.1.1 no plants of any species of *Chloris* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof; or

1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.

1.2 A field which is intended for the production of basic seed or certified seed of a particular Rhodes grass variety, may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

2 Planting requirements

2.1 Seed shall be sown or be established in rows on a unit.

2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.

- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -
- 3.1.1.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and
- 3.1.1.2 is at least 100 metres wide where the area of the unit concerned is more than two hectares; and
- 3.1.2 in the case of the intended production of certified seed -
- 3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and
- 3.1.2.2 is at least 50 metres wide where the area of the unit concerned is more than two hectares.
- 3.2 Such isolation area shall be free from plants of any Rhodes grass variety which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.
- 3.2.3 in the case of the intended production of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants
- 4.1 The number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and
- 4.1.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.
- 4.2 Plants established on a unit registered for the production of basic seed, may, after the establishment thereof, be used for such purpose for a period of not more than two years.
- 4.3 After the use of plants on a unit for the production of basic seed, these plants can be used for the production of certified seed provided the unit has been registered for the production of certified seed.
- 4.4 Plants established on a unit for the intended production of certified seed -
- 4.4.1 may be used for this purpose for a period of not more than four years; and
- 4.4.2 may, with the written approval from the Authority, be used for that purpose for a further period of two years.
- 5 Inspection requirements
- Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof;
- 5.2 during the flowering stage thereof; and
- 5.3 during the full seed stage thereof.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination or a viability percentage of at least 20, or in the case where the weighted replicate method of analysis is being used, have a germination of at least 800,000 normal seedlings per weight (kg); and
- 6.2 in the case of coated seed, a germination or a viability percentage of at least 20 percent;
- 6.3 have at least 90,0 percent pure seed; and
- 6.4 not contain more than -
- 6.4.1 0,5 percent other seed;
- 6.4.2 10,0 percent other material; and in the case of coated seeds, 2,0 percent other material; and
- 6.4.3 0,2 percent seed of deviating plants.
- 6.4.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

**ANNEXURE 18****REQUIREMENTS RELATING TO WATERMELON [*Citrullus lanatus* (Thunb.) Matsumura. et Nakai]****1 Field requirements**

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Citrullus* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular watermelon variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season

**2 Planting requirements**

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

**3 Isolation requirements**

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, is at least 2 000 metres wide; and

3.1.2 in the case of the intended production of certified seed, is at least 1 000 metres wide.

3.2 Such isolation area shall be free from plants of any watermelon variety or species of *Citrullus* which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

**4 Requirements for plants**

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 The number of disease-infected plants on a unit shall-

4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent; and

4.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent.

4.3 For the purposes of paragraph 4.2 "disease-infected plants" shall mean plants showing virus symptoms visually.

**5 Inspection requirements**

5.1 Seedlings shall be inspected before they are established on a unit.

5.2 Plants which are established on a unit from such seedlings shall be inspected -

5.2.1 during the green fruit stage thereof; and

5.2.2 during the full ripe stage of the fruit thereof.

5.3 No fruit may be harvested before the inspection referred to in paragraph 5.2.2 has been carried out.

**6 Physical requirements**

Seed shall -

6.1 have a germination percentage of at least 75;

6.2 have at least 98,0 percent pure seed; and

- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed;
- 6.3.2 0,1 percent seed of deviating plants or fruit; and
- 6.3.3 2,0 percent other material.
- 6.3.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 19

### REQUIREMENTS RELATING TO CORIANDER (*Coriandrum sativum* L.)

#### 1 Field requirements

A field may be registered as a unit with a view to the production of certified pre-basic seed, basic seed or certified seed only if no plants of any coriander variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

#### 2 Planting requirements

- 2.1 Plants shall be established in rows on a unit.
- 2.2 Gap-filling in rows shall not be permissible.
- 2.3 In the case of the intended production of seed of a hybrid variety -
- 2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and
- 2.3.2 rows containing plants of the pollen parent shall be clearly marked.

#### 3 Isolation requirements

- 3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic and basic seed of -
- 3.1.1.1 an open-pollinated variety, is at least 2 000 metres wide; and
- 3.1.1.2 a hybrid variety, is at least 3 000 metres wide; and
- 3.1.2 in the case of the intended production of certified seed -
- 3.1.2.1 of an open-pollinated variety, is at least 1 000 metres wide; and
- 3.1.2.2 of a hybrid variety, is at least 1 500 metres wide.
- 3.2 Such isolation area shall be free from plants of any carrot variety which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
- 3.3.1 a common pollen parent is used; and
- 3.3.2 a distance of a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

#### 4 Requirements for plants

- 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
- 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
- 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and

4.2.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.

4.2.2 the number of deviating plants of the seed parent on a unit shall -

4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and

4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and

4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall –

4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent;

4.2.3.2 in the case of the intended production of certified seed, not exceed 2,0 percent of the plants of the seed parent.

## 5 Inspection requirements

5.1 Seedlings shall be inspected before they are established on a unit.

5.2 Plants which are established on a unit from such seedlings shall be inspected -

5.2.1 during the flowering stage thereof;

5.2.2 during the full seed stage thereof; and

5.2.3 in the case of a hybrid variety, after the seed heads of the plants of the pollen parent have been removed.

5.3 If plants of a hybrid variety have been established on a unit -

5.3.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -

5.3.1.1 the plants of the seed parent are expected to start flowering; and

5.3.1.2 the seed heads of the pollen parent are to be removed; and

5.3.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.2.3 has been carried out.

## 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 75;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed;

6.3.2 1,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 20

### REQUIREMENTS RELATING TO SWEET MELON (*Cucumis melo* L.)

#### 1 Field Requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Cucumis* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular sweet melon variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season

- 2 Planting requirements
  - 2.1 Plants shall be established in rows on a unit.
  - 2.2 Gap-filling in rows shall not be permissible.
  
- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, is at least 2 000 metres wide; and
    - 3.1.2 in the case of the intended production of certified seed, is at least 1 000 metres wide.
  - 3.2 Such isolation area shall be free from plants of any sweet melon variety or species of *Cucumis* which flower at the same time as the plants on the unit concerned, unless -
    - 3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and
    - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
    - 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
  
- 4 Requirements for plants

The number of deviating plants on a unit shall -

  - 4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
  - 4.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
  
- 5 Inspection requirements
  - 5.1 Seedlings shall be inspected before they are established on a unit.
  - 5.2 Plants which are established on a unit from such seedlings shall be inspected -
    - 5.2.1 during the green fruit stage thereof; and
    - 5.2.2 during the full ripe stage of the fruit thereof;
  - 5.3 No fruit may be harvested before the inspection referred to in paragraph 5.2.2 has been carried out.
  
- 6 Physical requirements

Seed shall -

  - 6.1 have a germination percentage of at least 75;
  - 6.2 have at least 98,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,1 percent other seed; and
    - 6.3.2 2,0 percent other material.
  - 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 21

### REQUIREMENTS RELATING TO CUCUMBER (*Cucumis sativus* L.)

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Cucumis* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
  - 1.2 A field which is intended for the production of basic seed or certified seed of a particular cucumber variety may also be registered as a unit, if -
    - 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season

2 Planting requirements

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, is at least 2 000 metres wide; and

3.1.2 the case of the intended production of certified seed, is at least 1 000 metres wide.

3.2 Such isolation area shall be free from plants of any cucumber variety or species of *Cucumis* which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

4 Requirements for plants

The number of deviating plants on a unit shall -

4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

5 Inspection requirements

5.1 Seedlings shall be inspected before they are established on a unit.

5.2 Plants which are established on a unit from such seedlings shall be inspected -

5.2.1 during the green fruit stage thereof; and

5.2.2 during the full ripe stage of the fruit thereof;

5.3 No fruit may be harvested before the inspection referred to in paragraph 5.2.2 has been carried out.

6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 75;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 22

### REQUIREMENTS RELATING TO PUMPKIN & SQUASH [*Cucurbita maxima* Duchesne, *C. moshata* (Duchesne) Duchesne ex Poir & *C. pepo* L.]

1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Cucurbita* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular pumpkin or squash variety may also be registered as a unit, if -

- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

## 2 Planting requirements

Plants shall be established in rows on a unit.

## 3 Isolation requirements

3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic and basic seed of -

3.1.1.1 an open-pollinated variety, is at least 2 000 metres wide; and

3.1.1.2 a hybrid variety, is at least 3 000 metres wide; and

3.1.2 in the case of the intended production of certified seed -

3.1.2.1 of an open-pollinated variety, is at least 1 000 metres wide; and

3.1.2.2 of a hybrid variety, is at least 2 000 metres wide.

3.2 Such isolation area shall be free from plants of any pumpkin or squash variety or species of *Cucurbita* which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -

3.3.1 a common pollen parent is used; and

3.3.2 a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

3.4 In the case of the production of certified seed of all generations of *Cucurbita maxima* and *C. pepo* an isolation distance of 5 metre must be maintained between varieties and species.

## 4 Requirements for plants

4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 If male sterility is used in the seed parent of a hybrid variety -

4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -

4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and

4.2.1.2 in the case of the intended production of certified seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.

4.2.2 the number of deviating plants of the seed parent on a unit shall -

4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the seed parent; and

4.2.2.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the seed parent; and

4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -

4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the seed parent;

4.2.3.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the seed parent.

- 5 Inspection requirements
- 5.1 Seedlings shall be inspected before they are established on a unit.
- 5.2 Plants which are established on a unit from such seedlings shall be inspected -
- 5.2.1 during the green fruit stage thereof; and
- 5.2.2 during the full ripe stage of the fruit thereof;
- 5.2.3 in the case of a hybrid variety, after the fruit of the plants of the pollen parent have been removed.
- 5.3 If plants of a hybrid variety have been established on a unit -
- 5.3.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -
- 5.3.1.1 the plants of the seed parent are expected to start flowering; and
- 5.3.1.2 the fruit of the pollen parent are to be removed; and
- 5.3.2 the fruit of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.2.3 has been carried out.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 75;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 23

### REQUIREMENTS RELATING TO COCKSFOOT (*Dactylis glomerata* L.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
- 1.1.1 no plants of any species of *Dactylis* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or
- 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular cocksfoot variety may also be registered as a unit if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season
- 2 Planting requirements
- 2.1 Seed shall be sown or be established in rows on a unit.
- 2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area, which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -
- 3.1.1.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and
- 3.1.1.2 is at least 100 metres wide where the area of the unit concerned exceeds two hectares; and
- 3.1.2 in the case of the intended production of certified seed -
- 3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and

- 3.1.2.2 is at least 50 metres wide where the area of the unit concerned exceeds two hectares.
- 3.2 Such isolation area shall be free from plants of any cocksfoot variety which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants
- 4.1 Plants which are established on a unit may annually be grazed after the removal of the seed crop until October 15 of the following growing season.
- 4.2 The number of deviating plants on a unit shall -
- 4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and
- 4.2.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.
- 5 Inspection requirements
- Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof; and
- 5.2 during the flowering stage thereof; and
- 5.3 during the full seed stage thereof.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 70;
- 6.2 have at least 95,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed;
- 6.3.2 5,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## **ANNEXURE 24**

### **REQUIREMENTS RELATING TO CARROT (*Daucus carota* L.)**

- 1 Field requirements
- A field may be registered as a unit with a view to the production of certified pre-basic seed, basic seed or certified seed only if no plants of any carrot variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 2 Planting requirements
- 2.1 Plants shall be established in rows on a unit.
- 2.2 Gap-filling in rows shall not be permissible.
- 2.3 In the case of the intended production of seed of a hybrid variety -
- 2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and
- 2.3.2 rows containing plants of the pollen parent shall be clearly marked.
- 3 Isolation requirements
- 3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed of -
- 3.1.1.1 an open-pollinated variety, is at least 2 000 metres wide; and

- 3.1.1.2 a hybrid variety, is at least 3 000 metres wide; and
- 3.1.2 in the case of the intended production of certified seed of -
  - 3.1.2.1 an open-pollinated variety, is at least 1 000 metres wide; and
  - 3.1.2.2 a hybrid variety, is at least 1 500 metres wide.
- 3.2 Such isolation area shall be free from plants of any carrot variety which flower at the same time as the plants on the unit concerned, unless -
  - 3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and
  - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
  - 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
  - 3.3.1 a common pollen parent is used; and
  - 3.3.2 a distance of a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

#### 4 Requirements for plants

- 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -
  - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
  - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
  - 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
    - 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and
    - 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.
  - 4.2.2 the number of deviating plants of the seed parent on a unit shall -
    - 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and
    - 4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and
  - 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
    - 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and
    - 4.2.3.2 in the case of the intended production of certified seed, not exceed 2,0 percent of the plants of the seed parent.

#### 5 Inspection requirements

- 5.1 Sticklings (immature carrots) shall be inspected before they are established on a unit.
- 5.2 Plants which are established on a unit from such carrots shall be inspected -
  - 5.2.1 during the flowering stage thereof;
  - 5.2.2 during the full seed stage thereof; and
  - 5.2.3 in the case of a hybrid variety, after the seed heads of the plants of the pollen parent have been removed.
- 5.3 If plants of a hybrid variety have been established on a unit -
  - 5.3.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -
    - 5.3.1.1 the plants of the seed parent are expected to start flowering; and
    - 5.3.1.2 the seed heads of the pollen parent are to be removed; and
  - 5.3.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.2.3 has been carried out.

#### 6 Physical requirements

- Seed shall -
  - 6.1 have a germination percentage of at least 75;
  - 6.2 have at least 98,0 percent pure seed; and

- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed;
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 25

### REQUIREMENTS RELATING TO SMUTS FINGER GRASS (*Digitaria eriantha* Steud.)

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
    - 1.1.1 no plants of any species of *Digitaria* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or
    - 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.
  - 1.2 A field which is intended for the production of basic seed or certified seed of a particular Smuts Finger grass variety may also be registered as a unit if -
    - 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
  - 2.1 Seed shall be sown or be established in rows on a unit.
  - 2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -
      - 3.1.1.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and
      - 3.1.1.2 is at least 100 metres wide where the area of the unit concerned exceeds two hectares; and
    - 3.1.2 in the case of the intended production of certified seed -
      - 3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and
      - 3.1.2.2 is at least 50 metres wide where the area of the unit concerned exceeds two hectares.
  - 3.2 Such isolation area shall be free from plants of any Smuts Finger grass variety which flower at the same time as the plants on the unit concerned, unless -
    - 3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and
    - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
    - 3.2.3 in the case of the intended production of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants
  - 4.1 The number of deviating plants on a unit shall -
    - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and
    - 4.1.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.
  - 4.2 Plants established on a unit registered for the production of certified pre-basic seed or basic seed, may, after the establishment thereof, be used for such purpose for a period of not more than two years.

4.3 After the use of plants on a unit for the production of certified pre-basic seed or basic seed, these plants can be used for the production of certified seed provided the unit has been registered for the production of certified seed.

4.4 Plants established on a unit for the production of certified seed -

4.4.1 may be used for this purpose for a period of not more than four years; and

4.4.2 may, with the written approval from the Authority, be used for that purpose for a further period of two years.

5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof; and

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 15;

6.2 in the case of coated seed, have a germination percentage of at least 20;

6.2 have at least 94,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed;

6.3.2 6,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 26

### REQUIREMENTS RELATING TO JAPANESE MILLET [*Echinochloa crus-galli* (L.) P. Beauv.]

1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Echinochloa* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular Japanese Millet variety may also be registered as a unit, if

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

2 Planting requirements

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

2.3 In the case of the intended production of seed of a hybrid variety -

2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and

2.3.2 rows containing plants of the pollen parent shall be clearly marked.

3 Isolation requirements

3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic and basic seed of -

3.1.1.1 an open-pollinated variety, is at least 400 metres wide; and

3.1.1.2 a hybrid variety, is at least 500 metres wide; and

- 3.1.2 in the case of the intended production of certified seed -
  - 3.1.2.1 of an open-pollinated variety, is at least 350 metres wide; and
  - 3.1.2.2 of a hybrid variety, is at least 500 metres wide.
- 3.2 Such isolation area shall be free from plants of any Japanese Millet variety or species of *Echinochloa* which flower at the same time as the plants on the unit concerned, unless -
  - 3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and
  - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
  - 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
  - 3.3.1 a common pollen parent is used; and
  - 3.3.2 a distance of a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

#### 4 Requirements for plants

- 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -
  - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
  - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
  - 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
    - 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and
    - 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.
  - 4.2.2 the number of deviating plants of the seed parent on a unit shall -
    - 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the seed parent; and
    - 4.2.2.2 in the case of the intended production of certified seed, not exceed 0,3 percent of the plants of the seed parent; and
  - 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
    - 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent at the stage at which 20,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate number of plants with pollen-shedding flowers found during consecutive inspections shall not exceed 0,5 percent of the plants of the seed parent; and
    - 4.2.3.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent at the stage at which 30,0 percent or more of the plants of the seed parent has pollen-susceptible flowers.

#### 5 Inspection requirements

- 5.1 Plants which are established on a unit shall be inspected -
  - 5.1.1 before the flowering stage thereof;
  - 5.1.2 during the flowering stage thereof;
  - 5.1.3 during the full seed stage thereof; and
  - 5.1.4 in the case of a hybrid variety, after the seed heads of the plants of the pollen parent have been removed.
- 5.2 If plants of a hybrid variety have been established on a unit -
  - 5.2.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -
    - 5.2.1.1 the plants of the seed parent are expected to start flowering; and
    - 5.2.1.2 the seed heads of the pollen parent are to be removed; and
  - 5.2.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.1.4 has been carried out.

- 6 Physical requirements  
Seed shall -
- 6.1 have a germination percentage of at least 80;
  - 6.2 have at least 96,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,1 percent other seed; and
    - 6.3.2 4,0 percent other material.
    - 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 27

### REQUIREMENTS RELATING TO FINGER MILLET [*Eleusine corocana* L. Gaertn.]]

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Eleusine* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
  - 1.2 A field which is intended for the production of basic seed or certified seed of a particular finger millet variety may also be registered as a unit, if -
    - 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
- 2.1 Plants shall be established in rows on a unit.
  - 2.2 Gap-filling in rows shall not be permissible.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which is at least five metres wide.
  - 3.2 Such isolation area shall be free from plants of any finger millet variety or species of *Eleusine* which flower at the same time as the plants on the unit concerned.
- 4 Requirements for plants
- 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -
    - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
    - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 5 Inspection requirements
- 5.1 Plants which are established on a unit shall be inspected -
    - 5.1.1 before the flowering stage thereof;
    - 5.1.2 during the flowering stage thereof; and
    - 5.1.3 during the full seed stage thereof.
- 6 Physical requirements  
Seed shall -
- 6.1 have a germination percentage of at least 80;
  - 6.2 have at least 97,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,1 percent other seed; and
    - 6.3.2 3,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 28

### REQUIREMENTS RELATING TO WEEPING LOVE GRASS [*Eragrostis curvula* (Schrad.) Nees]

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -

1.1.1 no plants of any species of *Eragrostis* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or

1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.

1.2 A field which is intended for the production of basic seed or certified seed of a particular weeping love grass variety may also be registered as a unit if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season

#### 2 Planting requirements

2.1 Seed shall be sown or be established in rows on a unit.

2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.

#### 3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which is at least five metres wide.

3.2 Such isolation area shall be free from plants of any weeping love grass variety.

#### 4 Requirements for plants

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.1.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

4.2 Plants established on a unit registered for the production of certified pre-basic seed or basic seed, may, after the establishment thereof, be used for such purpose for a period of not more than two years.

4.3 After the use of plants on a unit for the production of certified pre-basic seed or basic seed, these plants can be used for the production of certified seed provided the unit has been registered for the production of certified seed.

4.4 Plants established on a unit for the production of certified seed -

4.4.1 may be used for this purpose for a period of not more than four years; and

4.4.2 may, with the written approval from the Authority, be used for that purpose for a further period of two years.

#### 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof; and

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

#### 6 Physical requirements

Seed shall -

- 6.1 have a germination percentage of at least 70;
- 6.2 have at least 97,0 percent pure seed; and
- 6.3 not contain more than -
  - 6.3.1 0,5 percent other seed, of which maximum of 0,3 percent may be weed seed;
  - 6.3.2 0,2 percent nematode galls; and
  - 6.3.3 3,0 percent other material.
- 6.4 Notwithstanding the provisions of paragraph 6.3.1 -
  - 6.4.1 the percentage seed of *Eragrostis tef* (Zucc.) Trotter in seed shall -
    - 6.4.1.1 in the case of certified pre-basic seed or basic seed, not exceed 0,1 percent; and
    - 6.4.1.2 in the case of certified seed, not exceed 0,2 percent; and
  - 6.4.2 the percentage seed of *E. plana* Nees in seed of all generations not exceed 0,1 percent; and
  - 6.4.3 not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 29

### REQUIREMENTS RELATING TO TEFF [*Eragrostis tef* (Zuccagni) Trotter]

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
    - 1.1.1 no plants of any species of *Eragrostis* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or
    - 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic or basic seed or certified seed, as the case may be.
  - 1.2 A field which is intended for the production of seed of a *Eragrostis tef* variety may -
    - 1.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not be registered as a unit for more than two consecutive growing seasons if certified breeder seed or certified pre-basic seed, whichever the case may be, of the same variety is annually established thereon; and
    - 1.2.2 in the case of the intended production of certified seed, not be registered as a unit for more than four consecutive growing seasons if basic seed of the same variety is annually established thereon: Provided that such field may also be registered as a unit if certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
  - 2.1 Seed may be sown or be established in rows on a unit.
  - 2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which is at least five metres wide.
  - 3.2 Such isolation area shall be free from plants of any *Eragrostis tef* variety.
- 4 Requirements for plants
  - The number of deviating plants on a unit shall -
    - 4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and
    - 4.2 in the case of the intended production of certified seed, not exceed one plant per 15 square metres.
- 5 Inspection requirements
  - Plants which are established on a unit shall be inspected -
    - 5.1 before the flowering stage thereof;
    - 5.2 during the flowering stage thereof; and
    - 5.3 during the full seed stage thereof.

- 6 Physical requirements  
Seed shall -
- 6.1 have a germination percentage of at least 70.
  - 6.2 have at least 97,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,5 percent other seed, of which not more than 0,3 percent may be weed seed;
    - 6.3.2 3,0 percent other material; and
    - 6.3.3 0,2 percent nematode galls.
  - 6.4 Notwithstanding the provisions of paragraph 6.3.1 -
    - 6.4.1 the percentage seed of *Eragrostis curvula* (Schrad.) Nees in seed shall -
      - 6.4.1.1 in the case of certified pre-basic or basic seed, not exceed 0,1 percent; and
      - 6.4.1.2 in the case of certified seed, not exceed 0,2 percent; and
    - 6.4.2 the percentage seed of *E. plana* Nees in seed of all generations not exceed 0,1 percent; and
    - 6.4.3 not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 30

### REQUIREMENTS RELATING TO BUCKWHEAT (*Fagopyrum esculentum* Moench)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any specie of *Fagopyrum* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
  - 1.2 A field which is intended for the production of basic seed or certified seed of a particular buckwheat variety may also be registered as a unit, if -
    - 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.
    - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
- 2.1 Seed shall be sown or be established in rows on a unit.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed is at least 500 metres wide; and
    - 3.1.2 in the case of the intended production of certified seed is at least 300 metres wide.
  - 3.2 Such isolation area shall be free from plants of any buckwheat variety which flower at the same time as the plants on the unit concerned.
- 4 Requirements for plants
- 4.1 The number of deviating plants on a unit shall -
    - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent; and
    - 4.1.2 in the case of the intended production of certified seed, not exceed 0,3 percent.
  - 4.2 Methods for the determination of deviating plants shall be as determined by the Authority.
- 5 Inspection requirements
- Plants which are established on a unit shall be inspected -
- 5.1 during the stooling stage thereof;
  - 5.2 during the flowering stage thereof; and
  - 5.3 during the full seed stage thereof.

- 6 Physical requirements  
Seed shall -
- 6.1 have a germination percentage of at least 75;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,5 percent other seed, but not more than 0,2 percent weed seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 31

### REQUIREMENTS RELATING TO TALL FESCUE & FESTULOLIUM (*Festuca arundinacea* Schreb. & *xFestulolium* Asch. & Graebn.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
- 1.1.1 no plants of any species of *Lolium*, *Festuca* and *xFestulolium* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or
- 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular tall fescue or of *Festulolium* variety may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
- 2.1 Seed may be sown or be established in rows on a unit.
- 2.2 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -
- 3.1.1.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and
- 3.1.1.2 is at least 100 metres wide where the area of the unit concerned is more than two hectares; and
- 3.1.2 in the case of the intended production of certified seed -
- 3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and
- 3.1.2.2 is at least 50 metres wide where the area of the unit concerned is more than two hectares.
- 3.2 Such isolation area shall be free from plants of any *Festuca*, *Lolium* and *xFestulolium* variety which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

- 4 Requirements for plants
- 4.1 Plants which are established on a unit may annually be grazed after the removal of the seed crop until October 15 of the following growing season.
- 4.2 The number of deviating plants on a unit shall –
- 4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and
- 4.2.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.
- 5 Inspection requirements
- Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof;
- 5.2 during the flowering stage thereof; and
- 5.3 during the full seed stage thereof.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 75;
- 6.2 have at least 96,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,5 percent other seed, but not more than 0,2 percent weed seed; and
- 6.3.2 4,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 32

### REQUIREMENTS RELATING TO FENNEL (*Foeniculum vulgare* Mill.)

- 1 Field requirements
- A field may be registered as a unit with a view to the production of certified pre-basic seed, basic seed or certified seed only if no plants of any fennel variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 2 Planting requirements
- 2.1 Plants shall be established in rows on a unit.
- 2.2 Gap-filling in rows shall not be permissible.
- 2.3 In the case of the intended production of seed of a hybrid variety -
- 2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and
- 2.3.2 rows containing plants of the pollen parent shall be clearly marked.
- 3 Isolation requirements
- 3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed and basic seed of -
- 3.1.1.1 an open-pollinated variety, is at least 2 000 metres wide; and
- 3.1.1.2 a hybrid variety, is at least 3 000 metres wide; and
- 3.1.2 in the case of the intended production of certified seed -
- 3.1.2.1 of an open-pollinated variety, is at least 1 000 metres wide; and
- 3.1.2.2 of a hybrid variety, is at least 1 500 metres wide.
- 3.2 Such isolation area shall be free from plants of any fennel variety which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of certified basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -

3.3.1 a common pollen parent is used; and

3.3.2 a distance of a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

#### 4 Requirements for plants

4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 If male sterility is used in the seed parent of a hybrid variety -

4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -

4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and

4.2.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.

4.2.2 the number of deviating plants of the seed parent on a unit shall -

4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and

4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and

4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -

4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent;

4.2.3.2 in the case of the intended production of certified seed, not exceed 2,0 percent of the plants of the seed parent.

#### 5 Inspection requirements

5.1 Seedlings shall be inspected before they are established on a unit.

5.2 Plants which are established on a unit from such seedlings shall be inspected -

5.2.1 during the flowering stage thereof;

5.2.2 during the full seed stage thereof; and

5.2.3 in the case of a hybrid variety, after the seed heads of the plants of the pollen parent have been removed.

5.3 If plants of a hybrid variety have been established on a unit -

5.3.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -

5.3.1.1 the plants of the seed parent are expected to start flowering; and

5.3.1.2 the seed heads of the pollen parent are to be removed; and

5.3.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.3.1 has been carried out.

#### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 75;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed;

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

**ANNEXURE 33****REQUIREMENTS RELATING TO SOYA BEAN [*Glycine max* (L.) Merrill]**

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
    - 1.1.1 no plants of any soya bean variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
  - 1.2 A field which is intended for the production of basic seed or certified seed of a particular soya bean variety may also be registered as a unit if -
    - 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season
- 2 Planting requirements
  - 2.1 Seed shall be established in rows on a unit.
  - 2.2 Gap-filling in rows shall not be permissible.
- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which is at least five metres wide
  - 3.2 Such isolation area shall be free from plants of any soya bean variety.
- 4 Requirements for plants

The number of deviating plants on a unit shall -

  - 4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
  - 4.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 5 Inspection requirements

Plants which are established on a unit shall be inspected -

  - 5.1 before the flowering stage thereof; and
  - 5.2 during the flowering stage thereof; and
  - 5.3 during the full seed stage thereof.
- 6 Physical requirements

Seed shall -

  - 6.1 have a germination percentage of at least 70;
  - 6.2 have at least 98,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,1 percent other seed;
    - 6.3.2 0,2 percent seed of deviating plants;
    - 6.3.3 2,0 percent other material;
    - 6.3.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and
  - 6.4 not contain more than 0,2 percent sclerotia of *Sclerotinia sclerotiorum* in a 1000 gram sample.

**ANNEXURE 34****REQUIREMENTS RELATING TO COTTON  
(*Gossypium hirsutum* L.) & (*G. hirsutum* x *G. barbadense*)**

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -

- 1.1.1 no plants of any cotton variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 1.2 A field which is intended for the production of basic seed or certified seed of an open-pollinated cotton variety may also be registered as a unit if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season
- 2 Planting requirements
- 2.1 Plants shall be established in rows on a unit.
- 2.2 Gap-filling in rows shall not be permissible.
- 2.3 In the case of the intended production of seed of a hybrid variety -
- 2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and
- 2.3.2 rows containing plants of the pollen parent shall be clearly marked.
- 3 Isolation requirements
- 3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of a pre-basic and basic seed of -
- 3.1.1.1 *G. hirsutum* is at least 100 metres wide;
- 3.1.1.2 *G. barbadense* is at least 200 metres wide;
- 3.1.1.3 *G. hirsutum* x *G. barbadense* is at least 200 metres wide;
- 3.1.2.3 a hybrid when a CMS is used which is intended for the use as a parent for the production of a hybrid, is at least 800 metres wide;
- 3.1.2 in the case of the intended production of certified seed of -
- 3.1.2.1 an open-pollinated variety, is at least 100 metres wide; and
- 3.1.2.2 a hybrid variety where a cytoplasmic male sterile (CMS) line is not used; -
- 3.1.2.2.1 *G. hirsutum* is at least 100 metres wide;
- 3.1.2.2.2 *G. barbadense* and *G. hirsutum* x *G. barbadense* is at least 150 metres wide;
- 3.1.2.3 a hybrid when a CMS is used, is at least 800 metres wide;
- 3.2 Such isolation area shall be free from plants of any cotton variety or species of *Gossypium* which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of basic seed of an open-pollinated variety, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed of an open-pollinated variety, they have been established from certified pre-basic seed or basic seed of the same variety; and
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
- 3.3.1 a common pollen parent is used; and
- 3.3.2 a distance of a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.
- 4 Requirements for plants
- 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
- 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
- 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and
- 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.

- 4.2.2 the number of deviating plants of the seed parent on a unit shall -
- 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,01 percent of the plants of the seed parent; and
- 4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and
- 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
- 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the seed parent at the stage at which 20,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate number of plants with pollen-shedding flowers found during consecutive inspections shall not exceed 0,2 percent of the plants of the seed parent; and
- 4.2.3.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the seed parent at the stage at which 30,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate of the number of plants with pollen-shedding flowers found during consecutive inspections shall not exceed 0,75 percent of the plants of the seed parent.

## 5 Inspection requirements

- 5.1 Plants which are established on a unit shall be inspected -
- 5.1.1 before the flowering stage thereof;
- 5.1.2 during the flowering stage thereof;
- 5.1.3 after the first bolls thereof are open; and
- 5.1.4 in the case of a hybrid variety, after the plants of the pollen parent have been removed.
- 5.2 If plants of a hybrid variety have been established on a unit -
- 5.2.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -
- 5.2.1.1 the plants of the seed parent are expected to start flowering; and
- 5.2.1.2 the plants of the pollen parent are to be removed; and
- 5.2.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.1.4 has been carried out.

## 6 Physical requirements

- Seed shall be delinted and -
- 6.1 have a germination percentage of at least 75;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed; and
- 6.3.2 2,0 percent other material;
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.
- 6.4 Seed shall be treated against seed-borne diseases with a chemical remedy, which is registered for this purpose.

## ANNEXURE 35

### REQUIREMENTS RELATING TO SUNFLOWER (*Helianthus annuus* L.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
- 1.1.1 no plants of any species of *Helianthus* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 1.2 In the case of an open-pollinated sunflower variety only: A field which is intended for the production of basic seed or certified seed of a particular sunflower variety may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season

## 2 Planting requirements

- 2.1 Plants shall be established in rows on a unit.
- 2.2 Gap-filling in rows shall not be permissible.
- 2.3 In the case of the intended production of seed of a hybrid variety -
- 2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and
- 2.3.2 rows containing plants of the pollen parent shall be clearly marked.

## 3 Isolation requirements

- 3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic and basic seed of -
- 3.1.1.1 an open-pollinated variety, is at least 1 500 metres wide; and
- 3.1.1.2 a hybrid variety, is at least 3 000 metres wide; and
- 3.1.2 in the case of the intended production of certified seed -
- 3.1.2.1 of an open-pollinated variety, is at least 500 metres wide; and
- 3.1.2.2 of a hybrid variety, is at least 1 000 metres wide.
- 3.2 Such isolation area shall be free from plants of any sunflower variety or species of *Helianthus* which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of certified basic seed of an open-pollinated variety, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed of an open-pollinated variety, they have been established from certified pre-basic seed or basic seed of the same variety; and
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
- 3.3.1 a common pollen parent is used; and
- 3.3.2 a distance of at least five metres wide, which is free from plants of the seed parent concerned, is maintained between the units concerned.

## 4 Requirements for plants

- 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
- 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
- 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which 2,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and
- 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.
- 4.2.2 the number of deviating plants of the seed parent on a unit shall -
- 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the seed parent; and
- 4.2.2.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the seed parent; and
- 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
- 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the seed parent at the stage at which 2,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate number of plants with pollen-shedding flowers found during consecutive inspections shall not exceed 0,2 percent of the plants of the seed parent; and

4.2.3.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the seed parent at the stage at which 5,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate of the number of pollen-shedding flowers found during inspections shall not for the three inspections showing the highest incidence of such plants, exceed 0,5 percent of the plants of the seed parent.

4.3 The number of disease-infected plants on a unit shall -

4.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 1,0 percent; and

4.3.2 in the case of the intended production of certified seed, not exceed 3,0 percent.

4.4 For the purposes of paragraph 4.3 "disease-infected plants" shall mean plants which are not visually free from *Verticillium* wilt disease.

## 5 Inspection requirements

5.1 Plants which are established on a unit shall be inspected -

5.1.1 before the flowering stage thereof;

5.1.2 during the flowering stage thereof;

5.1.3 during the full seed stage thereof; and

5.1.4 in the case of a hybrid variety, after the seed heads of plants of the pollen parent have been removed.

5.2 If plants of a hybrid variety have been established on a unit-

5.2.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -

5.2.1.1 the plants of the seed parent are expected to start flowering; and

5.2.1.2 the seed heads of the pollen parent are to be removed; and

5.2.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.1.4 has been carried out.

## 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 80;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed; and

6.3.2 2,0 percent other material; and

6.3.3 0,2 percent seed of deviating plants; and

6.3.4 1,0 percent seed without a seed coat.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and

6.4 not contain more than 0,2 percent sclerotia of *Sclerotinia sclerotiorum* in a 1000 gram sample.

## ANNEXURE 36

### REQUIREMENTS RELATING TO BARLEY (*Hordeum vulgare* L. subsp. *vulgare*)

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Hordeum* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular barley variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

- 2 Planting requirements  
Seed may be sown or be established in rows on a unit.
- 3 Isolation requirements
  - 3.1 The isolation area surrounding a unit shall be at least 5 meters wide.
  - 3.2 Such isolation area shall be free from plants of any barley species.
- 4 Requirements for plants
  - 4.1 The number of deviating plants on a unit shall -
    - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
    - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
  - 4.2 Methods for determination of deviating plants shall be as determined by the Authority.
- 5 Inspection requirements  
Plants which are established on a unit shall be inspected -
  - 5.1 before the booting stage thereof;
  - 5.2 during the flowering stage thereof; and
  - 5.3 during the ripening thereof.
- 6 Physical requirements  
Seed shall -
  - 6.1 have a germination percentage of at least 80.
  - 6.2 have at least 99,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,3 percent other seed, of which not more than 0,02 percent weed seed; and
    - 6.3.2 1,0 percent other material.
  - 6.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of wild oats may occur in a 400 g seed sample, and not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 37

### REQUIREMENTS RELATING TO COMMON & CHINESE LESPEDEZA [(*Kummerowia striata* (Thunb.) Schindl. [syn. *Lespedeza striata* (Thunb.) Hook. & Arn.] & [*Lespedeza cuneata* (Dum. Cours.) G. Don]

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
    - 1.1.1 no plants of any species of *Kummerowia* or *Lespedeza* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof; or
    - 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.
  - 1.2 A field which is intended for the production of seed of a particular *Kummerowia* or *Lespedeza* variety may -
    - 1.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not be registered as a unit for more than three consecutive growing seasons; and
    - 1.2.2 in the case of the intended production of certified seed, may also be registered for a further three seasons as a unit.
    - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
  - 1.3 Any further registrations will only be considered with written approval from the Authority.
- 2 Planting requirements
  - 2.1 Seed shall be sown or be established in rows on a unit.

2.2 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.

### 3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -

3.1.1.1 at least 200 metres wide where the area of the unit concerned is two hectares or less; and

3.1.1.2 at least 100 metres wide where the area of the unit concerned exceeds two hectares; and

3.1.2 in the case of the intended production of certified seed -

3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and

3.1.2.2 is at least 50 metres wide where the area of the unit concerned exceeds two hectares.

3.2 Such isolation area shall be free from plants of any *Lespedeza* variety or species of *Lespedeza* or *Kummerowia* or which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

### 4 Requirements for plants

4.1 Plants which are established on a unit may -

4.1.1 if such unit is registered for the production of basic seed, be used for such purpose for a period of not more than two years after the year of establishment thereof, and may thereafter for a further period of not more than three years be used for the production of certified seed if the unit concerned is registered for this purpose;

4.1.2 if such a unit is registered for the production of certified seed, be used for such purpose for a period of not more than three years after the year of establishment thereof;

4.2 The number of deviating plants on a unit shall -

4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.2.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.3 No plants of dodder (*Cuscuta* spp.) may occur on a unit.

4.4 Methods for determination of deviating plants on a unit shall be as determined by the Authority.

### 5 Inspection requirements

5.1 Plants which are established on a unit shall be inspected -

5.1.1 before the flowering stage thereof;

5.1.2 during the flowering stage thereof; and

5.1.3 during the full seed stage thereof.

5.2 A seed grower shall notify the authorised person at least 14 days prior to the date on which plants are expected to start flowering.

### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 70; of which a maximum of 50 percent hard seeds may be counted as germinated seeds;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,2 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the species being tested

**ANNEXURE 38****REQUIREMENTS RELATING TO LETTUCE (*Lactuca sativa* L.)****1 Field requirements**

Any field may be registered as a unit if no lettuce-related plants were cultivated there during the preceding two growing seasons.

**2 Planting requirements**

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

**3 Isolation requirements**

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, is at least 100 metres wide; and

3.1.2 in the case of the intended production of certified seed, is at least 50 metres wide.

3.2 Such isolation area shall be free from plants of any lettuce variety which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

**4 Requirements for plants**

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre basic seed or basic seed, not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 A unit shall be free from infected plants which are not visually free from the pathogen Lettuce Mosaic Virus.

**5 Inspection requirements**

5.1 Seedlings shall be inspected before they are planted;

5.2 Plants which are established on a unit from such seedlings shall be inspected –

5.2.1 during the 50 percent marketable stage thereof;

5.2.2 during the full marketable stage thereof; and

5.2.3 during the full seed stage thereof.

**6 Physical requirements**

Seed shall -

6.1 have a germination percentage of at least 70;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed; and

6.3.2 2,0 percent other material; and

6.3.3 0,2 percent seed of deviating plants,

6.3.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

**ANNEXURE 39****REQUIREMENTS RELATING TO ITALIAN AND WESTERWOLDS RYEGRASS & RIGID ANNUAL RYEGRASS (*Lolium multiflorum* Lam. & *Lolium rigidum* Gaudin)****1 Field requirements**

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any rye grass variety -

1.1.1 in the case of the intended production of certified pre-basic seed or basic seed, the three growing seasons; and

1.1.2 in the case of the intended production of certified seed, the two growing seasons, preceding the registration thereof and have been established thereon for seed production or otherwise.

1.2 A field which is intended for the production of seed of a rye grass variety may -

1.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not be registered as a unit for more than two consecutive growing seasons if breeder seed of the same variety is annually established thereon; and

1.2.2 in the case of the intended production of certified seed, not be registered as a unit for more than four consecutive growing seasons if basic seed of the same variety is annually established thereon: Provided that such field may also be registered as a unit if basic seed of the same variety has been produced thereon during the preceding growing season.

**2 Planting requirements**

2.1 Seeds shall be sown or be established in rows on a unit.

2.2. All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.

2.3 The breeder shall, with regard to quality and production, determine the planting date, the production areas where the seed shall be planted and the date on which grazing shall be withdrawn.

**3 Isolation requirements**

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -

3.1.1.1 between units of a diploid ryegrass variety and a tetraploid ryegrass variety is at least five metres wide; and

3.1.1.2 between varieties of another *Lolium* specie, different varieties of diploid ryegrass and different varieties of tetraploid ryegrass respectively -

3.1.1.2.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and

3.1.1.2.2 is at least 100 metres wide where the area of the unit concerned exceeds two hectares; and

3.1.2 in the case of the intended production of certified seed -

3.1.2.1 between units of a diploid ryegrass variety and a tetraploid ryegrass variety is at least five metres wide; and

3.1.2.2 between varieties of another *Lolium* specie, different varieties of diploid ryegrass-varieties and different varieties of tetraploid ryegrass-varieties respectively, -

3.1.2.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and

3.1.2.2.2 is at least 50 metres wide where the area of the unit concerned is more than two hectares;

3.2 Such isolation area shall be free from plants of any rye grass variety or species of *Lolium* which flower at the same time as the plants on the unit concerned, unless-

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

**4 Requirements for plants**

4.1 Plants which are established on a unit shall not be grazed after October 15, of the growing season during which seed is to be produced or as determined by the breeder of the particular variety.

4.2 The number of deviating plants on a unit shall -

- 4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 50 square metres; and
- 4.2.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.
- 5 Inspection requirements  
Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof;
- 5.2 during the flowering stage thereof; and
- 5.3 during the full seed stage thereof.
- 6 Physical requirements  
Seed shall -
- 6.1 have a germination or a viability percentage of at least 70;
- 6.2 have at least 96,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,5 percent other seed, of which no more than 0,2 percent may be weed seed;
- 6.3.2 4,0 percent other material; and
- 6.3.3 0,2 percent seed of deviating plants.
- 6.3.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 40

### REQUIREMENTS RELATING TO PERENNIAL RYEGRASS & HYBRID RYEGRASS (*Lolium perenne* L. & *Lolium ×hybridum* Hausskn.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
- 1.1.1 no plants of any species of *Lolium* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof; or
- 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular rye grass variety, may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
- 2.1 Seed shall be sown or be established in rows on a unit.
- 2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -
- 3.1.1.1 between units of a diploid ryegrass variety and a tetraploid ryegrass variety is at least five metres wide; and
- 3.1.1.2 between different varieties of diploid ryegrass varieties and different varieties of tetraploid ryegrass varieties respectively -
- 3.1.1.2.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and

- 3.1.1.2.2 is at least 100 metres wide where the area of the unit concerned is more than two hectares; and
- 3.1.2 in the case of the intended production of certified seed -
- 3.1.2.1 between units of a diploid ryegrass variety and a tetraploid ryegrass variety is at least five metres wide; and
- 3.1.2.2 between different varieties of diploid ryegrass-varieties and different varieties of tetraploid ryegrass-varieties respectively, -
- 3.1.2.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and
- 3.1.2.2.2 is at least 50 metres wide where the area of the unit concerned is more than two hectares.
- 3.2 Such isolation area shall be free from plants of any rye grass variety or species of *Lolium* which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants
- The number of deviating plants on a unit shall –
- 4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and
- 4.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.
- 5 Inspection requirements
- Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof;
- 5.2 during the flowering stage thereof; and
- 5.3 during the full seed stage thereof.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination or a viability percentage of at least 75.
- 6.2 have at least 96,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,5 percent other seed, of which no more than 0,2 percent may be weed seed; and
- 6.3.2 4,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 41

### REQUIREMENTS RELATING TO LUPIN (WHITE LUPIN - *Lupinus albus* L.; NARROW LEAF LUPIN - *Lupinus angustifolius* L. & YELLOW LUPIN *Lupinus luteus* L.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
- 1.1.1 no plants of any lupin variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 1.2 in the case of the intended production of certified pre-basic seed or basic seed, the three growing seasons; and
- 1.2.1 in the case of the intended production of certified seed, the two growing seasons, preceding the registration thereof and have been established thereon for seed production or otherwise.
- 1.3 A field which is intended for the production of basic seed or certified seed of a particular lupin variety may also be registered as a unit, if -

- 1.3.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.3.2 certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.
- 1.3.3 in the case of certified seed, in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 1.4 Subject to the provisions of paragraph 1.2, a field may be registered as a unit for the production of disease-free seed only if no plants of any lupin variety or species of *Lupinus* –
- 1.4.1 in the case of the intended production of pre-basic seed and basic seed, during the two years; and
- 1.4.2 in the case of the intended production of certified seed, has been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 1.5 A field which is intended for the production of disease-free certified seed of a particular lupin variety may also be registered as a unit if disease-free basic seed of the same variety has been produced thereon during the preceding growing season.
- 1.6 Should the pathogen *Colletotrichum* spp., occur on a unit, no *Lupinus* may be cultivated for the following three years on the field concerned.
- 2 Planting requirements  
Seed shall be sown or be established in rows on a unit.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of disease-free seed, is at least 500 metres wide;
- 3.2.1 otherwise, in the case of the intended production of certified pre-basic seed or basic seed of -
- 3.2.1.1 white lupin, is at least 200 metres wide where the area of the unit concerned is two hectares or less, and at least 100 metres wide where the area of the unit concerned is more than two hectares; and
- 3.2.1.2 narrow leaf lupin and yellow lupin, is at least five metres wide; and
- 3.2.1 in the case of the intended production of certified seed of –
- 3.2.2.1 white lupins, is at least 100 metres wide where the area of the unit concerned is two hectares or less, and at least 50 metres wide where the area of the unit concerned is more than two hectares; and
- 3.2.2.2 narrow leaf lupins and yellow lupins, at least five metres wide.
- 3.3 Such isolation area shall-
- 3.3.1 in the case of the intended production of disease-free seed, be free from plants of any lupin variety or species of *Lupinus*, irrespective of the stage of development thereof, unless they are also intended for the production of such disease-free seed; and
- 3.3.2 otherwise be free from plants of any lupin variety or species of *Lupinus* which flower at the same time as the plants on the unit concerned, unless -
- 3.3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
- 3.3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants
- 4.1 The number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 Methods for determination of deviating plants shall be as determined by the Authority.
- 4.3 A unit, which is intended for the production of disease-free seed, shall be free from disease-infected plants.
- 4.4 For the purpose of paragraph 4.3 “disease-infected plants” shall mean plants which are not visually free from the pathogens *Colletotrichum* spp., or Cucumber Mosaic Virus (CMV).
- 5 Inspection requirements  
Plants which are established on a unit shall be inspected -

- 5.1 before the flowering stage thereof;
  - 5.2 during the flowering stage thereof; and
  - 5.3 during the full seed stage thereof.
- 6 Physical requirements  
Seed shall -
- 6.1 have a germination percentage of at least 75;
  - 6.2 have at least 98,0 percent pure seed; and
  - 6.3 not contain more than -
    - 6.3.1 0,1 percent other seed;
    - 6.3.2 2,0 percent other material.
    - 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and
  - 6.4 In the case of sweet *Lupinus albus*, *Lupinus angustifolius* and *Lupinus luteus*, not contain more than 2,0 percent bitter seeds.
  - 6.5 In the case of disease-free seed, according to a laboratory examination, be free from seed that is infected with a pathogen as specified in paragraph 4.4.

## ANNEXURE 42

### REQUIREMENTS RELATING TO MEDICS

**[*Medicago littoralis* Rohde ex Loisel; *M. polymorpha* L. var. *brevispina* (Benth.) Heyn.; *M. rugosa* Desr.; *M. scutellata* (L.) Miller; & *M. truncatula* Gaertn.]**

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Medicago* -
    - 1.1.1 in the case of the intended production of certified pre-basic seed or basic seed, during the four growing seasons; and
    - 1.1.2 in the case of the intended production of certified seed, the three growing seasons, preceding the registration thereof and have been established thereon for seed production or otherwise.
  - 1.2 A field which is intended for the production of seed of a particular *Medicago* variety may -
    - 1.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not be registered as a unit for more than three consecutive growing seasons if breeder seed of the same variety is annually established thereon; and
    - 1.2.2 in the case of the intended production of certified seed, may also be registered for a further three seasons as a unit if certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.
    - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
  - 1.3 Any further registrations will only be considered with written approval from the Authority.
- 2 Planting requirements
- 2.1 Seeds shall be sown or be established in rows on a unit.
  - 2.2 If established in rows on a unit, the area between such rows shall for a period of one year after the plants were established on a unit, be kept free from any plants.
  - 2.3 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which is at least five metres wide.
  - 3.2 Such isolation area shall be free from plants of any *Medicago* spp., unless -
    - 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
    - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

#### 4 Requirements for plants

4.1 Plants which are established on a unit may only be grazed after consideration of a written request by the seed grower concerned.

4.2 The number of deviating plants on a unit shall –

4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent; and

4.2.2 in the case of the intended production of certified seed, not exceed 2,0 percent.

4.3 Methods for the determination of deviating plants are as determined by the Authority.

#### 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

#### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 70, including hard seeds;

6.2 have at least 97,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,5 percent other seed, of which no more than 0,2 percent may be weed seed;

6.3.2 3,0 percent other material; and

6.3.3 0,5 percent seed of deviating plants.

6.3.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

### ANNEXURE 43

#### REQUIREMENTS RELATING TO LUCERNE (*Medicago sativa* L.)

##### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -

1.1.1 no plants of any species of *Medicago* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof; or

1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.

1.2 A field which is intended for the production of basic seed or certified seed of a particular lucerne variety, may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

##### 2 Planting requirements

2.1 Seed shall be sown or be established in rows on a unit.

2.2 If established in rows on a unit, the area between such rows shall for a period of one year after the plants were established on a unit, be kept free from any plants.

2.3 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.

### 3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -

3.1.1.1 at least 200 metres wide where the area of the unit concerned is two hectares or less; and

3.1.1.2 at least 100 metres wide where the area of the unit concerned exceeds two hectares; and

3.1.2 in the case of the intended production of certified seed -

3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and

3.1.2.2 is at least 50 metres wide where the area of the unit concerned exceeds two hectares.

3.2 Such isolation area shall be free from plants of any lucerne variety or species of *Medicago* which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

### 4 Requirements for plants

4.1 Plants which are established on a unit may -

4.1.1 if such unit is registered for the production of basic seed, be used for such purpose for a period of not more than two years after the year of establishment thereof, and may thereafter for a further period of not more than three years be used for the production of certified seed if the unit concerned is registered for this purpose;

4.1.2 if such a unit is registered for the production of certified seed, be used for such purpose for a period of not more than three years after the year of establishment thereof; and

4.1.3 annually be grazed from the time after the removal of the seed crop until October 15 of the following growing season.

4.2 The number of deviating plants on a unit shall -

4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.2.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.3 No plants of dodder (*Cuscuta* spp.) may occur on a unit.

4.4 Methods for determination of deviating plants shall be as determined by the Authority.

### 5 Inspection requirements

5.1 Plants which are established on a unit shall be inspected -

5.1.1 before the flowering stage thereof;

5.1.2 during the flowering stage thereof; and

5.1.3 during the full seed stage thereof.

5.2 A seed grower shall notify the authorised person at least 14 days prior to the date on which plants are expected to start flowering.

### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 80; of which a maximum of 40 percent hard seeds may be counted as germinated seeds;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,2 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

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**ANNEXURE 44****REQUIREMENTS RELATING TO WHITE BUFFALO GRASS & SMALL BUFFALO GRASS  
[*Megathyrsus maximus* (Jacq.) B.K.Simon & S.W.L.Jacobs (Synonym *Panicum maximum* Jacq.) & *Panicum coloratum* L.]****1 Field requirements**

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -

1.1.1 no plants of any species of *Panicum* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or

1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.

1.2 A field which is intended for the production of basic seed or certified seed of a particular white buffalo grass variety, may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

**2 Planting requirements**

2.1 Seed shall be sown or be established in rows on a unit.

2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.

**3 Isolation requirements**

3.1 A unit shall be surrounded by an isolation area which is at least five metres wide.

3.2 Such isolation area shall be free from plants of any white buffalo grass or small buffalo grass variety, as the case may be.

**4 Requirements for plants**

The number of deviating plants on a unit shall -

4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

4.3 Plants established on a unit registered for the production of basic seed, may, after the establishment thereof, be used for such purpose for a period of not more than two years.

4.4 After the use of plants on a unit for the production of basic seed, these plants can be used for the production of certified seed provided the unit has been registered for the production of certified seed.

4.5 Plants established on a unit for the production of certified seed -

4.5.1 may be used for this purpose for a period of not more than four years; and

4.5.2 may, with the written approval from the Authority, be used for that purpose for a further period of two years.

**5 Inspection requirements**

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

**6 Physical requirements**

Seed shall -

6.1 have a germination percentage of at least 10 or a viability percentage of at least 20;

6.2 in the case of coated seed, have a germination percentage of at least 20 percent or a viability percentage of at least 40;

- 6.3 have at least 98,0 percent pure seed; and
- 6.4 not contain more than -
  - 6.4.1 0,5 percent other seed; and
  - 6.4.2 2,0 percent other material.
  - 6.4.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 45

### REQUIREMENTS RELATING TO WHITE SWEET-CLOVER (*Melilotus albus* Medik.)

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
    - 1.1.1 no plants of any species of *Melilotus* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof; or
    - 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.
  - 1.2 A field which is intended for the production of basic seed or certified seed of a particular white sweet-clover variety, may also be registered as a unit, if -
    - 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
  - 2.1 Seed shall be sown or be established in rows on a unit.
  - 2.2 If established in rows on a unit, the area between such rows shall for a period of one year after the plants were established on a unit, be kept free from any plants.
  - 2.3 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -
      - 3.1.1.1 at least 200 metres wide where the area of the unit concerned is two hectares or less; and
      - 3.1.1.2 at least 100 metres wide where the area of the unit concerned exceeds two hectares; and
    - 3.1.2 in the case of the intended production of certified seed -
      - 3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and
      - 3.1.2.2 is at least 50 metres wide where the area of the unit concerned exceeds two hectares.
  - 3.2 Such isolation area shall be free from plants of any white sweet clover variety or species of *Melilotus* which flower at the same time as the plants on the unit concerned, unless -
    - 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
    - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
    - 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants
  - 4.1 Plants which are established on a unit may -
    - 4.1.1 if such unit is registered for the production of basic seed, be used for such purpose for a period of not more than two years after the year of establishment thereof, and may thereafter for a further period of not more than three years be used for the production of certified seed if the unit concerned is registered for this purpose;

- 4.1.2 if such a unit is registered for the production of certified seed, be used for such purpose for a period of not more than three years after the year of establishment thereof; and
- 4.1.3 annually be grazed from the time after the removal of the seed crop until October 15 of the following growing season.
- 4.2 The number of deviating plants on a unit shall -
- 4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.2.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.3 No plants of dodder (*Cuscuta* spp.) may occur on a unit.
- 4.4 Methods for determination of deviating plants shall be as determined by the Authority.
- 5 Inspection requirements
- 5.1 Plants which are established on a unit shall be inspected -
- 5.1.1 before the flowering stage thereof;
- 5.1.2 during the flowering stage thereof; and
- 5.1.3 during the full seed stage thereof.
- 5.2 A seed grower shall notify the authorised person at least 14 days prior to the date on which plants are expected to start flowering.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 80; of which a maximum of 40 percent hard seeds may be counted as germinated seeds;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,2 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 46

### REQUIREMENTS RELATING TO TOBACCO (*Nicotiana tabacum* L.)

- 1 Field requirements
- Any field may be registered as a unit
- 2 Planting requirements
- 2.1 Plants shall be established in rows on a unit.
- 2.2 Gap filling shall not be permissible.
- 2.3 In the case of the intended production of seed of a hybrid variety -
- 2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and
- 2.3.2 rows containing plants of the pollen parent shall be clearly marked.
- 3 Isolation requirements
- 3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed of an open-pollinated variety, is at least 400 metres wide;
- 3.1.2 notwithstanding the provisions of paragraph 3.1.1, a unit may be established within any commercial crop of the same variety; with the condition that the florescence or flowers of the seed parents are covered in such a way that contamination by unwanted pollen is prevented; and
- 3.1.3 in the case of the intended production of certified seed of an open-pollinated variety, is at least 400 meters wide;

- 3.2 notwithstanding the provisions of paragraph 3.1, a unit may be established within a commercial crop of the same variety established from certified seed, or within any commercial crop in which male sterility occurs in the variety.
- 3.3 In the case of the intended production of a hybrid variety, the plants may be established within any commercial crop in which male sterility occurs in the variety.
- 3.3.1 The production of the seed and pollen parents of a hybrid crop in which male sterility occurs can be multiplied on the same unit if a two-metre strip is kept clean between the multiplications.
- 3.4 During the production of certified pre- basic, basic or certified seed of both open-pollinated or hybrid varieties within commercial crops, a five metre strip should be maintained at all times between the seed and commercial crop.
- 3.5 Such isolation area shall be free from plants of any tobacco variety which flower at the same time as the plants on the unit concerned, unless -
- 3.5.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety;
- 3.5.2 notwithstanding the provisions of paragraph 3.1.1, a unit may be established within any commercial crop of the same variety; with the condition that the florescence or flowers of the seed parents are covered in such a way that contamination by unwanted pollen is prevented; and
- 3.5.3 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.
- 3.6 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
- 3.6.1 a common pollen parent is used; and
- 3.6.2 a distance of at least five metres wide, which is free from plants of the seed parent concerned, is maintained between the units concerned.

#### 4 Requirements for plants

- 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall –
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety –
- 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall –
- 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the pollen parent at the stage at which the pollen is being collected; and
- 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the pollen parent at the stage at which the pollen is being collected;
- 4.2.2 the number of deviating plants of the seed parent on a unit shall -
- 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent; and
- 4.2.2.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent; and
- 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
- 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the seed parent; and
- 4.2.3.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent.

#### 5 Inspection requirements

- 5.1 Seedlings shall be inspected before they are established on a unit.
- 5.2 Plants which are established on a unit from such tobacco shall be inspected -
- 5.2.1 two weeks before the flowering stage thereof; and
- 5.2.2 two weeks before harvesting of the seed.
- 5.3 If plants of a hybrid variety have been established on a unit -
- 5.3.1 the seed grower concerned shall notify the authorised person at least 21 days prior to the date on which -
- 5.3.1.1 the plants of the seed parent is expected to start flowering; and
- 5.3.1.2 the plants or florescence of the pollen parent are to be removed; and
- 5.3.2 The seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.3.1.2 has been carried out.

- 5.4 In the case where the unit has been established within a commercial planting, no more than 0,1% plants or suckers with flowers will be allowed within the commercial planting during the seed production process.
- 5.5 All senesced and diseased leaves should be removed before harvesting.
- 5.6 Florescence of plants infected with the following pathogens must be removed before harvesting of the seed commences:
- Viruses
  - *Colletotrichum destructivum*
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 80;
- 6.2 have at least 99,9 percent pure seed; and
- 6.3 be free from any other seed; and
- 6.4 not contain more than 0,1 percent other material.

## ANNEXURE 47

### REQUIREMENTS RELATING TO YELLOW SERRADELLA & FRENCH SERRADELLA [(*Ornithopus compressus* L.) & (*Ornithopus sativus* Brot.)]

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
- 1.1.1 no plants of any species of *Ornithopus* have been established thereon for seed production or otherwise during the three growing seasons preceding the registration thereof; or
- 1.1.2 the plants which are already established thereon, have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular serradella variety may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
- 2.1 Seed may be sown or be established in rows on a unit.
- 2.2 Gap filling shall not be permissible.
- 2.3 In the case of hard-seeded varieties an uncultivated strip of three meters wide must be maintained during the first year of production.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed is at least 200 metres wide; and
- 3.1.2 in the case of the intended production of certified seed is at least 100 metres wide.
- 3.2 Such isolation area shall be free from plants related to serradella.
- 4 Requirements for plants
- 4.1 The number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and
- 4.1.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.
- 4.2 Methods for the determination of deviating plants shall be as determined by the Authority.

4.3 Plants established on a unit registered for the production of certified pre-basic seed or basic seed, may after the establishment thereof, be used for such purpose for a period of not more than two years.

4.4 After the use of plants on a unit for the production of certified pre-basic seed or basic seed, these plants can be used for the production of certified seed provided the unit has been registered for the production of certified seed.

4.5 Plants established on a unit for the production of certified seed -

4.5.1 may be used for this purpose for a period of not more than four years; and

4.5.2 may, with the written approval from the Authority, be used for the purpose for a further period of two years.

5 Inspection requirements

5.1 Plants which are established on a unit shall be inspected -

5.1.1 before the flowering stage thereof;

5.1.2 during the flowering stage thereof; and

5.1.3 during the full seed stage thereof.

5.2 The seed grower concerned shall notify the authorised person at least 10 days prior to the date on which the plants are expected to start flowering.

6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 70, hard seeds included;

6.2 have at least 98,0 percent pure seed; and

6.3. not contain more than -

6.3.1 0,5 percent other seed, of which no more than 0,2 percent may be weed seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 48

### REQUIREMENTS RELATING TO RICE (*Oryza sativa* L.)

1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -

1.1.1 no plants of a rice variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof; or

1.2 A field which is intended for the production of basic seed or certified seed of a particular rice variety, may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

2 Planting requirements

Seed may be sown or be established in rows on a unit.

3 Isolation requirements

3.1 The isolation area around a unit shall be at least five metres wide.

3.2 Such isolation area shall be free from plants of any rice variety.

4 Requirements for plants

The number of deviating plants on a unit shall -

4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

5 Inspection requirements

Plants which are established on a unit shall be inspected -

- 5.1 before the flowering stage thereof;
- 5.2 during the flowering stage thereof; and
- 5.3 during the full seed stage thereof.

6 Physical requirements

Seed shall -

- 6.1 have a germination percentage of at least 80;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
  - 6.3.1 0,1 percent other seed; and
  - 6.3.2 2,0 percent other material; and
  - 6.3.3 one red rice seed per 2,5 kg sample.
  - 6.3.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 49

### REQUIREMENTS RELATING TO PASPALUM

#### (*Paspalum dilatatum* Poir. & *Paspalum notatum* Flügge)

1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -

- 1.1.1 no plants of any species of *Paspalum* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or
- 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.

1.2 A field which is intended for the production of basic seed or certified seed of a particular *Paspalum* variety, may also be registered as a unit, if -

- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

2 Planting requirements

- 2.1 Seed may be sown or be established in rows on a unit.
- 2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.
- 2.3 The breeder shall, with regards to quality and production, determine the planting date, the production areas where the seed shall be planted and the date on which grazing shall cease.

3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which -

- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -
  - 3.1.1.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and
  - 3.1.1.2 is at least 100 metres wide where the area of the unit concerned is more than two hectares; and
- 3.1.2 in the case of the intended production of certified seed -
  - 3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and
  - 3.1.2.2 is at least 50 metres wide where the area of the unit concerned is more than two hectares.

3.2 Such isolation area shall be free from plants of any *Paspalum* variety or species of *Paspalum* which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

#### 4 Requirements for plants

The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

#### 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

#### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 40;

6.2 have at least 65,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,2 percent other seed; and

6.3.2 35,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 50

### REQUIREMENTS RELATING TO PEARL MILLET

**[*Pennisetum glaucum* (L.) R. Br. (syn *Cenchrus americanus* (L.) Morrone)]**

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Pennisetum* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular pearl millet variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

#### 2 Planting requirements

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

2.3 In the case of the intended production of seed of a hybrid variety -

2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and

2.3.2 rows containing plants of the pollen parent shall be clearly marked.

### 3 Isolation requirements

3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic and basic seed of -

3.1.1.1 an open-pollinated variety, is at least 400 metres wide; and

3.1.1.2 a hybrid variety, is at least 800 metres wide; and

3.1.2 in the case of the intended production of certified seed -

3.1.2.1 of an open-pollinated variety, is at least 350 metres wide; and

3.1.2.2 of a hybrid variety, is at least 800 metres wide.

3.2 Such isolation area shall be free from plants of any pearl millet variety or species of *Pennisetum* which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -

3.3.1 a common pollen parent is used; and

3.3.2 a distance of a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

### 4 Requirements for plants

4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 If male sterility is used in the seed parent of a hybrid variety -

4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -

4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and

4.2.1.2 in the case of the intended production of certified seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.

4.2.2 the number of deviating plants of the seed parent on a unit shall -

4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the seed parent; and

4.2.2.2 in the case of the intended production of certified seed, not exceed 0,3 percent of the plants of the seed parent; and

4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -

4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent at the stage at which 20,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate number of plants with pollen-shedding flowers found during consecutive inspections shall not exceed 0,5 percent of the plants of the seed parent; and

4.2.3.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent at the stage at which 30,0 percent or more of the plants of the seed parent has pollen-susceptible flowers.

### 5 Inspection requirements

5.1 Plants which are established on a unit shall be inspected -

5.1.1 before the flowering stage thereof;

5.1.2 during the flowering stage thereof;

5.1.3 during the full seed stage thereof; and

5.1.4 in the case of a hybrid variety, after the seed heads of the plants of the pollen parent have been removed.

5.2 If plants of a hybrid variety have been established on a unit -

- 5.2.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -
- 5.2.1.1 the plants of the seed parent are expected to start flowering; and
- 5.2.1.2 the seed heads of the pollen parent are to be removed; and
- 5.2.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.1.4 has been carried out.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 80;
- 6.2 have at least 96,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed; and
- 6.3.2 4,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 51

### REQUIREMENTS RELATING TO DRY BEAN

#### (KIDNEY BEAN - *Phaseolus coccineus* L. & DRY BEAN - *Phaseolus vulgaris* L.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any dry bean variety or species of *Phaseolus* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof.
- 1.1.1 in the case of the intended production of certified pre-basic seed or basic seed, during the two years; and
- 1.1.2 in the case of the intended production of certified seed, during the year preceding the registration thereof.
- 1.2 A field which is intended for the production of disease-free seed, may also be registered as a unit if disease-free seed has been produced thereon during the preceding growing season.
- 1.3 Any field may be registered as a unit for the production of seed other than disease-free seed.
- 2 Planting requirements
- Plants shall be established in rows on a unit.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 subject to the provisions of paragraphs 3.1.2.1 and 3.1.3.1, in the case of the intended production of disease-free seed, is at least 100 metres wide; and
- 3.1.2 in the case of the intended production of certified pre-basic seed or basic seed of -
- 3.1.2.1 kidney beans, at least 400 metres wide; and
- 3.1.2.2 other dry beans, at least 10 metres wide; and
- 3.1.3 in the case of the intended production of certified seed of -
- 3.1.3.1 kidney beans, at least 200 metres wide; and
- 3.1.3.2 other dry beans, at least five metres wide.
- 3.2 Such isolation area shall -
- 3.2.1 in the case of the intended production of disease-free seed, be free from -
- 3.2.1.1 plants of any dry bean variety or species of *Phaseolus*, irrespective of the stage of development thereof, unless they are also intended for the production of such disease-free seed; and
- 3.2.1.2 plants of any *Glycine* spp., *Pisum* spp. or *Vigna* spp., irrespective of the stage of development thereof; and
- 3.2.2 otherwise be free from plants of any dry bean variety or species of *Phaseolus* which flower at the same time as the plants on the unit concerned, unless -
- 3.2.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

#### 4 Requirements for plants

4.1 The number of deviating plants on a unit shall –

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 A unit which is intended for the production of disease-free seed shall be visually free from disease-infected plants.

4.3 On a unit other than a unit referred to in paragraph 4.2 -

4.3.1 in the case of the intended production of certified pre-basic seed or basic seed, no disease-infected plants shall occur; and

4.3.2 in the case of the intended production of certified seed, a maximum of 8,0 percent disease-infected plants may occur.

4.4 For the purposes of paragraphs 4.2 and 4.3 "disease-infected plants" shall mean plants which are not visually free from the pathogens Bean Common Mosaic virus (BCMV), *Colletotrichum lindemuthianum* Sacc. et Magn., *Elsinoe phaseoli*, *Pseudomonas phaseolicola*, *P. syringae*, *Xanthomonas phaseoli* or *X. phaseoli* var. *fuscans*.

4.5 Plants that are not visually free from the pathogens mentioned in paragraph 4.4, may also be analysed by an acknowledged plant pathologist for confirmation of the pathogen.

#### 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering to the pod stage thereof;

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

#### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 70;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,05 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and

6.4 not contain more than 0,2 percent seed of deviating plants; and

6.5 not contain more than 0,2 percent sclerotia of *Sclerotinia sclerotiorum* in a 1000 gram sample; and

6.6 in the case of disease-free seed, according to a laboratory examination be free from seed that is infected with a pathogen, excluding Bean Common Mosaic Virus (BCMV) and *Elsinoe phaseoli*, specified in paragraph 4.4.

## ANNEXURE 52

### REQUIREMENTS RELATING TO GARDEN BEAN (DWARF & RUNNER) (*Phaseolus vulgaris* L.)

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any garden bean variety or species of *Phaseolus* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof.

1.1.1 in the case of the intended production of certified pre-basic seed or basic seed, during the two years; and

- 1.1.2 in the case of the intended production of certified seed, during the year preceding the registration thereof.
- 1.2 A field which is intended for the production of disease-free seed, may also be registered as a unit if disease-free seed has been produced thereon during the preceding growing season.
- 1.3 Any field may be registered as a unit for the production of seed other than disease-free seed.
- 2 Planting requirements
- 2.1 Plants shall be established in rows on a unit.
- 2.2 All plants on a unit which is intended for the production of certified pre-basic seed or basic seed of a runner bean variety shall be trellised.
- 2.3 At least 10,0 percent of the plants on a unit which is intended for the production of certified seed of a runner bean variety shall be trellised by means of a recognised method.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of disease-free seed, is at least 100 metres wide;
- 3.1.2 in the case of the intended production of certified pre-basic seed or basic seed, is at least 10 metres wide; and
- 3.1.3 in the case of the intended production of certified seed, is at least 5 metres wide.
- 3.2 Such isolation area shall -
- 3.2.1 in the case of the intended production of disease-free seed, be free from -
- 3.2.1.1 plants of any garden bean variety or species of *Phaseolus*, irrespective of the stage of development thereof, unless they are also intended for the production of such disease-free seed; and
- 3.2.1.2 plant of any *Glycine* spp., *Pisum* spp. or *Vigna* spp., irrespective of the stage of development thereof; and
- 3.2.2 otherwise be free from plants of any garden bean variety or species of *Phaseolus*.
- 4 Requirements for plants
- 4.1 Subject to the provisions of paragraphs 4.2 and 4.3, the number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 The number of plants with stringed pods on a unit on which plants of a stringless variety have been established shall -
- 4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 1,0 percent; and
- 4.2.2 in the case of the intended production of certified seed, not exceed 2,0 percent.
- 4.3 The number of plants with flat to oval stringless pods on a unit on which plants of a round stringless variety have been established shall -
- 4.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 2,0 percent; and
- 4.3.2 in the case of the intended production of certified seed, not exceed 5,0 percent.
- 4.4 A unit which is intended for the production of disease-free seed shall be free from disease-infected plants.
- 4.5 On a unit other than a unit referred to in paragraph 4.4 -
- 4.5.1 in the case of the intended production of certified pre-basic seed or basic seed, no disease-infected plants shall occur; and
- 4.5.2 in the case of the intended production of certified seed, a maximum of 5,0 percent disease-infected plants shall occur.
- 4.6 For the purposes of paragraphs 4.4 and 4.5 "disease-infected plants" shall mean plants which are not visually free from the pathogens Bean Common Mosaic virus (BCMV), *Colletotrichum lindemuthianum* Sacc. et Magn., *Elsinoe phaseoli*, *Pseudomonas phaseolicola*, *P. syringae*, *Xanthomonas phaseoli* or *X. phaseoli* var. *fuscans*.
- 4.7 Plants that are not visually free from the pathogens mentioned in paragraph 4.6, may also be analysed by an acknowledged plant pathologist for confirmation of the pathogen.
- 5 Inspection requirements
- Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof;

- 5.2 during the flowering to the pod stage thereof; and
- 5.3 during the full seed stage thereof.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 70;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,05 percent other seed;
- 6.3.2 2,0 percent other material;
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and
- 6.4 not contain more than 0,2 percent seed of deviating plants; and
- 6.5 not contain more than 0,2 percent sclerotia of *Sclerotinia sclerotiorum* in a 1000 gram sample; and
- 6.6 in the case of disease-free seed, according to a laboratory examination be free from seed that is infected with a pathogen, excluding Bean Common Mosaic Virus (BCMV) and *Elsinoe phaseoli*, specified in paragraph 4.4.

## ANNEXURE 53

### REQUIREMENTS RELATING TO PEAS (DRY PEA & GARDEN PEA - *Pisum sativum* L. *sensu lato*)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any pea variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular pea variety may also be registered as a unit if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 1.3 Subject to the provisions of paragraph 1.4, a field may be registered as a unit for the production of disease-free seed only if no plants of a pea variety or species of *Pisum* -
- 1.3.1 In the case of an intended production of pre-basic and basic seed during the two years; and
- 1.3.2 in the case of the intended production of certified seed, during the growing season that preceded the registration, have been established thereon for seed production or otherwise.
- 2 Planting requirements
- Plants may be sown or be established in rows on a unit.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which is at least 5 metres wide.
- 3.2 Such isolation area shall be free from plants of any pea variety.
- 4 Requirements for plants
- Subject to the provisions of paragraphs 4.2 and 4.3, the number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 A unit on which plants of a pea variety with white flowers have been established, shall not contain any plants with red flowers.

- 4.3 The number of plants on a unit which shows "rabbit ear" characteristics, shall not exceed 1,0 percent.
- 4.4 A unit shall be visually free from plants of which the pods are infected with the pathogen *Pseudomonas pisi* Sackett.
- 5 Inspection requirements  
Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof;
- 5.2 during the flowering to pod stage thereof; and
- 5.3 during the full seed stage thereof.
- 6 Physical requirements  
Seed shall -
- 6.1 have a germination percentage of at least 70;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,05 percent other seed; and
- 6.3.2 2,0 percent other material;
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and
- 6.4 not contain more than 0,2 percent seed of deviating plants; and
- 6.5 be visually free from sclerotia of *Sclerotinia sclerotiorum*; or be treated with a chemical remedy registered for this purpose.

## ANNEXURE 54

### REQUIREMENTS RELATING TO FODDER & GARDEN RADISH (*Raphanus sativus* L.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of the Brassicaceae family have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular radish variety, may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements  
Plants may be sown or be established in rows on a unit.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, is at least 800 metres wide; and
- 3.1.2 in the case of the intended production of certified seed, is at least 400 metres wide.
- 3.2 Subject to the provisions of paragraph 3.3, such isolation area shall be free from plants of a species of *Raphanus* or any radish variety which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

3.3 Plants not complying with the requirements set out in paragraph 3.2.1 and 3.2.2, may occur within the isolation area around a unit if -

3.3.1 those plants occur on a single field which contain no more than 150 of the plants concerned.

3.3.2 in the case of the intended production of certified pre-basic seed or basic seed, not more than 40 of the plants concerned occur within a distance of 100 metres around the unit concerned; and

3.3.3 in the case of the intended production of certified seed, not more than 40 of the plants concerned occur within a distance of 50 metres around the unit concerned.

#### 4 Requirements for plants

The number of deviating plants on a unit shall –

4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

#### 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

#### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 75;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed; and

6.3.2 2,0 percent other material;

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and

6.4 Not contain more than 0,2 percent sclerotia of *Sclerotinia sclerotiorum* in a 1000 gram sample.

## ANNEXURE 55

### REQUIREMENTS RELATING TO RYE (*Secale cereale* L.)

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any specie of *Secale* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular rye variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

#### 2 Planting requirements

2.1 Seed shall be sown or be established in rows on a unit.

2.2 The breeder shall, with regard to quality and production, determine the planting date, the production areas where the seed shall be planted and the date on which grazing shall cease.

- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed is at least 500 metres wide; and
    - 3.1.2 in the case of the intended production of certified seed is at least 300 metres wide.
  - 3.2 Such isolation area shall be free from plants of any rye variety which flower at the same time as the plants on the unit concerned.
- 4 Requirements for plants
  - 4.1 The number of deviating plants on a unit shall -
    - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
    - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
  - 4.2 Methods for the determination of deviating plants shall be as determined by the Authority.
- 5 Inspection requirements
  - Plants which are established on a unit shall be inspected -
    - 5.1 during the stooling stage thereof;
    - 5.2 during the flowering stage thereof; and
    - 5.3 during the full seed stage thereof.
- 6 Physical requirements
  - Seed shall -
    - 6.1 have a germination percentage of at least 80;
    - 6.2 have at least 98,0 percent pure seed; and
    - 6.3 not contain more than -
      - 6.3.1 0,5 percent other seed, but not more than 0,2 percent weed seed; and
      - 6.3.2 2,0 percent other material.
    - 6.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of wild oats may occur in 400 g of seed, and not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 56

### REQUIREMENTS RELATING TO TOMATO (*Solanum lycopersicum* L.)

- 1 Field requirements
  - 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any tomato variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
  - 1.2 A field which is intended for the production of basic seed or certified seed of a particular tomato variety may also be registered as a unit, if -
    - 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
    - 1.2.3 in the case of certified seed, in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
  - 2.1 Plants shall be established in rows on a unit.
  - 2.2 Gap-filling in rows shall not be permissible.
- 3 Isolation requirements
  - 3.1 A unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed, shall be at least 10 metres wide; and

- 3.1.2 in the case of the intended production of certified seed, shall be at least 5 metres wide.
- 3.2 such isolation area shall be free from plants of any tomato variety which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; or
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.
- 4 Requirements for plants
- 4.1 The number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 The number of plants on a unit which are infected with the pathogen *Corynebacterium michiganense* Smith, Jensen shall -
- 4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 2,0 percent; and
- 4.2.2 in the case of the intended production of certified seed, not exceed 5,0 percent.
- 4.3 The number of plants on a unit which are infected with tobacco mosaic virus shall -
- 4.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 5,0 percent; and
- 4.3.2 in the case of the intended production of certified seed, not exceed 10,0 percent.
- 4.4 The number of plants on a unit which are infected with the pathogen *Xanthomonas vesicatoria* (Doidge) Dow, shall -
- 4.4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 5,0 percent; and
- 4.4.2 in the case of the intended production of certified seed, not exceed 10,0 percent
- 5 Inspection requirements
- 5.1 Seedlings shall be inspected before planting.
- 5.2 Plants which are established on a unit from such seedlings shall be inspected -
- 5.2.1 during the green fruit stage thereof;
- 5.2.2 during the full ripe stage of the fruit thereof; and
- 5.2.3 at the end of the growing season before all the ripe fruit has been harvested.
- 5.3 No fruit may be harvested before the inspection referred to in paragraph 5.2 has been carried out.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 70;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 57

### REQUIREMENTS RELATING TO EGGPLANT (*Solanum melongena* L.)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Solanum* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular eggplant variety may also be registered as a unit, if -

- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
- 2.1 Plants shall be established in rows on a unit
- 2.2 Gap-filling in rows shall not be permissible.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which is at least 20 metres wide.
- 3.2 Such isolation area shall be free from plants of any eggplant variety or species of *Solanum*.
- 4 Requirements for plants
- The number of deviating plants on a unit shall -
- 4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 5 Inspection requirements
- 5.1 Seedlings shall be inspected before planting.
- 5.2 Plants which are established on a unit from such seedlings shall be inspected -
- 5.2.1 before flowering stage thereof;
- 5.2.2 during the early ripening stage of the fruit thereof; and
- 5.2.3 at the end of the growing season before all the ripe fruit thereof has been harvested.
- 5.3 No fruit may be harvested before the inspection referred to in paragraph 5.2.3 has been carried out.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 70;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 58

### REQUIREMENTS RELATING TO COLUMBUS GRASS & SUDAN GRASS

[*Sorghum almum* Parodi & *Sorghum bicolor* (L.) Moench subsp. *drummondii* (Steud.) de Wet ex Davidse (synonym *Sorghum sudanense* (Piper) Stapf)]

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -
- 1.1.1 no plants of any species of *Sorghum* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof; or
- 1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular Columbus or Sudan grass variety, may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

## 2 Planting requirements

Plants shall be established in rows on a unit.

## 3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -

3.1.1.1 is at least 400 metres wide where the area of the unit concerned is two hectares or less; and

3.1.1.2 is at least 200 metres wide where the area of the unit concerned is more than two hectares;

and

3.1.2 in the case of the intended production of certified seed -

3.1.2.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and

3.1.2.2 is at least 100 metres wide where the area of the unit concerned is more than two hectares.

3.2 Such isolation area shall be free from plants of any Columbus or Sudan grass variety or species of Sorghum which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

## 4 Requirements for plants

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.1.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

4.2 Plants established on a unit registered for the production of basic seed, may, after the establishment thereof, be used for such purpose for a period of not more than two years.

4.3 After the use of plants on a unit for the production of basic seed, these plants can be used for the production of certified seed provided the unit has been registered for the production of certified seed.

4.4 Plants established on a unit for the production of certified seed -

4.4.1 may be used for this purpose for a period of not more than four years; and

4.4.2 may, with the written approval from the authority, be used for that purpose for a further period of two years.

## 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

## 6 Physical requirements

Seed shall -

6.1 have a germination or a viability percentage of at least 70;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

**ANNEXURE 59****REQUIREMENTS RELATING TO GRAIN SORGHUM****[*Sorghum bicolor* (L.) Moench subsp. *bicolor* & *Sorghum vulgare* Pers.]****1 Field requirements**

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Sorghum* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof.

1.2 Only in the case of an open-pollinated variety, may a field which is intended for the production of basic seed or certified seed of a particular grain sorghum variety be registered as a unit, if –

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

**2 Planting requirements**

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

2.3 In the case of the intended production of seed of a hybrid variety –

2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and

2.3.2 rows containing plants of the pollen parent shall be clearly marked.

**3 Isolation requirements**

3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which –

3.1.1 in the case of the intended production of certified pre-basic and basic seed of –

3.1.1.1 an open-pollinated variety, at least 500 metres wide; and

3.1.1.2 a hybrid variety, at least 800 metres wide; and

3.1.2 in the case of the intended production of certified seed –

3.1.2.1 of an open-pollinated variety, is at least 400 metres wide; and

3.1.2.2 of a hybrid variety, is at least 500 metres wide.

3.2 Such isolation area shall be free from plants of any sorghum variety or species of *Sorghum* which flower at the same time as the plants on the unit concerned, unless –

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if –

3.3.1 a common pollen parent is used; and

3.3.2 a distance of at least five metres wide, which is free from plants of the seed parent concerned, is maintained between the units concerned.

**4 Requirements for plants**

4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall –

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 If male sterility is used in the seed parent of a hybrid variety –

4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall –

4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and

4.2.1.2 in the case of the intended production of certified seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.

4.2.2 the number of deviating plants of the seed parent on a unit shall -

4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the seed parent; and

4.2.2.2 in the case of the intended production of certified seed, not exceed 0,3 percent of the plants of the seed parent; and

4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -

4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent at the stage at which 20,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate number of plants with pollen-shedding flowers found during consecutive inspections shall not exceed 0,5 percent of the plants of the seed parent; and

4.2.3.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent at the stage at which 30,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate of the number of pollen-shedding flowers found during inspections shall not for the three inspections showing the highest incidence of such plants, exceed 1,0 percent of the plants of the seed parent.

4.3 If the percentages referred to in paragraphs 4.2.3.1 and 4.2.3.2, are exceeded in respect of a unit, seed of a hybrid variety shall not be considered for certification if it has been harvested from plants which were established within a distance calculated at the rate of 10 meters for each 1,0 percent or portion thereof, but with a maximum of 500 metres, by which the applicable percentage referred to in paragraphs 4.2.3.1 or 4.2.3.2 is exceeded from the unit concerned.

## 5 Inspection requirements

5.1 Plants which are established on a unit shall be inspected -

5.1.1 before the flowering stage thereof;

5.1.2 during the flowering stage thereof;

5.1.3 during the full seed stage thereof; and

5.1.4 in the case of a hybrid variety, after the seed heads of the plants of the pollen parent have been removed.

5.2 If plants of a hybrid variety have been established on a unit -

5.2.1 the seed grower concerned shall notify the authorised person authority at least 10 days prior to the date on which -

5.2.1.1 the plants of the seed parent are expected to start flowering; and

5.2.1.2 the seed heads of the pollen parent are to be removed; and

5.2.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.1.4 has been carried out.

## 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 80;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

**ANNEXURE 60****REQUIREMENTS RELATING TO ANNUAL FORAGE SORGHUM HYBRIDS (*Sorghum* spp.)**

- 1 Field requirements  
Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Sorghum* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof.
- 2 Planting requirements
  - 2.1 Plants shall be established in rows on a unit.
  - 2.2 Gap-filling in rows shall not be permissible.
  - 2.3 In the case of the intended production of seed of a hybrid variety -
    - 2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and
    - 2.3.2 rows containing plants of the pollen parent shall be clearly marked.
- 3 Isolation requirements
  - 3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -
    - 3.1.1 in the case of the intended production of certified pre-basic and basic seed of -
      - 3.1.1.1 an open-pollinated variety, at least 500 metres wide; and
      - 3.1.1.2 a hybrid variety, at least 800 metres wide; and
    - 3.1.2 in the case of the intended production of certified seed -
      - 3.1.2.1 of an open-pollinated variety, is at least 400 metres wide; and
      - 3.1.2.2 of a hybrid variety, is at least 500 metres wide.
  - 3.2 Such isolation area shall be free from plants of any sorghum variety or species of *Sorghum* which flower at the same time as the plants on the unit concerned, unless -
    - 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
    - 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
    - 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
  - 3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
    - 3.3.1 a common pollen parent is used; and
    - 3.3.2 a distance of a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.
- 4 Requirements for plants
  - 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -
    - 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
    - 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
  - 4.2 If male sterility is used in the seed parent of a hybrid variety -
    - 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
      - 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and
      - 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.
    - 4.2.2 the number of deviating plants of the seed parent on a unit shall -
      - 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the seed parent; and
      - 4.2.2.2 in the case of the intended production of certified seed, not exceed 0,3 percent of the plants of the seed parent; and
    - 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -

4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent of the plants of the seed parent at the stage at which 20,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate number of plants with pollen-shedding flowers found during consecutive inspections shall not exceed 0,5 percent of the plants of the seed parent; and

4.2.3.2 in the case of the intended production of certified seed, not exceed 1,0 percent of the plants of the seed parent at the stage at which 30,0 percent or more of the plants of the seed parent has pollen-susceptible flowers.

#### 5 Inspection requirements

5.1 Plants which are established on a unit shall be inspected -

5.1.1 before the flowering stage thereof;

5.1.2 during the flowering stage thereof;

5.1.3 during the full seed stage thereof; and

5.1.4 in the case of a hybrid variety, after the seed heads of the plants of the pollen parent have been removed.

5.2 If plants of a hybrid variety have been established on a unit -

5.2.1 the seed grower concerned shall notify the authorised person at least 10 days prior to the date on which -

5.2.1.1 the plants of the seed parent are expected to start flowering; and

5.2.1.2 the seed heads of the pollen parent are to be removed; and

5.2.2 the seed of the plants of the seed parent may not be harvested before the inspection referred to in paragraph 5.1.4 has been carried out.

#### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 70; or a viability percentage of at least 80.

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,1 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 61

### REQUIREMENTS RELATING TO PERENNIAL INTERSPECIFIC FORAGE SORGHUM (*Sorghum* spp.)

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Sorghum* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof.

1.1.1 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.

1.2 A field which is intended for the production of basic seed or certified seed of a particular perennial forage sorghum variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

#### 2 Planting requirements

2.1 Plants shall be established in rows on a unit.

- 2.2 Gap-filling in rows shall not be permissible.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed is at least 500 metres wide; and
- 3.1.2 in the case of the intended production of certified seed is at least 400 metres wide.
- 3.2 Such isolation area shall be free from plants of any *Sorghum* variety which flower at the same time as the plants on the unit concerned.
- 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants
- 4.1 Plants established on a unit may -
- 4.1.1 if such unit is registered for the production of certified pre-basic seed or basic seed, be used for such purpose for not more than two seed crops after the year of establishment thereof, and may thereafter for not more than a further two seed crops be used for the production of certified seed, if the unit concerned is registered for this purpose; or
- 4.1.2 if such unit is registered for the production of certified seed, be used for such purpose for not more than three seed crops after the year of establishment thereof.
- 4.2 Plants which are established on a unit, may annually be grazed after the seed crop has been removed. If grazing is allowed, the plants on the unit shall be mowed after grazing has ceased to ensure even re-growth.
- 4.3 The number of deviating plants on a unit shall -
- 4.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.3.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 5 Inspection requirements
- Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof;
- 5.2 during the flowering stage thereof; and
- 5.3 during the full seed stage thereof.
- 6 Physical requirements
- Seed shall -
- 6.1 have a germination percentage of at least 70; or a viability percentage of at least 80.
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,1 percent other seed;
- 6.3.2 2,0 percent other material; and
- 6.3.3 0,2 percent seed of deviating plants.
- 6.3.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 62

### REQUIREMENTS RELATING TO DROP SEED GRASS [*Sporobolus fimbriatus* (Trin.) Nees]

- 1 Field requirements
- 1.1 Subject to the provisions in paragraph 1.2, a field may be registered as a unit only if -
- 1.1.1 no plants of any species of *Sporobolus* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or

1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, or as the case may be.

1.2 A field which is intended for the production of basic seed or certified seed of a particular drop seed grass variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

## 2 Planting requirements

2.1 Seed shall be sown or be established in rows on a unit.

2.2 All vegetation within a distance of three metres around a unit shall be kept short from the full seed stage thereof until seed has been harvested from the plants on the unit concerned.

## 3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which is at least five metres wide.

3.2 Such isolation area shall be free from plants of any drop seed grass variety.

## 4 Requirements for plants

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.1.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

4.2 Plants established on a unit registered for the production of certified pre-basic seed or basic seed, may, after the establishment thereof, be used for such purpose for a period of not more than two years.

4.3 After the use of plants on a unit for the production of certified pre-basic seed or basic seed, these plants can be used for the production of certified seed provided the unit has been registered for the production of certified seed.

4.4 Plants established on a unit for the production of certified seed -

4.4.1 may be used for this purpose for a period of not more than four years; and

4.4.2 may, with the written approval from the Authority, be used for that purpose for a further period of two years.

## 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof; and

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

## 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 70;

6.2 have at least 97,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,5 percent other seed of which no more than 0,3 percent may be weed seed; and

6.3.2 0,2 percent nematode galls.

6.4 Notwithstanding the provisions of paragraph 6.3.1, -

6.4.1 the percentage seed of *Eragrostis tef* (Zucc.) Trotter and *Eragrostis curvula* (Schrad.) Nees in seed shall -

6.4.1.1 in the case of certified pre-basic seed or basic seed, not exceed 0,1 percent; and

6.4.1.2 in the case of certified seed, not exceed 0,2 percent; and

6.4.2 *E. plana* Nees in seed of all generation, not exceed 0,1 percent; and

6.4.3 not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

**ANNEXURE 63****REQUIREMENTS RELATING TO WHITE CLOVER (*Trifolium repens* L.)****1 Field requirements**

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if -

1.1.1 no plants of any species of *Trifolium* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or

1.1.2 the plants which are already established thereon have also during the preceding growing season been used for the production of certified pre-basic seed or basic seed or certified seed, as the case may be.

1.2 A field which is intended for the production of seed of a particular white clover variety may -

1.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not be registered as a unit for more than two consecutive growing seasons if breeder seed or certified pre-basic seed of the same variety is annually established thereon; and

1.2.2 in the case of the intended production of certified seed, not be registered as a unit for more than three consecutive growing seasons if certified pre-basic seed or basic seed of the same variety is annually established thereon: Provided that such field may also be registered as a unit if certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

**2 Planting requirements**

2.1 Plants shall be established in rows on a unit.

2.2 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.

**3 Isolation requirements**

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -

3.1.1.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and

3.1.1.2 is at least 100 metres wide where the area of the unit concerned is more than two hectares; and

3.1.2 in the case of the intended production of certified seed -

3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and

3.1.2.2 is at least 50 metres wide where the area of the unit concerned is more than two hectares.

3.2 Such isolation area shall be free from plants of any white clover variety which flower at the same time as the plants on the unit concerned, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

**4 Requirements for plants**

4.1 Plants which are established on a unit may annually be grazed from after the removal of the seed crop until 15 October of the following growing season.

4.2 The number of deviating plants on a unit shall -

4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and

4.2.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.

**5 Inspection requirements**

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering stage thereof; and

- 5.3 during the full seed stage thereof.
- 6 Physical requirements  
Seed shall -
- 6.1 have a germination or a viability percentage of at least 70;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,2 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 64

### REQUIREMENTS RELATING TO ARROW LEAF CLOVER (*Trifolium vesiculosum* Savi)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Trifolium* have been established thereon for seed production or otherwise during the growing season preceding the registration thereof; or
- 1.2 A field which is intended for the production of basic seed or certified seed of a particular tall arrow leaf clover variety may also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
- 2.1 Plants shall be established in rows on a unit.
- 2.2 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
- 3.1 A unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic seed or basic seed -
- 3.1.1.1 is at least 200 metres wide where the area of the unit concerned is two hectares or less; and
- 3.1.1.2 is at least 100 metres wide where the area of the unit concerned is more than two hectares; and
- 3.1.2 in the case of the intended production of certified seed -
- 3.1.2.1 is at least 100 metres wide where the area of the unit concerned is two hectares or less; and
- 3.1.2.2 is at least 50 metres wide where the area of the unit concerned is more than two hectares.
- 3.2 Such isolation area shall be free from plants of any arrow leaf clover variety which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and
- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety.
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 4 Requirements for plants
- 4.1 Plants which are established on a unit may annually be grazed after the removal of the seed crop therefrom until October 15 of the following growing season.
- 4.2 The number of deviating plants on a unit shall -

- 4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed one plant per 30 square metres; and
- 4.2.2 in the case of the intended production of certified seed, not exceed one plant per 10 square metres.
- 5 Inspection requirements  
Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof;
- 5.2 during the flowering stage thereof; and
- 5.3 during the full seed stage thereof.
- 6 Physical requirements  
Seed shall -
- 6.1 have a germination percentage of at least 70;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,2 percent other seed; and
- 6.3.2 2,0 percent other material.
- 6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 65

### REQUIREMENTS RELATING TO TRITICALE (*xTriticosecale* Wittm. ex A. Camus)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Triticosecale* or *Secale cereale* have been established thereon for seed production or otherwise during the two growing seasons preceding the registration thereof; or
- 1.2 Only in the case of an open-pollinated variety, may a field which is intended for the production of basic seed or certified seed of a particular triticale variety also be registered as a unit, if-
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.
- 1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.
- 2 Planting requirements
- 2.1 Seed shall be sown or be established in rows on a unit.
- 2.2 All vegetation within a distance of three metres around a unit shall be kept short until seed has been harvested from the plants on the unit concerned.
- 3 Isolation requirements
- 3.1 Subject to the provisions of paragraph 3.3, a unit shall be surrounded by an isolation area which -
- 3.1.1 in the case of the intended production of certified pre-basic and basic seed of -
- 3.1.1.1 an open-pollinated variety, is at least 500 metres wide; and
- 3.1.1.2 a hybrid variety, is at least 750 metres wide; and
- 3.1.2 in the case of the intended production of certified seed -
- 3.1.2.1 an open-pollinated variety, is at least 5 metres wide; and
- 3.1.2.2 of a hybrid variety, is at least 500 metres wide.
- 3.2 Such isolation area shall be free from plants of any triticale variety or species of *Triticosecale* or *Secale* which flower at the same time as the plants on the unit concerned, unless -
- 3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

- 3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and
- 3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.
- 3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -
- 3.3.1 a common pollen parent is used; and
- 3.3.2 a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

#### 4 Requirements for plants

- 4.1 Subject to the provisions of paragraph 4.2, the number of deviating plants on a unit shall -
- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If male sterility is used in the seed parent of a hybrid variety -
- 4.2.1 the number of deviating pollen-shedding plants of the pollen parent on a unit shall -
- 4.2.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers; and
- 4.2.1.2 in the case of the intended production of certified seed, not exceed 0,1 percent of the plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent have pollen-susceptible flowers.
- 4.2.2 the number of deviating plants of the seed parent on a unit shall -
- 4.2.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent of the plants of the seed parent; and
- 4.2.2.2 in the case of the intended production of certified seed, not exceed 0,3 percent of the plants of the seed parent; and
- 4.2.3 the number of pollen-shedding plants of the seed parent on a unit shall -
- 4.2.3.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent of the plants of the seed parent at the stage at which 5,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate number of plants with pollen-shedding flowers found during consecutive inspections shall not exceed 0,3 percent of the plants of the seed parent; and
- 4.2.3.2 in the case of the intended production of certified seed, not exceed 0,5 percent of the plants of the seed parent at the stage at which 10,0 percent or more of the plants of the seed parent has pollen-susceptible flowers: Provided that the aggregate of the number of plants with pollen-shedding flowers found during inspections shall not for the three inspections showing the highest incidence of such plants, exceed 1,0 percent of the plants of the seed parent.
- 4.3 If the percentages referred to in paragraphs 4.2.3.1 and 4.2.3.2, are exceeded in respect of a unit, seed of a hybrid variety shall not be considered for certification if it has been harvested from plants which were established within a distance calculated at the rate of 20 meters for each 1,0 percent or portion thereof, but with a maximum of 500 meters, by which the applicable percentage referred to in paragraphs 4.2.3.1 or 4.2.3.2 is exceeded from the unit concerned.

#### 5 Inspection requirements

- Plants which are established on a unit shall be inspected -
- 5.1 before the flowering stage thereof;
- 5.2 during the flowering stage thereof; and
- 5.3 during the full seed stage thereof.

#### 6 Physical requirements

- Seed shall -
- 6.1 have a germination percentage of at least 80;
- 6.2 have at least 98,0 percent pure seed; and
- 6.3 not contain more than -
- 6.3.1 0,5 percent other seed, but not more than 0,2 percent weed seed; and
- 6.3.2 2,0 percent other material.
- 6.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of wild oats may occur in 400 g of seed and not more than one seed of any of the restricted weed seed species may

occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 66

### REQUIREMENTS RELATING TO WHEAT & DURUM WHEAT (*Triticum aestivum* L. subsp. *aestivum*) & *Triticum turgidum* L. subsp. *durum* (Desf.) van Slangeren

#### 1 Field requirements

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any *Triticum* species have been established thereon for seed production or otherwise during the year preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a wheat variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

#### 2 Planting requirements

Seed may be sown or be established in rows on a unit.

#### 3 Isolation requirements

3.1 The isolation area surrounding a unit shall be at least 5 meters wide.

3.2 Such isolation area shall be free from plants of any wheat specie or species of *Triticum*.

#### 4 Requirements for plants

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,3 percent.

4.2 Methods for determination of deviating plants shall be as determined by the authority.

#### 5 Inspection requirements

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering stage thereof; and

5.3 during the full seed stage thereof.

#### 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 85.

6.2 have at least 99,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,3 percent other seed, but not more than 0,05 percent weed seed; and

6.3.2 1,0 percent other material; and

6.4 Notwithstanding the provisions of paragraph 6.4.1, not more than one seed of wild oats may occur in a 400 g seed sample and not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

**ANNEXURE 67****REQUIREMENTS RELATING TO BROAD BEAN (*Vicia faba* L.)****1 Field requirements**

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any broad bean variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular broad bean variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season;

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season;

and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

**2 Planting requirements**

Plants shall be established in rows on a unit.

**3 Isolation requirements**

3.1 A unit shall be surrounded by an isolation area which is at least 15 metres wide.

3.2 Such isolation area shall be free from plants of any broad bean variety.

**4 Requirements for plants**

The number of deviating plants on a unit shall -

4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

**5 Inspection requirements**

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering to pod stage thereof; and

5.3 during the full seed stage thereof.

**6 Physical requirements**

Seed shall -

6.1 have a germination percentage of at least 70;

6.2 have at least 99,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,05 percent other seed; and

6.3.2 1,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

**ANNEXURE 68****REQUIREMENTS RELATING TO COWPEA, DOLICHOS & LAB-LAB BEAN [*Vigna unguiculata* (L.) Walpers]; *Dolichos biflorus* L. & *Lablab purpureus* (L.) Sweet]****1 Field requirements**

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any cowpea, dolichos or lab-lab bean variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 A field which is intended for the production of basic seed or certified seed of a particular cowpea, dolichos or lab-lab bean variety may also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

**2 Planting requirements**

Plants shall be established in rows on a unit.

**3 Isolation requirement**

3.1 A unit shall be surrounded by an isolation area which is at least 20 metres wide.

3.2 Such isolation area shall be free from plants of any cowpea, dolichos or lab-lab bean variety as the case may be.

**4 Requirements for plants**

4.1 The number of deviating plants on a unit shall -

4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,2 percent; and

4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.

4.2 The number of disease-infected plants on a unit shall -

4.2.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 5,0 percent; and

4.2.2 in the case of the intended production of certified seed, not exceed 8,0 percent.

4.3 For the purposes of paragraph 4.2 "disease-infected plants" shall mean plants which are not visually free from the pathogens *Pseudomonas syringae* or *Xanthomonas vignicola* Barkholder.

**5 Inspection requirements**

Plants which are established on a unit shall be inspected -

5.1 before the flowering stage thereof;

5.2 during the flowering to pod stage thereof; and

5.3 during the full seed stage thereof.

**6 Physical requirements**

Seed shall -

6.1 have a germination percentage of at least 70;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,05 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested; and

6.4 not contain more than 0,2 percent sclerotia of *Sclerotinia sclerotiorum* in a 1000 gram sample.

**ANNEXURE 69****REQUIREMENTS RELATING TO MAIZE (*Zea mays* L.)****1 Field requirements**

1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any *Zea* variety have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.

1.2 Only in the case of an open-pollinated variety, may a field which is intended for the production of basic seed or certified seed of a particular maize variety also be registered as a unit, if -

1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season.

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

**2 Planting requirements**

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

2.3 In the case of the intended production of seed of a hybrid variety -

2.3.1 the plants of the seed parent and those of the pollen parent shall be established in separate rows; and

2.3.2 rows containing plants of the pollen parent shall be clearly marked., unless the authorised person determines otherwise in writing in a particular case after consideration of a written request by the seed grower concerned.

**3 Isolation requirements**

3.1 Subject to the provisions of paragraph 3.3, 3.4 and 3.5, a unit shall be surrounded by an isolation area which shall be at least 350 metres wide; and

3.1.1 in the case of the intended production of certified seed of an open pollinated variety, a unit shall be surrounded by an isolation area which shall be at least 200 metres wide.

3.2 Such isolation area shall be free from plants of any maize variety or species of *Zea* which shed pollen at the stage at which the plants on the unit concerned show pollen-susceptible silk, unless -

3.2.1 in the case of the intended production of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

3.3 Plants of different seed parents of a hybrid variety may be established on adjoining units if -

3.3.1 a common pollen parent is used; and

3.3.2 a distance of at least five metres wide, which is free from plants of the seed parents concerned, is maintained between the units concerned.

3.4 An area at least 400 metres wide around a unit which is intended for the production of certified pre-basic seed or basic seed shall be free from plants of any maize variety or species of *Zea* which shed pollen at the stage at which the plants on the unit concerned show pollen-susceptible silk.

3.5 Plants of a yellow kernel variety may be established on a field adjoining a unit which is intended for the production of certified seed of a white kernel variety if -

3.5.1 such adjoining field is not intended for the production of certified pre-basic seed or basic seed or certified seed;

3.5.2 no plants with seed cobs containing white kernels occur on such adjoining field; and

3.5.3 a distance of at least five metres wide, which is free from any plants of a variety of a species of *Zea*, is maintained between the unit and field concerned.

**4 Requirements for plants**

4.1 Subject to the provisions of paragraphs 4.2, 4.3 and 4.4, the number of deviating plants on a unit shall -

- 4.1.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,1 percent; and
- 4.1.2 in the case of the intended production of certified seed, not exceed 0,5 percent.
- 4.2 If plants are established on a unit with a view to the production of certified pre-basic seed or basic seed of a hybrid variety -
- 4.2.1 the number of deviating pollen-shedding plants of the pollen parent at any stage after the plants of the seed parent show pollen-susceptible silk shall not exceed 0,1 percent of the plants of the pollen parent;
- 4.2.2 the number of deviating plants of the seed parent at the stage at which the plants of the seed parent no longer show pollen-susceptible silk shall not exceed 0,1 percent of the plants of the seed parent; and
- 4.2.3 the number of pollen-shedding plants of the seed parent at the stage at which 2 percent or more of those plants show pollen-susceptible silk -
- 4.2.3.1 during a particular inspection of that unit, not exceed 0,5 percent of the plants of the seed parent: Provided that the aggregate of the number of pollen-shedding plants of the seed parent found during consecutive inspections shall not exceed 1,0 percent of the plants of the seed parent; and
- 4.2.3.2 shall during a particular inspection of a single row or a portion thereof, or of two adjacent rows or portions thereof, not exceed 5,0 percent of the plants of the seed parent in that row or rows or portion or portions;
- 4.2.4 the number of ripe deviating seed cobs on or harvested from the plants of the seed parent shall not exceed 0,1 percent of the seed cobs on or harvested from the plants of the seed parent.
- 4.3 If plants are established on a unit with a view to the production of certified seed of a hybrid variety -
- 4.3.1 the number of deviating pollen-shedding plants of the pollen parent at the stage at which 5,0 percent or more of the plants of the seed parent show pollen-susceptible silk shall not exceed 0,2 percent of the plants of the pollen parent;
- 4.3.2 the number of deviating plants of the seed parent at the stage at which the plants of the seed parent no longer show pollen-susceptible silk shall not exceed 0,2 percent of the plants of the seed parent;
- 4.3.3 the number of pollen-shedding plants of the seed parent at the stage at which 5,0 percent or more of those plants show pollen-susceptible silk -
- 4.3.3.1 shall during a particular inspection of that unit, not exceed 1,0 percent of the plants of the seed parent : Provided that the aggregate of the number of pollen-shedding plants of the seed parent found during inspections shall not for the three inspections showing the highest incidence of such plants exceed 1,0 percent of the plants of the seed parent; and
- 4.3.3.2 shall during a particular inspection of a single row or a portion thereof, or of two adjacent rows or portions thereof, not exceed 5,0 percent of the plants of the seed parent in that row or rows or portion or portions; and
- 4.3.4 the number of ripe deviating seed cobs on or harvested from the plants of the seed parent shall not exceed 0,2 percent of the seed cobs on or harvested from the plants of the seed parent.
- 4.4 If the percentages referred to in paragraphs 4.2.3 and 4.3.3 are exceeded in respect of a unit, seed of a hybrid variety shall not be considered for certification if it has been harvested from plants which were established -
- 4.4.1 within a distance calculated at the rate of 10 metres for each 1,0 percent or portion thereof, but with a maximum of 350 metres, by which the applicable percentage referred to in paragraphs 4.2.3.1 and 4.3.3.1 is exceeded from the unit concerned; and
- 4.4.2 within a distance calculated at the rate of five metres plus one metre for each 1,0 percent or portion thereof, but with a maximum of 50 metres, by which the applicable percentage referred to in paragraphs 4.2.3.2 or 4.3.3.2 is exceeded from the row or rows or portion or portions thereof concerned.
- 5 Inspection requirements
- 5.1 Plants which are established on a unit shall be inspected -
- 5.1.1 before the flowering stage thereof;
- 5.1.2 during the flowering stage thereof; and
- 5.1.3 during the full seed stage thereof.
- 5.2 A seed grower shall notify the authorized person at least five days prior to the date on which the plants on a unit are expected to start flowering.
- 5.3 If plants have been established on a unit with a view to the production of certified pre-basic seed or basic seed of a hybrid variety -

- 5.3.1 the seed grower concerned shall pick and dehusk the seed cobs of the plants of the seed parent and thereafter remove it from the unit concerned with a view to thresh it;
- 5.3.2 those seed cobs shall be inspected after having been picked and dehusked; be inspected before being threshed; and
- 5.3.3 the seed grower concerned shall notify the authorised person at least five days prior to the date on which such seed cobs are expected to be threshed.
- 5.4 If plants have been established on a unit with a view to the production of certified seed of a hybrid variety-
- 5.4.1 the seed grower concerned shall either -
- 5.4.1.1 pick the seed cobs of the plants of the seed parent and remove it from the unit concerned before threshing those seed cobs; or
- 5.4.1.2 harvest or otherwise remove the seed cobs of the plants of the pollen parent before the seed of the plants of the seed parent is harvested by means of a combine harvester;
- 5.4.2 the seed cobs referred to in paragraph 5.4.1.1 or the plants of the seed parent referred to in paragraph 5.4.1.2, or as the case may be, shall respectively be inspected before being threshed or being harvested by means of a combine harvester; and
- 5.4.3 the seed grower concerned shall notify the authorised person at least five days prior to the date on which the seed of the plants concerned of the seed parent is expected to be harvested.
- 6 Physical requirements
- 6.1 Certified pre-basic seed or basic seed shall -
- 6.1.1 have a germination percentage of at least 70;
- 6.1.2 have at least 99,0 percent pure seed; and
- 6.1.3 not contain more than -
- 6.1.3.1 0,2 percent other seed;
- 6.1.3.2 1,0 percent other material;
- 6.1.3.3 0,1 percent seed of which the colour of the endosperm deviates from the colour of the endosperm of the variety concerned.
- 6.1.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.
- 6.2 Certified seed shall -
- 6.2.1 have a germination percentage of at least 90;
- 6.2.2 have at least 99,0 percent pure seed; and
- 6.2.3 not contain more than -
- 6.2.3.1 0,05 percent other seed;
- 6.2.3.2 1,0 percent other material; and
- 6.2.3.3 0,2 percent seed of which the colour of the endosperm differs from the colour of the endosperm of the variety concerned.
- 6.2.4 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## ANNEXURE 70

### REQUIREMENTS RELATING TO SWEET CORN (*Zea mays* L. var. *saccharata* Baily)

- 1 Field requirements
- 1.1 Subject to the provisions of paragraph 1.2, a field may be registered as a unit only if no plants of any species of *Zea* of have been established thereon for seed production or otherwise during the growing season preceding the registration thereof.
- 1.2 Only in the case of an open-pollinated variety, may a field which is intended for the production of basic seed or certified seed of a particular maize variety also be registered as a unit, if -
- 1.2.1 in the case of basic seed, certified pre-basic seed of the same variety has been produced thereon during the preceding growing season; and
- 1.2.2 in the case of certified seed, certified pre-basic seed or basic seed of the same variety has been produced thereon during the preceding growing season; and

1.2.3 in the case of 2nd generation certified seed, 1st generation certified seed of the same variety has been produced thereon during the preceding growing season.

## 2 Planting requirements

2.1 Plants shall be established in rows on a unit.

2.2 Gap-filling in rows shall not be permissible.

## 3 Isolation requirements

3.1 A unit shall be surrounded by an isolation area which -

3.1.1 in the case of the intended production of certified pre-basic seed or basic seed is at least 800 metres wide; and

3.1.2 in the case of the intended production of certified seed is at least 400 metres wide.

3.2 Such isolation area shall be free from plants of any sweet corn variety or species of *Zea* which shed pollen at the stage on which the plants on the unit concerned show pollen-susceptible silk, unless -

3.2.1 in the case of the intended production certified of basic seed, they have been established from certified pre-basic seed of the same variety; and

3.2.2 in the case of the intended production of certified seed, they have been established from certified pre-basic seed or basic seed of the same variety; and

3.2.3 in the case of the intended production of an open-pollinated variety of 2nd generation certified seed, they have been established from 1st generation certified seed of the same variety.

## 4 Requirements for plants

The number of deviating plants on a unit shall -

4.1 in the case of the intended production of certified pre-basic seed or basic seed, not exceed 0,5 percent; and

4.2 in the case of the intended production of certified seed, not exceed 1,0 percent.

## 5 Inspection requirements

5.1 Plants which have been established on a unit shall be inspected -

5.1.1 before the flowering stage thereof;

5.1.2 at the stage on which 5,0 percent or more thereof show pollen-susceptible silk; and

5.1.3 during the full seed stage thereof.

5.2 The ripe seed cobs of the plants, which have been established on a unit, shall be inspected prior to the harvesting thereof.

5.3 An inspection referred to in paragraph 5.2, shall only be done after the seed cobs concerned have been defoliated.

5.4 A seed grower shall notify the authorised person at least 10 days prior to the date on which seed cobs will be ready for inspection referred to in paragraph 5.2.

## 6 Physical requirements

Seed shall -

6.1 have a germination percentage of at least 80;

6.2 have at least 98,0 percent pure seed; and

6.3 not contain more than -

6.3.1 0,05 percent other seed; and

6.3.2 2,0 percent other material.

6.3.3 Notwithstanding the provisions of paragraph 6.3.1, not more than one seed of any of the restricted weed seed species may occur in an ISTA working sample for the determination of other seed by number of the specie being tested.

## FORESTRY, FISHERIES AND THE ENVIRONMENT, DEPARTMENT OF

NO. 693

6 August 2021

**NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT, 2004  
(ACT NO. 39 OF 2004)****SECOND GENERATION AIR QUALITY MANAGEMENT PLAN FOR THE VAAL TRIANGLE AIRSHED  
PRIORITY AREA**

I, Barbara Dallas Creecy, Minister of Forestry, Fisheries and the Environment, hereby publish the Second Generation Air Quality Management Plan for the Vaal Triangle Airshed Priority Area, in terms of section 19(1) and (5) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004), as set out in the Schedule hereto, for implementation.

  
**BARBARA DALLAS CREECY****MINISTER OF FORESTRY, FISHERIES AND THE ENVIRONMENT**



# forestry, fisheries & the environment

Department:  
Forestry, Fisheries and the Environment  
**REPUBLIC OF SOUTH AFRICA**

## **THE SECOND GENERATION VAAL TRIANGLE AIRSHED PRIORITY AREA AIR QUALITY MANAGEMENT PLAN: FINAL PLAN**

**SCHEDULE A:****Abbreviations, Symbols, Units**

<b>Abbreviations</b>	
AARTO	Administrative Adjudication of Road Traffic Offences
AEL	Atmospheric Emissions License
AIR	Air Impact Report
AQA	Air Quality Assessment
AQM	Air quality management
AQMP	Air quality management plan
BnM	Basa Njenjo Magogo
CAMx	Comprehensive Air Quality Model with Extensions
CBO	Community Based Organisation
COJ	City of Johannesburg
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEA	Department of Environmental Affairs (now DFFE)
DEAT	Department of Environmental Affairs and Tourism (now DFFE)
DEFF	Department of Environment, Forestry and Fisheries (previously DEAT)
DFFE	Department of Forestry, Fisheries and the Environment (previously DEFF)
DESTEA	Department of Economic, Small Business Development, Tourism and Environmental Affairs (Free State)
DHS	Department of Human Settlements
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DOH	Department of Health
DOT	Department of Transport
DST	Department of Science and Technology
DTI	Department of Trade and Industry
EIA	Environmental Impact Assessment
EPWP	Expanded Public Works Programme
FINN	Fire Inventory
GAINS	Greenhouse Gas – Air Pollution Interactions and Synergies
GAUTRANS	Gauteng Department of Roads and Transport
GCR	Gauteng City-region
GDARD	Gauteng Department of Agriculture and Rural Development
GG	Government Gazette
GHG	Greenhouse gas
ITTs	Implementation Task Teams
LM	Local Municipality
LPG	Liquefied Petroleum Gas
MSRG	Multi-Stakeholder Reference Group
NAAQS	National Ambient Air Quality Standards
NAEIS	National Atmospheric Emission Inventory System
NCAR	National Center for Atmospheric Research
NEM:AQA	National Environmental Management: Air Quality Act

THE SECOND GENERATION VAAL TRIANGLE AIRSHED PRIORITY AREA AIR QUALITY MANAGEMENT PLAN: FINAL PLAN

<b>Abbreviations</b>	
NDCR	National Dust Control Regulations
NGO	Non-governmental organisation
PPP	Pollution Prevention Plan
PRASA	Passenger Rail Agency of South Africa
RDP	Reconstruction and Development Programme
SANEDI	South African National Energy Development Institute
SANRAL	South African National Roads Agency Limited
SAPS	South African Police Service
SMART	Simple, Measurable, Achievable, Realistic and Time-Bound
TSF	Tailing storage facility
VKT	Vehicle kilometres travelled
VTAPA	Vaal Triangle Airshed Priority Area
WHO	World Health Organization
WRF	Weather Research and Forecasting Model

<b>Symbols</b>	
BVOC	Biogenic volatile organic compounds
CO	Carbon monoxide
CH <sub>4</sub>	Methane
NMVOC	Non-methane volatile organic compounds
NO <sub>x</sub>	Oxides of nitrogen
NO <sub>2</sub>	Nitrogen dioxide
NH <sub>3</sub>	Ammonia
O <sub>3</sub>	Ozone
Pb	Lead
PM	Particulate matter
PM <sub>2.5</sub>	Inhalable particulate matter (aerodynamic diameter less than 2.5 µm)
PM <sub>10</sub>	Thoracic particulate matter (aerodynamic diameter less than 10 µm)
SO <sub>2</sub>	Sulfur dioxide
VOC	Volatile organic compounds

<b>Units</b>	
°C	Degree Celsius
g	Gram(s)
g/m <sup>2</sup>	Grams per square metre
g/s	Grams per second
g/s.m <sup>2</sup>	Grams per second per square metre
kg	Kilograms
kg/day	Kilograms per day
km	Kilometre
kPa	Kilopascal
K	Temperature in Kelvin
1 kilogram	1 000 grams

ii

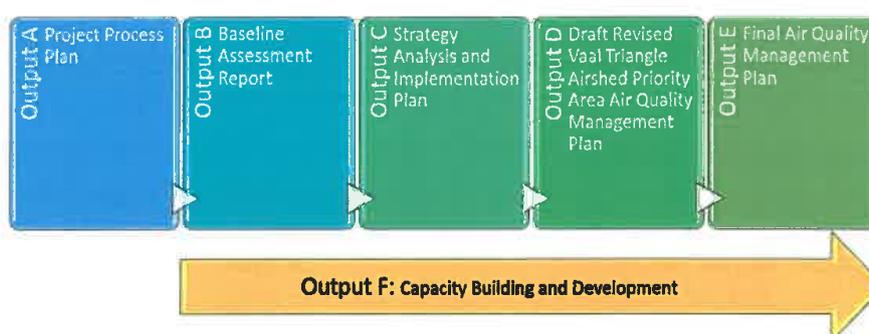
THE SECOND GENERATION VAAL TRIANGLE AIRSHED PRIORITY AREA AIR QUALITY MANAGEMENT PLAN: FINAL PLAN

Units	
m	Metre
m/s	Metres per second
mamsl	Metres above mean sea level
µg	Microgram(s)
µg/m <sup>3</sup>	Micrograms per cubic metre
m <sup>2</sup>	Square metre
m <sup>3</sup>	Cubic metre
m <sup>3</sup> /hr	Cubic metre per hour
mg/m <sup>2</sup> .day	Milligram per square metre per day
mg/Nm <sup>3</sup>	Milligram per normal cubic metre (normalised at 273 K; 101.3 kpa)
MW	Mega Watt
ppm	Parts per million
t/a	Tonnes per annum

## Executive Summary

The Vaal Triangle Airshed was declared a priority area in April 2006 (Government Gazette Notice No. 365 of 21 April 2006, as amended by Notice 711 of 17 August 2007) due to the concern of elevated pollutant concentrations within the area, specifically particulate matter. An AQMP was developed for the area between 2006 and 2008 with the final AQMP published in May 2009 (Government Gazette No. 32254, 29 May 2009). A medium-term review was conducted in 2013 to inform objectives that ensure improvement in air quality in the area. The objective of the second generation Air Quality Management Plan (AQMP) was to characterise the baseline after seven years and determine the improvement, if any, that resulted from the implementation of the 2009 AQMP. This second generation AQMP aimed to establish new strategies and intervention plans, based on a better understanding of the cause and effect relationships, that will ensure further improvement and eventual compliance within the area.

The development of a second generation VTAPA AQMP was undertaken in six (6) phases as shown in the figure below, with each task or output having a verifiable indicator and provided a means of verification as shown in Table A.



**Table A: Summary of immediate objectives, verifiable indicators and means of verification**

Description	Verifiable Indicator	Means of Verification
Output A: Project Process Plan	A clear and unambiguous plan on how the project is to be conducted	Project Process Plan approved by the PSC/National Air Quality Officer
Output B: Baseline assessment report	<ul style="list-style-type: none"> <li>A comprehensive baseline assessment report with verifiable information</li> <li>VTAPA emissions inventory (comprehensive database/spreadsheets and GIS files)</li> <li>Dispersion modelling input files</li> </ul>	A baseline report approved by PSC
Output C: Strategy Analysis and Implementation Plan	Strategy Analysis and Implementation Plan with SMART objectives, clear activity descriptions, clear resource requirements and indicators	Strategy Analysis and Implementation Plan
Output D: Draft Revised Vaal Triangle Airshed Priority Area Air Quality Management Plan	A draft AQMP based on current, accurate and relevant information that is informed by best practice in the field of air quality management. The AQMP should provide a clean and practical plan to efficiently and effectively bring air quality in the area into sustainable compliance with NAAQS within agreed timeframes	Draft plan published in the Gazette for public comment

Description	Verifiable Indicator	Means of Verification
Output E: Final Vaal Triangle Airshed Priority Area Air Quality Management Plan	A final AQMP based on current, accurate and relevant information that is informed by best practice in the field of air quality management. The AQMP should provide a clean and practical plan to efficiently and effectively bring air quality in the area into sustainable compliance with NAAQS within agreed timeframes. The final AQMP would take into account public comments.	Plan published in the Gazette.
Output F: Capacity Building/Development	Active involvement of departmental staff in the implementation of the project	Capacity building plan submitted to DFFE and progress reports

Notes: DFFE stands for Department of Forestry, Fishery and the Environment, previously the Department of Environmental Affairs (DEA), and before that the Department of Environmental Affairs and Tourism (DEAT).

#### Assessment of the First Generation VTAPA AQMP

The development of the AQMP followed a holistic approach due to the complex nature of air quality issues within the VTAPA, and resulted in the identification of management measures which, at the time, were thought to ensure improvement in the air quality in the area over time.

At the time of the 2009 first generation VTAPA AQMP, the AQA had been in place for only five years with sections still under development. Since then 22 publications assisting with AQMP implementation have been gazetted.

#### *The main findings from the first generation AQMP*

Limited ambient monitoring data were available at the time of the AQMP development and the Department of Environment, Forestry and Fishery (DFFE) (previous DEAT and DEA) commissioned six ambient air quality stations in 2007. Available data indicated elevated PM<sub>10</sub> concentrations over the largest part of the VTAPA with areas where SO<sub>2</sub> and ozone were high. Dispersion modelling was used to determine the spatial extent of ambient concentrations and relied on a first level emissions inventory. The emissions inventory included industrial, power generation, domestic fuel burning, mining and vehicle emissions, and focussed on criteria pollutants. Simulated ground level concentrations indicated PM<sub>10</sub> to be the main pollutant of concern within the VTAPA resulting in six priority areas or "hotspots". These "hotspots" were primarily around industrial and residential areas.

The 2009 intervention strategies were based on the cause and effect relationships using the Logical Framework Approach (LFA). Eleven problem complexes were identified around which problem and associated objective trees were developed. Emission problem complexes included: (i) Biomass Burning, (ii) Domestic Fuel Burning, (iii) Iron, Steel and FerroAlloys, (iv) Mining, (v) Petrochemical, (vi) Power Generation, (vii) Small Industries, (viii) Transportation and (ix) Waste Burning. Non-emission problem complexes included (x) Government Capacity for Air Quality Management, and (xi) Information Management. Several interventions within each problem complex were expanded into action plans providing assumptions associated with the intervention strategy, estimated costs, timeframes and indicator. Each industry had to develop a detailed emission reduction strategy in support of the overall objectives of the interventions. As an interim indicator of performance, and in the absence of the NAAQS at the time, air quality objectives were determined for the VTAPA. At the time of the implementation of the plan, there were still limited capacity and technical knowledge.

A medium-term review of the first generation AQMP was conducted in 2013. Based on the status at the time, 46% of the set interventions were successfully implemented, 18% were in progress, 22% could not be achieved and 14% could not be ascertained. The industrial stakeholders were found to have met their obligations to a larger degree than any of the other sectors, with performance of government stakeholders and municipalities generally low or not ascertained. The Multi

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Stakeholder Reference Group (MSRG) members overall view was that inadequacy in capacity and the failure to achieve many of the planned interventions and objectives were the main reasons for failing at implementing the VTAPA AQMP.

### **Second Generation AQMP Baseline Assessment Findings**

A background assessment covering the evaluation of ambient air quality in the VTAPA, an emission inventory representing the year 2017, and associated dispersion modelling results were conducted as part of the second generation AQMP. The assessment provided a good understanding of the current state of air quality within the VTAPA and to some extent, the source contributions to the ambient pollution levels. The preliminary results from a large-scale source apportionment study, currently in the final stages, provided the link between source and receptor allowing for the identification of desired intervention strategies.

The main finding thus far from the Source Apportionment Study (SAS) is that dust is the main source of PM<sub>10</sub> concentrations within the VTAPA, with the main sources contributing to PM<sub>2.5</sub> still unaccounted for. The unaccounted fraction will be narrowed down through use of the positive matrix factorization (PMF) model as well as industry profiling. Nonetheless, the contribution from sulphates, domestic fuel burning, biomass burning, and vehicles were significant in all three campaigns.

#### *Background Assessment*

The background assessment used existing information to assess the current state of air in the VTAPA, as well as to understand the geographical context of the priority area; the drivers of air quality; and how the air quality has changed since the 2009 AQMP and the 2013 medium term review. Use was made of the 2011 Census data and the 2016 Community Survey statistics, where the 2009 VTAPA AQMP study made use of the 2001 Census data. In 2001 the population was reported to be 2 532 362, increasing to 2 848 140 in 2011 and by a further 10% in 2016 (3 127 907).

#### *Emission Inventory*

The emission inventory for the second generation VTAPA AQMP assessed available emissions data, quantified fugitive emission sources, and identified gaps in the emission inventory. Two emission inventories were developed: one for the VTAPA and one as a regional emission inventory. The focus of the emission inventory was on criteria pollutants, especially for the industrial sources. The VTAPA emission inventory was used for management purposes, and the regional emission inventory was used for dispersion modelling.

Emissions were quantified for all main sources within the VTAPA, as well as sources from the surrounding areas to form input into air quality modelling. Sources within the VTAPA include:

- *Industrial Sources:* mostly stationary facilities operating under licenses or registration, of which the emissions are reported to the authorities annually (Section 21 and Section 23 sources) and data reported on in the National Atmospheric Emissions Inventory System (NAEIS) for the 2017 calendar year.
- *Mining Sources:* including two opencast mines (one dolomite and one coal) and one underground coal mine with activity data reported on in NAEIS for the calendar year 2017.
- *Mobile Sources:* use was made of the South African National Roads Agency Ltd (SANRAL) national counts for 2016 and GAUTRANS Gauteng Manual counts for 2015. A top-down and bottom-up approach was followed.
- *Domestic Fuel Burning:* Community Survey 2016 and Census 2011 data were used to proportionally disaggregate national fuel consumption to provincial and then small area level geographic units following both a top-down (for gas, paraffin and coal) and bottom-up (for wood) approach.

- *Waste*: open burning in residential areas was quantified based on available information (no information was available on landfills and wastewater treatment facilities to quantify these emissions).
- *Windblown Dust*: from mine waste facilities, product stockpiles, as well as ash storage facilities for large combustion sources, excluding windblown dust from denuded areas.
- *Biogenic VOC Emission*: plants emitting numerous VOC compounds, primarily Isoprene, were included.
- *Biomass Burning*: Fire INventory (FINN) from National Center for Atmospheric Research (NCAR) data was extracted for the year 2016 for large scale agricultural burning and natural fires.
- *Airfields*: since there are no major commercial airports within the VTAPA, these were excluded.
- *Agriculture*: Including mainly for its contribution to ammonia emissions used in the dispersion model.

Based on the quantified emissions, industrial sources were the main contributors of SO<sub>2</sub> (99.8%) and NO<sub>x</sub> (93%) emissions within the VTAPA. Mobile sources were the only other significant contributors to NO<sub>x</sub> emissions at 7%. Total PM<sub>10</sub> emissions were mainly a result of industrial operations (52%) followed by windblown dust (31%), with biomass burning third contributing at 5%. For the sources for which PM<sub>2.5</sub> emissions were reported and/or quantified, windblown dust was the main contributing source (56%) followed by domestic fuel burning (29%). It should be noted that PM<sub>2.5</sub> is under-reported in the NAEIS and hence the emissions would be higher. CO emissions were a result of domestic fuel burning (28%), mobile sources (27%), biomass burning (26%) and industrial sources (19%). Biogenic VOC emissions were unsurprisingly the main contributor to NMVOC emissions followed by biomass burning. Ammonia emission (NH<sub>3</sub>) sources were mainly (soil) biogenic, with contributions from agriculture (87%) and to a lesser extent mobile sources (11%).

Compared to the 2009 and 2013 medium-term review inventories, the total emissions within the VTAPA remained similar for SO<sub>2</sub> but reduced significantly for NO<sub>x</sub> and PM<sub>10</sub> emissions. The 2017 emission inventory is regarded more comprehensive than the one for 2009.

#### *Ambient Air Quality Assessment*

The ambient air quality assessment made use of available ambient air quality data from the South African Air Quality Information System (SAAQIS), from District Municipalities and from industries. The DEA operates six ambient monitoring stations within the VTAPA, located at Diepkloof, Sharpeville, Three Rivers, Zamdela, Kliprivier and Sebokeng. These stations record meteorological parameters and ambient air quality concentrations for SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. Data was obtained from these stations for the period 2013-2015 to determine dispersion conditions and for the period 2007-2016 to assess ambient air quality trends. In addition, data from the three Sasol ambient monitoring stations was obtained for the same period as well as from the Eskom station and the four ArcelorMittal stations. The Sedibeng DM stations were not included since data was only available for one year (2017).

The main findings were:

- There was some variability in wind fields across the VTAPA monitoring stations, however a predominance of winds from the north-easterly and north-westerly sectors were evident at all stations, with possible exception of Eco Park, where a south-easterly flow was dominant. Winds exceeding 4 m/s were more frequently recorded at Sharpeville, Leitrim, and Eco Park. The Leitrim station recorded the least calm conditions (6%), while calm periods were most frequent at the AJ Jacobs station (30%).
- Long term trends, from 2007 to 2016, in SO<sub>2</sub> concentrations showed compliance with the National Ambient Air Quality Standards (NAAQS) at most of the stations for most of the time. Trends in SO<sub>2</sub> concentrations over 10 years showed small decreases at Diepkloof, Zamdela, Randwater and Eco Park but slight increases over time at Kliprivier, Three

Rivers and AJ Jacobs. Concentrations at Sebokeng, Sharpeville and Leirim showed more annual variability and no distinct long-term trends.

- Annual average NO<sub>2</sub> concentrations were non-compliant with the NAAQS at Diepkloof (all the years except 2011), Kliprivier (2009 and 2010), Sebokeng (2015) and Sharpeville (2015). Hourly NO<sub>2</sub> concentrations were also non-compliant with NAAQS at Sebokeng in 2015, with the lowest concentrations recorded at the Randwater station. Monthly NO<sub>2</sub> concentrations have decreased slightly at the Leirim station, while concentrations have increased at Diepkloof; Three Rivers; Zamdela; and AJ Jacobs stations. At the other stations ambient NO<sub>2</sub> concentrations remained the same.
- PM<sub>10</sub> concentrations were in exceedance of the NAAQS at most of the stations for most of the years except at Eco Park where annual PM<sub>10</sub> has been compliant with NAAQS since the establishment of the station. The highest concentrations were recorded at Zamdela.
- Annual average PM<sub>2.5</sub> concentrations were in non-compliance with NAAQS, for most of the period assessed, except for AJ Jacobs where no annual exceedances were noted between 2014 and 2016. AJ Jacobs and Three Rivers had the lowest annual average concentrations whereas Leirim, Sharpeville, Kliprivier, and Sebokeng had the highest. Annual average concentrations seem to have decreased at Diepkloof and Sebokeng but monthly average PM<sub>2.5</sub> concentrations did not show substantive improvements with slight increases at Kliprivier, Sharpeville, Zamdela and AJ Jacobs stations.

#### *Dispersion Modelling and Scenario Assessment*

The CAMx chemical air quality model was used to simulate ambient air quality concentrations over the VTAPA, including background sources outside the VTAPA boundary. The model also allows for primary and secondary pollutant tracking. The same modelling domain was used as for the 2009 VTAPA AQMP, including the topographical data with an update on the land-use data including all air quality sensitive receptors within the study area.

#### PM<sub>10</sub>

- PM<sub>10</sub> concentrations were in general under-estimated compared to measured concentrations, primarily due to the potential impact of much localized sources near stations.
- High exceedances of the NAAQS (for both 24hr and annual averages) were simulated around industrial facilities, mines and the old tailings areas in the City of Johannesburg (CoJ).
- Exceedances of the NAAQS were also simulated around high emitting residential fuel combustion areas.

#### PM<sub>2.5</sub>

- The model showed reasonable performance even though PM<sub>2.5</sub> concentrations were in general under-estimated in comparison to measured results.
- Exceedances for 24hr averages were simulated over most of VTAPA even with the under-estimation, with annual means showing areas of impact around mines, tailings facilities and areas of heavy domestic fuel combustion.
- Model simulations did not reflect the annual exceedances recorded at Sebokeng and Three Rivers.
- The model did not simulate late evening and early morning peaks – this may be related to over-estimated wind speed.

#### SO<sub>2</sub>

- The model showed overall moderate performance with over-estimated SO<sub>2</sub> concentrations compared to measured results due to over-estimated wind speed – tall stack impacts tend to dominate due to enhanced turbulence.
- General modelled exceedances of the NAAQS were around Lethabo power station and Sasolburg.

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**NO<sub>2</sub>**

- The modelling results generally provided a good comparison to the measured values.
- The model under-estimated at Diepkloof (Ben Naude Street traffic) as the model did not capture micro-scale emissions activity on roads around the monitoring station.
- It over-estimated at AJ Jacobs due to enhanced turbulence leading to Lethabo power-station and Sasol Sasolburg plumes impacting ground level concentrations.
- Higher concentrations were modelled around Sasolburg.

**O<sub>3</sub>**

- Generally, the modelled results indicated a good comparison to the measured values.
- The simulated 8-hour concentrations resulted in NAAQS exceedances over the majority of the VTAPA.
- There was a zone of titration around Sasolburg where the concentrations were lower.

Model simulations indicated widespread exceedances of O<sub>3</sub> and PM over the majority of the VTAPA.

Source tracking was done for industry sources within and outside the VTAPA. PM<sub>10</sub> impacts within VTAPA were primarily due to industries within VTAPA. There is a regional aspect to O<sub>3</sub> formation when related to the precursor contributing sources and for the VTAPA there was a mixed contribution from local industry and those outside, but the outside sources seem to play a larger role in O<sub>3</sub> formation within the VTAPA.

***VTAPA Health Study***

A baseline health assessment study was conducted in the VTAPA during 2013 and 2014. The study comprised of a community survey in four communities and a child respiratory health study (including lung function tests) in four schools within the community study areas, as well as an assessment of human health risks resulting from exposure to air pollution.

The main findings of the study may be summarised as follows:

- Ambient concentrations measured at DEA/South African Weather Services (SAWS) stations in 2013 indicated no risk from SO<sub>2</sub> but indicated risk from NO<sub>2</sub> in Zamdela. PM<sub>10</sub> was found to be a concern with highest concentrations of PM<sub>10</sub> recorded in Sharpeville during 2013.
- From the community survey, risk factors for respiratory illnesses were mostly associated with energy use (coal for cooking and paraffin for heating), overcrowding and hygiene practices (burning or burying of refuse or failure to regularly remove refuse) as well as lifestyle (active and passive smoking and alcohol use).
- The main conditions affecting vulnerability of areas to the effects of air pollution involved socio-economic conditions and energy use. The main areas of vulnerability were north of the Sebokeng and Sharpeville monitoring stations and south-east of the Zamdela monitoring station.
- Although the socio-economic conditions and exposure at the schools were similar, the odds of having chronic symptoms (such as cough, wheeze and phlegm and asthma) were significantly higher at the school in Sharpeville.

There is reason for concern that air pollution in the VTAPA may be affecting child health.

#### *VTAPA Source Apportionment Study*

The VTAPA SAS aims to apportion the contribution of sources to the overall PM<sub>10</sub> and PM<sub>2.5</sub> loading in the VTAPA. Three sampling campaigns were initiated to cover the winter, summer and spring months at four (4) strategically identified sites namely; Kliprivier, Sebokeng, Sharpville and Zamdela in the VTAPA. The samples were analysed for chemical-, elemental- and ionic composition and statistical models were used to apportion the various sources.

Preliminary results indicate:

- The NAAQS are frequently exceeded at all four sites in summer, winter and spring, but it is significantly worse during winter with PM<sub>10</sub>, PM<sub>2.5</sub> and SO<sub>2</sub> the main pollutants of concern.
- The coarse particulate fraction dominated both during daytime and night-time sampling periods, during all three sampling campaigns.
- Elemental characterization of the summer and winter samples showed dust elements in the coarse particulate fraction to be prominent during the day at all four sites. At Kliprivier and Sharpville, and to a lesser extent Zamdela, indicators of combustion products were evident in the evenings in summer and winter. Motor vehicle elements were higher in the coarse fraction at night at all four sites, in both seasons.
- Soluble inorganic concentration loading showed inorganic content from crustal and anthropogenic activities.
- Source apportionment of the coarse particulate fraction indicated dust to be the dominant source, with sulphates and nitrates second.
- In the fine fraction, the largest portion of observed mass is unresolved with sulphates and nitrates dominating at all four sites during all three sampling campaigns.

The main finding thus far from the SAS is that dust is the main source of PM<sub>10</sub> concentrations within the VTAPA, with the main sources contributing to PM<sub>2.5</sub> still unaccounted for. Nonetheless, the contribution from sulphates, domestic fuel burning, biomass burning, and vehicles were significant in all three campaigns.

A qualitative waste burning survey conducted in Sharpville highlighted the large scale of local waste burning and veld fires in this community and reinforces the strong need for improved activity and emission factor data on burning.

#### *GAINS modelling scenario findings*

The GAINS model was used to assess a set of emission reduction scenarios as a first screening to determine the potential for reducing health impacts of air pollutants within the VTAPA. This is done by altering the energy activity mix and applying abatement measures to different sectors.

For the scenarios, 2015 was taken as the baseline year with emission reduction pathways assessed in the medium-term (20-year period). The sectors included in the GAINS modelling scenarios were:

- Domestic Fuel Burning – electrification of households; replacing coal with Liquefied Petroleum Gas (LPG) and implementing low-smoke stoves, with LPG the option with the highest reduction in PM<sub>2.5</sub> emissions.
- Industrial Sector – Implementation of fabric filters versus Electrostatic Precipitators (ESPs) to control PM emissions; controlling SO<sub>2</sub> emissions with flue gas (dry and wet) desulphurisation technologies and use of combustion modification technologies to control NO<sub>x</sub> emissions.

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- Waste Sector – increased municipal waste due to population growth with banning municipal waste burning the preferred scenario.
- Transport Sector – Implementation of Euro 5 and Euro 6 fuel standards in the transport sector, with Euro 6 having the largest reduction in NOx emissions.

#### **VTAPA Capacity Building Plan**

Capacity for air quality management and control at National, Provincial and Local government levels were found to be inadequate to ensure the successful implementation of the intervention plans and a capacity building plan was developed as part of the AQMP. The air quality officers and relevant government officials from the various municipalities within the VTAPA identified the required skills to be developed and areas of interest in air quality management. Training on emissions inventory development, specifically for sources and activities within VTAPA, was the most sought-after skillset requirement. A hands-on training course focussing on the smaller sources (i.e. controlled emitters) within the VTAPA and providing additional information in the development of the AQMP were conducted on the 19<sup>th</sup> and 20<sup>th</sup> June 2018 in Pretoria.

The strategic framework for capacity building covered:

- Background to SA emissions inventory,
- Background to VTAPA emissions inventory,
- Brief introduction to sources and sinks (industrial; mining; mobile; domestic fuel burning; waste; windblown dust; biogenic VOC emissions; biomass and others),
- Emissions inventory development, and
- A practical session where each AQO had to identify and collect the relevant information from at least three (3) controlled emitters or small sources within their jurisdiction, and the emissions for these were quantified during the session.

#### **Strategy Analysis**

Identifying appropriate strategies is important for the development of feasible interventions and based on the findings from the baseline characterisation, the preliminary SAS results and the GAINS results, five problem complexes were identified as the main contributors to the current air quality situation in the VTAPA. These complexes are: i) industry; ii) vehicles; iii) windblown dust; iv) waste burning and v) domestic fuel burning.

In order to gain an understanding around the sensitivity of ambient air quality in the VTAPA to the various emission changes (brought about by interventions), modelling was used to translate emission scenarios to changes in pollutant concentrations. A summary of the scenarios is provided in Table B.

**Table B: Summary of emission changes applied for the "new baseline" and scenarios**

Sector	Baseline	Scenario 2025	Scenario 2030
<b>Industry</b>	<p>1. New Vaal open-cast coal mine emissions re-calculated based on this throughput rate and the emission factors for open cast mining in NAEIS.</p> <p>2. Emissions from Gryphon Tiles were re-calculated using MES, and Pegasus Tile Factory emissions were corrected based on emission measurement reports.</p> <p>3. All other emissions as reported in NAEIS.</p>	<p>MES 2020 for industry in 1km domain</p> <p>(assumed industries already compliant, would not increase production and would remain at baseline emissions)</p>	<p>MES 2020 for industry in 1km domain</p> <p>(assumed industries already compliant, would not increase production and would remain at baseline emissions)</p>
<b>Vehicles</b>	No change compared to baseline report	None	100% of vehicle fleet are EURO5 compliant
<b>Dust</b>	No change compared to baseline report	Control Efficiency of 80% on all TSFs	Control Efficiency of 80% on all TSFs
<b>Waste burning</b>	No change compared to baseline report	39% reduction on baseline	60% reduction on baseline
<b>Domestic burning</b>	No change compared to baseline report	53% reduction on baseline	77% reduction on baseline

The main findings from the scenario modelling are as follows:

- Simulations indicate that through the scenario emission reductions, PM may be reduced to acceptable levels. However, 24-hour PM<sub>2.5</sub> remains an issue in the northern VTAPA.
- For NO<sub>2</sub>, the baseline indicates that only the NAAQS for the annual average is exceeded around Sasolburg. The reductions in the scenarios do not reduce this significantly. The majority of reductions in ambient are seen further afield from Sasolburg.
- Ozone remains problematic after both future scenarios. This is primarily due to the region being VOC-limited and emission reductions on NO<sub>x</sub> being moderate. It is also possible the ozone issue involves transboundary impacts into and out of VTAPA; making it a regional management issue.
- Further reductions in SO<sub>2</sub> are required since the 2020 MES will not ensure compliance. These are relevant for Lethabo power-station and other industries around Wolwehoek, Diepkloof Zone 6 and north of Bophelong.

## Air Quality Management Actions for the VTAPA

The objective for VTAPA is

**Compliance with NAAQS within the VTAPA through continuous AQM implementation action and coordination by the various spheres of government and all stakeholders**

### VTAPA Implementation Plan

Interventions for the VTAPA second generation AQMP was developed by means of a Stakeholder Consultation Workshop that was held on the 13<sup>th</sup> of March 2019 in Vanderbijlpark. A total of eight (8) sectors were identified for which specific interventions were developed to form part of the implementation plan. These intervention sectors, and the main goal for that intervention, are as follows:

1. **Industries and power generation / compliance monitoring and enforcement**  
Goal: *All Listed Activities will be compliant with MES and fugitive emissions would have reduced such as to ensure compliance with NAAQS.*
2. **Mining operations**  
Goal: *By 2025, fence line monitoring to confirm compliance with NAAQS, specifically for PM<sub>10</sub> and PM<sub>2.5</sub>, and NDCR.*
3. **Ash dumps and tailings storage facilities**  
Goal: *By 2025, 80% reduction in windblown dust emissions ensuring compliance with NAAQS within the vicinity of all ash dumps and tailings storage facilities.*
4. **Domestic fuel burning**  
Goal: *By 2025, emissions from domestic fuel burning would have decreased by 50%, and with a further 25% reduction by 2030 which would ensure compliance with NAAQS.*
5. **Domestic waste burning**  
Goal: *No informal waste burning by 2030.*
6. **Biomass burning**  
Goal: *Reduced uncontrolled veld fires through veld management measures and quick response times.*
7. **Education and awareness**  
Goal: *Increased awareness on air quality challenges within the VTAPA.*
8. **Vehicle emissions**  
Goal: *By 2025, reduce emissions from vehicles to ensure compliance with NAAQS near roads.*

Implementation plans for each of these intervention sectors are provided in the following tables where the interventions were prioritised based on the significance of the problem necessitating the set intervention, the likelihood of implementation, the cost and the risks linked to the intervention. Since detailed cost associated with each intervention can only be determined through consultation with the various stakeholders<sup>1</sup>, an estimated cost category is indicated as *Low* (<R1,000,000); *Medium* (R1,000,000 – R5,000,000) and *High* (>R5,000,000).

<sup>1</sup> It is noted that the AQMP lacks an accompanying economic impact assessment at a time when there are various other initiatives at provincial and municipal level competing for the same resources. Allocation of funds and resources at initiative level is crucial for successful implementation of the AQMP.

Sector 1: Industries & Power Generation /Compliance Monitoring and Enforcement.

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Minimisation of emissions from regulated facilities	Compliance with the existing MES	Industry, NGO's	Licensing Authority	<b>High cost</b> – for industry <b>Medium cost</b> – for Licensing Authority	AEL's and NAEIS annual reporting More EMI's required for inspections and enforcement (Licencing Authority)	The year 2025	Monitoring reports (Compliance monitoring activities)	High
Minimisation of fugitive emissions (e.g. waste, stockpiles, conveyor belts, haul roads etc.)	Develop and implement the Fugitive Emission Plan informed by Best Environmental Practice	Industry	Licensing Authority	<b>Low cost</b> – for industry and authority	Industry to submit Plan to Licencing Authority within set timeframe as specified in AEL Annual NAEIS reporting	2 years or timeframe to be specified in the AEL	All facilities with AEL submitted plans to the licensing authorities	High
	Identification and implementation of suitable technology (Introduction of binding agents in waste stockpiles and dust suppressants)	Industry	Licensing Authority	<b>Medium cost</b> – for industry	Investigating various products on the market Suppliers to do on-site trials to identify most suitable product Determine frequency of application and budget for it annually	3 years	Dust management plans implemented	High
	Reporting of fugitive emissions on NAEIS	Industry	Licensing Authority and DFFE	<b>Low cost</b> – for industry	Already a legal requirement – annual NAEIS reporting	yearly	All facilities with AEL submitted plans fugitive emissions	High
	Minimize and manage NEMA Section 30 incidents	Industry	Licensing Authority	<b>Medium to High cost</b> – for industry	Incidence register. Should be part of operations Cost of managing incidents would depend of the industry and type of incident	1 year	Number of Section 30 incidents	High
Emissions from dust-generating activities are reduced	Development of legal framework to manage emissions from small/unlicensed facilities	Local municipalities	DFFE	<b>Low cost</b> – existing personnel	To form part of Local government legislation development	2 years for development and implementation in 5yrs	Legal framework in developed	High

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Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
	Identify unlicensed dust generating activities	Local municipalities, CBOs and NGOs	DFPE	Low cost – to be done by existing personnel	Can form part of emissions inventory development of Section 23 (per capacity building plan) Local government officials will have to do visual inspections of areas to identify activities	Ongoing	Identified dust generating activities	High
	Holistic approach for dust management where there is cluster of facilities	Industry/ licensing authorities	Licensing Authority	Low cost – industry and government	Can form part of dust management plan reviews and interpretation To be reported at MSRG meetings	2 years	Integrated dust management plans developed	High

Notes: NGO – Non-Government Organisation, CBO – Community Based Organisation, MSRG – Multi Stakeholder Reference Group

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**Sector 2: Mines**

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Management of emissions from mines	Dust management plans developed and implemented	DMRE and mines	DFFE and Licensing authorities	Medium cost – monitoring	Requirement of annual NAEIS reporting Installation of dustfall networks (analysis and reporting)	2 years	All mines developed dust management plans	High
	Vegetation (indigenous plants and grass) on the abandoned mine dumps	Mines and DMRE	DFFE	High cost – depending on type of cover	Mines to submit rehabilitation plans to government with implementation timeframes and required maintenance frequency	5 years	Number of dumps rehabilitated	Medium
	Establish the complaints management system for all mines	Mines and DMRE	DFFE, NGO's and Municipalities	Low cost	Complaints register and upkeep Report annually to authority	2 years	The complaints management system established by all mines	High
	Implementation of the rehabilitation plans for non-operational mines	Mines and DMRE	Municipalities and DFFE	High cost – depending on type of cover	Mines to submit rehabilitation plans to government with implementation timeframes and required maintenance frequency	Long-term	Mines rehabilitated	Medium

Notes: DMRE – Department of Mineral Resources and Energy

## Sector 3: Ash Dumps and Tailings Storage Facilities

Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Reduction of particulate matter emanating from ash dumps and tailings storage facilities	Dust suppression (e.g. chemical application and watering active dumps)	Industry	DFFE ,DMRE and municipalities	High cost – continuous	Requirement in AEL and/or NAEIS reporting Industries to submit management plans to government with implementation timeframes and required maintenance frequency	Ongoing	Number of dumps rehabilitated Complaint with dust regulations	High
	Reduce quantities of ash dumps by diversifying reuse and beneficiation	DFFE F: Waste Phakisa and industry	Local Municipalities, NGOs, CBOs	High cost – continuous	Requirement in AEL and/or NAEIS reporting Industry to find use for ash – by-product	5 years	Increase in the amount of ash reused	Medium

Notes: NGO – Non-Government Organisation, CBO – Community Based Organisation

**Sector 4: Domestic Fuel Burning**

Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Domestic fuel burning emissions reduction	Rollout of low smoke and LPG stoves and heaters, and alternative energy sources	DMRE and DFFE	Provinces, DFFE, Industry, NGOs & CBOs	High cost – frequent and continuous	Funding through offset projects, social responsibility programmes and alternatives	50% by 2025 75% by 2030	% uptake by targeted households	High
	Promote use of clean/green fuels such as LPG, biogas etc.	DMRE	Provinces, Industry, DFFE, NGOs & CBOs	Low cost – quarterly awareness campaigns	Awareness campaigns in partnership with NGO's and CBO's	50% by 2025 75% by 2030	% uptake by targeted households	High
	Promote and fit RDP houses with sufficient insulation	DHS and municipalities	Provinces, DFFE, NGOs & CBO's	High cost – once off	Industries can assist as part of offset projects and social responsibility programmes in general Implement guidelines on indoor air pollution	5 years	Number of RDP houses with sufficient insulation	Medium

Notes: DMRE – Department of Mineral Resources and Energy; DHS – Department of Human Settlements, LPG – Liquefied Petroleum Gas, NGO – Non-Government Organisation, CBO – Community Based Organisation, RDP – Reconstruction and Development Programme

Sector 5: Domestic Waste Burning									
Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority	
Reducing domestic waste burning emissions	Waste separation at source & recycling	Local Government	DFFE, Province, industry, private companies, NGOs & CBOs	High cost – continuous	Develop procedure for waste separation (group specific wastes) Partnership with NGO's and CBO's Train and contract community people Industries involvement as part of offset projects	50% by 2025	% uptake by targeted households	High	
	Waste collection & clean-up	DFFE, local government and industry through offset projects	DFFE, Province, NGOs & CBOs	High cost – continuous	Should already be budgeted for by municipalities Partnership with NGO's and CBO's Industries involvement as part of off-set projects	90% by 2030	% uptake by targeted households	Medium	
	Management of municipal and privately-owned landfill sites	GDARD and DESTEA	DFFE	High cost – continuous	DFFE roles, including enforcement, in National Environmental Management: Waste Act (NEMA:WA; no 59 of 2008) Provincial to support compliance monitoring and municipal capacity Additional human resource capacity	75% reduction of burning incidents by 2025 100% reduction of burning incidents by 2030	% reduction in number of burning incidents	High	
Reducing tyre burning emissions	Awareness campaigns	Local municipality, CBO, NGO	GDARD and DESTEA	Low cost	Awareness campaigns Partnership with NGO's and CBO's	No tyre burning by 2025	% reduction of tyre burning by 2025	High	
	Regulate tyre burning through bylaws (SAPS to enforce the bylaws)	Local municipality, SAPS	DFFE, GDARD	Medium cost – to implement By-law	Additional human resource capacity required to enforce bylaws Conduct ad hoc checks			High	

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Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
	Establish way to support tyre collection facilities per district through Waste Bureau.	DFFE, Waste Bureau, district municipalities, local municipalities, NGOs, CBOs	Industry NGOs and CBOs	High cost – continuous	Waste Bureau Phakisa			Medium

Notes: GDARD – Gauteng Department of Agriculture and Rural Development; DESTEA – Department of Economic, Small Business Development, Tourism and Environmental Affairs, NGO – Non-Government Organisation, CBO – Community Based Organisation, SAPS – South African Police Service

**Sector 6: Biomass Emissions**

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Management of veld fire occurrence	Municipalities to implement Veld fires guidelines (establish relation with EPWP working for fire. Establish veld fire hotline. Induction of employees in management of veld fires.)	Local municipality NGOs and CBOs	Private companies Landowners DFFE, DALRRD Metro Polices Municipal Fire units	Low cost	Fire Protection Associations may be developed in line with the National Veld and Forest Fire Act (No. 101 of 1998); which include veldfire management strategies and a fire protection officer	Ongoing	Reduced number of uncontrolled veld fires	High
	Conduct education and awareness campaigns on burning and veld fires.	Local municipality, Province, and DFFE	Private companies Landowners DFFE, DALRRD, NGOs, CBOs Metro Polices Municipal Fire units	Low cost – quarterly awareness campaigns	Awareness campaigns – billboards, advertisements in local newspapers, campaigns at schools	Ongoing	Annual campaigns	High

Notes: DFFE – Department of Forestry, Fisheries and the Environment; DALRRD – Department of Agriculture, Land Reform and Rural Development; EPWP – Expanded Public Works Programme

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## Sector 7: Education and Awareness

Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Domestic fuel burning emissions reduction	Awareness Programme clean fuels, and other alternative energy sources,	DFFE, Local Government	DFFE, Province, Industry, NGOs & CBOs	Low cost – quarterly awareness campaigns	Monthly advertisements in local newspapers Quarterly awareness programmes at schools Awareness campaigns on billboards Industries as part of offset projects	Ongoing	Annual workshop held	High
Reducing domestic waste burning emissions	Awareness (Green Good Deeds type) on waste burning & recycling	DFFE, Local Government	DFFE, Province, Industry, NGOs & CBOs	Low cost – quarterly awareness campaigns High cost – Industry	Monthly advertisements in local newspapers Quarterly awareness programmes at schools Awareness campaigns on billboards Industries as part of offset projects	Ongoing	Annual workshop held	High
Promotion of educational programmes on the use of biomass	Introduce and continuations of alternative programmes	DFFE	DTI, DFFE, DST, DALRRD, NGOS, CBOs and municipalities, SANEDI	Low cost – annual workshops		Ongoing	Annual workshop held	Medium
Reduce emissions from vehicles	Awareness campaign on green transport (e.g. use of bicycles, lift clubbing, park and ride to work or shops etc.)	DFFE and DOT	Communities and Municipalities	Low cost – quarterly awareness campaigns	Monthly advertisements in local newspapers Quarterly awareness programmes at schools Awareness campaigns on billboards	Ongoing	Annual workshop held	Medium

Notes: DOT – Department of Transport; DOH – Department of Health; DTI – Department of Trade and Industry; DST – Department of Science and Technology; DALRRD – Department of Agriculture, Land Reform and Rural Development; SANEDI – South African National Energy Development Institute

**Sector 8: Vehicle Emissions**

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Reduce emissions from vehicles	Promotion of non-motorised and public transport systems	DOT, municipalities	NGO's	<i>Low cost</i> – quarterly awareness campaigns	Monthly advertisements in local newspapers Quarterly awareness programmes at schools Awareness campaigns on billboards	3 years	Annual campaigns	Medium
	Annual testing of vehicle exhaust emissions	DOT, municipalities	DOT, municipalities	<i>Medium cost</i> – once off purchase and maintenance of equipment	Determine the number of testing equipment required per municipality and the human resource capacity required to conduct the testing Testing can be done at testing grounds as part of license renewal (then additional staff might not be required); or as spot checks in the first year Include emission testing as part of roadworthiness certification Include cost for testing equipment and additional salaries in Municipal IDP Compile a testing procedure	3 years	Testing reports indicating numbers of vehicle tested	Medium
Improve the regulatory framework in	Identify unpaved road generating dust and prioritise high risk roads	DOT and Local municipality	DFFE, NGO, CBO	<i>Low cost</i> – can be done by existing personnel	Community awareness campaigns and cooperation with NGO's and CBO's Air quality personnel to visually inspect areas and identify busy unpaved roads	2 years	All unpaved roads identified	High
	Implement management measures for identified high risk dust generating roads	DOT and Local municipality	DFFE	<i>Medium cost</i> – once off with maintenance	Costing will depend on the length of the road Can be done by industry as part of off-set projects	5 - 10 years	Unpaved roads tarred	High
	Municipalities to develop/review bylaws to address air quality related issues (e.g. consider penalizing vehicles with visible smoke)	Local municipality	Local municipalities, DFFE, NGO's and CBO	<i>Low cost</i> – to be done by existing personnel	Enforce municipal by-law	5 years	Developed or reviewed bylaws impacting air quality	Medium

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THE SECOND GENERATION VAAL TRIANGLE AIRSHED PRIORITY AREA AIR QUALITY MANAGEMENT PLAN: FINAL PLAN

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
the municipality	Increase of capacity to enforce bylaws to address air quality related issues	Local municipality	Local municipalities, DFFE	Medium cost – to employ more personnel	Assess additional human resource capacity required to enforce bylaws	5 years	Number of enforcement officials trained	Medium
	Establish intergovernmental coordination committee on air quality (Transport, Energy, Health, Minerals, Cooperative governance and Human settlement)	DFFE	DFFE	Low cost – to include existing personnel	Intergovernmental communication and awareness to get by-in for coordination committee Can be incorporated into current responsibilities	1 year	Committee established	High

Notes: DOT – Department of Transport, NGO – Non-Government Organisation, PRASA – Passenger Rail Agency of South Africa, CBO – Community Based Organisation, AARTO – Administrative Adjudication of Road Traffic Offences

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THE SECOND GENERATION VAAL TRIANGLE AIRSHED PRIORITY AREA AIR QUALITY MANAGEMENT PLAN: FINAL PLAN

### *Potential Future Threats*

Future threats in the area are regarded as risks associated with the implementation of the interventions which would jeopardise the overall objective of the AQMP. These threats can be summarised as follows:

- Budgetary allocations or lack of provision to be inadequate to achieve goals;
- Available control technology found to be unfeasible;
- Political buy-in from decision making powers lacking resulting in lack of planning and budgetary constraints;
- Too many interventions, with some not clearly defined (also economic factors that could hamper certain intervention);
- Interventions at National level that are outside the control of the Local Municipality to implement;
- Constraints in human resource capacity for AQMP implementation – number of people and technical competency (insufficient follow-up);
- Political buy-in from decision making powers lacking resulting in lack of planning and budgetary constraints;
- Enforcement – no consequences or penalties for failing to implement the set interventions; and
- Inadequate methods in creating public awareness.

### *Monitoring and Evaluation*

One of the most important indicators for AQMP success is a decrease in air pollutant concentrations. In order to monitor progress, measurements of pollutants must be analysed in order to understand the ultimate impact from interventions. With the locations of the current monitoring stations mainly within low income settlements, it is likely that only improvements as a result of interventions on domestic fuel burning and domestic waste burning would be reflected in the ambient monitoring data. Conducting ambient monitoring at locations within the more formal settlements, away from main influencing sources but within the main impact area of the VTAPA should show improvements from other interventions aimed at reducing emissions from: vehicles, industry (i.e. 2020 MES) and mining. Passive sampling campaigns are recommended for this purpose to be conducted bi-annually, one campaign in winter and one in summer. Two locations are proposed: one in the southern part of Vanderbijlpark and one to the north of Vereeniging. These campaigns will also serve to monitor impacts on regional air quality.

### *Update of the VTAPA Second Generation Emissions Inventory*

As part of regular monitoring and evaluation, the second generation VTAPA emissions inventory will have to be continuously updated. The update should include, as a minimum, the identification and quantification of all Controlled Emitters and Small Stationary Sources in the region as well as updating information on the fuel use for domestic fuel burning consumption, record waste burning activities and identify exposed areas within residential areas that can give rise to windblown dust. This will further enable the Air Quality Officers to fulfil their legal obligation and ensure a successful implementation of the second generation VTAPA AQMP.

### *Stakeholder Engagement*

There are several forums in place in the VTAPA to ensure inter-governmental communication and cooperation's as well as engagement with various stakeholders. These forums should be used optimally to ensure the successful and continuous and successful implementation of the VTAPA second generation AQMP. Action for these forums could include:

- MSRG should continue to meet bi-annually but with focus on information communication and awareness raising, track clear targets for implementation and hold responsible parties accountable for non-performance;
- ITT quarterly meetings should serve as interim follow-ups on specific actions should be consequences for actions not taken;
- VTAPA Authorities bi-annually meeting should set clear targets with implementation timeframes and accountability for non-performance; and
- DFFE remains responsible for enforcement and accountable for non-performance.

*Review of VTAPA Implementation Plan*

Progress on the implementation of the VTAPA second generation AQMP should be closely monitored, with an internal review at the end of each financial year where the interventions should be re-defined if needed and re-prioritised. The AQMP should be reviewed within five years of publication.

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1 INTRODUCTION

The Vaal Triangle Airshed was declared a priority area in April 2006 (Government Gazette Notice No. 365 of 21 April 2006, as amended by Notice 711 of 17 August 2007) by the then Minister of Environmental Affairs and Tourism and was the first Air Quality Priority Area in South Africa due to concern for elevated pollutant concentrations within the area, specifically particulates (Figure 1). An Air Quality Management Plan (AQMP), providing detailed intervention strategies, was developed for the Vaal Triangle Airshed Priority Area (VTAPA) between 2007 and 2009, with the final plan published on 29 May 2009 (Government Gazette No. 32254). In 2013, the AQMP was reviewed with the objective to establish an updated understanding of the air quality status in the VTAPA and to inform strategies that will ensure improvement in air quality in the area. The aim of the second generation AQMP is to characterise the baseline after seven years and determine the improvement, if any, that resulted from the implementation of the 2009 AQMP. This second generation AQMP aims to establish new strategies and intervention plans, based on a better understanding of the cause and effect relationships, that will ensure further improvement and eventual compliance within the area.

The VTAPA encompasses: a portion of the City of Johannesburg Municipality, as well as Emfuleni, Midvaal, and Metsimaholo Local municipalities (Figure 2).

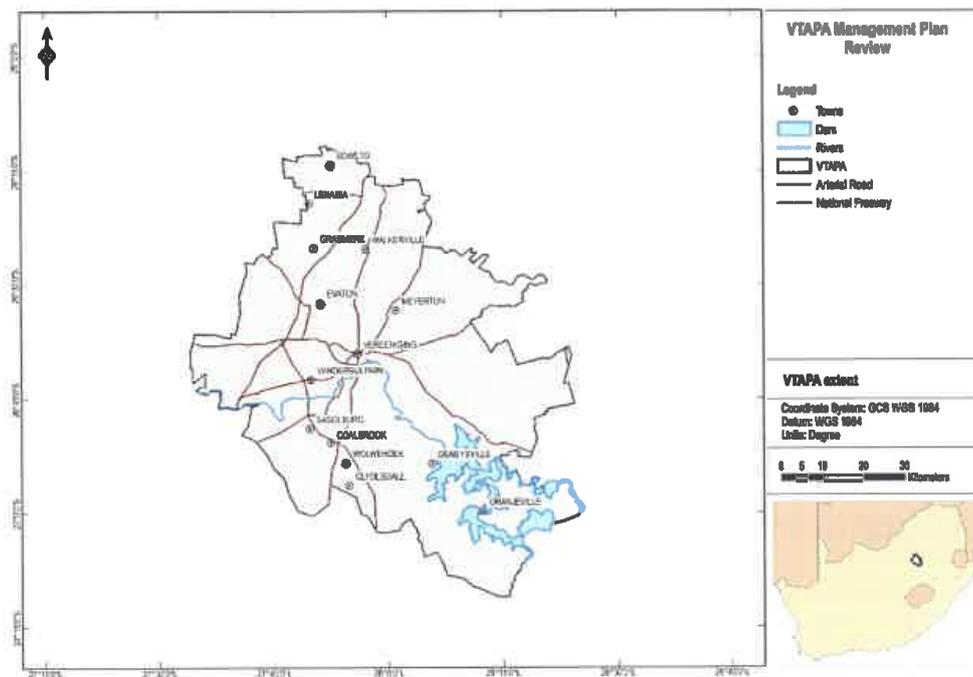


Figure 1: Demarcation of the Vaal Triangle Airshed Priority Area

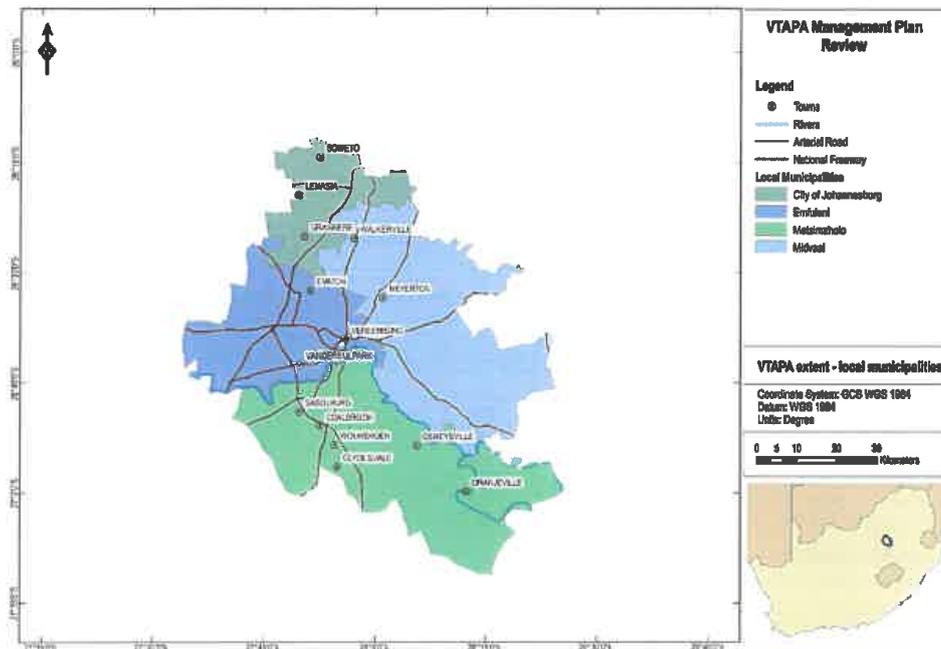


Figure 2: Local, District, and Metropolitan Municipalities Included In the VTAPA

1.1 Methodological Approach for the Development of a Second Generation Vaal Triangle Airshed Priority Area Air Quality Management Plan

The development of a Second Generation VTAPA AQMP was done in six (6) phases as summarised in Table 1 and briefly described in the subsections to follow. Each task or output had a verifiable indicator and provide a means of verification.

Table 1: Summary of immediate objectives, verifiable indicators and means of verification

Description	Verifiable indicator	Means of Verification
Output A: Project Process Plan	A clear and unambiguous plan on how the project is to be conducted	Project Process Plan approved by the PSC/National Air Quality Officer
Output B: Baseline assessment report	<ul style="list-style-type: none"> <li>A comprehensive baseline assessment report with verifiable information</li> <li>VTAPA emissions Inventory (comprehensive database/spreadsheets and GIS files)</li> <li>Dispersion modelling input files</li> </ul>	A baseline report approved by PSC
Output C: Strategy Analysis and Implementation Plan	Strategy Analysis and Implementation Plan with SMART objectives, clear activity descriptions, clear resource requirements and indicators	Strategy Analysis and Implementation Plan
Output D: Draft Revised Vaal Triangle Airshed Priority Area Air Quality Management Plan	A draft AQMP based on current, accurate and relevant information that is informed by best practice in the field of air quality management. The AQMP should provide a clean and practical plan to efficiently and effectively bring	Draft plan published in the Gazette for public comment

Description	Verifiable indicator	Means of Verification
	air quality in the area into sustainable compliance with NAAQS within agreed timeframes	
Output E: Final Vaal Triangle Airshed Priority Area Air Quality Management Plan	A final AQMP based on current, accurate and relevant information that is informed by best practice in the field of air quality management. The AQMP should provide a clear and practical plan to efficiently and effectively bring air quality in the area into sustainable compliance with NAAQS within agreed timeframes. The final AQMP would take into account public comments.	Plan published in the Gazette.
Output F: Capacity Building/Development	Active involvement of departmental staff in the implementation of the project	Capacity building plan submitted to DFFE and progress reports

Notes: DFFE stands for the Department of Environment, Forestry and Fishery, previously the Department of Environmental Affairs (DEA)

#### 1.1.1 Output A: Project process plan

The Project Process Plan gave clear form, context and focus to the project and set the direction, guidance to the general process needed to reach the ultimate goal of the project, including a timeline of each of the critical phases in the project indicating key milestones.

#### 1.1.2 Output B: Baseline assessment report

The VTAPA baseline characterisation, which provides the foundation for the development of the AQMP, has been characterised and reported on with the main findings provided in Section 3 (DEA, 2019). These findings, together with the Source Apportionment study's (SAS) preliminary findings informed the strategy analysis and intervention plan, described in Section 4.

The emission inventory for VTAPA assessed available emissions data, quantified fugitive emission sources, and identified gaps in the emission inventory. The focus of the emission inventory was on criteria pollutants, including particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), sulfur dioxide (SO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>). All sources of emissions within the VTAPA, including industry, mining, residential areas, public areas and natural sources, were identified and quantified where information was available. Two emission inventories were developed: one for the VTAPA and one as a regional emission inventory. The VTAPA emission inventory was used for management purposes, and the regional emission inventory was used for dispersion modelling.

The ambient air quality assessment made use of available ambient air quality data from SAAQIS (South African Air Quality Information System), from District Municipalities and from industries. Data was obtained from these stations for the period 2013-2015 to determine dispersion conditions and for the period 2007-2016 to assess ambient air quality trends.

The CAMx chemical air quality model was used to simulate ambient air quality concentrations over the VTAPA, including background sources outside the VTAPA boundary. The model also allows for primary and secondary pollutant tracking. The same modelling domain was used as for the 2009 VTAPA AQMP, including the topographical data with an update on the land-use data including all air quality sensitive receptors within the study area.

Preliminary results from the VTAPA Source Apportionment Study (SAS), which is currently being finalised, were integrated into the baseline assessment to inform the cause and effect relationship. The findings from a baseline health assessment study conducted in the VTAPA during 2013 and 2014, were also assessed and included.

#### *1.1.3 Output C: Strategy Analysis and implementation plan*

The Second Generation VTAPA baseline assessment, together with the preliminary results from the SAS and the findings from the VTAPA baseline health assessment were used to identify the main sectors and associated activities for which interventions needed to be developed. The GAINS model was run for a set of intervention scenarios, based on the same emission inventory used in the VTATA baseline assessment with the aim to provide an indication of the expected air quality improvement associated with a specific intervention, as well as the cost benefit thereof. Up to three scenarios were selected for each source group. These selected interventions were then modelled using the VTAPA CAMx model to assess the air quality improvement these interventions are likely to provide.

The strategy analysis was conducted during a workshop with all the relevant stakeholders. The outcome will be action plans for implementation within a set timeframe

The interventions were revised and finalised based on comments received from the VTAPA Stakeholders. A high-level risk assessment was conducted for these interventions on the probability of not achieving the desired aim of ensuring ambient air quality improvement within the VTAPA.

#### *1.1.4 Output D: Draft Second Generation Vaal Triangle Airshed Priority Area Air Quality Management Plan*

The Draft AQMP provides a review of the First Generation VTAPA AQMP findings and interventions to indicate the progress, if any, and inform the Second Generation AQMP. The key aspects from the second generation Baseline Assessment and the Strategy Analysis are provided to explain the intervention descriptions and inform the development of the Implementation Plan.

**The Draft Second Generation AQMP will be published for public comments before being finalised.**

#### *1.1.5 Output E: Final Vaal Triangle Airshed Priority Area Air Quality Management Plan*

The final AQMP based on current, accurate and relevant information that is informed by best practice in the field of air quality management, will be completed once the public comments on the Draft AQMP have been addressed. The aim of the AQMP is to provide a clean and practical plan to efficiently and effectively bring air quality in the area into sustainable compliance with National Ambient Air Quality Standards (NAAQS) within agreed timeframes.

#### *1.1.6 Output F: Capacity Building/Development*

The capacity building plan was developed based upon the skills and interests of the assigned officials. The plan for capacity development includes a hands-on training course for the most desired AQMP implementation activity. A senior member of the team guided the participants through the process followed. In addition, there were hands-on exercises that assisted with the overall AQMP development. This assisted the officials in not only understanding the process, but in understanding how and why assumptions are made, and what data are needed for the implementation of the AQMP.

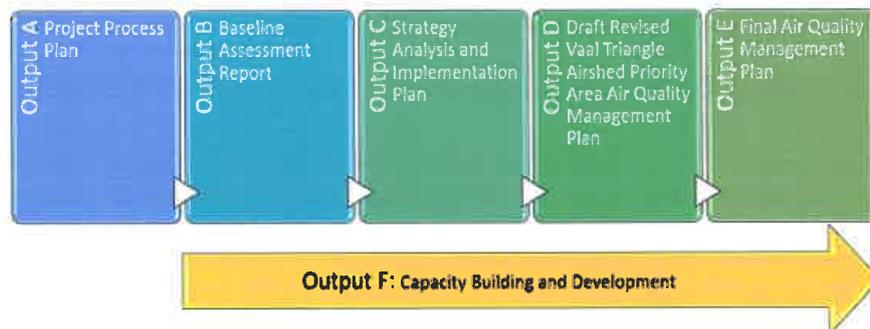


Figure 3: AQMP development process flow

## 1.2 Air Quality Legislation and Regulatory Requirements

The National Environmental Management: Air Quality Act (hereafter "the Act" or NEM: AQA) (Act No. 39 of 2004) sets out to protect the environment by providing reasonable measures for: (i) the protection and enhancement of the quality of air in the Republic; (ii) the prevention of air pollution and ecological degradation; and (iii) securing ecologically sustainable development while promoting justifiable economic and social development. These objectives give effect to section 24 (b) of the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of the people.

The Act is specific to what an air quality management plan must achieve. These include improvement of air quality; reducing negative impacts on human health and the environment; addressing the effects of fossil fuels in residential applications; addressing the effects of emissions from industrial sources and from any point or non-point sources of air pollution; implementing the Republic's obligations in respect of international agreements; and giving effect to best practice in air quality management. The Act also provides for regulations that may be made for implementing and enforcing approved priority area AQMPs including, amongst others, funding arrangements; measures to facilitate compliance and regular review.

The Act makes provision for the declaration and setting of standards for controlled emitters and controlled fuels, as well as the control of dust, noise and offensive odours. The Department of Environment, Forestry and Fisheries (DFFE) Manual for Air Quality Management Planning (2008) furthermore recommends that, in addition to the NEM: AQA, other legislation be consulted in the goal setting processes of developing an AQMP.

### 1.2.1 Changes in Legislation since the publication of the 2009 VTAPA AQMP

At the time of the 2009 first generation VTAPA AQMP, sections of the AQA were still under development. Publications applicable to the VTAPA after May 2009 include (not in order of publication):

- National Framework Second Generation (Notice 919, Government Gazette (GG) 37078 of 29 Nov 2013), and Third Generation (Notice 1144 GG 41996 of 26 Oct 2018)
- National Ambient Air Quality Standards (NAAQS) (Notice 1210 GG 32186 of 24 Dec 2009)
- NAAQS for PM<sub>2.5</sub> (Notice 486 GG 35463 of 29 Jun 2012)

- National Dust Control Regulations (NDCR) (Notice R827 GG 36974 of 1 Nov 2013) and draft change in regulations (Notice 517 GG 41650 of 25 May 2018)
- Minimum National Emission Standards (NMES) (Notice 893 GG 37054 of 22 Nov 2013)
- A new Atmospheric Emission License (AEL) application requires an Environmental Impact Assessment (EIA) (GG 38282 of 4 Dec 2012) and NEMA s24 applies
- Reporting requirements for AEL holders (Notice R823 GG 38633 of 2 Apr 2014)
- Regulations for Air Impact Report (AIR) (Notice R533, GG 37084 of 11 Jul 2014) and amendments to this (Notice R284 GG 38633 of 2 Apr 2015)
- Administrative fines for operating without an AEL (Notice 332 GG 39833 of 18 Mar 2016)
- NEM: AQ Amendment Act 2014 (Notice 390, GG 37666 of 14 May 2014) pertaining mostly to administration changes
- Regulations regarding Air Dispersion Modelling (Notice 589, GG 37804 of 2 Jul 2010)
- Model air quality management by-law for municipalities (Notice 579, GG 33342 of 2 Jul 2010)
- Section 23 small boilers as controlled emitters (Notice 831, GG 36973 of 1 Nov 2013)
- Section 23 temporary asphalt plants as controlled emitters (Notice 1138, GG 37062 of 29 Nov 2013)
- Section 23 small-scale char and charcoal plants as controlled emitters (Notice 602, GG 39220 of 18 Sept 2015)
- Air Quality Offsets guideline (Notice 333, GG 39833 of 18 Mar 2016)
- Draft strategy to address air pollution in dense low-income settlements (Notice 356, GG 40088 of 24 Jun 2016)
- Regulations for declaring Greenhouse gas (GHG) priority pollutants (Notice 710, GG 40966 of 12 Jul 2017)
- Regulations for GHG emitters >100,000 ton per annum in a number of industrial sectors to report (Notice 712, GG 40966 of 12 Jul 2017)
- Pollution Prevention Plan (PPP) regulations (Notice 712, GG 40996 of 21 Jul 2017)
- Regulations for GHG reporting using National Atmospheric Emission Inventory System (NAEIS) (Notice 275, GG 40762 of 3 Apr 2017)
- The Minister may establish a National Air Quality Advisory Committee under the National Environmental Advisory Forum (Notice 245, GG 40733 of 31 Mar 2017)

#### 1.2.2 *National Ambient Air Quality Standards*

Air quality guidelines and standards are fundamental to effective air quality management, providing the link between the source of atmospheric emissions and the user of that air at the downstream receptor site. The ambient air quality standards and guideline values indicate safe daily exposure levels for most of the population.

National Ambient Air Quality Standards (NAAQS) for criteria pollutants are listed in Table 2 (Government Gazette No. 35463).

**Table 2: South African National Ambient Air Quality Standards**

Substance	Molecular formula / notation	Averaging period	Concentration limit ( $\mu\text{g m}^{-3}$ )	Frequency of exceedance <sup>(a)</sup>	Compliance date <sup>(b)</sup>
Sulfur dioxide	SO <sub>2</sub>	10 minutes	500	526	Currently enforceable
		1 hour	350	88	Currently enforceable
		24 hours	125	4	Currently enforceable
		1 year	50	-	Currently enforceable
Nitrogen dioxide	NO <sub>2</sub>	1 hour	200	88	Currently enforceable
		1 year	40	-	Currently enforceable
Particulate matter	PM <sub>10</sub>	24 hours	75	4	Currently enforceable
		1 year	40	-	Currently enforceable
Fine particulate matter	PM <sub>2.5</sub>	24 hours	40	4	1 Jan 2016 – 31 Dec 2029
			25	-	1 Jan 2030
		1 year	20	-	1 Jan 2016 – 31 Dec 2029
			15	-	1 Jan 2030
Ozone	O <sub>3</sub>	8 hours (running)	120	11	Currently enforceable
Benzene	C <sub>6</sub> H <sub>6</sub>	1 year	5	-	Currently enforceable
Lead	Pb	1 year	0.5	-	Currently enforceable
Carbon monoxide	CO	1 hour	30 000	88	Currently enforceable
		8 hours (based on 1-hourly averages)	10 000	11	Currently enforceable

Notes: (a) The number of averaging periods where exceedance of limit is acceptable.  
 (b) Date after which concentration limits become enforceable.

### 1.2.3 National Dust Control Regulations

The National Dust Control Regulations (NDCR) prescribe general measures for the control of dust in all areas including residential and light commercial areas (Government Gazette No. 36974 and No. 41650). The standard for acceptable dustfall rates is set out in Table 3.

**Table 3: Acceptable dustfall rates**

Restriction Area	Dustfall Rate ( $\text{mg/m}^2\text{.day}$ , 30-day average)	Permitted Frequency of Exceeding Dustfall Rate
Residential area	D<600	Two in a year, not sequential months
Non-residential area	600<D<1200	Two in a year, not sequential months

### 1.2.4 Section 21 – Listed activities

Industrial and materials processing activities that are likely to, or currently, result in atmospheric emissions are required to apply for atmospheric emissions licenses (AEL). The activities are classified into ten categories (and sub-categories) in the Government Gazette No.: 37054 (2013):

- Category 1: Combustion Installations
- Category 2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal gas or biomass

- Category 3: Carbonization and Coal Gasification
- Category 4: Metallurgical Industry
- Category 5: Mineral Processing, Storage and Handling
- Category 6: Organic Chemicals Industry
- Category 7: Inorganic Chemicals Industry
- Category 8: Thermal Treatment of Hazardous and General Waste
- Category 9: Pulp and Paper Manufacturing Activities, Including By-Products Recovery
- Category 10: Animal Matter Processing

#### 1.2.5 Section 23 – Controlled Emitters

Controlled emitters, as per Section 23(1) of NEM: AQA, include:

- any small boiler with a design capacity exceeding 10 MW but less than 50 MW net heat input per unit, based on the lower calorific value used;
- any temporary asphalt plants producing mixtures of aggregate and tar (or bitumen) for road surfacing purposes; and
- any small-scale char or charcoal plants.

Section 23 of the Act provides for registration and reporting requirements; fuel use; emission standards for these controlled emitters; and appropriate operating conditions.

#### 1.2.6 Reporting of Atmospheric Emissions

The National Atmospheric Emission Reporting Regulations (Government Gazette No. 38633) came into effect on 2 April 2015.

The purpose is to regulate the reporting of data and information from identified point, non-point and mobile sources of atmospheric emissions to an internet based NAEIS. Its objective is to provide all stakeholders with relevant, up to date and accurate information on South Africa's emissions profile for informed decision making.

Emission sources and data providers are classified according to groups:

- Group A: "Listed activity published in terms of section 21(1) of the Act". Emission reports from Group A must be made in the format required for NAEIS and should be in accordance with the AEL or provisional AEL.
- Group B: "Controlled emitter declared in terms of section 23(1) of the Act". Emission reports must include any information that is required to be reported in terms of the notice published in the Gazette in terms of section 23 of the Act.
- Group C: "Mines" where emission reports must be made in the format required in NAEIS.

After registration on NAEIS the facility or their data provider must submit the required information for the preceding calendar year to the NAEIS by 31 March of each year.

## 2 THE FIRST GENERATION VTAPA AQMP

The development of the first generation AQMP followed a holistic approach due to the complex nature of air quality issues within the VTAPA, and resulted in the identification of management measures which, at the time, was thought to ensure improvement in the air quality in the area over time.

During the development of the initial VTAPA AQMP and even at the time of publication in 2009, no published NAAQS and MES were available.

### 2.1 Ambient Air Quality Data as Recorded in the First Generation VTAPA AQMP

The Department of Environment, Forestry and Fishery (DFFE) ambient air quality stations were commissioned between February and March 2007 and had limited data available at the time of the study. Use was thus made of ambient air quality data obtained from the metropolitan municipality stations. Ambient monitored data were obtained from the Jabavu (Soweto) and Orange Farm stations (City of Johannesburg) measuring ambient concentrations of PM<sub>10</sub> and SO<sub>2</sub> since mid-2004. Data from the Sedibeng District Municipality stations in Meyerton (Midvaal Local Municipality) and Vanderbijlpark (Emfuleni Local Municipality) measuring NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub>, CO (at both) and NO, NO<sub>x</sub>, PM<sub>10</sub> at Meyerton and benzene, toluene and xylene at Vanderbijlpark were not used due to poor data availability and quality. Ambient monitoring data from industrial sites included the Eskom Makalu station (decommissioned end of 2004), the five Sasol Stations and three ArcelorMittal Stations.

Based on the available monitoring data, the main findings are summarised as follows:

- PM<sub>10</sub> concentrations were found to be elevated over the largest part of the VTAPA, particularly in residential areas where domestic coal burning occurs and areas neighboring major industrial operations.
- SO<sub>2</sub> concentrations showed reduction over the period 2004 to 2006 but several exceedances occurred at Jabavu and Orange Farm and in Sasolburg.
- NO<sub>2</sub> concentrations were low with a seasonal signature over the VTAPA.
- CO concentrations were considered to be insignificant in the VTAPA at the time.
- Ozone concentrations were elevated in areas surrounding major industrial operations.

### 2.2 Predicted Ambient Air Quality Data within the Vaal Triangle

Based on limited ambient air quality data at the time, dispersion modelling (the US.EPA approved CALMET/CALPUFF suite of models) was used to determine the spatial extent of the ambient concentrations within the VTAPA. From the modelling results, "hot spot" zones or focus areas were established.

A first level emissions inventory for the VTAPA was compiled based on information received through questionnaires, Environmental Impact Assessment (EIA) reports and other public documents. Sources included industrial, power generation, domestic fuel burning, mining and vehicle emissions. Criteria pollutants formed the focus of the impact assessment, with emissions of PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>x</sub> accounted for.

Simulated ground level concentrations indicated PM<sub>10</sub> to be the main pollutant of concern within the VTAPA and six (6) priority areas were identified based on highest PM<sub>10</sub> concentration zones or "hotspots" (Figure 4). The areas were also selected to correspond with impact zones due to acute exposures to SO<sub>2</sub> and NO<sub>2</sub>. The sensitive receptors together with the emission sources and main pollutants of concern are provided in Table 4 for each of the identified priority zones.

**FREQUENCY OF EXCEEDANCE OF DAILY PM<sub>10</sub> LIMIT OF 75 µg/m<sup>3</sup>  
ALL CURRENT SOURCES**

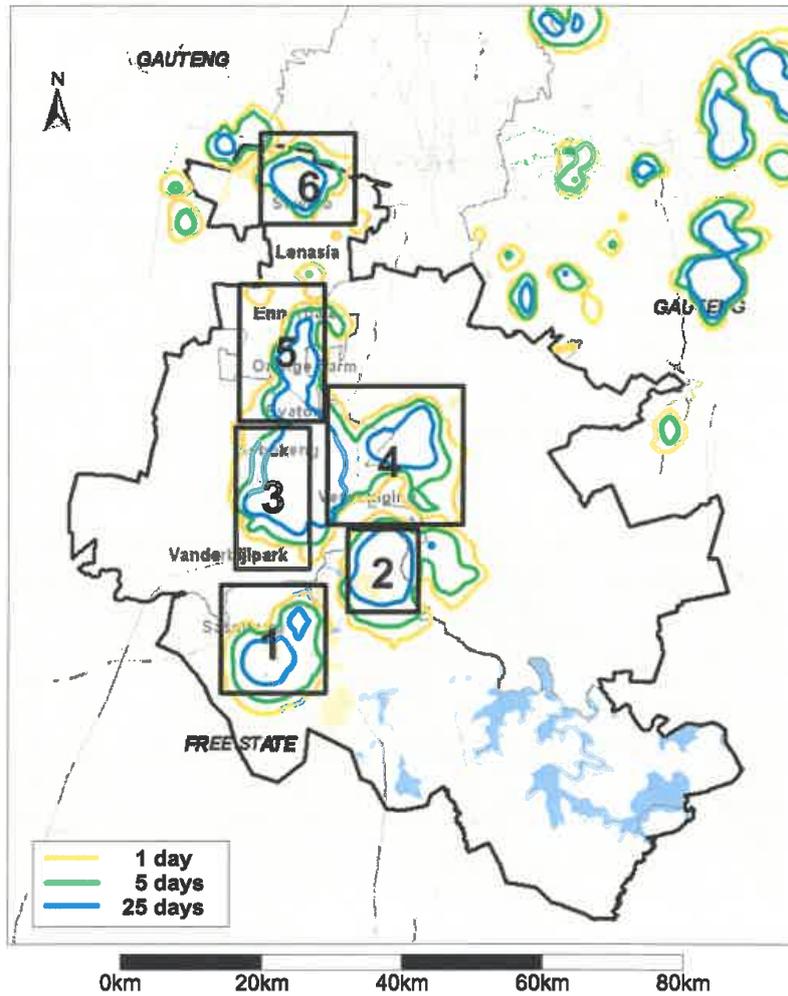


Figure 4: Six priority "hotspot" areas identified within the VTAPA based on predicted PM<sub>10</sub> ground level concentrations

**Table 4: Priority “hotspot” zones indicating the sensitive receptors within and the main contributing sources**

Hotspot Zone	Sensitive Receptors within Zone	Emission Sources within the Zone	Additional sources not quantified and included	Pollutants of concern
1	Residential areas of Sasolburg, Zamdela and Coalbrook	Industrial activities (viz. Sasol, Omnia and Natref), mining activities (viz. Sigma Colliery) and domestic fuel burning	Agricultural activities and biomass burning	PM <sub>10</sub> , SO <sub>2</sub> and NO <sub>2</sub> H <sub>2</sub> S, VOCs
2	Located just south of the residential area of Vereeniging – no residential areas included in this zone but potential for environmental impacts	Mining activities (viz. New Vaal Colliery), power generation (viz. Lethabo Power Station) and other industrial activities	Agricultural activities and water treatment works' which may result in odour impacts	PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>2</sub>
3	Developments of Vanderbijlpark and Sebokeng	Industrial activities (viz. Iron and Steel process (ArcelorMittal and Davsteel), commercial boilers and other smaller industrial activities), and domestic fuel burning	Industrial activities just north of ArcelorMittal (a ceramics manufacturing facility, a brickwork and a quarry), water treatment works, biomass burning and agricultural activities	PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>2</sub> and odours, Ozone, VOCs
4	Residential developments of Vereeniging and Meyerton	Industrial activities (viz. ArcelorMittal Vaal Works, ArcelorMittal Kip Works, Metalloys, commercial boilers, and other small industrial activities) and domestic fuel burning	Agricultural activities and large areas of biomass burning	PM <sub>10</sub> , SO <sub>2</sub> and NO <sub>2</sub> , Ozone, VOCs
5	Residential developments of Orange Farm, Evaton and Ennerdale	Domestic fuel burning	Large areas of biomass burning	PM <sub>10</sub> , SO <sub>2</sub> and NO <sub>2</sub> , VOCs
6	Residential area of Soweto	Domestic fuel burning	Windblown dust from gold tailings dams	PM <sub>10</sub> , SO <sub>2</sub> and NO <sub>2</sub> , VOCs

### 2.3 Capacity Assessment

In 2009, the capacity assessment indicated a lack of communication between the various spheres of government (National, Provincial and Local) and between municipal departments resulting in duplication of work and the neglect of certain functions. At municipal level, systems and procedures for the implementation of the AQMP were found to be inadequate. It should be noted that at the time of the VTAPA AQMP publication, the AQA was in place for five years and the DFFE were in the process of building capacity for the implementation of the various components of the AQA. Also, at the time, air quality management at municipal level was the responsibility of Environmental Health Practitioners and not dedicated air quality officers and officials.

## 2.4 VTAPA AQMP Intervention Strategy

The 2009 intervention strategies were based on the cause and effect relationships using the Logical Framework Approach (LFA). The main problems and critical gaps associated with air quality and the management thereof were based on the identified priority "hotspot" zones and initial characterisation of the existing situation in the VTAPA. Eleven problem complexes were identified around which problem and associated objectives trees were developed. Emission problem complexes identified included: (i) Biomass Burning, (ii) Domestic Fuel Burning, (iii) Iron, Steel and FerroAlloys, (iv) Mining, (v) Petrochemical, (vi) Power Generation, (vii) Small Industries, (viii) Transportation and (ix) Waste Burning. Non-emission problem complexes identified included (x) Government Capacity for Air Quality Management, and (xi) Information Management.

A strategy analysis followed to develop feasible interventions addressing the eleven problem complexes. These interventions also incorporated suggestions from stakeholders within the VTAPA which were received during a two-day workshop. General concerns voiced by stakeholders were incorporated into the intervention strategies in the short and medium term. The main concerns included:

- The air quality target is based on a single exceedance of the VTAPA Ambient Air Quality Objectives (as per individual pollutant). It is however prudent that the management plan provides clear and unambiguous targets and timelines in which these must be achieved.
- PM<sub>2.5</sub> is a concern given the fine fraction of the particulates posing a larger health risk than PM<sub>10</sub>. The VTAPA AQMP only addressed PM<sub>10</sub> and should include PM<sub>2.5</sub> ambient monitoring to adequately protect human health within VTAPA. Metal analysis should also be included.
- The ambient air quality must be improved beyond the Ambient Air Quality Standards to allow room for future development in the area. This is necessary for economic growth, development and employment opportunities.
- Lenient timeframes for intervention strategies and reduction plans will result in the plan not achieving its main objective, i.e. to ensure that, once the plan is implemented, the air quality within the area will effectively and efficiently be brought into sustainable compliance.
- Indoor combustion sources, specifically the use of paraffin, should be discouraged.

A number of interventions within each problem complex were expanded into action plans providing assumptions associated with the intervention strategy, estimated costs, timeframes and indicator. Each industry had to develop a detailed emission reduction strategy that supported the overall objectives of the interventions. As an interim indicator of performance, and in the absence of the NAAQS at the time, air quality objectives were determined for the VTAPA. These were in line with the later published NAAQS.

## 2.5 VTAPA First Generation AQMP Implementation Review

During the medium-term review of the 2009 VTAPA AQMP in 2013, the implementation status of the VTAPA First Generation AQMP, as it was in 2013, was reported on. The barriers and challenges of implementation was based on interactive discussions with the MSRSG members. This is summarised in Table 5.

Table 5: Barriers and challenges to implementation

Barriers/Challenges	Observations and Recommendations
Economic conditions	The Implementation of the VTAPA AQMP commenced during the time when the global economic conditions were not favourable for certain interventions. This implied that some of the key intervention that requires huge investments could not be fully implemented.
Teething problems	The VTAPA AQMP was the first priority area AQMP and one of the first AQMPs developed in the AQA regime. As one of the first AQMPs, there were lots of new learnings both in terms of AQMP development and implementation.
Accountability	<ul style="list-style-type: none"> <li>• Clear accountability is required to ensure that commitments are fulfilled. It is necessary for stakeholders to be accountable by way of enforceable key performance indicators that include responsibilities assigned in terms of the AQMP.</li> <li>• Specific champions are required that will motivate.</li> <li>• To progress and be accountable for achievement of the actions assigned to them.</li> </ul>
Specific timelines	Deadlines need to be SMART (Simple, Measurable, Achievable, Realistic and Time-Bound) in order to facilitate planning and implementation by the various responsible stakeholders. Some of the interventions were either not clear or were reflected as on-going without specific indication on how to measure and report on such on-going projects.
Consequence for non-implementers	Specific stakeholders have made commitments aimed at reducing emissions and improving air quality. Such commitments formed part of the AQMP intervention strategies. However, there was no clear consequences for non-implementation of such commitments.
Insufficient follow-up	More frequent and specific follow-up is required with regards to implementation and meeting deadlines. Stakeholders must be required to provide specific feedback to the various forums such as the MSRG, the ITTs and institutional reporting structures.
Insufficient capacity and turnover of implementers	A comprehensive capacity assessment and subsequent training needs analysis was required. Individual training and development must be developed and implemented to ensure that authorities have the skills and knowledge to implement the AQMP.
Formal/Written reporting and gap analysis required.	<ul style="list-style-type: none"> <li>• Formal reporting is required from all stakeholders and implementers, through the forums available – MSRG, ITTs etc. A lack of formal reporting implies that outstanding issues and/or non-performance are not noted timeously and thus not attended to effectively as well.</li> <li>• Written reporting required to ensure timeously attention to effect required intervention</li> </ul>
Information communication and awareness	<ul style="list-style-type: none"> <li>• Although various publicity and awareness campaigns were in progress, the general impression of various MSRG members was that the effect is limited, and greater effort is required to effect more pronounced public awareness.</li> <li>• Improved public awareness may in turn bolster political buy-in.</li> </ul>
Inadequate political buy-in from decision making powers.	<ul style="list-style-type: none"> <li>• A lack of political buy-in appeared to be significant, particularly at the local government level as this manifests itself in a lack of resources (human and technical) required to achieve the obligations of these stakeholders in terms of the AQMP. Strengthening of municipal budgeting and planning was needed.</li> <li>• It was recommended that the DFFE partner with municipalities in raising awareness of the importance of the AQMP and its objectives for the health and well-being of the affected communities, and the wider potential economic impacts (present and future) of failure to successfully implement the plan. This in terms of not only community health and well-being but also economic expansion constraints due to the significant baseline air pollutant load.</li> </ul>

Recommendations at the time to strengthen the working groups included:

- Re-arrangement of the ITTs by geographical grouping and per problem complex as this facilitates interaction and ensures that the efforts of the ITTs are targeted and relevant to the issues and interventions required within their specific geographical regions;
- Regular and standardized reporting required;
- Monthly meeting of ITTs;
- SOPs for reporting;
- Clear planning and communication of the objectives and requirements for individuals within the ITTs;
- A review of the terms of reference to produce clear and specific terms of reference based on AQMP; and
- Specific feedback required at ITT meetings.

The following support items and issues and requests were identified through the MSRSG:

- DFFE must be accountable for inaction;
- DFFE to support CBOs/Civil society with logistical and material support, where possible;
- Enforcement assistance for local and provincial government;
- Assist municipality in motivation for appointment of AQOs and air quality management functions in terms of NEMAQA; and,
- DFFE to facilitate a forum for AQMP review/discussion/report back with political powers.

The implementation status of the action plans for the eleven problem complexes were also assessed as part of the 2013 medium-term review and the findings are summarised in Table 6 for the Emission Problem Complexes and Table 7 for the Non-emissions Problem Complexes. The comprehensive action plans with the implementation status are provided in Appendix B.

Two emission problem complexes, not included in the first generation AQMP and identified during the 2013 medium-term review were:

- Agriculture; and
- Clay Brick Manufacture.

Based on the implementation status, 46% of the set interventions were successfully implemented, with 18% in progress at the time, 22% could not be achieved and 14% could not be ascertained. The performance reviews between the sectors indicated that the industrial stakeholders managed to meet their obligations to a larger degree than any of the other sectors. The performance of government stakeholders and municipalities were generally low, or in many cases could not be ascertained.

It was the overall view of the MSRSG members that the reason for failing at implementing the VTAPA AQMP was inadequacy in capacity and the failure to achieve many of the planned interventions and objectives of the AQMP.

Based on the findings from the 2013 medium-term review, updates for the goals have been set.

**Table 6: Review and Summary of the Implementation Status of the Emission Problem Complexes Intervention Plans**

<b>Problem Complex</b>	<b>2013 Review</b>	<b>Implementation Progress In 2013</b>
<b>Biomass Burning</b>	Updated emissions inventory (previously not quantified) and confirmed to be a significant source	Only limited progress could be confirmed.
<b>Domestic Fuel Burning</b>	Updated emissions inventory, review of research and confirmed to be a significant source	Limited progress can be verified, improvements achieved in electrification, housing provision, roll out of the BnM method, awareness campaigns and increased household income. However, measured ambient data does not reflect a notable improvement in ambient exposure concentrations.
<b>Industry: Iron and Steel/Ferroalloys</b>	Updated emissions inventory, confirmed to be a significant source	Significant reductions by Iron and Steel/Ferroalloys in stack and fugitive emissions as well as improved emissions monitoring.
<b>Industry: Petrochemical</b>	Updated emissions inventory, confirmed to be a significant source	Although action, as committed to, has been undertaken, major emitter Sasol is yet to complete its intervention roadmap. The complete intervention roadmap is anticipated to be communicated with the Stakeholders by 2014.
<b>Industry: Power Generation</b>	Updated emissions inventory, confirmed to be a significant source	Various actions committed to have been implemented however improvements in respect of combustion related direct emissions are limited.
<b>Industry: Small Industries</b>	Updated emissions inventory, confirmed to be a significant source	Significant improvements have however been achieved by some emitters (notably Afrisam Slagment and Rand Water) resulting in a substantial decrease in total emissions. Limited progress in terms of the gazetted interventions could be confirmed for this sector.
<b>Mining</b>	Emissions inventory unchanged, confirmed to be a significant source	Little if any progress could be confirmed for this sector. Notably no action taken by the regulating authority (DMR) could be confirmed.
<b>Transportation</b>	Not updated, confirmed to be a significant source. To be updated as an outcome of the National Vehicle Emissions Strategy.	Little if any. National Vehicle Emissions Strategy in process of being developed.
<b>Waste Burning</b>	Updated emissions inventory (previously not quantified) and confirmed to be a significant source	Limited progress can be confirmed, improvements achieved through improved refuse collection service delivery, National Domestic Waste Collection Standards published.

**Table 7: Review and Summary of the Implementation Status of the non-Emission Problem Complexes Intervention Plans**

<b>Problem Complex</b>	<b>2013 Review</b>
<b>Budgetary provision for Air Quality Management</b>	Previously not identified as a discrete problem complex but budgetary constraints or lack of provision confirmed to be inadequate to achieve goals. This is particularly notable at local government level where both human resource and establishment of adequate logistical services for effective air quality management is lacking.
<b>Human Resource Capacity for Air Quality Management</b>	<ul style="list-style-type: none"> <li>• Reviewed and confirmed to be a significant obstacle to implementation of plans and air quality improvement.</li> <li>• Human resource capacity is constrained both in terms of adequate human resources as well as adequate technically competent capacity. The provision for sufficient technically competent persons is lacking.</li> </ul>
<b>Information Management and Upkeep of Monitoring equipment</b>	<ul style="list-style-type: none"> <li>• Data coverage from ambient air quality monitoring stations is constrained for various stations and for various pollutants per station. The ambient monitoring stations operated by SDM were noted to be out of operation since 2009.</li> <li>• While ambient monitoring and other data is managed through the South African Air Quality Information System (SAAQIS), the ambient monitoring data is not readily available to the general public and other stakeholders via the website.</li> <li>• The management and upkeep of air quality information confirmed to be a significant problem.</li> </ul>

**SCHEDULE B - BASELINE ASSESSMENT FINDINGS**

### 3 BASELINE ASSESSMENT FINDINGS

The objective of the baseline characterisation was two-fold: to determine the current state of air quality in the VTAPA, and to assess whether the interventions set by the 2009 VTAPA AQMP resulted in ambient air quality improvements, and if not, the reasons for this. The main findings set out in this section are primarily based on the background assessment, the evaluation of ambient air quality in the VTAPA, the 2017 emission inventory and the associated dispersion modelling. These provided a good understanding of the current state of air quality within the VTAPA and to some extent, the source contributions to the ambient pollution levels. The results of the SAS currently being conducted will allow for a more specific link between source and effect to allow for the identification of desired intervention strategies.

#### 3.1 Geography and Demographics

The 2009 VTAPA AQMP study made use of the 2001 Census data, which indicated the population in the VTAPA to be 2 532 362 at the time. The current study made use of the 2011 Census data, which indicated a population growth of 12% over the 10-year period to 2 848 140, and the 2016 Community Survey statistics, which indicated a population of 3 127 907 implying a growth of 10% over five years. According to the census data, the only Local Municipalities within VTAPA with more than 10% of households using coal, wood or dung for cooking were Emfuleni (17.8%) and Metsimaholo (12.6%). Due to changes in the boundaries between the census years a quantitative comparison was not possible.

#### 3.2 Regional Climate and Existing Ambient Air Quality

The DFFE operates six ambient monitoring stations within the VTAPA, located at Diepkloof, Sharpeville, Three Rivers, Zamdela, Kliprivier and Sebokeng. These stations record meteorological parameters and ambient air quality concentrations for, among other pollutants, SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. Data was obtained from these stations for the period 2013-2015 to determine dispersion conditions and for the period 2007-2016 to assess ambient air quality trends. In addition, data from the three Sasol ambient monitoring stations was obtained for the same period as well as from the Eskom station and the four ArcelorMittal stations. The Sedibeng DM stations were not included since data was only available for one year (2017).

The main findings are:

- There was some variability in wind fields across the VTAPA monitoring stations, but with a predominant north-easterly and north-westerly flow evident at all stations, with possible exception of Eco Park, where a south-easterly flow was dominant. Winds exceeding 4 m/s were more frequently recorded at Sharpeville, Letrim, and Eco Park. The Letrim station recorded the fewest calm conditions (6%), while calm periods were most frequent at the AJ Jacobs station (30%).
- Long term trends, from 2007 to 2016, in SO<sub>2</sub> concentrations showed compliance with the National Ambient Air Quality Standards (NAAQSs) at most of the stations for most of the time. Trends in SO<sub>2</sub> concentrations over 10 years showed small decreases at Diepkloof, Zamdela, Randwater and Eco Park but slight increases over time at Kliprivier, Three Rivers and AJ Jacobs. Concentrations at Sebokeng, Sharpeville and Letrim showed more annual variability and no distinct long-term trends.

At AJ Jacobs a distinct pattern of contribution from the north-east was noted with two sources contributing at the Letrim station, one to the north-west and one to the north-east of the station. At Kliprivier station the contribution was mostly from the south and at Sebokeng and Sharpeville it was from the south-east. North-east and easterly winds resulted in higher SO<sub>2</sub> concentrations at Diepkloof whereas north-east and southerly winds contributed to the

Three Rivers station. The Zamdela station recorded elevated SO<sub>2</sub> concentrations from the north-east, north and north-west.

- Annual average NO<sub>2</sub> concentrations were non-compliant with the NAAQS at Diepkloof (all the years except 2011), Kliprivier (2009 and 2010), Sebokeng (2015) and Sharpeville (2015). Hourly NO<sub>2</sub> concentrations were also non-compliant with NAAQS at Sebokeng in 2015, with the lowest concentrations recorded at the Randwater station. Monthly NO<sub>2</sub> concentrations have decreased slightly at the Leirim station, while concentrations have increased at Diepkloof; Three Rivers; Zamdela; and AJ Jacobs stations. At the other stations the ambient NO<sub>2</sub> concentrations remained the same.

Higher concentrations at Diepkloof were associated with winds from the north-east, south-west, and west during periods of higher wind speeds whereas strong winds from the west and north-west contributed to higher NO<sub>2</sub> concentrations at the Kliprivier station. NO<sub>2</sub> concentrations at the Sebokeng and Three Rivers stations persist mainly during low wind speeds. The Sharpeville station was influenced by stronger winds from the north-west, west and north-east while the Zamdela station recorded higher concentrations during winds from the north-west and north-east. NO<sub>2</sub> concentrations at the Randwater station were mostly during strong winds from the north-west, north-east and east-southeast. Most of the stations recorded NO<sub>2</sub> concentrations from all directions at low wind speeds. Observations from the stations located in high traffic areas with a strong contribution during low wind speeds were most likely from vehicle exhaust emissions.

- PM<sub>10</sub> concentrations were in exceedance of the NAAQS at most of the stations for most of years assessed except at Eco Park where annual PM<sub>10</sub> had been compliant with NAAQS since the establishment of the station. The highest concentrations were recorded at Zamdela.

The stations of Kliprivier, Sebokeng, Three Rivers, Sharpeville, Zamdela, and to a lesser extent, Randwater and Diepkloof showed significant PM<sub>10</sub> contributions at low wind speeds from all directions suggesting local contributing sources. During high wind speeds the contributing directions vary at the different stations, with winds from the northerly sector contributing mainly at the Diepkloof station and winds from the south-west at the Kliprivier station. The Sebokeng, Three Rivers and Sharpeville stations recorded elevated particulate concentrations from the northerly sector under strong winds. PM<sub>10</sub> concentrations at Zamdela showed high concentrations from the west, north-west, north-east, east, and south. At the Eco Park station elevated PM<sub>10</sub> concentrations were associated with northerly winds whereas winds from north and west contribute at AJ Jacobs station.

- Annual average PM<sub>2.5</sub> concentrations were in non-compliance with NAAQS, for most of the period assessed, except for AJ Jacobs where no annual exceedances were noted between 2014 and 2016. AJ Jacobs and Three Rivers had the lowest annual average concentrations whereas Leirim, Sharpeville, Kliprivier, and Sebokeng had the highest. Annual average concentrations appeared to have decreased at Diepkloof and Sebokeng but monthly average PM<sub>2.5</sub> concentrations did not show substantive improvements with slight increases at Kliprivier, Sharpeville, Zamdela and AJ Jacobs stations.

The stations of Diepkloof, Kliprivier, Sebokeng, Three Rivers, Sharpeville, Zamdela, and to a lesser extent Randwater had persistent PM<sub>2.5</sub> contributions at low wind speeds equally distributed in direction.

### 3.3 VTAPA Emissions

Emissions were quantified for all main sources within the VTAPA, as well as sources from the surrounding areas to form input into air quality modelling. The emission inventory reported on are for the sources within the VTAPA. These include:

- **Industrial Sources:** sources of air pollutants represent mostly stationary facilities operating under licenses or registration where emissions are reported to the authorities annually (Section 21 and Section 23 sources). A total of 452 individual point sources were identified, across 117 facilities, in the VTAPA, mostly in the Emfuleni Local Municipality of which 40 facilities operate listed activities under Section 21 of National Environmental Management: Air Quality Act (NEM:AQA) and 48 individual point sources are classified as Section 23 Controlled Emitters. Data reported on in NAEIS for the 2017 calendar year was used.
- **Mining Sources:** including opencast and underground mines and quarries. Two open-cast mines (one dolomite and one coal) and one underground coal mine were identified. Activity data reported on in NAEIS for the calendar year 2017 was used.
- **Mobile Sources:** accounting for vehicles traveling on arterial- and main roads, national freeway, secondary roads, slipways, off- and on ramps and streets. Use was made of the South African National Roads Agency Ltd (SANRAL) national counts for 2016 and GAUTRANS Gauteng Manual counts for 2015. A hybrid top-down (fuel sales)/bottom-up (vehicle count) approach was used to estimate emissions.
- **Domestic Fuel Burning:** fuel combustion for energy use in the domestic environment in VTAPA. Both a top-down (for gas, paraffin and coal) and bottom-up (for wood) approach was used for domestic fuel use emissions. Community Survey 2016 and Census 2011 data were used to proportionally disaggregate national fuel consumption to provincial and then small area level (SAL) geographic units.
- **Waste:** open burning in residential areas were quantified based on available information (no information was available on landfills and waste-water treatment facilities to quantify these emissions).
- **Windblown Dust:** from mine waste facilities, product stockpiles, as well as ash storage facilities for large combustion sources. Windblown dust from denuded areas were not included.
- **Biogenic VOC Emission:** plants emitting numerous VOC compounds, primarily isoprene due to stress responses, were included due to the important role in the atmospheric chemistry.
- **Biomass Burning:** large scale agricultural burning and natural fires. Fire Inventory from NCAR (FINN) data was extracted for the year 2016 and processed, with erroneous fires due to surface coal mines removed.
- **Airfields:** there are no major commercial airports within the VTAPA and the occasional use of airstrips in the area were not regarded to result in significant emissions.
- **Agriculture:** was included mainly for its contribution to ammonia emissions that were used in the dispersion model due to its important role in atmospheric chemistry.

#### 3.3.1 Synopsis of VTAPA Emissions

Emissions from the various sources identified and quantified in the VTAPA are provided in Table 8 and in Figure 5. Based on the quantified emissions, industrial sources were the main contributors of SO<sub>2</sub> (99.8%) and NO<sub>x</sub> (93%) emissions within the VTAPA. Mobile sources were the only other significant contributors to NO<sub>x</sub> emissions at 7%. Total PM<sub>10</sub> emissions were

mainly a result of industrial operations (52%) followed by windblown dust (31%), with biomass burning the third highest contributing source at 5%. For the sources for which PM<sub>2.5</sub> emissions were reported and/or quantified, windblown dust was the main contributing source (56%) followed by domestic fuel burning (29%). It should be noted that PM<sub>2.5</sub> is under-reported in the NAEIS and hence the emissions would be higher. CO emissions were a result of domestic fuel burning (28%), mobile sources (27%), biomass burning (26%) and industrial sources (19%). Biogenic VOC emissions were unsurprisingly the main contributor to NMVOC emissions followed by biomass burning. Ammonia emission (NH<sub>3</sub>) sources were mainly (soil) biogenic, with contributions from agriculture (87%) and to a lesser extent mobile sources (11%).

Subsequent to the publication of the Baseline Assessment Report (DEA, 2019), irregularities in the Industrial emissions uncovered during the Baseline Assessment were corrected/ improved where possible and are reflected in Table 8.

**Table 8: Emissions from the various source groups in VTAPA (tonnes per annum)**

Source Groups	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	NMVOC	NH <sub>3</sub>
Industrial Sources	232 669	118 459	14 424(a)	18 (a)(b)(c)	6 761	830	70
Mining Sources	-	-	363(a)	53 (a)(b)	-	-	-
Mobile Sources	251	8 299	245	-	9 635	967	493
Domestic Fuel Burning	261	184	2 552	1 242	9 982	1 404	0
Waste	12	90	287	-	-	544	27
Windblown Dust	-	-	8 444	2 449	-	-	-
Biogenic VOC Emissions	-	-	-	-	-	9 727	-
Biomass Burning	44	589	1 318	589	9 359	4 057	-
Agriculture	-	-	-	-	-	-	3 890
<b>TOTAL</b>	<b>233 237</b>	<b>127 621</b>	<b>27 653(a)</b>	<b>4 351(a)(b)</b>	<b>35 737</b>	<b>17 529</b>	<b>4 480</b>

**Note:** (a) Corrected/ Improved mission rates after publication of the Baseline Assessment Report  
 (b) PM<sub>2.5</sub> is under-reported in NAEIS and hence the emissions would be higher  
 (c) Only reflects reported PM<sub>2.5</sub> emissions by Industries where a large fraction of PM<sub>10</sub> is expected to be PM<sub>2.5</sub>

Compared to the 2009 and 2013 medium-term review inventories, the total emissions within the VTAPA remained similar for SO<sub>2</sub> but reduced significantly for NO<sub>x</sub> (Table 9). This is primarily due to lower estimated mobile source emissions and domestic fuel burning emissions. PM<sub>10</sub> emissions decreased from the 2009 inventory but is slightly higher compared to the 2013 inventory. Industrial PM<sub>10</sub> emissions reduced from the 2009 VTAPA, and even though the cause of this reduction is not clear, it could be an actual reduction in Industrial PM<sub>10</sub> emissions since the 2017 emission inventory is regarded more comprehensive than the one for 2009.

**Table 9: Medium-term VTAPA AQMP review versus 2018 VTAPA AQMP total emissions (tpa)**

	SO <sub>2</sub>	NO <sub>x</sub>	PM <sub>10</sub>
<b>2009 AQMP</b>	221 361	188 640	37 033
<b>2013 Medium-term review</b>	248 583	149 748	22 743
<b>2018 VTAPA AQMP</b>	233 237	127 621	27 653(a)

**Note:** (a) Corrected/ Improved mission rates after publication of the Baseline Assessment Report

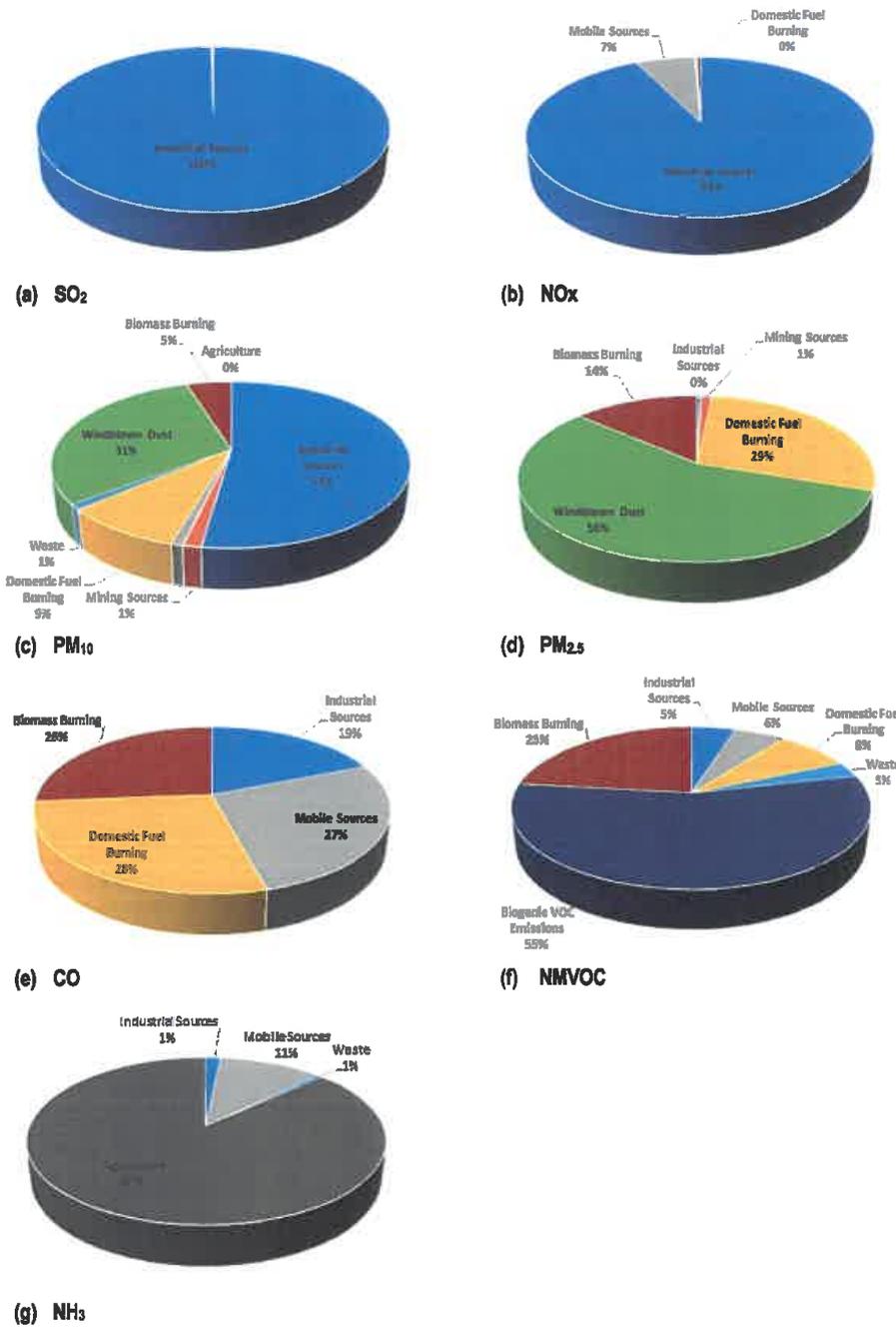


Figure 5: Source contributions to the total emissions for (a) SO<sub>2</sub>; (b) NO<sub>x</sub>; (c) PM<sub>10</sub> (updated); (d) PM<sub>2.5</sub> (updated); (e) CO; (f) NMVOC and (g) NH<sub>3</sub>

### 3.4 Dispersion Model

The aim of air quality modelling within the context of a baseline assessment was to simulate current ambient concentrations of pollutants within the VTAPA to assess ambient air quality on a more comprehensive spatial scale than what can be provided with monitoring stations. Areas of elevated concentrations can be identified for expanded monitoring; and when viewed within the context of the emission inventory, likely contributing sources targeted for intervention strategies. Through the use of source tracking features in the model, it was also possible to quantify relative contribution between tracked sources.

CAMx, a chemical air quality model, was used to simulate baseline ambient air quality. A regional 3 km resolution modelling domain aimed to capture Highveld regional sources that may impact in the VTAPA, while a finer resolution 1 km domain over VTAPA aimed to simulate ambient air quality in more detail.

#### 3.4.1 Summary of findings

The primary aim of air quality modelling in this AQMP was to assess ambient air quality in the VTAPA on a more comprehensive spatial scale than what can be provided with monitoring stations and provide directed source tracking analyses. The CAMx air quality model was run to aid in the baseline assessment of the VTAPA. To this end a comprehensive emission inventory was developed for both management purposes and as input into the air quality model. The WRF meteorological model was also used to simulate the necessary meteorological parameters that form additional input to the air quality model. A comparison of model output to measurements from monitoring stations was done to ascertain performance. The comparison took the form of both statistics and time-series plots. For source tracking, two groups were tracked; industry located within the VTAPA and those outside. Source tracking output was analysed for O<sub>3</sub> and PM<sub>10</sub> impacts.

Concentrations of PM<sub>10</sub> were in general under-estimated by, looking at hourly data, between 32% (at Sebokeng) and 71% (Kliprivier). This was primarily due to the potential impact of much localized sources near the monitoring stations. High exceedances (for both 24hr and annual averages) were still simulated. The majority of these were in close proximity to industrial facilities, mines and the old tailings areas in CoJ. Exceedances were also simulated in northern VTAPA, located around high emitting residential fuel combustion areas. PM<sub>2.5</sub> results were also in general under-estimated where monitoring data was good enough for a comparison, although performance was better than for PM<sub>10</sub>. Under-estimation ranged from as low as 14% (at Randwater) to 50% (at Sebokeng). Even though PM<sub>2.5</sub> was under-estimated, a majority of the VTAPA was simulated to be in exceedance of the 24hr NAAQS for PM<sub>2.5</sub>. However, for the annual mean, the exceedance levels were seen to be more limited to the immediate vicinity of mines, tailings facilities and areas of heavy domestic fuel combustion. The model did not simulate annual exceedances measured at Sebokeng and Three Rivers. Elevated PM<sub>2.5</sub> concentrations measured during hours between ~21:00 - ~05:00 (i.e. very late evening and very early morning) were not simulated by the model. This may be related to the over-estimate in wind speed.

The over-estimate in wind speed also resulted in over-estimation of SO<sub>2</sub>; since in the model the tall stack impacts tend to dominate due to enhanced turbulence. However, this did not impact the ability of the model to simulate areas of exceedance (or lack thereof according to the monitoring data, when the monitoring data was of good quality). The exception to this is at the Rand Water location, where the model simulated an exceedance of the annual mean while the monitoring data (relatively good quality and completeness) did not show an exceedance. In general exceedances were seen around Lethabo power-station and Sasolburg.

Performance of NO<sub>2</sub> and O<sub>3</sub> simulations were good; particularly for O<sub>3</sub>. For NO<sub>2</sub> the highest under-estimate was at Diepkloof, as the model did not capture micro-scale emissions activity on roads around the monitoring station. On the other hand, at AJ

Jacobs, over-estimates were due to enhanced turbulence leading to Lethabo power-station and Sasol Sasolburg plumes impacting ground concentrations. In general, the model simulated the lack of exceedances seen in the monitoring data; the only exception being at Diepkloof for the annual mean. The model simulated highest (though not necessarily in exceedance) concentrations around Sasolburg. For O<sub>3</sub> the modelled concentrations resulted in 8-hr NAAQS exceedances over the majority of the VTAPA. There is a zone of titration around Sasolburg where concentrations were simulated to be lower.

The air quality model simulations indicated widespread exceedances of O<sub>3</sub> and PM over the majority of the VTAPA. Exceedances were seen for short-term/acute time scale periods (24-hr and 8-hr running) indicating high variability and magnitude.

In terms of source tracking, it must be noted that only two industry groups were tracked; and therefore, results were only relative to industry contribution. It is possible that other sources could play a significant role in actual ambient exceedances for a given time and place. PM<sub>10</sub> impacts within VTAPA were primarily due to industry within VTAPA; which was expected since PM<sub>10</sub> concentrations were generally highest immediately around sources. For O<sub>3</sub> it was more complex since highest concentrations may be found near the sources if NO emissions are low, or further downwind if NO emissions are high. Thus, there is a regional aspect to O<sub>3</sub> formation when related to the precursor contributing sources. For the VTAPA there was a mix of contribution from local industry and those outside. However, simulations indicated that industry outside the VTAPA plays a larger role in O<sub>3</sub> formation than within the VTAPA.

### 3.5 Conclusions from the VTAPA Health Study

A baseline health assessment study was conducted in the VTAPA during 2013 and 2014. The study comprised of a community survey in four communities within the priority area and a child respiratory health study (including lung function tests) in four schools within the community study areas, as well as an assessment of human health risks resulting from exposure to air pollution.

The main findings of the study may be summarised as follows:

- Given the ambient concentrations measured at DFFE/SAWS stations in 2013, no risk from SO<sub>2</sub> was found. NO<sub>2</sub> was estimated to pose a health risk in Zamdela. The risk to health from exposure to particulate matter (PM<sub>10</sub>) was found to be more of a concern than the risk from exposure to SO<sub>2</sub> and NO<sub>2</sub>. Sharpeville in particular recorded the highest concentrations of PM<sub>10</sub> during 2013.
- From the community survey, risk factors for respiratory illnesses were mostly associated with energy use (coal for cooking and paraffin for heating), overcrowding and hygiene practices (burning or burying of refuse or failure to regularly remove refuse) as well as lifestyle (active and passive smoking and alcohol use).
- The main conditions affecting vulnerability of areas to the effects of air pollution involved socio-economic conditions and energy use. The main vulnerable areas of concern were north of the Sebokeng and Sharpeville monitoring stations and south-east of the Zamdela monitoring station.
- Although the socio-economic conditions and exposure at the schools were similar, the odds of having chronic symptoms (such as cough, wheeze and phlegm and asthma) were significantly higher at the school in Sharpeville. Pollutant concentrations at the Sharpeville monitoring station were also consistently among the highest.

Significant declines in daily lung function (therefore poorer respiratory health) and an increased chance of having negative respiratory symptoms were associated with changes in the concentrations of the various pollutants. Given that these adverse

respiratory outcomes were observed within the context of some pollution levels complying with the national ambient air quality standards, there is reason for concern that air pollution in the VTAPA may be affecting child health.

### 3.6 Preliminary Findings on the VTAPA Source Apportionment Study

The VTAPA SAS aims to apportion the contribution of sources to the overall PM<sub>10</sub> and PM<sub>2.5</sub> loading in the VTAPA. Aerosol sampling was initiated at four (4) strategically identified sites namely; Kliprivier, Sebokeng, Sharpville and Zamdela in the Vaal Triangle. The samples were further used to characterise the chemical composition through chemical analysis, the elemental composition through X-ray fluorescence spectrometry (XRF) analysis and ionic composition using Ion Chromatography (IC) Analyses. Statistical models were then used to apportion the various sources. A total of three sampling campaigns were conducted during the winter of 2018, the summer of 2019 and the spring of 2019.

Preliminary results indicate:

- The NAAQS are frequently exceeded at all four sites in summer, winter and spring, but it is significantly worse during winter with PM<sub>10</sub>, PM<sub>2.5</sub> and SO<sub>2</sub> the main pollutants of concern.
- The coarse particulate fraction dominated both during daytime and night-time sampling periods, during all three sampling campaigns.
- Elemental characterization of the summer, winter and spring samples showed dust elements in the coarse particulate fraction to be prominent during the day at all four sites. At Kliprivier and Sharpville, and to a lesser extent Zamdela, indicators of combustion products were evident in the evenings in summer and winter. Motor vehicle elements were higher in the coarse fraction at night at all four sites, in all three seasons.
- Soluble Inorganic concentration loading showed inorganic content from crustal and anthropogenic activities.
- Source apportionment of the coarse particulate fraction indicated dust to be the dominant source at all four sites, during all three sampling campaigns (winter, summer and spring) and during daytime and night-time. Sulphates and nitrates were the second most dominant source during summer and both during daytime and night-time at all four sites whereas waste burning was second during the winter months. Coal burning only flagged at Zamdela during the winter months but was the second most abundant source in the coarse fraction at all four sites during the spring campaign.
- In the fine fraction, the largest portion of observed mass is unresolved with sulphates and nitrates dominating at all four sites during all three sampling campaigns. Varying contributions from vehicle-, waste burning, wood- and biomass burning, and paved and unpaved roads were observed.

The main finding thus far from the SAS is that dust is the main source of PM<sub>10</sub> concentrations within the VTAPA, with the main sources contributing to PM<sub>2.5</sub> still unaccounted for. The unaccounted fraction will be narrowed down through use of the positive matrix factorization (PMF) model as well as industry profiling. Nonetheless, the contribution from sulphates, domestic fuel burning, biomass burning, and vehicles were significant in all three campaigns.

A qualitative waste burning survey conducted in Sharpeville highlighted the large scale of local waste burning and veld fires in this community and reinforces the strong need for improved activity and emission factor data on burning.

### 3.7 GAINS modelling scenario findings

The GAINS model was used to assess a set of emission reduction scenarios as a first screening to determine the potential for reducing health impacts of air pollutants within the VTAPA. This is done by altering the energy activity mix and applying abatement measures to different sectors. The GAINS modelling scenarios used energy activity data from the Gauteng City-region (GCR) and defined strategies available in the model. For the scenarios, 2015 was taken as the baseline year with emission reduction pathways assessed in the medium-term (20-year period).

The findings from the GAINS model can be summarised as follows:

#### Domestic Fuel Burning

- Electrification of households in informal settlements is likely to result in a steady decline in domestic fuel burning emissions.
- Replacing coal with Liquefied Petroleum Gas (LPG) in informal settlements is likely to eliminate PM<sub>2.5</sub> emissions from the domestic sector by 2035. This could also be complimentary to the electrification program in informal settlements.
- Low-smoke stoves are marginally less effective than LPG due to lower combustion efficiency.

#### Industrial Sector

- With business as usual, PM<sub>2.5</sub> emissions would increase due to industrial growth. The implementation of fabric filters is likely to reduce PM<sub>2.5</sub> emissions by 70% whereas Electrostatic Precipitators (ESPs) only result in a 43% drop compared to baseline emissions.
- The control of SO<sub>2</sub> emissions in the industrial sector can be effectively achieved with the application of dry flue gas desulphurisation controls (55% reduction from baseline emissions) and wet flue gas desulphurisation technologies (68% reduction from baseline emissions).
- Increase industrial activities would result in an increase in NO<sub>x</sub> emissions, however the use of combustion modification technologies and selective catalytic reduction controls would reduce emissions by 56%.

#### Waste Sector

- Population growth in urban areas is expected to result in an increased generation of municipal waste which is predicted to result in a rise in PM<sub>2.5</sub> emissions.
- Banning municipal waste burning would result in an emission reduction of over 83% should a ban be fully implemented by 2025.

#### Transport Sector

- The gradual implementation of Euro 5 fuel standards in the transport sector would result in a slow decrease of NO<sub>x</sub> emissions, remaining high by 2035. With an accelerated implementation rate and halving the vehicle population by 2035, NO<sub>x</sub> emissions are projected to fall by 79%.
- With the implementation of Euro 6 fuel standards in the transport sector, NO<sub>x</sub> emission will reduce by 81%.

## 4 VTAPA CAPACITY BUILDING PLAN

Capacity in terms of resources, tools and finances for air quality management and control within the various spheres of government (National, Provincial and Local levels) have been an on-going challenge jeopardizing the implementation of the VTAPA AQMP. Current capacity for air quality management and control at National, Provincial and Local government levels were found to be inadequate to ensure the successful implementation of the Intervention plans (DEA, 2013).

The Government Capacity Goals as re-defined in the 2013 medium-term review, are as follows:

- Government Capacity Goal 1: By 2015 all government spheres that have an air quality management function have undertaken organisational capacity review and developed structures to allow it to and effectively maintain, monitor and enforce compliance with ambient air quality standards.
- Government Capacity Goal 2: By 2017 all government structures have provided adequate budgets and human resources to implement the VTAPA AQMP and to efficiently and effectively maintain, monitor and enforce compliance with ambient air quality standards.
- Government Capacity Goal 3: By 2017 a measurable increase in awareness and knowledge of air quality exists such that air quality and related health issues are incorporated in IDPs.

### 4.1 VTAPA Capacity Analysis

The capacity building plan is based on the required skills development and interests identified by the air quality officers and relevant government officials from the various municipalities within the VTAPA. The Department (DFFE) sent out a questionnaire to all the municipalities to identify the areas where additional capacity development is mostly required. Ten (10) out of the 25 questionnaires were received back, and these were used to identify the training requirements. After collaboration with the relevant authorities, the approach decided on was to focus on one or two aspects for in-depth training, instead of a general high-level approach.

The summarised results from the 10 questionnaires received are shown in Figure 6. Most votes were for additional training on emissions inventory development, specifically for sources and activities within VTAPA. Training on dispersion modelling was the second-most sought-after skillset, followed by air quality monitoring and evaluation.

The approach as provided in this plan followed a hands-on training course focussing on the smaller sources (i.e. controlled emitters) within the VTAPA. At this course, senior members of the team guided the participants through the process followed. In addition, there were hands-on exercises that aimed to provide additional information to be used in the AQMP development. For example, the participants assisted with emissions estimation for the project at the end of the "emissions estimate training".

The aim was that this would assist the officials in not only understanding the emissions quantification methodology, but also understanding how and why assumptions are made, and what data are needed for the implementation of the VTAPA AQMP. The aim of the capacity plan was to provide officials with a broad-based understanding of air pollution for them to fulfil their legal obligation and ensure a successful implementation of the VTAPA AQMP. On the one hand the plan is general in nature, but on the other hand it is detailed enough so that officials can deal with industry representatives and consultants from a position of knowledge.

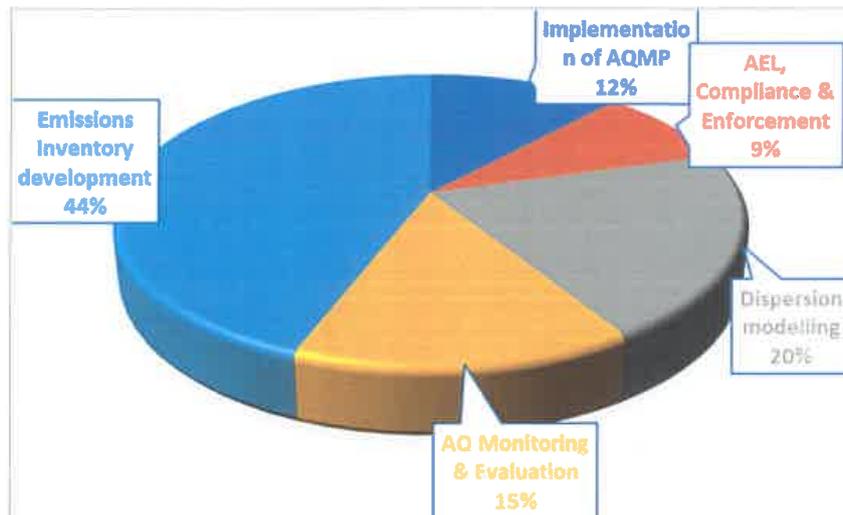


Figure 6: Capacity Building questionnaire results

4.2 Strategic Framework for Capacity Building

A workshop was held at the Manhattan Hotel, Pretoria on the 19<sup>th</sup> and 20<sup>th</sup> June 2018 including a theory component and a practical component, focussing on calculation of emissions from Section 23 sources. A schematic representation of the approach followed is include in Figure 7.

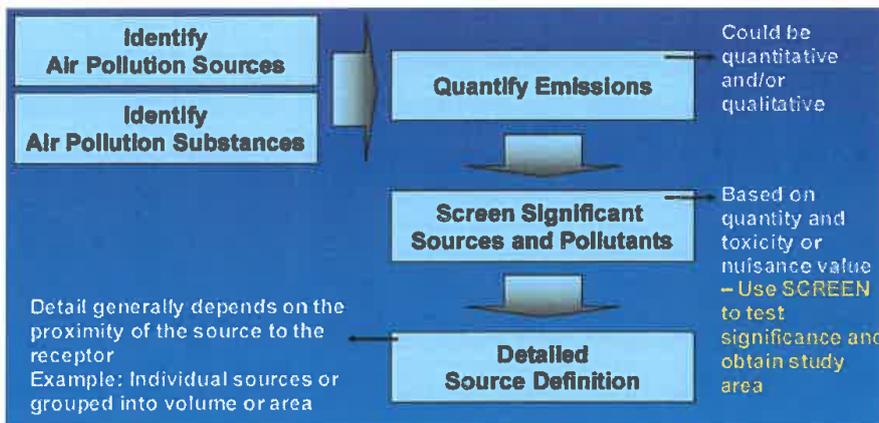


Figure 7: Capacity building workshop approach

Local authorities were asked to submit information for Section 23 facilities before the workshop to be used as part of the practical session. An example for the inventory requirements for the municipalities is provided in Figure 8. The completed questionnaires received from the municipalities mostly comprised of a source list that included: uncontrolled small sources; Section 23 activities; and Section 21 activities. These were used as examples in the Capacity Building sessions to allow the officials to complete their own inventories in the process.

The framework for the Capacity Building Plan is provided in Table 10.

Facility/Plant name		No of boilers	Type of boiler specified	Fuel type	Fuel quantity		Operational days
		#			tpa	kg/a	
Chang's Marine Hoist (example)		24 (2004)	24 (2004)	coal	24 120	24 120	0.5
Assumed							
Release height (m)	Diameter (m)	Area (m <sup>2</sup> )	exit temperature (°C)	exit temperature (K)	exit velocity (m/s)	flow rate (m <sup>3</sup> /s)	flow rate (Nm <sup>3</sup> /s)
42	0.935	0.687	140	413	23	15.79	10.44
Theoretical air combustion for boilers		Emission Standard (mg/Nm <sup>3</sup> )			Emission rates (g/s)		
m <sup>3</sup> /kg		PM (existing)	PM (new)	SO <sub>2</sub>	PM (existing)	PM (new)	SO <sub>2</sub>
6.9		250	120	2800	2.61	1.25	29.23
6.9					0.00	0.00	0.00
6.9					0.00	0.00	0.00
6.9					0.00	0.00	0.00

Key:	
Required input	From literature
Include if available (can be assumed)	Emission limits
Include if available (can be estimated)	Contents calculated, do not enter values

Figure 8: Capacity building questionnaire for Section 23 sources

**Table 10: Strategic Framework for Capacity Building**

Activity Area	Planning	Implementation	Training Timeframe	Authorities Enhancement	Performance Measures
Emissions Inventory Compilation Training	Develop a 2-day emissions inventory course specific to the sources within the VTAPA	Air quality officers from the various municipalities within the VTAPA were trained at a combined Training Workshop	19 and 20 June 2018, Manhattan Hotel, Pretoria	<p>Training sessions covered the following:</p> <ul style="list-style-type: none"> <li>● Background to SA emissions inventory;</li> <li>● Background to VTAPA emissions inventory;</li> <li>● Brief introduction to sources and sinks:                             <ul style="list-style-type: none"> <li>○ Industrial sources</li> <li>○ Mining sources</li> <li>○ Mobile sources</li> <li>○ Domestic fuel burning</li> <li>○ Waste</li> <li>○ Windblown dust</li> <li>○ Biogenetic VOC emissions</li> <li>○ Biomass</li> <li>○ Other</li> </ul> </li> <li>● Emissions inventory development:                             <ul style="list-style-type: none"> <li>○ What is an emissions inventory?</li> <li>○ Purpose of emissions inventories</li> <li>○ Emission types</li> <li>○ Emission estimation methods</li> <li>○ Examples</li> </ul> </li> <li>● Practical session:                             <ul style="list-style-type: none"> <li>○ Each AGO had to identify and collect the relevant information from at least three (3) controlled emitters or small sources within their District before the training.</li> <li>○ The practical session included:                                     <ul style="list-style-type: none"> <li>■ One (1) source from each DM to be done together.</li> <li>■ The second source to be done by the AGO's and attendees with the support of the presenters.</li> </ul> </li> </ul> </li> </ul>	<p>Updated and comprehensive emissions inventory for the VTAPA, with specific reference to Controlled Emitters and Small Stationary Sources.</p> <p>VTAPA Authorities with a better understanding of emissions inventory development, specifically on:</p> <ul style="list-style-type: none"> <li>● How to identify controlled emitters and small stationary sources;</li> <li>● What information is required to quantify emissions from these sources;</li> <li>● How to quantify the source emissions; how to verify quantified emissions;</li> <li>● How often to update emissions inventory.</li> </ul>

## 5 STRATEGY ANALYSIS

Identifying appropriate strategies is important for the development of feasible interventions which address the problem complexes. Based on the findings from the baseline characterisation, the preliminary SAS results and the GAINS results, five problem complexes were identified as the main contributors to the current air quality situation in the VTAPA. These complexes are: i) industry; ii) vehicles; iii) windblown dust; iv) waste burning and v) domestic fuel burning. The expectation is that by reducing emissions from these sectors, the resulting ambient air quality would be within compliance in the VTAPA.

In order to gain an understanding around the sensitivity of ambient air quality in the VTAPA to the various emission changes (brought about by interventions), modelling was used to translate emission scenarios to changes in pollutant concentrations. The modelling system used is the one developed for the Baseline Assessment, thus the only changing variable is emissions. It must be noted that due to industrial emissions irregularities uncovered during the Baseline Assessment, the scenario modelling utilized improved industrial emissions information for a baseline (Table 8). These changes are noted in the subsection below, and the subsequent analyses show the results of the "new baseline" together with scenario results.

### 5.1 Scenario Assessment

Various methods and rationale were applied to the emission sectors that were investigated. Scenarios were made up of a suite of changes to emission sectors and are outlined in Table 11. Two scenarios were investigated, namely Scenario 2025 and Scenario 2030. The naming convention is carried over from the GAINS analysis and applies to the domestic fuel combustion and waste burning in terms of expected year of implementation. However, the industrial changes will occur in 2020 and vehicle changes are arbitrarily chosen for 2030.

Table 11: Summary of emission changes applied for the "new baseline" and scenarios

Sector	Baseline	Scenario 2025	Scenario 2030
<b>Industry</b>	<p>1. New Vaal open-cast coal mine emissions re-calculated based on this throughput rate and the emission factors for open cast mining in NAEIS.</p> <p>2. Emissions from Gryphon Tiles were re-calculated using MES, and Pegasus Tile Factory emissions were corrected based on emission measurement reports.</p> <p>3. All other emissions as reported in NAEIS.</p>	MES 2020 for Industry in 1km domain	MES 2020 for Industry in 1km domain
<b>Vehicles</b>	No change compared to baseline report	None	100% of vehicle fleet are EURO5 compliant
<b>Dust</b>	No change compared to baseline report	Control Efficiency of 80% on all TSFs	Control Efficiency of 80% on all TSFs
<b>Waste burning</b>	No change compared to baseline report	39% reduction on baseline	60% reduction on baseline
<b>Domestic burning</b>	No change compared to baseline report	53% reduction on baseline	77% reduction on baseline

For each of the five identified sectors, the following reductions were applied and modelled:

- I. **Industry:** By the year 2025, all Listed Activities will have to be compliant with the 2020 Minimum Emission Standards (MES), thus all industries within the VTAPA were modelled at MES unless the industry is already compliant (operating below the MES), then the baseline emissions were applied. It was assumed that industries that are already compliant, would not increase production and would remain at baseline emissions.
- II. **Windblown dust:** Erosion losses from grassed slopes measured by Blight (1989) was found to be in the order of 100 t/ha/year compared to uncontrolled slopes from which losses of up to 500 t/ha/year were recorded. This relates to an 80% control efficiency due to effective vegetation cover. According to the Australian National Pollutant Inventory (NPI, 2012), the control efficiency of vegetation is 40% for non-sustaining vegetation and 90% for re-vegetation. For the purpose of scenario modelling, a control efficiency of 80% was applied to all tailings storage facilities (TSFs) within the VTAPA.
- III. **Waste burning:** Informal burning of waste was identified as a significant source of air pollution at a local level within the VTAPA. Intervention strategies as set out in Table 11, aim to improve the collection, separation and recycling of domestic waste as well as improved management of municipal landfill sites. Ultimately any burning of municipal solid waste will be banned. A 39% (Scenario 2025) and 60% (Scenario 2030) reduction derived from the GAINS analysis (summarized in the Baseline Assessment report and Section 0) was applied to the baseline. This is due to a reduction in activity and thus applies to all pollutants. No specific emission factor change is given by GAINS thus all pollutants are reduced accordingly. The reduction is applied only within the VTAPA area. Table 12 shows the changes in emissions within the 1km domain. Note that since it is domain wide, and the reduction scenario includes only VTAPA, the percentage reduction does not show in the values (i.e. going from 51 tpa to 46 tpa is not a 39% reduction).

Table 12: Emission (ton per annum) for each scenario in the 1km domain for waste burning

Scenario	PM <sub>10</sub>	SO <sub>2</sub>	NM VOC	NO <sub>x</sub>	NH <sub>3</sub>
Baseline	1 203	51	2 284	378	113
2025 (i.e. 39%)	1 091	46	2 072	343	103
2030 (i.e. 60%)	1 031	43	1 957	324	97

- IV. **Domestic burning:** As discussed in Section 0, the electrification of households in informal settlements would not necessarily result in a decrease in solid fuel use. Also, switching fuel from coal to LPG is not a financially viable option. Thus, the implementation of low smoke stoves is regarded a more viable option. A 53% (Scenario 2025) and 77% (Scenario 2030) reduction derived from the GAINS analysis (summarized in the Baseline Assessment report and Section 0) was applied to the baseline. This is reduction in activity for wood and coal burning only. No specific emission factor change is given by GAINS thus all pollutants are reduced accordingly. The reduction is applied only within the VTAPA area. The table below (Table 13) shows the changes in emissions within the 1km domain. Note that since it is domain wide, and the reduction scenario includes only VTAPA, the percentage reduction does not show in the values (i.e. going from 6 962 tpa to 6 270 tpa is not a 53% reduction).

**Table 13: Emission (ton per annum) for each scenario in the 1km domain for domestic fuel combustion**

Scenario	SO <sub>2</sub>	PM <sub>10</sub>	NO <sub>x</sub>	NM <sub>10</sub> OC	NH <sub>3</sub>	CO	CH <sub>4</sub>
Baseline	2 115	6 982	1 154	6 411	0.045	51 457	1 249
2025 (i.e. 53%)	1 981	6 270	1 068	5 668	0.042	48 437	1 133
2030 (i.e. 77%)	1 921	5 957	1 029	5 331	0.041	44 164	1 081

- V. **Vehicles:** This emission sector change applied only to Scenario 2030. It consisted of assuming 100% of the active road fleet (passenger and commercial; light and heavy) were EURO5 compliant. This in contrast to using the scrapping curve seen in the Baseline Assessment; where the emission factors are weighted. For this sector change, all emission factors are for EURO5 vehicles and are applied to both top-down and bottom-up portions of the sector's inventory. However, EURO5 vehicles also exhibit different fuel consumption, and for a given amount of fuel (relevant for the top-down portion of the vehicle emissions inventory) this changes the vehicle kilometers travelled (VKT). If fuel consumption decreases, for a given amount of fuel, the VKT will increase (potentially increasing emissions for certain classes). Like emission factors, this factor is dynamic in that it is different for different vehicle classes as well as for different speeds. This was taken into account for the emission changes (Table 14).

**Table 14: Emission (ton per annum) for each scenario in the 1km domain for on-road vehicles**

Scenario	CO	NO <sub>x</sub>	NM <sub>10</sub> OC	PM <sub>2.5</sub>	CH <sub>4</sub>	NH <sub>3</sub>	SO <sub>2</sub>
Baseline	39 379	31 103	3 680	925	540	2 058	964
2025 (No change)	39 379	31 103	3 680	925	540	2 058	964
2030 (100% EURO5)	25 786	26 638	1 781	199	295	607	959

## 5.2 Scenario Modelling Results

The following maps illustrate the impact on ambient air quality from the scenarios. Pollutants shown are PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub>, O<sub>3</sub> and SO<sub>2</sub>. For each pollutant, only the relevant averaging periods are shown (i.e. only averaging periods for which there is a NAAQS). For each averaging period, the first map shows the baseline (i.e. including improvements to the industrial emissions), the second shows the Scenario 2025 simulation, the third shows the Scenario 2030 simulation and the last shows the percentage decrease going from baseline to Scenario 2030 (note a negative percentage decrease indicates an increase). Since Scenario 2030 includes all of the changes in Scenario 2025, it (2030) is seen as a cumulative result and thus the percentage decrease from baseline to Scenario 2030 shows the total reduction. It may however be useful to look at the percentage reduction going from Scenario 2025 to Scenario 2030 in order to identify specific improvements, particularly for vehicles. Maps of the reduction from Scenario 2025 to Scenario 2030 are included in Appendix A.

### 5.2.1 PM<sub>10</sub> Scenario Modelling Concentrations

All the scenario emission changes will affect PM<sub>10</sub> concentrations. There is a reduction in exceedances (as well as total eradication) around the central and northern VTAPA. This is primarily related to reduction in TSF and industrial emissions; however, impacts from reducing waste burning and domestic fuel combustion can be seen around and south of Soweto. In the central VTAPA region an area of exceedance remains due to no MES being applicable to brick production in clamp kilns.

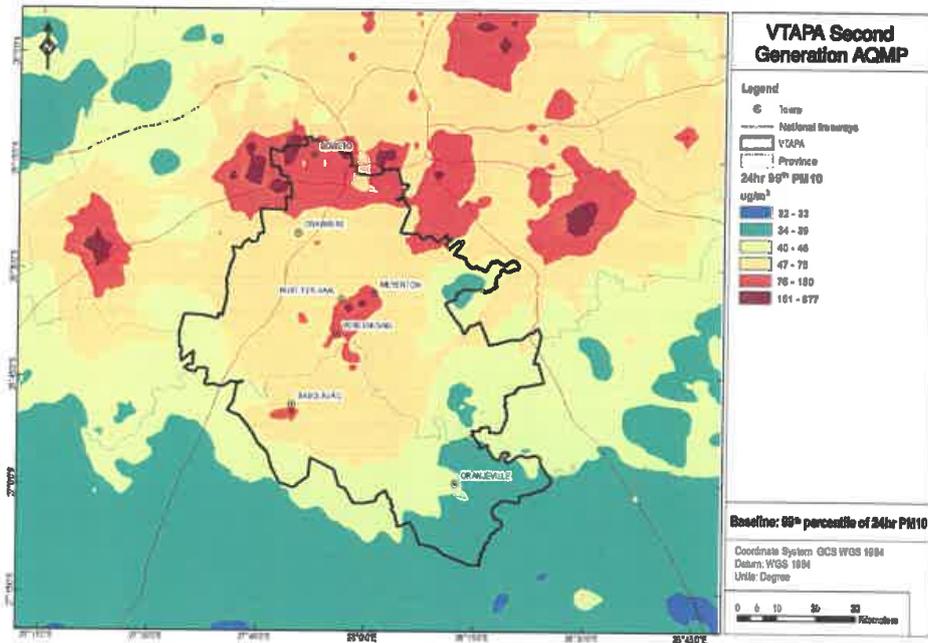


Figure 9: PM<sub>10</sub> 24-hour concentrations as a 99<sup>th</sup> percentile for the Baseline Scenario

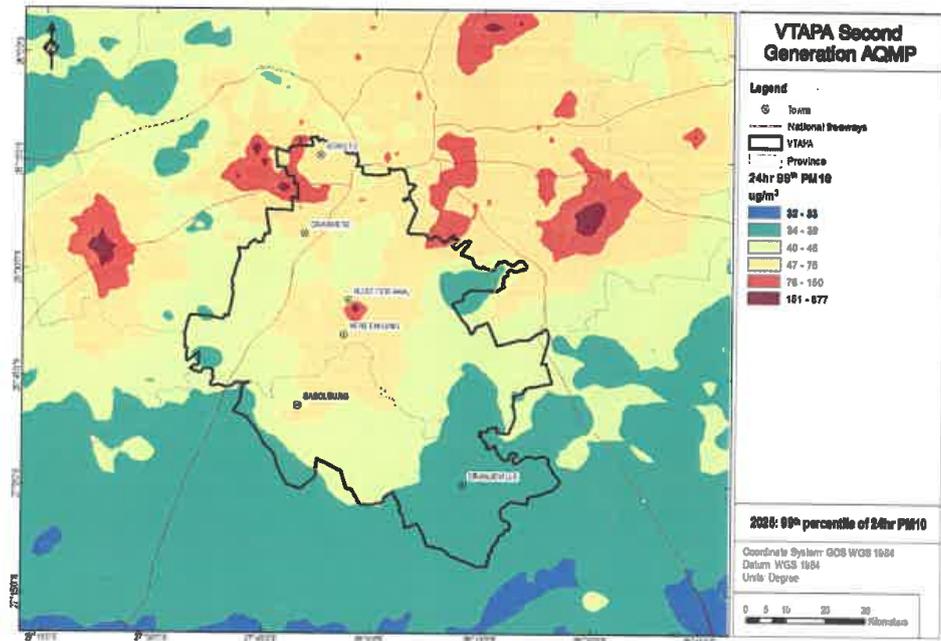


Figure 10: PM<sub>10</sub> 24-hour concentrations as a 99<sup>th</sup> percentile for Scenario 1 – year 2025

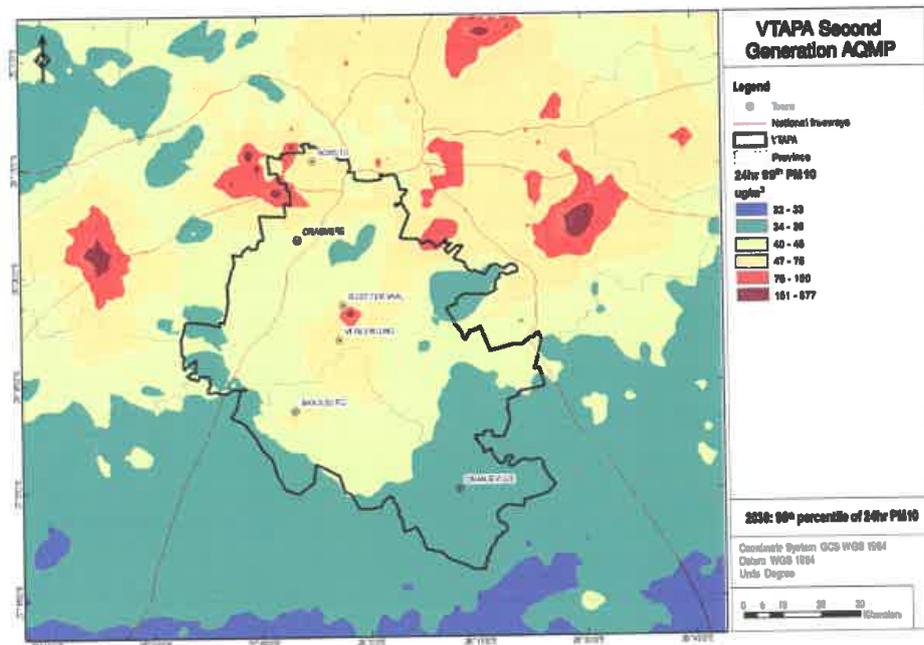


Figure 11: PM<sub>10</sub> 24-hour concentrations as a 99<sup>th</sup> percentile for Scenario 2 – year 2030

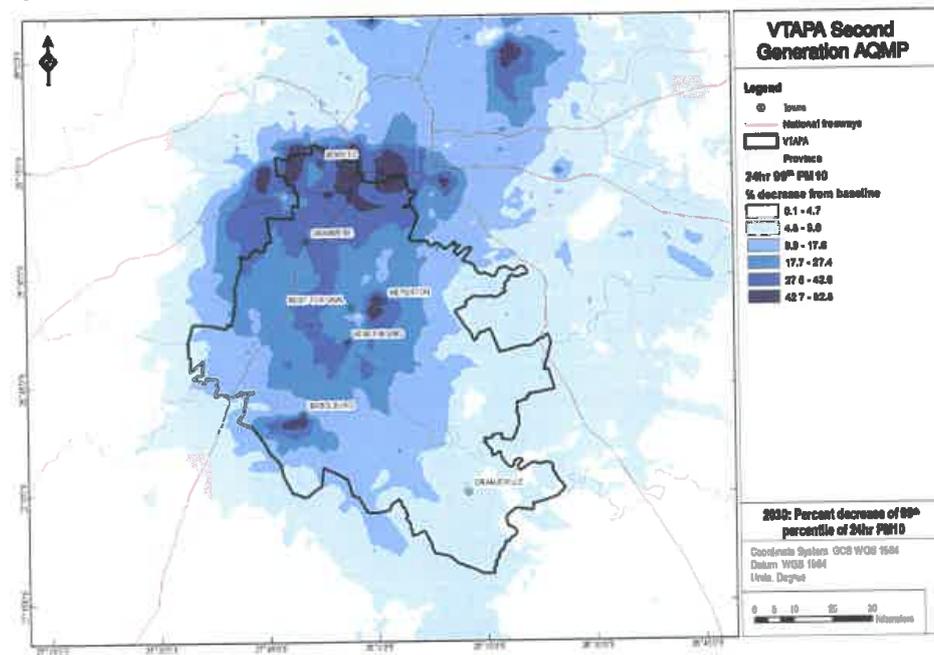


Figure 12: PM<sub>10</sub> 24-hour percent decrease of the 99<sup>th</sup> percentile from Baseline to Scenario 2 – year 2030

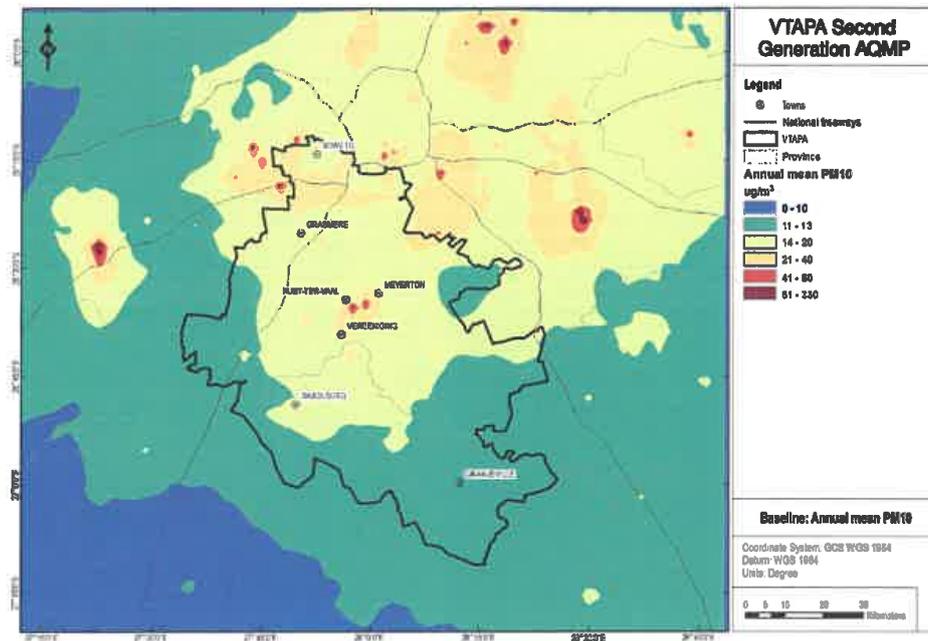


Figure 13: PM<sub>10</sub> annual mean concentrations for the Baseline Scenario

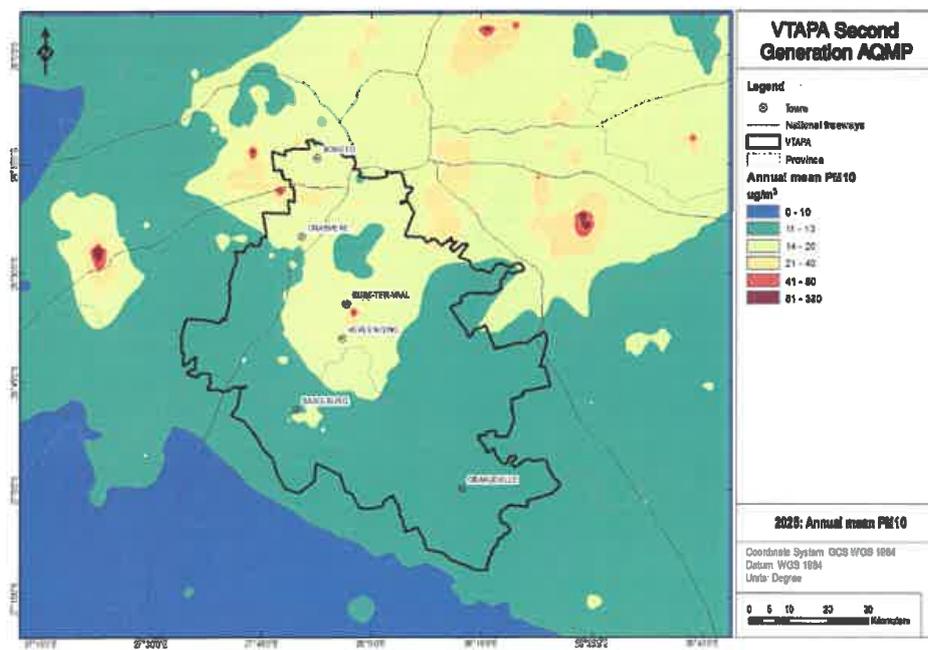


Figure 14: PM<sub>10</sub> annual mean concentrations for Scenario 1 - year 2025

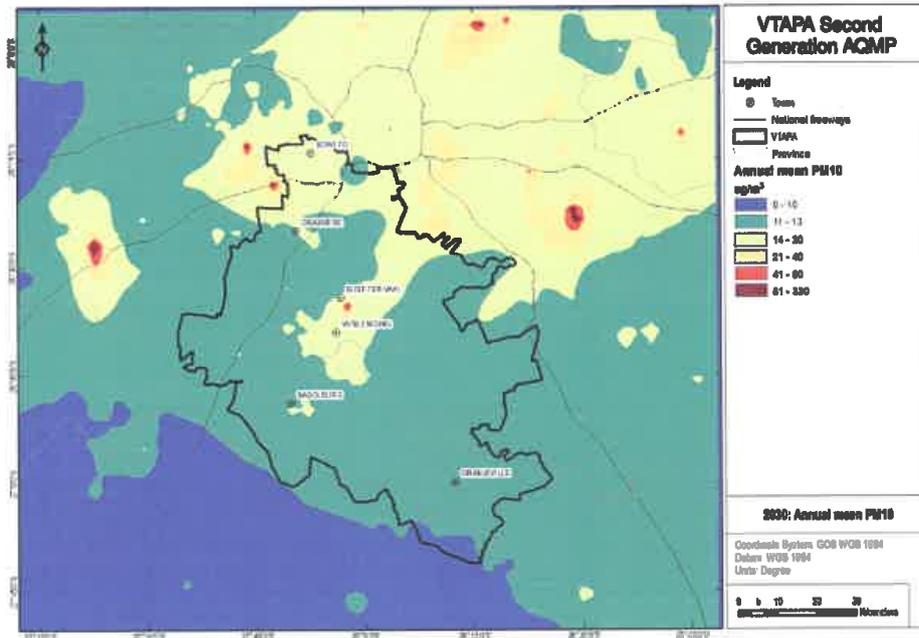


Figure 15: PM<sub>10</sub> annual mean concentrations for Scenario 2 – year 2030

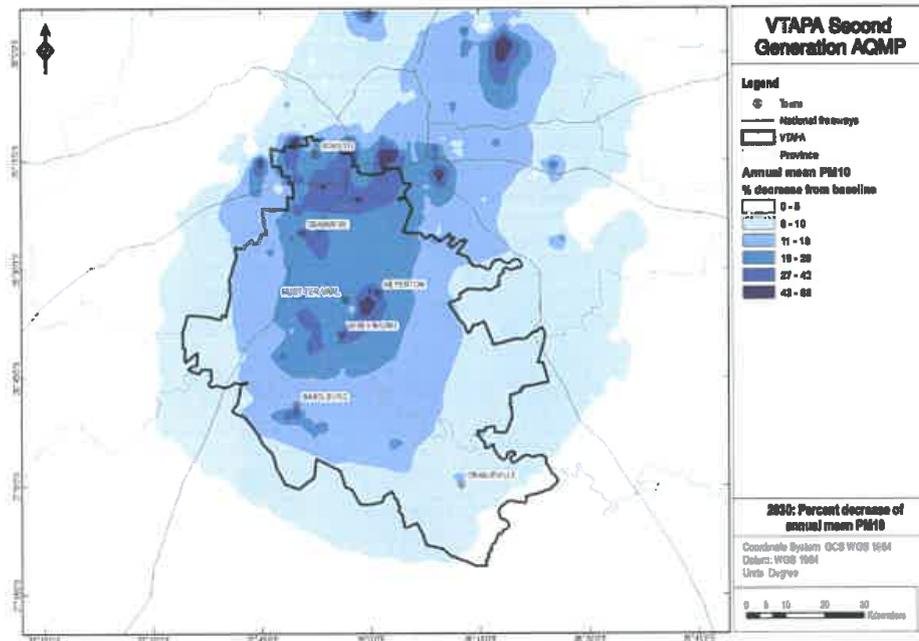


Figure 16: PM<sub>10</sub> percent decrease of the annual mean from Baseline to Scenario 2 – year 2030

5.2.2 *PM<sub>2.5</sub> Scenario Modelling Concentrations*

For PM<sub>2.5</sub>, reductions in the 24hr 99<sup>th</sup> percentile are not as readily seen as PM<sub>10</sub> for Scenario 2025. This is possibly due to the fact that many more sources are estimated (in the emissions inventory) to emit PM<sub>2.5</sub>. There is also the influence of secondary PM formation, which enhances PM<sub>2.5</sub> only. For Scenario 2025 24hr 99<sup>th</sup> percentile there are reductions, and the remaining hotspots in VTAPA are due to industrial, waste burning and domestic fuel combustion emissions. Exceedances around Zamdela region have been eliminated. Scenario 2030 (further reductions in domestic fuel combustion and waste burning, as well as EURO5 vehicles) contributes even further to 24hr 99<sup>th</sup> percentile reductions in exceedance areas, particularly along the central region. However, areas of exceedance in the north remain. The annual average shows better reductions, with Scenario 2030 resulting in total eradication of exceedance areas.

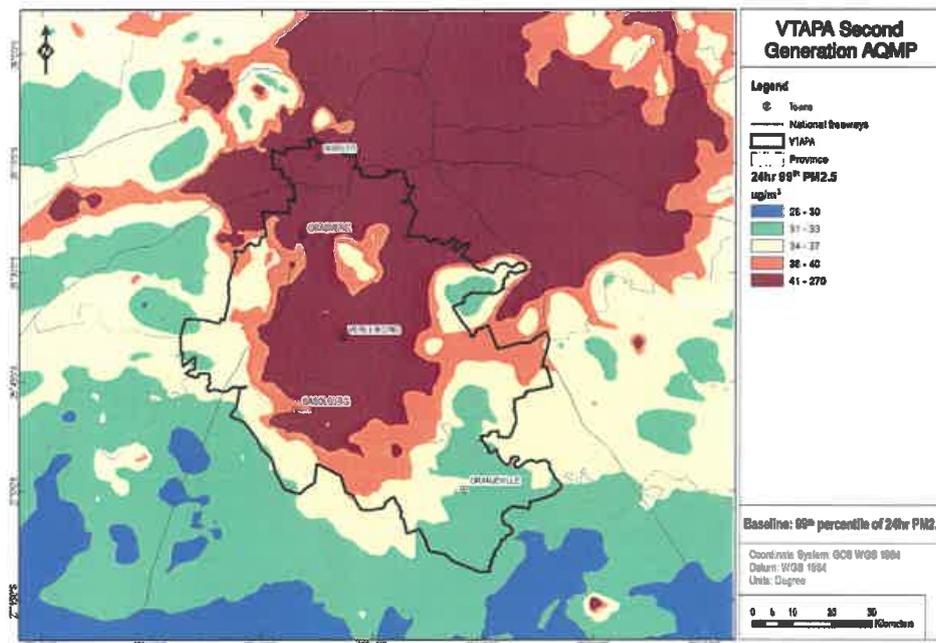


Figure 17: PM<sub>2.5</sub> 24-hour concentrations as a 99<sup>th</sup> percentile for the Baseline Scenario

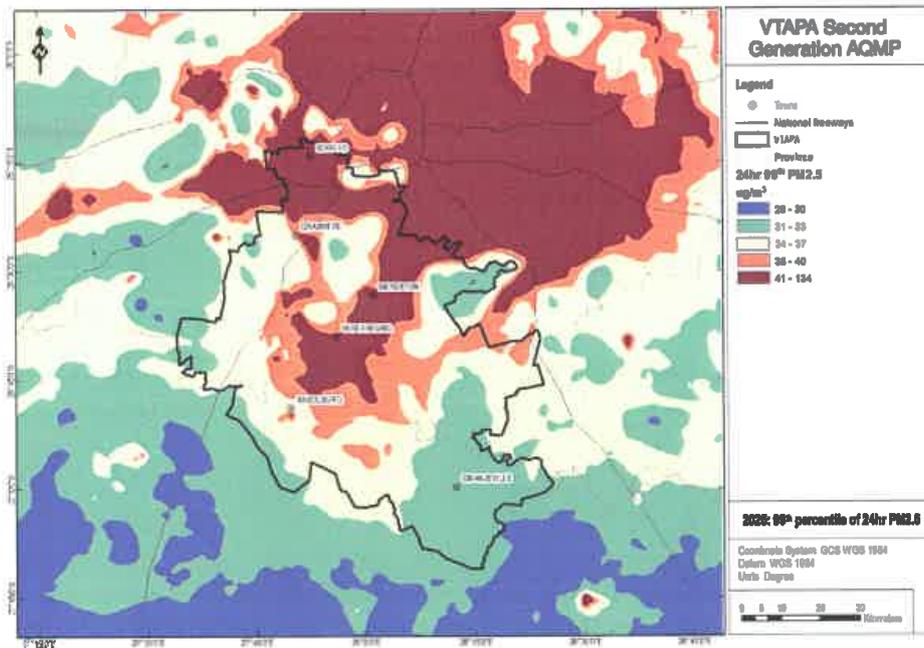


Figure 18: PM<sub>2.5</sub> 24-hour concentrations as a 99<sup>th</sup> percentile for Scenario 1 – year 2025

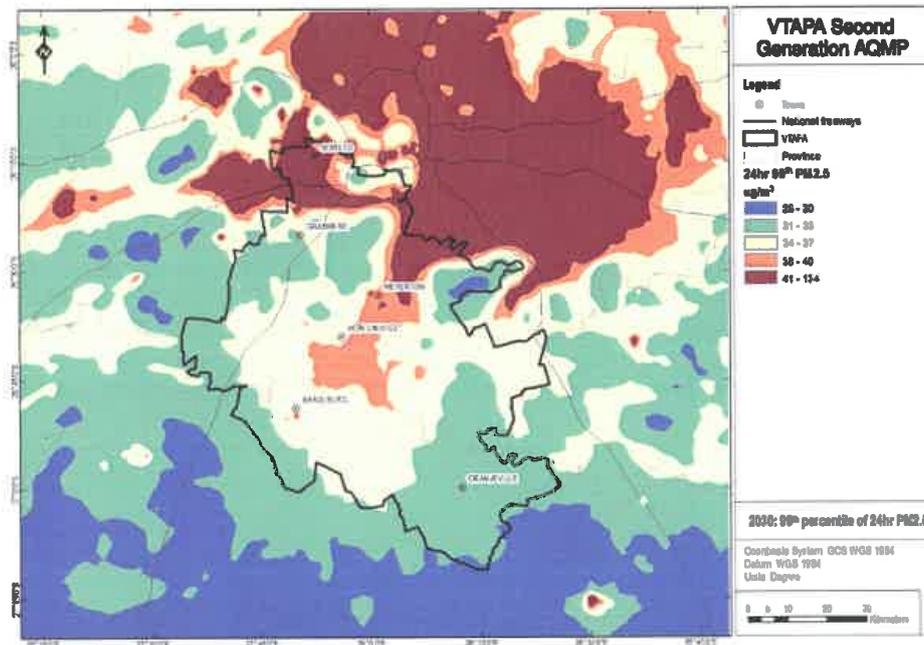


Figure 19: PM<sub>2.5</sub> 24-hour concentrations as a 99<sup>th</sup> percentile for Scenario 2 – year 2030

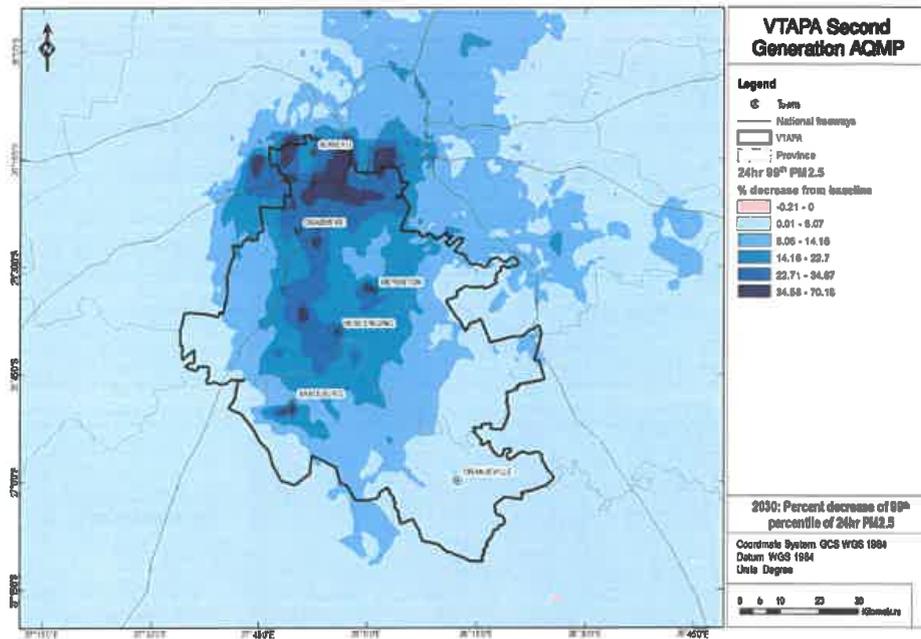


Figure 20: PM<sub>2.5</sub> 24-hour percent decrease of the 99<sup>th</sup> percentile from Baseline to Scenario 2 – year 2030

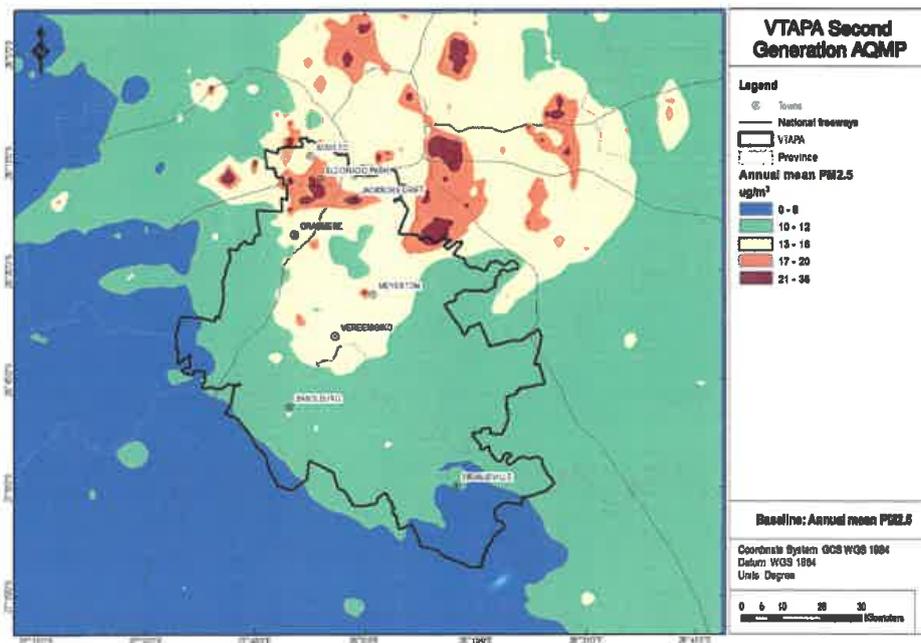


Figure 21: PM<sub>2.5</sub> annual mean concentrations for the Baseline Scenario

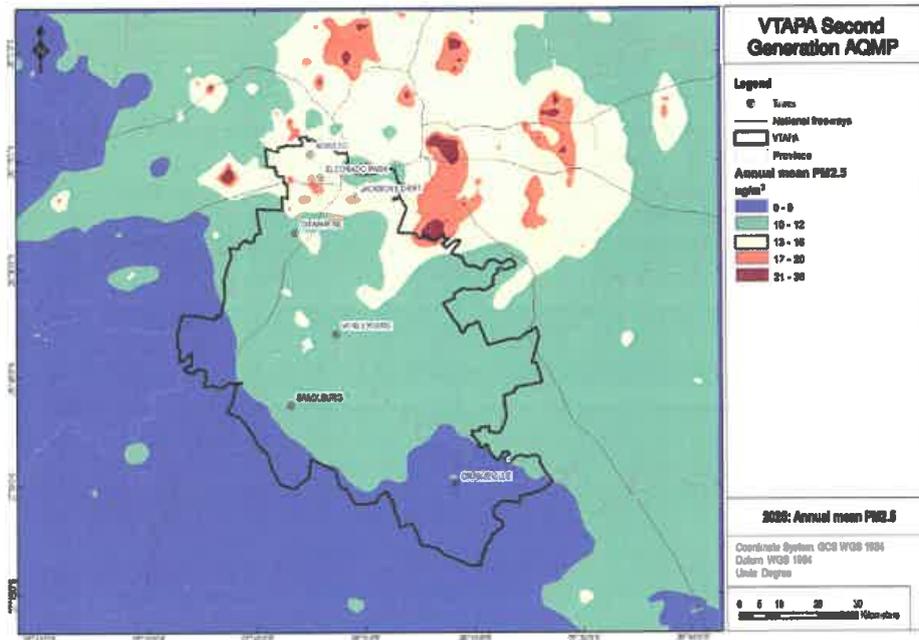


Figure 22: PM<sub>2.5</sub> annual mean concentrations for Scenario 1 – year 2025

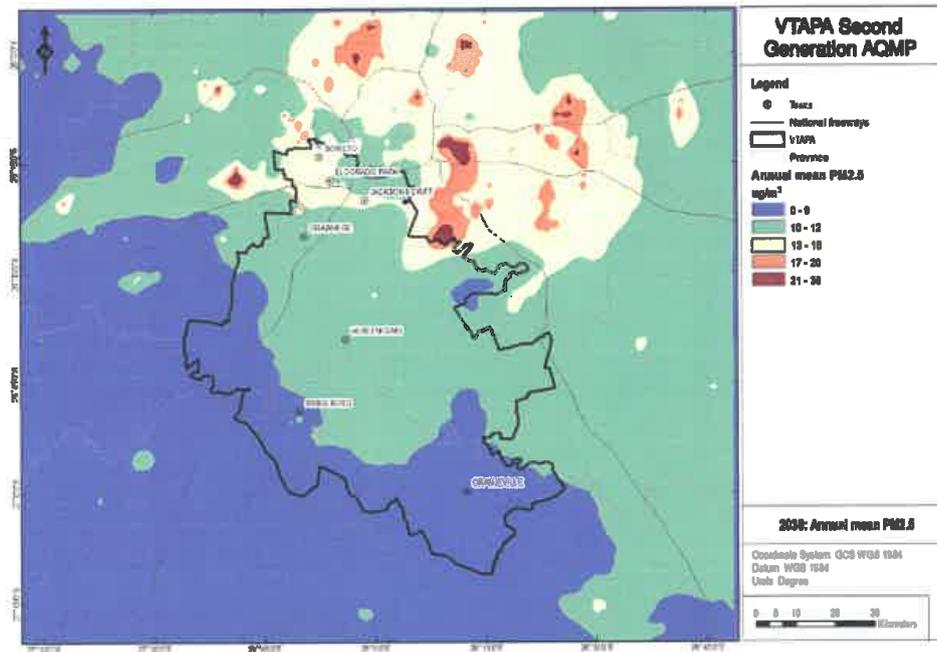


Figure 23: PM<sub>2.5</sub> annual mean concentrations for Scenario 2 – year 2030

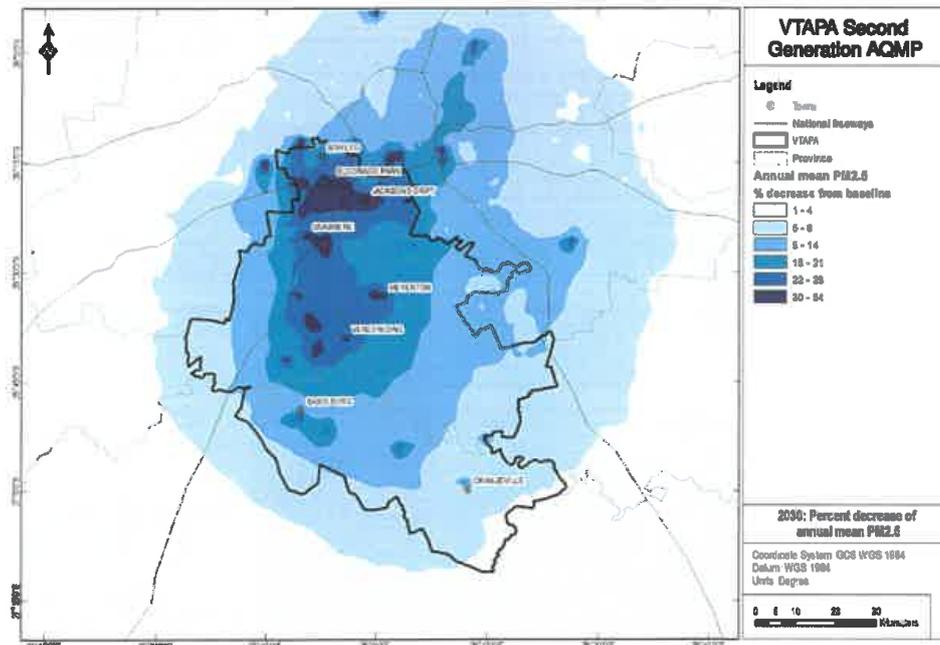


Figure 24: PM<sub>2.5</sub> percent decrease of the annual mean from Baseline to Scenario 2 – year 2030

5.2.3 NO<sub>2</sub> Scenario Modelling Concentrations

Only exceedances of the annual NAAQS are seen for NO<sub>2</sub> in VTAPA. Scenario 2025 does show a reduction, however, the exceedance around Sasolburg still persists. Scenario 2030 does not show any significant reduction. In the maps showing the percentage reduction, it is clear that much of the impact on NO<sub>2</sub> from the scenario is seen outside the VTAPA (dark blue) and originating from the region around Sasolburg. For industrial emissions the largest reductions are seen from Sasol Sasolburg facilities; since Lethabo power station is estimated to be within its NO<sub>x</sub> MES (and is therefore not changed for the scenario). The reductions in NO<sub>2</sub> concentrations are seen to expand away from Sasol, however, the exceedance immediately around the facility still persists because they are due to either low level sources that have not been affected by MES or higher stacks whose plumes reach the surface to create exceedances but with concentrations higher than the MES can reduce to acceptable levels.

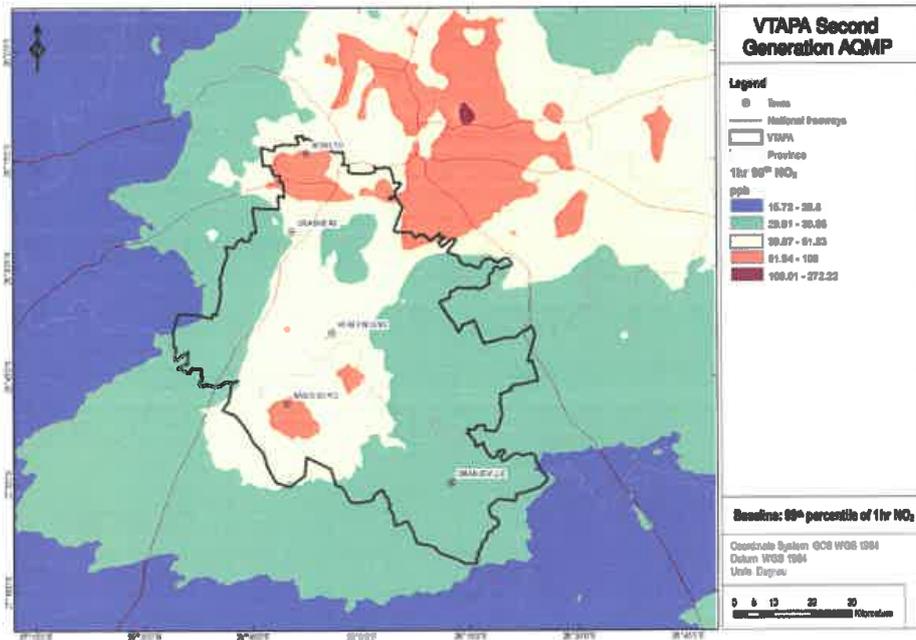


Figure 25: NO<sub>2</sub> 1-hour concentrations as a 99<sup>th</sup> percentile for the Baseline Scenario

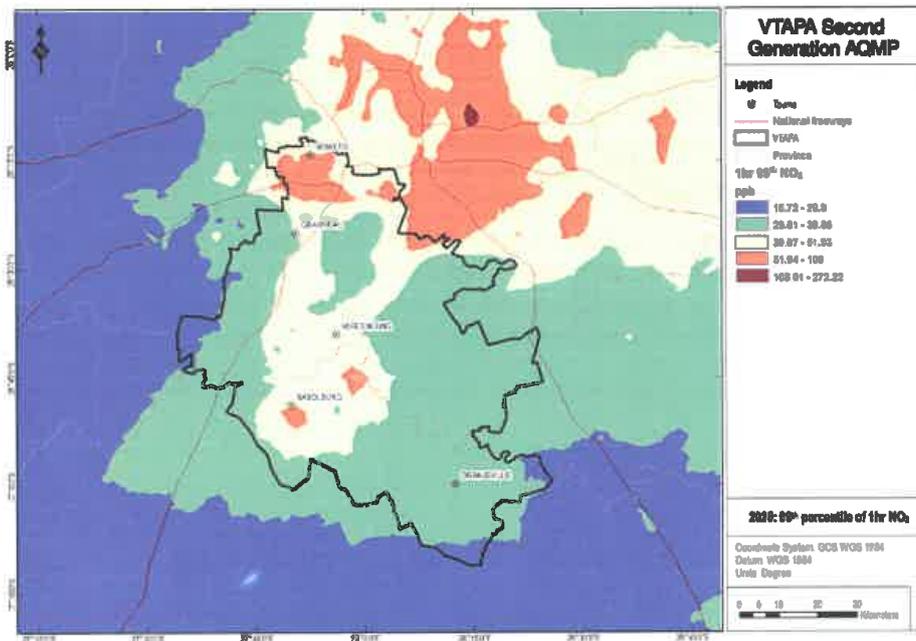


Figure 26: NO<sub>2</sub> 1-hour concentrations as a 99<sup>th</sup> percentile for Scenario 1 – year 2025

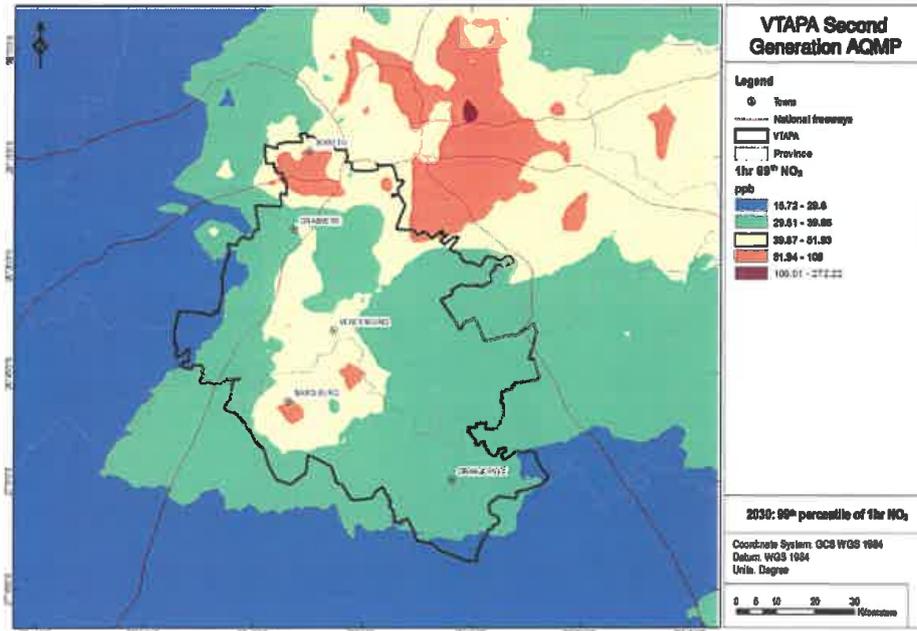


Figure 27: NO<sub>2</sub> 1-hour concentrations as a 99<sup>th</sup> percentile for Scenario 2 – year 2030

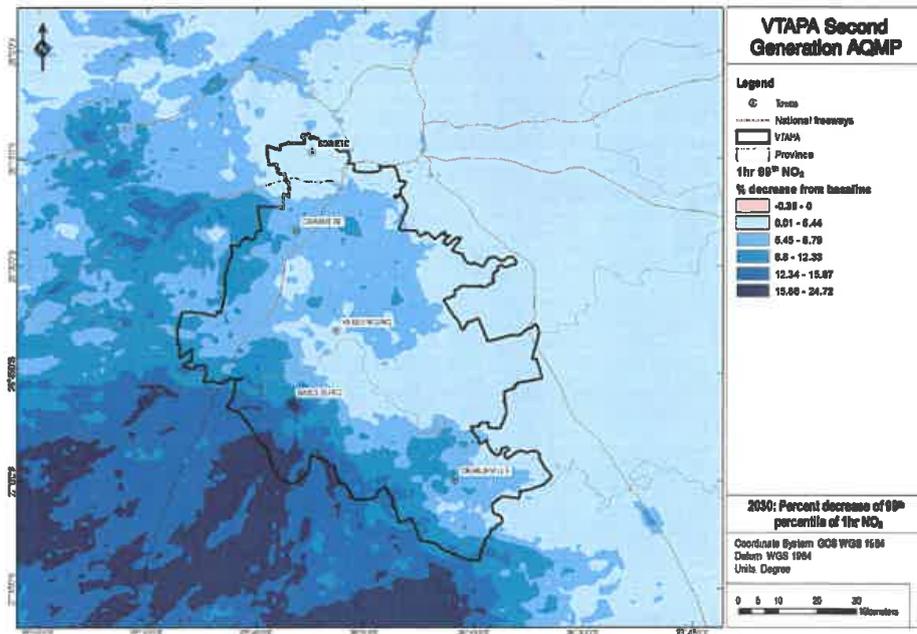


Figure 28: NO<sub>2</sub> 1-hour percent decrease of the 99<sup>th</sup> percentile from Baseline to Scenario 2 – year 2030

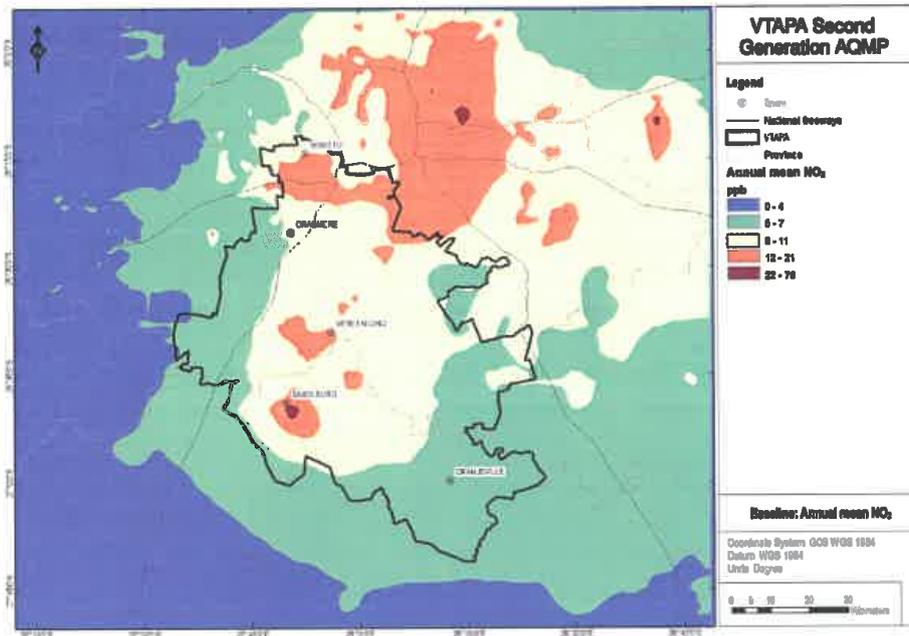


Figure 29: NO<sub>2</sub> annual mean concentrations for the Baseline Scenario

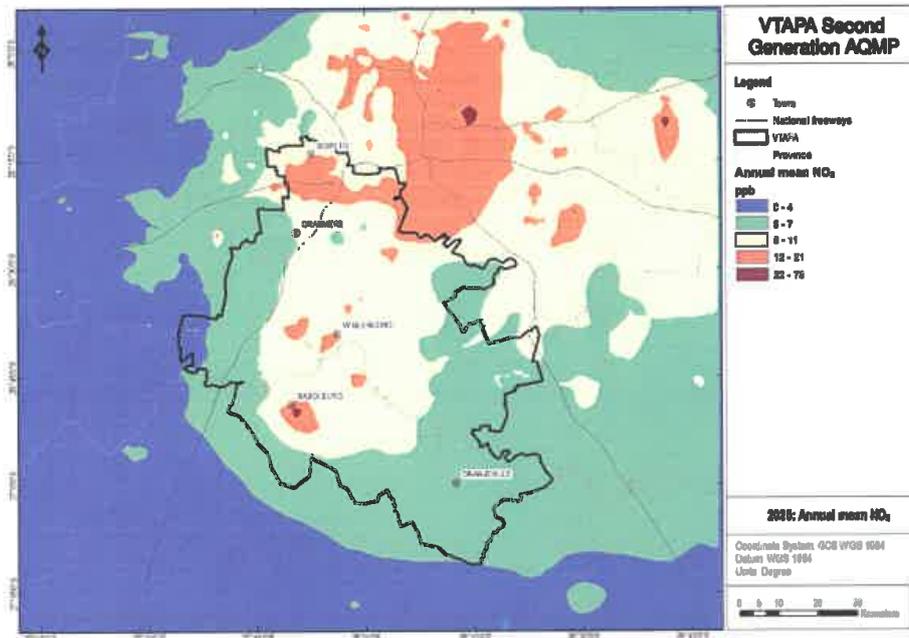


Figure 30: NO<sub>2</sub> annual mean concentrations for Scenario 1 – year 2025

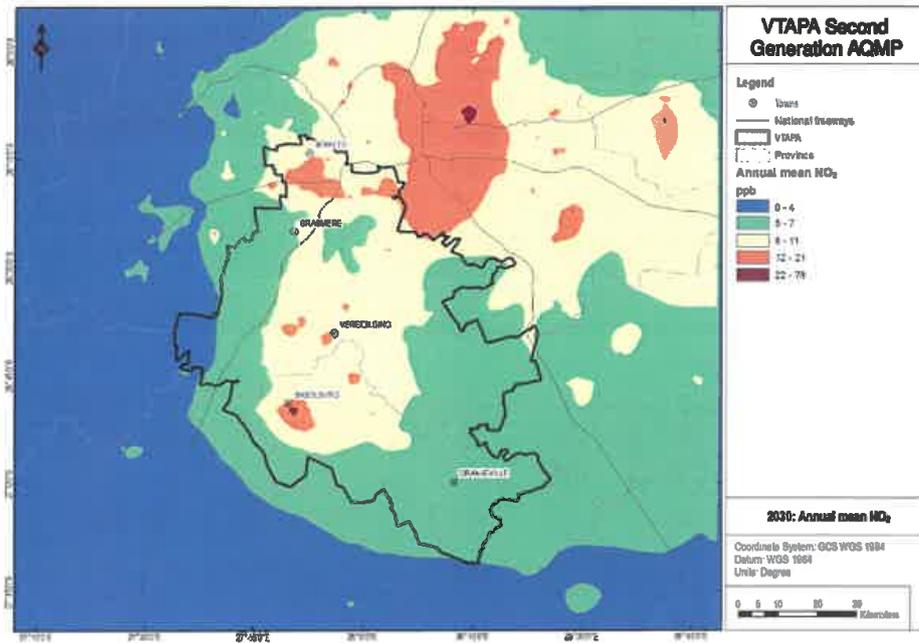


Figure 31: NO<sub>2</sub> annual mean concentrations for Scenario 2 – year 2030

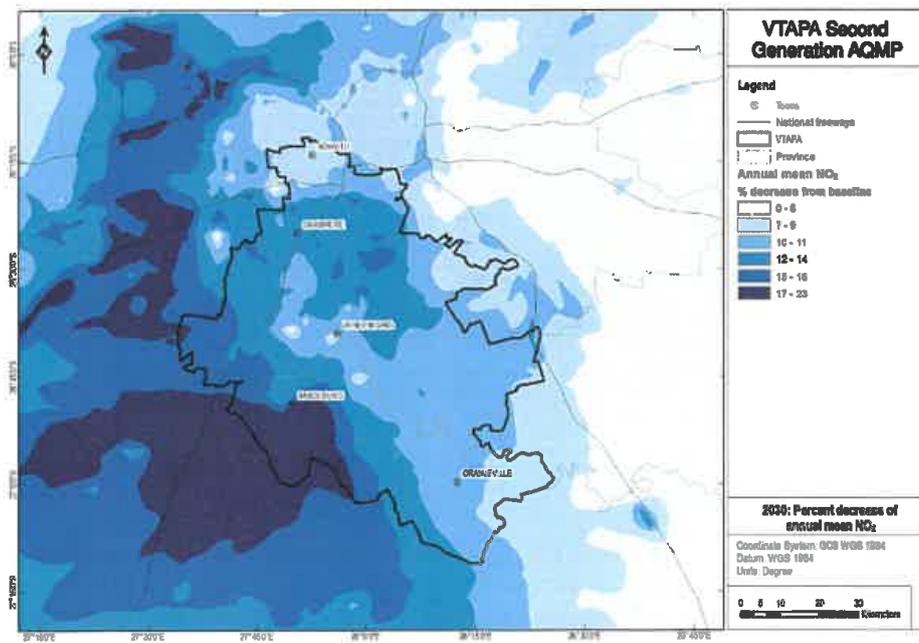


Figure 32: NO<sub>2</sub> percent decrease of the annual mean from Baseline to Scenario 2 – year 2030

5.2.4 Ozone Scenario Modelling Concentrations

Important factors affecting ozone concentrations are pre-cursor concentrations, solar radiation intensity and chemistry in general. NO<sub>x</sub> and VOC are pre-cursors, however, an important distinction between NO and NO<sub>2</sub> must be made since NO titrates ozone and NO<sub>2</sub> enhances formation. For a majority of combustion sources, the emission ratio of NO to NO<sub>2</sub> is heavily weighted towards NO. This means, for example, a NO<sub>x</sub> MES reduces mainly NO in the inventory. A reduction in NO reduces titrations and enhances O<sub>3</sub> concentrations near the source. The percentage decrease map shows that O<sub>3</sub> has increased due to the decrease in NO around Sasolburg. A reduction in NO<sub>x</sub> from vehicles also tends to increase ozone throughout the domain; and this is particularly so for small decreases in NO<sub>x</sub> in a VOC-limited region (example Roustan et al., 2011 and Collet et al., 2012). Either more reductions need to be applied in general in the sector (for which there is potential since the reductions from EURO5 were relatively small) or reductions targeting specific NMVOC need to be formulated.

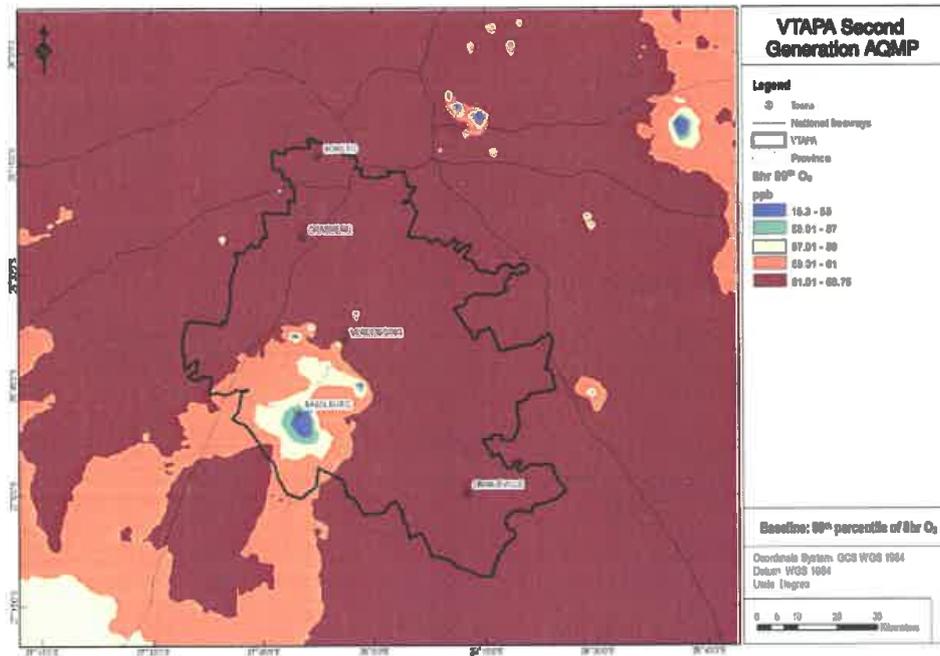


Figure 33: Ozone 8-hour concentrations as a 99<sup>th</sup> percentile for the Baseline Scenario

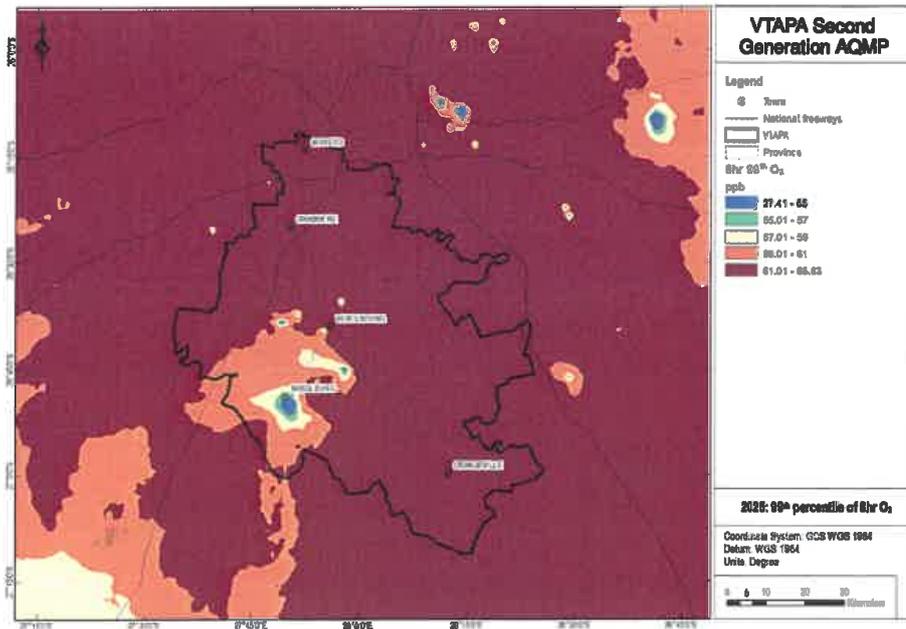


Figure 34: Ozone 8-hour concentrations as a 99<sup>th</sup> percentile for Scenario 1 – year 2025

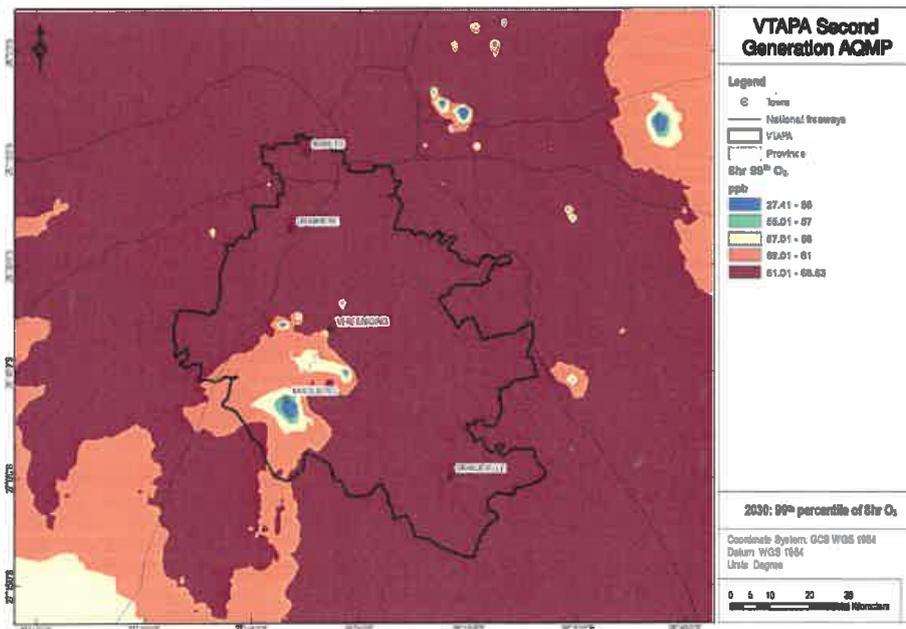


Figure 35: Ozone 8-hour concentrations as a 99<sup>th</sup> percentile for Scenario 2 – year 2030

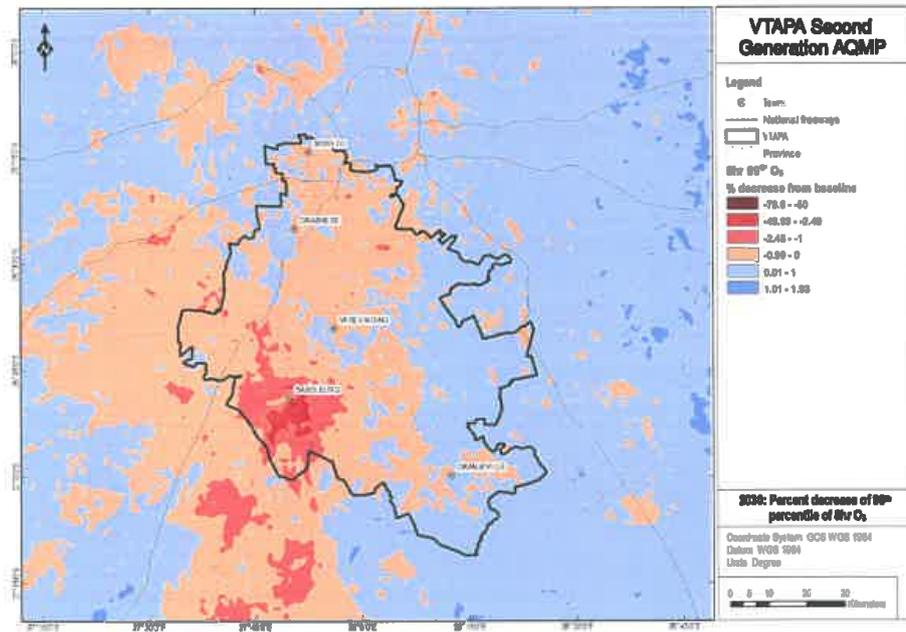


Figure 38: Ozone 8-hour percent decrease of the 99<sup>th</sup> percentile from Baseline to Scenario 2 – year 2030

5.2.5 SO<sub>2</sub> Scenario Modelling Concentrations

For SO<sub>2</sub> there is a reduction in the area of exceedances, however the exceedances still exist. The areas of greatest decrease are around Sasolburg and north of Vereeniging (around Rust ter Vaal). The reduction on Eskom Lethabo SO<sub>2</sub> emissions due to MES (of 1000 mg/Nm<sup>3</sup>) is relatively small, at an average of 9% (min=1.7%, max=17.7%), resulting in only a small reduction in SO<sub>2</sub> concentrations around the power station. However, it was subsequently found that the baseline annual emission tonnage from NAEIS (used in the modelling) is lower than a calculated annual tonnage from the AEL stack concentration. Thus, the baseline to which the reduction is compared to is closer to the MES than a baseline that would be estimated using only the AEL stack concentration. Other areas of persisting exceedances are Wolwehoek, Diepkloof Zone 6 and north of Bophelong.

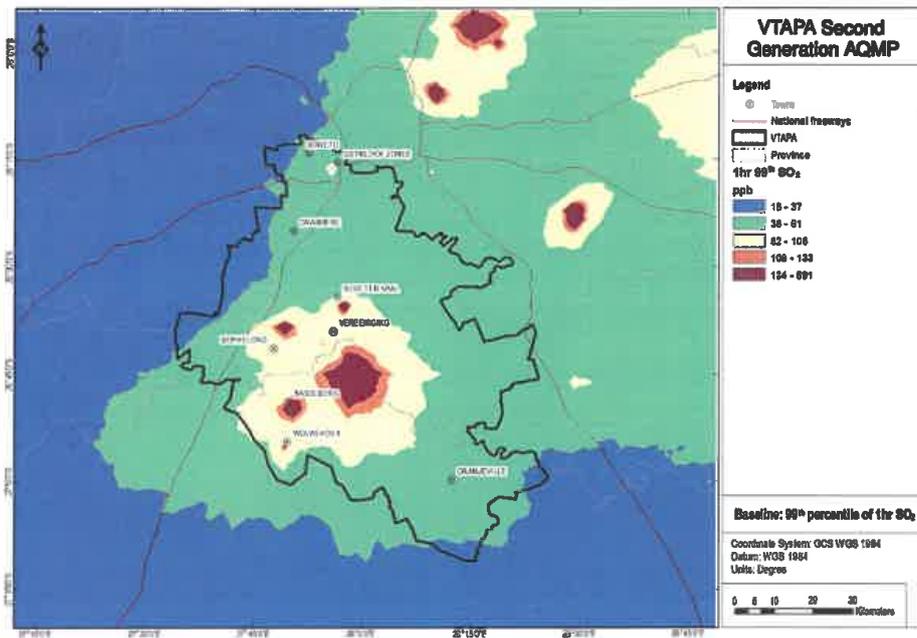


Figure 37: SO<sub>2</sub> 1-hour concentrations as a 99<sup>th</sup> percentile for the Baseline Scenario

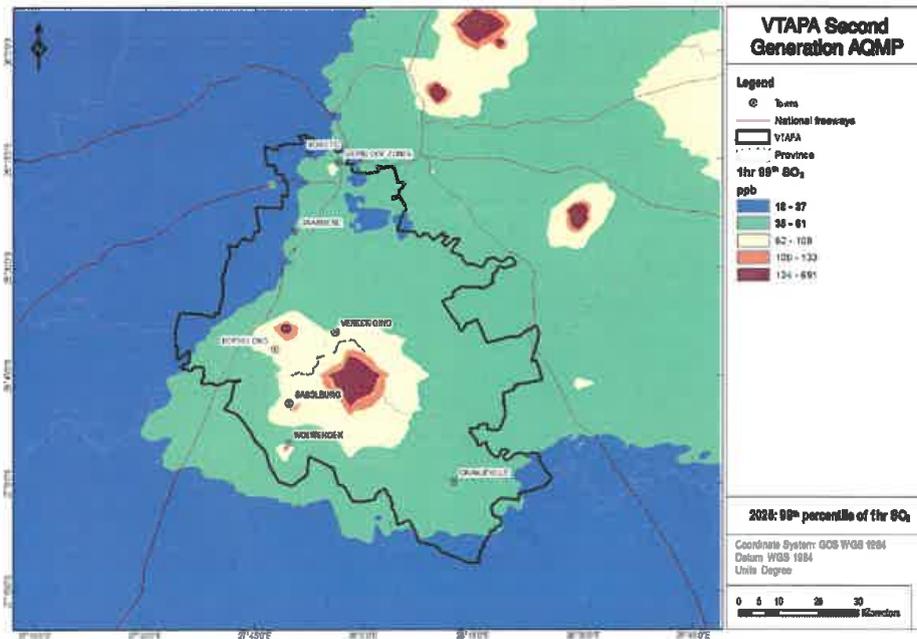


Figure 38: SO<sub>2</sub> 1-hour concentrations as a 99<sup>th</sup> percentile for Scenario 1 – year 2025

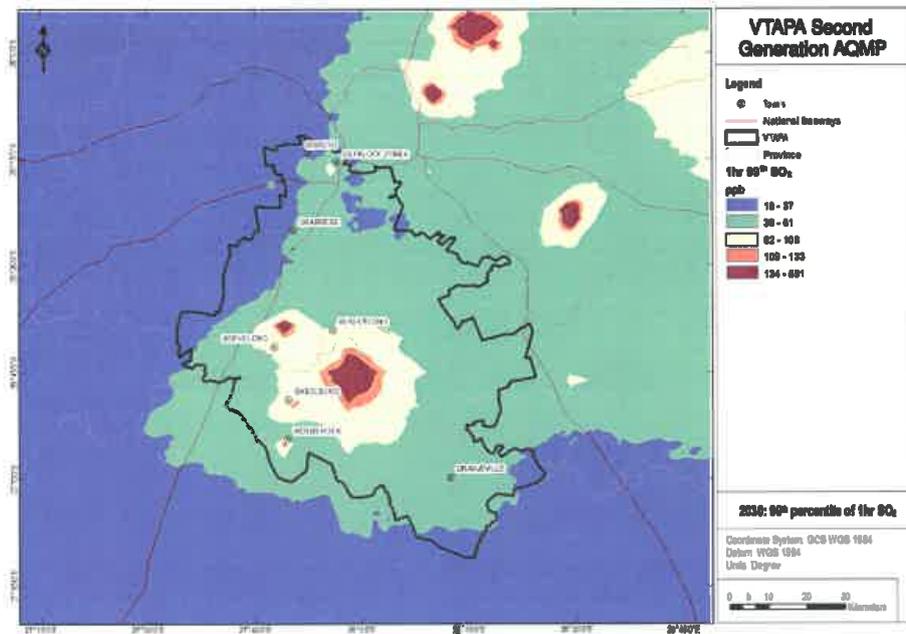


Figure 39: SO<sub>2</sub> 1-hour concentrations as a 99<sup>th</sup> percentile for Scenario 2 – year 2030

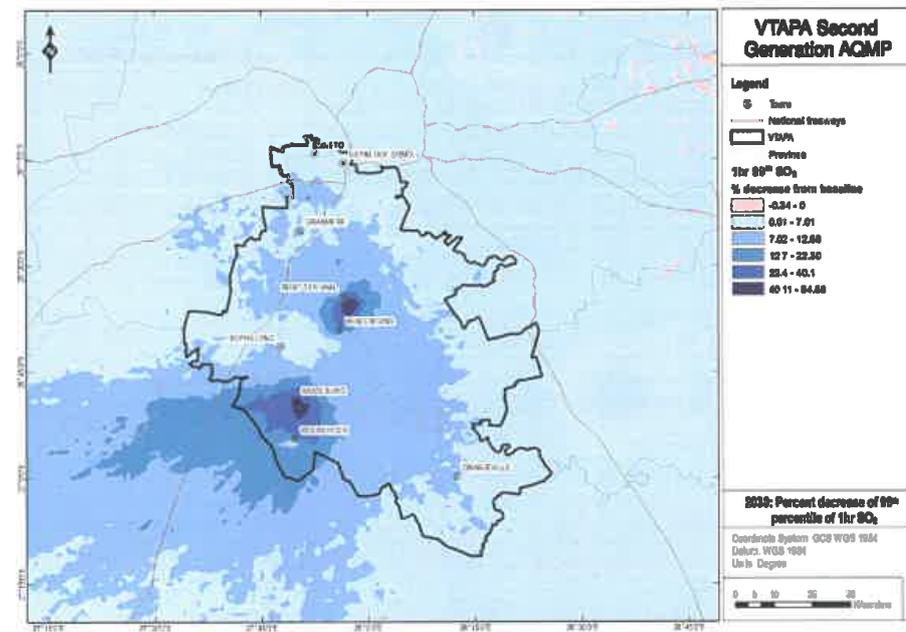


Figure 40: SO<sub>2</sub> 1-hour percent decrease of the 99<sup>th</sup> percentile from Baseline to Scenario 2 – year 2030

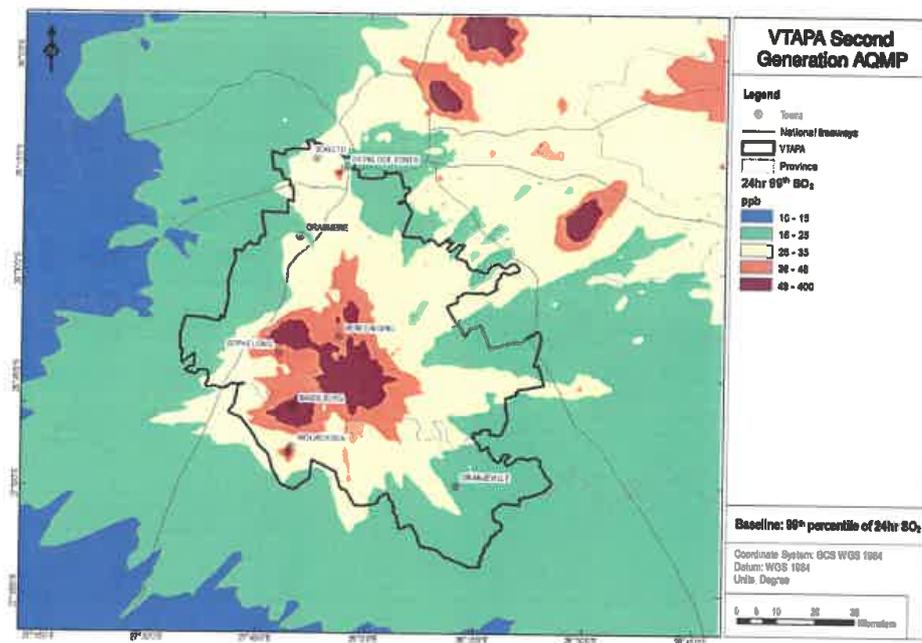


Figure 41: SO<sub>2</sub> 24-hour concentrations as a 99<sup>th</sup> percentile for the Baseline Scenario

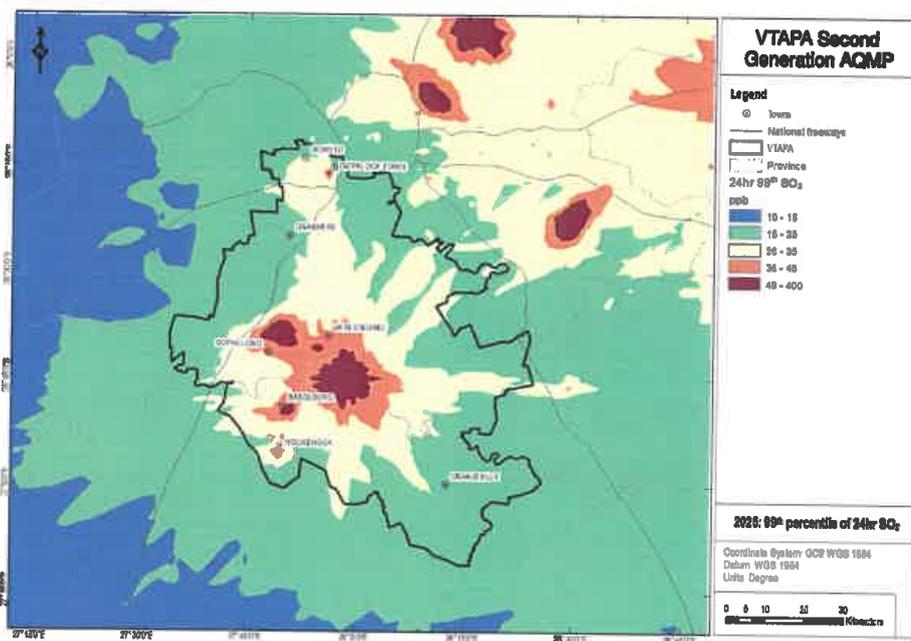


Figure 42: SO<sub>2</sub> 24-hour concentrations as a 99<sup>th</sup> percentile for Scenario 1 – year 2025

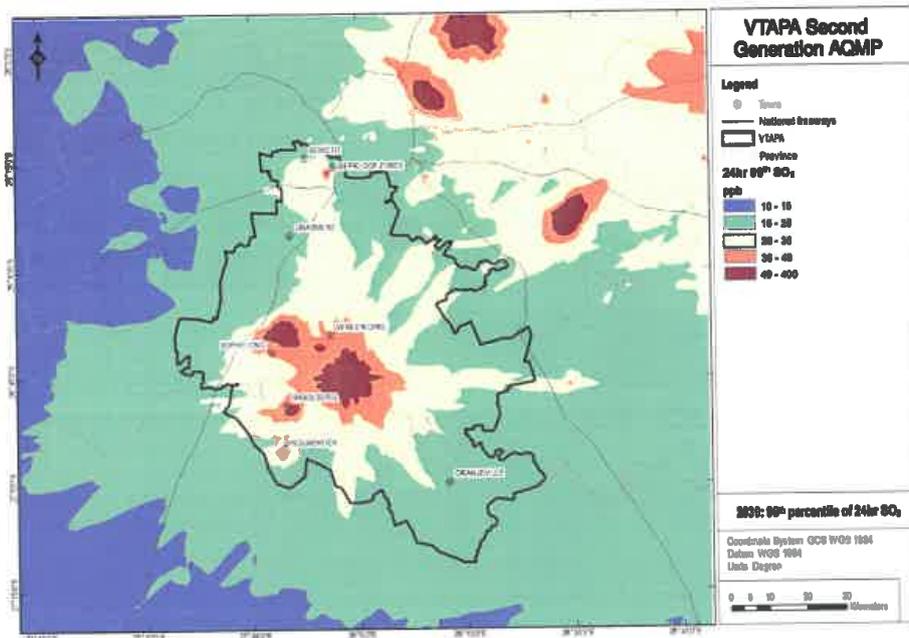


Figure 43: SO<sub>2</sub> 24-hour concentrations as a 99<sup>th</sup> percentile for Scenario 2 – year 2030

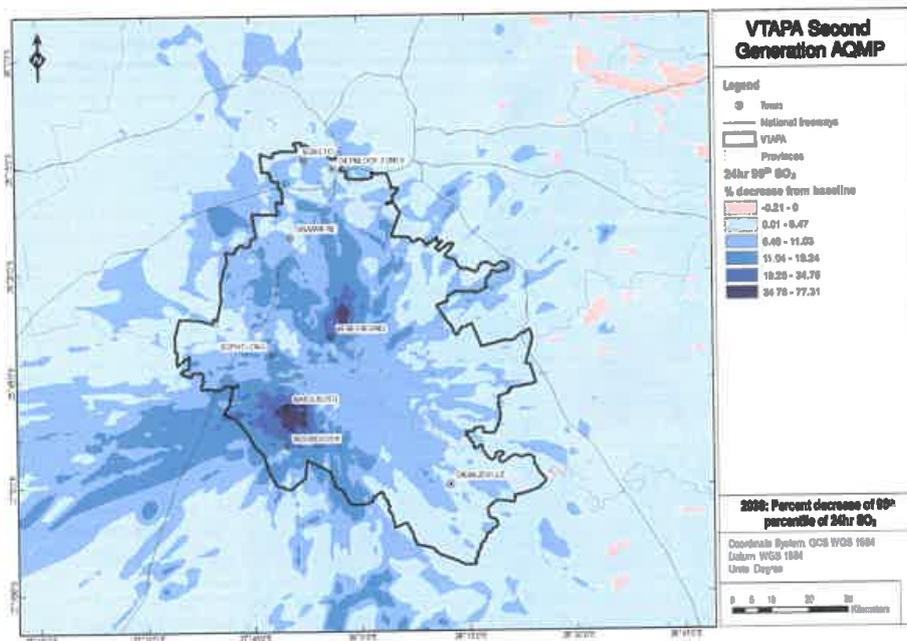


Figure 44: SO<sub>2</sub> 24-hour percent decrease of the 99<sup>th</sup> percentile from Baseline to Scenario 2 – year 2030

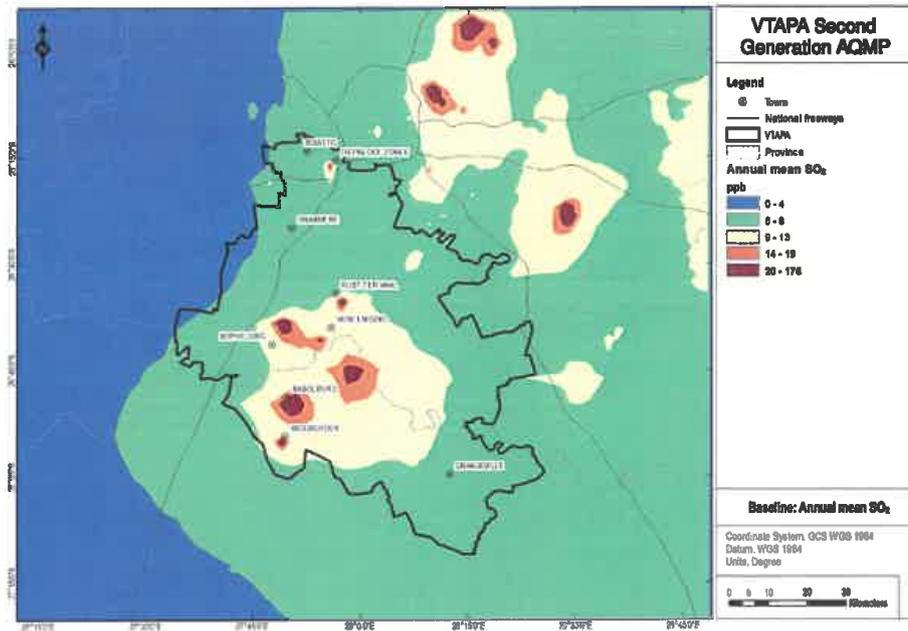


Figure 45: SO<sub>2</sub> annual mean concentrations for the Baseline Scenario

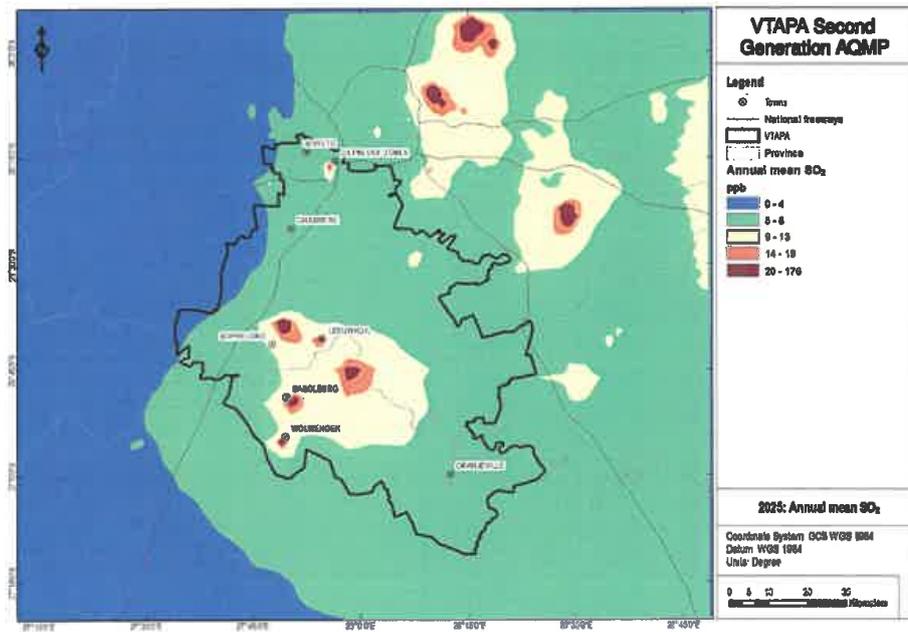


Figure 46: SO<sub>2</sub> annual mean concentrations for Scenario 1 – year 2025

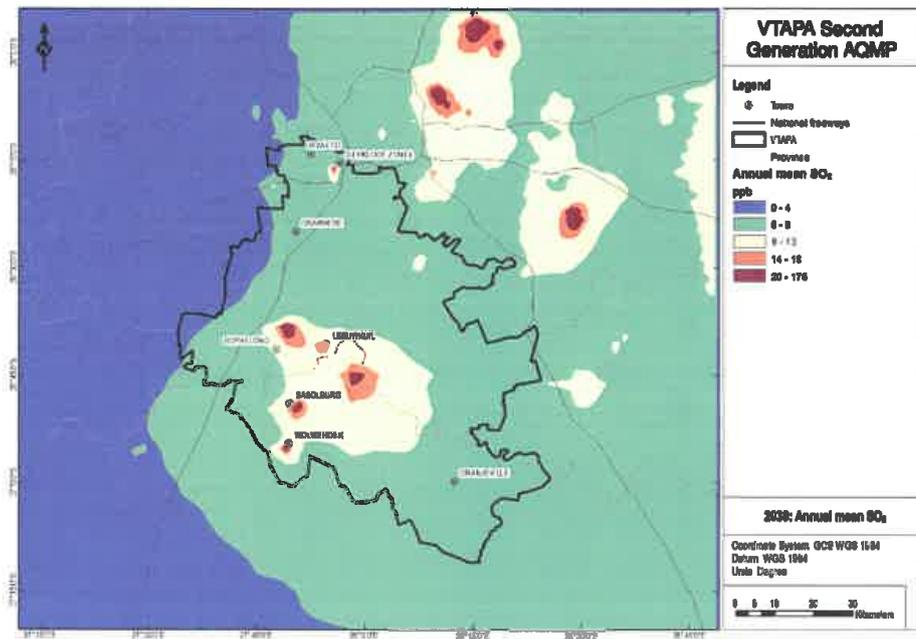


Figure 47: SO<sub>2</sub> annual mean concentrations for Scenario 2 – year 2030

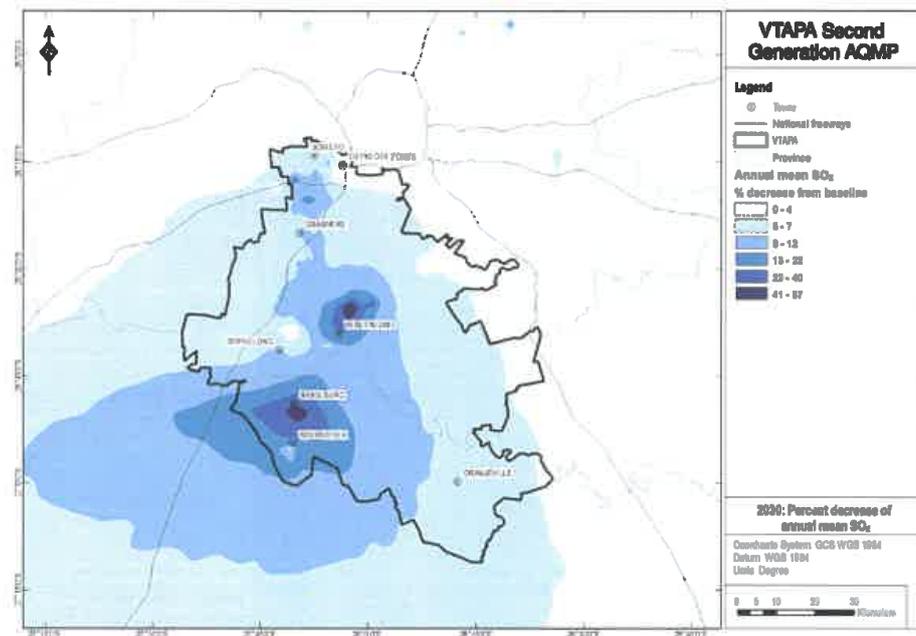


Figure 48: SO<sub>2</sub> percent decrease of the annual mean from Baseline to Scenario 2 – year 2030

### 5.3 Key Findings

The main findings from the scenario modelling are as follows:

- Simulations indicate that through the scenario emission reductions, PM may be reduced to acceptable levels. However, 24hr PM<sub>2.5</sub> remains an issue in the northern VTAPA.
- For NO<sub>2</sub>, the baseline indicates that only the NAAQS for the annual average is exceeded around Sasolburg. The reductions in the scenarios do not reduce this significantly (majority of reductions in ambient are seen further afield from Sasolburg).
- Ozone remains problematic after both future scenarios. This is primarily due to the region being VOC-limited and emission reductions on NO<sub>x</sub> being moderate. It is also possible the ozone issue involves transboundary impacts into and out of VTAPA; making it a regional management issue.
- Further reductions in SO<sub>2</sub> are required since the 2020 MES will not ensure compliance. These are relevant for Lethabo power-station and other industries around Wolwehoek, Diepkloof Zone 6 and north of Bophelong.

## SCHEDULE\_C

### 6 AIR QUALITY MANAGEMENT ACTIONS FOR THE VTAPA

#### 6.1 Objective

Compliance with NAAQS within the VTAPA through continuous AQM implementation action and coordination by the various spheres of government and all stakeholders

#### 6.2 VTAPA Implementation Plan

Interventions for the VTAPA second generation AQMP was developed by means of a Stakeholder Consultation Workshop that was held on the 13<sup>th</sup> of March 2019 in Vanderbijlpark. The findings from the SAS report as well as the scenario modelling results identified the main sectors of concern for which feasible interventions needed to be developed. The workshop consultation followed the SMART (Simple, Measurable, Achievable, Realistic and Time-Bound) method of goal setting which allows to prioritise the interventions for implementation. Other considerations included (i) the environmental benefit that will be obtained from such an intervention, (ii) whether it is technical and economically feasible, and (iii) if it is socially acceptable and desirable. The potential risk or degree of uncertainty around the measure, the strategic and political desirability, timeframes for implementation and environmental benefit realisation, and the development of local expertise and potential for local employment, were also accounted for.

A total of eight (8) sectors were identified for which specific interventions were developed to form part of the implementation plan. These include:

1. Industries and power generation / compliance monitoring and enforcement
2. Mining operations
3. Ash dumps and tailings storage facilities
4. Domestic fuel burning
5. Domestic waste burning
6. Biomass burning
7. Education and awareness
8. Vehicle emissions

The aim of these interventions is to be practical, implementable and aimed to result in the desired ambient air quality improvements. In addition, the interventions should have clear objectives, activity descriptions, resource requirements and indicators. These intervention descriptions are provided in Table 15 to Table 22 for the eight sectors. The need for granulation and clarification of roles and responsibilities for all stakeholders at local level, who will be collaborating to execute relevant initiatives and providing progress feedback, is pertinent.

##### 6.2.1 *Prioritisation and Financial Implications of Interventions*

In prioritising the interventions, the significance of the problem necessitating the set intervention was considered in combination with the likelihood of implementation, i.e. how feasible the implementation is. This was in turn influenced by both the cost and the risks linked to the intervention.

Since detailed cost associated with each Intervention can only be determined through consultation with the various stakeholders<sup>2</sup>, an estimated cost category is indicated as *Low* (<R1,000,000); *Medium* (R1,000,000 – R5,000,000) and *High* (>R5,000,000).

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<sup>2</sup> It is noted that the AQMP lacks an accompanying economic impact assessment at a time when there are various other initiatives at provincial and municipal level competing for the same resources. Allocation of funds and resources at initiative level is crucial for successful implementation of the AQMP.

CONTINUES ON PAGE 258 OF BOOK 3

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Table 15: Implementation Plan for Industries & Power Generation (Compliance Monitoring and Enforcement)  
 Goal 1: All Listed Activities will be compliant with MES and fugitive emissions would have reduced such as to ensure compliance with NAAQS.

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
<b>Minimisation of emissions from regulated facilities</b>	Compliance with the existing MES	Industry, NGO's	Licensing Authority	High cost – for industry  Medium cost – for Licensing Authority	AEL's and NAEIS annual reporting More EMI's required for inspections and enforcement (Licensing Authority)	2025 years	Monitoring reports (Compliance monitoring activities)	High
	Develop and implement the Fugitive Emission Plan informed by Best Environmental Practice	Industry	Licensing Authority	Low cost – for industry and authority	Industry to submit Plan to Licensing Authority within set timeframe as specified in AEL Annual NAEIS reporting	2 years or timeframe to be specified in the AEL	All facilities with AEL submitted plans to the licensing authorities	High
<b>Minimisation of fugitive emissions (e.g. waste, stockpiles, conveyor belts, haul roads etc.)</b>	Identification and implementation of suitable technology (Introduction of binding agents in waste stockpiles and dust suppressants)	Industry	Licensing Authority	Medium cost – for industry	Investigating various products on the market Suppliers to do on-site trials to identify most suitable product Determine frequency of application and budget for it annually	3 years	Dust management plans implemented	High
	Reporting of fugitive emissions on NAEIS	Industry	Licensing Authority and DFFE	Low cost – for industry	Already a legal requirement – annual NAEIS reporting	yearly	All facilities with AEL submitted plans fugitive emissions	High
	Minimize and manage NEMA Section 30 incidents	Industry	Licensing Authority	Medium to High cost – for industry	Incidence register. Should be part of operations Cost of managing incidents would depend on the industry and type of incident	1 year	Number of Section 30 incidents	High

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Emissions from dust-generating activities are reduced	Development of legal framework to manage emissions from small/unlicensed facilities	Local municipalities	DFFE	Low cost – existing personnel	To form part of Local government legislation development	2 years for development and implementation in 5yrs	Legal framework in developed	High
	Identify unlicensed dust generating activities	Local municipalities, CBOs and NGOs	DFFE	Low cost – to be done by existing personnel	Can form part of emissions inventory development of Section 23 (per capacity building plan) Local government officials will have to do visual inspections of areas to identify activities	Ongoing	Identified dust generating activities	High
	Holistic approach for dust management where there is cluster of facilities	Industry/ licensing authorities	Licensing Authority	Low cost – industry and government	Can form part of dust management plan reviews and interpretation To be reported at MSRG meetings	2 years	Integrated dust management plans developed	High

Notes: NGO – Non-Government Organisation, CBO – Community Based Organisation, MSRG – Multi Stakeholder reference Group

Table 16: Implementation Plan for Mines

Goal 2: By 2025, fence line monitoring to confirm compliance with NAAQS, specifically for PM<sub>10</sub> and PM<sub>2.5</sub>, and NDCR.

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Management of reduction of emissions from mines	Dust management plans developed and implemented	DMRE and mines	DFFE and Licensing authorities	Medium cost – monitoring	Requirement of annual NAEIS reporting Installation of dustfall networks (analysis and reporting)	2 years	All mines developed dust management plans	High
	Vegetation (indigenous plants and grass) on the abandoned mine dumps	Mines and DMRE	DFFE	High cost – depending on type of cover	Mines to submit rehabilitation plans to government with implementation timeframes and required maintenance frequency	5 years	Number of dumps rehabilitated	Medium
	Establish the complaints management system for all mines	Mines and DMRE	DFFE, NGO's and Municipalities	Low cost	Complaints register and upkeep Report annually to authority	2 years	The complaints management system established by all mines	High
	Implementation of the rehabilitation plans for non-operational mines	Mines and DMRE	Municipalities and DFFE	High cost – depending on type of cover	Mines to submit rehabilitation plans to government with implementation timeframes and required maintenance frequency	Long-term	Mines rehabilitated	Medium

Notes: DMRE – Department of Mineral Resources and Energy

Table 17: Implementation Plan for Ash Dumps and Tailings Storage Facilities

Goal 3: By 2025, 80% reduction in windblown dust emissions ensuring compliance with NAAQS within the vicinity of all ash dumps and tailings storage facilities.

Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Reduction of particulate matter emanating from ash dumps and tailings storage facilities	Dust suppression (e.g. chemical application and watering active dumps)	Industry	DFFE, DMRE and municipalities	High cost – continuous	Requirement in AEL and/or NAEIS reporting Industries to submit management plans to government with implementation timeframes and required maintenance frequency	Ongoing	Number of dumps rehabilitated Complaint with dust regulations	High
	Reduce quantities of ash dumps by diversifying reuse and beneficiation	DFFE: Waste Phakisa and industry	Local Municipalities, NGOs, CBOs	High cost – continuous	Requirement in AEL and/or NAEIS reporting Industry to find use for ash – by-product	5 years	Increase in the amount of ash reused	Medium

Notes: NGO – Non-Government Organisation, CBO – Community Based Organisation

**Table 18: Implementation Plan for Domestic Fuel Burning**  
**Goal 4: By 2025, emissions from domestic fuel burning would have decreased by 50%, and with a further 25% reduction by 2030 which would ensure compliance with NAAQS.**

Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Domestic fuel burning emissions reduction	Rollout of low smoke and LPG stoves and heaters, and alternative energy sources	DMRE and DFFE	Province, DFFE, Industry, NGOs & CBOs	High cost – frequent and continuous	Funding through offset projects, social responsibility programmes and alternatives	50% by 2025 75% by 2030	% uptake by targeted households	High
	Promote use of clean/green fuels such as LPG, biogas etc.	DMRE	Province, Industry, DFFE, NGOs & CBOs	Low cost – quarterly awareness campaigns	Awareness campaigns in partnership with NGO's and CBO's	50% by 2025 75% by 2030	% uptake by targeted households	High
	Promote and fit RDP houses with sufficient insulation	DHS and municipalities	Province, DFFE, NGOs & CBO's	High cost – once off	Industries can assist as part of offset projects and social responsibility programmes in general Implement guidelines on indoor air pollution	5 years	Number of RDP houses with sufficient insulation	Medium

Notes: DMRE – Department of Mineral Resources and Energy; DHS – Department of Human Settlements, LPG – Liquefied Petroleum Gas, NGO – Non-Government Organisation, CBO – Community Based Organisation, RDP – Reconstruction and Development Programme

Table 19: Implementation Plan for Domestic Waste Burning

Goal 5: No informal waste burning by 2030.

Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Reducing domestic waste burning emissions	Waste separation at source & recycling	Local Government	DFFE, Province, Industry, private companies, NGOs & CBOs	High cost – continuous	Develop procedure for waste separation (group specific wastes) Partnership with NGO's and CBO's Train and contract community people Industries involvement as part of offset projects	50% by 2025	% uptake by targeted households	High
	Waste collection & clean-up	DFFE, local government and Industry through offset projects	DFFE, Province, NGOs & CBOs	High cost – continuous	Should already be budgeted for by municipalities Partnership with NGO's and CBO's Industries involvement as part of off-set projects	90% by 2030	% uptake by targeted households	Medium
	Management of municipal and privately-owned landfill sites	GDARD and DESTEA	DFFE	High cost – continuous	DFFE roles, including enforcement, in National Environmental Management: Waste Act (NEM:WA; no 59 of 2008) Provincial to support compliance monitoring and municipal capacity Additional human resource capacity	75% reduction of burning incidents by 2025 100% reduction of burning incidents by 2030	% reduction in number of burning incidents	High
Reducing tyre burning emissions	Awareness campaigns	Local municipality, CBO, NGO	GDARD and DESTEA	Low cost	Awareness campaigns Partnership with NGO's and CBO's	No tyre burning by 2025	% reduction of tyre burning by 2025	High
	Regulate tyre burning through bylaws (SAPS to enforce the bylaws)	Local municipality, SAPS	DFFE, GDARD	Medium cost – to implement By-law	Additional human resource capacity required to enforce bylaws Conduct ad hoc checks			High

Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
	Establish way to support tyre collection facilities per district through Waste Bureau.	DFFE, Waste Bureau, district municipalities, local municipalities, NGOs, CBOs	Industry NGO's and CBOs	High cost – continuous	Waste Bureau Phakisa			Medium

Notes: GDARD – Gauteng Department of Agriculture and Rural Development; DESTEA – Department of Economic, Small Business Development, Tourism and Environmental Affairs, NGO – Non-Government Organisation, CBO – Community Based Organisation, SAPS – South African Police Service

Table 20: Implementation Plan for Biomass Emissions

Goal 6: Reduced uncontrolled veld fires through veld management measures and quick response times.

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Management of veld fire occurrence	Municipalities to implement Veld fires guidelines (establish relation with EPWP working for fire. Establish veld fire hotline. Induction of employees in management of veld fires.) Conduct education and awareness campaigns on burning and veld fires.	Local municipality NGOs and CBOs Local municipality, Province, and DFFE	Private companies Landowners DFFE, DALRRD Metro Polices Municipal Fire units Private companies Landowners DFFE, DALRRD, NGOs, CBOs Metro Polices Municipal Fire units	Low cost       Low cost – quarterly awareness campaigns	Fire Protection Associations may be developed in line with the National Veld and Forest Fire Act (No. 101 of 1998); which include veldfire management strategies and a fire protection officer Awareness campaigns – billboards, advertisements in local newspapers, campaigns at schools	Ongoing       Ongoing	Reduced number of uncontrolled veld fires       Annual campaigns	High       High

Notes: DFFE – Department of Forestry, Fisheries and the Environment; DALRRD – Department of Agriculture, Land Reform and Rural Development; EPWP – Expanded Public Works Programme

**Table 21: Implementation Plan for Education and Awareness**  
**Goal 7: Increased awareness on air quality challenges within the VTAPA.**

Objectives	Activities	Mandatory Responsibility	Participatory Responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Domestic fuel burning emissions reduction	Awareness Programme clean fuels, and other alternative sources, as well as Renewable energy sources,	DFPE, Local Government	DFPE, Province, Industry, NGOs & CBOs	Low cost - quarterly awareness campaigns	Monthly advertisements in local newspapers Quarterly awareness programmes at schools Awareness campaigns on billboards Industries as part of offset projects	Ongoing	Annual workshop held	High
Reducing domestic waste burning emissions	Awareness (Green Good Deeds type) on waste burning & recycling	DFPE, Local Government	DFPE, Province, Industry, NGOs & CBOs	Low cost - quarterly awareness campaigns High cost - industry	Monthly advertisements in local newspapers Quarterly awareness programmes at schools Awareness campaigns on billboards Industries as part of offset projects	Ongoing	Annual workshop held	High
Promotion of educational programmes on the use of biomass	Introduce and continuations of alternative programmes	DFPE	DTI, DFFE, DST, DALRRD, NGOs, CBOs and municipalities, SANEDI	Low cost - annual workshops		Ongoing	Annual workshop held	Medium
Reduce emissions from vehicles	Awareness campaign on green transport (e.g. use of bicycles, lift clubbing, park and ride to work or shops etc.)	DFPE and DOT	Communities and Municipalities	Low cost - quarterly awareness campaigns	Monthly advertisements in local newspapers Quarterly awareness programmes at schools Awareness campaigns on billboards	Ongoing	Annual workshop held	Medium

Notes: DOT – Department of Transport; DOH – Department of Health; DTI – Department of Trade and Industry; DST – Department of Science and Technology; DALRRD – Department of Agriculture, Land Reform and Rural Development; SANEDI – South African National Energy Development Institute

**Table 22: Implementation Plan for Vehicle Emissions**

**Goal 8: By 2025, reduce emissions from vehicles to ensure compliance with NAAQS near roads.**

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
Reduce emissions from vehicles	Promotion of non-motorised and public transport systems	DOT, municipalities	NGO's	Low cost – quarterly awareness campaigns	Monthly advertisements in local newspapers Quarterly awareness programmes at schools Awareness campaigns on billboards	3 years	Annual campaigns	Medium
	Annual testing of vehicle exhaust emissions	DOT, municipalities	DOT, municipalities	Medium cost – once off purchase and maintenance of equipment	Determine the number of testing equipment required per municipality and the human resource capacity required to conduct the testing Testing can be done at testing grounds as part of license renewal (then additional staff might not be required); or as spot checks in the first year Include emission testing as part of roadworthiness certification Include cost for testing equipment and additional salaries in Municipal IDP Compile a testing procedure	3 years	Testing reports indicating numbers of vehicle tested	Medium
Improve the regulatory framework in	Identify unpaved road generating dust and prioritise high risk roads	DOT and Local municipality	DFFE, NGO, CBO	Low cost – can be done by existing personnel	Community awareness campaigns and cooperation with NGO's and CBO's Air quality personnel to visually inspect areas and identify busy unpaved roads	2 years	All unpaved roads identified	High
	Implement management measures for identified high risk dust generating roads	DOT and Local municipality	DFFE	Medium cost – once off with maintenance	Costing will depend on the length of the road Can be done by industry as part of off-set projects	5 - 10 years	Unpaved roads tarred	High
Improve the regulatory framework in	Municipalities to develop/review bylaws to address air quality related issues (e.g. consider penalizing vehicles with visible smoke)	Local municipality	Local municipalities, DFFE, NGO's and CBO	Low cost – to be done by existing personnel	Enforce municipal by-law	5 years	Developed or reviewed bylaws impacting air quality	Medium

Objectives	Activities	Mandatory responsibility	Participatory responsibility	Estimated Cost	Enabling Factors	Timeframes	Indicators	Priority
the municipality	Increase of capacity to enforce bylaws to address air quality related issues	Local municipality	Local municipalities, DFFE	<b>Medium cost</b> – to employ more personnel	Assess additional human resource capacity required to enforce bylaws	5 years	Number of enforcement officials trained	Medium
	Establish intergovernmental coordination committee on air quality (Transport, Energy, Health, Minerals, Cooperative governance and Human settlement)	DFFE	DFFE	<b>Low cost</b> – to include existing personnel	Intergovernmental communication and awareness to get by-in for coordination committee Can be incorporated into current responsibilities	1 year	Committee established	High

Notes: DOT – Department of Transport, NGO – Non-Government Organisation, PRASA – Passenger Rail Agency of South Africa, CBO – Community Based Organisation, AARTO – Administrative Adjudication of Road Traffic Offences

### 6.2.2 Potential Future Threats

Future threats in the area are regarded as risks associated with the implementation of the interventions which would jeopardise the overall objective of the AQMP – to improve the air quality within the VTAPA. Table 23 to Table 30 describe the potential risks associated with each intervention and the associated mitigation measure.

Threats associated with the successful implementation of the VTAPA second generation AQMP, based on the lessons learnt, can be summarised as follows:

- Budgetary allocations or lack of provision to be inadequate to achieve goals;
- Available control technology found to be unfeasible;
- Political buy-in from decision making powers lacking resulting in lack of planning and budgetary constraints;
- Too many interventions, with some not clearly defined (also economic factors that could hamper certain intervention);
- Interventions at National level that are outside the control of the Local Municipality to implement;
- Constraints in human resource capacity for AQMP implementation – number of people and technical competency (insufficient follow-up);
- Political buy-in from decision making powers lacking resulting in lack of planning and budgetary constraints;
- Enforcement – no consequences or penalties for failing to implement the set interventions; and
- Inadequate methods in creating public awareness.

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Table 23: Implementation Plan with associated risk and mitigation for Industries & Power Generation Compliance Monitoring and Enforcement

Objectives	Activities	Indicators	Risk	Mitigation
Minimisation of emissions from regulated facilities	Compliance with the existing MES	Monitoring reports (Compliance monitoring activities)	<ul style="list-style-type: none"> <li>Postponement application</li> <li>Lack of progress of the off-sets projects</li> <li>Available control technology not feasible</li> </ul>	<ul style="list-style-type: none"> <li>End of postponement application cycle</li> <li>Enforcement of compliance with MES</li> <li>Monitoring of the off-sets projects</li> </ul>
Minimisation of fugitive emissions (e.g. waste, stockpiles, conveyor belts, haul roads etc.)	Develop and implement the fugitive emission Plan informed by Best Environmental Practice	All facilities with AEL submitted plans to the licensing authorities	Some industries may not prioritize fugitive emission plans as an important component of their development plans	<ul style="list-style-type: none"> <li>Municipalities to include the development of the fugitive emission as part of the AEL conditions</li> <li>Municipalities to enforce compliance to AEL conditions</li> </ul>
	Identification and implementation of suitable technology (introduction of binding agents in waste stockpiles and dust suppressants)	Dust management plans implemented	No record of implementation of dust management plan	Dust management plans developed and implemented
	Reporting of fugitive emissions on NAEIS	All facilities with AEL submitted plans fugitive emissions	<ul style="list-style-type: none"> <li>Lack of guidelines on reporting of fugitive emissions</li> <li>Reporting of fugitive emissions not mandatory</li> </ul>	<ul style="list-style-type: none"> <li>DFFE to develop/ include guidelines on the reporting of fugitive emissions on NAEIS</li> <li>Reporting of fugitive emission to be part of the AEL conditions</li> <li>Enforcement and compliance to reporting of fugitive emissions guidelines</li> <li>Workshops aiming to train industrial personnel in estimating fugitive emissions</li> </ul>
	Minimize and manage NEMA Section 30 incidents	Number of Section 30 Incidents	<ul style="list-style-type: none"> <li>Lack of reporting of NEMA section 30 incidences</li> <li>Irregular monitoring of section 30 facilities</li> </ul>	<ul style="list-style-type: none"> <li>Ensure Compliance of reporting of NEMA section 30 incidences</li> <li>Compliance monitoring of section 30 facilities on regular basis</li> </ul>
<b>Emissions from dust-generating activities are reduced</b>	Development of legal framework to manage with emission from small/unlicensed facilities	Legal framework in developed	Lack of Legal framework for emissions from small/ unlicensed facilities	Local municipalities to develop Legal framework for emissions from small/ unlicensed facilities
	Identify unlicensed dust generating activities	Identified dust generating activities	Identification of unlicensed dust generating activities not a priority due to limited resources in the municipality	<ul style="list-style-type: none"> <li>Prioritise and allocate resources</li> <li>Establish a toll-free number or complains, register book at the municipality whereby locals can report all environmental problems including</li> </ul>

Objectives	Activities	Indicators	Risk	Mitigation (complaints from identified dust generating activities)
	Holistic approach for dust management where there is cluster of facilities	Integrated dust management plans developed	Working in silos, and also lack of cooperation from cluster of facilities in the development of integrated dust management plans	Use AEL process to ensure enforce the requirement

Table 24: Implementation Plan with associated risk and mitigation for Mines

Objectives	Activities	Indicators	Risk	Mitigation
Management /reduction of emissions from mine	Dust management plans developed and implemented	All mines developed dust management plans	<ul style="list-style-type: none"> <li>Dust management plans which are not in line with guideline.</li> <li>Lack of commitment to enforce the development and dust management plan.</li> <li>Lack of enforcement to implement dust management plan.</li> </ul>	<ul style="list-style-type: none"> <li>Continuous consultation</li> <li>Compliance and enforcement of dust management plan.</li> </ul>
	Vegetation (indigenous plants and grass) on the abandoned mine dumps	Number of dumps rehabilitated	<ul style="list-style-type: none"> <li>Lack of resources (e.g. human &amp; finance) for Vegetating on abandoned mine dumps.</li> </ul>	<ul style="list-style-type: none"> <li>Planning and prioritisation of Resource</li> <li>Commercially viable (non-food) species used for rehabilitation</li> </ul>
	Establish the complaints management system for all mines	The complaints management system established by all mines	Lack of resources to manage the complaints.	<ul style="list-style-type: none"> <li>Planning and prioritisation of Resource</li> </ul>
	Implementation of the rehabilitation plans for non-operational mines	Mines rehabilitated	Limited resources to be used in the implementation of the rehabilitation plans for non-operational mines	<ul style="list-style-type: none"> <li>RSA to source donor funding</li> <li>Incentives for facilities that adopts and rehabilitate non-operational mines</li> <li>Sale of rehabilitated land to recoup costs</li> </ul>

**Table 25: Implementation Plan with associated risk and mitigation for Ash Dumps and Tailings Storage Facilities**

Objectives	Activities	Indicators	Risk	Mitigation
<b>Reduction of particulate matter emanating from ash dumps</b>	Dust suppression (e.g. chemical application and or watering active dumps)	<ul style="list-style-type: none"> <li>Number of dumps rehabilitated.</li> <li>Complaint with dust regulations</li> </ul>	<ul style="list-style-type: none"> <li>Water is a scarce resource</li> <li>Contamination of underground water, plants and animals by chemicals used to suppress dust</li> </ul>	Further research on the alternatives for dust suppression
	Reduce quantities of ash dumps by diversifying reuse and beneficiation	Amount of ash reused increased	Limited knowledge on the diversifying reuse and beneficiation of ash dumps	Further research on diversifying reuse and beneficiation of ash dumps

**Table 26: Implementation Plan with associated risk and mitigation for Domestic Fuel Burning**

Objectives	Activities	Indicators	Risk	Mitigation
<b>Domestic fuel burning emissions reduction</b>	Rollout of low smoke and LPG stoves and heaters, and alternative energy sources	% uptake by targeted households	<ul style="list-style-type: none"> <li>Prices of LPG stoves / lack of funding to buy low smoke and LPG stoves</li> <li>Lack accessibility and affordability of LPG.</li> <li>Lack Continuous /sustainable supply of LPG.</li> </ul>	<ul style="list-style-type: none"> <li>Government to source donor findings.</li> <li>Government to subsidise LPG to low income so that it could be easily accessible and affordable to everyone in the country</li> <li>DMRE to ensure continuous supply of LPG</li> <li>Investigate waste to LPG</li> </ul>
	Promote use of clean/green fuels such as LPG, biogas etc.	% uptake by targeted households	Community perception associated with the dangers of using LPG.	Education and Awareness campaigns on the safe use of LPG.
	Promote RDP houses with sufficient insulation	Number of RDP houses with sufficient insulation	Poor planning and lack of funds for insulation of RDP houses.	Proper coordination intergovernmental committee responsible for proper planning of RDP.

Notes: DMRE – Department of Mineral Resources and Energy; LPG - Liquefied Petroleum Gas; RDP - Reconstruction and development programme

Table 27: Implementation Plan with associated risk and mitigation for Domestic Waste Burning

Objectives	Activities	Indicators	Risk	Mitigation
Reducing domestic waste burning emissions	Waste separation at source & recycling	% uptake by targeted households	Lack of resource for separating waste at source.	<ul style="list-style-type: none"> <li>Local Government to provide resources (clearly labelled bin) for sorting waste at source</li> <li>Streamline with the many already existing commercial attempts (retail sector e.g. Pick n Pay) at waste separation</li> </ul>
	Waste collection & clean-up	% uptake by targeted households	Collapse of municipality system.	<ul style="list-style-type: none"> <li>Stop corruption – proper political administration.</li> </ul>
	Management of municipal and privately-owned landfill sites	% reduction in number of burning incidents	Lack of awareness on 3Rs (Reuse, Reduce and recycling)	<ul style="list-style-type: none"> <li>Awareness campaign to reduce landfill waste through 3Rs</li> <li>Enforcement of bylaws to stop burning at landfill site</li> </ul>
Reducing tyre burning emissions	Awareness campaigns	% reduction of tyre burning by 2025	Lack of understanding of impacts of tyre burning	<ul style="list-style-type: none"> <li>Awareness campaigns</li> </ul>
	Regulate tyre burning true bylaws (SAPS to enforce the bylaws)		Lack of bylaws on tyre burning	<ul style="list-style-type: none"> <li>Develop bylaws to control burning of tyres</li> <li>Criminalise tyre burning</li> </ul>
	Establish way to support tyre collection facilities per district through Waste Bureau		DFFE & Waste Bureau working in silos	<ul style="list-style-type: none"> <li>Collaboration between affected parties</li> </ul>

**Table 28: Implementation Plan with associated risk and mitigation for Biomass Emissions**

Objectives	Activities	Indicators	Risk	Mitigation
Management of veld fire occurrence	Municipalities to implement Veld fires guidelines (establish relation with EPWP working for fire. Establish veld fire hotline. Induction of employees in management of veld fires.)	Reduced number of fires	Lack of cooperation of affected parties Lack of capacity	Continuous consultation Public and governmental (all spheres) awareness on air quality impacts from fires
	Conduct education and awareness campaigns on burning and veld fires.	Annual campaigns	Lack of interest	Continuous consultation Capitalize on international fire events to raise awareness

Notes: DAFF – Department of Agriculture, Forest and Fisheries

**Table 29: Implementation Plan with associated risk and mitigation for Education and Awareness**

Objectives	Activities	Indicators	Risk	Mitigation
Domestic fuel burning emissions reduction	Awareness Programme clean fuels, and other alternative sources, as well as Renewable energy sources,	Annual workshop held	Low uptake of cleaner fuels and other alternative sources, as well as Renewable energy sources	Continuous consultation and incentives for using alternative sources
Reducing domestic waste burning emissions	Awareness (Green Good Deeds type) on waste burning & recycling	Annual workshop held	Lack of interest by stakeholders	Stakeholders will be widely consulted, and their commitment secured.
Promotion of educational programmes on the use of biomass	Introduce and continuations of alternative programmes	Annual workshop held	<ul style="list-style-type: none"> <li>Lack of interest</li> <li>lack of commitment by stakeholders and lack of prioritisation of resources such as personnel</li> </ul>	<ul style="list-style-type: none"> <li>Continuous awareness campaigns</li> </ul>
Reduce emissions from vehicles	Awareness campaign on green transport (e.g. use of bicycles, lift clubbing, park and ride to work or shops etc.)	Annual workshop held	<ul style="list-style-type: none"> <li>Lack of interest from vehicle users.</li> <li>Park and ride: Distance between bus stop and workplace after drop-off.</li> <li>Additional funds for parking.</li> <li>crimes (those with laptop bags and essentials will be afraid to walk around).</li> </ul>	<ul style="list-style-type: none"> <li>Continuous awareness campaign.</li> <li>Provide other alternatives such as bicycles at the drop – off to the office.</li> <li>Provide incentives –subsidising ticket price and parking.</li> <li>Police visibility to curb crime</li> </ul>

Table 30: Implementation Plan with associated risk and mitigation for Vehicles Emissions

Objectives	Activities	Indicators	Risk	Mitigation
<b>Reduce emissions from vehicles</b>	Promotion of non-motorised and public transport systems	Annual campaigns	<ul style="list-style-type: none"> <li>Lack of resources and commitment from stakeholders e.g. personnel</li> </ul>	<ul style="list-style-type: none"> <li>Continuous stakeholder consultation to get buy-in and commitment from stakeholders</li> </ul>
	Annual testing of vehicle	Testing reports indicating numbers of vehicle tested	<ul style="list-style-type: none"> <li>Lack of co-operation by Municipalities which might be exacerbated by lack of skilful (qualified/trained) personnel</li> </ul>	<ul style="list-style-type: none"> <li>Training the existing officials – offer better condition (salaries &amp; benefits) to ensure staff retention</li> </ul>
	Identify unpaved road generating dust and prioritise high risk roads	Unpaved roads identified	<ul style="list-style-type: none"> <li>Municipality could not prioritise due to limited resources (financial &amp; lack of officials).</li> </ul>	<ul style="list-style-type: none"> <li>Establish a toll-free number or complaints register at the municipality offices to allow local communities to report all environmental problems including (dust complaints due to unpaved roads).</li> </ul>
	Implement management measures for identified high risk dust generating roads	Unpaved roads tarred	<ul style="list-style-type: none"> <li>DOT and municipalities may not prioritise tarring of identified dust generating roads in VTAPA as an important component of their development plans</li> </ul>	<ul style="list-style-type: none"> <li>Offsets programmes and cooperate social responsibility programmes can be used to resolve these issues.</li> </ul>
<b>Improve the regulatory framework in the municipality</b>	Municipalities to develop/review bylaws to address air quality related issues (consider penalizing vehicles with visible smoke)	Developed or reviewed bylaws	Insufficient capacity in local municipality	Adoption of National department bylaws; provincial capacity
	Increase of capacity to enforce bylaws to address air quality related issues	Number of enforcement officials trained	Insufficient budget, and resignation of trained personnel	Source funding and implementation of HR retention strategy
	Establish intergovernmental coordination committees on air quality (Transport, Energy, Health, Minerals, Cooperative governance and Human settlement)	Committee established	<ul style="list-style-type: none"> <li>Lack of commitments from different head of departments and other political counterparts on air quality issues.</li> <li>Lack of understanding of air quality and how other departments are affected and also contributing to AQ problems, this could result in lack of prioritisation on air</li> </ul>	<ul style="list-style-type: none"> <li>Minister to establish intergovernmental coordination</li> <li>Continuous consultation and awareness</li> </ul>

Objectives	Activities	Indicators	Risk	Mitigation
			quality issues by other government departments	Prioritize air quality (and its departmental relationships) within Parliamentary Portfolio Committees

Notes: DOT – Department of Transport, NGO – Non-Government Organisation, PRASA – Passenger Rail Agency of South Africa, CBO – Community Based Organisation

### 6.3 Monitoring and Evaluation

The 2013 review found that regular monitoring of the AQMP implementation progress provides an important mechanism to ensure actions are taken and key stakeholders are engaged with. At the very least it provides valuable information as to why an implementation has failed.

#### 6.3.1 Expansion of Ambient Air Quality Monitoring Network

One of the most important indicators for AQMP success is a decrease in air pollutant concentrations. In order to monitor progress, measurements of pollutants must be analysed. This forms the basis for understanding the ultimate impact from interventions. However, this is reliant on a functioning, well maintained and representative monitoring network. Section 3.2 gives a summarized analysis on the current measurements from existing stations in the VTAPA, and the Baseline Assessment Report goes further into the network's performance in terms of data quality. This section aims to set out the rationale for an expansion of the existing DFFE network.

Air quality in the VTAPA has not improved over the past 10 years. Slight decreases in PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>x</sub> have been noted at some of the stations whereas at others the concentrations have increased slightly. PM<sub>10</sub> and PM<sub>2.5</sub> concentrations remain in non-compliance with the NAAQS in spite of decreases in some industrial sector emissions and limited successes with other interventions.

The current location of most of the monitoring stations should reflect improvements in interventions aimed at low income settlements – domestic fuel burning and domestic waste burning. These stations are, however, unlikely to show improvements from other interventions aimed at reducing emissions from: vehicles, industry (i.e. 2020 MES) and mining.

Conducting ambient monitoring at locations within the more formal settlements, away from main influencing sources but within the main impact area of the VTAPA should cover this gap in ambient air quality data, tracking overall performance of all interventions. Passive sampling campaigns are recommended for this purpose to be conducted bi-annually, one campaign in winter and one in summer. Two locations are proposed: one in the southern part of Vanderbijlpark and one to the north of Vereeniging (Figure 49). These campaigns will also serve to monitor impacts on regional air quality.

#### 6.3.2 Update of VTAPA Second Generation Emissions Inventory

As part of regular monitoring and evaluation, the second generation VTAPA emissions inventory will have to be continuously updated. This forms part of the capacity building plan, enabling the Air Quality Officers to fulfil their legal obligation and ensure a successful implementation of the second generation VTAPA AQMP.

The update of the emissions inventory is proposed to be done annually and should include, but not be limited to, the following:

- Identify and quantify emissions from all Controlled Emitters and Small Stationary Sources;
- Update the fuel use for domestic fuel burning consumption (i.e. switching from coal to LPG);
- Identify and record waste burning activities (include types of waste burnt, frequency and duration); and
- Identify open exposed areas within residential areas that can give rise to windblown dust.

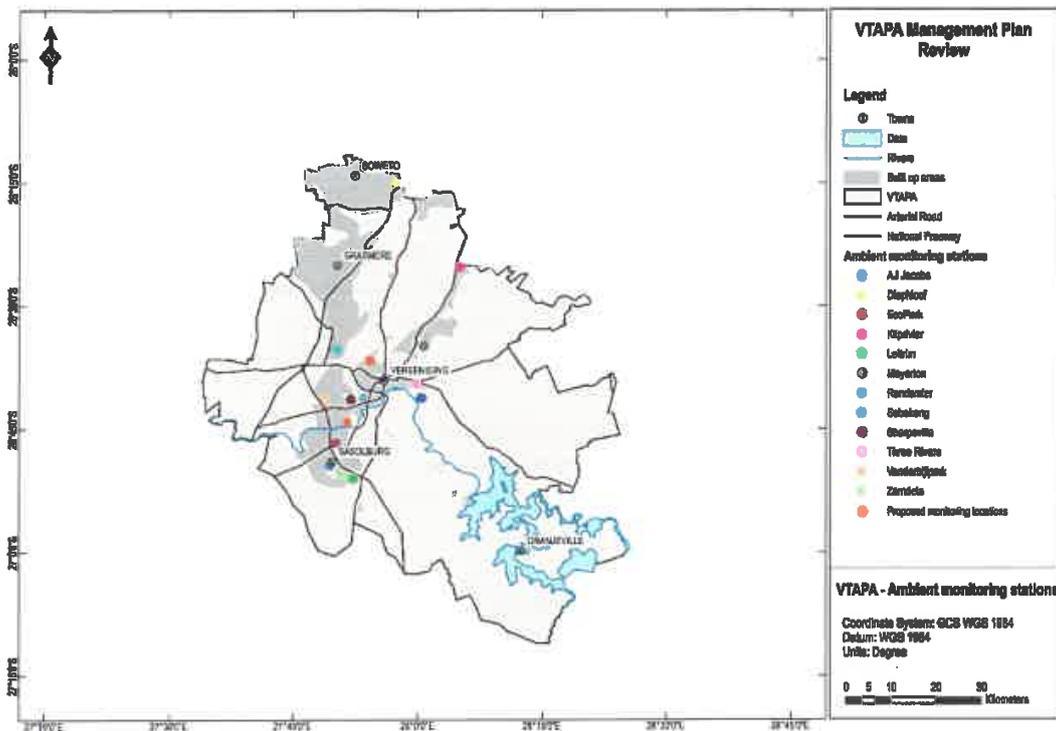


Figure 49: Locations for passive sampling campaigns within the VTAPA

### 6.3.3 Stakeholder Engagement

There are several forums in place in the VTAPA to ensure inter-governmental communication and cooperation's as well as engagement with various stakeholders. However, the need for granulation and clarification of roles and responsibilities for all stakeholders at local level, who will be collaborating to execute relevant initiatives and providing progress feedback, is pertinent.

The Multi Stakeholder Reference Group (MSRG) meets twice a year and comprises representatives from all spheres of government, industry and Interested and Affected Parties (I&APs). These meetings provide a platform for feedback on the progress of the implementation of the AQMP as well as interaction between the various stakeholders. This forum should continue to meet bi-annually but with more focus on information communication and awareness raising – this could also be an ideal platform to provide guidance to industry on how to report in NAEIS and raise awareness on the importance of correct reporting. This forum should be used to track clear targets for implementation within the specific timeframes and holding the responsible parties accountable for non-performance.

The Implementation Task Team (ITT) is grouped geographically to facilitate interaction and focussed efforts at interventions relevant to a specific geographical area. These groups consist of government officials at municipal level, industry representatives, NGO's and CBO's and are hands-on in the implementation of the area-based interventions. These quarterly meetings should serve as interim follow-ups on specific actions (listed in tables in Section 6.1.2: *Prioritisation and Financial Implications of Interventions*) and there should be consequences for actions not taken. Clear targets should be set, and progress traced at these meetings.

The VTAPA Authorities meet bi-annually and comprises of the air quality officers from the various spheres of government. Here the focus is specifically on intergovernmental cooperation and feedback from the various air quality officials on progress made within their jurisdictions. Again, clear targets with implementation timeframes should be set and there should be accountability for non-performance.

Even though the DFFE, as the national department, is responsible for the implementation of the Priority Area AQMP, it works in collaboration with other spheres government (particularly local) and various stakeholders. However, the DFFE remains responsible for enforcement and accountable for non-performance. The DFFE has, in support of local and provincial government, deployed personnel to assist with the implementation of the air quality responsibilities.

#### *6.3.4 Review of VTAPA Implementation Plan*

The AQMP promotes collaboration between the various stakeholders to achieve a shared vision and goals. The success of the VTAPA second generation AQMP will depend on the implementation of the intervention strategies. This in turn depends on the feasibility of the interventions and how easily these can be implemented. The latter relies on human resource capacity, planning and financial provision.

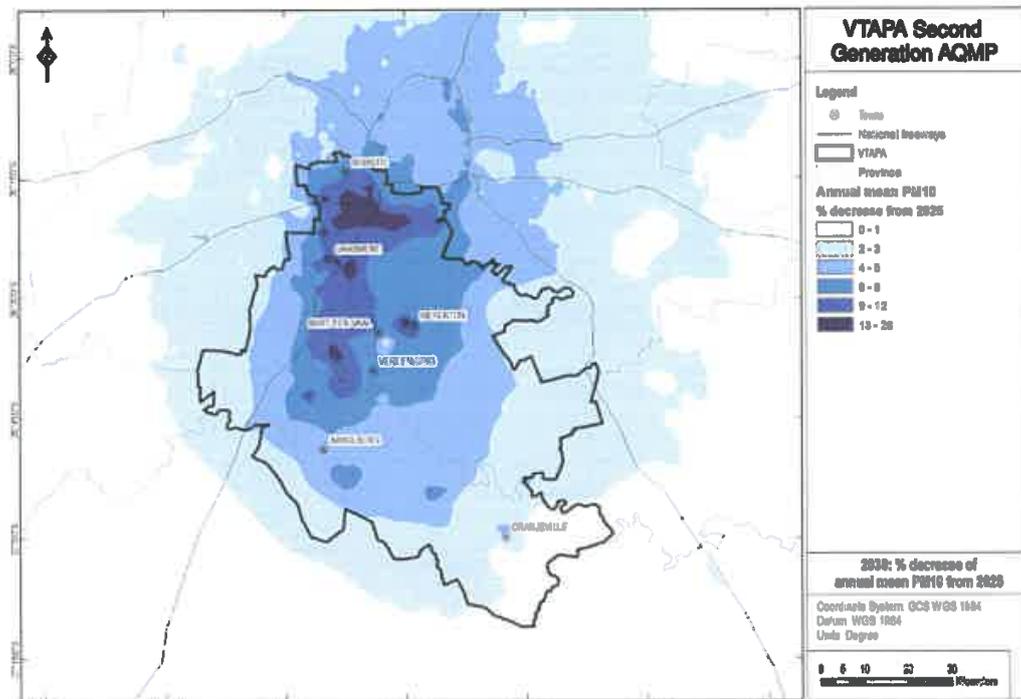
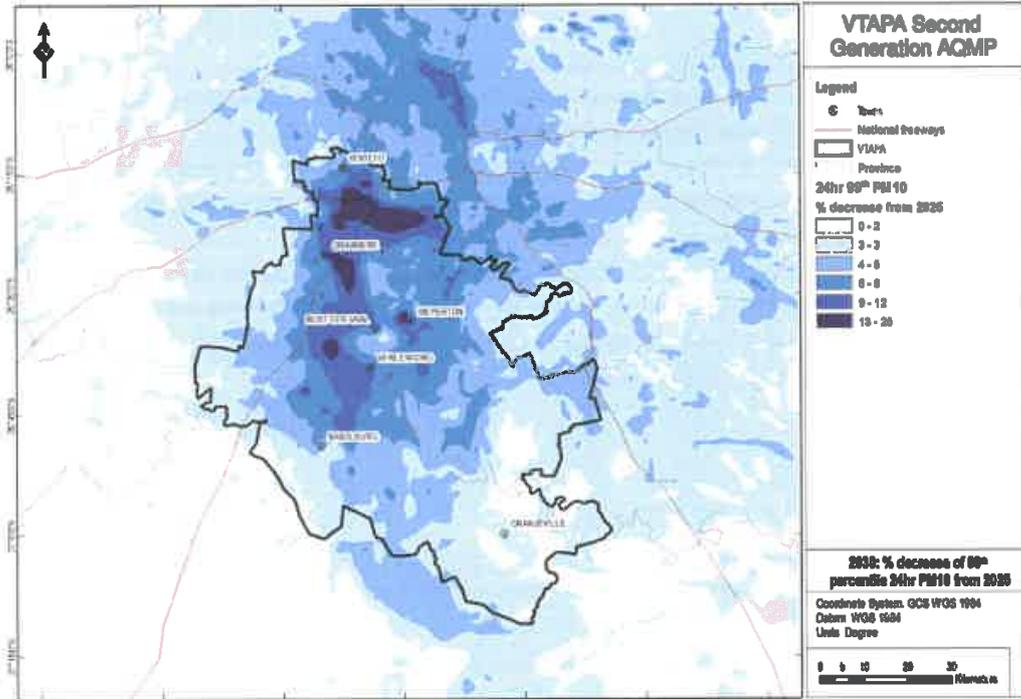
Progress on the implementation of the VTAPA second generation AQMP should be closely monitored, with an internal review at the end of each financial year where the interventions should be re-defined if needed and re-prioritised. The AQMP should be reviewed within five years of publication.

## 7 REFERENCES

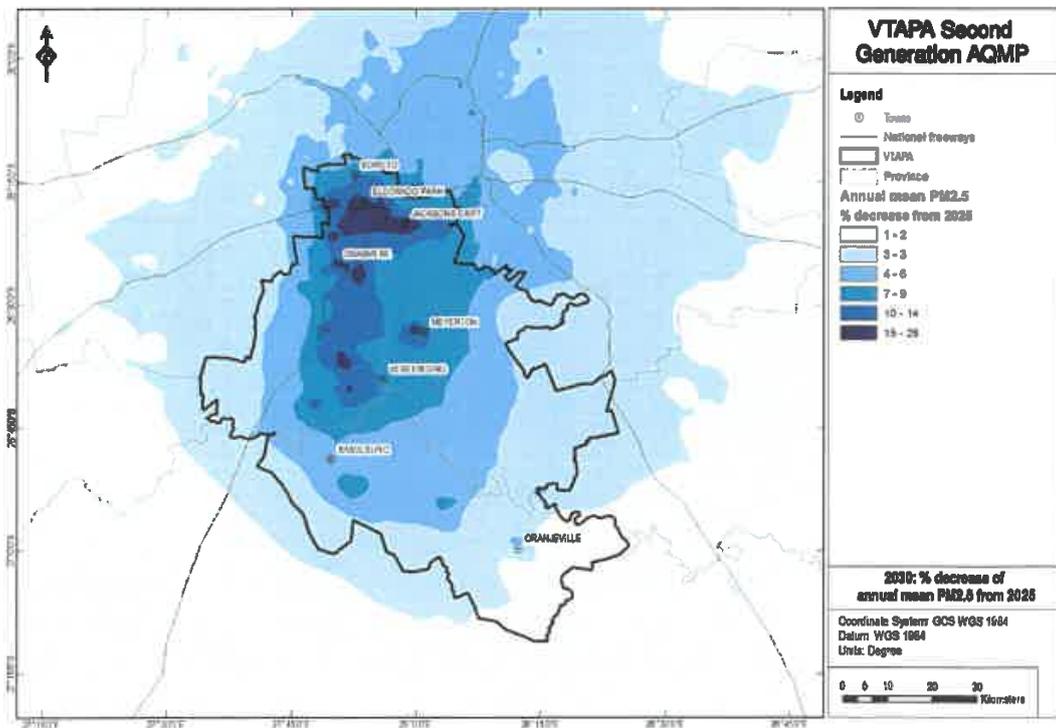
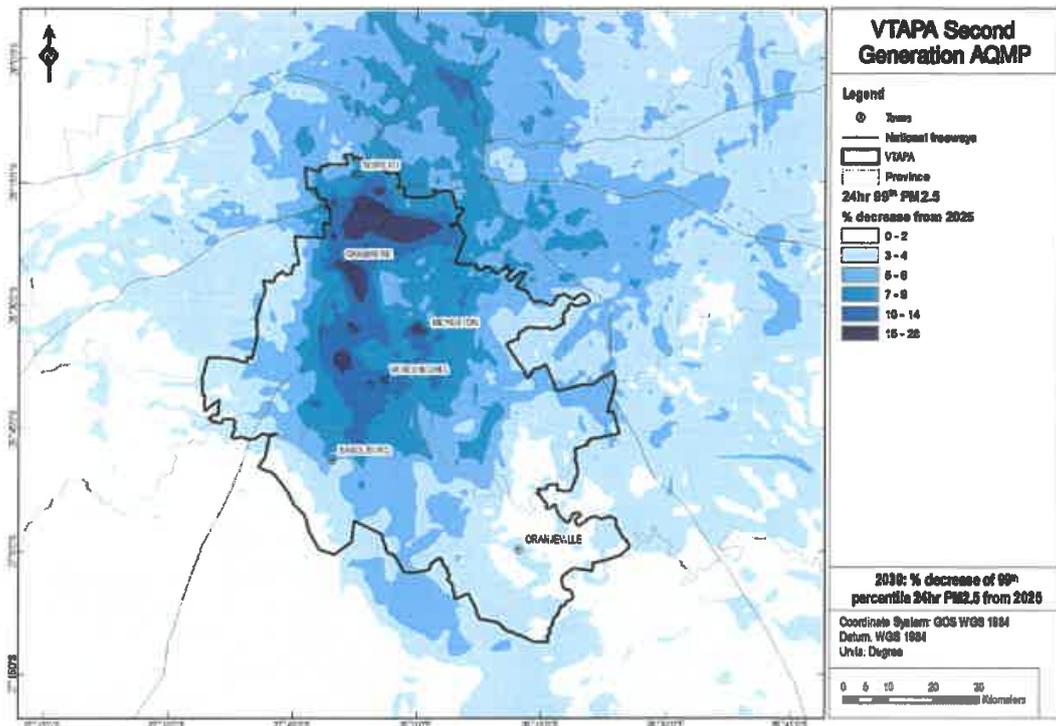
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**8 APPENDIX A – SCENARIO MODELLING: PERCENTAGE DECREASE FROM SCENARIO 2025 TO SCENARIO 2030**

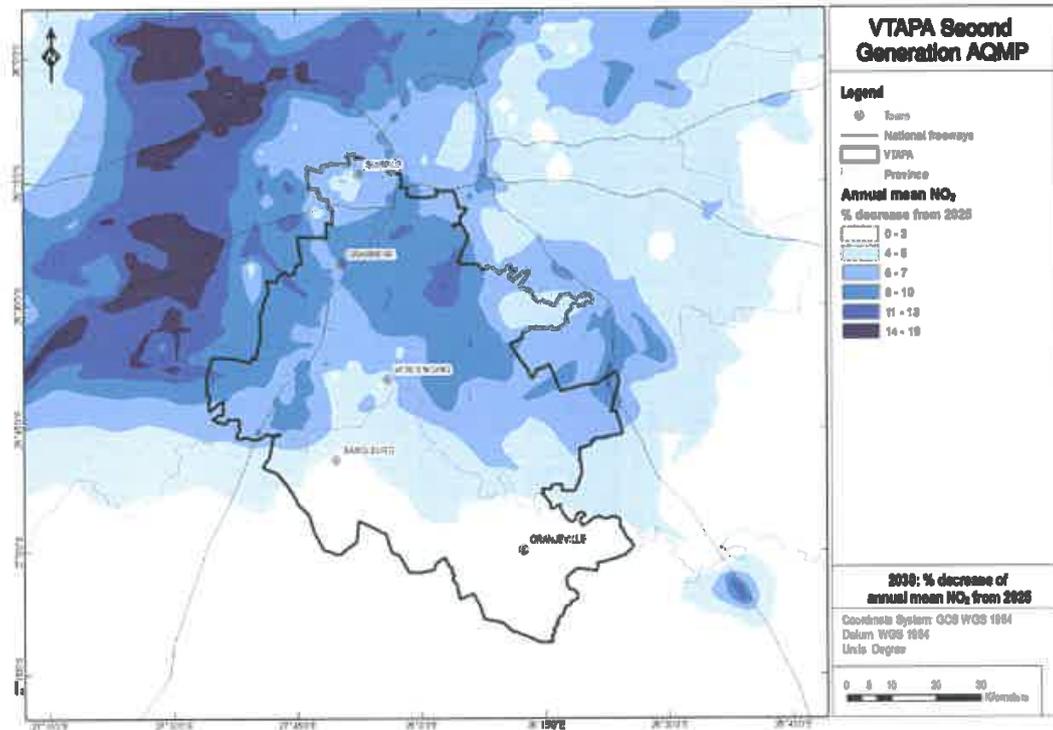
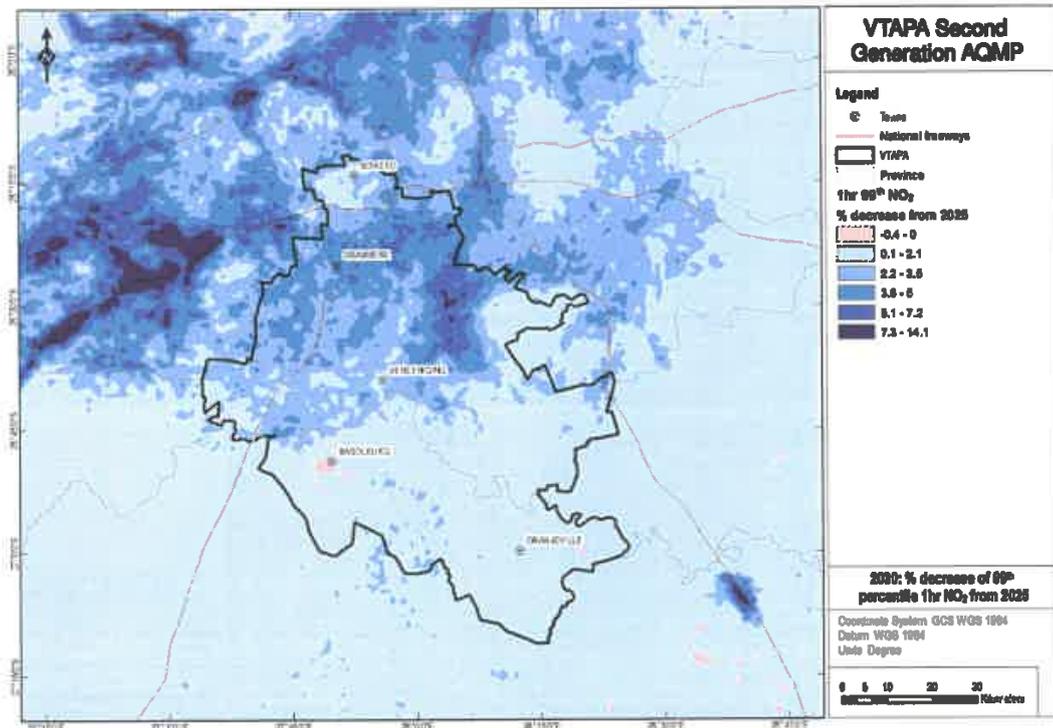
**PM<sub>10</sub>**



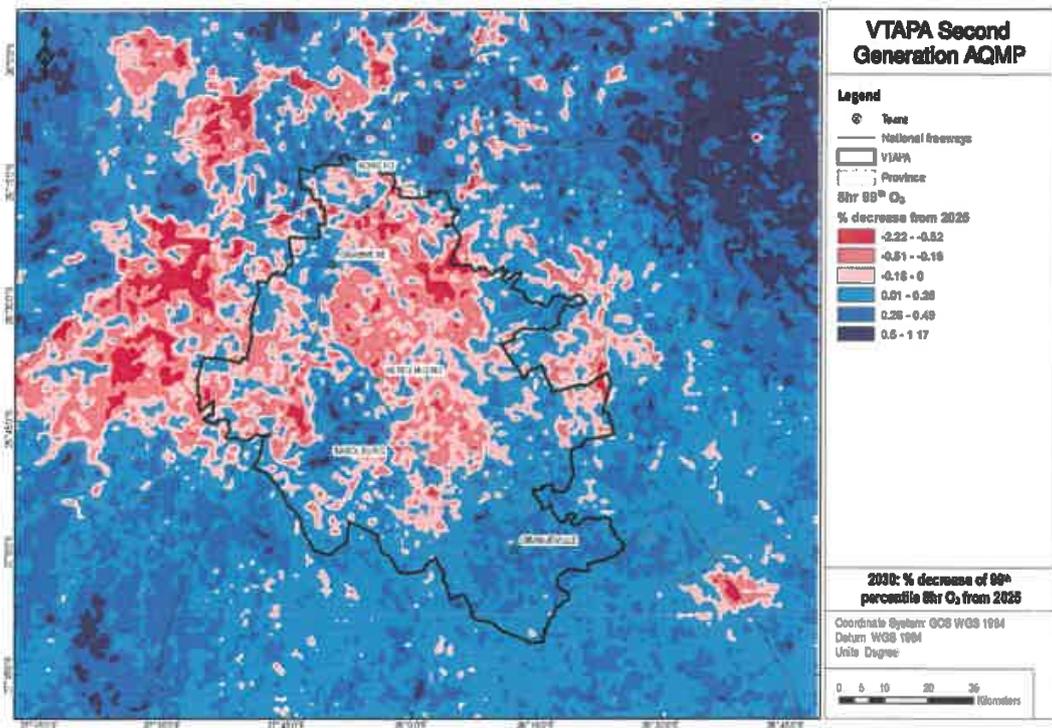
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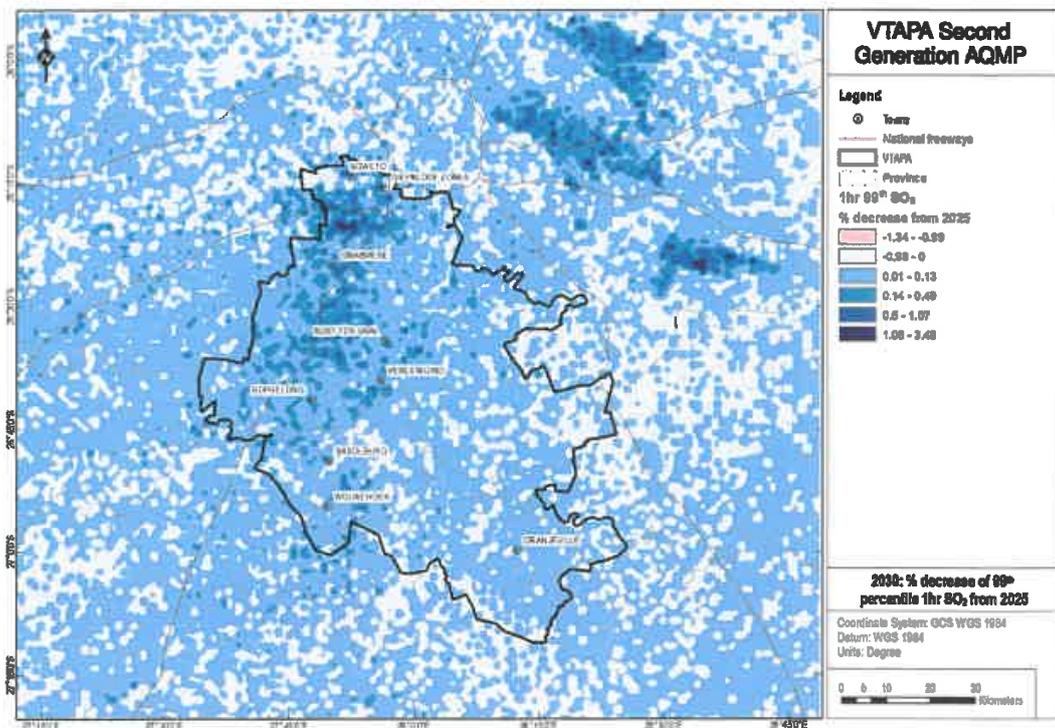
**NO<sub>2</sub>**

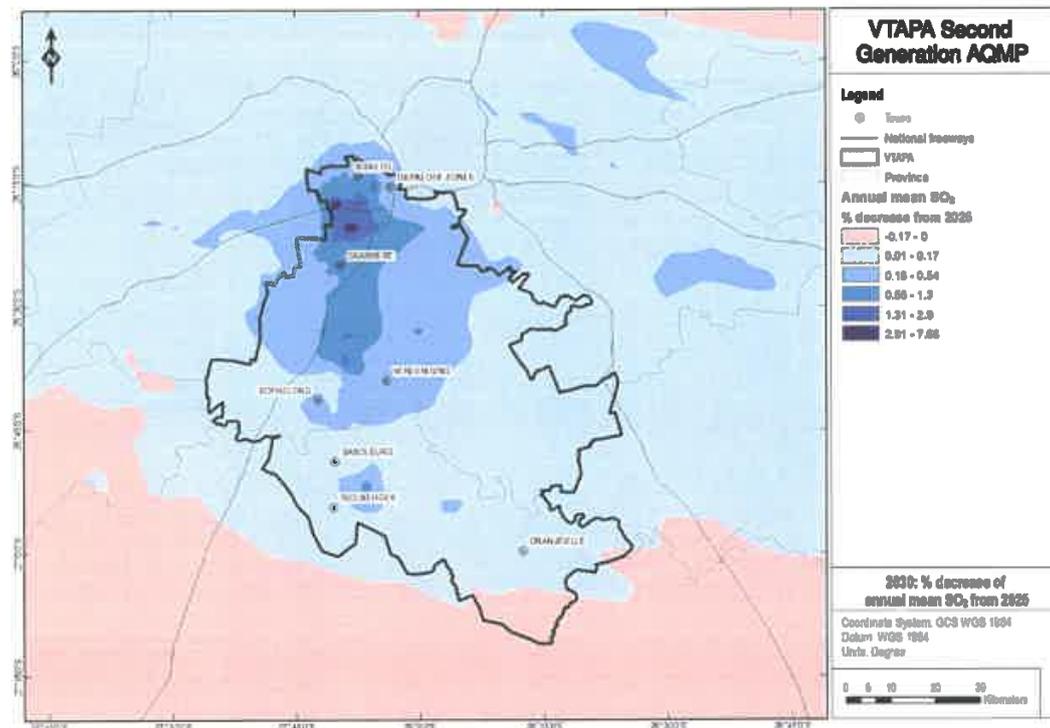
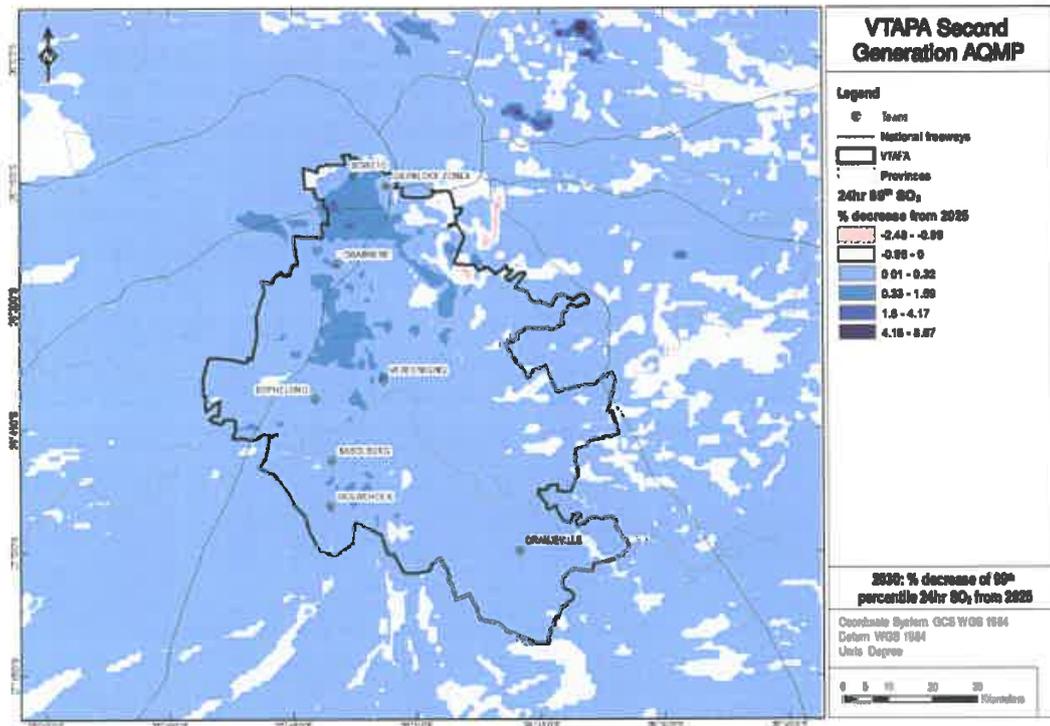


Ozone



**SO<sub>2</sub>**





## 9 APPENDIX B – FIRST GENERATION VTAPA AQMP IMPLEMENTATION PLAN

The current known status of these action plans is provided in each table.

Note that at the time of publication of the 2009 VTAPA AQMP, the DFFE was called the Department of Environment and Tourism, hence the DEAT abbreviation.

Table 31: Action plan for selected interventions identified for Biomass Burning

Intervention	Implementation Strategy	Responsible	Assumptions	Estimated Cost	Timeframe	Control Efficiency	Indicators	Current (2019) status
<b>Identify and quantify emissions from biomass burning</b>	Obtain information on locations of veld fires and areas burnt from fire department (s) within each Municipality. Obtain updated satellite imagery to identify burn scars which will indicate the size of areas burnt.	COJ, FDDM and SDM	Each fire department has information on veld burning	R 10 000 – R 20 000	Short – Medium Term	Not Applicable	Emissions from biomass burning are quantified	Not quantified by Municipalities, however quantified as part of the 2013 Review and the Second Generation Baseline Study
<b>Research into international best practice regarding controlled/uncontrolled burning</b>	Compilation of a comprehensive document detailing current international best practice. Such information should include the burning of firebreaks, season of burning and frequency (etc.). This information should be developed into a veld fire management strategy for the Vaal Triangle. DEAT to liaise with COJ, FDDM and SDM to implement system.	DEAT in collaboration with COJ, FDDM and SDM	International best practice methods are available	R 40 000 – R 80 000 for a report	Short – Medium Term	Not Applicable	A comprehensive report detailing best practice for burning. Best practice methods are implemented in each Municipality.	No report
<b>Development of an inversion early warning system that triggers a veld fire control response</b>	DEAT to develop an early warning system that detects and forecasts meteorological conditions which can cause uncontrolled veld fires. DEAT to liaise with COJ, FDDM and SDM to implement system COJ, FDDM and SDM to liaise with relevant fire departments to respond to veld fires	DEAT in collaboration with COJ, FDDM and SDM	Fire departments respond to veld fire warnings	Unknown	Short Term (2009)	Uncontrolled veld fires reduced by 50 – 70%	Frequency of uncontrolled veld fires is reduced in Vaal Triangle. Fast response of Fire Department to uncontrolled veld fires in Vaal Triangle	Not known. Status not known.

Notes: DEAT – Department of Environment and Tourism, COJ – City of Johannesburg, FDDM – Fezile Dabi District Municipality, SDM – Sediberg District Municipality

Table 32: Action plan for selected interventions identified for Domestic Fuel Burning

Intervention	Implementation Strategy	Responsible	Assumptions	Estimated Cost	Timeframe	Control Efficiency	Indicators	Current (2019) status
<b>Basas Njengo Magogo (BNM) – Top down ignition</b>	Roll-out of the BNM in Orange Farm to reach 60% of households using coal	DEAT in collaboration with DME and COJ	Eskom to sponsor roll-out in Orange Farm	R400 000 – R1 million per 20 000 households	Short Term (2008/9)	Estimated reduction of 50% emissions for PM10 and 20% for other pollutants	60% of households reached PM10 ambient monitoring data in Orange Farm to indicate annual average reductions over 2008/9	Ongoing
	DEAT to liaise with DME and COJ to initiate project by June 2008 DEAT to liaise with Eskom to obtain funding for the roll-out. Eskom provided technical support in measuring the effectiveness of the Basa Njengo Magogo rollouts in the Vaal.							
<b>Electrification</b>	Roll-out of the BNM in Zamdeia to reach 60% of households using coal	DEAT in collaboration with DME and FDDM	Sasol to sponsor roll-out in Orange Farm	R400 000 – R1 million per 20 000 households	Short Term (2008/9)	Estimated reduction of 50% emissions for PM10 and 20% for other pollutants	60% of households reached PM10 ambient monitoring data in Zamdeia to indicate annual average reductions over 2008/9	Status not known
	DEAT to liaise with DME and FDDM to initiate project by June 2008 DEAT to liaise with Sasol to obtain funding for the roll-out.							
	Electrification of households in Orange Farm. DEAT to liaise with COJ, FDDM and SDM to initiate project DEAT to liaise with Eskom to obtain funding.	DEAT in collaboration with COJ, FDDM and SDM	Eskom to sponsor roll-out in Orange Farm and Zamdeia Households use electricity rather than coal		Short Term (2008/9)	90% PM10 and SO2 reduction	PM10 and SO2 ambient monitoring data in Orange Farm and Zamdeia Indicates a reduction between 2007 and 2016 but increased PM2.5 and NO2 concentrations. SO2 and NO2 had poor data available (<75%). No monitoring station in Orange Farm. (DEA, 2019)	Zamdeia station indicated a reduction in PM10 and SO2 concentrations between 2007 and 2016 but increased PM2.5 and NO2 concentrations. SO2 and NO2 had poor data available (<75%). No monitoring station in Orange Farm. (DEA, 2019)

Notes: DME – Department of Mineral and Energy, COJ – City of Johannesburg, FDDM – Fozile Dabi District Municipality, SDM – Sedibeng District Municipality

Table 33: Action plan for selected interventions identified for ArcelorMittal (Iron and Steel Sector)

<i>Emission Reduction Intervention</i>	<i>Full Description of the Emission Reduction Intervention</i>	<i>Compliance Date (Day/ Month/Year)</i>	<i>Estimated Cost</i>	<i>Comments /Progress</i>	<i>Current (2019) status</i>
<b>Roof emissions from Blast Furnace D (reduction of fugitive emissions strategy)</b>	<ul style="list-style-type: none"> <li>Phase 1: Installation of the Blast Furnace D Cast House Bag House to ensure dust captured are abated.</li> <li>Phase 2: During the relime on Blast Furnace D, the effectiveness of the primary extraction system will be engineered to be able to capture a significant proportion of roof emissions. It is planned to reassess the situation after stabilization of the Blast Furnace after start-up.</li> </ul>		+/- R 30 million	Completed  Target date Sept 2007 (Completed November 2007)	Completed
<b>Dust Suppression at waste disposal site (reduction of fugitive emissions strategy)</b>	A dust suppression system at the Tipping station (off-loading point), utilizing high pressure to create a fine mist of water is currently being erected at the waste disposal site, and this will assist in preventing excessive secondary dust emissions. It is planned to prepare the roads to the waste disposal site in order to reduce the entrained dust from vehicle movement.		R 1.9 million	Target date June 2008 Completed	Completed with an additional emission reduction by enclosing of Tip station B fitted with roof dust suppression system
<b>Stoppage of dosing with spent pickling liquor at the Sinter Plant (Mitigation projects on PM<sub>10</sub>)</b>	As part of the operation at the sinter plant, spent pickling liquor (a mixture of iron chloride & hydrogen chloride) was used to reduce the levels of potassium in the sinter product. This practice was developed in the 80s, due to the detrimental effect potassium had on the blast furnace process. The SPL was sprayed into the mixing drum and the liquor would react with the alkalis in the ore and form potassium chloride (KCl), which formed part of the gas released into the atmosphere. The downstream gas cleaning facilities could unfortunately not remove the particulate KCl very well, and these particulates formed part of the emissions from the plant. After careful evaluation of all related inputs and aspects, a decision was taken to stop the dosing at the end of Feb 2006, to be monitored for 3 months before a final decision on the impact, or not, is taken. No visible deterioration of the functioning of the		Operational costs	Target date Feb 2006 Completed	Completed

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/ Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
<b>25% Demonstration Unit for proof of performance at the Sinter Plant (Mitigation projects on PM<sub>10</sub>)</b>	<p>blast furnace was experienced, mainly because of improved coke strength.</p> <p>This refers to the installation of wet scrubbing emission abatement technology to reduce the volume of atmospheric emissions (mainly particulates) from the sinter plant. This is a novel technology developed by ArcelorMittal and will be used to test possible applications. A Proof of Performance authorization has been issued, by GDACE, to undertake performance tests on the Clean Gas Unit Demonstration Plant. 25% demonstration unit (GAUT 002/02-03-137); the demonstration plant is currently being commissioned.</p>		+/- R 66 million	Target date October 2009?	Completed
<b>Coke Oven Gas (COG) &amp; Water Cleaning Plant Project (mitigation project on SO<sub>2</sub>)</b>	<p>The coke oven gas cleaning plant technology had become outdated and did not operate efficiently &amp; effectively, hence the COG &amp; water-cleaning project was initiated in 2003 to upgrade the system and hence reduce SO<sub>2</sub>, NH<sub>3</sub>, HCN, CO<sub>2</sub> &amp; heat released to the atmosphere. The project was authorized under GAUT 002/02-03/138 and is in the final phases of commissioning.</p>		+/- R 330 million	Target date June 2009	<p>Plant failure during 2012. Commit to construct new gas plant to be commissioned 2023.</p> <p>Short term interventions – extensive ceramic welding, battery tightening project and automated exhausters (busy with implementation). Battery 1 &amp; 3 has been shut down and upgrades of battery 4, 6, 7, 8 and 9 scheduled to reduce fugitive emissions.</p>
<b>Proposed Sinter Clean Gas Unit (mitigation project on Particulates and SO<sub>2</sub>)</b>	<p>This refers to the installation of emission abatement technology to reduce the volume of atmospheric emissions (particulates, SO<sub>2</sub> &amp; dioxins) from the entire sinter plant. A Proof of Performance authorization has been issued to undertake performance tests on the Clean Gas Unit Demonstration Plant (GAUT 002/02-03-137); the demonstration plant is currently being commissioned.</p>		+/- R 250 million	Currently planned Q4 2010	Some bag filters challenges to ensure effectiveness of the BAT
<b>Secondary Dust Extraction System at EAF</b>	<p>Install secondary dust/fume extraction system with its own bagfilter system with an average capacity of ~5,000,000 m<sup>3</sup>/hr. Thus, will capture fumes and dust currently escaping through the</p>	2013		Capital constraints	Plant switched off

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/ Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
Additional emission reduction interventions not committed to VTAPA AQMP	<p>openings in the roof. This project was not implemented and the EAF plant has switch off</p> <ul style="list-style-type: none"> <li>• Vegetation of open areas – 400 hectares</li> <li>• Removal of historical ramp at metal recovery plant</li> <li>• Installation of new baghouse at Blast furnace D stock house</li> <li>• Installation of new BAT bagfilters at Blast furnace pulverising plant</li> <li>• Installation of new bagfilter at Foundary</li> <li>• Emissions from Raw material stockpiles mitigation measures</li> <li>• Upgrade lancing booth</li> <li>• Installation of dedusting hoods on the bucket feeding conveyers at Blast furnace D for fugitive emission reduction</li> <li>• PCI 1 and 2 Installation of new baghouse</li> <li>• 400 hectares of grass cut/baled to avoid veid fires</li> <li>• Shute replacement in Blast Furnace stock House D – Sinter /Coke transport of materials</li> <li>• Upgrade of hoods and ducting within Sinter cold screening area</li> </ul>	<p>2014 2013 2014 2014 2012 2013 2012 2019 2020 2019 2019 2019 2020</p>		Completed	

Notes: GDACE – Gauteng Department of Agriculture, Conservation and Environment

Table 34: Action plan for selected interventions identified for Metalloys

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/ Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
Rehabilitation of old North dams	The project is to rehabilitation of the area west of Metalloys office building where decommissioned old North plant sludge dams are situated. Finally, the area will be greened	Deferred to be part of the integrated rehabilitation planning in 2009 (Completion target date was 06/2008)	R3 million	Implementation phase to be prioritized according to integrated rehabilitation	North Plant is not operational but not rehabilitated.

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/ Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
Dust suppression at Final Products Handling	Dust suppression by added moisture, screening and washing to remove fine materials, resulting less dust generation during dispatching	Test phase target date was 04/2008, Completion target date was 06/2008	R5 million	Due to cost strategy (to be finalized by 12/2009) Completed on time	Completed Highly ineffective
Rail tippler building enclosure at Raw Materials Handling	Enclose Rail Tippler building to contain dust. During the windy periods the wind blows the dust out of the semi open structure. The project will enclose the tippler building so that the existing wet dust suppression system will work more effectively.	Completion target date was 06/2008	R0.6 million	Completed in 12/2008	Completed Highly ineffective
Secondary Fume extraction system upgrade at North plant	Additional extraction hoods and additional capacity on the existing bag house to increase efficiency of current secondary fume extraction system at the tapping process.	Completion target date was 06/2008	Revised cost estimate >>R15 million	Due to cost escalation and revised scope referred to ERS rev 2 project Front End Loading (see below)	North Plant is not operational but not rehabilitated
Dust-A-Site network extension	Construction of a road and weekly maintenance of a 150m of current dirt road next to the salvage yard with dust-a-site	Completion target date was 10/2007	R0.3 million	Completed on time	Completed
PM10 monitoring	Installation of 3 continuous ambient air PM10 monitoring stations on site and in downwind communities, including meteorological data	Completion target date was 08/2007	R1.5 million	Completed on time	Completed
Online stack monitoring	Continuous in stack point source emission monitoring for all clean gas stacks and bag filter plants (Particulate Matter)	Completion target date was 06/2008	Revised cost R6.5 million	Delayed due to cost escalation and required re-tender, currently in procurement phase, revised completion target 8/2009	Few were installed this year for M14 raw gas stack
APPA permit review	Extensive data collection of all point, fugitive, area and line sources of relevant pollutants during APPA permit review	Completion target date was 10/2007	R0.5 million	Completed on time	Completed No longer APPA, only AEL

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Completion Date (Day/Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
<b>PM<sub>10</sub> source identification</b>	Short term ambient air PM <sub>10</sub> monitoring project to assist in emission source identification	Completion target date was 02/2008	R0.1 million	Completed on time	Completed
<b>Emission Inventory update</b>	Comprehensive Emission Inventory update based on data collected during APPA permit review	Completion target date was 02/2008	R0.1 million	Completed on time	Completed Last updated in 2018
<b>Dispersion modelling</b>	Dispersion modelling of current baseline	Completion target date was 03/2008	R0.1 million	Completed in 04/2008	Completed Last updated in 2018
<b>Additional dust fallout monitoring on site</b>	Installation and monthly monitoring of 4 additional dust fallout monitoring stations on site in high risk areas in order to monitor progress of dust reduction initiatives	Completion target date was 07/2008	R0.05 million	Completed in 09/2008	Completed Have 21 in total
<b>AQMP and ERS development</b>	Air Quality Management Plan and Emission Reduction Strategy (revision 2) development and facilitation Identification of potential Emission Reduction Initiatives (in total 33) Assessment of emission reduction and ambient air improvement potential (in total 19 of the 33)	Completion target date was 06/2008	R0.5 million	Completed in 07/2008	Completed
<b>Engineering Front End Loading for priority ERS rev 2 projects</b>	Prioritisation of the 19 emission reduction initiatives based on emission reduction potential, ambient air improvement potential and cost benefit analysis Engineering Front End Loading for prioritised projects (in total 7 out of the 19, i.e. feasibility studies, preliminary design parameter definition, cost estimation)	Completion targets are between 09/2009 and 06/2010 depending on project complexity	In excess of R3 million	On target for tall gate one approvals	Status not known
<b>Completion of approved ERS rev 2 projects</b>	Completion of ERS rev 2 projects, once passed tall gates one and two (number of projects depending on Front End Loading outcome, i.e. feasibility, cost effectiveness and CAPEX requirements)	To be determined	To be determined (current cost estimation >> R100 million)	Not yet applicable	Status not known
<b>Greening of open areas</b>	Intensive greening of open areas which previously resulted in windblown dust emissions at times of high wind speed (approx. 3ha), including barricading and regular maintenance	Completion target date was 12/2008	R0.5 million	Completed	There are still open spaces and unpaved roads

Table 35: Action plan for selected interventions identified for New Vaal Colliery (mining sector)

THE SECOND GENERATION VAAL TRIANGLE AIRSHED PRIORITY AREA AIR QUALITY MANAGEMENT PLAN: FINAL PLAN

<b>Emission Reduction Intervention</b>	<b>Full Description of the Emission Reduction Intervention</b>	<b>Compliance Date (Day/ Month/Year)</b>	<b>Estimated Cost</b>	<b>Comments /Progress</b>	<b>Current (2019) status</b>
<b>Dust fallout monitoring programme</b>	Operation of a dust fallout monitoring programme, consisting 32 single and 9 directional dust buckets	Ongoing (short term)			Ongoing (not sure about the number of dustfall units)
<b>Air emission inventory</b>	An air emissions inventory has been developed for the mine by Airshed Planning Professionals but need update to reflect the current operational status. Refining of the model by mine personnel is the next step to be taken.	End 2008			Status not known Emissions reported incorrectly to NAEIS 2017
<b>Dust suppression technologies</b>	Implementation of dust suppression technologies including: <ul style="list-style-type: none"> <li>• Three water tankers running 24 hours/day to spray haul roads</li> <li>• Use of water sprays at plant conveyor belt transfer points</li> <li>• Wetting and compaction of seasonal coal stacks in stockyard</li> <li>• Use of a fogging cannon at tip and/or stacker/reclaimers</li> <li>• Use of up to 5 water cannons at working faces</li> <li>• Dust-a-side application on haul roads. Current 8km; total planned 13.8 km</li> <li>• Project: Enclosing of primary tip and installation of passive dust stilling hood. At present 85% complete, upgrade of sprays and installation of conveyor belt curtain to be completed</li> <li>• Project: Dust hood installed at secondary crushers. Motor damper arrangement to be finalized</li> </ul>	Ongoing Ongoing Ongoing as required Ongoing as required End 2008 End 2008 End 2008			Ongoing, assume to be in place Ongoing, assume to be in place Status not known Status not known Status not known
<b>Dust-a – side application on Haul roads</b>	Current 8 km, total planned 13.8 km	Ongoing (short term - end 2008)			Status not known
<b>Buffer blasting programme</b>	Implementation of buffer blasting programme to minimise ingress of air into old workings	Ongoing standard operating procedure			Ongoing, assume to be in place
<b>Primary tip and passive dust stilling hood</b>	Enclosing of primary tip and installation of passive dust stilling hood. At present 85% complete, upgrade of spray and installation of conveyor belt curtain to be completed.	End 2008			Status not known

<i>Emission Reduction Intervention</i>	<i>Full Description of the Emission Reduction Intervention</i>	<i>Compliance Date (Day/Month/Year)</i>	<i>Estimated Cost</i>	<i>Comments /Progress</i>	<i>Current (2019) status</i>
<b>Gravimetric dust sampling programme</b>	Implementation of gravimetric dust sampling programme, using random statistically representative number of employees to collate data. A quarterly report is submitted to the inspector if readings exceed the allowable	Ongoing standard operating procedure			Ongoing, assume to be in place
<b>PM10 Monitor</b>	A PM10 monitor has been purchased to assess the impact of dust on the surrounding community. Numerous technical difficulties have been encountered and the solar panels are to be replaced with permanent AC power	End July 2008			Status not known

Table 36: Action plan for selected Interventions identified for SASOL (Petrochemical Industrial Sector)

<i>Emission Reduction Intervention</i>	<i>Full Description of the Emission Reduction Intervention</i>	<i>Compliance Date (Day/Month/Year)</i>	<i>Estimated Cost</i>	<i>Comments /Progress</i>	<i>Current (2019) status</i>
<b>Natural gas conversion project</b>	<b>Emission reductions and air quality management measures implemented by Sasol</b> Sasol has reduced its emissions on a continuous basis throughout the years, with the biggest reduction in emissions as a result of a switch over to cleaner technologies during 2005. The natural gas conversion project has reduced Sasol's environmental footprint significantly with the virtual elimination of hydrogen sulphide emissions and significant reductions on particulates, SO <sub>2</sub> and NO <sub>x</sub> emissions.	Completed			Completed
<b>Basa Njengo Magogo project</b>	Sasol has been involved in the rollout of some 10 000 households of the Basa Njengo Magogo fire making method within the local community as part of the functional household strategy to further enhance air quality within the area and to better the lives of the community surrounding the site.	Ongoing	± R 100 000 per annum	Continuation with the functional household further discussed below	One of the key projects identified by Sasol was an opportunity to electrify a large portion of Zamdela. Due to the high repeat rollout frequency to new residents, since neighbours did not share the basa njengo magogo fire making method amongst each other, together with the electrification of a part of Zamdela, the requirement

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
					<p>for Basa Njengo Magogo became obsolete within Zamdele.</p> <p>Sasol was granted postponement decisions which, were subsequently incorporated into its AELs, and it included a requirement to develop and implement offsets plans. Sasol had developed such plans which was approved by DEAT for implementation. The progress of which is currently on track as per plan.</p> <p>Continuation with the functional household strategy is further discussed below</p>
<b>Ambient air quality monitoring stations</b>	<p>Sasol has established and operates 5 ambient air quality monitoring stations in the Sasolburg area since in the late 1990's. These stations have assisted to determine Sasol's emission footprint as well as to track the reduction achieved through improvements implemented.</p>	Completed and ongoing	R 25 million with annual operational costs of R 1.5 million	The data from the residential stations will be made available to SAAQIS	Completed and ongoing – additional to providing airshed quality data, the monitoring stations also helps in contextualising Sasol's relative contribution to the air shed.
<b>Reduction of SO<sub>2</sub>, particulate and NOx emissions</b>	<p><b>Emission reduction and air quality management measures to be undertaken by Sasol Infracchem</b></p> <p>As part of immediate short-term economic growth, the emissions from Sasol Infracchem will increase in a phased approach, however Sasol is committed to reduce its SO<sub>2</sub>, NOx and particulate emissions to below the required reduction targets as stipulated within the Vaal triangle Priority Area Air Quality Management Plan.</p>	2019	Depending on board approval	Various plans are considered but Board approval is required before project specific commitments can be made, however Sasol is committed to the reduction within 10 years	<p>Although Sasol planned to recommission four of the boilers at its SS1, only one boiler was recommissioned resulting in a smaller increase of particulates, NOx and SO<sub>2</sub> emissions than was initially anticipated.</p> <p>Shortly after the initial VTAPA AQMP was published the Minimum</p>

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/ Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
					<p>Emission Standards were published and Sasol focused resources to find alternative technologies that will be able to meet these standards.</p> <p>Sasol is committed to comply with the Minimum Emission Standards and is in the process of installing new abatement technologies on its boilers and thermal oxidisers that will meet the new plant standards for particulates and NOx. SO<sub>2</sub> emissions are stable but no feasible SO<sub>2</sub> reduction opportunities have been identified yet.</p> <p>In 2015 Sasol's licensed limits for Steam Station 1 particulates decreased from a maximum of 400 mg/Nm<sup>3</sup> to 165 mg/Nm<sup>3</sup> and from an average of 265 mg/Nm<sup>3</sup> to 100mg/Nm<sup>3</sup> for Steam Station 2. Since Sasol is committed to comply with the minimum emission standards, the plan is to reduce the 165 and 265 mg/Nm<sup>3</sup> to the minimum emissions standard of 50 mg/Nm<sup>3</sup> by 2025. One of the Boilers has already been fully retrofitted with low NOx burners and its Electrostatic Precipitator (ESP) has been upgraded. Its performance is being monitored to confirm it can operate sustainably at</p>

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/ Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
<b>Offset project- Functional household strategy</b>	Sasol will offset it's emission by exploring functional opportunities within the region it operates.	Ongoing	± R 100 000 per annum	This could potentially form part of the functional household strategy discussed above.	<p>its design concentrations. It can however be confirmed that there was a substantial improvement in its emissions. Two additional boilers' ESPs were upgraded and the full abatement project for the boilers and thermal oxidisers to meet the new plant standards are in full implementation as per its schedule.</p> <p>Sasol's air emission offset intervention took its current form in 2015 after the NAQO required Sasol and Naitref to implement an approved Offset intervention as part of a license condition. It is based on a diverse set of activities, which are informed by detailed baseline assessments having been conducted. These activities are contained in area specific programs aligned with the approved offset plan.</p> <p>The aim of the program is to gain experience and understanding in conducting offset programs while continuously improving the quality of life, including air quality improvements for the communities benefiting from the interventions.</p> <p>Sasol and Naitref has been Implementing a substantially larger Offset project within Zamdela consisting of four smaller projects which has been approved by the</p>

<b>Emission Reduction Intervention</b>	<b>Full Description of the Emission Reduction Intervention</b>	<b>Compliance Date (Day/ Month/Year)</b>	<b>Estimated Cost</b>	<b>Comments /Progress</b>	<b>Current (2019) status</b>
					<p>NAQO. The focus of the projects is to reduce ambient pollutant concentrations by reducing emissions caused by uncontrolled burning of waste and/or bio-mass.</p> <p>These projects entail the removal of recyclable waste, removal of non-recyclable waste, reducing the impacts of grass and veld fires through the cutting and removal of bio-mass as well as the quick extinguishing of veld and waste fires when they do occur. Further also through influencing vehicle emissions through testing and citations to be given when the MLM bylaws are exceeded. Sasol and Natref is jointly implementing these Offset projects, and to ensure the future sustainability of these projects it is done in, in partnership with the Metsimaholo Local Municipality.</p>

Table 37: Action plan for selected Interventions Identified for NATREF (Petrochemical Industrial Sector)

<b>Emission Reduction Intervention</b>	<b>Full Description of the Emission Reduction Intervention</b>	<b>Compliance Date (Day/ Month/Year)</b>	<b>Estimated Cost</b>	<b>Comments /Progress</b>	<b>Current (2019) status</b>
<b>Installation of high efficiency Sulphur Recovery Unit part of 2015 upgrade</b>	Should the project to meet more stringent fuel specifications be approved, this could result in the need to construct and additional sulphur plant. This need would arise if the Natref board decides to	2015 or depending when the revised fuel specifications are promulgated. The agreement with DME is that 5 years are	R500 million	Awaiting promulgation of revised fuel quality specifications	Status not known

	increase current refinery capacity back to nameplate.	given between promulgation and implementation	R1 300 million operating cost per annum)	Already being done	Status not known
<b>Switch to low sulphur crude</b>	The switch to lower sulphur containing crude oils is an operating cost/profit option which Natref follows already. Given Natref's inland location and small capacity, it is difficult to assure continued procurement of low sulphur crude oils.				
<b>Installation of high efficiency Sulphur Recovery Unit part of 2015 upgrade</b>	Should the project to meet more stringent fuel specifications be approved, this could result in the need to construct and additional sulphur plant. This need would arise if the Natref board decides to increase current refinery capacity back to nameplate.	2015 or depending when the revised fuel specifications are promulgated. The agreement with DME is that 5 years are given between promulgation and implementation	R500 million	Awaiting promulgation of revised fuel quality specifications	Status not known
<b>Switch to low sulphur crude</b>	The switch to lower sulphur containing crude oils is an operating cost/profit option which Natref follows already. Given Natref's inland location and small capacity, it is difficult to assure continued procurement of low sulphur crude oils.		R1300 million operating cost per annum)	Already being done	Completed
<b>Installation of high efficiency Sulphur Recovery Unit part of 2015 upgrade</b>	Should the project to meet more stringent fuel specifications be approved, this could result in the need to construct and additional sulphur plant. This need would arise if the Natref board decides to increase current refinery capacity back to nameplate.	2015 or depending when the revised fuel specifications are promulgated. The agreement with DME is that 5 years are given between promulgation and implementation	R500 million	Found to be unfeasible due to water constraints and station set.	Status not known

Table 38. Action plan for selected interventions identified for ESKOM (Power Generation Sector)

<i>Emission Reduction Intervention</i>	<i>Full Description of the Emission Reduction Intervention</i>	<i>Compliance Date (Day/Month/Year)</i>	<i>Estimated Cost</i>	<i>Comments /Progress</i>	<i>Current (2019) status</i>
Emission reduction and air quality management measures to be undertaken by Eskom Letlhabo Power Station					



Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
	<p>the greatest impact on air quality to the south-east to south-south-east of Lethabo. Since the ambient air quality standards have been formulated to ensure that levels of atmospheric pollution are not harmful to human health and well-being, it is most appropriate to monitor ambient air quality in a populated area such as Refenggotso.</p> <ul style="list-style-type: none"> <li>• <b>Air quality monitoring methods:</b> Concentrations of sulphur dioxide, oxides of nitrogen and PM<sub>10</sub> will be monitored continuously at the ambient air quality monitoring station using the following instrumentation:                             <ul style="list-style-type: none"> <li>○ Sulphur dioxide gas analyser</li> <li>○ Nitrogen oxide gas analyser</li> <li>○ Beta gauge for monitoring of PM<sub>10</sub></li> </ul> </li> <li>• The air quality instruments will be installed in a standard monitoring hut. The sample flow will be drawn in about 2 m above the surface through a glass manifold on the roof of the hut.</li> <li>• A meteorological station measuring temperature, wind speed and wind direction will also be set up at the monitoring station. The anemometer will be mounted on a 9 m mast.</li> <li>• Hourly average concentrations of pollution and meteorological parameters will be logged on a CR-1000 data logger. A system to transfer the recorded data on a real-time basis from the monitoring site via GPRS will be installed. Verified data will be archived at the Eskom Sustainability and Innovation Department in Rosherville.</li> </ul>			submitted to SAAQIS, when operational.	Ongoing

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/ Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
	<ul style="list-style-type: none"> <li>• The air quality monitoring station will be operated according to procedures of the South African National Accreditation System (SANAS) i.e. two-weekly zero and span checks and quarterly dynamic calibrations and will be part of Eskom's SANAS accredited network.</li> <li>• <b>Air quality reporting:</b> Air quality reports detailing the findings of the monitoring at the Refenggotso monitoring site will be compiled on a quarterly basis and submitted to DEAT. Reports will be based on verified data. <ul style="list-style-type: none"> <li>○ The ambient air quality monitoring report will contain the following: <ul style="list-style-type: none"> <li>○ The site description map</li> <li>○ Wind rose showing frequency and direction of winds during the monitoring period</li> <li>○ Percentage data recovery</li> <li>○ Average, maximum hourly and maximum daily pollution concentrations</li> <li>○ List of exceedances of ambient air quality standards</li> <li>○ Pollution roses showing the wind direction associated with highest recorded concentrations at the 98<sup>th</sup> percentile. Where applicable, exceedance roses showing the wind direction associated with exceedance of ambient air quality limits, will be shown</li> <li>○ Average diurnal variation of pollution concentrations</li> <li>○ Time series of pollution concentrations over the past year</li> </ul> </li> </ul> </li> </ul>	August 2009			<p>Rand Water Monitoring Station installed in 2012</p> <p>Small decreases reported between 2012 and 2017 in SO<sub>2</sub> and PM<sub>10</sub>, with low NO<sub>2</sub> concentrations.</p> <p>Ongoing</p>

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
	<ul style="list-style-type: none"> <li>Fugitive emission monitoring network: A network will be set up to monitor fugitive emissions from the ash dump at Lethabo. Initially, the network will comprise two monitoring stations, and it will be expanded if needed. Nuisance dust is most likely to be a problem in Three Rivers, the populated area in closest proximity to Lethabo (Three Rivers is situated just over 8 km north of Lethabo, and approximately 5 km from the northern edge of the ash dump). A monitoring station will be sited at the northern end of the ash dump to measure the dust that may blow towards Three Rivers.</li> <li>PM<sub>10</sub> concentrations will be continuously monitored using Met One Instruments' e-Samplers or other suitable samplers. A meteorological station will be sited at one of the fugitive emission monitoring sites to provide the information about wind speed and direction needed to determine the area which is influenced by the fugitive emissions. The PM<sub>10</sub> concentrations and meteorological information recorded at the site will be continuously transmitted to a central server, so that the information can be used to identify pollution episodes if they arise, and to respond to complaints received from the public.</li> <li>The DEAT monitoring station at Three Rivers provides information on the impact of dust from Lethabo on the residents of Three Rivers.</li> </ul>			<p>Lethabo has a Fugitive Monitoring Plan in place. The station has commenced with dust bucket monitoring and monthly reports are sent to the licensing authority.</p> <p>A report on the commissioning of the stations will be completed.</p>	
<b>SO<sub>2</sub> emission reduction</b>	SO <sub>2</sub> emissions from Lethabo may be reduced either after combustion by installing flue gas desulphurisation (FGD) plant, or by beneficiating the coal to reduce the sulphur content (and increase the			According to Eskom, SO <sub>2</sub> reduction is unfeasible in the context of the remaining	The application in terms of Minimum Emission Standards not to implement SO <sub>2</sub> reduction and to comply with a limit of 2 600 mg/Nm <sup>3</sup>

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/ Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
	<p>CV) of the coal. Both of these measures involve an investment of several billion rand together with major changes in the power station operation and the way in which associated activities (mining, transport and handling of the coal and/or inputs to the FGD plant) are conducted. The feasibility of installing FGD at Lethabo has been investigated. The results of the study are discussed below. Investigations into the feasibility of coal beneficiation at Lethabo are ongoing. The scope of the investigation and issues to be considered regarding coal beneficiation are also discussed below.</p> <p><b>FGD feasibility:</b></p> <ul style="list-style-type: none"> <li>SO<sub>2</sub> emissions from Lethabo can be reduced by up to 90% if FGD is retrofitted at the power station. However, FGD is prohibitively costly and water availability precludes Lethabo from installing FGD until additional water is supplied to the Vaal River system via an augmentation scheme, and at this point Eskom has decided that retrofitting Lethabo with FGD plant is not feasible.</li> <li>The most cost-effective option to achieve a 60% SO<sub>2</sub> emission reduction at Lethabo Power Station would be to install a wet FGD with 90% removal efficiency on 4 of the 6 units.</li> </ul> <p><b>Coal beneficiation feasibility</b></p> <ul style="list-style-type: none"> <li>An investigation into the feasibility of coal beneficiation with respect to sulphur removal at Lethabo has been initiated by the Eskom and the Council for Scientific and Industrial Research.</li> </ul>	<p>This has a net present value of around R9 billion, assuming a 30-year life</p> <p>The investigation into the feasibility of coal beneficiation at Lethabo should be completed by March 2009. The results of the study will be published in a report by June 2009.</p>	<p>operating life of the power station. They found it to be prohibitively costly and that water availability precludes Lethabo from installing FGD.</p> <p>Eskom submitted a report to Department of Environmental Affairs in July 2009. A report on the feasibility of Coal beneficiation was</p>	<p>instead of 1 000 mg/N<sub>m<sup>3</sup></sub></p> <p>In March 2019.</p>	

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/ Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
	<ul style="list-style-type: none"> <li>The coal used at Lethabo power station is obtained from the adjacent New Vaal Colliery, and is supplied to Eskom under a 'Cost Plus' contract. New Vaal is an opencast mine and mines coal from the Vereeniging-Sasolburg coalfield. The ash content of the coal supplied to Lethabo is high (around 38%), and the calorific value is correspondingly low (just over 14 MJ/kg in 2007). The boilers at Lethabo have been specifically designed to handle such a low-grade feedstock. The sulphur content of the coal is low, averaging 0.6%. Presently, only the coarse coal is processed at New Vaal. The fine coal, which constitutes roughly 60% of the total feed to the processing plant, is screened out and sent untreated to Lethabo. There is potential to reduce the sulphur content of the coal by processing the fine coal. Coal washing potentially has the added benefit of increasing the CV of the coal and reducing the ash content, which means that less coal will need to be burnt in order to produce the same amount of electricity.</li> </ul>			<p>completed. Coal beneficiation has the potential to reduce SO<sub>2</sub> emissions, but not nearly enough to achieve the new plant emission limit. Coal beneficiation will reduce the life of the mine, generate additional waste in the form of coal discards, and potentially pollute water. Therefore, was found unfeasible.</p>	
Energy efficiency	<p><b>Internal Energy Efficiency – driven by the Billion kWh Savings Project:</b> Energy efficiency is the quickest, most cost-effective and cleanest way to extend energy supplies thereby contributing to energy security, reducing greenhouse gas and other atmospheric emissions as well as water consumption. Eskom's 'billion kilowatt-hour' savings project, officially launched in October 2006, focuses on internal initiatives to reduce energy consumption through education; communication and awareness;</p>	Completed		Completed	

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/Month/Year)	Estimated Cost	Comments /Progress	Current (2019) status
	<p>and technically feasible and economically viable efficiency improvements within the organisation. The savings from this drive will also contribute to the savings outlined in the national energy efficiency strategy.</p> <p>The energy efficiency measures to be implemented across all Eskom facilities are:</p> <ul style="list-style-type: none"> <li>o Incandescent lights replaced with compact fluorescent lights (CFLs)</li> <li>o Day/night switches installed and maintained regularly for all appropriate lighting, including security and street lighting</li> <li>o Motion sensors installed for specific areas including bathrooms, coffee bars and so on</li> <li>o Lighting in passageways in Eskom buildings be adjusted to meet minimum lighting standards in line with health and safety requirements</li> <li>o Water heaters and geysers in bathrooms switched off during peak periods (07:00 – 10:00 and 18:00 – 21:00)</li> <li>o Where geysers are essential, geyser blankets installed and the thermostats all set to 60°C</li> <li>o Wherever possible, natural ventilation be used instead of air conditioners</li> <li>o Air conditioners maintained at the optimum temperature of approximately 21°C (the recommended minimum temperature setting for air conditioners). Further, there should be adequate maintenance of heating, ventilation and air conditioning systems and the indoor air</li> </ul>				

Emission Reduction Intervention	Full Description of the Emission Reduction Intervention	Compliance Date (Day/Month/Year)	Estimated Cost	Comments / Progress	Current (2019) status
	<p>temperature must remain within the minimum requirements in terms of indoor air quality specifications.</p> <ul style="list-style-type: none"> <li>o Office fridges switches off when not in use</li> <li>o Non-essential equipment including lights, office equipment, escalators, lifts, water heaters, air conditioning systems etc. switched off when not in use and after office hours</li> </ul> <p><b>Energy improvements at Lethabo: The station has initiated a revised lighting programme in order to further improve energy efficiency at the power station. In the outside plant areas, timers and day light switches have been installed. Since the lights are now on for 11 hours a day, as opposed to 24 hours a day, this has resulted in a saving of 753 MWh a year. As far as the internal lighting in the offices is concerned, Lethabo has installed timers, bypass switches, emergency lights and additional wiring to improve the efficiency of the wiring.</b></p>	Completed		Completed	Completed

Table 39: Action plan for selected interventions identified Smaller Industries and Commercial Operations

Intervention	Implementation Strategy	Responsible	Assumptions	Estimated Cost	Timeframe	Control Efficiency	Indicators	Current (2019) status
Electronic database of all small industries	Compilation of an emissions inventory of all small sources in each Municipality (Project already initiated in the City of Johannesburg) This could be undertaken by students at the Vaal Triangle Technicon. FDDM and SDM to liaise with the Vaal Triangle Technicon	COJ, FDDM, SDM	Each Municipality will have sufficient funds to compile an emissions inventory	Approximately R500,000 per Municipality	Short Term (2008)	Not Applicable	A comprehensive, electronic emissions inventory of all small industries in each Municipality	Not done, formed part of the Capacity Building

Small boilers to be declared as controlled emitters	The Minister declares small boilers as controlled emitters, as provided for in AQA. Emission standards must then be established for small boilers. Compliance timeframes to be established.	DEAT	DEAT will declare small boilers as controlled emitters	Unknown	Medium – Long Term	Not Applicable	Small boilers are declared as controlled emitters. Emission standards are established. Small boilers are in compliance within the required timeframes.	Published in November 2013, Government Gazetted No. 36973
Develop a permit system for all non-listed activities	DEAT to develop a permitting system for all non-listed activities. COJ, FDDM and SDM to be responsible for issuing of permits.	DEAT	A permit system for non-listed activities is developed	Unknown	Short Term (2008)	Not Applicable	All small industries are permitted and regulated. Emissions from these activities fall within permitted levels.	Not done
Model scheduled trade by-laws	Regulations on model scheduled trade by-laws to be developed by DEAT. COJ, FDDM and SDM to develop by-laws based on DEAT recommendations.	DEAT in collaboration with COJ, FDDM, SDM	By-laws are developed and enforced by the Municipality	Unknown	Short – Medium Term		By-laws are developed for small industries. Emissions from small industries are regulated and controlled.	Co Air Pollution Control By-laws. None for FDDM or SDM yet – draft Air Quality Management By-laws for Emfuleni Local Municipality

Table 40: Action plan for selected interventions identified for the Transportation Sector

Intervention	Implementation Strategy	Responsible	Assumptions	Estimated Cost	Timeframe	Control Efficiency	Indicators	Current (2019) status
Review vehicle emissions database with updated traffic count data	Each Municipality to liaise with the relevant traffic department to obtain available traffic count information. If this information is not available, traffic counts must be undertaken by each Municipality.	COJ, FDDM, SDM	Updated traffic count data is available	Varies depending on extent	Short Term	Not Applicable	An updated, electronic emissions inventory for vehicles	This was done for COJ as part of their AQMP review (2017), and done as part of the Second Generation VTAPA Baseline study (2018)

<b>Vehicle emission blitz in partnership with Cape Town</b>	All Municipalities to liaise with Cape Town to initiate a monitoring project by end 2007	COJ, FDDM, SDM	Diesel testing equipment is purchased by each Municipality	R 80 000 per Municipality per instrument	Short Term (end 2007)	Unknown	60% of vehicles are measured in each Municipality Non-compliance vehicles are in compliance	Not done?
<b>Vehicles to be declared controlled emitters</b>	The Minister declares vehicles as controlled emitters, as provided for in AQA ( <i>will be declared the first controlled emitters in South Africa</i> ) Emission standards must then be established for vehicles Compliance timeframes to be established	DEAT	Vehicles are declared controlled emitters	Unknown	Short-Medium Term	Unknown	Vehicles are declared controlled emitters Emission standards are established Vehicles to be in compliance within the required timeframes	Vehicles not declared controlled emitters
<b>Synchronisation of traffic lights</b>	COJ to liaise with the Johannesburg Roads Agency to synchronise traffic lights. FDDM and SDM to liaise with appropriate traffic departments.	COJ, FDDM and SDM	Sufficient funding is available	Approximately R 200 000 per intersection	Short Term	Unknown	Congestion is reduced during peak hours	Not done?

Table 41: Action plan for selected interventions identified for Waste Burning

<i>Intervention</i>	<i>Implementation Strategy</i>	<i>Responsible</i>	<i>Assumptions</i>	<i>Estimated Cost</i>	<i>Timeframe</i>	<i>Control Efficiency</i>	<i>Indicators</i>	<i>Current (2019) status</i>
<b>Emissions inventory of waste burning sources</b>	Each Municipality to develop an emissions inventory of all landfills, incinerators, sewage and waste water treatment works. Each Municipality to identify existing information and supplement where unavailable	COJ, FDDM, SDM	Funding is available within each Municipality	Approximately R80 000	Short Term		A comprehensive, electronic emissions inventory of all waste burning sources in each Municipality	Not done As part of the SAS, a qualitative survey was conducted in Sharpeville 9-13 July 2018 Emissions from waste burning were quantified based on available information, but no information was available on landfills and waste water treatment facilities to quantify these emissions (DEA, 2019)

Develop National legislation for dioxin control	DEAT is in the process of developing legislation to control dioxin emissions	DEAT	Dioxin legislation is approved	Unknown	Short Term (31 June 2008)	Dioxin emissions are controlled and regulated	Section 21, Category 8 Published Nov 2013, Government Gazette No. 37054
Landfill permitting backlog project	DEAT has taken over the responsibility for landfill permitting and is working in collaboration with Provinces to address the backlog. COJ and SDM to supply Gauteng with a list of permitted and non-permitted landfills. FDDM to supply Free State with a list of permitted and non-permitted landfills.	DEAT	Sufficient capacity and resources	Unknown	Short Term (2009)	All non-permitted landfills are permitted and regulated	Status unknown
Proper refuse removal by Local Authorities	COJ and SDM to liaise with Pikitup to address refuse removal in Soweto and Orange Farm. FDDM to liaise with relevant refuse removal services.	COJ, FDDM, SDM	Sufficient resources and finances within the refuse collection service		Short – Medium Term	A reliable refuse collection service in areas previously affected	Not done?

Table 42: Action plan for selected interventions identified for the Government Sectors

Intervention	Implementation Strategy	Responsible	Assumptions	Estimated Cost	Timeframe	Control Efficiency	Indicators	Current (2019) status
Establish a separate, dedicated air quality division within each level of Government	FDDM to initiate the process to establish an air quality division (SDM is in the process of restructuring)	FDDM and SDM	Funding is available for restructuring		Short Term (2008)		An air quality division is established in FDDM and SDM Air quality is effectively managed and controlled	Completed
Marketing of the Priority Area	DEAT to develop marketing campaigns using all forms of media (radio, newspapers, flyers etc.)	DEAT	People have access to the information	Approximately R1 000 000	Short Term (Jan 2008)		Public and politicians are aware of the significance of the VTAPA.	Not done

Intervention	Implementation Strategy	Responsible	Assumptions	Estimated Cost	Timeframe	Control Efficiency	Indicators	Current (2019) status
	This information is to be given to COJ, FDDM and SDM to disseminate to members of the public						Focus is given to air quality issues in Government.	
Each sphere of Government to appoint a skilled, trained air quality officer	FDDM and SDM to appoint, at a minimum, one skilled and trained air quality officer  Air quality officers to attend air quality courses including monitoring, modeling and management. (The University of Johannesburg recently held an air quality course).	FDDM and SDM	Funding is available for personnel appointments	R 200 000 – R250 000 per appointment per annum	Short Term		A trained air quality officer is appointed in FDDM and SDM  Air quality is effectively managed and controlled	Completed DEA has support staff deployed at each Municipality

Table 43: Action plan for selected interventions identified for Information Management

Intervention	Implementation Strategy	Responsible	Assumptions	Estimated Cost	Timeframe	Control Efficiency	Indicators	Current (2019) status
A centralised, electronic complaints register database at all Municipalities	Each Municipality to develop an electronic complaints' register, which includes details of the complaint, source of complaint and response. Each Municipality must ensure that a contact number is available for the public to lodge complaints.	COJ, FDDM, SDM	Public are aware of a complaints' contact number		Short Term	Not applicable	All complaints are registered into a centralised, electronic database  Complaints are effectively addressed	Completed
An electronic, centralised air quality monitoring database	An electronic, centralised database is being developed as part of the South African Air Quality Information System (SAAQIS) Project Ambient monitoring data from COJ and SDM to be linked to this database	DEAT and SAWS		R 2 million – R 4 million	Medium – Long Term	100% control of ambient air quality data	All air quality monitoring data is collated into a centralised, electronic database held at SAWS	Completed and ongoing (SAAQIS)
Comprehensive emissions Inventory	An electronic, centralized emissions inventory database is developed as part of SAAQIS	DEAT and SAWS	COJ, FDDM and SDM have a comprehensive,	R 2 million – R 4 million	Short Term (2008) and ongoing	80% control of Local Authorities	All emissions inventories are collated into a centralised, electronic	Completed and ongoing – NAEIS

<i>Intervention</i>	<i>Implementation Strategy</i>	<i>Responsible</i>	<i>Assumptions</i>	<i>Estimated Cost</i>	<i>Timeframe</i>	<i>Control Efficiency</i>	<i>Indicators</i>	<i>Current (2019) status</i>
	CO <sub>2</sub> , FDDM and SDM to submit their emissions inventories to DEAT (CO <sub>2</sub> is in the process of updating their emissions inventory)		electronic emissions inventory			emission inventories	emissions database held at SAWS	
<b>SANAS accredited air quality monitoring stations</b>	All monitoring stations in the Vaal Triangle are SANAS accredited (the CO <sub>2</sub> stations are SANAS accredited) The application process has been initiated for the six DEAT stations	DEAT, SDM	Monitoring stations are well maintained and regularly calibrated	R 9 000 – R 12 000	Short – Medium Term (2012)	Not applicable	All monitoring stations in the Vaal Triangle are SANAS accredited Data capture meets the SANAS requirements (80%) Data received from these stations is complete and accurate	Completed and ongoing

Notes: SAAQIS – South African Air Quality Information System, NAEIS – National Atmospheric Emissions Inventory System

## DEPARTMENT OF HOME AFFAIRS

NO. 694

6 August 2021

**ALTERATION OF FORENAMES IN TERMS OF SECTION 24 OF THE BIRTHS AND DEATHS REGISTRATION ACT, 1992 (ACT NO. 51 OF 1992)**

The Director-General has authorized the following persons to assume the forename printed in *italics*:

Notice is hereby given of Government Gazette No. **31604** which, was published in Government Notice No. **1233** dated **21 November 2008**, is hereby rectified to read as follow

1. Nkhensani Mabunda - 710707 5450 \*\*\* - No 25 Governir Str, Ivy Park, Extension 21, POLOKWANE, 0699 - *Nkhensani David*

Notice is hereby given of Government Gazette No. **44822** which, was published in Government Notice No. **604** dated **09 July 2021**, is hereby rectified to read as follow

1. Mangope Onismus Kgaphola - 971214 5522 \*\*\* - 30 Springbok, KRIEL, 2271 - *Segopotse Onismus*
2. Lungile Mikateko Mashele - 850105 0966 \*\*\* - 4362 Blue Valley, Golf Estate, CENTURION, 0097 - *Lungile Mikateko Muhlavasi*
3. Maleisatsi Lea Misapitso - 971012 0175 \*\*\* - 13303 Zion Street, Ikageng Extention 7, POTCHEFSTROOM, 2531 - *Maletsatsi Leah*
4. Mzondi Siyila - 011204 5605 \*\*\* - Ncora A/A, COFIMVABA, 5380 - *Mzondi Phiwokuhle*
5. Nomalady Ludwesa - 591004 0184 \*\*\* - Cacadu Area, LADY FRERE, 5410 - *Nomalady Letticia*

Notice is hereby given of Government Gazette No. **44383** which, was published in Government Notice No. **294** dated **01 April 2021**, is hereby rectified to read as follow

1. Izukiswe Nomanzi - 001003 5762 \*\*\* - 2582/2 B Snipe Street, Blybank, CARLETONVILLE, 0100 - *Michael*
2. Khaukani Sylvia Mudau - 600216 0160 \*\*\* - Ha-Maubunda, SIBASA, 0970 - *Khaulani Sylvia*

Notice is hereby given of Government Gazette No. **41270** which, was published in Government Notice No. **1299** dated **24 November 2017**, is hereby rectified to read as follow

1. Ettien Mabushe Matlawa - 950108 5679 \*\*\* - Stand No 230, Letebesane Village, GROBLERSDAL, 0470 - *Ettien Jan*

## DEPARTMENT OF HOME AFFAIRS

NO. 695

6 August 2021

**ALTERATION OF SURNAMES IN TERMS OF SECTION 26 OF THE BIRTHS AND DEATHS REGISTRATION ACT, 1992 (ACT NO. 51 OF 1992)**

The Director-General has authorized the following persons to assume the surnames printed in *italics*:

Notice is hereby given of Government Gazette No. **44383** which, was published in Government Gazette Notice No. **295** dated **01 April 2021** is hereby rectified to read as follows

1. Njokwene Johannes Phetha - 480813 5630 \*\*\* - Majemantsho Village, MAHIKENG, 2745 - *Plaatjies*
2. Phakeme Qhayiso Motsisi Mpurwana - 020614 5370 \*\*\* - 13 Avondale Drive, BALLITO, 4399 - *Sukati*
3. Laila Christina Brown - 020513 0092 \*\*\* - 34 Cedar Road, KYALAMI, 1685 - *Stergiopoulos*
4. Linda Aretha Note - 700924 0994 \*\*\* - 17 Samhancork Street, Parktown, JOHANNESBURG, 2001 - *Mbalo*
5. Thage Yuzzia Moroko - 881011 6116 \*\*\* - 34454 Lengwana Street, Extension 6, MAMELODI EAST, 0100 - *Ramego*
6. Mpho Mooiman Khunong - 000517 5468 \*\*\* - 162 Extension 1, Kanana, TEMBA, 0407 - *Sibanyone*

Notice is hereby given of Government Gazette No. **43962** which, was published in Government Gazette Notice No. **1285** dated **04 December 2020** is hereby rectified to read as follows

1. Nkosinathi Gavine Ngwenyama - 860810 5476 \*\*\* - 839 Claremont Street, DASPOORT, 0010 - *Hlatshwayo*
2. Emmanuel Sthembiso Mthethwa - 800115 5336 \*\*\* - 767 Tokologo, MHLUZI, 1053 - *Hlatshwayo*
3. Mishack Sonny Mngunu - 680822 5919 \*\*\* - 709 D Mandela Village, HAMMANSKRAAL, 0400 - *Mahlangu*

Notice is hereby given of Government Gazette No. **44822** which, was published in Government Gazette Notice No. **603** dated **09 July 2021** is hereby rectified to read as follows

1. Nhlanhla Ziphozonke Mkhize - 010211 5702 \*\*\* - Mshayazafe Reserve, EMPANGENI, 3910 - *Khoza*
2. Andisiwe Jayiya - 020926 0534 \*\*\* - Mbongweni, MT AYLIFF, 5101 - *Njiva*
3. Belinah Portia Ntiwane - 000827 0553 \*\*\* - Private Bag X1008, WHITE RIVER, 1201 - *Maluleke*
4. Adam Molimirui Namane - 910603 6116 \*\*\* - 33185 Arcata Plot, Blomspruit, THABA NCHU, 9780 - *Dichaba*

Notice is hereby given of Government Gazette No. **44505** which, was published in Government Gazette Notice No. **388** dated **30 April 2021** is hereby rectified to read as follows

1. Warren Vusi Mthembu - 820120 5565 \*\*\* - and two minor children - Thandolwethu Tiisetso Mthembu - 120217 1086 \*\*\* - Kgomotso Lunga Mthembu - 130305 0666 \*\*\* - Siphahleni Area, MBAZWANE, 3974 - *Mbuyazi*

Notice is hereby given of Government Gazette No. **44822** which, was published in Government Gazette Notice No. **605** dated **09 July 2021** is hereby rectified to read as follows

1. Talitha Maré - 871113 0093 \*\*\* - 3 Lann Ave, Arconpark, VEREENIGING, 1939 - *Jordaan*
2. Siyabonga Anthony Masango - 010913 5180 \*\*\* - No 714 Tweefontein, MKOBOLA, 1022 - *Khumalo*
3. Thabo Malatji - 001120 6067 \*\*\* - 2386 Mayibuye, TEMBISA, 1685 - *Ramolobeng*
4. Dakalo Happyness Mugagadeli - 950630 5194 \*\*\* - Maila Village, MAKHADO, 0920 - *Raulinga*
5. Awona Fikeni - 001126 0533 \*\*\* - Vlei Area, FLAGSTAFF, 4810 - *Tshungu*
6. Katlego Queen Ncube - 990518 0561 \*\*\* - 6231 Moeder Street, LETHABONG, 0263 - *Lekabe*
7. Zinhle Nozipho Ngubane - 890104 0662 \*\*\* - Loop Street, Bide Flats, PIETERMARITZBURG, 3201 - *Gumede*
8. Sinethemba Mabutle Mlambo - 960119 0725 \*\*\* - 25 Botrivier Street, Aerorand, MIDDELBURG, 1050 - *Zikode*

9. Sibusiso Mazibuko - 900622 5592 \*\*\* - Fordeville, ESTCOURT, 3310 - *Msimanga*
10. Siphokuhle Gama - 930308 0443 \*\*\* - 937 Block 9, DOORKOP, 1723 - *Mahlobo*
11. Marcell Janse Van Rensburg - 011120 0408 \*\*\* - Kykoedie Farm, STORMSVLEI, 7280 - *Van Tonder*
12. Nkosinathi Goffrey Dhladhla - 900330 5701 \*\*\* - 8307 Magoa Street, Ivory Park, TEMBISA, 1628 - *Mabuza*

## DEPARTMENT OF HOME AFFAIRS

NO. 696

6 August 2021

## ALTERATION OF SURNAMES IN TERMS OF SECTION 26 OF THE BIRTHS AND DEATHS REGISTRATION ACT, 1992 (ACT NO. 51 OF 1992)

The Director-General has authorized the following persons to assume the surnames printed in *italics*:

1. Nomthandazo Selato - 961001 0503 \*\*\* - 19672 Pitiki Street, Extension 9, KAGISO, 1754 - *Segope*
2. Tumisang Leonard Thakgwe - 910912 5593 \*\*\* - M 74 Phohung Section, GANYESA, 8613 - *Balale*
3. Jade Nicole Sampson - 010115 0201 \*\*\* - Unit 206, Twin Palms, KUILSRIVER, 7500 - *Pillay*
4. Benjamin Goodman Tlou - 760718 5792 \*\*\* - 1003 Welverdiend, MADIKWE, 2840 - *Dube*
5. Doctor Phillemon Mnguni - 881102 5717 \*\*\* - 1504 Verena D, VERENA, 1086 - *Mabena*
6. Vuyisile Motaung - 010820 0076 \*\*\* - 1599 Mayihlome Street, BLUEGUMVIEW, 1400 - *Mxinwa*
7. Buti Samuel Tlonke - 751023 5687 \*\*\* - Unit 40, Oasis Palm, RANDFONTEIN, 1759 - *Lekoko*
8. Selemala Willy Thokwane - 920923 5776 \*\*\* - Ga-Mashishi, DRIEKOP, 0700 - *Moloto*
9. Mmueleli Matunda - 960502 5322 \*\*\* - 145 James Cindi Street, MMABATHO, 2735 - *Seleka*
10. Winston Katlego Ribane - 920611 5591 \*\*\* - 5470 Unit 13, MMABATHO, 2735 - *Mothobi*
11. Bulelani Totise - 841229 5482 \*\*\* - 20297 Zinbane Valley, MTHATHA, 5100 - *Ngesi*
12. Sinthemba Candice Nothando Dlamini - 010614 0589 \*\*\* - Ntambanana, TONGAAT, 4400 - *Biyela*
13. James Moeketsi Leping - 980712 5283 \*\*\* - 1783 Moteane Street, Mohlakeng, RANDFONTEIN, 1759 - *Mogonare*
14. Thimna Fipaza - 991013 5560 \*\*\* - 14 Wyehill Way, RETREAT, 7820 - *Dube*
15. Mike Malatole - 000710 5982 \*\*\* - 39285 Exist Street, MAMELODI EAST, 2010 - *Sambo*
16. Cornelius Matuoane - 900519 5086 \*\*\* - 75 / 5857 Sigasa Street, Liliba Section, TEMBISA, 1632 - *Moeta*
17. Ropfiwa Righteous Mulaiwa - 970311 5960 \*\*\* - Kuruleni Mission, VUWANI, 0952 - *Tshilowa*
18. Sibongile Cynthia Mahlangu - 960224 0199 \*\*\* - 609 Block R, SOSHANGUVE, 0152 - *Choba*
19. Monau Albert Ntsala - 941121 5331 \*\*\* - 5765 Extension 2, Botlakeng, BETHLEHEM, 9700 - *Zim*
20. Mvulane Sikhumbuzo Mhlanga - 940523 0134 \*\*\* - 4 Saligna Complex, Impala Crescent, BRITS, 0250 - *Reed*
21. Rittah Nothando Mthombeni - 020311 1213 \*\*\* - Kathwini Area, KWANGWANASE, 3973 - *Manzini*
22. Siyabonga Gift Nkosi - 020630 6060 \*\*\* - 3341 Extension 2, Emzinoni Township, BETHAL, 2310 - *Mthombeni*
23. Skhumbuzo Paulos Motshegoa - 020130 5640 \*\*\* - 54 Block Mm, SOSHANGUVE, 0152 - *Africa*
24. Asanda Sphesihle Vilakazi - 000601 5559 \*\*\* - 2101 Loskop Road, Takane Area, DURBAN, 4001 - *Mdakane*
25. Seipone Celestine Nxumalo - 900725 0655 \*\*\* - 725 Tshwaraganang Street, MOTHIBISTAD, 8474 - *Molete*
26. Tshediso Emmanuel Nyokoong - 940208 5877 \*\*\* - 7 Strauss Street, Riebeeckstad, WELKOM, 9459 - *Mosenohi*
27. Hope Phillemon Phakathi - 860502 5343 \*\*\* - 1621 Lakeside, EVATON, 1984 - *Rakosa*
28. Solofelang Agisanang Darius Tshoma - 930503 5329 \*\*\* - 8505 Steve Kgame Drive, Extension 2, DOBSONVILLE, 1863 - *Mosiapoa*
29. Veli Chiliza - 960202 5908 \*\*\* - 102 Buller Road, MONTCLAIR, 4004 - *Nhlapho*
30. Lucia Gugu Dlamini - 870407 0651 \*\*\* - P O Box 7420, ULUNDI, 3838 - *Mvubu*
31. Thabani Innocent Ntshangase - 920128 5337 \*\*\* - Nkonjane Area, MAHLABATINI, 3800 - *Khali*

32. Kagiso Lekau Mamabolo - 891118 5355 \*\*\* - P O Box 48, BELA-BELA, 0480 - *Mashishi*
33. Makabane Victor Mosea - 961228 5149 \*\*\* - 3024 Petsana, REITZ, 9810 - *Gabela*
34. Sanele Trinity Nxumalo - 951207 5632 \*\*\* - House No 588, Section E, GIYANI, 0826 - *Ziqubu*
35. Mailane Arnold Mpokane - 830321 5387 \*\*\* - Z 2 F 346, TAFELKOP, 1500 - *Mapule*
36. Thuto Jabulile Montsitsi - 920402 0104 \*\*\* - 8042 Hospital View, BETHLEHEM, 9701 - *Mthembu*
37. Lunga Tafu - 871026 5750 \*\*\* - 39 Castle Street, PAARL, 7620 - *Madikane*
38. Tshepo Confidance Motimedi - 840902 5547 \*\*\* - 3006 Ramosadi Village, MAFIKENG, 2745 - *Tsatsinyane*
39. Potego Tshehla Mphela - 950109 5694 \*\*\* - Ma 784, TAFELKOP, 0700 - *Mahlangu*
40. Sibusiso Goodman Sibiya - 730107 6089 \*\*\* - X 429 Malukazi Area, UMLAZI, 4031 - *Sibisi*
41. Morné Verster - 960305 5082 \*\*\* - Plot 7, Eendrag, HEIDELBERG, 1441 - *Robertson*
42. Nceba Gulwa - 810612 5514 \*\*\* - 19241 A.S. Motsoeledi, KHAYELITSHA, 7784 - *Mkefa*
43. Moloko Fredericah Ngoatje - 980903 0490 \*\*\* - 21 Bamtry Road, BRYANSTON, 0100 - *Mdluli*
44. Phillip Tshogofatso Molapo - 860612 5825 \*\*\* - 1299 Barbary Street, Extension 15, Blue Hills, MIDRAND, 1685 - *Moleke*
45. Lerato Albert Pitlele - 771031 5513 \*\*\* - 7826 Extension 1, Khutsong Location, CARLETONVILLE, 2500 - *Roberts*
46. Benjamin Udumo Ndimba - 710613 5591 \*\*\* - 12 Maluzi Berg Crescent, Extension 16, CARLETONVILLE, 2499 - *Nhlapo*
47. Innocent Collect Mogolobaneng Selwana - 871008 5472 \*\*\* - 33267 Sompisi Street, Extension 7, MAMELODI EAST, 0120 - *Maleka*
48. Khanyisa Buntyuntyu - 881010 5882 \*\*\* - 4653 Nu 2, MDANTSANE, 5610 - *Mambalu*
49. Mzwamashenge Emmanuel Mncwango - 010608 5792 \*\*\* - C 158, OSIZWENI, 2952 - *Buthelezi*
50. Donovan James Mcantagart - 970402 5028 \*\*\* - 11 Edgewater Place, EAST LONDON, 5200 - *Cooke*
51. Lehlogonolo Daniel Prince Mandevu - 900520 5340 \*\*\* - 2559 Mangaliso Sobokwe Street, MAMELODI EAST, 0180 - *Chauke*
52. Lebogang Brandon Mandevu - 930817 5347 \*\*\* - 2559 Mangaliso Sobokwe Street, MAMELODI EAST, 0180 - *Chauke*
53. Kabelo Sekgobela - 881030 5525 \*\*\* - 252 Block C, MABOPANE, 0190 - *Mmushi*
54. Ruth Mmola - 941127 0657 \*\*\* - Stand No 330, Mandela Park, BOLOBEDU, 0838 - *Seoka*
55. Sizwe Sibanyoni - 020221 5702 \*\*\* - 205 Dube Street, Etwatwa, DAVEYTON, 1520 - *Buthelezi*
56. Zongezile Collin Baepi - 890809 5301 \*\*\* - 41 Orange Street, CARLETONVILLE, 2500 - *Sibonda*
57. Mashudu Gugulethu Mashinini - 950118 0542 \*\*\* - 47 – 13th Avenue, ALEXANDRA, 2090 - *Magadani*
58. Mpumelelo Ngcobo - 991211 5745 \*\*\* - Qoloqolo Mtwalume, UMZINTO, 4200 - *Jiba*
59. Sthenjwa Njabulo Ngema - 990518 5509 \*\*\* - P O Box 10913, Sokesimbane General, UMZINTO, 4200 - *Nzama*
60. Shawn Tebogo Mohlala - 961128 5652 \*\*\* - 3511 Panda Street, Extension 5, BENONI, 1520 - *Modiga*
61. S'nakhokonke Siyanda Mabizela - 990917 5621 \*\*\* - Ezakheni, LADYSMITH, 3370 - *Ngubane*
62. Busisiwe Grace Tshilwavhusiku - 890513 0290 \*\*\* - 1043 Lali Street, Rockville, SOWETO, 1700 - *Maselela*
63. Mbali Ndlwana - 940517 0135 \*\*\* - 2092 A Masero Street, Zola 2, SOWETO, 1700 - *Ndlangisa*
64. Christian Hoffeldt - 990528 5106 \*\*\* - 39 Kerk Street, JACOBSDAL, 8701 - *De Scandé*
65. Mbongiseni Msibi - 020320 6121 \*\*\* - House No 2090, Trichardt Street, VOLKSRUST, 2470 - *Mbhele*

66. Gontse Mathabathe - 020917 6001 \*\*\* - Stand No 430, Malaeneng, DENNILTON, 0400 - *Mohlamonyane*
67. Pfulani Decorate Mashakeni - 980213 5574 \*\*\* - P O Box 552, GIYANI, 0826 - *Maluleke*
68. Talia Nadine Munsamy - 010628 0620 \*\*\* - 108 The Vinyard, 2 Harris Avenue, EDENVALE, 1609 - *Nair*
69. Solly Chuene Makgoba - 791126 5576 \*\*\* - 434 Roobokfontein, MAPELA, 0610 - *Ramotshela*
70. Nkululeko Penganane - 010101 5745 \*\*\* - 28 Jobela Street, DURNACOL, 3082 - *Nkosi*
71. Sinesipho Sagwityi - 010819 0374 \*\*\* - Mdlanlomo, LIBODE, 5160 - *Gono*
72. Katleho Shane Sekaja - 960924 5533 \*\*\* - 181 K Section, BOTSHABELO, 9781 - *Matlosa*
73. Mlungisi Sikhakhane - 900628 5051 \*\*\* - A 563 Damet Road, WELBEDAGHT WEST, 4092 - *Ntombela*
74. Anthony Matuoane - 920609 5301 \*\*\* - 75 / 5857, Ililiba Section, KEMPTON PARK, 1620 - *Moeta*
75. Jabulile Mbatha - 870311 0765 \*\*\* - 571 Phase 5 B, Buhle Park, GERMISTON, 1401 - *Masina*
76. Mokibelo Makgato - 940802 5753 \*\*\* - Makgato Village, MODJADJISKLOOF, 0835 - *Pilusa*
77. Khathutshelo Mashamba - 931021 5721 \*\*\* - Stand No 138, VAALWATER, 0814 - *Mohale*
78. Phetolo Phahlamohlaka - 001231 5455 \*\*\* - 2939 Toadtree Street, BENONI, 1501 - *Sekgala*
79. Matima Matome Makgato - 921022 5765 \*\*\* - Makgato Village, BOTLOKWA, 0850 - *Pilusa*
80. Ayanda Hloma - 800411 5574 \*\*\* - 2163 Mbatane Street, DAVEYTON, 1520 - *Bam*
81. Tshepaone Mohibidu - 010907 5675 \*\*\* - B 01 Kokwaza, MOROKWENG, 8614 - *Mothibakgomo*
82. Thembisa Veronica Makhosi - 970603 0335 \*\*\* - 5 Tutura Street, Nu 4 B, MOTHERWELL, 6211 - *Mahobe*
83. Phuti Clarence Moabelo - 960716 5765 \*\*\* - 5318 Extension 6, Mayfield, DAVEYTON, 1520 - *Boshomane*
84. Owen Tumelo Manoto - 991227 5714 \*\*\* - 1632 Zone 12, SEBOKENG, 1983 - *Maduna*
85. Sobantu Mboni - 980425 5665 \*\*\* - Qinqama North, ELLIOTDALE, 8016 - *Mgidlana*
86. Gilbert Lesego Sharp - 770424 5982 \*\*\* - 50078 Seweding Village, MAHIKENG, 2735 - *Lekgoe*
87. Koketso Bernard Ramongane - 890506 5440 \*\*\* - 2088 Block C, New Eersterus, HAMMANSKRAAL, 0150 - *Seloma*
88. Thandiwe Thuli Eugenia Mahlangu - 860419 0367 \*\*\* - 796 Block Dd, SOSHANGUVE, 0152 - *Mnguni*
89. Mitchel Masilo - 810807 5370 \*\*\* - 20351 Zone 14, SEBOKENG, 1900 - *Radebe*
90. Gopolang Alpheus Bashube - 910510 5707 \*\*\* - 10 Olvime Street, Extension 9, CARLETONVILLE, 2500 - *Mavimbela*
91. Yonela Mbewu - 000221 0918 \*\*\* - Sapukanduku Area, MT AYLIFF, 5130 - *Nogcantsi*
92. Bongekile Nqobile Khumalo - 000115 1116 \*\*\* - 995 No, White City, INANDA, 4309 - *Sikhakhane*
93. Zama Coulette Nkosi - 901020 0423 \*\*\* - House No 5615, LISTER FARM, 2900 - *Nyamane*
94. Nokuthula Princess Nkosi - 940430 0368 \*\*\* - 65 Haynes Road, Richmond Crescent, PIETERMARITZBURG, 3200 - *Nyamane*
95. Andile Nqubeko Mdletshe - 950223 5604 \*\*\* - B 469 Mangusuthu Highway, EMPANGENI, 9701 - *Mthethwa*
96. Keketso Mokoena - 910710 5865 \*\*\* - 3979 Folley Ledwaba Street, MOHLAKENG, 1759 - *Belani*
97. Cynthia Moshasho Kokoelal - 851112 0529 \*\*\* - P O Box 580, BOCHUM, 0790 - *Tlouamma*
98. Tebogo Ramphisa - 931221 5783 \*\*\* - 68 Kerkvosfontein, DENNILTON, 1030 - *Segope*

99. Gaolatlheope Clifford Marobe - 900305 5578 \*\*\* - House No 1154, Tlatlagne Street, Unit 4, MOGWASE, 0314 - *Tshubyane*
100. Mamajane Mirriam Mattala - 690907 1037 \*\*\* - Stand No 483, Letebejane, MARBLE HALL, 0450 - *Mokola*
101. Kagiso Peace Gows - 000426 5539 \*\*\* - O 2481, Vergenoeg, MOROKWENG, 8614 - *Johnie*
102. Tlamelo Moreki - 960418 6007 \*\*\* - 2046 N Mandela, 59 Huhuda, VRYBURG, 8600 - *Dooms*
103. Obositse Lucky Motlhodi - 861015 5756 \*\*\* - 20156 Masemantsho, MAFIKENG, 2745 - *Phete*
104. Lesego Montisi - 841121 5433 \*\*\* - 10395 Magogoe, MAFIKENG, 2745 - *Mosela*
105. Asavela Madlebe - 961108 0702 \*\*\* - Mboya Area, WILLOWVALE, 5040 - *Tshandana*
106. Moses Galetshitse - 760620 5636 \*\*\* - 43 Maanblom Street, Geelhout Park, RUSTENBURG, 0300 - *Manyapelo*
107. Sandile Teddy Malinga - 870301 5417 \*\*\* - 6936 Eziphunzini, PIET RETIEF, 2380 - *Shandu*
108. Ntsoaki Moipone Selina Nyezi - 920526 0636 \*\*\* - 90 Makgatho Street, ATTERIDGEVILLE, 0008 - *Mofolo*
109. Mduduzi Lucas Mthethwa - 761210 5627 \*\*\* - Enqabeni Location, Sweetwaters, PIETERMARITZBURG, 3200 - *Buthelezi*
110. Vincent Thobile Matjila - 970619 5609 \*\*\* - Calcium Street, NELLMAPIUS, 0122 - *Mnisi*
111. Sello Joseph Ntaupane - 780205 5392 \*\*\* - 74252 Sonderwater, SEBOKENG, 1983 - *Majoro*
112. Archiebold Boy-Boy Tlou - 820410 5591 \*\*\* - 80 Ramushu Street, ATTERIDGEVILLE, 0200 - *Kgomo*
113. Hloriso William Legodi - 020315 5068 \*\*\* - Ga-Mashashane, Maotant Village, POLOKWANE, 0601 - *Mnisi*
114. Msizi Sithole - 021020 6064 \*\*\* - Kwashoba Area, PONGOLA, 3170 - *Sibiya*
115. Lindokuhle Patrick Sigwaza - 021011 5326 \*\*\* - E 426 Sinxolo Road, KWADABEKA, 3610 - *Ngcobo*
116. Zwothe Austine Nenzhelele - 020207 6088 \*\*\* - Mlanzwi, MUTALE, 0956 - *Tshikovhi*
117. Tlotlego Melvin Tsatsi - 020813 5503 \*\*\* - House No H 31 D, Policetation Section, GANYESA, 8613 - *Maleke*
118. Kgaogelo Letsika - 020218 5127 \*\*\* - Marirong Village, TZANEEN, 0850 - *Mashapu*
119. Sihle Ayanda Buthelezi - 020416 6115 \*\*\* - 2433 Shanyase Road, INANDA, 4020 - *Ngubane*
120. Busani Mthembu - 020225 5741 \*\*\* - White City, UMZIMKHULU, 3297 - *Sofunani*
121. Theo Tekolo - 020728 5615 \*\*\* - House No 3007, GANYESA, 8613 - *Sebogodi*
122. Brian Matyhila Majila - 020210 5447 \*\*\* - 921 Khutseng, CARLETONVILLE, 2502 - *Mtiyane*
123. Melusi Nzuza - 020515 5559 \*\*\* - D 205, Magidaveni, TONGAAT, 4400 - *Ndlela*
124. Sandile Khulekani Mthombeni - 020425 6091 \*\*\* - C 540 Emaphlazini, INANDA, 4310 - *Phewa*
125. Idani Witness Rantsana - 020627 5749 \*\*\* - P O Box 140, MAKONDE, 0984 - *Mphaga*
126. Meluleki Samkele Dumo Masondo - 010619 5170 \*\*\* - Mzwazwa Area, CORONATION, 3107 - *Malinga*
127. Nhlakanipho Andries Ngcobo - 010424 5190 \*\*\* - 1028 Main Road, Shongweni Dam, PINETOWN, 3601 - *Mzimela*
128. Puleng Thapeli - 011227 0243 \*\*\* - 31 General Hertzog Road, Peacehaven, VEREENIGING, 1930 - *Mphore*
129. Bulelani Johnson - 020208 5533 \*\*\* - 12 Queen, ST GEORGE, 6001 - *Faltein*
130. Kgotso Aphane - 020318 6460 \*\*\* - 5300 Vuselela Street, Extension 7, DIEPSLOOT, 2100 - *Ndou*
131. Elizabeth Motlhwa - 010911 1070 \*\*\* - 130392 Ga-Ramorulana Village, MAPELA, 0610 - *Bohlolo*
132. Oteng Masisi - 020722 5417 \*\*\* - 1497 Section 2, LEDIG, 0338 - *Melato*

133. Kamva Ubenathi Njobe - 020214 5564 \*\*\* - Emvubukazi, UMZIMKHULU, 3297 - *Khambula*
134. Mthokozisi Ndwandwe - 021104 5426 \*\*\* - Alpha Area, VRYHEID, 3100 - *Qwabe*
135. Zamokuhle Mjoli - 021014 5918 \*\*\* - Dayi Location, UMZIMKHULU, 3297 - *Magobodi*
136. Lebogang Pertunia Molebale - 020520 0904 \*\*\* - 20 Matsemela Street, SAULSVILLE, 0125 - *Malema*
137. Nhlakanipho Tshiamo Mooke - 020720 5126 \*\*\* - 8 Naboom Crescent, Extension 6, Dalpark, BRAKPAN, 1541 - *Nkabinde*
138. Amani Vuyo Simone - 021029 5159 \*\*\* - 278 Hlahatsi Section, KATLEHONG, 1400 - *Khoba*
139. Hombakazi Kuboni - 020116 0881 \*\*\* - Ward 22, Farm Location, UMZIMKHULU, 3297 - *Zililo*
140. Lethukuthula Quinton Ngidi - 020902 5848 \*\*\* - Q 1616 Umsilinga Road, DURBAN, 4001 - *Zulu*
141. Qalokwakhe Ngiba - 020523 5779 \*\*\* - Ward 01, Umkhunya, UMZINTO, 4200 - *Dlamini*
142. Virginia Mapula Mogatli - 020805 1058 \*\*\* - No 10006, Rooival, MOKOPANE, 0611 - *Matlou*
143. Mesuli Zakhe Mbatha - 020209 5799 \*\*\* - P O Box 01, MAHLABATHINI, 3865 - *Buthelezi*
144. Thabiso Mtshali - 020713 5344 \*\*\* - P O Box 14, MAHLABATINI, 3838 - *Zwane*
145. Milisa Zwedala - 020104 1221 \*\*\* - C 773 Concordia, KNYSNA, 6500 - *Godola*
146. Mpho Tshepe - 020715 5359 \*\*\* - 1287 Stateng Section, BETHANIE, 0270 - *Moropa*
147. Thandolwethu Welcome Trinity Mkhwanazi - 020806 5548 \*\*\* - 3194 Extension 2, Wesselton Location, ERMELO, 2350 - *Mthethwa*
148. Wanga Mhlali Mahlangu - 020304 5819 \*\*\* - Nomlacu Location, BIZANA, 4800 - *Chitwayo*
149. Donald Mantsie - 021026 5565 \*\*\* - Stand No 0122, Hlalanikahle, MPUDULLE, 1057 - *Hlakola*
150. Luzuko Mcetywa - 020220 6367 \*\*\* - Majaripini, UMZIMKHULU, 3297 - *Dandala*
151. Lungelo Maphumulo - 020228 5537 \*\*\* - C 1278 Umtate Road, KWAMASHU, 4360 - *Ngubane*
152. Tshepo Ignatius Mokone - 890113 5335 \*\*\* - 12074 Dube Street, MAMELODI EAST, 0150 - *Tshikalange*
153. Sizwazonke Edgar Sambo - 780322 5492 \*\*\* - Emakholweni Area, UMBUMBULU, 4105 - *Ngubane*
154. Mbuso Siphesihle Ntshangase - 900209 5101 \*\*\* - 60 Woodpecker Circle 1, Yellowwood Park, DURBAN, 4001 - *Makhanya*
155. Togotela Johannes Gafane - 800529 5555 \*\*\* - Stand No 381, Maripathekong, GA-MOLEPO, 0700 - *Rammala*
156. Thabiso Pheele - 981028 5915 \*\*\* - 2494 Extension 4, PHOMOLLONG, 1401 - *Mofokeng*
157. Modise Ananias Taukobong - 730709 5838 \*\*\* - 25640 Mayibuye Street, Extension 7, MAMELODI EAST, 1630 - *Hlatshwayo*
158. Thabo Xaba - 890227 5474 \*\*\* - 548 Mavimbela Section, KATLEHONG, 1400 - *Mokoena*
159. Nseketelo Vanessa Mabunda - 020928 1091 \*\*\* - Section B 2, MALAMULELE, 0982 - *Shilubane*
160. Minenhle Ndlela - 020209 5827 \*\*\* - Menyezwayo Area, MAPHUMULO, 4470 - *Chamane*
161. Giraldo Mamabolo - 020518 5491 \*\*\* - P O Box 350, SANDFONTEIN, 0708 - *Malatjie*
162. Tsakani Lucky Nukeri - 780918 5950 \*\*\* - 7838 Themba Street, Zone 2, DIEPKLOOF, 1864 - *Mhlongo*
163. Monyane Dominique Mokonyane - 970926 5392 \*\*\* - 16589 Letuka Street, Phase 2, BLOEMFONTEIN, 9300 - *Molefi*
164. Koketso Emanuel Semosa - 000818 5929 \*\*\* - P O Box 260, SEKGOPO, 0802 - *Monakhisi*
165. Masabata Gladys Mbele - 960811 0119 \*\*\* - 15 Zone 10, Extension 2, SEBOKENG, 1983 - *Mokoena*

166. Lebohang Tshabalala - 020323 0137 \*\*\* - 2258 Phase 2, Tshepiso, SHARPEVILLE, 1908 - *Tsukulu*
167. Sifiso Molisenyanane - 911228 5415 \*\*\* - 15 Agaat Street, VANDERBIJLPARK, 1911 - *Tshabalala*
168. Muthuphei Alfred Rasetho - 690329 5791 \*\*\* - Tshikombani, NZHELELE, 0993 - *Nesindande*
169. Sikhonangenkosi Happy-Boy Mcineka - 791020 5334 \*\*\* - Magogo Area, NQUTU, 3135 - *Mbatha*
170. Cameron Sonwabo Qiqimana - 810514 5750 \*\*\* - 4166 Thulamutwana, Grasmere, KANANA PARK, 1828 - *Mpalisa*
171. Shay Francke - 020410 5239 \*\*\* - 19 Anthes Road, BLUEDOWNS, 7100 - *Van Reenen*
172. Masilakhe Hlalakuhle - 990408 6369 \*\*\* - Dumalisile Area, WILLOWVALE, 5040 - *Nongadlela*
173. Sakhile Tshabangu - 010124 6043 \*\*\* - House No 70, Louis Trichardt Street, VOLKSRUST, 2470 - *Mtambo*
174. Nkosikhona Thandwayinkosi Mabaso - 950108 5839 \*\*\* - Zwelisha, ESTCOURT, 3310 - *Ntshangase*
175. Ofentse Malefetsane Daniél Morake - 941126 5247 \*\*\* - 1570 Vuka Section, Oukasie, BRITS, 0250 - *Mpitso*
176. Mohau Monnanyane - 000715 5526 \*\*\* - 8660 Drieziek 5, ORANGE FARM, 1890 - *Tlali*
177. Letlhogonolo Molefe - 020202 6307 \*\*\* - 1552 Lebanon, WINTERVELDT, 0191 - *Swate*
178. Lehlohonolo Mabece - 010820 5163 \*\*\* - 12322 Mopane Street, DOBSONVILLE, 1865 - *Nondabula*
179. Viwe Dudley Lekhuleni - 020405 5512 \*\*\* - 5 Norman Wader Street, BARBERTON, 1300 - *Ngobe*
180. Baganetsile Malope - 020503 0466 \*\*\* - P O Box 445, BUSHBUCKRIDGE, 1250 - *Mashego*
181. Tshepo Kupa - 010403 5619 \*\*\* - P O Box 40, ATOK, 0749 - *Thobejane*
182. Genesis Maloma - 010120 5599 \*\*\* - Stand No 705, Verena C, VERENA, 0400 - *Magagula*
183. Tsidiso Bongani Khoza - 011106 5404 \*\*\* - Stand No 108, MAKOKO, 1245 - *Malumane*
184. Muzi Ignitious Mahlangu - 010104 6081 \*\*\* - No 2592, KWAGGAFONTEIN, 0450 - *Skosana*
185. Vusimuzi Mpela - 010506 6028 \*\*\* - Slahla Area, RICHMOND, 3780 - *Basi*
186. Nkululeko Fortune Nkambule - 010427 5663 \*\*\* - Stand No E5, DUNDONALD, 2336 - *Sibiya*
187. Bonginkosi Mvuna - 010813 5832 \*\*\* - 79 St George Street, DURBAN, 4001 - *Makhoba*
188. Jabulile Rosta Mahlangu - 900728 0556 \*\*\* - 2064 / 60 Extension 25, EMBALENHLE, 2285 - *Madonsela*
189. Tshepang Lawrance Motsitsi - 000502 6397 \*\*\* - 1611 New Location, KOPPIES, 1940 - *Nkwane*
190. Molato Timothy Moeketsane - 451016 5541 \*\*\* - 12 Talashe Street, Rest In Peace, KWA-THEMA, 1575 - *Kazzie*
191. Shimanyana John Maluleka - 481128 5641 \*\*\* - 1946 Section F, MAMELODI WEST, 1001 - *Malahlela*
192. Andile Brightness Shabangu - 020531 0836 \*\*\* - Stand No 535, Jeppies Reef, NKOMAZI, 1300 - *Gama*
193. Musa Philangenkosi Mpakathi - 820717 5910 \*\*\* - 2144 Weilers Farm, Extension 2, KANANA, 1820 - *Gumede*
194. Zanele Ntombzodwa Mahlangu - 020318 0809 \*\*\* - Stand No 5803, Extension 4, DELMAS, 2210 - *Mashego*
195. Mokaba Petronella Machaba - 020714 0863 \*\*\* - Makgari Village, RADITSHABA, 0700 - *Raletjena*
196. Mulaedza Nndindeleni Radzilani - 020321 5122 \*\*\* - 316 Extension 2, DIEPSLOOT, 2120 - *Rakhombe*
197. Lucky Samuel Shabangu - 880603 5671 \*\*\* - 2960 Simelane Street, Extension 2, ZITHOBENI, 1020 - *Msiza*
198. Bafana Innocent Sebegu - 960314 5610 \*\*\* - Plot 27, Bagale Village, TARLETON, 1700 - *Xontana*
199. Mpho Sarah Ramokolo - 970421 0741 \*\*\* - 72 Zone 6, SESHEGO, 0742 - *Raphesu*

200. Kamogelo Brilliant Ledwaba - 010714 5182 \*\*\* - Stand No 122 B, MANKWENG, 0701 - *Hopane*
201. Audrey Poloko Sefolo - 760416 0736 \*\*\* - 13 Zone 4, SESHEGO, 0699 - *Mahwai*
202. Sekantane Mack Mapheto - 780302 5946 \*\*\* - Matobole Village, POLOKWANE, 0700 - *Selepe*
203. Itumeleng Elvis Mocumi - 821215 5490 \*\*\* - House No 129, Sesheng Family Unit, KATHU, 8446 - *Masigo*
204. Molele Penelope Qhoai - 950910 0467 \*\*\* - Stand No 10086, Chloethabaneng Village, GA-MATLALA, 0701 - *Setumo*
205. Soto Johannes Ngobeni - 790102 5646 \*\*\* - P O Box 192, KOLOTI, 0709 - *Rapholo*
206. Tshepiso Youlender Khumalo - 940531 0218 \*\*\* - Madhlana, LEBOWAKGOMO, 0737 - *Tshehla*
207. Bakang Robert Malejwe - 790130 5705 \*\*\* - Plot 6, Tarlton, KRUGERSDORP, 1740 - *Moiloa*
208. Dimakatso Harry Ntjana - 830609 5850 \*\*\* - House No 870, JANE FURSE, 1085 - *Sithole*
209. Moshadi Paulina Naila - 850203 0737 \*\*\* - Stand No 22, Ga-Kobe, SENWABARWANA, 0793 - *Mailula*
210. Mojalefa Gift Rangwato - 890205 5856 \*\*\* - 443 Johong Village, MOLOTOTSI, 1600 - *Moshoma*
211. Refilwe Euphemia Masilo - 870615 0430 \*\*\* - 17803 Mogoboya Street, Extension 25, VOSLOORUS, 1475 - *January*
212. Pabalo Shantel Moeta - 020806 0944 \*\*\* - Private Bag X145, RADITSHABA, 0718 - *Matlopela*
213. Leroy Hathin Uithaler - 950905 5167 \*\*\* - 5010 Northend, MATATIELE, 4730 - *Van Der Merwe*
214. Lutendo Sikhwari - 020629 5593 \*\*\* - Gonden-Mikosi, THOHOYANDOU, 0900 - *Gadivhana*
215. Thabang Letuaba - 970915 5388 \*\*\* - Chevy Chase, MT FLETCHER, 4770 - *Thelejane*
216. Khanyisa Patrick Majova - 950928 5589 \*\*\* - 1337 Koka Street, Old Cross Road, NYANGA, 7750 - *Boqwana*
217. Dullen Zeelie - 011224 5048 \*\*\* - 78 Natron Street, PRETORIA, 0001 - *Joubert*
218. Mlondolozu Donick Makhanya - 911227 5750 \*\*\* - 5 Thwelenye Unit, Amatikwe Area, INANDA, 4310 - *Mpanza*
219. Dalton Dato Mthembu - 650303 5882 \*\*\* - 47 Gwala's Farm, TONGAAT, 4399 - *Sokudela*
220. Kananelo Tshepang Moshoeshe - 950822 5379 \*\*\* - 795 N, Bluegumbosch, WITSIESHOEK, 9870 - *Salomane*
221. Bulelani Jabulani - 920518 6364 \*\*\* - Lukholo, BIZANA, 4800 - *Qhameka*
222. July Solomon Motau - 670609 5487 \*\*\* - 2033 Newtown, MHLUZI, 1050 - *Masango*
223. Matsolane Kenneth Mugwena - 691205 5382 \*\*\* - 301 Sengatane, MOLETJIE, 0808 - *Mothapo*
224. Phathutshedzo Maano - 960216 6099 \*\*\* - P O Box 617, FONDWE, 0969 - *Nelufule*
225. Leon Petrus Mabebe - 860606 5646 \*\*\* - 5992 Zone 5, GA-RANKUWA, 0200 - *Phiri*
226. Gilford Sekala - 860228 5686 \*\*\* - Lonsdale, MOLETJIE, 0710 - *Mashao*
227. Thabang Harrison Legodi - 920924 5892 \*\*\* - P O Box 185, LONSDALE, 0710 - *Ngoetjana*
228. Mojalefa Maleke - 800606 7764 \*\*\* - 6355 Phase 4, Tshepiso, SHARPEVILLE, 1928 - *Mohlala*
229. Thembalungile Cliford Samela - 850614 5770 \*\*\* - S 8600 Mpinga Street, Slovo Park, MTHATHA, 5100 - *Morolela*
230. Lekoko Charles Seima - 730221 5330 \*\*\* - 2729 Section J, MAMELODI WEST, 0152 - *Leso*
231. Sebenzile Radebe - 850517 0915 \*\*\* - 5243 Extension 2, Block H, KANANA, 0100 - *Matshika*
232. Kagiso Mokoena - 021124 5316 \*\*\* - H 076 Tsakatseni, HAZYVIEW, 1242 - *Matsana*

233. Lungani Smangaliso Mbatha - 020816 5716 \*\*\* - F 204 Dudu Ngcobo Street, KWADABEKA, 3801 - *Mantengu*
234. Zamanguni Annah Sonto - 020725 0209 \*\*\* - 461 Classic Street, Mohlakeng Location, RANDFONTEIN, 1759 - *Zondo*
235. Puleng Nelson Phiri - 020226 5794 \*\*\* - 1554 Extension 101, SIYABUSWA, 0472 - *Mokutu*
236. Jimmy Maniki Mngomezulu - 020327 5961 \*\*\* - 103 Delmore Settlement, BOKSBURG, 1459 - *Langa*
237. Puseletso Sebitile - 021111 1035 \*\*\* - House No 516, DRYHARTS, 8588 - *Monamodi*
238. Linamandla Myeko - 020430 0496 \*\*\* - No 57 Zone 18, LANGA, 7455 - *Dubula*
239. Lebo Francinah Khoza - 020109 1133 \*\*\* - Stand No 273, Block A Trust, KOMATIPOORT, 1340 - *Mlotshwa*
240. Letlhogonolo Enock Manganye - 031002 5775 \*\*\* - 8074 Block 5, Moloto Village, CULLINAN, 0083 - *Kutumela*
241. Welcome Makhasa Mathala - 020907 5694 \*\*\* - 1146 Section D, EKANGALA, 1021 - *Mabuza*
242. Sanele Thethlwayo - 020214 6060 \*\*\* - 26242 Gambi Street, EMAPHUPHENI, 1520 - *Mkondo*
243. Mphilisi Sithole - 020106 5956 \*\*\* - Emabovini Area, GREYTOWN, 3250 - *Shelembe*
244. Mali bongwe Sibongimpilo Mtetwa - 020219 5588 \*\*\* - Nkolokoalo, MTUBATUBA, 3935 - *Ndima*
245. Tshagofatso Owen Mabungu - 020206 5605 \*\*\* - 21978 Extension 7, SOSHANGUVE, 0152 - *Maimela*
246. Hlengiwe Prim-Rose Mabaso - 020319 0180 \*\*\* - 2118 Phase 6, Mahoganu Street, ROODEPOORT, 1723 - *Mdletshe*
247. Sithokozile Mapasa - 020427 0364 \*\*\* - P O Box 357, Nganu Store, MOUNT FRERE, 5090 - *Mvambi*
248. Songezo Tshangela - 020625 5535 \*\*\* - 63 Maphanga Section, KATLEHONG, 1431 - *Galawe*
249. Nhlanhla Ratau - 020808 1166 \*\*\* - 5495 Extension 4, DELMAS, 2210 - *Motau*
250. Lesetsa Nkabinde - 021124 5533 \*\*\* - Plot 58, Beyers Naude, ZANDSPRUIT, 2120 - *Makgoba*
251. Lesiba Atania Ntsodisane - 020511 0704 \*\*\* - 33033 No, MATHIBISTAD, 0418 - *Kekana*
252. Ronald Palama - 020219 5498 \*\*\* - Mashite, GA-MPHAHLELE, 0736 - *Montjane*
253. Sinenhlanhla Mlambo - 020130 0781 \*\*\* - P O Box 150, HLUHLUWE, 3960 - *Zungu*
254. Kutlwano Mandindi - 020418 5161 \*\*\* - 970 Mbatha Street, SOWETO, 1868 - *Mathe*
255. Phetogo Winky Phaladi - 020210 0731 \*\*\* - 43 Chauke Street, SAULSVILLE, 0125 - *Radebe*
256. Tebogo Mapula Shiluvana - 870612 0956 \*\*\* - 1624 Manningburg, GA-KGAPANE, 0838 - *Mokgomola*
257. Peetri Van Vuuren - 981029 5093 \*\*\* - 70 Louis Trichardt Street, VOLKSRUST, 2470 - *Thompson*
258. Katleho Brian Radebe - 020608 5223 \*\*\* - 67 Motsamai Section, KATLEHONG, 1431 - *Tshabalala*
259. Thato Lebakoane - 020514 5538 \*\*\* - 543 Thlapi Street, SOWETO, 1610 - *Dibakwana*
260. Gustav Luvuyo Kok - 980119 5301 \*\*\* - No 26, BLOEMFONTEIN, 9300 - *Mogaecho*
261. Lithetha Maso - 020927 5743 \*\*\* - Upper Hukula, WHITTLESEA, 5360 - *Nyathi*
262. Nomalungisa Zibulale - 020210 0798 \*\*\* - Mbanyana Area, ELLIOTDALE, 3070 - *Msinekelwa*
263. Sindiswa Mzobe - 020625 0283 \*\*\* - Halambu Area, NKANDLA, 3855 - *Dlamini*
264. Mamello Diphoko - 020515 1216 \*\*\* - 1098 Rulaganyane Street, VRYBURG, 2786 - *Maine*
265. Lindokuhle Fortune Nkosi - 020121 5751 \*\*\* - Machibini Area, MTUBATUBA, 3935 - *Khoza*
266. Elisa Nompumelelo Masombuka - 011215 0783 \*\*\* - 103 Sochulumi, BRONKHORSTSPRUIT, 1200 - *Booi*

267. Sboniso Zimba - 010306 6024 \*\*\* - Tatane, LOSKOP, 3330 - *Mpembe*
268. Duduzile Mabuza - 010124 1010 \*\*\* - 5105 Extension 2, Masechaba, DUDUZA, 1496 - *Diomo*
269. Hendrick Maredi - 010505 5869 \*\*\* - P O Box 72, NEBO, 1051 - *Lebambo*
270. Kaitswe Petrus Mathabathe - 950824 5881 \*\*\* - 279 Newtown, TAMBO SQUARE, 1033 - *Malapane*
271. Dineo Kamohelo Langa - 00817 0483 \*\*\* - 15958 Zone 21, SEBOKENG, 1983 - *Bofelo*
272. Christopher S'fiso Phiri - 870419 5337 \*\*\* - 1611 Amaoti Cuba Area, INANDA, 4068 - *Shabalala*
273. Lungisani Sihle Gasa - 000420 6457 \*\*\* - Ezifundeni Area, HLUHLUWE, 3960 - *Sithole*
274. Inga Zungula - 010924 5749 \*\*\* - Private Bag X5009, MTHATHA, 5099 - *Mnukwa*
275. Kgadi Morongwa Ledwaba - 010302 1050 \*\*\* - P O Box 119, LIONSDALE, 0710 - *Mphela*
276. Phomelelo Given Makweng - 001209 5209 \*\*\* - 1156 Extension 3, KLARINET, 1035 - *Mosima*
277. Dikeledi Jenifer Masondo - 000726 1099 \*\*\* - Block 9, Maula, MODJADJISKLOOF, 0835 - *Kobela*
278. Nick Mathiba - 000117 5718 \*\*\* - A 31 Sekampaneng, Block A, TEMBA, 0407 - *Judge*
279. Zamokuhle Neal Luthuli - 001113 5997 \*\*\* - 1404 Bear Road, Waltloo, VERULAM, 4340 - *Mthembu*
280. Luzuko Madalana - 000623 6450 \*\*\* - 8 Njodo Street, NYANGA, 7750 - *Majeke*
281. Naho Altru Mukhathedzwa - 010924 0969 \*\*\* - Lwamondo, VUWANI, 0952 - *Makhani*
282. Tiisetso Laurine Ngobeni - 010907 1146 \*\*\* - 098 New Stand, RAMOKOKASTAD, 0195 - *Ngwagamobe*
283. Andile Samkelisiwe Ngwenya - 001104 0827 \*\*\* - 5423 Winnie Mandela Street, BREDASDORP, 7280 - *Mafu*
284. Kananelo Maleho - 001213 5725 \*\*\* - 2075 D, BOTSHABELO, 9781 - *Mokhele*
285. Onalenna Moropa - 001122 0795 \*\*\* - 3494 Extension 4, SOSHANGUVE, 0152 - *Mokgatle*
286. Owami Andile Makaleng - 010403 5941 \*\*\* - Mantungweni Reserve, SUNDUMBILI, 4491 - *Khuzwayo*
287. Okuhle Keletso Dingile - 011002 5896 \*\*\* - 10861 Makogane Street, PHILINDABA, 9301 - *Maphatlalatsa*
288. Mfundo Didi - 010913 6165 \*\*\* - C 108 Mfolozi Road, KWAMASHU, 4359 - *Ndlovu*
289. Amogelang Amantle Mfetane - 010710 0900 \*\*\* - No 1002 Level 4, Lerome, MOGWASE, 0314 - *Ntshabele*
290. Lwande Yengwa - 011223 5808 \*\*\* - Umzimkhulu, UMZIMKHULU, 3297 - *Mngeni*
291. Lethuxolo Mthetheleli Bhengu - 011011 5867 \*\*\* - Kogahohhi Area, TUGELA FERRY, 3010 - *Ngubane*
292. Nkosana Ndaba - 010924 6111 \*\*\* - 1642 Braamfisher, PRETORIA, 0001 - *Maduna*
293. Angel Morongwa Mamphoka - 011222 0462 \*\*\* - Mamone, JANE FURSE, 1085 - *Molapo*
294. Siphora Precious Komane - 000105 1357 \*\*\* - Marcaneng, SEKHUKHUNE, 1124 - *Ngwatle*
295. Sinamile Ayanda Mbatha - 011211 0730 \*\*\* - P O Box 626, ULUNDI, 3865 - *Ntombela*
296. Hlengiwe Sonto Mazibuko - 010723 1126 \*\*\* - Embokodo Area, NQUTU, 3135 - *Mgaga*
297. Zinhle Amanda Zulu - 010822 0309 \*\*\* - Dukudora Area, MTUBATUBA, 3935 - *Nyawo*
298. Bonisile Queen Sithole - 011001 1936 \*\*\* - 2070 Mazakhela Location, ERMELO, 2350 - *Masina*
299. Akho Tshandana - 011017 5758 \*\*\* - Willowvale, WILLOWVALE, 0040 - *Matshaya*

300. Tebogo Simon Manamela - 011113 5745 \*\*\* - 5551 Siyangoba, WITBANK, 1035 - *Mokwana*
301. Nomthandazo Mchunu - 011204 0952 \*\*\* - Mhlumayo Area, LADYSMITH, 3370 - *Sokhela*
302. Sifiso Thokozani Mahlangu - 001130 5976 \*\*\* - 1359 Tweefontein, KWAMHLANGA, 1022 - *Mtsweni*
303. Luyandaqiniso Mchunu - 001115 6159 \*\*\* - 1053 Unit 14, Umbali, PIETERMARITZBURG, 3200 - *Mngadi*
304. Siphosethu Sindisa - 000815 5989 \*\*\* - Mahlake Area, MATATIELE, 4730 - *Mlamleli*
305. Anele Zinhle Sithole - 000303 1076 \*\*\* - A 2447 Saliwa Road, LINDELANI, 4359 - *Manyanga*
306. Mbulelo Malunga - 000801 6041 \*\*\* - Kwa James, UMZIMKHULU, 3297 - *Gamede*
307. Aaron Koketso Molefe - 000116 6064 \*\*\* - 93 Molokwane Street, KOSTER, 0348 - *Mogorosi*
308. Mxolisi Khetha Gumede - 000225 5803 \*\*\* - Thengani Area, MANGUZI, 3901 - *Zulu*
309. Inga Daniel Samana - 000920 6263 \*\*\* - Ff 84 Town Two, KHAYELITSHA, 1784 - *Noyakaza*
310. Mduduzi Douglas Kekana - 001118 5872 \*\*\* - 1129 Tweefontein H, PRETORIA, 0001 - *Masilela*
311. Ngwakwane Carlifornia Sekele - 000903 1134 \*\*\* - New Stands, GLEN COWIE, 1061 - *Mabelane*
312. Gwiba Kowa - 000707 5993 \*\*\* - 11368 Tambo Street, SOWETO, 1804 - *Magadla*
313. Siyabonga Khoza - 000710 6352 \*\*\* - Steenbok, MAMELODI, 0100 - *Mabunda*
314. Rofniwa Nematlali - 000420 1011 \*\*\* - Malale, MUSINA, 0900 - *Nemalale*
315. Simamkele Maqhwazima - 010809 0757 \*\*\* - 20380 Khetbelo Street, KRAAIFONTEIN, 7570 - *Madolo*
316. Lethukuthula Christopher Mqwebedu - 000214 6066 \*\*\* - Kwazibusele, DALTON, 3236 - *Zungu*
317. Nosipho Sboneliwe Mcanyana - 000703 0638 \*\*\* - Magwavem, TONGAAT, 4400 - *Msoni*
318. Sibabalo Ndzeke - 000306 5526 \*\*\* - Modlweni, MOUNT AYLIFF, 4735 - *Mpumza*
319. Zanele Valiphathwa - 000326 0976 \*\*\* - Bungeni, MT AYLIFF, 4735 - *Mafiti*
320. Ndumiso Khoza - 000501 6069 \*\*\* - Dukuza Area, BERGVILLE, 3380 - *Zwane*
321. Goitseman Lizzie Nkgatho - 000602 1261 \*\*\* - 57 Moroto Trust, THABA NCHU, 9780 - *Choane*
322. Vuyo Gideon Rampedi - 000224 6048 \*\*\* - 42 Richmond Village, VEREENIGING, 1939 - *Sigidi*
323. Xolani Zitumane - 000128 6135 \*\*\* - Delfkan Klipwal, PIET RETIEF, 2380 - *Dlamini*
324. Sanelisiwe Ngidi - 000121 0991 \*\*\* - Msinga High Road, TUGELA FERRY, 3010 - *Mbhele*
325. Jetro Kgaugelo Diphofa - 001118 5722 \*\*\* - Stand No 3442, Moganela Village, GROBLERSDAL, 0450 - *Maleswene*
326. Nonhlanhla Dlomo - 000715 1025 \*\*\* - Emakhabeleni Area, KRANSKOP, 3268 - *Ncengwa*
327. Akani Khosa - 000630 6019 \*\*\* - 32 -13th Avenue, ALEXANDRA, 2090 - *Mashava*
328. Siindile Nonjabulo Mlambo - 000620 0933 \*\*\* - Ekuthukuzeni, KWNGWANASE, 3973 - *Thwala*
329. Minenhle Handsome Dlamini - 000131 6106 \*\*\* - D 198 Lindelani, DURBAN, 4001 - *Mbatha*
330. Siyathokoza Mthoko Dube - 871224 5368 \*\*\* - Mathunzi Area, Nseleni Reserve, EMPANGENI, 3880 - *Dlamini*
331. Sanele Makalima - 010707 6021 \*\*\* - A 246 Orange Groove, Greenfields, EAST LONDON, 5100 - *Jini*
332. Thembelihle Ndebele - 011218 1091 \*\*\* - Bahulazi Area, TUGELA FERRY, 3010 - *Cebekhulu*
333. Oreeditse Makhubela - 010619 5893 \*\*\* - House No 30789, Mositwane Section, LEROME, 0818 - *Mogale*

334. Sakhile Jacques Bonginkosi Nkosi - 011204 5278 \*\*\* - E 821 Mzilikazi Road, KWAMASHU, 4260 - *Mthethwa*
335. Tshengwane Magdeline Makwana - 010416 1114 \*\*\* - 138 Ngwanamatlang, JANE FURSE, 1085 - *Mokabane*
336. Mxolisi Anele Mabaso - 011201 5859 \*\*\* - Malomini Area, TUGELA FERRY, 3010 - *Mchunu*
337. Nduduzo Zondo - 010620 6236 \*\*\* - 4537 Nyamazane Road, UMLAZI, 4031 - *Shusha*
338. Kabelo Emanuel Kgatle - 010519 5802 \*\*\* - Motsimone Village, MODJADJISKLOOF, 0835 - *Maake*
339. Mfundo Xolani Msane - 020416 5540 \*\*\* - Ekuthukuzeni Area, KWANGWANASE, 3973 - *Ngwenya*
340. Jonathan Drotskie - 020110 5340 \*\*\* - 5 Bultaf Crescent, 36 Eldorado, CENTURION, 0157 - *Lewis*
341. Blessing Lethabo Nyathi - 000821 6103 \*\*\* - Aginedwa, THULAMASHASHE, 1365 - *Khoza*
342. Sfundo Wonderboy Sithole - 000104 6080 \*\*\* - 458977 New Road, Umzinyathi, INANDA, 4310 - *Msoni*
343. Yingsani Sphamandla Nkuna - 001023 5934 \*\*\* - 5237 Extension 24, Tsolm Street, OLIEVENHOUTBOSCH, 1020 - *Mabaso*
344. Ayanda Democracy Siyaya - 000412 6201 \*\*\* - Belgrade Area, PONGOLA, 3170 - *Masina*
345. Inga Bini - 980417 5736 \*\*\* - Slovo Park, MTHATHA, 5099 - *Siqithi*
346. Mperekeng Derrick Ntilebofu - 850204 5988 \*\*\* - House No 200, Ramangwana, MOLETJIE, 8661 - *Tolo*
347. Mvelo Sthembelenkosini Nxumalo - 020713 5791 \*\*\* - Mvunyane Area, PONGOLA, 3170 - *Dlamini*
348. Mogomotsi Charles Sapele - 020902 6447 \*\*\* - House No 10055 Modimong, TAUNG, 8580 - *Leshoe*
349. Mmatsawela Melita Makola - 800920 0542 \*\*\* - 854 Mothuthong, BRITS, 0250 - *Mataboge*
350. Cashier Nthabeleng Baloyi - 911007 0666 \*\*\* - 36166 Tumelo Street, TSAKANE, 1550 - *Mapotse*
351. Nothando Thembelihle Buthelezi - 011003 1302 \*\*\* - P O Box 6043, NONGOMA, 3950 - *Ndlela*
352. Boitumelo Caron Khobotlo - 970327 0387 \*\*\* - 82 – 7 Champ Road, EVATON, 1984 - *Moabi*
353. Hendrick Joconia Itumeleng Mothabane - 870226 5826 \*\*\* - 2442 Gumenge Street, MOHLAKENG, 1759 - *Matshitse*
354. Lauren Brihtness Manamela - 010607 0996 \*\*\* - 3356 Kgwele Street, WINDMILL PARK, 1459 - *Makhoba*
355. Michael Vhutshilo Mphaphuli - 010329 5732 \*\*\* - Block G, THOHOYANDOU, 0950 - *Sikhwivhilu*
356. Ayanda Israel Ngcobo - 931130 5411 \*\*\* - 56 Hambanathi Road, TONGAAT, 4399 - *Jiyane*
357. Johanna Toys Motong - 700513 0068 \*\*\* - 13661 Madihlaba Street, DAVEYTON, 1520 - *Ditsego*
358. April Chantal Clough - 960102 0139 \*\*\* - 2 Torgway Close, PARKLANDS, 7444 - *Waters*
359. Puleng Piet Sithabathaba - 880707 5461 \*\*\* - 1303 Extension 2, Tshing, VENTERSDORP, 2710 - *Malefo*
360. Xolile Bethuel Bembe - 840308 5802 \*\*\* - Stand No 405, KWANYAMAZANE, 1240 - *Sedibe*
361. Gontse Jobane Modisakeng - 961220 5772 \*\*\* - 6269 Zone 5, LETLABILE, 8264 - *Lebese*
362. Sbusiso Jabulani Mabhena - 010417 5328 \*\*\* - 5077 Zamokuhle Street, Extension 2, MIDDELBURG, 1050 - *Sihlangu*
363. Luzuko Nightingale - 870815 5603 \*\*\* - 48 Blake Way Road, MTHATHA, 5099 - *Mti*
364. Matlhogonolo Meshack Chere - 891125 5877 \*\*\* - Loopeng Village, KURUMAN, 8460 - *Gaobusiwe*
365. Vhahangwele Michael Netshaulu - 010410 5751 \*\*\* - Tshakhuma, VUWANI, 0551 - *Neludani*
366. Ntombifuthi Patience Shabangu - 831107 0319 \*\*\* - 16196 No, BRAAMFISHERVILLE, 1700 - *Mabotsa*

367. Luyanda Engelbert Ndlovu - 020608 5319 \*\*\* - 55 North Carolina Crescent, COSMO CITY, 2188 - *Ncube*
368. Semmy Maseko - 020412 5213 \*\*\* - Po Box 42, HAZYVIEW, 1242 - *Lekhuleni*
369. Vuyo Goodman Thabethe - 020711 5895 \*\*\* - Stand No 201, Phumula, BARBERTON, 1300 - *Nkosi*
370. Amukelani Chauke - 010629 5844 \*\*\* - 896 Matoko-Xikaya, LULEKANI, 1392 - *Baloyi*
371. Nkosingiphile Kunene - 841229 0762 \*\*\* - 8363 Extension 3, ORANGE FARM, 1841 - *Sithole*
372. Sindiswa Dlamini - 980130 1115 \*\*\* - Khokwane Location, Elandskop, PIETERMARITZBURG, 3200 - *Ngcobo*
373. Sifiso Bogale - 890412 5327 \*\*\* - 220 A Pheea Street, White City, JABAVU, 1700 - *Maseko*
374. Nkosingiphile Terence Blose - 000222 5345 \*\*\* - 88 / 250 Zakheleni, UMLAZI, 4031 - *Makhanya*
375. Lefa Jonathan-Junior Mabelebele - 991017 5368 \*\*\* - 1031 Maokeng, Skylab Street, TEMBISA, 1632 - *Moloto*
376. Megan Anthea Bedser - 950406 0041 \*\*\* - 34 B Meent Street, Heather Park, GEORGE, 6530 - *Varty*
377. Lungisani Mthembu - 920623 5516 \*\*\* - Ward 13, Kwa Hlongwa Location, UMZUMBE, 4225 - *Shozi*
378. Malibongwe Nkosi - 951223 5825 \*\*\* - Stand No 30, MAGUDU, 1334 - *Ngomane*
379. Samkeliso Nkosi - 951223 5826 \*\*\* - Stand No 50, MAGUDU, 1331 - *Ngomane*
380. Thapelo Julias Mautsoe - 920905 5720 \*\*\* - House No 1030, Blairgowrie Section, CHANENG, 0314 - *Phatshoane*
381. Irene Mamphepi Qubelo - 840630 0403 \*\*\* - 3760 Zone 13, SEBOKENG, 1900 - *Hlomuka*
382. Morithi Providence Mahlangu - 981223 0767 \*\*\* - 986 Charles Street, Grootfontein Country Estate, CENTURION, 0140 - *Mpofu*
383. Sandile Malusi Mathenjwa - 850501 5656 \*\*\* - Dot 459, White City Area, NONGOMA, 3950 - *Dumisa*
384. Donovan Willie Wolmarans - 920808 5803 \*\*\* - 3 Highlands Road, Park Hill, DURBAN, 4001 - *Singleton*
385. Omphile Seitei - 010814 5294 \*\*\* - 4 Kgwefane Street, RUSTENBURG, 0300 - *Moiloa*
386. Sbonelo Wiseman Sindane - 890316 5901 \*\*\* - 116 Her Heights, Adelaide Street, RUSTENBURG, 0300 - *Khumalo*
387. Moses Obakeng Maungwe - 870413 5268 \*\*\* - 20452 Phakedi, ZEERUST, 2800 - *Moarabi*
388. Sifiso Briason Ndlakama - 931030 5139 \*\*\* - 792 Phiphidi Street, Zone 5, MEADOWLANDS, 1700 - *Ramadibane*
389. Masala Agreement Mbooi - 020828 0532 \*\*\* - 10087 Block H, Tshikuwi, DZANANI, 0955 - *Mudau*
390. Khethukuthula Nokukhanya Mdluli - 020521 0647 \*\*\* - Mthonjeni Area, BHAMBANANI, 3968 - *Mabuyakhulu*
391. Amanda Candy Hadebe - 020621 0334 \*\*\* - 1625 V 9 Section, Wembezi, ESTCOURT, 3310 - *Ngcobo*
392. Nombuso Rato Evah Mbuyane - 020612 0558 \*\*\* - No 20, WATERVALBOVEN, 1195 - *Shakoane*
393. Gcinile Anele Ntusi - 020604 0782 \*\*\* - A 704 Mpumalanga Road, KWAMASHU, 4020 - *Radebe*
394. Thembeke Mthiyane - 020408 1117 \*\*\* - 1351 Ugagane Street, Enseleni Township, EMPANGENI, 3910 - *Mpanza*
395. Sabelo Sandile Msomi - 020805 5234 \*\*\* - F 773 Ntuzuma, KWA MASHU, 4359 - *Ngiba*
396. Vuyile Khanyisile Ntshangase - 020719 0918 \*\*\* - P O Box 761, HLABISA, 3937 - *Buthelezi*
397. Bheki King Mkhathswa - 020705 6155 \*\*\* - 15982 Mandela, Extension 8, DAVEYTON, 1520 - *Hlase*
398. Luvo Ngxovu - 000507 5455 \*\*\* - Mxambuli Area, MQANDULI, 5080 - *Mahlanyana*
399. Ntandoyenkosi Ngcebo Mpungose - 020403 6467 \*\*\* - P O Box 415, NONGOMA, 3950 - *Zulu*
400. Mfanelo Magaqa - 020830 6104 \*\*\* - Nhzimkuhlu Location, UMZIMKHULU, 3297 - *Njiyela*

401. Thuso Onalenna Raymond Mogale - 020106 5538 \*\*\* - Motswedi Village, LEHURUTSHE, 2870 - *Gaotime*
402. Songezo Ncobela - 020520 5399 \*\*\* - Embuzweni Location, Ward 12, UMZIMKHULU, 4600 - *Mbele*
403. Langelihle Fortune Manana - 020712 5442 \*\*\* - 876 Phumlani Street, Extension 2, Langaville, TSAKANE, 1550 - *Nxumalo*
404. Princess Naledi Makwana - 020822 1056 \*\*\* - 748 – 3rd Avenue, Gogo Kate Vilakazi Street, MIDDELBURG, 1055 - *Lerobane*
405. Phezane Ndingi - 020909 5521 \*\*\* - Ngwaqa Location, UMZIMKHULU, 3297 - *Langa*
406. Ayanda Ntshangase - 020928 6154 \*\*\* - Klebe Street, MKUZE, 3120 - *Nene*
407. Siyabonga Mkhathswa - 000131 5888 \*\*\* - Stand No 73, Mganduzweni Trust, KABOKWENI, 1245 - *Matsaba*
408. Sinesipho Ncetani - 000215 5688 \*\*\* - Mdlankomo Area, LIBODE, 5160 - *Takati*
409. Phenyo Conquest Mosinki - 000712 6068 \*\*\* - 1923 Maroro Street, Bodulong, KURUMAN, 8460 - *Dube*
410. Nosipho Zemndeni Lomahoza - 000618 1213 \*\*\* - 124 Everfair Avenue, Randjiesfontein Country Estate, MIDRAND, 1683 - *Rakale*
411. Kwazikwakhe Mabuza - 020201 5434 \*\*\* - 4217 Ghost Fish Street, KAALFONTEIN, 2010 - *Malevu*
412. Simphiwe Dindi - 020327 5575 \*\*\* - Ongoye Area, KWA-DLANGEZWA, 3836 - *Sithole*
413. S'fundo Nhleko - 020219 6166 \*\*\* - P O Box 108, HARDING, 4680 - *Luthuli*
414. Moses Tebogo Ngobeni - 000716 5914 \*\*\* - 510 Dukuza Street, DIEPSLOOT, 2189 - *Maluleka*
415. Sabelo Emmanuel Zikode - 000128 5990 \*\*\* - 397 Smith Street, DURBAN, 4001 - *Xulu*
416. Sinalo Thembelihle Zikalala - 000526 6280 \*\*\* - Watersmeet Area, LADYSMITH, 3370 - *Ngubane*
417. Suprise Martin Thobela - 020430 5580 \*\*\* - Stand No 835, EKULINDENI, 1301 - *Shiba*
418. Phumelele Mthethwa - 000416 5442 \*\*\* - Z 2069, UMLAZI, 4010 - *Shezi*
419. Dimphe Precious Moleko - 000601 1270 \*\*\* - 1307 Rockdale, EKANDLA, 1051 - *Mashigo*
420. Mandilakhe Ntsiko - 000408 0744 \*\*\* - New Payne Location, MTHATHA, 5099 - *Luwaca*
421. Amahle Excelentia Khanyile - 000601 1103 \*\*\* - 663 Thabo Mbeki Village, Lion Park, LANSERIA, 1748 - *Makhoba*
422. Moses Tshepang Motaung - 010203 5671 \*\*\* - 1605 Block 6, SWANNIEVILLE, 1759 - *Rantao*
423. Ntethelelo Ngabhi - 000420 6029 \*\*\* - Private Bag X6022, NONGOMA, 3950 - *Mathula*
424. Khonowaziyo Ishmael Buthelezi - 001105 6182 \*\*\* - 5176 Vent Street, FREEDOM PARK, 1818 - *Ximba*
425. Amukelani Mabaso - 000411 6231 \*\*\* - Hasani, MALAMULELE, 0952 - *Makhanye*
426. Mamogege Tshegofatjo Mothupi - 000423 5886 \*\*\* - 927 Zone A, LEBOWAKGOMO, 0737 - *Kodi*
427. Sebuke Lethabo Maloma - 000623 1113 \*\*\* - 173 Kalkfontein, STEELPOORT, 1133 - *Maimela*
428. Lebo Lusanda Mathumbu - 001202 1136 \*\*\* - 2121 Lusaka Area, Mpanyana Ntelele Road, INANDA, 4309 - *Nzama*
429. Mason Darrell Soetland - 000307 6193 \*\*\* - 973 Calender Street, KNYSNA, 6300 - *Van Rooyen*
430. Thato Moropa - 010908 0889 \*\*\* - 4697 Julius Nyelele Street, Extension 5, DIEPSLOOT, 2100 - *Monyeki*
431. Mondli Vilakazi - 010614 5843 \*\*\* - Mpumazi Reserve, ESHOWE, 3815 - *Dlamuka*
432. Pinky Nonzwakazi Nkaqa - 000522 0600 \*\*\* - Nikawe Location, BIZANA, 4800 - *Nako*
433. Pfano Magidimisa - 010428 5924 \*\*\* - P O Box 352, MAKONDE, 0987 - *Mashige*

434. Simphiwe Domenich Mokoena - 010115 6073 \*\*\* - 3 Rit Me Street, Tassbet, WITBANK, 1035 - *Shongwe*
435. Lister Tsatsawane Marutha - 900226 0886 \*\*\* - Unit 54 Cussonia Centre, 11 Diagonal Street, Halfway House, MIDRAND, 1685 - *Khoza*
436. Noxolo Londeka Loveness Mkhali - 001229 0781 \*\*\* - Verdriet, DANNHAUSER, 3080 - *Masango*
437. Marcum Ntshunxekani Baloyi - 010326 6069 \*\*\* - 7176 Ohega Street, KRUGERSDORP, 1740 - *Vukeya*
438. Mahlatsi Paris Mahasha - 010716 5809 \*\*\* - P O Box 4646, GIYANI, 0826 - *Mabunda*
439. Sifundo Mthabela - 010413 6082 \*\*\* - P O Box 815, MTUBATUBA, 3933 - *Ntshangase*
440. Ziyanda Nobesuthu Afrikander - 011016 0938 \*\*\* - 686 Masingafi Street, Zondi One, SOWETO, 1717 - *Ramoipone*
441. Nhlamulo Cleric Nhlapo - 010209 6102 \*\*\* - 2424 Ruth First, GELUKSDAL, 1550 - *Nyambi*
442. Matoteng Kenneth Kokozela - 011101 5493 \*\*\* - 13456 Snake Park, KROONSTAD, 9499 - *Chabango*
443. Precious Gazu - 010928 0830 \*\*\* - P O Box 1, MAHLABATHINI, 3860 - *Mbatha*
444. Lungile Donald Molefe - 010407 5776 \*\*\* - A 0044 Manyebethwane, MDUTJANA, 0472 - *Sibiya*
445. Thabang Matome Mothobeki - 010926 6049 \*\*\* - P O Box 4063, GA-KGAPANE, 0838 - *Morwasehla*
446. Mokgaetji Gladys Makalla - 790122 0309 \*\*\* - 557 Moshitshane Village, MOKOPANE, 0600 - *Kgopa*
447. Neo Martha Montshioa - 011217 0708 \*\*\* - House No 2185, Selosecha Section, LEDIG, 0338 - *Maboe*
448. Xolani Mbongeni Masango - 011125 6172 \*\*\* - 609 Thembaletu, BELFAST, 1022 - *Nkomo*
449. Tebogo Stefans Mtshweni - 011102 5843 \*\*\* - Stand No 3459, Section F, EKANGALA, 1021 - *Paledi*
450. Cebolakhe Zungu - 010914 5915 \*\*\* - Mpumuza Location, PIETERMARITZBURG, 3200 - *Zuma*
451. S'phesihle Nene - 001115 5895 \*\*\* - B 472 Mathenjwa Area, HAMMARSDALE, 3700 - *Buthelezi*
452. Persuacia Miyelani Nkuna - 000109 1181 \*\*\* - 155 B, PHALABORWA, 1390 - *Mabunda*
453. Sibekezelo Nomalungelo Mpanza - 000923 1115 \*\*\* - Private Bag X135, NONGOMA, 3950 - *Cebekhulu*
454. Londisa Anathi Sithupha - 000107 1091 \*\*\* - Nkhwe Area, BIZANA, 4800 - *Denese*
455. Tumelo Ramalo - 001017 0457 \*\*\* - 4785 Zwane Street, Lawley Extension 2, SOWETO, 1830 - *Phahlane*
456. Nasiphi Skeyi - 000325 1014 \*\*\* - 890 Mwelase Road, CHESTERVILLE, 4091 - *Mlaba*
457. Lindokuhle Kabini - 010302 0643 \*\*\* - 1485 Koekoek Street, EAST LYNNE, 0100 - *Thoka*
458. Kwanga Kenny Bhenu - 011014 5522 \*\*\* - 8880 Rylaan Street, SALDANHA, 7395 - *Sigwela*
459. Cebolenkosi Lungani Mnguni - 010916 5806 \*\*\* - Dondotha Reserve, EMPANGENI, 3910 - *Ndlovu*
460. Katlego Dashi Tlomatsane - 010906 6182 \*\*\* - 274 Block T, SOSHANGUVE, 0152 - *Movalu*
461. Menzi Ratau - 010718 6110 \*\*\* - 5495 Extension 4, DELMAS, 2210 - *Motau*
462. Thobile Martha Malefo - 010725 0955 \*\*\* - 1958 Extension 2, THOKOZA, 1022 - *Kabini*
463. Sandile Ndlovu - 010601 6155 \*\*\* - Empophomeni Location, PIETERMARITZBURG, 3200 - *Langa*
464. Junior Lawrence Masuluke - 011128 5625 \*\*\* - Stand No 257, Maharing Section, SIYABUSWA, 0435 - *Chauke*
465. Sbahle Minenhle Mkhize - 011004 0082 \*\*\* - 223 Mike Du Toit, ELANDSPOORT, 0100 - *Chonco*
466. Sikho Joseph Zanani - 010307 5560 \*\*\* - No 48 Mgosana Street, Tambo Village, MANENBERG, 7764 - *Mapempeni*
467. Sindiswa Olga Sekaja - 011113 1040 \*\*\* - 334 H Section, BOTSHABELO, 9780 - *Mfazwe*

468. Thato Bopape - 010722 5590 \*\*\* - 2813 Extension 44, Ivy Park, POLOKWANE, 0700 - *Ndhlovu*
469. Sandile Sanele Mkhize - 010719 5819 \*\*\* - P O Box 668, NKANDLA, 3855 - *Shandu*
470. Nokwazi Zethembiso Sibisi - 010804 1063 \*\*\* - Mabhaloni Area, ESTCOURT, 3310 - *Cebekhulu*
471. Awodwa Sipolo - 010414 0973 \*\*\* - Marwada Area, MT AYLIFF, 4735 - *Zimase*
472. Mthulisi Nsindiso Makhoba - 011130 5789 \*\*\* - Hlathingwe Area, VRYHEID, 3100 - *Mhlungu*
473. Mthobisi Ndwandwe - 010204 5370 \*\*\* - P O Box 243, NONGOMA, 3950 - *Thabede*
474. Boitumelo Gwangwa - 010701 0929 \*\*\* - P O Box 645, MPHABLELE, 0737 - *Phatudi-Mphahlele*
475. Halalisani Radebe - 011117 5872 \*\*\* - Nyandu Area, MSINGA, 3010 - *Magwanyana*
476. Anathi Sifora - 010930 0883 \*\*\* - 23 Mdlwembe Street, Well's Estate, MOTHERWELL, 6211 - *Sikeyi*
477. Chande Kenon Marais - 000717 6187 \*\*\* - Lot 1250, Mars Road, PORT SHEPSTONE, 4240 - *Steenekamp*
478. Nonduduzo Noxolo Mkhabela - 000909 1363 \*\*\* - P O Box 347, INGWAVUMA, 3968 - *Mngomezulu*
479. Anele Joseph Ndarala - 000806 6008 \*\*\* - 27726 Namibia Square, BLOEMFONTEIN, 9300 - *Jonivaba*
480. Sphiwe Xaba - 000310 6219 \*\*\* - P O Box 183, TUGELA FERRY, 3010 - *Ngubane*
481. Thulani Khumalo - 871022 5694 \*\*\* - 22 Villa Manna, KEMPTON PARK, 1620 - *Sibiya*
482. Moipone Moletsane - 990822 0230 \*\*\* - Room 14 B, Block H, Hostel 3, SEBOKENG, 1983 - *Mokoena*
483. Koos Van Rooyen - 820509 5210 \*\*\* - 4024 Extension 3, Alabama, KLERKSDORP, 2577 - *Mmutlwane*
484. Innocentia Skhosana - 011030 0966 \*\*\* - 0417 Boekenhouhoek, MKOBOLA, 0455 - *Motau*
485. Kgadishi Ndumiso Dikgale - 010920 6048 \*\*\* - 978 Siyabuswa A, SIYABUSWA, 0472 - *Masombuka*
486. Mpho Gift Masetlana - 010726 5744 \*\*\* - 5300 Dimakatso Street, MAMELODI, 0122 - *Mallela*
487. Nhlanhla Knowledge Masondo - 000412 6068 \*\*\* - 524 Tshabalala Street, THOKOZA, 1426 - *Mbule*
488. Nothando Precious Ngubane - 001009 1321 \*\*\* - P O Box 470, HLUHLUWE, 3960 - *Mthethwa*
489. Daniel Mbonani - 650202 5489 \*\*\* - 1 Meyer Drive, SPRINGS, 1560 - *Masilela*
490. Galaletsang Motale - 000404 1167 \*\*\* - 4932 Mokhuane Street, Rocklands, BLOEMFONTEIN, 9300 - *Valashiya*
491. Mangope Onismus Kgaphola - 971214 5522 \*\*\* - 30 Springbok, KRIEL, 2271 - *Selala*
492. Xolani Mahlobo – 720605 5463 \*\*\* - your wife – Nontuthuko Mahlobo – 790427 0617 \*\*\* - and a minor child – Samukelisiwe Bongeka Mbongwa – 100214 0278 \*\*\* - 4465 Gambushe Street, Lamontville, 407 - *Madlala*
493. Caiphus Vilane – 870812 5843 \*\*\* - and two minor children – Okuhle Bridgette Vilane – 130921 1058 \*\*\* - Nosipho Tricia Vilane – 150730 0707 \*\*\* - Stand No 11, Block B, Komatipoort, 1340 - *Chauke*
494. Mmaphaka Marth Makgamata – 850616 0662 \*\*\* - and a minor child - Mmafios Martina Makgamata – 090825 0697 \*\*\* - 2218 Block P, Soshanguve, 0152 - *Putlela*
495. Jacob Simphiwe Ngobese – 851018 5553 \*\*\* - your wife – Ntombifuthi Edistar ngobese – 820519 0417 \*\*\* - and a minor child – Sinakhokonke Ndalwenhle Simphiwe Jr Ngobese – 161128 6056 \*\*\* - E91 Sago Reserve, Kwandengezi, 3607 - *Gumede*
496. Johannes Lesiba Lekalakala – 720119 5768 \*\*\* - your wife Dikeledi Poppy Lekalakala – 850119 0433 \*\*\* – and three minor children – Mmatsatsi Tshegofatso Lekalakala – 061231 0207 \*\*\* - Andronica Relebogile Lekalakala – 081212 0632 \*\*\* - Reneilwe Lesiba Given Lekalakala – 160110 5243 \*\*\* - 2939 Manyeleti, Temba, 0407 - *Leso*
497. Tshidiso Patrick Mathang – 780617 5652 \*\*\* - and two minor children – Oagile Tshiamo Mathang – 120518 0261 \*\*\* - Tshimologo Botshelo Nthite Mathang – 050609 5391 \*\*\* - 3 Balloting Road, Freeway Park, Boksburg, 1459 - *Nhleko-Mathang*

498. Lungile Sweetness Mleya – 860209 0969 \*\*\* - and three minor children – Mzwandile Richard Mleya – 071206 5163 \*\*\* - Sithembiso Senzo Valentine Mleya – 110214 5733 \*\*\* - Thando Amahle Princess Mleya – 140901 0645 \*\*\* - 646 Magubane Street, Mavimbela Section, Katlehong, 1431 - *Dhlamini*
499. Sibusisiwe Gift Spogter – 880705 0680 \*\*\* - and three minor children – Sinalo Spogter – 070310 6020 \*\*\* - Jayron Songenathi Spogter – 090423 5487 \*\*\* - Junaid Similise Spogter – 150924 5318 \*\*\* - 12 Soyama Street, Langa, Uitenhage, 6229 - *Leeuw*
500. Peggie sekgebela – 780223 0374 \*\*\* - and two minor children – Iethabo sekgebela – 081108 5706 \*\*\* - surprise leeto sekgebela – 190212 6581 \*\*\* - Dichoeung Village, Marble Hall, 0450 - *Kanyane*
501. Mpho Ivan Motjopi - 790704 5240 \*\*\* - your wife Raisibe Modiegi Elizabeth Motjopi – 841208 0634 \*\*\* -and two minor children – Moshimodi Jessica Motjopi – 150429 0703 \*\*\* – Holofelang Timothy Motjopi – 130213 5552 \*\*\* - P O Box 325, Seshego, 0742 - *Malebana*
502. Nkosinathi Mbulelo Mashiyi - 770927 5504 \*\*\* - your wife – Tokozile Truelove Mashiyi – 791202 0396 \*\*\* - and three minor children - Hlalunathi Liziwe Thando Mashiyi - 070716 0388 \*\*\* - Lizolile Lathi-Tha Sonwabale Mashiyi – 121009 0187 \*\*\* - Lubabalo Nceba Mashiyi – 200513 5759 \*\*\* - 32 Du Toit Street, Ravenwood, Boksburg, 1459 - *Nonkwelo*
503. Sipiwe Aaron Nhlapo - 791104 5174 \*\*\* - your wife Ntombizodwa Martha Nhlapo – 790404 1478 \*\*\* - and a minor child Njabulo Nhlapo – 120403 5678 \*\*\* - 182 Ngema Section, Hlathi Street, Katlehong, 1431 - *Mokwena*
504. Frank Ramoshaba - 721201 5394 \*\*\* - and three minor children – Omphile Kgothatso Ramoshaba – 050823 5142 \*\*\* – Thabang Ramoshaba – 080114 5442 \*\*\* – Kelebogile Ramoshaba – 080114 0409 \*\*\* - 66/209 Mahube Valley, Extension 2, Mamelodi East, 0122 - *Ncube*
505. Osea Ali Ameen – 800403 5351 \*\*\* - your wife – Thando Charlot Ameen – 820922 1141 \*\*\* –and six minor children – Nandi Thando Ameen – 031226 0191 \*\*\* – Oscar Ali Ameen – 061113 5691 \*\*\* – Amirah Zinhle Ameen – 141119 0878 \*\*\* - Malik Eli Ameen – 190607 6193 \*\*\* - Malika Ataliah Ameen – 190607 1253 \*\*\*
506. Nqobile Blessing Ameen – 100704 5717 \*\*\* - 1379 Village Main Street, Strubenvale, Extension 2, Springs, 1559 - *Khumalo*
507. Mpho Caroline Nxumalo - 941023 0359 \*\*\* - and a minor child Thoriso Sinethemba Hope Nxumalo – 190807 6540 \*\*\* - 3495 Masichaba, Extension 3, Duduza, 1493 - *Matyila*
508. Thembelani lungani - 820213 5570 \*\*\* - your wife – Ziyanda Lungani – 920530 0960 \*\*\* – and a minor child – Banothando Sixaso – 190222 0626 \*\*\* - 3345 Ekuphumleni Ndevana Location, King Williams Town, 5600 - *Baneti*
509. Ashwell Oswald Erasmus - 810115 5070 \*\*\* - your wife – Michelle Vivian Erasmus – 850209 0024 \*\*\* - and four minor children - Tamlyn Michlyn Erasmus – 030522 0141 \*\*\* - Storme Ashwell Erasmus – 090901 5670 \*\*\* - Matthew Leslie Erasmus – 090901 5667 \*\*\* - Luke Michael Erasmus – 090901 5669 \*\*\* - 17 12th Street, Maraisburg, 1709 - *Tainton*
510. Obakeng Mohatsi - 970829 0401 \*\*\* and a minor child Zanelizwe Lulonke Avery Mohatsi – 200910 6295 \*\*\* - 2306 Lebusa Street, Mohlakeng, Randfontein, 1759 - *Nyembe*
511. Nokuzola Yvodla Mtakwende - 880411 0257 \*\*\* - and two minor children – Siphesihle Lethabo Junior Mtakwende – 100620 5364 \*\*\* - Melokuhle Kgaogelo Mtakwende – 150530 1028 \*\*\* - 635 Nkonono Crescent, Extension 5, Phonong, Katlehong, 1431 - *Mataka*
512. Zolani Denzel Msomi - 740825 5382 \*\*\* and your wife – Nomkhosi Promise Msomi – 750309 0255 \*\*\* - - B B 1306, Umlazi, 4031 - *Miya*
513. Nonkululeko Princess Bhengu - 880415 0794 \*\*\* - and a minor child Siphesihle Phemello Bhengu – 110323 1422 \*\*\* - 25 Madlala Road, Gamalakhe, 4249 - *Mavundla*
514. Vuyani Mayongo - 770504 5904 \*\*\* and a minor child – Siyabonga Mayongo – 080223 5746 \*\*\* - Manzimdaka Area, Cala, 5455 - *Botha*
515. Fanelekile Craig Dlomo - 790506 5417 \*\*\* -and your wife – Nomagcino Pretty Dlomo – 821105 1258 \*\*\* - 72 Roland Chapmen, Mount Clair, 4004 - *Nonjabe*
516. Chenille Wehr - 911217 0030 \*\*\* - and a minor child – Le'skye Di-Nah Wehr – 160821 1005 \*\*\* - 124 Vanzyk Avenue, Worcester, 6850 - *Ockhuis*
517. Katleho Thabisile Precious Mdlala - 000712 0483 \*\*\* - and a minor child – Simphiwe Thuto Nkanyezi Mdlala – 200720 1023 \*\*\* -, 7029 Moelani Street, Motloung, Katlehong, 1431 - *Dlamini*
518. Christian Choshi - 800919 5402 \*\*\* - and your wife – Dineo Dieketseng Confidence Choshi – 810623 0452 \*\*\* and three minor children - Lesedi Masego Choshi – 060508 0182 \*\*\* - Lesedi Masego Choshi – 200310 6091 \*\*\* - Onalerona Caroline Choshi – 131212 0562 \*\*\* - House 12103, Block X Extension, Mabopane, 0190 - *Nhlapo*
519. Portia Mtubane - 811221 0588 \*\*\* - and two minor children – Masego Ashante Mtubane – 060108 1375 \*\*\* - Realeboga mtubane – 160131 0840 \*\*\* - 7042 Matsime Street, Thokoza, 1426 - *Watson*

520. Sedipa Daphney Mokgomme - 811216 0849 \*\*\* - and two minor children – Nompumelelo Nomsombuluko Ettie Mokgomme – 060422 0478 \*\*\* - Nqobile Ofentse Mokgomme – 070817 0237 \*\*\* - P O Box 230, Bochum, 0790 - *Moshokwa*
521. James Seepe Mogale - 840721 5365 \*\*\* - your wife – Rudzani Noria Mogale – 860214 0898 \*\*\* - and a mionor child – Modjadji Onthatile Daniella Mogale – 120531 0327 \*\*\* - 1264 Mamadimo Park, Mankweng, 0727 - *Rakgwale*
522. Elizabeth Hlamalani Baloyi - 820702 0718 \*\*\* - and four minor children – Hlulani Isabel Naledi Baloyi – 200725 1041 \*\*\* - Amukelani Precious Baloyi – 070524 0726 \*\*\* - Lethabo Theo Baloyi – 030617 5265 \*\*\* - Ethan Joseph Junior Baloyi – 101030 5330 \*\*\* - 169 Block A, Mabopane, 0190 - *Maluleke*
523. Lucky Ofentse Lotata - 811102 5505 \*\*\*your wife Thandi Lotata – 881105 0373 \*\*\* – and two minor children – Thuso Fortune Lotata – 160628 5130 \*\*\* - Archibald Thamsanqa Lotata – 190421 5398 \*\*\* - House No 30180, Leksalong Village, Rustenburg, 0300 - *Monageng*

## SOUTH AFRICAN QUALIFICATIONS AUTHORITY

NO. 697

6 August 2021



## SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

**INVITATION TO COMMENT:  
REQUEST FOR PUBLIC COMMENT ON SAQA'S INTENTION TO RECOGNISE A NEW  
PROFESSIONAL BODY AND REGISTER PROFESSIONAL DESIGNATIONS**

**1. Recognition of a New Professional Body**

The public is kindly invited to comment on SAQA's intention to recognise the South African Institute of Medico-Legal Experts (SAIME) and to register its two professional designation titles namely:

- a. Certified Medico-Legal Expert
- b. Fellow Medico-Legal Expert

The detailed SAIME application, seeking recognition and the registration of its professional designations, is available on the SAQA Website: [saqa.org.za](http://saqa.org.za).

**2. Registration of Additional Designations**

The public is invited to comment on SAQA's intention to register additional designations for the Professional Body listed below:

**2.1 Coaches and Mentors of South Africa (COMENSA)****Three additional professional designation titles**

- a. COMENSA Credentialed Mentor (CCM)
- b. COMENSA Senior Mentor (CSM)
- c. COMENSA Master Mentor (CMM)

The detailed COMENSA application, seeking registration of its professional designations, is available on the SAQA Website: [saqa.org.za](http://saqa.org.za).

Public comments regarding the above must reach SAQA no later than 30 days after publication of this Notice. All correspondence must be addressed to Mr JHA Nel, Senior Manager: Registration and Recognition at e-mail addresses: [kmadue@saqa.org.za](mailto:kmadue@saqa.org.za) / [nmukari@saqa.org.za](mailto:nmukari@saqa.org.za).

A handwritten signature in black ink that reads 'Reddy' with a stylized flourish underneath.

**DR JULIE REDDY  
EXECUTIVE OFFICER, SAQA**

## DEPARTMENT OF TRADE, INDUSTRY AND COMPETITION

NO. 698

6 August 2021

**CO-OPERATIVES THAT HAVE BEEN REMOVED FROM THE REGISTER**

1. MOUNT ZION DEVELOPMENT PRIMARY CO-OP LTD 2014/007108/24
2. IZIMPILO ZETHU DEVELOPMENT PROJECTS AND MULTI-PURPOSE PRIMARY CO-OP LTD 2016/004157/24
3. INTATHAKUSA TRANSPORT AND LOGISTICS PRIMARY CO-OP LTD 2016/005987/24
4. TAMBO PROJECTS MULTIPURPOSE PRIMARY CO-OP LTD 2018/001307/24
5. ZIYENDANE AGRICULTURAL PRIMARY CO-OPERATIVE LIMITED 2012/015970/24
6. UMNOTHO WASEKHAYA JEWELLERY TRAINING INSTITUTION PRIMARY CO-OP LTD 2012/010280/24
7. AMALANGENI 442 TRADING PRIMARY CO-OP LTD 2014/005906/24
8. FUMANI CLEANING AND MULTI-PURPOSE PRIMARY CO-OP LTD 2009/001045/24
9. PONELOPELE PROJECTS JW PRIMARY CO-OP LTD 2015/001535/24
10. PEO SKILLS DEVELOPMENT PRIMARY CO-OP LTD 2012/010966/
11. SENZANGAKHONA AGRICULTURAL CO-OP LTD 2011/010759/24
12. NORTHERN CAPE EXPERT MATERIAL WORK CO-OP LTD 2018/004095/24
13. BIG JINGELS CO-OP LTD 2011/001558/24
14. EMMANUEL MAINTENANCE PRIMARY CO-OP LTD 2017/003527/24
15. THEMBALESIZWE CLEANING SERVICES PRIMARY CO-OP LTD 2008/000696/24
16. AMAHLUBI FARMING AND N3 MAINTENANCE PRIMARY CO-OP LTD 2017/005463/24
17. UZINIKELE MULTI-PURPOSE PRIMARY CO-OP LTD 2013/014457/24
18. SISOWAFEZI GENERAL TRADING PRIMARY CO-OP LTD 2013/004939/24
19. PHUMALANGA SOTHE INTUTHUKO PRIMARY CO-OP LTD 2009/006064/24
20. EPIKOUQIA TRADING AND PROJECTS PRIMARY CO-OP LTD 2013/018072/24
21. IZETHEMBISO PROJECTS PRIMARY CO-OPERATIVE LIMITED 2014/008899/24
22. FEZILE INVESTMENTS PRIMARY CO-OP LTD 2012/018761/24
23. REQUEST GRANTED PRIMARY CO-OP LTD 2012/003914/24
24. ABBA 276 MULTIPURPOSE PRIMARY CO-OP LTD 2017/012850/24
25. EKAMSUTHU PRIMARY CO-OP LTD 2014/008685/24
26. YOUNG SOLUTION WASTE PRIMARY CO-OP LTD 2019/000291/24
27. TECHPIONEERS PRIMARY CO-OPERATIVE LIMITED 2019/004384/24
28. GEETHA MALA PRODUCTIONS PRIMARY CO-OPERATIVE LIMITED 2015/000418/24

Notice is hereby given that the names of the abovementioned Co-operatives have been struck off the register from the register in terms of the provisions of section 71A of the Co-operatives Amendment Act, No 6 of 2013.

Any objections to this procedure, which interested persons may wish to raise, must together with the reasons therefore, be lodged with this office before the expiration of the period of thirty days.

REGISTRAR OF CO-OPERATIVES  
Office of the Registrar of Co-operatives  
Dti Campus  
77 Meintjies Street  
Pretoria  
0002

Private Bag X237  
Pretoria  
0001

**DEPARTMENT OF TRADE, INDUSTRY AND COMPETITION**

NO. 699

6 August 2021

**SOUTH AFRICAN SUGAR ASSOCIATION – EXTENSION OF CONDITIONAL EXEMPTION GRANTED**

1. On 17 August 2020, the South African Sugar Association (“SASA”) and its members, hereinafter jointly referred to as (“the Applicants”) filed an application for an exemption in terms of Section 10 of the Competition Act No 89 of 1998, as amended (“the Competition Act”). The exemption was requested for a period of one year, from the date of the application up to and including 30 June 2021.
2. SASA is a statutory body established in terms of Section 2(1) of the Sugar Act No. 9 of 1978 (“the Sugar Act”). SASA provides a variety of services to its members in order to support the functioning of the regulatory framework within which the industry operates, and acts as a representative of the industry in relation to engagements with external stakeholders. SASA’s members comprise of two levels of the value chain, namely Growers and Millers and are made up of the associations which represent the interests of those levels. These are (1) the South African Sugar Miller’s Association (“SASMA”); (2) the South African Cane Growers Association (“SACGA”); and (3) the South African Farmer’s Development Association (“SAFDA”).
3. The exemption application was brought in terms of Section 10(1) of the Competition Act which allows a firm to apply to the Commission to exempt an agreement, a practice and/or a category of agreements from the provisions of Chapter 2 of the Competition the Act. SASA relied on the objective set out in Section 10(3)(b)(iv) of the Competition Act, which allows an exemption of agreements and/or practices that contribute to the economic stability of any industry designated by the Minister of Trade, Industry and Competition (“Minister”).
4. The exemption application covered the following practices by SASA and its members:
  - 4.1. restrain producer price increases of sugar in terms of timing, notice and manner of implementing such price increases;
  - 4.2. share competitively sensitive information and in light of that information, engage regarding various options for interventions that could be implemented to support small-scale growers and ensure that they become a sustainable part of the sugar supply chain, in line with the objectives of the Sugar Master Plan;
  - 4.3. share competitively sensitive information of the various sugar industry participants, including growers, millers and refiners and in light of that information engage on the various means by which the industry could implement a restructuring of the nature contemplated in the Sugar Master Plan; and

- 4.4. share competitively sensitive information with the Eswatini Sugar Association (including in relation to production volumes, local and export sales volumes, notional pricing, and identification of diversification opportunities) and in light of this information engage with the Eswatini Sugar Association to achieve policy harmonisation to the mutual benefit of each country's sugar producers.
5. The Commission's investigation resulted in the following findings:
  - 5.1. the conduct of SASA's members would result in a contravention of Section 4 of the Competition Act as the application relates to coordination and information exchange between parties in a horizontal relationship;
  - 5.2. the exemption may contribute to the economic stability of the sugar industry; and
  - 5.3. the exemption can be used as an instrument for transformation and the opening up of the sugar industry to previously disadvantaged individuals, particularly small-scale sugarcane growers, in line with the objectives of the Competition Act.
6. Based on these findings, the Commission granted the Applicants a conditional exemption up to and including 30 June 2021. The exemption was subject to monitoring mechanisms which the Commission put in place to ensure that the objectives set out in the application are met within the scope of the exemption. The decision of the Commission was published in Government Gazette No. 43872 on 06 November 2020.
7. Subsequently, on 07 June 2021, the Applicants submitted an application requesting the Commission to extend their conditional exemption by 24 months (i.e. up to 30 June 2023) in light of the Minister's extension of the designation of the sugar industry to 30 June 2023 as published in Government Gazette No. 44653 on 3 June 2021. The scope of the application remains unchanged as set out above and the basis for the request is to accommodate additional time required to achieve the economic stability of the sugar industry.
8. After due consideration of the above, the Commission has decided to grant SASA and its' members an extension of the conditional exemption, up to and including 30 June 2023. The conditions and monitoring mechanisms will remain the same as those gazetted on 06 November 2020.

## DEPARTMENT OF WATER AND SANITATION

NO. 700

6 August 2021

**NATIONAL WATER ACT, 1998  
(ACT NO. 36 OF 1998)****PROPOSED RESERVE DETERMINATION FOR WATER RESOURCES OF THE BREEDE-GOURITZ WATER MANAGEMENT AREA**

I, Lindiwe Sisulu, in my capacity as Minister of Human Settlements, Water and Sanitation, having complied with section 13 of the National Water Act, 1998 (Act No. 36 of 1998) ("the Act") and regulation 3 of the Regulations for the Establishment of Water Resource Classification System (No. R. 810 Government Gazette No. 33541, 17 September 2010), and duly authorised in terms of section 16(1) of the Act, hereby publish, for public comment in accordance with section 16(3) of the Act, the proposed Reserve for water resources of the Breede-Gouritz Water Management Area, as set out in the Schedule to this Notice.

Any person who wishes to submit written comments with regards to the proposed Reserve should submit the comments within 60 days from the date of publication of this Notice to:

Director: Reserve Determination  
Attention: Mr Yakeen Atwaru  
Department of Human Settlements, Water and Sanitation  
Ndinaye Building 185 Francis Baard Street  
Private Bag X313  
Pretoria  
0001  
Email: [atwaruy@dws.gov.za](mailto:atwaruy@dws.gov.za)



**MS LINDIWE SISULU**  
**MINISTER OF HUMAN SETTLEMENTS, WATER AND SANITATION**  
DATE: 26/08/2021

**PROPOSED RESERVE FOR WATER RESOURCES OF THE BREEDE-GOURITZ WATER  
MANAGEMENT AREA IN TERMS OF SECTION 16(1) AND (2) OF THE NATIONAL WATER ACT,  
1998 (ACT NO. 36 OF 1998)**

**SCHEDULE**

**1. DESCRIPTION OF WATER RESOURCE**

1.1. The Reserve is determined for all or part of every significant water resource within the Breede-Gouritz Water Management Area as set out below:

Water Management Area:	Breede-Gouritz
Drainage Regions:	G40-G50, H10- H90, J11-J40, K10-K70 Tertiary Drainage Region
Rivers:	Breede Overberg Area: Breede River, Rivieronderend River, Overberg River, as well as other smaller coastal rivers. Gouritz Coastal Area: Gouritz River, Buffels River, Touws River, Groot River, Gamka River, Olifants River, Kammanassie River, and smaller coastal rivers.

1.2. The Minister has in terms of section 12 of the National Water Act, 1998 (Act No.36 of 1998) ("the Act"), prescribed a system for classifying water resources by issuing Government Notice No. R. 810, published in *Government Gazette* No. 33541 dated 17 September 2010. In terms of section 16(1) of the Act, the Minister must, as soon as reasonably practicable after the class of all or part of a water resource has been determined, by Notice in the *Gazette*, determine the Reserve for all or part of that water resource.

1.3. The Minister, in terms of section 16(3) of the Act, proposes, for the purpose of section 16(1) of the Act, the following Reserve determination for the Breede-Gouritz Water Management Area.

**2. PROPOSED RESERVE DETERMINATION AS REQUIRED IN TERMS OF SECTION 16(1) AND (2) OF THE NATIONAL WATER ACT, 1998**

2.1. The proposed Reserve which includes the Ecological Water Requirements (EWRs) and the Basic Human Needs Reserve (BHN) for the Rivers at EWR sites and selected biophysical nodes in the Breede-Gouritz Water Management Area is set out in **Section 4**. The Gouritz and Breede-Overberg Catchments and EWR sites are indicated in **Figure 1 and 2 respectively**.

2.2. The Water Quality component of the proposed Reserve for the Rivers at the EWR sites in Breede-Gouritz Water Management Area in terms of section 16(1) of the Act is set out in **Section 5**.

2.3. The proposed Groundwater Reserve for Water Quantity and Quality in terms of section 16(1) of the Act for the Breede-Gouritz Water Management Area is set out in **Section 6**.

2.4. The proposed Estuarine Reserve in terms of section 16(1) of the Act for the Breede-Gouritz Water Management Area is set out in **Section 7**.

2.5. The proposed Wetland Reserve in terms of section 16(1) of the Act for the Breede-Gouritz Water Management Area catchment is set out in **Section 8**.

2.6. The Reserve will apply from the date signed off as determined in terms of section 16(1) of the Act, unless otherwise specified by the Minister.

### 3. ACRONYMS AND DEFINITIONS

#### 3.1 Acronyms

BHN	Basic Human Needs
EC	Ecological Category
EcoSpecs	Ecological Specifications
EIS	Ecological Importance and Sensitivity
ER	Ecological Reserve
EWR	Ecological Water Requirement
MAR	Mean Annual Runoff
MCM	Million Cubic Metres
PES	Present Ecological Status
RC	Reference conditions
REC	Recommended Ecological Category
TPCs	Thresholds of Potential Concern
WQSU	Water quality sub-unit

#### 3.2 Definitions

**Baseflow** is a sustained low flow in rivers during dry or fair weather conditions, but not necessarily all contributed by groundwater; includes contribution from delayed interflow and groundwater discharge.

**Ecological Importance and Sensitivity (EIS):** Key indicators in the ecological classification of water resources. Ecological importance relates to the presence, representativeness and diversity of species of biota and habitat. Ecological sensitivity relates to the vulnerability of the habitat and biota to modifications that may occur in flows, water levels and physico-chemical conditions.

**Ecological Water Requirements (EWR):** The flow patterns (magnitude, timing and duration) and water quality needed to maintain a riverine ecosystem in a particular condition. This term is used to refer to both the quantity and quality components.

**Ecological Water Requirement (EWR) Sites:** Specific points on the river as determined through the site selection process. An EWR site consists of a length of river which may consist of various cross-sections for both hydraulic and ecological purposes. These sites provide sufficient indicators to assess environmental flows and assess the condition of biophysical components (drivers such as hydrology, geomorphology and physico-chemical) and biological responses (viz. fish, invertebrates and riparian vegetation).

**Present Ecological State (PES):** A category indicating the current health or integrity of various biological attributes of the water resource, compared to the natural or close to natural reference conditions. The results of the process are provided as Ecological Categories (ECs) ranging from A (near natural) to F (completely modified) for the PES.

**Recharge** is the addition of water to the zone of saturation, either by downward percolation of precipitation or surface water and/ or the lateral migration of groundwater from adjacent aquifers.

**Recommended Ecological Category (REC):** An ecological category indicating the ecological management target for a water resource based on its ecological classification that should be attained. Categories range from Category A (unmodified, natural) to Category D (largely modified).

**Reserve:** is the quantity and quality of the water required to satisfy the basic human needs by securing a basic water supply and to protect the aquatic ecosystem in order to secure ecologically sustainable development and use of the relevant water resource.

**River Node (biophysical node):** These are modelling point's representative of an upstream reach or area of an aquatic eco-system (rivers, wetlands, estuaries and groundwater) for which a suite of relationships apply.

**Sub-quaternary catchments:** A finer subdivision of the quaternary catchments (the catchment areas of tributaries of main stem rivers in quaternary catchments).

#### 4. SURFACE WATER QUANTITY COMPONENT FOR RIVERS AT SELECTED EWR SITES AND NODES

The Reserve consists of two parts – the Basic Human Need (BHN) Reserve and the Ecological Reserve (ER). The BHN Reserve provides for the essential needs of individuals served by the water resource in question and includes water for drinking, food preparation and for personal hygiene. The ER relates to the water required to protect the aquatic ecosystems of the water resource. The Reserve refers to both the **quantity** and **quality** of the water in the resource, and will vary depending on the class of the resource (Class I, II and III).

##### BREED-OVERBERG AREA (ECOLOGICAL RESERVE)

Table 4.1: Summary of the data for Nodes and EWR sites. EWR Sites are indicated in bold.

Quaternary Catchment	Node/ EWR site	Water Resource	PES	EIS	REC	nMAR (MCM)	EWR nMAR (%)
G40C	Piii1	Palmiet	B	High	B	39.9	19.1
G40C	Piv10	Witklippiesskl oof	D	High	D	15.1	21.5
G40C	Piv9	Palmiet	D	High	B	78.8	21.5
G40C	Piv8	Klipdrift	D	High	D	13.6	21.5
G40D	Piv4	Klein-Palmiet	D	High	D	13.7	21.5
G40D	Piv7	Krom/Ribbok	D	Very High	A	27.5	21.5
G40D	Piii2	Palmiet	C	Very High	B/C	206.6	31.2
G40D	Piv12	Dwars/Louws	C	Very High	C	25.2	100.0
G40D	Piii3	Palmiet	C	Very High	B	250.4	34.5
G40G	Niii5	Bot	C	Very High	A	31.9	21.3
G40H	Nx6	Onrus	E	High	B	5.1	13.4
G40F	Niv43	Swart	E	High	B	42.1	13.3
G40K	Niv45	Steenbok	E	Very High	A	10.8	12.2
G40J	Nii4	Hartebees	D	Very High	B	18.4	12.5
G40K	Nv23	Klein	D	Moderate	C	43.0	19.3
G40M	Nx8	Uilkraal	C	Very High	A	2.4	19.2
G50B	Ni4	Nuwejaar	D	Moderate	D	12.5	13.0
G50C	Nvii15	Heuninges	D	-	D	17.8	13.1
G50C	Niv44	Heuninges	D	Very High	B	18.8	13.1
G50C	Nii5	Kars	E	Very High	B	21.6	20.4
G50E	Nv24	Kars	C	Moderate	B	15.4	30.3
G50H	Nii7	DeHoop Vlei	B	High	B	27.1	30.0
G50H	Nii6	Sout	D	-	B	4.2	12.6
H10B	Nvii3	Rooikloof	B	High	B	6.807	37.95
H10B	Niv3	Titus	C	Moderate	C	26.2	22.0
H10C	Niv1	Koekedou	D	Very High	A	18.8	14.2
H10C	Niv2	Dwars	C	High	B	74.9	22.0
H10D	Nvi4	Breede	D	Moderate	D	175.509	17.51
H10D	Niv4	Witels	A	Very High	A	84.3	43.3
H10D	Nvi3	Breede	C	High	B	252.8	31.7
H10E	Nvi2	Wit	A	Very High	A	42.6	46.6
H10F	Niv6	Wabooms	D	High	B	7.4	14.4
<b>H10F</b>	<b>Nviii1/ EWR1</b>	<b>Breede</b>	<b>D/E</b>	<b>High</b>	<b>D</b>	<b>434.90</b>	<b>31.7</b>
H10G	Niv7	Slanghoek	D	High	B	32.6	14.5
H10G	Niii1	Breede	D	High	B	497.6	25.4
H10J	Niv40	Elands	B	Very High	A	58.1	50.8
H10J	Niv41	Krom	B	Very High	A	9.0	50.8
<b>H10J</b>	<b>Nvii2/ EWR2</b>	<b>Molenaars</b>	<b>C</b>	<b>Very High</b>	<b>B</b>	<b>105.6</b>	<b>35.0</b>
H10J	Niv42	Molenaars (Smalblaar)	E	High	B	191.2	17.4

Quaternary Catchment	Node/ EWR site	Water Resource	PES	EIS	REC	nMAR (MCM)	EWR nMAR) (%)
H10K	Niv12	Holsloot	C	High	B	119.5	35.0
H10H	Nvii6	Hartbees	D	Very High	A	4.0	14.4
H10H	Niv9	Hartbees/ Wetskloof	D	Very High	A	10.2	14.4
H10L	Nv3	Breede	C	High	B	850.9	31.7
H20G	Nvii7	Hex	C	Moderate	C	102.8	22.3
H20H	Niv10	Hex	D	High	B	107.1	22.3
H40B	Nvii5	Koo	D	High	B	0.9	13.1
H40C	Niv11	Nuy	E	High	B	29.4	13.2
H40D	Niv13	Doring	E	High	B	47.4	12.9
<b>H40F</b>	<b>Nvii8/ EWR3</b>	<b>Breede</b>	<b>C/D</b>	<b>Moderate</b>	<b>C/D</b>	<b>1042.8</b>	<b>45.5</b>
H40G	Nvii11	Poesnels	D	High	B	16.1	12.8
H40K	Niv14	Keisers	D	Very High	A	12.6	12.5
H40H	Niv15	Vink	D	Very High	A	15.6	12.4
H30C	Niv20	Pietersfontein	D	Moderate	C	17.3	12.0
H30B	Niv18	Kingna	D	High	B	27.1	12.3
H30D	Nvii9	Keisie	D	High	B	21.5	11.9
H30E	Nii2	Kogmanskloof	D	Very High	B	52.0	18.9
H50B	Ni2	Breede	D	High	B	1170.1	17.3
H60B	Nvii10	Du Toits	B	Very High	A	43.9	50.8
H60D	Nv7	Riviersonderend	C	Very High	A	370.2	30.1
<b>H60E</b>	<b>Niv28/ EWR6</b>	<b>Baviaans</b>	<b>B</b>	<b>High</b>	<b>B</b>	<b>7.9</b>	<b>70.90</b>
H60E	Niv29	Sersants	D	High	B	4.6	29.9
H60F	Niv30	Gobos	C	Very High	A	12.4	48.1
<b>H60F</b>	<b>Nv9/EWR5</b>	<b>Riviersonderend</b>	<b>D</b>	<b>High</b>	<b>D</b>	<b>413.7</b>	<b>24.5</b>
H60G	Niv31	Kwartel	D	High	B	10.7	13.4
H60H	Niv33	Soetmelksvlei	D	Very High	A	4.0	29.9
H60H	Niv34	Slang	D	Very High	A	2.1	29.9
H60H	Nv10	Riviersonderend	D	Very High	A	442.9	24.5
H60K	Niv35	Kwassadie	E	Very High	A	5.9	17.3
H60L	Ni3	Riviersonderend	D	High	B	483.8	24.5
H70A	Niv24	Leeu	E	Very High	A	5.8	12.6
H70B	Nv2	Breede	C	High	B	1701.4	26.4
H70D	Nii3	Tradouw	B	Very High	A	19.4	29.9
H70F	Niv25	Buffeljags	E	High	B	119.4	14.1
<b>H70G</b>	<b>Niii4/ EWR4</b>	<b>Breede</b>	<b>C</b>	<b>Very High</b>	<b>B/C</b>	<b>1832.7</b>	<b>40.1</b>
H70J	Niv26	Slang	E	High	B	10.0	14.2

## GOURITZ COASTAL AREA (ECOLOGICAL RESERVE)

Table 4.2: Summary of the data for Nodes and EWR sites. EWR sites are indicated in bold.

Quaternary Catchment	Node/ site	EWR	Water Resource	PES	EIS	REC	nMAR (MCM)	EWR nMAR (%)
J11C	giv34		Buffels	B	High	B	13.1	26.5
J11F	gv25		Buffels	B	High	B	24.2	17.8
<b>J11H</b>	<b>J1BUFF-EWR5</b>		<b>Buffels</b>	<b>C</b>	<b>Moderate</b>	<b>C</b>	<b>27.4</b>	<b>17.9</b>
J11K	giv32		Groot	D	High	B	30.5	17.9
J12D	giv28		Touws	D	High	B	16.4	11.3
J12H	giv27		Touws	B	Moderate	C	26.4	26.8
J12K	giv26		Brak	C	High	B	2.9	17.7
<b>J12L</b>	<b>J1DORI-EWR7</b>		<b>Doring</b>	<b>C/D</b>	<b>Low</b>	<b>C/D</b>	<b>2.9</b>	<b>12.0</b>
J12L	J12L Modelled		Huis	D		D	1.56	40.3
<b>J12M</b>	<b>J1TOUW-EWR3</b>		<b>Touws</b>	<b>B/C</b>	<b>High</b>	<b>B/C</b>	<b>33.5</b>	<b>17.8</b>
J13B	gv7		Groot	C	High	B	72.7	18.0
J13C	gii3		Groot	B	High	B	78.1	27.0
J21D	giv3		Gamka	B	High	A	31.9	27.1
J22F	giv1		Koekemoers	C	Very High	A	7.4	17.9
J22K	giv2		Leeu	C	Very High	A	17.1	17.9
J23F	gv17		Gamka	B	High	B	58.1	27.0
J23J	gv27		Gamka	C	High	B	69.6	18.3
J24E	gv14		Dwyka	A	High	B	4.0	39.1
<b>J25A</b>	<b>J2GAMK-EWR4</b>		<b>Gamka</b>	<b>C/D</b>	<b>High</b>	<b>C</b>	<b>79.8</b>	<b>14.9</b>
J25E	gii2		Gamka	C	High	B	111.8	15.2
<b>J31D</b>	<b>J3OLIF-EWR9</b>		<b>Olifants</b>	<b>C</b>	<b>Moderate</b>	<b>C</b>	<b>11.8</b>	<b>17.8</b>
J32E	giv15		Traka	C	High	C	2.7	17.9
J33B	gv33		Olifants	D	High	B	25.0	11.9
J33E	gv21		Meirings	C	Very High	A	21.4	19.1
J33F	giv11		Olifants	E	High	B	80.0	12.4
<b>J34C</b>	<b>J3KAMM-EWR10</b>		<b>Kammanassie</b>	<b>C/D</b>	<b>Low</b>	<b>C/D</b>	<b>41.2</b>	<b>15.3</b>
J34F	giv10		Leeu	E	Very High	A	59.2	12.1
J35E	gv19		Olifants	E	High	B	224.5	12.9
J35F	giv17		Olifants	D	High	B	253.4	12.9
<b>J40B</b>	<b>J4GOUR-EWR6</b>		<b>Gouritz</b>	<b>C</b>	<b>Moderate</b>	<b>C</b>	<b>489.1</b>	<b>14.8</b>
J40E	gv9		Gouritz	C	High	B	571.8	14.8
H80B	giii5		Duiwenhoks	E	Very High	A	62.5	20.1
<b>H80E</b>	<b>H8DUIW-EWR1</b>		<b>Duiwenhoks</b>	<b>D</b>	<b>Low</b>	<b>D</b>	<b>83.2</b>	<b>20.9</b>
H90C	giv27		Korinte	D	High	B	34.1	14.5
<b>H90C</b>	<b>H9GOUK-EWR2</b>		<b>Goukou</b>	<b>C/D</b>	<b>Moderate</b>	<b>C/D</b>	<b>50.9</b>	<b>24.2</b>
H90E	gv41		Goukou	C	High	B	105.0	28.2
K10D	giv25		Brandwag	D	High	B	17.9	9.9
K20A	gvii7		Groot-Brak	B/C	Very High	A	27.0	26.5
<b>K20A</b>	<b>gviii2-EWR GB1-BC</b>		<b>Groot-Brak</b>	<b>B/C</b>	<b>Very High</b>	<b>B/C</b>	<b>15.3</b>	<b>26.5</b>
<b>K20A</b>	<b>gviii3-EWR Var 3</b>		<b>Varing</b>	<b>D</b>	<b>High</b>	<b>C/D</b>	<b>8.4</b>	<b>20.9</b>
<b>K20A</b>	<b>gviii12-EWR Var2</b>		<b>Varing</b>	<b>D</b>	<b>High</b>	<b>C/D</b>	<b>6.0</b>	<b>20.9</b>
<b>K30A</b>	<b>gviii4-EWR</b>		<b>Maalgate</b>	<b>B</b>	<b>Very High</b>	<b>A</b>	<b>15.3</b>	<b>46.0</b>

Quaternary Catchment	Node/ EWR site	Water Resource	PES	EIS	REC	nMAR (MCM)	EWR nMAR (%)
K30A	gvii8	Maalgate	B	High	D	30.1	16.4
K30B	gvii9	Malgas	C	Very High	C	17.3	31.6
<b>K30B</b>	<b>gviii6 EWR Gwa1 -D</b>	<b>Gwaing</b>	<b>E</b>	<b>High</b>	<b>D</b>	<b>34.1</b>	<b>16.4</b>
K30C	gviii7 EWR Sw1 - D	Swart	D	High	D	16.1	14.5
K30C	gvii11 EWR Ka1 - D	Kaaimans	B	High	B	18.6	50.2
K30C	gviii8 EWR Si1 -B	Silver	B	Very High	B	14.9	50.2
K30D	gvii12	Touws	B	Very High	A	16.7	30.3
K30D	gx8	Klein Keurbooms	D	Very High	B	2.5	14.1
<b>K40A</b>	<b>giii10 EWR 2 Diep -B</b>	<b>Diep</b>	<b>B</b>	<b>Very High</b>	<b>B</b>	<b>12.4</b>	<b>30.3</b>
K40B	giii13	Hoekraal	B	Very High	A	27.9	30.3
<b>K40C</b>	<b>gvii13 EWR 4 Karatara-AB</b>	<b>Karatara</b>	<b>B</b>	<b>Very High</b>	<b>A/B</b>	<b>11.2</b>	<b>40.2</b>
K40C	giii11	Karatara	A/B	Very High	A	33.8	40,2
<b>K40E</b>	<b>Gou 1</b>	<b>Goukamma</b>	<b>B/C</b>	<b>Very High</b>	<b>B/C</b>	<b>30.4</b>	<b>38.5</b>
<b>K50A</b>	<b>EWR 1</b>	<b>Knysna</b>	<b>B</b>	<b>High</b>	<b>B</b>	<b>26.5</b>	<b>32.1</b>
<b>K50A</b>	<b>Kny 2</b>	<b>Knysna</b>	<b>B</b>	<b>-</b>	<b>B</b>	<b>46.5</b>	<b>32.1</b>
<b>K50B</b>	<b>EWR 2</b>	<b>Gouna</b>	<b>A/B</b>	<b>Very High</b>	<b>A/B</b>	<b>27.6</b>	<b>53.4</b>
<b>K60C</b>	<b>K6KEUR-EWR8</b>	<b>Keurbooms</b>	<b>C</b>	<b>Very High</b>	<b>B/C</b>	<b>46.1</b>	<b>34.9</b>
K60D	giv5	Palmiet	A	Very High	A	42.1	48.3
K60F	giv4	Bitou	C	Very High	A	23.6	22.8
<b>K60G</b>	<b>Noe 1</b>	<b>Noetsie</b>	<b>B</b>	<b>Very High</b>	<b>A/B</b>	<b>4.8</b>	<b>63.4</b>
K60G	gx3	Piesang	D	Very High	A	7.3	28.5
K60E	gx9	Keurbooms	C	Very High	A	91.3	34.9
K70A	gx4	Buffels	B	Very High	B	1.8	34.3
K70A	gx5	Sout	B	Very High	B	3.8	34.3
K70B	gvii15	Bloukrans	B	Very High	B	31.2	33.9

Table 4.3: Basic Human Needs for the Breede-Gouritz WMA

Quaternary Catchment	Water Resource	BHN (%NMAR)	Quaternary Catchment	Water Resource	BHN (%NMAR)
G40C	Palmiet	0.008	J11C	Buffels	0.02
G40D	Palmiet	0	J11F	Buffels	0.03
G40G	Bot	0.50	J11H	Buffels	0.03
G40H	Onrus	5.88	J11K	Groot	0.36
G40F	Swart	0.17	J12D	Touws	0.03
G40K	Steenbok	0	J12H	Touws	0
G40J	Hartebees	0.08	J12K	Brak	0
G40K	Klein	0	J12L	Doring	0.21
G40M	Uilkraal	0.125	J12M	Touws	0
G50B	Nuwejaar	1.12	J13B	Groot	0.01
G50C	Heuninges	0	J13C	Groot	0
G50E	Kars	0.84	J21D	Gamka	0
G50G	DeHoop Vlei	0.03	J22F	Koekemoers	0.14
G50H	Sout	0.04	J22K	Leeu	0
H10B	Rooikloof	0	J23F	Gamka	0.10
H10C	Dwars	0.70	J23J	Gamka	0
H10D	Breede	0	J24E	Dwyka	0
H10E	Wit	0	J25A	Gamka	0.003
<b>H10F</b>	<b>Breede</b>	<b>0.04</b>	J25E	Gamka	<b>0.03</b>
H10G	Slanghoek	0	J31D	Olifants	0.02
H10J	Elands	0.02	J32E	Traka	0.03
H10K	Holsloot	0	J33B	Olifants	0.02
H10H	Breede	0	J33E	Meirings	0.56
H10L	Breede	0.005	J34C	Olifants	0.01
H20G	Hex	0.01	J34F	Kammanassie	0.05
H20H	Hex	1.20	J35E	Leeu	0.004
H40B	Koo	2.22	J35F	Olifants	0.01
H40C	Nuy	0.07	J40B	Olifants	0
H40D	Doring	0	J40E	Gouritz	0.003
<b>H40F</b>	<b>Breede</b>	<b>0.002</b>	H80B	Gouritz	0
H40G	Poesnels	0	H80E	Duiwenhoks	0.005
H40K	Keisers	0.32	H90C	Goukou	0.33
H40H	Vink	0.06	H90E	Goukou	0.06
H30C	Pietersfontein	0.07	K10D	Brandwag	0.06
H30B	Kingna	1.33	K20A	Varing	1.50
H30D	Keisie	0.04	K30A	Maalgate	0.39
H30E	Kogmanskloof	0.17	K30B	Malgas	0.18
H50B	Breede	0.004	K30C	Swart	8.99
H60B	Du Toits	0	K30D	Touws	0.54
H60D	Riviersonderend	0.001	K40A	Diep	0.04
<b>H60E</b>	<b>Baviaans</b>	<b>1.14</b>	K40B	Hoekraal	0
<b>H60F</b>	<b>Gobos</b>	<b>0.007</b>	K40C	Karatara	0.54
H60G	Kwartel	0	K40E	Goukamma	0.39
H60H	Soetmelksvlei	0	K50A	Knysna	0.002
H60K	Kwassadie	0	K50B	Gouna	0.47
H60L	Riviersonderend	0	K60C	Keurbooms	0.03
H70A	Leeu	0	K60D	Palmiet	25.26
H70B	Breede	0.01	K60F	Bitou	0.38
H70D	Tradouw	0	K60G	Piesang	4.34
H70F	Buffeljags	0.02	K60E	Keurbooms	0.02
<b>H70G</b>	<b>Breede</b>	<b>0</b>	K70A	Buffels	1.32
H70J	Slang	0.40	K70B	Bloukrans	0.03

## 5. SURFACE WATER QUALITY COMPONENT FOR RIVERS AT EWR SITES

### BREDE-OVERBERG

Table 5.1: PES categories and overall site assessment for Breede River at Node Nviii1 (represented by EWR Site 1)

RIVER	Breede River		WATER QUALITY MONITORING POINTS	
WQRU	1(Upper Breede River to Wit River confluence)		RC	DWA monitoring station @ Koekedou River in Ceres (H1H013Q01) (1998 -2002, n=38)
EWR SITE	EWR Site 1		PES	DWA monitoring station @ Witbrug (H1H006Q01) (1998 -2002, n=143)
<b>Confidence assessment</b>		Medium. EWR site is further downstream of DWA monitoring station.		
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L) 1:95 <sup>th</sup> Percentile values	MgSO <sub>4</sub>	7	21	Category B
	Na <sub>2</sub> SO <sub>4</sub>	8	4	Category A
	MgCl <sub>2</sub>	5	6	Category A
	CaCl <sub>2</sub>	12	24	Category B
	NaCl	6	27	Category A
	CaSO <sub>4</sub>	0	0	Category A
Nutrients (mg/L)	SRP	-	-	No data
	TIN	2.8011	0.318	Category B
	TDS	21.8-50.6	< 45	<i>B Category.</i> Increased TDS during Winter months
	TSS	-	< 5	Acceptable
	PO <sub>4</sub>	0.024	0.042	<i>C Category.</i>
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	6.2-7.5	6.9 – 7.8	<i>A Category.</i>
	Temperature	-	-	No data but no concerns noted about DO concentrations
	Dissolved oxygen	-	-	
	Turbidity (NTU)	-	2	
	Electrical conductivity (mS/m)	-	-	No data
Response variables	Chl a: periphyton	-	-	No data
	Chl a: phytoplankton	-	-	No data
	Macroinvertebrates	SASS score = >110 and an ASPT score >7	SASS score = 69 and ASPT score = 5.3	<i>D/E Category.</i> Largely modified. Loss of habitat area through infilling.
	Fish community score			<i>D/E Category.</i> Introductions of alien fish species, i.e., bass, trout and blue gills.
Toxics		-	No data but pesticide residues are the concern due to intensive agriculture in Ceres	
<b>OVERALL SITE CLASSIFICATION</b>		<i>A/B Category</i>		

**Table 5.2: PES categories and overall site assessment for Molenaars River at Node Nvii2 (represented by EWR Site 2)**

RIVER	Molenaars River		WATER QUALITY MONITORING POINTS	
WQRU	2 (Complete Molenaars River)		RC	The Molenaars River @ Hawequas Forest Reserve (H1H018Q01) (1998 -1992, n=93)
EWR SITE	EWR Site 2		PES	The Molenaars River @ Hawequas Forest Reserve (H1H018Q01) (1998 -2002, n=141)
Confidence assessment		High. Monitoring point is very close to the EWR site. Historic data shows no trends and hence PES data was used for Reference conditions.		
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L) 1:95 <sup>th</sup> % values	MgSO <sub>4</sub>	6	6	Category A
	Na <sub>2</sub> SO <sub>4</sub>	9	9	Category A
	MgCl <sub>2</sub>	4	4	Category A
	CaCl <sub>2</sub>	6	6	Category A
	NaCl	9	9	Category A
	CaSO <sub>4</sub>	0	0	Category A
Nutrients (mg/L)	SRP		-	
	TIN (1:50 <sup>th</sup> %)	0.151	0.151	Category A
	TDS	22	22	Category A
	TSS	< 5	< 5	Category A
	PO <sub>4</sub> (1:50 <sup>th</sup> %)	0.025	0.025	Category C
	NH <sub>3</sub> -N	<0.015.	<0.015.	Within range
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	5.5 – 7.3	5.5 – 7.3	A Category. Typical acidic Western Cape river
	Temperature			
	Dissolved oxygen	80 - 120% saturation.	80 - 120% saturation.	Within range, Category A
	Turbidity (NTU)	-	0	
	Electrical conductivity (mS/m)	-	-	No data
Response variables	Chl a: periphyton	-	-	No data
	Chl a: phytoplankton	-	-	No data
	Macroinvertebrates	SASS score ≥140 and an ASPT score >8	SASS score = 175 and ASPT score = 7.9	A/B Category. Catchment is relatively pristine
	Fish community score			E Category. No indigenous fish were recorded during the study
Toxics		-	-	No toxic substance concerns
<b>OVERALL SITE CLASSIFICATION</b>		<b>A Category</b>		

**Table 5.3: PES categories and overall site assessment for Breede River at Node Nvii8 (represented by EWR Site 3)**

RIVER	Breede River		WATER QUALITY MONITORING POINTS	
WQRU	3 (Middle Breede from Molenaars confluence to Kogmanskloof confluence)		RC	None. No WQ monitoring station could provide reference data for this Resource Unit.
EWR SITE	EWR Site 3		PES	Breede River at Le Chasseur (H4H017Q01) (1995 -1999, n=214)
Confidence assessment	Moderate			
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L) (1:95 <sup>th</sup> %)	MgSO <sub>4</sub>	-	39	Category D
	Na <sub>2</sub> SO <sub>4</sub>	-	5	Category A
	MgCl <sub>2</sub>	-	12	Category A
	CaCl <sub>2</sub>	-	32	Category B
	NaCl	-	95	Category B
	CaSO <sub>4</sub>	-	0	Category A
Nutrients (mg/L)	SRP	-		
	TIN (1:50 <sup>th</sup> %)	-	0.242	Category A
	TDS	-	< 45	<i>B Category.</i> High TDS loads. Irrigation return flows in tributaries and main stem between Brandvlei Dam and EWR Site 3.
	TSS	-	< 5	High TSS loads. Releases from Brandvlei to alleviate high TDS.
	P0 <sub>4</sub> (1:50 <sup>th</sup> %)	-	0.032	C Category
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	-	6.9 – 7.8	A Category
	Temperature (°C)	-	22.4	Summer temperature
	Dissolved oxygen	-	-	No observed data
	Turbidity (NTU)	-	-	No data. Low sediment production area
	Electrical conductivity (mS/m)	-	-	No data
	Response variables	Chl a: periphyton	-	-
Chl a: phytoplankton		-	-	No data
Macroinvertebrates		SASS score ≥110 and an ASPT score >7	SASS score = 91 and ASPT score = 7	<i>A Category.</i> Suggest there is no significant impact to community structure.
Fish community score		-		<i>D Category.</i> Only 2 of the 7 indigenous freshwater species expected to occur there were sampled.
Toxics		-	-	No data but Pesticides are a concern as a result of intensive agriculture
<b>OVERALL SITE CLASSIFICATION</b>		<b><i>D Category.</i></b> Mainly due to increased summer low flows and increased sediment load.		

Table 5.4: PES categories and overall site assessment for Breede River at Node Niii4 (represented by EWR Site 4)

RIVER	Breede River	WATER QUALITY MONITORING POINTS		
WQRU	6 (Breede River from Buffelsjags River to Estuary)	RC	None. No WQ monitoring station could provide reference data for this Resource Unit.	
EWR SITE	EWR Site 4	PES	Lower Breede River @ Swellendam (H7H006Q01) (1995 -1999, n=214)	
Confidence assessment	Moderate (There were no observed hydrological data for this reach of the river and flow in the river during field visits was often too high to allow for discharge readings to be taken; Monitoring point quite far upstream)			
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L) (1:95 <sup>th</sup> %)	MgSO <sub>4</sub>	-	83	Category E/F
	Na <sub>2</sub> SO <sub>4</sub>	-	3	Category A
	MgCl <sub>2</sub>	-	49	Category D
	CaCl <sub>2</sub>	-	62	Category C
	NaCl	-	318	Category D
	CaSO <sub>4</sub>	-	0	Category A
Nutrients (mg/L)	SRP	-	-	No data
	TIN (1:50 <sup>th</sup> %)	-	0.23	Category A
	TDS	-	-	C Category. High TDS loads due to Irrigation return flows in tributaries and main
	TSS	-	-	No data
	P0 <sub>4</sub> (1:50 <sup>th</sup> %)	-	0.024	C Category
	NH <sub>3</sub> -N	-	0.3 (Median)	No historic data
Physical Variables	NO <sub>2</sub> NO <sub>3</sub> -N	-	<1	Recommended winter concentrations but summer can be as low as < 0.3 mg/l
	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	-	6.9 – 8.1	Category A/B. No significant change.
	Temperature (°C)	-	-	No observed data. Some concerns about short-term fluctuation in DO levels.
	Dissolved oxygen	-	-	
	Turbidity (NTU)	-	-	No data
Electrical conductivity (mS/m)	-	-	No data	
Response variables	Chl a: periphyton	-	-	No data
	Chl a: phytoplankton	-	-	No data
	Macroinvertebrates	SASS score ≥110 and an ASPT score >7	SASS score = 87 and ASPT score = 6.9	B Category. Moderately impacted.
Fish community score	10 indigenous fish species		C Category. Presence of carp and bass.	
Toxics		-		No data but pesticide residues are the concern due to intensive agriculture.
<b>OVERALL SITE CLASSIFICATION</b>		<b>D Category.</b> Dependent on high quality inflow from Buffelsjags River to ensure acceptable WQ in the lower Breede Resource Unit & Estuary		

**Table 5.5: PES categories and overall site assessment for Riviersonderend at Node Nv7 (represented by EWR site 5)**

RIVER	Riviersonderend River		WATER QUALITY MONITORING POINTS	
WQRU	7 (Middle Riviersonderend River from Theewaterskloof Dam to Bok River)		RC	Riviersonderend at Swart River/Nuweberg Forest Reserve (H6H008Q01) (1990 -1992, n=34)
EWR SITE	EWR Site 5		PES	Riviersonderend at Theewaterskloof Dam (H6H012Q01) (1998 -2002, n=39) Riviersonderend at Reenen (H6H009Q01) (1995 -1999, n=56)
Confidence assessment		High		
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L) 1:95 <sup>th</sup> value %	MgSO <sub>4</sub>	7	12	Category A
	Na <sub>2</sub> SO <sub>4</sub>	7	13	Category A
	MgCl <sub>2</sub>	4	14	Category A
	CaCl <sub>2</sub>	5	14	Category A
	NaCl	11	99	Category B
	CaSO <sub>4</sub>	0	0	Category A
Nutrients (mg/L)	SRP	-	-	No data
	TIN (1:50 <sup>th</sup> %)	0.068	0.154	Category A.
	TDS	13.6-32	Summer: <100 and winter: < 150	B Category. High TDS loads due to agricultural return flows in winter
	TSS	< 5	-	No data
	P0 <sub>4</sub> (1:50 <sup>th</sup> %)	<0.0165	0.013	Category B. Slightly higher.
	NO <sub>2</sub> NO <sub>3</sub> -N	0.02	<0.25	Recommended winter concentrations but summer can be as low as < 0.2 mg/l
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	6.5 – 7.5	6.4 - 7.4	A/B Category.
	Temperature (°C)	+4 °C	-	No data
	Dissolved oxygen	80 - 120% saturation	-	
	Turbidity (NTU)	-	4	
	Electrical conductivity (mS/m)	-	-	No data
Response variables	Chl a: periphyton	-	-	No data
	Chl a: phytoplankton	-	-	No data
	Macroinvertebrates	SASS score ≥110 and an ASPT score >7	SASS score = 95 and ASPT score = 6.8	C/D Category. Most of the reach has good water quality but poor habitat quality.
	Fish community score	Six indigenous fish species		E Category. Dominated by large and small mouth bass. Reduction of indigenous fish species.
Toxics		-	-	No data but pesticide residues are the concern due to intensive agriculture upstream of EWR site
<b>OVERALL SITE CLASSIFICATION</b>		<b>A/B Category</b> (The presence of Theewaterskloof Dam has slightly reduced the water quality in the downstream river)		

**Table 5.6: PES categories and overall site assessment for Baviaans River at Node Niv28 (represented by EWR Site 6)**

RIVER	Baviaans River	WATER QUALITY MONITORING POINTS		
WQRU	9 (Complete Baviaans River)	RC	Baviaans River at Genadendal Mission Station (H6H005Q01) (1972 -1994, n=346)	
EWR SITE	EWR Site 6	PES	Baviaans River at Genadendal Mission Station (H6H005Q01) (1998 -2002, n=42)	
Confidence assessment	High. Good data record to assess both reference and PES. Historic data shows no trends and hence PES data was used for Reference conditions			
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L) 1:95 <sup>th</sup> % value	MgSO <sub>4</sub>	9	9	Category A
	Na <sub>2</sub> SO <sub>4</sub>	9	9	Category A
	MgCl <sub>2</sub>	4	4	Category A
	CaCl <sub>2</sub>	10	10	Category A
	NaCl	25	25	Category A
	CaSO <sub>4</sub>	0	0	Category A
Nutrients (mg/L)	SRP	-	-	No data
	TIN (1:50 <sup>th</sup> % value)	0.04	0.040	Category A
	TDS	41	41	Category A
	TSS	-	-	No data
	P0 <sub>4</sub> (1:50 <sup>th</sup> % value)	0.022	0.022	Category A
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	4.7 – 7.1	4.7 – 7.0	A Category. Regarded as natural for low pH Western Cape Rivers
	Temperature (°C)	-	-	No data but no DO concerns
	Dissolved oxygen	-	-	
	Turbidity (NTU)	-	-	
	Electrical conductivity (mS/m)	-	-	No data
Response variables	Chl a: periphyton	-	-	No data
	Chl a: phytoplankton	-	-	No data
	Macroinvertebrates	SASS score ≥140 and an ASPT score >8	SASS score = 109 and ASPT score = 8.38	A Category. Reduced habitat.
	Fish community score	Three indigenous fish species		A/B Category. All species expected to occur here historically, were recorded
Toxics		-	-	No data but no toxic substance concerns noted
<b>OVERALL SITE CLASSIFICATION</b>		<b>A Category</b>		

## GOURITZ

Table 5.7: PES categories and overall site assessment for Duiwenhoks River at H8DUIW-EWR1

RIVER	Duiwenhoks River	WATER QUALITY MONITORING POINTS	
WQRU		RC	DWS gauging weir H8H001Q01 (1967 – 1979; number of samples (n) = 66 - 71, Electrical Conductivity: n = 110).
EWR SITE	H8DUIW-EWR1	PES	DWS gauging weir H8H001Q01 (2007 – 2013; n = 69, Fluorine (F) = 48).
Confidence assessment	Confidence: 3.5		
Water Quality Constituents		PES Value	Category/Comment
Inorganic salts (mg/L)	SO <sub>4</sub>	N/A	-
	Na	382.2	Exceeds the ≤ 70 mg/L (TWQR) for Agricultural Use: Irrigation.
	Mg	67.4	No guideline.
	Ca	55.0	No guideline.
	Cl	805.4	Exceeds the ≤ 100 mg/L (TWQR) for Agricultural Use: Irrigation.
	K	9.25	No guideline.
Nutrients (mg/L)	SRP	0.014	A
	TIN	0.118	A
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	6.6 and 8.1	B
	Temperature (°C)	N/A	A/B. Impacts expected at low flows.
	Dissolved oxygen	N/A	B. Impacts expected at low flows.
	Turbidity (NTU)	N/A	B. Changes in turbidity appear to be largely related to natural with minor man-made modifications, e.g. gravel mining upstream
	Electrical conductivity (mS/m)	272	80 mS/m
Response variables	Chl a: phytoplankton	N/A	N/A
	Macroinvertebrates	50.7% SASS score = 78 ASPT score = 56	D
	Diatoms	11.1	C/D (n = 1, Jan 2014)
	Fish community score	51.6%	D (all estuarine spp. that moved into the freshwater zone and aliens).
Toxics	Ammonia (as N)	0.003	A
	Fluoride (as F)	0.33	A
<b>OVERALL SITE CLASSIFICATION</b>		<b>C Category</b>	

**Table 5.8: Water quality EcoSpecs and TPCs (C category) for Duiwenhoks River at H8DUIW-EWR1**

Metrics	EcoSpecs	TPCs
<b>Inorganic salt ions</b>		
Sulphate as SO <sub>4</sub>	N/A	N/A
Sodium as Na	The 95 <sup>th</sup> percentile of the data must be ≤ 380 mg/L.	The 95 <sup>th</sup> percentile of the data must be 300 - 380 mg/L.
Magnesium as Mg	The 95 <sup>th</sup> percentile of the data must be ≤ 67 mg/L.	The 95 <sup>th</sup> percentile of the data must be 53.5 - 67 mg/L.
Calcium as Ca	The 95 <sup>th</sup> percentile of the data must be ≤ 55 mg/L.	The 95 <sup>th</sup> percentile of the data must be 44 - 55 mg/L.
Chloride as Cl	The 95 <sup>th</sup> percentile of the data must be ≤ 800 mg/L.	The 95 <sup>th</sup> percentile of the data must be 640 - 800 mg/L.
Potassium as K	The 95 <sup>th</sup> percentile of the data must be ≤ 9 mg/L.	The 95 <sup>th</sup> percentile of the data must be 7 - 9 mg/L.
<b>Physical Variables</b>		
Electrical conductivity (mS/m)	The 95 <sup>th</sup> percentile of the data must be ≤ 270 mS/m.	The 95 <sup>th</sup> percentile of the data must be 210 - 270 mS/m.
pH	The 5 <sup>th</sup> percentile of the data must be 6.5 - 8.0, and the 95 <sup>th</sup> percentile 8.0 - 8.8.	The 5 <sup>th</sup> percentile of the data is ≤ 6.3 and the 95 <sup>th</sup> percentile is ≥ 8.6.
Temperature <sup>(a)</sup>	Natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen <sup>(a)</sup> (DO)	The 5 <sup>th</sup> percentile of the data must be ≥ 7.0 mg/L.	The 5 <sup>th</sup> percentile of the data must be 7.2 - 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity <sup>(a)</sup>	Changes in turbidity are related to minor man-made modifications (e.g. gravel mining upstream). Some silting of habitats is expected.	Initiate baseline monitoring for this variable.
<b>Nutrients</b>		
TIN	The 50 <sup>th</sup> percentile of the data must be ≤ 0.25 mg/L.	The 50 <sup>th</sup> percentile of the data must be 0.2 - 0.25 mg/L.
PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data must be 0.012 - 0.015 mg/L.
<b>Response variables</b>		
Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be < 15 µg/L.	The 50 <sup>th</sup> percentile of the data must be 12 - 15 µg/L.
Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be ≤ 12 mg/m <sup>2</sup> .	The 50 <sup>th</sup> percentile of the data must be 10 - 12 mg/m <sup>2</sup> .
<b>Toxics</b>		
Fluoride	The 50 <sup>th</sup> percentile of the data must be ≤ 1.5 mg/L.	The 50 <sup>th</sup> percentile of the data must be 1.2 - 1.5 mg/L.
Ammonia (NH <sub>3</sub> -N)	The 50 <sup>th</sup> percentile of the data must be ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data must be 0.012 - 0.015 mg/L.
Other toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996) or the A Category boundary as stated in DWAF (2008).	An impact is expected if the 95 <sup>th</sup> percentile of the data exceeds the TWQR as stated in DWAF (1996) or the upper limit of the A Category boundary as stated in DWAF (2008).

(a) N/A- No data were available for this assessment.

**Table 5.9: PES categories and overall site assessment for Goukou River at H9GOUK-EWR2**

RIVER	Goukou River	WATER QUALITY MONITORING POINTS	
WQRU		RC	Reference Condition (RC) was represented by the A Category benchmark tables in DWAF (2008), as no other data were available to describe natural state.
EWR SITE	H9GOUK-EWR2	PES	DWS gauging weir H9H005Q01 (2007 – 2014; n = 63 - 71, F = 52).
<b>Confidence assessment</b>		Confidence: 3	
Water Quality Constituents		PES Value	Category/Comment
Inorganic salts (mg/L)	SO <sub>4</sub>	N/A	N/A
	Na	650.4	Exceeds the ≤ 70 mg/L (TWQR) for Agricultural Use: Irrigation.
	Mg	79.0	No guideline.
	Ca	57.1	No guideline.
	Cl	1081.3	Exceeds the ≤ 100 mg/L (TWQR) for Agricultural Use: Irrigation.
	K	20.4	No guideline.
Nutrients (mg/L)	SRP	0.085	D
	TIN	0.055	A
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	6.6 and 8.35	B
	Temperature (°C)	N/A	A/B. Impacts expected at low flows.
	Dissolved oxygen	N/A	B. Impacts expected at low flows.
	Turbidity (NTU)	N/A	A/B. Changes in turbidity appear to be largely related to natural.
	Electrical conductivity (mS/m)	408.4	E/F
Response variables	Chl a: phytoplankton	N/A	N/A
	Macroinvertebrates	51.2% SASS score = 113 ASPT score = 6.6	D
	Diatoms	14.4 and 11.0	C/D (n = 2; Jan and July 2014)
	Fish community score	47.4%	D
Toxics	Ammonia (as N)	0.01	A
	Fluoride (as F)	0.59	A
<b>OVERALL SITE CLASSIFICATION</b>		<b><i>C/D Category</i></b>	

**Table 5.10: Water quality EcoSpecs and TPCs (Category: C/D) for Goukou River at GOUK-EWR2**

Metrics	EcoSpecs	TPCs
<b>Inorganic salt ions</b>		
Sulphate as SO <sub>4</sub>	N/A	N/A
Sodium as Na	The 95 <sup>th</sup> percentile of the data is between ≤ 650 mg/L.	The 95 <sup>th</sup> percentile of the data is between 520 - 650 mg/L.
Magnesium as Mg	The 95 <sup>th</sup> percentile of the data is between ≤ 80 mg/L.	The 95 <sup>th</sup> percentile of the data is between 64 - 80 mg/L.
Calcium as Ca	The 95 <sup>th</sup> percentile of the data is between ≤ 55 mg/L.	The 95 <sup>th</sup> percentile of the data is between 44 - 55 mg/L.
Chloride as Cl	The 95 <sup>th</sup> percentile of the data is between ≤ 1 000 mg/L.	The 95 <sup>th</sup> percentile of the data is between 800 - 1 000 mg/L.
Potassium as K	The 95 <sup>th</sup> percentile of the data is between ≤ 20 mg/L.	The 95 <sup>th</sup> percentile of the data is between 16 - 20 mg/L.
<b>Physical variables</b>		
Electrical conductivity (mS/m)	The 95 <sup>th</sup> percentile of the data is between ≤ 400 mS/m.	The 95 <sup>th</sup> percentile of the data is between 320 - 400 mS/m.
pH	The 5 <sup>th</sup> percentile of the data must be 6.5 - 8.0, and the 95 <sup>th</sup> percentile 8.0 - 8.8.	The 5 <sup>th</sup> percentile of the data is ≤ 6.3 and the 95 <sup>th</sup> percentile is ≥ 8.6.
Temperature <sup>(a)</sup>	Natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen <sup>(a)</sup>	The 5 <sup>th</sup> percentile of the data is between ≥ 7.0 mg/L.	The 5 <sup>th</sup> percentile of the data is between 7.2 - 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity <sup>(a)</sup>	Changes in turbidity are related to minor man-made modifications. Some silting of habitats is expected.	Initiate baseline monitoring for this variable.
<b>Nutrients</b>		
TIN-N	The 50 <sup>th</sup> percentile of the data is between ≤ 0.25 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.2 - 0.25 mg/L.
PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data is between ≤ 0.125 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.1 - 0.125 mg/L.
<b>Response variables<sup>(a)</sup></b>		
Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data is between < 15 µg/L.	The 50 <sup>th</sup> percentile of the data is between 12 - 15 µg/L.
Chl-a periphyton	The 50 <sup>th</sup> percentile of the data is between ≤ 21 mg/m <sup>2</sup> .	The 50 <sup>th</sup> percentile of the data is between 17 - 21 mg/m <sup>2</sup> .
<b>Toxics</b>		
Fluoride	The 50 <sup>th</sup> percentile of the data is between ≤ 1.5 mg/L.	The 50 <sup>th</sup> percentile of the data is between 1.2 - 1.5 mg/L.
Ammonia (NH <sub>3</sub> -N)	The 50 <sup>th</sup> percentile of the data is between ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.012 - 0.015 mg/L.
Other toxics	The 95 <sup>th</sup> percentile of the data is between within the TWQR as stated in DWAF (1996) or the A Category boundary as stated in DWAF (2008).	An impact is expected if the 95 <sup>th</sup> percentile of the data exceeds the TWQR as stated in DWAF (1996) or the upper limit of the A Category boundary as stated in DWAF (2008).

(a) N/A: No data were available for this assessment.

**Table 5.11: PES categories and overall site assessment for Touws River at J1TOUW-EWR3**

RIVER	Touws River		WATER QUALITY MONITORING POINTS	
WQRU			RC	N/A
EWR SITE	J1TOUW-EWR3		PES	J1H018Q01 (Water Management System (WMS) code 102147), located upstream of the EWR site. (Data record: 2000 – 2014; number of samples (n) = ± 128).
<b>Confidence assessment</b>		2.5		
Water Quality Constituents		PES Value	Category/Comment	
Inorganic salts (mg/L)	SO <sub>4</sub>	N/A	All guidelines exceeded due to high saline geology of the area. It is assumed that some increase in salinity may be expected due to irrigation return flows. No large urban centers are situated in this area.	
	Na	2 016.9		
	Mg	370.1		
	Ca	258.2		
	Cl	3 494.6		
	K	37.06		
Nutrients (mg/L)	SRP	0.033	D	
	TIN	0.079	A	
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	7.6 and 8.6	B	
	Temperature (°C)	N/A	B. Impacts expected at low flows. B. Impacts expected at low flows, although on-site data still shows high levels. B. Changes in turbidity appear to be largely related to natural with minor man-made modifications.	
	Dissolved oxygen	N/A		
	Turbidity (NTU)	N/A		
	Electrical conductivity (mS/m)	1181.8		
Response variables	Chl a: phytoplankton	N/A	N/A	
	Macroinvertebrates	74.0%	C	
	Diatoms	8.6 (average)	D	
	Fish community score	56.8%	D	
Toxics	Ammonia (as N)	0.034	A	
	Fluoride (as F)	0.43	A	
<b>OVERALL SITE CLASSIFICATION</b>		<b>B/C Category</b>		

**Note:**

RC: Information available to the water quality specialist on water quality conditions and land-use were used as no RC data were available and the A Category benchmarks tables in DWAF (2008) were considered unsuitable due to the high geology-based salinities in the area.

**Table 5.12: Water quality EcoSpecs and TPCs (Category B/C) for Touws River at J1TOUW-EWR3**

Metrics	EcoSpecs	TPCs
<b>Inorganic salt ions</b>		
Sulphate as SO <sub>4</sub>	N/A	
Sodium as Na	The 95 <sup>th</sup> percentile of the data is between ≤ 2000 mg/L.	The 95 <sup>th</sup> percentile of the data is between 1600 - 2000 mg/L.
Magnesium as Mg	The 95 <sup>th</sup> percentile of the data is between ≤ 370 mg/L.	The 95 <sup>th</sup> percentile of the data is between 300 - 370 mg/L.
Calcium as Ca	The 95 <sup>th</sup> percentile of the data is between ≤ 260 mg/L.	The 95 <sup>th</sup> percentile of the data is between 200 - 260 mg/L.
Chloride as Cl	The 95 <sup>th</sup> percentile of the data is between ≤ 3500 mg/L.	The 95 <sup>th</sup> percentile of the data is between 2800 - 3500 mg/L.
Potassium as K	The 95 <sup>th</sup> percentile of the data is between ≤ 37 mg/L.	The 95 <sup>th</sup> percentile of the data is between 30 - 37 mg/L.
<b>Physical variables</b>		
Electrical conductivity (mS/m)	The 95 <sup>th</sup> percentile of the data is between ≤ 1100 mS/m.	The 95 <sup>th</sup> percentile of the data is between 880 - 1100 mS/m.
pH	The 5 <sup>th</sup> percentile of the data is between 6.5 – 8.0, and the 95 <sup>th</sup> percentile 8.0 - 8.8.	The 5 <sup>th</sup> percentile of the data is ≤ 6.3 and the 95 <sup>th</sup> percentile is ≥ 8.6.
Temperature	Natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen	The 5 <sup>th</sup> percentile of the data is between ≥ 7.0 mg/L.	The 5 <sup>th</sup> percentile of the data is between 7.2 - 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity	Changes in turbidity are related to minor man-made modifications. Some silting of habitats is expected.	Initiate baseline monitoring for this variable.
<b>Nutrients</b>		
TIN-N	The 50 <sup>th</sup> percentile of the data is between ≤ 0.25 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.2 - 0.25 mg/L.
PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data is between ≤ 0.075 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.06 - 0.075 mg/L.
<b>Response variables</b>		
Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data is between < 15 µg/L.	The 50 <sup>th</sup> percentile of the data is between 12 - 15 µg/L.
Chl-a periphyton	The 50 <sup>th</sup> percentile of the data is between ≤ 21 mg/m <sup>2</sup> .	The 50 <sup>th</sup> percentile of the data is between 17 - 21 mg/m <sup>2</sup> .
<b>Toxics</b>		
Fluoride	The 50 <sup>th</sup> percentile of the data is between ≤ 1.5 mg/L.	The 50 <sup>th</sup> percentile of the data is between 1.2 - 1.5 mg/L.
Ammonia (NH <sub>3</sub> -N)	The 50 <sup>th</sup> percentile of the data is between ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.012 - 0.015 mg/L.
Other toxics	The 95 <sup>th</sup> percentile of the data is between within the TWQR as stated in DWAF (1996) or the A Category boundary as stated in DWAF (2008).	An impact is expected if the 95 <sup>th</sup> percentile of the data exceeds the TWQR as stated in DWAF (1996) or the upper limit of the A Category boundary as stated in DWAF (2008).

(a) N/A: No data were available for this assessment.

Table 5.13: PES categories and overall site assessment for Gamka River at J2GAMK-EWR4

RIVER	Gamka River		WATER QUALITY MONITORING POINTS	
WQRU			RC	A category benchmark tables from DWAF (2008) were used.
EWR SITE	J2GAMK-EWR4		PES	Data were sourced from DWS gauging weir J2H016Q01 (WMS code 102173), located downstream Gamkapoort Dam and upstream of the EWR site. (Data record: 2007 – 2014; n = 127).
<b>Confidence assessment</b>		3.0		
Water Quality Constituents		PES Value	Category/Comment	
Inorganic salts (mg/L)	SO <sub>4</sub>	N/A		
	Na	114.0	Exceeds the 70mg/l (TWQR) for Agricultural Use: Irrigation	
	Mg	20.5	No guideline	
	Ca	57.6	No guideline	
	Cl	155.5	Exceeds the 100mg/l (TWQR) for Agricultural Use: Irrigation	
	K	7.9	No guideline	
Nutrients (mg/L)	SRP	0.07	D	
	TIN	0.523	B	
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	7.4 and 8.6		
	Temperature (°C)	N/A		
	Dissolved oxygen	N/A	Impact expected as the site is downstream of the Gamkapoort Dam (constructed in 1970)	
	Turbidity (NTU)	N/A		
	Electrical conductivity (mS/m)	97.5	C. Natural salinity expected to be higher than the 30Ms/m A category benchmark value in DWAF (2008)	
Response variables	Chl a: phytoplankton	N/A	N/A	
	Macroinvertebrates	61.4%	C/D	
	Diatoms	9.9	D	
	Fish community score	60.4%	C/D	
Toxics	Ammonia (as N)	0.015	A	
	Fluoride (as F)	0.53	A	
<b>OVERALL SITE CLASSIFICATION</b>		<b>B/C Category</b>		

**Table 5.14: Water quality EcoSpecs and TPCs (PES: B/C) for Gamka River at J2GAMK-EWR4**

Metrics	EcoSpecs: PES	TPCs: PES
<b>Inorganic salt ions</b>		
Sulphate as SO <sub>4</sub>	N/A	N/A
Sodium as Na	The 95 <sup>th</sup> percentile of the data is between ≤ 114 mg/L.	The 95 <sup>th</sup> percentile of the data is between 90 - 114 mg/L.
Magnesium as Mg	The 95 <sup>th</sup> percentile of the data is between ≤ 20 mg/L.	The 95 <sup>th</sup> percentile of the data is between 16 - 20 mg/L.
Calcium as Ca	The 95 <sup>th</sup> percentile of the data is between ≤ 58 mg/L.	The 95 <sup>th</sup> percentile of the data is between 47 - 58 mg/L.
Chloride as Cl	The 95 <sup>th</sup> percentile of the data is between ≤ 155 mg/L.	The 95 <sup>th</sup> percentile of the data is between 124 - 155 mg/L.
Potassium as K	The 95 <sup>th</sup> percentile of the data is between ≤ 8 mg/L.	The 95 <sup>th</sup> percentile of the data is between 6.5 - 8.0 mg/L.
<b>Physical variables</b>		
Electrical conductivity (mS/m)	The 95 <sup>th</sup> percentile of the data is between ≤ 100 mS/m.	The 95 <sup>th</sup> percentile of the data is between 80 - 100 mS/m.
pH	The 5 <sup>th</sup> percentile of the data is between 5.9 - 6.5, and the 95 <sup>th</sup> percentile 8.0 - 8.8.	The 5 <sup>th</sup> percentile of the data is ≤ 5.7 and the 95 <sup>th</sup> percentile is ≥ 8.6.
Temperature <sup>(a)</sup>	Moderate change to temperature due to upstream Gamkapoort Dam.	Initiate baseline monitoring for this variable.
Dissolved oxygen <sup>(a)</sup>	The 5 <sup>th</sup> percentile of the data is between ≥ 7.0 mg/L. Although some impacts are expected due to the upstream Gamkapoort Dam, the size of the river will mitigate the effects.	The 5 <sup>th</sup> percentile of the data is between 7.2 - 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity <sup>(a)</sup>	Changes in turbidity are related to minor man-made modifications. Some silting of habitats is expected.	Initiate baseline monitoring for this variable.
<b>Nutrients</b>		
TIN-N	The 50 <sup>th</sup> percentile of the data is between ≤ 0.7 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.56 - 0.7 mg/L.
PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data is between ≤ 0.125 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.1 - 0.125 mg/L.
<b>Response variables</b>		
Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data is between < 15 µg/L.	The 50 <sup>th</sup> percentile of the data is between 12 - 15 µg/L.
Chl-a periphyton	The 50 <sup>th</sup> percentile of the data is between ≤ 21 mg/m <sup>2</sup> .	The 50 <sup>th</sup> percentile of the data is between 17 - 21 mg/m <sup>2</sup> .
<b>Toxics</b>		
Fluoride	The 50 <sup>th</sup> percentile of the data is between ≤ 1.5 mg/L.	The 50 <sup>th</sup> percentile of the data is between 1.2 - 1.5 mg/L.
Ammonia (NH <sub>3</sub> -N)	The 50 <sup>th</sup> percentile of the data is between ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.012 - 0.015 mg/L.
Other toxics	The 95 <sup>th</sup> percentile of the data is between within the TWQR as stated in DWAF (1996) or the A Category boundary as stated in DWAF (2008).	An impact is expected if the 95 <sup>th</sup> percentile of the data exceeds the TWQR as stated in DWAF (1996) or the upper limit of the A Category boundary as stated in DWAF (2008).

(a) N/A: No data were available for this assessment.

Table 5.15: PES categories and overall site assessment for Buffels River at J1BUFF-EWR5

RIVER	Buffels	WATER QUALITY MONITORING POINTS	
WQRU		RC	Data were sourced from DWS gauging weir J1H028Q01 (WMS code 102152), located downstream Floriskraal Dam and upstream of the EWR site. Note that the monitoring point is not in the same Level II EcoRegion as the EWR site; however, this was the only data point between the dam and the site. (Data record: 1972 – 1977; n = 54, Conductivity: n = 33).
EWR SITE	J1BUFF-EWR5	PES	Data were sourced from DWS gauging weir J1H028Q01 (WMS code 102152) (Data record: 2010 – 2014; n = 44).
Confidence assessment		Confidence: 2.5	
Water Quality Constituents		PES Value	Category/Comment
Inorganic salts (mg/L)	SO <sub>4</sub>	61.42	No guideline
	Na	81.44	Exceeds the ≤ 70 mg/L (TWQR) for Agricultural Use: Irrigation.
	Mg	25.2	No guideline.
	Ca	48.68	No guideline.
	Cl	124.0	Exceeds the ≤ 100 mg/L (TWQR) for Agricultural Use: Irrigation.
	K	6.11	No guideline.
Nutrients (mg/L)	SRP	0.015	B. Levels have decreased since the 1970s.
	TIN	0.26	A/B. No change from the 1970s.
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	7.5 and 8.5	B. No change from the 1970s.
	Temperature (°C)	N/A	Impact expected as the site is downstream the large Floriskraal Dam (constructed in 1965).
	Dissolved oxygen	N/A	
	Turbidity (NTU)	N/A	
	Electrical conductivity (mS/m)	78.1	No change from the 1970s.
Response variables	Chl a: phytoplankton	N/A	N/A
	Macroinvertebrates	72.0%	C
	Diatoms	11.2 (average)	C/D
	Fish community score	83.7%	B
Toxics	Ammonia (as N)	0.017	A
	Fluoride (as F)	0.66	A. No change from the 1970s.
<b>OVERALL SITE CLASSIFICATION</b>		<b>B/C Category</b>	

**Table 5.16: Water quality EcoSpecs and TPCs (Category B/C) for Buffels River at J1BUFF-EWR5**

<b>Metrics</b>	<b>EcoSpecs: PES</b>	<b>TPCs: PES</b>
<b>Inorganic salt ions</b>		
Sulphate as SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data is between ≤ 60 mg/L.	The 95 <sup>th</sup> percentile of the data is between 48 - 60 mg/L.
Sodium as Na	The 95 <sup>th</sup> percentile of the data is between ≤ 80 mg/L.	The 95 <sup>th</sup> percentile of the data is between 64 - 80 mg/L.
Magnesium as Mg	The 95 <sup>th</sup> percentile of the data is between ≤ 25 mg/L.	The 95 <sup>th</sup> percentile of the data is between 20 - 25 mg/L.
Calcium as Ca	The 95 <sup>th</sup> percentile of the data is between ≤ 50 mg/L.	The 95 <sup>th</sup> percentile of the data is between 40 - 50 mg/L.
Chloride as Cl	The 95 <sup>th</sup> percentile of the data is between ≤ 125 mg/L.	The 95 <sup>th</sup> percentile of the data is between 100 - 125 mg/L.
Potassium as K	The 95 <sup>th</sup> percentile of the data is between ≤ 6.0 mg/L.	The 95 <sup>th</sup> percentile of the data is between 4.8 - 6.0 mg/L.
<b>Physical variables</b>		
Electrical conductivity (mS/m)	The 95 <sup>th</sup> percentile of the data is between ≤ 85 mS/m.	The 95 <sup>th</sup> percentile of the data is between 68 - 85 mS/m.
pH	The 5 <sup>th</sup> percentile of the data is between 5.9 - 6.5, and the 95 <sup>th</sup> percentile 8.0 - 8.8.	The 5 <sup>th</sup> percentile of the data is ≤ 5.7 and the 95 <sup>th</sup> percentile is ≥ 8.6.
Temperature	Moderate change to temperature expected due to upstream Floriskraal Dam.	Initiate baseline monitoring for this variable.
Dissolved oxygen	The 5 <sup>th</sup> percentile of the data is between ≥ 7.0 mg/L. Although some impacts are expected due to the upstream Floriskraal Dam, the size of the river should mitigate the effects.	The 5 <sup>th</sup> percentile of the data is between 7.2 - 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity	Changes in turbidity are related to minor man-made modifications. Some silting of habitats is expected.	Initiate baseline monitoring for this variable.
<b>Nutrients</b>		
TIN-N	The 50 <sup>th</sup> percentile of the data is between ≤ 0.48 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.38 - 0.48 mg/L.
PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data is between ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.012 - 0.015 mg/L.
<b>Response variables</b>		
Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data is between < 10 µg/L.	The 50 <sup>th</sup> percentile of the data is between 8 - 10 µg/L.
Chl-a periphyton	The 50 <sup>th</sup> percentile of the data is between ≤ 12 mg/m <sup>2</sup> .	The 50 <sup>th</sup> percentile of the data is between 10 - 12 mg/m <sup>2</sup> .
<b>Toxics</b>		
Fluoride	The 50 <sup>th</sup> percentile of the data is between ≤ 1.5 mg/L.	The 50 <sup>th</sup> percentile of the data is between 1.2 - 1.5 mg/L.
Ammonia (NH <sub>3</sub> -N)	The 50 <sup>th</sup> percentile of the data is between ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.012 - 0.015 mg/L.
Other toxics	The 95 <sup>th</sup> percentile of the data is between within the TWQR as stated in DWAF (1996) or the A Category boundary as stated in DWAF (2008).	An impact is expected if the 95 <sup>th</sup> percentile of the data exceeds the TWQR as stated in DWAF (1996) or the upper limit of the A Category boundary as stated in DWAF (2008).

(a) N/A: No data were available for this assessment.

Table 5.17: PES categories and overall site assessment for Gouritz River at J4GOUR-EWR6

RIVER	Gouritz River	WATER QUALITY MONITORING POINTS	
WQRU		RC	Data were sourced from DWS gauging weir J4H002Q01 (WMS code 102201), located upstream of the EWR site. (Data record: 1965 – 1967; n = 29)
EWR SITE	J4GOUR-EWR6	PES	Data were sourced from DWS gauging weir J4H002Q01 (Data record: 2010 – 2014; n = 85).
<b>Confidence assessment</b>		Confidence 3	
Water Quality Constituents		PES Value	Category/Comment
Inorganic salts (mg/L)	SO <sub>4</sub>	693.0	No guideline, but a reduction over time.
	Na	964.0	Exceeds the ≤ 70 mg/L (TWQR) for Agricultural Use: Irrigation. <i>Significant increase over time.</i>
	Mg	127.0	No guideline.
	Ca	123.3	No guideline.
	Cl	1 289.3	Exceeds the ≤ 100 mg/L (TWQR) for Agricultural Use: Irrigation.
	K	9.81	No guideline.
Nutrients (mg/L)	SRP	0.015	B/C
	TIN	0.05	A
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	7.8 and 8.65	B
	Temperature (°C)	N/A	Impact expected at low flows.
	Dissolved oxygen	N/A	
	Turbidity (NTU)	N/A	
	Electrical conductivity (mS/m)	542.5	No change from the 1970s.
Response variables	Chl a: phytoplankton	N/A	N/A
	Macroinvertebrates	75.0%	C
	Diatoms	10.2 (average)	C/D
	Fish community score	50.1%	D
Toxics	Ammonia (as N)	0.015	A
	Fluoride (as F)	1.082	A. Substantial increase from the 1960s.
<b>OVERALL SITE CLASSIFICATION</b>		<b>B/C Category</b>	

**Table 5.18: Water quality) EcoSpecs and TPCs (Category B/C) for Gouritz River at J4GOUR-EWR6**

Metrics	EcoSpecs	TPCs
<b>Inorganic salt ions</b>		
Sulphate as SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data is between ≤ 690 mg/L.	The 95 <sup>th</sup> percentile of the data is between 550 - 690 mg/L.
Sodium as Na	The 95 <sup>th</sup> percentile of the data is between ≤ 960 mg/L.	The 95 <sup>th</sup> percentile of the data is between 770 - 960 mg/L.
Magnesium as Mg	The 95 <sup>th</sup> percentile of the data is between ≤ 130 mg/L.	The 95 <sup>th</sup> percentile of the data is between 105 - 130 mg/L.
Calcium as Ca	The 95 <sup>th</sup> percentile of the data is between ≤ 120 mg/L.	The 95 <sup>th</sup> percentile of the data is between 95 - 120 mg/L.
Chloride as Cl	The 95 <sup>th</sup> percentile of the data is between ≤ 1300 mg/L.	The 95 <sup>th</sup> percentile of the data is between 1050 - 1300 mg/L.
Potassium as K	The 95 <sup>th</sup> percentile of the data is between ≤ 10 mg/L.	The 95 <sup>th</sup> percentile of the data is between 8 - 10 mg/L.
<b>Physical variables</b>		
Electrical conductivity (mS/m)	The 95 <sup>th</sup> percentile of the data is between ≤ 550 mS/m.	The 95 <sup>th</sup> percentile of the data is between 450 - 550 mS/m.
pH	The 5 <sup>th</sup> percentile of the data is between 5.9 - 6.5, and the 95 <sup>th</sup> percentile 8.0 - 8.8.	The 5 <sup>th</sup> percentile of the data is ≤ 5.7 and the 95 <sup>th</sup> percentile is ≥ 8.6.
Temperature	Natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen	The 5 <sup>th</sup> percentile of the data is between ≥ 7.0 mg/L.	The 5 <sup>th</sup> percentile of the data is between 7.2 - 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity	Changes in turbidity are related to minor man-made modifications. Some silting of habitats is expected.	Initiate baseline monitoring for this variable.
<b>Nutrients</b>		
TIN-N	The 50 <sup>th</sup> percentile of the data is between ≤ 0.25 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.2 - 0.25 mg/L.
PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data is between ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.012 - 0.015 mg/L.
<b>Response variables</b>		
Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data is between < 10 µg/L.	The 50 <sup>th</sup> percentile of the data is between 8 - 10 µg/L.
Chl-a periphyton	The 50 <sup>th</sup> percentile of the data is between ≤ 12 mg/m <sup>2</sup> .	The 50 <sup>th</sup> percentile of the data is between 10 - 12 mg/m <sup>2</sup> .
<b>Toxics</b>		
Fluoride	The 50 <sup>th</sup> percentile of the data is between ≤ 1.5 mg/L.	The 50 <sup>th</sup> percentile of the data is between 1.2 - 1.5 mg/L.
Ammonia (NH <sub>3</sub> -N)	The 50 <sup>th</sup> percentile of the data is between ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.012 - 0.015 mg/L.
Other toxics	The 95 <sup>th</sup> percentile of the data is between within the TWQR as stated in DWAF (1996) or the A Category boundary as stated in DWAF (2008).	An impact is expected if the 95 <sup>th</sup> percentile of the data exceeds the TWQR as stated in DWAF (1996) or the upper limit of the A Category boundary as stated in DWAF (2008).

(a) N/A: No data were available for this assessment.

Table 5.19: PES categories and overall site assessment for Keurbooms River at K6KEUR-EWR8

RIVER	Keurbooms River	WATER QUALITY MONITORING POINTS	
WQRU		RC	A Category benchmark tables from DWAF (2008) were used.
EWR SITE	K6KEUR-EWR8	PES	Data were sourced from DWS gauging weir K6H001Q01 (WMS code 102295), located far (about 20 km) upstream of the EWR site. (Data record: 2007 – 2014; n = 121; Fluorine (F) = 107)
Confidence assessment		Confidence 3	
Water Quality Constituents		PES Value	Category/Comment
Inorganic salts (mg/L)	SO <sub>4</sub>	27.90	No guideline.
	Na	70.24	Just outside the ≤ 70 mg/L (TWQR) for Agricultural Use: Irrigation.
	Mg	11.25	No guideline.
	Ca	12.08	No guideline.
	Cl	129.02	Just exceeds the ≤ 100 mg/L (TWQR) for Agricultural Use: Irrigation.
	K	2.76	No guideline.
Nutrients (mg/L)	SRP	0.012	B
	TIN	0.06	A
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	6.6 and 7.8	B
	Temperature (°C)	N/A	B. Some impacts expected at low flows, although on-site data still shows high levels. B. Changes in turbidity appear to be largely related to natural with minor man-made modifications.
	Dissolved oxygen	N/A	
	Turbidity (NTU)	N/A	
	Electrical conductivity (mS/m)	54.6	B
Response variables	Chl a: phytoplankton	N/A	
	Macroinvertebrates	64.0%	C
	Diatoms	9.9 (average)	C/D
	Fish community score	76.4%	C
Toxics	Ammonia (as N)	0.001	A
	Fluoride (as F)	0.26	A
<b>OVERALL SITE CLASSIFICATION</b>		<b><i>B Category</i></b>	

**Table 5.20: Water quality EcoSpecs and TPCs (Category B) for Keurbooms River at K6KEUR-EWR8**

Metrics	Eco Specs	TPCs
<b>Inorganic salt ions</b>		
Sulphate as SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data is between ≤ 28 mg/L.	The 95 <sup>th</sup> percentile of the data is between 22 - 28 mg/L.
Sodium as Na	The 95 <sup>th</sup> percentile of the data is between ≤ 70 mg/L.	The 95 <sup>th</sup> percentile of the data is between 56 - 70 mg/L.
Magnesium as Mg	The 95 <sup>th</sup> percentile of the data is between ≤ 12 mg/L.	The 95 <sup>th</sup> percentile of the data is between 10 - 12 mg/L.
Calcium as Ca	The 95 <sup>th</sup> percentile of the data is between ≤ 12 mg/L.	The 95 <sup>th</sup> percentile of the data is between 10 - 12 mg/L.
Chloride as Cl	The 95 <sup>th</sup> percentile of the data is between ≤ 130 mg/L.	The 95 <sup>th</sup> percentile of the data is between 104 - 130 mg/L.
Potassium as K	The 95 <sup>th</sup> percentile of the data is between ≤ 3 mg/L.	The 95 <sup>th</sup> percentile of the data is between 2.4 - 3.0 mg/L.
<b>Physical variables</b>		
Electrical conductivity (mS/m)	The 95 <sup>th</sup> percentile of the data is between ≤ 55 mS/m.	The 95 <sup>th</sup> percentile of the data is between 45 - 55 mS/m.
pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentile of the data is between 6.5 - 8.0.	The 5 <sup>th</sup> and 95 <sup>th</sup> percentile of the data is ≥ 6.3 and ≤ 8.2.
Temperature	Natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen	The 5 <sup>th</sup> percentile of the data is between ≥ 7.0 mg/L.	The 5 <sup>th</sup> percentile of the data is between 7.2 - 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity	Changes in turbidity are related to minor man-made modifications. Some silting of habitats is expected.	Initiate baseline monitoring for this variable.
<b>Nutrients</b>		
TIN-N	The 50 <sup>th</sup> percentile of the data is between ≤ 0.25 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.2 - 0.25 mg/L.
PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data is between ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.012 - 0.0715 mg/L.
<b>Response variables</b>		
Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data is between < 10 µg/L.	The 50 <sup>th</sup> percentile of the data is between 8 - 10 µg/L.
Chl-a periphyton	The 50 <sup>th</sup> percentile of the data is between ≤ 12 mg/m <sup>2</sup> .	The 50 <sup>th</sup> percentile of the data is between 9.6 - 12.0 mg/m <sup>2</sup> .
<b>Toxics</b>		
Fluoride	The 50 <sup>th</sup> percentile of the data is between ≤ 1.5 mg/L.	The 50 <sup>th</sup> percentile of the data is between 1.2 - 1.5 mg/L.
Ammonia (NH <sub>3</sub> -N)	The 50 <sup>th</sup> percentile of the data is between ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.012 - 0.015 mg/L.
Other toxics	The 95 <sup>th</sup> percentile of the data is between within the TWQR as stated in DWAF (1996) or the A Category boundary as stated in DWAF (2008).	An impact is expected if the 95 <sup>th</sup> percentile of the data exceeds the TWQR as stated in DWAF (1996) or the upper limit of the A Category boundary as stated in DWAF (2008).

(a) N/A: No data were available for this assessment.

Table 5.21: PES categories and overall site assessment for Olifants River at J3OLIF-EWR9

RIVER	Olifants River	WATER QUALITY MONITORING POINTS	
WQRU		RC	Information available to the water quality specialist on water quality conditions and land-use were available and the A Category benchmark tables in DWAF (2008) were considered unsuitable.
EWR SITE	J3OLIF-EWR9	PES	Data were sourced from DWS gauging weir J3H021Q01 (WMS code 102192) was used for the present state assessment located downstream of the EWR site and upstream of Stompdrift Dam. (Data record: 1982 – 1993; n = 127).
Confidence assessment		Confidence: 2.5	
Water Quality Constituents		PES Value	Category/Comment
Inorganic salts (mg/L)	SO <sub>4</sub>	1 353.4	No guideline but concentrations are high.
	Na	1 774.5	Exceeds the ≤ 70 mg/L (TWQR) for Agricultural Use: Irrigation.
	Mg	336.0	No guideline
	Ca	284.4	No guideline
	Cl	3 113	Exceeds the ≤ 100 mg/L (TWQR) for Agricultural Use: Irrigation.
	K	30.16	No guideline.
Nutrients (mg/L)	SRP	0.019	B/C
	TIN	0.11	A
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	7.3 and 9.0	B/C but assumed to be linked to the groundwater signature.
	Temperature (°C)	N/A	C. Impact expected when little surface flow.
	Dissolved oxygen	N/A	B/C. Impact expected due to extensive livestock farming and erosion in the area.
	Turbidity (NTU)	N/A	B/C. Impact expected due to extensive livestock farming and erosion in the area.
	Electrical conductivity (mS/m)	1 078.7	Natural salinity expected to be high due to the geology of the area
Response variables	Chl a: phytoplankton	N/A	N/A
	Macroinvertebrates	69.0%	C
	Diatoms	6.0 (average)	D/E
	Fish community score	N/A	
Toxics	Ammonia (as N)	0.038	B
	Fluoride (as F)	0.678	A
<b>OVERALL SITE CLASSIFICATION</b>		<b>C Category</b>	

(a) N/A: No data were available for this assessment.

Table 5.22: Water quality EcoSpecs and TPCs (Category C) for Olifants River at J3OLIF-EWR9

Metrics	Eco Specs	TPCs
<b>Inorganic salt ions</b>		
Sulphate as SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data is between ≤ 1350 mg/L.	The 95 <sup>th</sup> percentile of the data is between 1080 - 1350 mg/L.
Sodium as Na	The 95 <sup>th</sup> percentile of the data is between ≤ 1775 mg/L.	The 95 <sup>th</sup> percentile of the data is between 1420 - 1775 mg/L.
Magnesium as Mg	The 95 <sup>th</sup> percentile of the data is between ≤ 335 mg/L.	The 95 <sup>th</sup> percentile of the data is between 270 - 335 mg/L.
Calcium as Ca	The 95 <sup>th</sup> percentile of the data is between ≤ 285 mg/L.	The 95 <sup>th</sup> percentile of the data is between 230 - 285 mg/L.
Chloride as Cl	The 95 <sup>th</sup> percentile of the data is between ≤ 3000 mg/L.	The 95 <sup>th</sup> percentile of the data is between 2400 - 3000 mg/L.
Potassium as K	The 95 <sup>th</sup> percentile of the data is between ≤ 30 mg/L.	The 95 <sup>th</sup> percentile of the data is between 24 - 30 mg/L.
<b>Physical variables</b>		
Electrical conductivity (mS/m)	The 95 <sup>th</sup> percentile of the data is between ≤ 1100 mS/m.	The 95 <sup>th</sup> percentile of the data is between 880 - 1100 mS/m.
pH	The 5 <sup>th</sup> percentile of the data is between 5.9 - 6.5, and the 95 <sup>th</sup> percentile 8.8 - 9.2.	The 5 <sup>th</sup> percentile of the data is ≤ 5.7 and the 95 <sup>th</sup> percentile is ≥ 9.0.
Temperature	The upper Olifants mostly runs underground, with water appearing in places. This is not groundwater from a deep aquifer, but water from the vadose zone. Elevated temperatures and low DO levels would be expected under these conditions. EcoSpecs and TPCs are therefore difficult to set for these variables, and should rather be linked to meeting biotic requirements and monitoring biotic responses.	Initiate baseline monitoring for this variable.
Dissolved oxygen	The upper Olifants mostly runs underground, with water appearing in places. This is not groundwater from a deep aquifer, but water from the vadose zone. Elevated temperatures and low DO levels would be expected under these conditions. EcoSpecs and TPCs are therefore difficult to set for these variables, and should rather be linked to meeting biotic requirements and monitoring biotic responses.	Initiate baseline monitoring for this variable where and if possible.
Turbidity	Changes in turbidity are related to minor man-made modifications. Some silting of habitats and temporary high turbidity levels are expected.	Initiate baseline monitoring for this variable.
<b>Nutrients</b>		
TIN-N	The 50 <sup>th</sup> percentile of the data is between ≤ 0.25 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.2 - 0.25 mg/L.
PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data is between ≤ 0.025 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.02 - 0.025 mg/L.
<b>Response variables<sup>(a)</sup></b>		
Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data is between < 15 µg/L.	The 50 <sup>th</sup> percentile of the data is between 12 - 15 µg/L.
Chl-a periphyton	The 50 <sup>th</sup> percentile of the data is between ≤ 21 mg/m <sup>2</sup> .	The 50 <sup>th</sup> percentile of the data is between 17 - 21 mg/m <sup>2</sup> .
<b>Toxics</b>		
Fluoride	The 50 <sup>th</sup> percentile of the data is between ≤ 1.5 mg/L.	The 50 <sup>th</sup> percentile of the data is between 1.2 - 1.5 mg/L.
Ammonia (NH <sub>3</sub> -N)	The 50 <sup>th</sup> percentile of the data is between ≤ 0.044 mg/L.	The 50 <sup>th</sup> percentile of the data is between 0.035 - 0.044 mg/L.
Other toxics	The 95 <sup>th</sup> percentile of the data is between within the TWQR as stated in DWAF (1996) or the A Category boundary as stated in DWAF (2008).	An impact is expected if the 95 <sup>th</sup> percentile of the data exceeds the TWQR as stated in DWAF (1996) or the upper limit of the A Category boundary as stated in DWAF (2008).

**Table 5.23: PES categories and overall site assessment for Kammanassie River at J3KAMM-EWR10**

RIVER	Kammanassie River		WATER QUALITY MONITORING POINTS	
WQRU		RC	No data were available for the water quality assessment. Land use and available information, diatom data, <i>in situ</i> water quality data and survey notes were used to provide an expert opinion and generate a PAI model and integrated water quality category for the site.	
EWR SITE	J3KAMM-EWR10	PES	N/A	
Confidence assessment	Confidence: 2			
Water Quality Constituents		PES Value	Category/Comment	
Inorganic salts (mg/L)	SO <sub>4</sub>	N/A	N/A	
	Na	N/A	N/A	
	Mg	N/A	N/A	
	Ca	N/A	N/A	
	Cl	N/A	N/A	
	K	N/A	N/A	
Nutrients (mg/L)	SRP	N/A	N/A	
	TIN	N/A	N/A	
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	N/A	N/A	
	Temperature (°C)	N/A	N/A	
	Dissolved oxygen	N/A	N/A	
	Turbidity (NTU)	N/A	N/A	
	Electrical conductivity (mS/m)	N/A	N/A	
Response variables	Chl a: phytoplankton	N/A	N/A	
	Macroinvertebrates	C/D		
	Diatoms	C/D	The biological water quality at this site was Moderate. Nutrient levels, organic pollution and salinity were elevated with salinity and organic pollution levels becoming problematic. The improvement in diatom-based water quality could mainly be ascribed to higher flows during July 2014 which allowed for the flushing of pollutants as diatom species associated with elevated flows were abundant.	
	Fish community score	D		
Toxics	Ammonia (as N)			
	Fluoride (as F)			
<b>OVERALL SITE CLASSIFICATION</b>		<b>C Category</b>		

a) N/A: No data were available for this assessment.

Note that limited water quality data exists for the Kammanassie River system. The water quality assessment is therefore based on available information and expert judgement.

**Table 5.24: PES categories and overall site assessment for Groot Brak WQSU 1 & 2. (expert judgment)**

<b>RIVER</b>	Groot Brak River		<b>WATER QUALITY MONITORING POINTS</b>	
<b>WQSU</b>	WQSU 1 + 2		<b>RC</b>	Default boundary tables for "A" category river
<b>EWR SITE</b>	None		<b>PES</b>	Groot Brak R. at Ernest Robertson dam - K2H005-Q01 (1983 – 1996; n = 29)
<b>Confidence assessment</b>		Very low because extrapolated from outflow from a dam, and not current data.		
<b>Water Quality Constituents</b>			<b>Value</b>	<b>Category/Comment</b>
Inorganic salts (mg/L)	MgSO <sub>4</sub>			No data
	Na <sub>2</sub> SO <sub>4</sub>			
	MgCl <sub>2</sub>			
	CaCl <sub>2</sub>			
	NaCl			
	CaSO <sub>4</sub>			
Nutrients (mg/L)	SRP (mg/l)		0.042	Unreliable data used
	TIN (mg/l)		<0.25	A category
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)		4.62	Naturally acidic
	Temperature			No data
	Dissolved oxygen			Expected to be high
	Turbidity (NTU)			Expected to be low
	Electrical conductivity (mS/m)		<30	A category
	Response variables	Chl a: periphyton		
Chl a: phytoplankton			No data	
Macroinvertebrates (ASPT)			No data	
Fish community score			No data	
Toxics				No data – expected to be minimal
<b>OVERALL SITE CLASSIFICATION</b>			<b>A/B</b> (from expert judgment)	

Table 5.25: Water quality Ecospecs and TPC's (Category A/B) for Groot Brak River at WQSU 1&amp;2

RIVER	WATER QUALITY MONITORING POINTS				
	Groot Brak River	DWAF WQ WMS	RHP		
WQSU	WQSU 1&2	Currently, no monitoring station			
EWB SITE	GB 1	Currently, no monitoring site			
<b>Confidence in PES assessment</b>					
Very Low because extrapolated from WQSU 3					
Water Quality Constituents	PES Category	WQ Ecospecs	Improvement required?	TPC	Monitoring frequency
Inorganic salts (mg/L)	MgSO <sub>4</sub>	≤23 mg/L		95 <sup>th</sup> percentile to be < 23 mg/L	
	Na <sub>2</sub> SO <sub>4</sub>	≤33 mg/L		95 <sup>th</sup> percentile to be < 33 mg/L	
	MgCl <sub>2</sub>	≤30 mg/L	N/A	95 <sup>th</sup> percentile to be < 30 mg/L	Monthly
	CaCl <sub>2</sub>	≤57 mg/L		95 <sup>th</sup> percentile to be < 57 mg/L	
	NaCl	≤191 mg/L		95 <sup>th</sup> percentile to be < 191 mg/L	
Nutrients (mg/L)	SRP	≤0.012 mg/L	Yes to A	50 <sup>th</sup> percentile to be < 0.012 mg/L	Monthly
	TIN	≤0.25 mg/L	No	50 <sup>th</sup> percentile to be < 0.25 mg/L	Monthly
	pH	< 7.9	No	95 <sup>th</sup> percentile to be < 7.9	Monthly
Physical Variables	Temperature	Maintain range	N/A	Maintain natural range	Monthly
	Dissolved oxygen	7 – 8 mg/L	N/A	5 <sup>th</sup> percentile to be > 7 mg/L	Monthly
	Turbidity (NTU)	Moderate change	N/A	Moderate change allowed	Monthly
	Electrical conductivity (mS/m)	≤30 mS/m	No	95 <sup>th</sup> percentile to be < 30 mS/m	Monthly
	Chl a: periphyton	≤12 mg/m <sup>2</sup> (B category)	N/A	50 <sup>th</sup> percentile to be < 12 mg/ m <sup>2</sup>	Quarterly
Response variables	Chl a: phytoplankton	≤ 15 µg/L (B category)	N/A	50 <sup>th</sup> percentile to be < 15 µg/L	
	Macroinvertebrates (ASPT)	See Ecospecs for fish and invertebrates respectively			
	Fish community score				
Toxics	Instream toxicity	Assess only if the biomonitoring results indicate that there is a serious problem and the cause is unknown.			
		No data. Possibly some pesticides			

Table 5.26: PES categories and overall site assessment for Groot Brak Water at WQSU 3

RIVER	Groot Brak River		1.1.1 WATER QUALITY MONITORING POINTS	
WQSU	WQSU 3	RC	Moordkuil R. at Banff - K1H005 (1979 – 1982 n = 91)	
EWR SITE	GB 1	PES	K1H005 (2002 – 2006 n = 51)	
<b>Confidence assessment</b>				
Medium. NB: Because extrapolated from another catchment. Biological data support inferred water quality				
<b>Water Quality Constituents</b>				
Inorganic salts (mg/L)	MgSO <sub>4</sub>			
	Na <sub>2</sub> SO <sub>4</sub>			
	MgCl <sub>2</sub>			No data
	CaCl <sub>2</sub>			
	NaCl			
	CaSO <sub>4</sub>			
Nutrients (mg/L)	SRP	0.006*	0.029	Category = C. Increase in trend
	TIN	0.04	0.06	Category = A. Trend stable
	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	Not calculated	6.6 – 7.9	
Physical Variables	Temperature			No data, but not considered to be problem variables, as not downstream of a major dam.
	Dissolved oxygen			
	Turbidity (NTU)			Slightly turbid on site visits in March and June 2007 (but after heavy rains).
	Electrical conductivity (mS/m)	40	30	Slight decrease in trend
Response variables	Chl a: periphyton			No data. Visual inspection March and June – no obvious signs of algae.
	Chl a: phytoplankton			
	Macroinvertebrates (ASPT)	-	A	Natural; ASPT = 8.0; SASS = 192 (this study)
Toxics	Fish community score	-	C	This study
<b>OVERALL SITE CLASSIFICATION</b>		<b>B</b> (from PAI model)		

Table 5.27: Water quality Ecospecs and TPC's (Category B) for Groot Brak River at WQSU 3

RIVER	WATER QUALITY MONITORING POINTS				
	Groot Brak River	DWAF WQ WMS RHP			
WQSU	3	Currently, no monitoring station			
EWR SITE	GB 1	Currently, no monitoring site			
Confidence in PES assessment					
Low – medium, because extrapolated from Moordkuil R. Biological data supports inferred PES for water quality.					
Water Quality Constituents	PES Category	WQ Ecospecs	Improvement required?	TPC	Monitoring frequency
Inorganic salts (mg/L)	MgSO <sub>4</sub>	≤23 mg/L		95 <sup>th</sup> percentile to be < 23 mg/L	
	Na <sub>2</sub> SO <sub>4</sub>	≤33 mg/L		95 <sup>th</sup> percentile to be < 33 mg/L	
	MgCl <sub>2</sub>	≤30 mg/L	N/A	95 <sup>th</sup> percentile to be < 30 mg/L	Monthly
	CaCl <sub>2</sub>	≤57 mg/L		95 <sup>th</sup> percentile to be < 57 mg/L	
	NaCl	≤191 mg/L		95 <sup>th</sup> percentile to be < 191 mg/L	
Nutrients (mg/L)	SRP	≤0.02 mg/L	Yes to B	50 <sup>th</sup> percentile to be < 0.02 mg/L	Monthly
	TIN	≤0.25 mg/L	No	50 <sup>th</sup> percentile to be < 0.25 mg/L	Monthly
Physical Variables	pH	< 7.9	No	95 <sup>th</sup> percentile to be < 7.9	Monthly
	Temperature	Maintain range	N/A	Maintain natural range	Monthly
	Dissolved oxygen	7 – 8 mg/L	N/A	5 <sup>th</sup> percentile to be > 7 mg/L	Monthly
	Turbidity (NTU)	Moderate change	N/A	Moderate change allowed	Monthly
	Electrical conductivity (mS/m)	Category = A	≤30 mS/m	No	95 <sup>th</sup> percentile to be < 30 mS/m
Response variables	Chl a: periphyton	≤12 mg/m <sup>2</sup> (B category)		50 <sup>th</sup> percentile to be < 12 mg/ m <sup>2</sup>	Quarterly
	Chl a: phytoplankton	≤ 15 µg/L (B category)	N/A	50 <sup>th</sup> percentile to be < 15 µg/L	
	Macroinvertebrates (ASPT)	A (this study)		See Ecospecs for fish and invertebrates respectively	
Toxics	Fish community score	C (this study)			
	Instream toxicity	No data No data. Possibly some pesticides		Assess only if the biomonitoring results indicate that there is a serious problem and the cause is unknown.	

**Table 5.28: PES categories and overall site assessment for Groot Brak WQSU 4 (\*boundary value recalibrated) (expert judgment)**

RIVER		Groot Brak		WATER QUALITY MONITORING POINTS	
WQSU		4		RC	Groot Brak R. at Wolwedans - K2H002-Q01 (1976 – 1978; n = 68)
EWR SITE		None		PES	K2H002 (2002 – 2006; n = 57)
Confidence assessment		Very good. Monitoring station located in WQSU, above point source of village. Data collected from > 15 years before dam construction			
Water Quality Constituents		RC Value	PES Value	Category/Comment	
Inorganic salts (mg/L)	MgSO <sub>4</sub>			No data	
	Na <sub>2</sub> SO <sub>4</sub>				
	MgCl <sub>2</sub>				
	CaCl <sub>2</sub>				
	NaCl				
	CaSO <sub>4</sub>				
Nutrients (mg/L)	SRP	0.016*	0.037	Category = C. Trend increasing	
	TIN	0.04	0.075	Category = A. Trend increasing	
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)		6.8 – 8.1	Based on Monitoring station located in WQSU, above point source of village	
	Temperature		No data	May be a problem considering downstream of dam. Requires monitoring	
	Dissolved oxygen		No data		
	Turbidity (NTU)		No data		
	Electrical conductivity (mS/m)	30	52	Category = B. Trend increasing	
Response variables	Chl a: periphyton			No data	
	Chl a: phytoplankton			No data	
	Macroinvertebrates (ASPT)			No data	
	Fish community score			No data	
Toxics				No data	
<b>OVERALL SITE CLASSIFICATION</b>		<b>B/C (expert judgment)</b>			

Table 5.29: Water quality Ecospecs and TPC's (Category B/C) for Groot Brak River at WQSU 4

RIVER		WATER QUALITY MONITORING POINTS			
WQSU	Groot Brak River	DWAF WQ WMS	Currently, no monitoring station		
EWR SITE	GB 1	RHP	Currently, no monitoring site		
<b>Confidence in PES assessment</b>					
		Very Low, because extrapolated from WQSU 3.			
Water Quality Constituents	PES Category	WQ Ecospecs	Improvement required?	TPC	Monitoring frequency
Inorganic salts (mg/L)	MgSO <sub>4</sub>	≤23 mg/L		95 <sup>th</sup> percentile to be < 23 mg/L	
	Na <sub>2</sub> SO <sub>4</sub>	≤33 mg/L		95 <sup>th</sup> percentile to be < 33 mg/L	
	MgCl <sub>2</sub>	≤30 mg/L	N/A	95 <sup>th</sup> percentile to be < 30 mg/L	Monthly
	CaCl <sub>2</sub>	≤57 mg/L		95 <sup>th</sup> percentile to be < 57 mg/L	
	NaCl	≤191 mg/L		95 <sup>th</sup> percentile to be < 191 mg/L	
Nutrients (mg/L)	SRP	≤0.025 mg/L	Yes to B/C	50 <sup>th</sup> percentile to be < 0.025 mg/L	Monthly
	TIN	≤0.25 mg/L	No	50 <sup>th</sup> percentile to be < 0.25 mg/L	Monthly
	pH	< 7.9	No	95 <sup>th</sup> percentile to be < 7.9	Monthly
Physical Variables	Temperature	Maintain range	N/A	Maintain natural range	Monthly
	Dissolved oxygen	7 – 8 mg/L	N/A	5 <sup>th</sup> percentile to be > 7 mg/L	Monthly
	Turbidity (NTU)	Moderate change	N/A	Moderate change allowed	Monthly
	Electrical conductivity (mS/m)	≤30 mS/m	No	95 <sup>th</sup> percentile to be < 30 mS/m	Monthly
	Chl a: periphyton	No data. Visual inspection March & June. No obvious sign of algae.	≤12 mg/m <sup>2</sup> (B category) ≤ 15 µg/L (B category)	N/A	50 <sup>th</sup> percentile to be < 12 mg/ m <sup>2</sup> 50 <sup>th</sup> percentile to be < 15 µg/L
Response variables	Macroinvertebrates (ASPT)	See Ecospecs for fish and invertebrates respectively			
	Fish community score				
	Instream toxicity	Assess only if the biomonitoring results indicate that there is a serious problem and the cause is unknown.			
Toxics	No data. Possibly some pesticides				

Table 5.30: Water quality Ecospecs and TPC's for Malgas River at WQSU2

RIVER	Malgas River	WATER QUALITY MONITORING POINTS			
WQSU	WQSU 2	RC	Default values		
EWR SITE	Mal 1	PES	Malgas R. at Blanco - K3H004-Q01 ('01 - '06 n = 53)		
<b>Confidence assessment</b>		Good for the overall WQSU. Low for the EWR Site.			
Water Quality Constituents		RC Value	PES Value	Category/Comment	G-power (Confidence)
Inorganic salts (mg/L)	MgSO <sub>4</sub>				No data
	Na <sub>2</sub> SO <sub>4</sub>				
	MgCl <sub>2</sub>				
	CaCl <sub>2</sub>				
	NaCl				
	CaSO <sub>4</sub>				
Nutrients (mg/L)	SRP	≤0.005	0.038	Category = C. Trend increasing.	0.116 (Low)
	TIN	≤0.25	0.413	Category = A/B. Trend increasing	
Physical Variables	pH (5 <sup>th</sup> + 95 <sup>th</sup> %ile)		4.3 + 7.2	Naturally acidic.	0.84 (High)
	Temperature	16.3 (50%ile)	-	No PES data. Not expected to be a problem since no dam upstream	
	Dissolved oxygen			No data. Could be a problem due to quarry	
	Turbidity (NTU)			Category = A. Trend = slight increase	0.64 (Medium)
	Electrical conductivity (mS/m)	<30	15		
Response variables	Chl a: periphyton			No data	No data (but visual inspection at EWR site indicated localised problem).
	Chl a: phytoplankton			No data	
	Macroinvertebrates			A category; ASPT = 8.2, SASS = 164 (this study)	
	Fish community score			C/D (this study)	
Toxics				No data. Possible toxicity from quarry/cement/asphalt works, outflows from village and agricultural return flows	
<b>OVERALL SITE CLASSIFICATION</b>		<b>B Category</b> (from PAI model)			

Table 5.31: PES categories and overall site assessment for Maalgate River

RIVER	Moeras/Maalgate River		WATER QUALITY MONITORING POINTS	
WQSU	N/A		RC	Default boundary tables for A category river
EWR SITE	Moe 1 & Maa 2		PES	Maalgate R. @ Noetze Kamma K3H003 ('02 – '06; n = 52)
Confidence assessment		Good.		
Water Quality Constituents		Value	Category/Comment	
Nutrients (mg/L)	SRP	0.019	Category = B (TP = 0.015 mg/L)	
	TIN	0.1	Category = A	
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)	5.7 – 7.7	Naturally acidic	
	Temperature		No data. May be impacted (by abstraction)	
	Dissolved oxygen		No data. May be impacted (due to excessive abstraction)	
	Turbidity (NTU)		No data. Site visit indicated not elevated.	
	Electrical conductivity (mS/m)	63	Category = C	
Response variables	Chl a: periphyton		No data. Site visit indicated extensive periphyton	
	Chl a: phytoplankton		No data	
	Macroinvertebrates (ASPT)		D (present study) Fair (RHP)	
	Fish community score		D (present study)	
Toxics			No data – expected to be pesticides from intensive agricultural activity	
<b>OVERALL SITE CLASSIFICATION</b>		<b>C Category (from expert judgement)</b>		
<b>Boundary values</b>				
Determinant	Lower boundary value	Upper boundary value		
TIN (mg/L) – 50 <sup>th</sup> %ile		2.0		
PHYTOPLANKTON Chl a (µg/L) – 50 <sup>th</sup> %ile	15	20		
SRP or PO4 (mg/L) – 50 <sup>th</sup> %ile		0.058		
PERIPHYTON Chl a (mg/m <sup>2</sup> ) – 50 <sup>th</sup> %ile	12	21		
pH – 5 <sup>th</sup> %ile and 95 <sup>th</sup> %ile	5 <sup>th</sup> percentile: 5.00 – 5.23			
TEMPERATURE (°C) – 10 <sup>th</sup> %ile and 90 <sup>th</sup> %ile	Vary by no more than 2°C from natural range			
Dissolved oxygen (mg/L) - 5 <sup>th</sup> %ile	6			
BIOLOGICAL INDICATOR (ASPT)	5.67			

Table 5.32: PES categories and overall site assessment for Gwaing (Malgas/Keur River) at WQSU1

RIVER	Malgas River (Keur River)	WATER QUALITY MONITORING POINTS		
WQSU	WQSU 1	RC	Rooi R. @ George K3H002-Q01 ('77 – '79 n = 84)	
EWR SITE	None	PES	K3H002-Q01 ('01 – '06 n = 65)	
<b>Confidence assessment</b>		Low. NB: extrapolated from an adjacent catchment		
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L)	MgSO <sub>4</sub>			No data
	Na <sub>2</sub> SO <sub>4</sub>			
	MgCl <sub>2</sub>			
	CaCl <sub>2</sub>			
	NaCl			
	CaSO <sub>4</sub>			
Nutrients (mg/L)	SRP	0.014	≤0.014*	Category = A
	TIN	0.04	≤0.25*	Category = A
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)		3.7 – 6.7	Naturally acidic
	Temperature			No data but expected to be natural as little development in upstream catchment.
	Dissolved oxygen			
	Turbidity (NTU)			
	Electrical conductivity (mS/m)	16	17	Category = A
Response variables	Chl a: periphyton			No data
	Chl a: phytoplankton			
	Macroinvertebrates			Good (RHP)
	Fish community score			Natural (RHP)
Toxics				No data
<b>OVERALL SITE CLASSIFICATION</b>		<b>A Category</b> (from expert judgement)		
<b>Boundary values</b>				
Determinant		Lower boundary value	Upper boundary value	
TIN (mg/L) – 50 <sup>th</sup> %ile			≤ 0.25	
PHYTOPLANKTON Chl a (µg/L) – 50 <sup>th</sup> %ile			<10	
SRP or PO <sub>4</sub> (mg/L) – 50 <sup>th</sup> %ile			≤ 0.005	
PERIPHYTON Chl a (mg/m <sup>2</sup> ) – 50 <sup>th</sup> %ile			< 1.7	
pH – 5 <sup>th</sup> %ile and 95 <sup>th</sup> %ile		6.5 – 8.00		
TEMPERATURE (°C) – 10 <sup>th</sup> %ile and 90 <sup>th</sup> %ile		Nat temp range		
Dissolved oxygen (mg/L) - 5 <sup>th</sup> %ile		>8		
BIOLOGICAL INDICATOR (ASPT)		7		

Table 5.33: PES categories and overall site assessment for Gwaing (Malgas River) at WQSU2

RIVER	Malgas River	WATER QUALITY MONITORING POINTS			
WQSU	WQSU 2	RC	Default values		
EWR SITE	Mal 1	PES	Malgas R. @ Blanco - K3H004-Q01 ('01 – '06 n = 53)		
<b>Confidence assessment</b>		Good for the overall WQSU. Low for the EWR Site.			
Water Quality Constituents		RC Value	PES Value	Category/Comment	G-power (Confidence)
Inorganic salts (mg/L)	MgSO <sub>4</sub>				No data
	Na <sub>2</sub> SO <sub>4</sub>				
	MgCl <sub>2</sub>				
	CaCl <sub>2</sub>				
	NaCl				
	CaSO <sub>4</sub>				
Nutrients (mg/L)	SRP	≤0.005	0.038	Category = C. Trend increasing.	0.116 (Low)
	TIN	≤0.25	0.413	Category = A/B. Trend increasing	
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)		4.3 – 7.2	Naturally acidic.	0.84 (High)
	Temperature	16.3 (50 <sup>th</sup> ile)	-	No PES data. Not expected to be a problem since no dam upstream	
	Dissolved oxygen				
	Turbidity (NTU)			No data. Could be a problem due to quarry	
	Electrical conductivity (mS/m)	<30	15	Category = A. Trend = slight increase	0.64 (Medium)
Response variables	Chl a: periphyton			No data	No data (but visual inspection indicated localised problem).
	Chl a: phytoplankton			No data	
	Macroinvertebrates			A category; ASPT = 8.2, SASS = 164 (this study)	
	Fish community score			C/D (this study)	
Toxics				No data. Possible toxicity from quarry/cement/asphalt works, outflows from village and return flows	
<b>OVERALL SITE CLASSIFICATION</b>		<b>B Category (from PAI model). Likely to be better at EWR site itself.</b>			
<b>Boundary values</b>					
Determinant		Lower boundary value		Upper boundary value	
TIN (mg/L) – 50 <sup>th</sup> %ile				0.75	
PHYTOPLANKTON Chl a (µg/L) – 50 <sup>th</sup> %ile		5		10	
SRP or PO <sub>4</sub> (mg/L) – 50 <sup>th</sup> %ile				0.02	
PERIPHYTON Chl a (mg/m <sup>2</sup> ) – 50 <sup>th</sup> %ile		1.7		12	
pH – 5 <sup>th</sup> %ile and 95 <sup>th</sup> %ile		5 <sup>th</sup> percentile: 6.00 – 6.24 95 <sup>th</sup> percentile: 8.37 – 8.69			
TEMPERATURE (°C) – 10 <sup>th</sup> %ile and 90 <sup>th</sup> %ile		Nat temp range			
Dissolved oxygen (mg/L) - 5 <sup>th</sup> %ile		7			
BIOLOGICAL INDICATOR (ASPT)		6.34			

Table 5.34: PES categories and overall site assessment for Gwaing (Gwaing River) at WQSU3

RIVER		Gwaing River	WATER QUALITY MONITORING POINTS		
WQSU		WQSU 3	RC	Default values	
EWR SITE		None	PES	No DWAF monitoring station	
<b>Confidence assessment</b>		Low for RC as default values used. Medium for the PES as no monitoring station, but supported by biomonitoring data and (limited) supplementary data.			
Water Quality Constituents		RC Value	PES Value	Category/Comment	
Inorganic salts (mg/L)	MgSO <sub>4</sub>			No data	
	Na <sub>2</sub> SO <sub>4</sub>				
	MgCl <sub>2</sub>				
	CaCl <sub>2</sub>				
	NaCl				
	CaSO <sub>4</sub>				
Nutrients (mg/L)	SRP	≤0.005	1.4 mg/L	Category = F	
	TIN	≤0.25		Category = D	
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)			No data. Likely to be a problem with low DO and elevated turbidity	
	Temperature				
	Dissolved oxygen				
	Turbidity (NTU)				
	Electrical conductivity (mS/m)	<30	49		
Response variables	Chl a: periphyton			No data	
	Chl a: phytoplankton				
	Macroinvertebrates (ASPT)			RHP = "Poor water quality"	
	Fish community score				
Toxics				No data, but likely to be a problem	
<b>OVERALL SITE CLASSIFICATION</b>		<b>D/E Category (expert judgement)</b>			
<b>Boundary values</b>					
Determinant		Lower boundary value	Upper boundary value		
TIN (mg/L) – 50 <sup>th</sup> %ile			4.0		
PHYTOPLANKTON Chl a (µg/L) – 50 <sup>th</sup> %ile		20	30		
SRP or PO <sub>4</sub> (mg/L) – 50 <sup>th</sup> %ile			0.125		
PERIPHYTON Chl a (mg/m <sup>2</sup> ) – 50 <sup>th</sup> %ile		21	84		
pH – 5 <sup>th</sup> %ile and 95 <sup>th</sup> %ile		5 <sup>th</sup> percentile: 5.46 – 5.7 95 <sup>th</sup> percentile: 8.56 – 10.00			
TEMPERATURE (°C) – 10 <sup>th</sup> %ile and 90 <sup>th</sup> %ile		Vary by no more than 4°C from natural range			
Dissolved oxygen (mg/L) - 5 <sup>th</sup> %ile		4			
BIOLOGICAL INDICATOR (ASPT)		5			

Where a difference in the water quality values for the Ecological Reserve and Basic Human Needs Reserve was found, the stricter or more protective value was selected for the water quality component of the Reserve.

Table 5.35: PES categories and overall site assessment for the Kaaimans River at WQSU 2

RIVER	Kaaimans River		WATER QUALITY MONITORING POINTS		
WQSU	WQSU 2	RC	Kaaimans R. @ Barbierskraal - K3H001-Q01 ('77 - '81; n = 175)		
EWR SITE	Ka1	PES	K3H001-Q01 ('01 - '06; n = 56)		
<b>Confidence assessment</b>	High for both the RC and PES, because the monitoring station is in the WQSU, has a good length of data, and because there is little land transformation in the catchment.				
Water Quality Constituents		RC Value	PES Value	Category/Comment	G-power (Confidence)
Inorganic salts (mg/L)	MgSO <sub>4</sub>				No data
	Na <sub>2</sub> SO <sub>4</sub>				
	MgCl <sub>2</sub>				
	CaCl <sub>2</sub>				
	NaCl				
	CaSO <sub>4</sub>				
Nutrients (mg/L)	SRP	0.011	0.028*	Category = B. Trend = slight increase	0.122 (Low)
	TIN	0.04	0.061	Category = A. Very slight increase in trend	
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)		4.4 – 7.4	Naturally acidic waters	0.87 (High)
	Temperature			No data. Unlikely to be a problem	
	Dissolved oxygen			No data. Visual inspection = low turbidity. Unlikely to be a problem	
	Turbidity (NTU)			No data. Visual inspection = low turbidity. Unlikely to be a problem	
	Electrical conductivity (mS/m)	16	17	A Category. Trend = stable	0.87 (High)
Response variables	Chl a: periphyton			No data. Visual inspection = no excessive algal growth	
	Chl a: phytoplankton				
	Macroinvertebrates			A category; ASPT = 8.0, SASS = 175 (this study). Natural (RHP)	
	Fish community score			B	
Toxics				No data, but unlikely to be a problem	
<b>OVERALL SITE CLASSIFICATION</b>		<b>A Category</b> (calculated from PAI model)			

Table 5.36: Water Ecospecs for the Kaaimans River in K30C

Quality Constituent	Parameter	Ecological Reserve Requirements	Basic Human Needs Requirement <sup>5</sup>	Reserve Requirement: water quality
General chemistry – major inorganic salts	MgSO <sub>4</sub> (mg/l) <sup>1</sup>	< 16	N/A	< 16
	Na <sub>2</sub> SO <sub>4</sub> (mg/l) <sup>1</sup>	< 20	N/A	< 20
	MgCl <sub>2</sub> (mg/l) <sup>1</sup>	< 15	N/A	< 15
	CaCl <sub>2</sub> (mg/l) <sup>1</sup>	< 21	N/A	< 21
	NaCl (mg/l) <sup>1</sup>	< 45	N/A	< 45
General chemistry – Major Ions	Sodium (mg/l)	N/A	<200	<200
	Magnesium (mg/l)	N/A	<100	<100
	Chloride (mg/l)	N/A	<200	<200
	Calcium (mg/l)	N/A	<80	<80
	Sulphate (mg/l)	N/A	<400	<400
Nutrients	Phosphate (PO <sub>4</sub> ) (mg/l) <sup>2</sup>	<0.02mg/L	N/A	<0.02mg/L
	Total Inorganic Nitrogen (mgN/l) <sup>2</sup>	<0.25mg/L	N/A	<0.25mg/L
Physical water quality	pH (range) 5 <sup>th</sup> percentile 95 <sup>th</sup> percentile	6.7 7.4	5 9.5	5 7.4
	<b>Dissolved Oxygen (mg/l)</b> <sup>1</sup>	>1.7 mg/L	N/A	>1.7 mg/L
	<b>Temperature</b> <sup>1</sup>	Small change from natural		Small change from natural
	<b>Electrical conductivity (mS/m) – USE ONLY IF AGGREGATED SALTS CANNOT BE PRODUCED</b>	≤30mS/m	0-70	≤30mS/m
Biological water quality	Chl-a: periphyton <sup>3</sup>	<1.7 mg/m <sup>2</sup>	N/A	
	<b>Chl-a: phytoplankton</b> <sup>3</sup>	< 10 µg/L (A category)	N/A	
	Biotic community composition - macroinvertebrates	ASPT: 8 (A category)		
	In-stream toxicity	In-stream toxicity should not occur		
Toxics and complex mixtures	Toxics (as listed in DWAF, 1996 <sup>6</sup> )	≤ TWQR	≤ TWQR	≤ TWQR

**NOTES:**

<sup>1</sup> : 95<sup>th</sup> percentile compliance. <sup>2</sup>: 50<sup>th</sup> percentile compliance. <sup>3</sup> Chl-a is not applicable to Desktop Reserve studies. <sup>4</sup> 90<sup>th</sup> percentile compliance

<sup>5</sup> ref: *South African Water Quality Guidelines, Volume 1: Domestic Water Use, 2<sup>nd</sup> Ed.* 1996. Department of Water Affairs and Forestry, Pretoria, South Africa.

<sup>6</sup> ref: *South African Water Quality Guidelines, Volume 7: Aquatic Ecosystems, 2<sup>nd</sup> Ed.* 1996. Department of Water Affairs and Forestry, Pretoria, South Africa.

Table 5.37: PES categories and overall site assessment for the Diep River at WQSU 3

RIVER	Diep River		WATER QUALITY MONITORING POINTS	
WQSU	WQSU 3 (start of level II Ecoregion 20.02 to the beginning of the mountain stream zone)		RC	Diep R. @ Woodville Forest Reserve K4H003Q01 ('77 - '80; n = 58)
EWR SITE	3		PES	K4H003Q01 ('03 - '07; n = 36)
Confidence assessment	Moderate to high confidence			
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L)	MgSO <sub>4</sub>	8.86	15.87	TEACHA was used for data assessment. Salts = an A category
	Na <sub>2</sub> SO <sub>4</sub>	0.00	0.00	
	MgCl <sub>2</sub>	14.83	14.52	
	CaCl <sub>2</sub>	7.18	9.89	
	NaCl	102.10*	94.31	
	CaSO <sub>4</sub>	0.66	0.59	
Nutrients (mg/L)	SRP	0.003	0.018	B/C category.
	TIN	0.04	0.07	A category.
Physical Variables	pH (5 <sup>th</sup> + 95 <sup>th</sup> %ile)	4.8 + 6.2	4.8 + 7.5	B category.
	Temperature	-	-	No data but no impacts expected.
	Dissolved oxygen	-	-	
	Turbidity (NTU)	-	-	No data. Slight evidence of sedimentation.
	Electrical conductivity (mS/m)		18.0	A category
Response variables	Chl a: periphyton	-	21.25	Some nutrient elevations shown by periphyton data (C/D category; n=1)
	Chl a: phytoplankton	-	0.18	
	Macroinvertebrates	ASPT <sup>§</sup> : mean of 6.58	ASPT: 7.3 MIRAI <sup>**</sup> : 86.1%	B category for the present state.
	Fish community score	-	FRAI <sup>*</sup> : 86.1%	B category for the present state.
	Diatoms	-	SPI <sup>#</sup> =17.6	High quality water
Toxics		-	-	No data, but some impact expected due to farming-related pesticides and fertilizer use.
<b>OVERALL SITE CLASSIFICATION</b>		<b>B (PAI model)</b>		

\*: boundary value recalibrated

-: no data

#: Specific Pollution Index

\*: FRAI = Fish Response Assessment Index

\*\*: MIRAI = Macro Invertebrate Response Assessment Index

§: ASPT = Average Score Per Taxon

Table 5.38: Water quality Ecospecs for Diep River (WQSU 3, K40A)

River: Diep		EWR Site: 3	Monitoring site: K4H003Q01
Water quality metrics		ECOSPEC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 16 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be ≤ 191 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 351 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be ≤ 30 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must range from 4.5 to 7.5.	
	Temperature	Small deviation from the natural temperature range.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be ≥ 7.5 mg/L.	
	Turbidity	Vary by a small amount from the natural turbidity range; minor silting of instream habitats acceptable.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be ≤ 0.25 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be ≤ 0.025 mg/L.	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be <15 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be ≤ 52.5 mg/m <sup>2</sup> . **	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

\* To be generated using TEACHA when the TPC for EC is exceeded or salt pollution expected.

\*\* Periphyton (21.25 mg/m<sup>2</sup>) is actually in a C/D category (C = 12 - 21 and D = 21 - 84 mg/m<sup>2</sup>; DWAF, 2008), so have defined the upper boundary of a C/D as the EcoSpec.

Table 5.39: Water quality TPC's for Diep River (WQSU 3, K40A)

River: Diep		EWR Site: 3	Monitoring site: K4H003Q01
Water quality metrics		TPC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 13 – 16 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 16 – 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 12 – 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 17 – 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be 36 – 45 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 153 – 191 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be 24 – 30 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must be <4.7 and >7.3.	
	Temperature	Small to moderate deviation from the natural temperature range. Some highly temperature sensitive species in lower abundances and frequency of occurrence than expected for reference.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be 7.8 – 7.5 mg/L.	
	Turbidity	Moderate changes to the catchment land-use resulting in <u>temporary</u> unnaturally high sediment loads and high turbidities.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be 0.2 – 0.25 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be 0.02 – 0.025 mg/L.	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be 12 – 15 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be 42 – 52.5 mg/m <sup>2</sup> .	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

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Table 5.40: PES categories and overall site assessment for the Karatara River at WQSU 5

RIVER	Karatara River		WATER QUALITY MONITORING POINTS	
WQSU	WQSU 5 (source to Swartvlei)		RC	Karatara R. @ Karatara Forest Reserve K4H002Q01 ('76 – '79; n = 115)
EWR SITE	4		PES	K4H002Q01 ('03 – '07; n = 36)
Confidence assessment		Moderate as adequate data to assess reference and present states		
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L)	MgSO <sub>4</sub>	7.62	12.63	TEACHA was used for data assessment. Salts = an A category.
	Na <sub>2</sub> SO <sub>4</sub>	2.05	3.01	
	MgCl <sub>2</sub>	4.43	4.16	
	CaCl <sub>2</sub>	9.89	9.16	
	NaCl	35.59	36.15	
	CaSO <sub>4</sub>	0.73	0.73	
Nutrients (mg/L)	SRP	0.022 *	0.047	B category.
	TIN	0.07	0.128	A category.
Physical Variables	pH (5 <sup>th</sup> + 95 <sup>th</sup> %ile)	3.7 + 7.7	3.8 + 6.6	A category.
	Temperature	-	-	No data but no impacts expected
	Dissolved oxygen	-	-	
	Turbidity (NTU)	-	-	No data. Slight evidence of sedimentation.
	Electrical conductivity (mS/m)	-	7.0	A category.
Response variables	Chl a: periphyton	-	9.91	B category for periphyton.
	Chl a: phytoplankton	-	0.09	
	Macroinvertebrates	ASPT: 7.3	ASPT: 8.1 MIRAI: 92.3%	A/B category for the present state.
	Fish community score	-	FRAI: 82.4%	B category for the present state.
	Diatoms	-	SPI=19.9	High quality water
Toxics		-	-	No data, but some impact from timber processing at Geelhoutvlei.
<b>OVERALL SITE CLASSIFICATION</b>		<b>B for WQSU 5</b> , although an A category for upstream river stretch (PAI model)		

\*: boundary value recalibrated

-: no data

Table 5.41: Water quality Ecospecs for Karatara River at WQSU 5

River: Karatara		EWR Site: 4	Monitoring site: K4H002Q01
Water quality metrics		ECOSPEC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 16 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be ≤ 191 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 351 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be ≤ 30 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must range from 4.5 to 7.5.	
	Temperature	Natural temperature range.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be ≥ 8.0 mg/L.	
	Turbidity	Vary by a small amount from the natural turbidity range; minor silting of instream habitats acceptable.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be ≤ 0.25 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be ≤ 0.075 mg/L.	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be < 10 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be ≤ 12 mg/m <sup>2</sup> .	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

\* To be generated using TEACHA when the TPC for EC is exceeded or salt pollution expected.

Table 5.42: Water quality TPC's for Karatara River at WQSU 5

River: Karatara		EWR Site: 4	Monitoring site: K4H002Q01
Water quality metrics		TPC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 13 – 16 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 16 – 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 12 – 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 17 – 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be 36 – 45 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 153 – 191 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be 24 – 30 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must be <4.7 and >7.3.	
	Temperature	Small deviation from the natural temperature range.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be 8.2 – 8.0 mg/L.	
	Turbidity	Small to moderate changes to the catchment land-use resulting in minor and temporary effects of silting of habitats.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be 0.2 – 0.25 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be 0.06 – 0.075 mg/L.**	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be 8 – 10 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be 10 – 12 mg/m <sup>2</sup> .	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

\* To be generated using TEACHA when the TPC for EC is exceeded or salt pollution expected.

\*\* Although the upper boundary for the relevant phosphate category is 0.125 mg/L, the TPC has been set at 0.075 mg/L as PES levels for phosphate were 0.046 mg/L.

Table 5.43: PES categories and overall site assessment for the Hoëkraal River at WQSU 4

RIVER	Hoëkraal River		WATER QUALITY MONITORING POINTS	
WQSU	WQSU 4 (source to beginning of lower foothills)		RC	Hoëkraal R. @ Eastbrook K4H001Q01 ('77 - '80; n = 83)
EWR SITE	-		PES	K4H001Q01 ('03 - '07; n = 28)
Confidence assessment	Low - Moderate as limited data for the present state assessment. Lower section in the backup zone from Swartvlei lake. Note that the gauging weir is located on the lower Hoëkraal River.			
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L)	MgSO <sub>4</sub>	35.87	153.20	TEACHA was used for the analysis of WMS data. Results should be disregarded as data shows salt intrusion from the saline Swartvlei lake.
	Na <sub>2</sub> SO <sub>4</sub>	9.95	159.5	
	MgCl <sub>2</sub>	35.92	100.33	
	CaCl <sub>2</sub>	24.80	45.24	
	NaCl	399.69	1560.41	
	CaSO <sub>4</sub>	0.59	0.73	
Nutrients (mg/L)	SRP	0.014 *	0.034	B category.
	TIN	0.06	0.088	A category.
Physical Variables	pH (5 <sup>th</sup> + 95 <sup>th</sup> %ile)	4.4 + 7.2	4.5 + 7.8	A category.
	Temperature	-	-	No data but no impacts expected, although the river is deep and wide above the lower site, which may result in lowering oxygen levels.
	Dissolved oxygen	-	-	No data, but some evidence of sedimentation.
	Turbidity (NTU)	-	-	
	Electrical conductivity (mS/m)		4.2: Upper site	A category
Response variables	Chl a: periphyton	-	4.81: Upper site 152.93: Lower site	Lower site shows some nutrient build-up in the water.
	Chl a: phytoplankton	-	0.14: Upper site 0.47: Lower site	
	Macroinvertebrates	-	-	Not assessed as not an EWR site.
	Fish community score	-	-	
	Diatoms	-	SPI=19.8: Upper river. SPI=16.2: Lower river.	Upper site: High quality water. Lower site: Good quality water.
Toxics		-	-	No data, but no impacts expected.
<b>OVERALL SITE CLASSIFICATION</b>		<b>C Category (PAI model)</b>		

\* boundary value recalibrates

Table 5.44: Water quality Ecospecs for Hoëkraal River at WQSU 4

River: Hoëkraal		EWR Site: -	Monitoring site: K4H001Q01, although located in the lower section of the river and salt water intrusion detected due to back-up from Swartvlei Lake.
Water quality metrics		ECOSPEC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 16 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be ≤ 191 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 351 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be ≤ 30 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must range from 4.5 to 7.5.	
	Temperature	Small deviation from the natural temperature range.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be ≥ 7.5 mg/L.	
	Turbidity	Vary by a small amount from the natural turbidity range; minor silting of instream habitats acceptable.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be ≤ 0.25 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be ≤ 0.125 mg/L.	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be <10 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be ≤ 12 mg/m <sup>2</sup> .	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

\* To be generated using TEACHA when the TPC for EC is exceeded or salt pollution expected.

Table 5.45: Water quality TPC's for Hoëkraal River at WQSU 4

River: Hoekraal		EWR Site: -	Monitoring site: K4H001Q01
Water quality metrics		TPC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 13 – 16 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 16 – 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 12 – 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 17 – 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be 36 – 45 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 153 – 191 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be 24 – 30 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must be <4.7 and >7.3.	
	Temperature	Small to moderate changes to the catchment land-use resulting in minor and temporary effects of silting of habitats.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be 7.8 – 7.5 mg/L.	
	Turbidity	Moderate changes to the catchment land-use resulting in <u>temporary</u> unnaturally high sediment loads and high turbidities.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be 0.2 – 0.25 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be 0.1 – 0.125 mg/L.	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be 8 – 10 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be 10 – 12 mg/m <sup>2</sup> .	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

Table 5.46: PES categories and overall site assessment for Goukamma River at WQSU 1

RIVER	Goukamma River		WATER QUALITY MONITORING POINTS	
WQSU	WQSU 1 (source to the end of the mountainous area)		RC	Rooi R. @ George K3H002-Q01 ('77 – '79 n = 84)
EWR SITE	None		PES	K3H002-Q01 ('01 – '06 n = 65)
Confidence assessment	Low to medium because no DWAF monitoring station. However unimpacted catchment and likely to be similar to other mountain streams.			
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L)	MgSO <sub>4</sub>			No data
	Na <sub>2</sub> SO <sub>4</sub>			
	MgCl <sub>2</sub>			
	CaCl <sub>2</sub>			
	NaCl			
Nutrients (mg/L)	SRP	0.014	≤0.014*	A category.
	TIN	0.04	≤0.25*	A category.
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)		3.7 – 6.7	Naturally acidic.
	Temperature			No data but expected to be natural as little development in upstream catchment.
	Dissolved oxygen			
	Turbidity (NTU)			
	Electrical conductivity (mS/m)	16	17	A category.
Response variables	Chl a: periphyton			No data
	Chl a: phytoplankton			No data
	Macroinvertebrates			No data
	Fish community score			No data
Toxics				No data.
<b>OVERALL SITE CLASSIFICATION</b>		<b>A</b>		

Table 5.47: Water quality Ecospecs and TPCs for the Goukamma River at WQSU 2

RIVER	WATER QUALITY MONITORING POINTS		
	Goukamma River	DWAF WQ WMS	RHP
WQSU	2	None	Currently a RHP site higher up in catchment
EWR SITE	none		
<b>Confidence in PES assessment</b>			
Low because extrapolated from another catchment (Karataru R) and WQSU (Goukamma WQSU 2). Biological data (from current project and RHP upper catchment) support inferred PES for water quality.			
Water Quality Constituents	PES Category	WQ ecospecs	Improvement required?
Inorganic salts (mg/L)	MgSO <sub>4</sub>	≤16 mg/L	
	Na <sub>2</sub> SO <sub>4</sub>	≤20 mg/L	
	MgCl <sub>2</sub>	≤15 mg/L	N/A
	CaCl <sub>2</sub>	≤21 mg/L	
	NaCl	≤45 mg/L	
Nutrients (mg/L)	SRP	≤0.012 mg/L	Yes - B/C
	TIN	≤0.25 mg/L	No
Physical Variables	pH	< 6.4	No
	Temperature	Natural range	N/A
	Dissolved oxygen	8 mg/L	N/A
	Turbidity (NTU)	No change	N/A
	Electrical conductivity (mS/m)	≤30 mS/m	No
Response variables	Chl a: periphyton	≤ 1.7 mg/m <sup>2</sup> (A category)	
	Chl a: phytoplankton	≤ 10 µg/L (B category)	N/A
	Macroinvertebrates (ASPT)		
Toxics	Fish community score		
	Instream toxicity		
See Ecospecs for fish and invertebrates respectively			
Unlikely to be a problem. Assess only if the biomonitoring results indicate there is a serious problem and the cause is unknown.			

Table 5.48: PES categories and overall site assessment for Goukamma River at WQSU 2

RIVER	Goukamma River	WATER QUALITY MONITORING POINTS			
WQSU	WQSU 2 (edge of mountainous/forested area to the upper limit of tidal influence - at approximately the N2 Bridge)	RC	Karataru R. @ Karataru State Forest K4H002-Q01 ('71 – '76; n = 107)		
EWR SITE	Gou 1	PES	K4H002-Q01 ('01 – '06; n = 51)		
Confidence assessment	Low, the monitoring station is in an adjacent catchment.				
Water Quality Constituents		RC Value	PES Value	Category/Comment	G-power (Confidence)
Inorganic salts (mg/L)	MgSO <sub>4</sub>				No data
	Na <sub>2</sub> SO <sub>4</sub>				
	MgCl <sub>2</sub>				
	CaCl <sub>2</sub>				
	NaCl				
	CaSO <sub>4</sub>				
Nutrients (mg/L)	SRP	0.018	0.048*	Category = C. Trend = increasing	0.232 (Low)
	TIN	0.11	0.11	Category = A. Trend = stable	
Physical Variables	pH (5 <sup>th</sup> – 95 <sup>th</sup> %)		3.8 – 6.4	Naturally acidic waters	0.781 (Medium)
	Temperature			No data. Unlikely to be a problem	
	Dissolved oxygen			No data. Visual inspection = low turbidity	
	Turbidity (NTU)			No data. Visual inspection = low turbidity	
	Electrical conductivity (mS/m)	10	12	Category = A. Trend = stable	0.997 (High)
Response variables	Chl a: periphyton			No data. Visual inspection = no excessive algal growth	
	Chl a: phytoplankton			No data. Visual inspection = no excessive algal growth	
	Macroinvertebrates			B category; ASPT = 7.2, SASS = 143 (this study). Natural (RHP)	
	Fish community score			C (this study)	
Toxics				No data, but unlikely to be a problem	
<b>OVERALL SITE CLASSIFICATION</b>		<b>A Category (PAI model)</b>			

Table 5.49: Water quality Ecospecs and TPCs for the Goukamma River at WQSU 2

RIVER	WATER QUALITY MONITORING POINTS			
	Goukamma River	DWAF WQ WMS	None	
WQSU	2			
EWR SITE	Gou 1	RHP	Currently a RHP site higher up in catchment	
<b>Confidence in PES assessment</b>				
Low - medium because extrapolated from another catchment (Karataara R). Biological data (from current project and RHP upper catchment) support inferred PES for water quality.				
<b>Water Quality Constituents</b>	<b>PES Category</b>	<b>WQ ecospecs</b>	<b>Improvement required?</b>	
			<b>TPC</b>	
			<b>Monitoring frequency</b>	
Inorganic salts (mg/L)	MgSO <sub>4</sub>	≤16 mg/L	95 <sup>th</sup> percentile to be < 16 mg/L	Every 2 months
	Na <sub>2</sub> SO <sub>4</sub>	≤20 mg/L	95 <sup>th</sup> percentile to be < 20 mg/L	
	MgCl <sub>2</sub>	≤15 mg/L	95 <sup>th</sup> percentile to be < 15 mg/L	
	CaCl <sub>2</sub>	≤21 mg/L	95 <sup>th</sup> percentile to be < 21 mg/L	
	NaCl	≤45 mg/L	95 <sup>th</sup> percentile to be < 45 mg/L	
Nutrients (mg/L)	<b>SRP</b>	≤0.025 mg/L	Yes - B/C	Every 2 months
	<b>TIN</b>	≤0.25 mg/L	No	Every 2 months
Physical Variables	pH	< 6.4	No	Every 2 months
	Temperature	Natural range	N/A	Every 2 months
	Dissolved oxygen	8 mg/L	N/A	Every 2 months
	Turbidity (NTU)	No change	N/A	Every 2 months
	Electrical conductivity (mS/m)	A – Stable	≤30 mS/m	No
Response variables	Chl a: periphyton	No data. Visual inspection did not reveal a problem.		50 <sup>th</sup> percentile to be < 1.7 mg/m <sup>2</sup>
	Chl a: phytoplankton			50 <sup>th</sup> percentile to be < 1.7 mg/m <sup>2</sup>
	Macroinvertebrates (ASPT)	B (this study)		50 <sup>th</sup> percentile to be < 10 µg/L
Toxics	Fish community score	C (this study)		See Ecospecs for fish and invertebrates respectively
	Instream toxicity	No data		Unlikely to be a problem. Assess only if the biomonitoring results indicate there is a serious problem and the cause is unknown.
	No data.			

Table 5.50: PES categories and overall site assessment for the Knysna River at WQSU 1

RIVER	Knysna River	WATER QUALITY MONITORING POINTS		
WQSU	WQSU 1	RC	Knysna R. @ Millwood K5H002Q01 ('77 – '80; n = 75)	
EWR SITE	1	PES	K5H002Q01 ('04 – '07; n = 26)	
Confidence assessment	Moderate as adequate data to assess reference and present states			
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L)	MgSO <sub>4</sub>	7.18	7.19	TEACHA was used for data assessment. Salts = A category
	Na <sub>2</sub> SO <sub>4</sub>	1.49	4.20	
	MgCl <sub>2</sub>	2.60	2.73	
	CaCl <sub>2</sub>	11.50	3.92	
	NaCl	50.83*	39.54	
	CaSO <sub>4</sub>	0.53	0.38	
Nutrients (mg/L)	SRP	0.011*	0.021	B category
	TIN	0.06	0.112	A category
Physical Variables	pH (5 <sup>th</sup> + 95 <sup>th</sup> %ile)	4.0 + 6.9	4.5 + 7.2	A category
	Temperature	-	-	No data but no impacts expected, although less shading may result in a slight increase in instream temperature.
	Dissolved oxygen	-	-	No data. Some evidence of slight sedimentation seen.
	Turbidity (NTU)	-	-	No data. Some evidence of slight sedimentation seen.
	Electrical conductivity (mS/m)	-	9.0	A category.
Response variables	Chl a: periphyton	-	4.08	Some nutrient elevation indicated by periphyton values (B category; n=1).
	Chl a: phytoplankton	-	0.12	
	Macroinvertebrates	ASPT: mean of 8.1	ASPT: 6.9 MIRAI: 86.92%	B category for the present state.
	Fish community score	-	FRAI: 86.4%	B category for the present state.
	Diatoms	-	SPI=18.9	High quality water.
Toxics	-	-	-	No data but no impacts expected.
<b>OVERALL SITE CLASSIFICATION</b>		<b>A/B for WQSU 1</b> , although an A category for EWR 1 and upstream of the site (PAI model)		

Table 5.51: Water quality Ecospecs for Knysna River at WQSU 1

River: Knysna		EWR: 1	Monitoring site: K5H002Q01
Water quality metrics		ECOSPEC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 16 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be ≤ 45 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 351 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be ≤ 30 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must range from 4.5 to 7.5.	
	Temperature	Natural temperature range.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be ≥ 8.0 mg/L.	
	Turbidity	Vary by a small amount from the natural turbidity range; minor silting of instream habitats acceptable.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be ≤ 0.25 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be ≤ 0.025 mg/L.	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be <15 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be ≤ 12 mg/m <sup>2</sup> .	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

\* To be generated using TEACHA when the TPC for EC is exceeded or salt pollution expected.

Table 5.52: Water quality TPC's for Knysna River at WQSU 1

River: Knysna		EWR: 1	Monitoring site: K5H002Q01
Water quality metrics		TPC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 13 – 16 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 16 – 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 12 – 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 17 – 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be 36 – 45 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 280 – 351 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be 24 – 30 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must be <4.7 and >7.3.	
	Temperature	Small deviation from the natural temperature range.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be 8.2 – 8.0 mg/L.	
	Turbidity	Moderate changes to the catchment land-use resulting in temporary unnaturally high sediment loads and high turbidities.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be 0.2 – 0.25 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be 0.02 – 0.025 mg/L.	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be 12 – 15 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be 10 – 12 mg/m <sup>2</sup> .	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

\* To be generated using TEACHA when the TPC for EC is exceeded or salt pollution expected.

**Table 5.53: PES categories and overall site assessment for the Gouna River at WQSU 2**

RIVER	Gouna River		WATER QUALITY MONITORING POINTS	
WQSU	WQSU 2		RC	Gouna R. @ Gouna Commonage K5H001Q01 ('77 – '80; n = 76)
EWR SITE	2		PES	K5H001Q01 ('81 – '84; n = 30)
Confidence assessment	Low confidence due to limited data, particularly for present state			
Water Quality Constituents		RC Value	PES Value	Category/Comment
Inorganic salts (mg/L)	MgSO <sub>4</sub>	14.45	23.19	TEACHA was used for data assessment. Slight elevation in salts seen, i.e. an A/B category
	Na <sub>2</sub> SO <sub>4</sub>	3.78	0.30	
	MgCl <sub>2</sub>	10.75	12.11	
	CaCl <sub>2</sub>	10.59	9.35	
	NaCl	95.29*	102.20	
	CaSO <sub>4</sub>	0.54	0.72	
Nutrients (mg/L)	SRP	0.009*	0.011	A category.
	TIN	0.070	0.120	A category.
Physical Variables	pH (5 <sup>th</sup> + 95 <sup>th</sup> %ile)	4.0 + 6.8	4.0 + 5.6	A category as little change from natural.
	Temperature	-	-	No data but no impacts expected.
	Dissolved oxygen	-	-	
	Turbidity (NTU)	-	-	No data. Sedimentation seen in lower section of the WQSU, i.e. below the pump station.
	Electrical conductivity (mS/m)	-	15.0	A category.
Response variables	Chl a: periphyton	-	43.70	Nutrient elevations indicated by periphyton value (D category; n=1).
	Chl a: phytoplankton	-	0.09	
	Macroinvertebrates	ASPT: 6.9 – 7.6	ASPT: 7.6 MIRAI: 92.8%	A category for the present state.
	Fish community score	-	FRAI: 93.8%	A category for the present state.
	Diatoms	-	SPI=19.8	High quality water.
Toxics	-	-	-	No data but no toxics expected.
<b>OVERALL SITE CLASSIFICATION</b>		<b>B for WQSU 2</b> , although an A category for river stretch upstream of the pump station (PAI model)		

Table 5.54: Water quality EcoSpecs for Gouna River at WQSU 2

River: Gouna		EWR: 2	Monitoring site: K5H001Q01
Water quality metrics		ECOSPEC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 23 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be ≤ 191 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be ≤ 351 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be ≤ 43 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must range from 4.5 to 7.5.	
	Temperature	Largely natural to small deviation from the natural temperature range.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be ≥ 7.5 mg/L.	
	Turbidity	Vary by a small amount from the natural turbidity range; minor silting of instream habitats acceptable.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be ≤ 0.15 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be ≤ 0.025 mg/L.	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be <15 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be ≤ 84 mg/m <sup>2</sup> .	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

\* To be generated using TEACHA when the TPC for EC is exceeded or salt pollution expected.

Table 5.55: Water quality TPC's for Gouna River at WQSU 2

River: Gouna		EWR: 2	Monitoring site: K5H001Q01
Water quality metrics		TPC	
Inorganic salts*	MgSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 18 – 23 mg/L.	
	Na <sub>2</sub> SO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 16 – 20 mg/L.	
	MgCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 12 – 15 mg/L.	
	CaCl <sub>2</sub>	The 95 <sup>th</sup> percentile of the data must be 17 – 21 mg/L.	
	NaCl	The 95 <sup>th</sup> percentile of the data must be 36 – 45 mg/L.	
	CaSO <sub>4</sub>	The 95 <sup>th</sup> percentile of the data must be 153 – 191 mg/L.	
Physical variables	EC	The 95 <sup>th</sup> percentile of the data must be 35 – 43 mS/m.	
	pH	The 5 <sup>th</sup> and 95 <sup>th</sup> percentiles of the data must be <4.7 and >7.3.	
	Temperature	Small to moderate deviation from the natural temperature range. Some highly temperature sensitive species in lower abundances and frequency of occurrence than expected for reference.	
	Dissolved oxygen	The 5 <sup>th</sup> percentile of the data must be 7.8 – 7.5 mg/L.	
	Turbidity	Moderate changes to the catchment land-use resulting in temporary unnaturally high sediment loads and high turbidities.	
Nutrients	TIN	The 50 <sup>th</sup> percentile of the data must be 0.2 – 0.25 mg/L.	
	PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be 0.012 – 0.015 mg/L.	
Response variables	Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be 12 – 15 µg/L.	
	Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be 67 – 84 mg/m <sup>2</sup> .	
Toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996).		

## 6. GROUNDWATER - QUANTITY COMPONENT

The groundwater quantity component was determined using values (recharge and groundwater baseflow) obtained during the determination of water resource classes and associated resource quality objectives in the Breede-Gouritz WMA, (DWS 2017), shown in Table 6.1.

Population values were obtained from the Water Services dataset of 2011 for the Breede catchment and from the Gouritz Catchment Intermediate Reserve study for the Gouritz catchment. The Basic Human Needs Reserve provides for the essential needs of individuals served by the water resource in question and includes water for drinking, food preparation and for personal hygiene. A life-line amount of 25 litres per person per day was used.

**Table 6.1: Breede-Gouritz Groundwater Reserve**

Quaternary Catchment	Recharge (Mm <sup>3</sup> /a)	Population	Basic Human Needs (Mm <sup>3</sup> /a)	Groundwater Baseflow (Mm <sup>3</sup> /a)	Reserve (Mm <sup>3</sup> /a)	Reserve as % of Recharge
G40A	13.06	15963	0.15	3.17	3.32	25.39
G40B	19.19	4612	0.04	5.33	5.37	27.99
G40C	45.16	38379	0.35	6.25	6.60	14.62
G40D	59.72	15963	0.15	14.45	14.60	24.44
G40E	13.19	7670	0.07	4.41	4.48	33.97
G40F	11.28	28422	0.26	2.12	2.38	21.09
G40G	16.02	17112	0.16	3.72	3.88	24.20
G40H	6.53	32767	0.30	1.58	1.88	28.77
G40J	6.92	1574	0.01	2.53	2.54	36.77
G40K	9.13	15963	0.15	4.67	4.82	52.75
G40L	13.96	15963	0.15	1.63	1.78	12.72
G40M	10.57	355	0.003	5.17	5.17	48.94
G50A	7.37	1370	0.01	2.61	2.62	35.58
G50B	6.59	1507	0.01	3.47	3.48	52.86
G50C	8.56	1748	0.02	2.05	2.07	24.13
G50D	5.39	9430	0.09	2.55	2.64	48.91
G50E	4.92	14355	0.13	1.37	1.50	30.51
G50F	6.64	1989	0.02	1.27	1.29	19.40
G50G	2.40	844	0.01	1.43	1.44	59.90
G50H	5.75	736	0.01	3.28	3.29	57.16
G50J	6.07	3325	0.03	1.90	1.93	31.80
G50K	2.72	1748	0.02	0.76	0.78	28.53
H10A	13.15	12494	0.11	0.76	0.87	6.65
H10B	12.20	12494	0.11	0.48	0.59	4.87
H10C	21.28	57300	0.52	2.00	2.52	11.86
H10D	14.89	12494	0.11	2.05	2.16	14.53
H10E	20.35	12494	0.11	3.20	3.31	16.29
H10F	25.24	20720	0.19	1.39	1.58	6.26
H10G	31.82	12494	0.11	0.44	0.55	1.74
H10H	28.48	12494	0.11	2.80	2.91	10.23
H10J	61.45	1035	0.01	7.94	7.95	12.94
H10K	43.17	12494	0.11	7.40	7.51	17.41
H10L	2.76	4268	0.04	0.00	0.04	1.41

Quaternary Catchment	Recharge (Mm <sup>3</sup> /a)	Population	Basic Human Needs (Mm <sup>3</sup> /a)	Groundwater Baseflow (Mm <sup>3</sup> /a)	Reserve (Mm <sup>3</sup> /a)	Reserve as % of Recharge
H20A	2.42	427	0.00	0.47	0.47	19.58
H20B	5.37	17136	0.16	0.17	0.33	6.08
H20C	2.84	1266	0.01	0.05	0.06	2.17
H20D	8.74	1266	0.01	2.11	2.12	24.27
H20E	14.68	1266	0.01	2.01	2.02	13.77
H20F	8.65	875	0.01	0.32	0.33	3.79
H20G	4.83	1266	0.01	0.47	0.48	9.97
H20H	1.56	140420	1.28	0.07	1.35	86.62
H30A	5.17	1102	0.01	0.33	0.34	6.58
H30B	6.04	39573	0.36	0.16	0.52	8.63
H30C	10.59	1317	0.01	0.07	0.08	0.77
H30D	3.18	926	0.01	0.06	0.07	2.15
H30E	2.95	9784	0.09	0.31	0.40	13.53
H40A	3.74	2233	0.02	0.87	0.89	23.81
H40B	12.26	2152	0.02	0.87	0.89	7.26
H40C	4.90	2233	0.02	0.86	0.88	17.97
H40D	4.18	2233	0.02	1.85	1.87	44.75
H40E	10.91	2233	0.02	0.20	0.22	2.02
H40F	1.07	1798	0.02	0.58	0.60	55.74
H40G	3.22	2233	0.02	0.23	0.25	7.78
H40H	4.71	1217	0.01	0.13	0.14	3.00
H40J	4.44	26455	0.24	0.18	0.42	9.49
H40K	2.99	3916	0.04	0.24	0.28	9.22
H40L	2.47	2290	0.02	0.42	0.44	17.85
H50A	1.42	3842	0.04	0.26	0.30	20.78
H50B	5.04	5825	0.05	0.78	0.83	16.53
H60A	30.87	10083	0.09	2.49	2.58	8.36
H60B	42.43	7900	0.0720875	7.28	7.35	17.33
H60C	30.89	15284	0.14	1.64	1.78	5.76
H60D	14.76	511	0.00	0.95	0.95	6.47
H60E	9.73	10305	0.09	0.71	0.80	8.26
H60F	7.65	3321	0.03	0.66	0.69	9.02
H60G	4.11	10083	0.09	0.64	0.73	17.81
H60H	7.49	10083	0.09	1.14	1.23	16.45
H60J	8.17	10083	0.09	1.31	1.40	17.16
H60K	3.59	10083	0.09	1.04	1.13	31.53
H60L	2.88	10083	0.09	0.87	0.96	33.40
H70A	5.55	4786	0.04	1.47	1.51	27.27
H70B	22.83	19350	0.18	4.17	4.35	19.04
H70C	3.99	4915	0.04	0.23	0.27	6.89
H70D	20.70	4786	0.04	5.53	5.57	26.93
H70E	26.55	6729	0.06	5.16	5.22	19.67
H70F	15.50	2721	0.02	2.31	2.33	15.06

Quaternary Catchment	Recharge (Mm <sup>3</sup> /a)	Population	Basic Human Needs (Mm <sup>3</sup> /a)	Groundwater Baseflow (Mm <sup>3</sup> /a)	Reserve (Mm <sup>3</sup> /a)	Reserve as % of Recharge
H70G	3.92	4786	0.04	1.26	1.30	33.26
H70H	2.80	746	0.01	1.89	1.90	67.74
H70J	3.95	4786	0.04	1.43	1.47	37.31
H70K	3.03	772	0.01	1.21	1.22	40.17
H80A	16.34	0	0.00	7.21	7.21	44.12
H80B	24.01	0	0.00	6.45	6.45	26.86
H80C	5.75	10 110	0.09	0.61	0.70	12.21
H80D	2.57	0	0.00	1.23	1.23	47.86
H80E	7.66	392	0.00	2.11	2.11	27.59
H80F	5.96	585	0.01	2.72	2.73	45.73
H90A	19.62	0	0.00	9.04	9.04	46.08
H90B	12.96	0	0.00	6.02	6.02	46.45
H90C	5.51	18 526	0.17	1.93	2.10	38.10
H90D	10.38	1 697	0.02	3.29	3.31	31.84
H90E	9.70	6 253	0.06	4.88	4.94	50.90
J11A	2.98	0	0.00	0.00	0.00	0.00
J11B	3.11	0	0.00	0.00	0.00	0.00
J11C	0.22	192	0.00	0.00	0.00	0.80
J11D	3.74	48	0.00	0.00	0.00	0.01
J11E	1.40	4 773	0.04	0.00	0.04	3.11
J11F	0.43	734	0.01	0.00	0.01	1.56
J11G	0.12	84	0.00	0.00	0.00	0.64
J11H	4.01	885	0.01	0.00	0.01	0.20
J11J	6.02	1 333	0.01	0.00	0.01	0.20
J11K	2.52	11 732	0.11	0.00	0.11	4.25
J12A	3.15	0	0.00	0.02	0.02	0.63
J12B	1.55	7 857	0.07	0.00	0.07	4.63
J12C	1.59	152	0.00	0.01	0.01	0.72
J12D	6.32	535	0.00	0.02	0.02	0.39
J12E	1.93	507	0.00	0.02	0.02	1.28
J12F	6.15	336	0.00	0.03	0.03	0.54
J12G	5.66	294	0.00	0.01	0.01	0.22
J12H	4.53	0	0.00	0.02	0.02	0.44
J12J	4.59	0	0.00	0.01	0.01	0.22
J12K	2.44	0	0.00	0.01	0.01	0.41
J12L	6.59	681	0.01	0.05	0.06	0.85
J12M	3.04	0	0.00	0.06	0.06	1.97
J13A	4.10	0	0.00	0.02	0.02	0.49
J13B	2.86	660	0.01	0.03	0.04	1.26
J13C	2.91	0	0.00	0.03	0.03	1.03
J21A	4.28	34 661	0.32	0.00	0.32	7.39
J21B	0.56	389	0.00	0.00	0.00	0.63
J21C	0.12	406	0.00	0.00	0.00	3.09

Quaternary Catchment	Recharge (Mm <sup>3</sup> /a)	Population	Basic Human Needs (Mm <sup>3</sup> /a)	Groundwater Baseflow (Mm <sup>3</sup> /a)	Reserve (Mm <sup>3</sup> /a)	Reserve as % of Recharge
J21D	0.24	0	0.00	0.00	0.00	0.00
J21E	0.26	0	0.00	0.00	0.00	0.00
J22A	3.04	0	0.00	0.00	0.00	0.00
J22B	1.12	0	0.00	0.00	0.00	0.00
J22C	1.27	241	0.00	0.00	0.00	0.17
J22D	1.22	133	0.00	0.00	0.00	0.10
J22E	1.31	0	0.00	0.00	0.00	0.00
J22F	0.12	1 237	0.01	0.00	0.01	9.41
J22G	2.92	0	0.00	0.00	0.00	0.00
J22H	4.19	919	0.01	0.00	0.01	0.20
J22J	0.90	0	0.00	0.00	0.00	0.00
J22K	0.35	0	0.00	0.00	0.00	0.00
J23A	0.28	2 080	0.02	0.00	0.02	6.78
J23B	0.50	47	0.00	0.00	0.00	0.09
J23C	0.25	12	0.00	0.00	0.00	0.04
J23D	0.70	12	0.00	0.00	0.00	0.02
J23E	2.03	674	0.01	0.18	0.19	9.17
J23F	1.33	6 901	0.06	0.00	0.06	4.73
J23G	0.00	0	0.00	0.00	0.00	0.00
J23H	1.11	0	0.00	0.00	0.00	0.00
J23J	1.82	0	0.00	0.97	0.97	53.30
J24A	2.58	193	0.00	0.00	0.00	0.07
J24B	0.51	1 521	0.01	0.00	0.01	2.72
J24C	0.21	0	0.00	0.00	0.00	0.00
J24D	0.08	314	0.00	0.00	0.00	3.58
J24E	0.39	0	0.00	0.00	0.00	0.00
J24F	1.37	0	0.00	0.00	0.00	0.00
J25A	2.42	200	0.00	1.02	1.02	42.22
J25B	4.45	4 135	0.04	1.23	1.27	28.49
J25C	1.04	1 342	0.01	0.02	0.03	3.10
J25D	2.94	5 170	0.05	0.61	0.66	22.35
J25E	1.12	402	0.00	0.04	0.04	3.90
J31A	7.88	0	0.00	1.13	1.13	14.34
J31B	1.57	0	0.00	0.48	0.48	30.57
J31C	1.87	0	0.00	0.35	0.35	18.72
J31D	2.07	266	0.00	0.38	0.38	18.47
J32A	0.08	50	0.00	0.00	0.00	0.57
J32B	0.01	881	0.01	0.00	0.01	80.39
J32C	0.01	77	0.00	0.00	0.00	7.03
J32D	0.00	0	0.00	0.00	0.00	0.00
J32E	1.76	719	0.01	0.00	0.01	0.37
J33A	4.81	130	0.00	1.44	1.44	29.96
J33B	8.98	680	0.01	1.47	1.48	16.44

Quaternary Catchment	Recharge (Mm <sup>3</sup> /a)	Population	Basic Human Needs (Mm <sup>3</sup> /a)	Groundwater Baseflow (Mm <sup>3</sup> /a)	Reserve (Mm <sup>3</sup> /a)	Reserve as % of Recharge
J33C	2.83	76	0.00	0.01	0.01	0.38
J33D	3.82	255	0.00	1.24	1.24	32.52
J33E	8.22	13 522	0.12	1.98	2.10	25.59
J33F	4.50	34 154	0.31	2.19	2.50	55.59
J34A	3.08	7 465	0.07	1.48	1.55	50.26
J34B	6.44	1 850	0.02	2.85	2.87	44.52
J34C	9.60	669	0.01	3.51	3.52	36.63
J34D	4.06	1 915	0.02	1.80	1.82	44.77
J34E	2.29	1 321	0.01	1.13	1.14	49.87
J34F	3.44	2 928	0.03	0.47	0.50	14.44
J35A	8.47	31 018	0.28	1.20	1.48	17.51
J35B	8.12	5 831	0.05	1.24	1.29	15.93
J35C	1.98	3 633	0.03	0.88	0.91	46.12
J35D	9.82	5 284	0.05	3.65	3.70	37.66
J35E	1.33	1 224	0.01	0.21	0.22	16.63
J35F	6.67	2 796	0.03	2.02	2.05	30.67
J40A	9.73	970	0.01	5.03	5.04	51.79
J40B	5.45	0	0.00	2.71	2.71	49.72
J40C	15.81	1 076	0.01	6.58	6.59	41.68
J40D	10.21	8 056	0.07	4.20	4.27	41.86
J40E	7.48	1 908	0.02	3.45	3.47	46.36
K10A	2.34	53 970	0.49	1.16	1.65	70.62
K10B	1.96	4 727	0.04	1.20	1.24	63.43
K10C	4.43	0	0.00	2.33	2.33	52.60
K10D	2.53	1 579	0.01	1.10	1.11	44.05
K10E	13.70	4 122	0.04	4.30	4.34	31.66
K10F	2.82	7 002	0.06	0.99	1.05	37.37
K20A	19.85	9 650	0.09	6.15	6.24	31.43
K30A	28.06	6 994	0.06	7.15	7.21	25.71
K30B	21.52	6 334	0.06	5.03	5.09	23.64
K30C	27.80	146 970	1.34	7.83	9.17	32.99
K30D	18.44	9 839	0.09	7.43	7.52	40.78
K40A	8.99	512	0.00	3.79	3.79	42.21
K40B	13.52	0	0.00	4.85	4.85	35.87
K40C	17.00	6 256	0.06	4.32	4.38	25.75
K40D	17.74	20 130	0.18	3.71	3.89	21.95
K40E	26.56	13 515	0.12	10.61	10.73	40.41
K50A	27.43	49	0.00	10.09	10.09	36.79
K50B	24.71	14 745	0.13	8.58	8.71	35.27
K60A	6.43	154	0.00	4.20	4.20	65.34
K60B	8.43	43	0.00	5.70	5.70	67.62
K60C	10.95	1 668	0.02	6.60	6.62	60.41
K60D	23.54	681	0.01	12.43	12.44	52.83

Quaternary Catchment	Recharge (Mm <sup>3</sup> /a)	Population	Basic Human Needs (Mm <sup>3</sup> /a)	Groundwater Baseflow (Mm <sup>3</sup> /a)	Reserve (Mm <sup>3</sup> /a)	Reserve as % of Recharge
K60E	6.39	2 392	0.02	3.95	3.97	62.16
K60F	14.35	10 113	0.09	9.35	9.44	65.80
K60G	11.31	23 053	0.21	5.02	5.23	46.25
K70A	14.30	5 364	0.05	6.84	6.89	48.17
K70B	20.46	852	0.01	4.46	4.47	21.84

### PROPOSED GROUNDWATER RESERVE – WATER QUALITY COMPONENT

The groundwater quality of quaternary catchments with available hydrochemistry data was assessed against the domestic water target water quality ranges as shown in Table 6.2. A summary of the results for the groundwater quality classification at quaternary level in the terms of basic human needs requirements is included in the tables that follow.

**Table 6.2: Physical and chemical water quality**

Parameter	Target Water Quality Ranges <sup>1)</sup>				
	Units	Class 0	Class I	Class II	Class III
pH	pH units	6 – 9	5 – 6 & 9 – 9.5	4 – 5 & > 9.5 – 10	<4 & > 10
Electrical Conductivity	mS/m	< 70	70 - 150	150 – 370	> 370
Calcium as Ca	mg/l	< 80	80 - 150	150 – 300	> 300
Magnesium as Mg	mg/l	< 70	70 - 100	100 – 200	> 200
Sodium as Na	mg/l	< 100	100 - 200	200 – 400	> 400
Chloride as Cl	mg/l	< 100	100 - 200	200 – 600	> 600
Sulphate as SO <sub>4</sub>	mg/l	< 200	200 - 400	400 – 600	> 600
Nitrate as NO <sub>x</sub> -N	mg/l	< 6	6 - 10	10 – 20	> 20
Fluoride as F	mg/l	<0.7	0.7 – 1.0	1.0 – 1.5	> 1.5

1) Reference: Classification Systems in terms of – Water Research Commission: Quality of Domestic Water Supplies – Volume 1. Report No. TT 101/98, Second Edition, 1998.

The water quality for the following quaternary catchments were not assessed due to insufficient information (lack of representative groundwater quality data):

- G40B; G40D; G40E; G40G; G40K
- G50A; G50B; G50C; G50D; G50G; G50J
- H10D; H10E; H10J; H10K
- H20C; H20G; H20H
- H30B; H30E
- H40C; H40D; H40E; H40G; H40J; H40K; H40L
- H50A; H50B
- H60A; H60B; H60C; H60D; H60E; H60F; H60G; H60H; H60J; H60K; H60L
- H70A; H70C; H70D; H70E; H70F; H70G; H70H; H70J
- J11A; J11C; J11D; J11F; J11H; J11J; J11K
- J12A; J12C; J12E; J12J; J12M
- J13A; J13C; J22A; J22G; J22K; J23B; J23E; J23J, J24, J25B; J25D; J25E
- J31A; J31B; J31C; J32D; J33A; J33B; J33C; J34C; J34E; J35C; J35E; J35F
- J40A; J40B; J40C
- K10C; K10E; K10F
- K20A
- K30A; K30C; K30D
- K40A; K40B; K40C; K40D; K40E
- K50A
- K60A; K60B; K60C; K60D; K60E; K60F; K60G
- K70A; K70B

Table 6.3. Groundwater Quality Reserve: Breede Gouritz Water Management Area

Chemical Parameter	Unit	Quaternary Catchments G40C, G40F, G40J, G40L												
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>					
		G40C	G40F	G40J	G40C	G40F	G40J		G40C	G40F	G40J	G40L		
pH		39	61	45	43	7.09	7.26	7.01	8.16	5.0 – 9.5	6.38–7.80	6.53–7.99	6.31–7.71	7.34–8.97
Electrical Conductivity	mS/m	39	61	45	43	20.70	20.90	21.20	208.00	<150	22.77	22.99	23.32	228.80
Calcium as Ca	mg/l	36	57	42	40	7.94	7.67	7.68	105.32	<150	8.73	8.43	8.45	115.85
Magnesium as Mg	mg/l	36	57	42	40	3.30	3.30	3.40	33.40	<100	3.63	3.63	3.74	36.74
Sodium as Na	mg/l	36	55	42	38	18.08	18.40	18.32	253.05	<200	19.89	20.24	20.16	253.05
Chloride as Cl	mg/l	36	58	42	40	31.94	32.69	32.57	391.39	<200	35.13	35.96	35.83	391.39
Sulphate as SO <sub>4</sub>	mg/l	36	58	42	40	5.71	5.35	5.81	78.14	<400	6.28	5.89	6.39	85.95
Nitrate as NO <sub>3</sub> -N	mg/l	36	57	42	38	0.04	0.05	0.06	5.17	<10	0.04	0.06	0.07	5.68
Fluoride as F	mg/l	36	54	42	35	0.30	0.31	0.29	0.28	<1.0	0.33	0.34	0.32	0.31
Chemical Parameter	Unit	Quaternary Catchments G40M, G50E, G50F, G50H												
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>					
		G40M	G50E	G50F	G40M	G50E	G50H		G40M	G50E	G50F	G50H		
pH		37	49	45	23	8.17	6.21	8.17	8.02	5.0 – 9.5	7.35–8.99	5.59–6.83	7.35–8.99	7.22–8.82
Electrical Conductivity	mS/m	37	49	45	23	109.10	54.90	91.90	1630.00	<150	120.01	60.39	101.09	1630.00
Calcium as Ca	mg/l	37	44	42	23	88.34	4.37	84.20	182.00	<150	97.18	4.81	92.62	182.00
Magnesium as Mg	mg/l	37	44	42	23	15.03	8.91	12.37	356.00	<100	16.54	9.81	13.61	356.00
Sodium as Na	mg/l	37	42	40	23	113.15	80.39	85.23	3107.18	<200	124.47	88.43	93.76	3107.18
Chloride as Cl	mg/l	37	44	42	23	203.98	143.85	153.44	5302.10	<200	203.98	158.24	168.79	5302.10
Sulphate as SO <sub>4</sub>	mg/l	37	44	41	23	31.52	20.58	25.59	742.40	<400	34.67	22.64	28.15	742.40
Nitrate as NO <sub>3</sub> -N	mg/l	37	43	40	23	1.70	0.06	0.26	0.13	<10	1.87	0.07	0.29	0.14
Fluoride as F	mg/l	37	40	39	23	0.18	0.11	0.22	1.35	<1.0	0.20	0.12	0.25	1.49
Chemical Parameter	Unit	Quaternary Catchments G50J, H10A, H10B, H10C												
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>					
		G50J	H10A	H10B	G50J	H10A	H10C		G50J	H10A	H10B	H10C		
pH		9	34	73	60	7.58	7.69	7.88	7.33	5.0 – 9.5	6.82–8.34	6.92–8.46	7.09–8.67	6.60–8.06
Electrical Conductivity	mS/m	9	34	73	60	142.90	180.00	49.00	45.60	<150	157.19	180.00	53.90	50.16
Calcium as Ca	mg/l	9	34	70	60	92.00	65.00	46.98	20.35	<150	101.20	71.50	51.67	22.39
Magnesium as Mg	mg/l	9	34	70	60	23.40	54.25	6.72	12.85	<100	25.74	59.68	7.39	14.14
Sodium as Na	mg/l	9	34	68	60	194.60	219.35	36.21	49.80	<200	200.00	241.29	39.83	54.78
Chloride as Cl	mg/l	9	34	70	60	338.90	380.55	80.09	106.25	<200	338.90	418.61	88.10	116.88
Sulphate as SO <sub>4</sub>	mg/l	9	34	70	60	38.70	153.60	21.75	22.30	<400	42.57	168.96	23.92	24.53
Nitrate as NO <sub>3</sub> -N	mg/l	9	34	70	60	1.04	0.42	0.17	0.44	<10	1.14	0.46	0.19	0.48
Fluoride as F	mg/l	9	34	68	60	0.16	0.34	0.18	0.17	<1.0	0.18	0.37	0.20	0.19



Chemical Parameter	Unit	Quaternary Catchments H40A, H40B, H40F, H70B													
		No. of Samples				Ambient GW quality or median <sup>1)</sup>				BHN Reserve <sup>2)</sup>		Groundwater Quality Reserve <sup>3)</sup>			
		H40A	H40B	H40F	H70B	H40A	H40B	H40F	H70B			H40A	H40B	H40F	H70B
pH		54	14	17	9	7.86	7.35	6.54	8.21	5.0-9.5	7.07-8.65	6.62-8.09	5.89-7.19	7.39-9.03	
Electrical Conductivity	mS/m	55	14	17	9	112.50	10.88	28.90	925.00	<150	123.75	11.97	31.79	925.00	
Calcium as Ca	mg/l	48	14	17	9	92.38	2.24	14.80	98.9	<150	101.82	2.47	16.28	108.79	
Magnesium as Mg	mg/l	49	14	17	9	44.90	0.93	7.00	259.10	<100	49.39	1.02	7.70	259.10	
Sodium as Na	mg/l	47	12	17	9	88.94	21.43	26.30	1722.90	<200	97.83	23.57	28.93	1722.90	
Chloride as Cl	mg/l	50	14	17	9	127.45	21.15	35.90	2741.20	<200	140.20	23.27	39.49	2741.20	
Sulphate as SO <sub>4</sub>	mg/l	50	14	17	9	229.91	3.50	20.70	338.60	<400	252.90	3.85	22.77	372.46	
Nitrate as NO <sub>3</sub> -N	mg/l	50	14	17	9	0.06	0.18	4.70	0.02	<10	0.06	0.20	5.27	0.02	
Fluoride as F	mg/l	46	13	17	9	0.43	0.36	0.05	1.75	<1.0	0.47	0.39	0.06	1.75	

Chemical Parameter	Unit	Quaternary Catchments H70K, H90D, H90E, J11B													
		No. of Samples				Ambient GW quality or median <sup>1)</sup>				BHN Reserve <sup>2)</sup>		Groundwater Quality Reserve <sup>3)</sup>			
		H70K	H90D	H90E	J11B	H70K	H90D	H90E	J11B			H70K	H90D	H90E	J11B
pH		29	21	85	37	7.50	8.12	8.09	7.80	5.0-9.5	6.75-8.25	7.31-8.94	7.28-8.90	7.02-8.58	
Electrical Conductivity	mS/m	29	21	85	37	121.00	102.70	179.00	81.30	<150	133.10	112.97	179.00	89.43	
Calcium as Ca	mg/l	26	21	81	37	46.20	53.66	87.18	60.50	<150	50.82	59.02	95.89	66.55	
Magnesium as Mg	mg/l	26	21	82	37	19.20	17.40	28.50	18.40	<100	21.12	19.14	31.35	20.24	
Sodium as Na	mg/l	26	21	80	37	166.95	144.96	208.48	79.20	<200	183.65	159.45	208.48	87.12	
Chloride as Cl	mg/l	26	20	81	37	273.10	247.79	358.72	94.70	<200	273.10	247.79	358.72	104.17	
Sulphate as SO <sub>4</sub>	mg/l	26	21	82	37	29.88	33.16	36.65	68.60	<400	32.87	36.47	40.31	75.46	
Nitrate as NO <sub>3</sub> -N	mg/l	26	20	79	37	0.02	0.83	3.40	1.41	<10	0.02	0.91	3.74	1.55	
Fluoride as F	mg/l	26	20	77	37	0.52	0.14	0.18	0.82	<1.0	0.57	0.15	0.19	0.90	

Chemical Parameter	Unit	Quaternary Catchments J11E, J11G, J12B, J12D													
		No. of Samples				Ambient GW quality or median <sup>1)</sup>				BHN Reserve <sup>2)</sup>		Groundwater Quality Reserve <sup>3)</sup>			
		J11E	J11G	J12B	J12D	J11E	J11G	J12B	J12D			J11E	J11G	J12B	J12D
pH		81	20	17	11	8.19	8.18	7.73	8.23	5.0-9.5	7.37-9.01	7.36-9.00	6.96-8.50	7.41-9.05	
Electrical Conductivity	mS/m	81	20	17	11	174.30	164.50	368.00	195.00	<150	174.30	164.50	368.00	195.00	
Calcium as Ca	mg/l	77	20	17	11	98.70	115.05	117.10	68.30	<150	108.57	126.56	128.81	75.13	
Magnesium as Mg	mg/l	77	20	17	11	45.00	44.65	129.30	50.60	<100	49.50	49.12	129.30	55.66	
Sodium as Na	mg/l	73	20	17	11	197.89	190.65	335.70	252.80	<200	217.68	200.00	335.70	252.80	
Chloride as Cl	mg/l	75	20	17	11	250.10	294.70	726.10	415.00	<200	250.10	294.70	726.10	415.00	
Sulphate as SO <sub>4</sub>	mg/l	77	20	17	11	179.50	120.45	144.20	104.80	<400	197.45	132.50	158.62	115.28	
Nitrate as NO <sub>3</sub> -N	mg/l	71	20	17	11	0.30	1.18	0.06	0.02	<10	0.33	1.29	0.07	0.02	
Fluoride as F	mg/l	67	20	17	11	0.88	0.92	0.80	0.53	<1.0	0.96	0.92	0.88	0.58	

Chemical Parameter	Unit	Quaternary Catchments J12F, J12G, J12H, J12I, J12J, J12K												
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>					
		J12G	J12H	J12K	J12F	J12G	J12H		J12K	J12F	J12G	J12H	J12K	
pH		10	11	13	10	8.23	8.20	7.75	8.13	5.0 - 9.5	7.41-9.05	7.38-9.02	6.98-8.53	7.32-8.94
Electrical Conductivity	mS/m	10	11	13	10	306.50	323.00	157.00	462.00	<150	306.50	323.00	157.00	462.00
Calcium as Ca	mg/l	10	11	13	10	79.65	103.10	121.90	212.95	<150	87.62	113.41	134.09	212.95
Magnesium as Mg	mg/l	10	11	13	10	81.35	91.80	26.00	112.55	<100	89.49	100.98	28.60	123.81
Sodium as Na	mg/l	10	11	13	10	406.70	262.30	151.50	703.25	<200	406.70	262.30	166.65	703.25
Chloride as Cl	mg/l	10	11	13	10	691.30	795.60	258.70	1168.85	<200	691.30	795.60	258.70	1168.85
Sulphate as SO <sub>4</sub>	mg/l	10	11	13	10	241.45	107.20	156.00	459.80	<400	265.60	117.92	171.60	459.80
Nitrate as NO <sub>x</sub> -N	mg/l	10	11	13	10	0.02	0.02	0.02	0.02	<10	0.02	0.02	0.02	0.02
Fluoride as F	mg/l	10	11	13	10	0.56	0.50	0.39	0.55	<1.0	0.61	0.55	0.43	0.61

Chemical Parameter	Unit	Quaternary Catchments J12L, J13B, J21A, J21B												
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>					
		J12L	J13B	J21A	J21B	J12L	J13B		J21A	J12L	J13B	J21A	J21B	
pH		57	15	64	56	7.54	7.98	7.97	7.60	5.0 - 9.5	6.79-8.29	7.18-8.78	7.17-8.76	6.84-8.35
Electrical Conductivity	mS/m	57	15	64	56	25.50	418.00	61.40	100.50	<150	28.05	418.00	67.54	110.55
Calcium as Ca	mg/l	54	14	60	56	16.11	94.90	58.18	60.10	<150	17.72	104.39	64.00	66.11
Magnesium as Mg	mg/l	54	15	59	56	2.89	93.80	18.81	19.45	<100	3.18	103.18	20.69	21.40
Sodium as Na	mg/l	52	15	60	54	21.85	623.60	43.23	116.95	<200	24.03	623.60	47.55	128.65
Chloride as Cl	mg/l	53	15	58	56	30.71	906.39	18.77	104.70	<200	33.78	906.39	20.64	115.17
Sulphate as SO <sub>4</sub>	mg/l	54	15	57	54	7.55	253.60	75.14	113.80	<400	8.31	278.96	82.65	125.18
Nitrate as NO <sub>x</sub> -N	mg/l	52	15	54	56	0.03	0.35	0.09	2.56	<10	0.03	0.39	0.09	2.81
Fluoride as F	mg/l	51	15	54	56	0.21	0.72	0.46	0.87	<1.0	0.23	0.79	0.51	0.96

Chemical Parameter	Unit	Quaternary Catchments J21C, J21D, J21E, J22B												
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>					
		J21C	J21D	J21E	J22B	J21C	J21D		J21E	J21C	J21D	J21E	J22B	
pH		107	40	26	21	7.75	7.66	7.96	8.00	5.0 - 9.5	6.98-8.53	6.89-8.42	7.16-8.76	7.20-8.80
Electrical Conductivity	mS/m	107	40	26	21	76.40	85.20	78.80	74.20	<150	84.04	93.72	86.68	81.62
Calcium as Ca	mg/l	107	40	26	21	56.90	43.30	61.00	60.30	<150	62.59	47.63	67.10	66.33
Magnesium as Mg	mg/l	107	40	26	21	16.40	17.70	16.00	24.80	<100	18.04	19.47	17.60	27.28
Sodium as Na	mg/l	107	38	26	21	83.80	107.90	83.40	67.90	<200	92.18	118.69	91.74	74.69
Chloride as Cl	mg/l	107	40	26	21	76.90	102.60	93.00	57.20	<200	84.59	112.86	102.30	62.92
Sulphate as SO <sub>4</sub>	mg/l	107	38	26	21	83.50	95.70	53.05	63.40	<400	91.85	105.27	58.36	69.74
Nitrate as NO <sub>x</sub> -N	mg/l	107	39	26	21	3.13	3.55	2.23	1.95	<10	3.44	3.91	2.45	2.15
Fluoride as F	mg/l	107	40	26	21	0.68	1.00	0.95	0.91	<1.0	0.75	1.00	0.95	1.00

Chemical Parameter	Unit	Quaternary Catchments J22C, J22D, J22E, J22F												
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>					
		J22C	J22D	J22E	J22C	J22D	J22E		J22C	J22D	J22E	J22F		
pH		26	46	80	8.00	7.94	7.79	7.80	5.0 – 9.5	7.20–8.80	7.15–8.73	7.01–8.57	7.02–8.58	
Electrical Conductivity	mS/m	26	46	80	97.10	89.85	88.70	103.45	<150	106.81	98.84	97.57	113.80	
Calcium as Ca	mg/l	26	46	80	50.15	44.95	61.80	82.10	<150	55.17	49.45	67.98	90.31	
Magnesium as Mg	mg/l	26	46	80	27.00	24.80	21.00	18.95	<100	29.70	27.28	23.10	20.85	
Sodium as Na	mg/l	26	46	80	102.75	118.25	95.95	86.35	<200	113.03	130.08	105.55	94.99	
Chloride as Cl	mg/l	26	46	80	94.00	102.75	92.40	109.40	<200	103.40	113.03	101.64	120.34	
Sulphate as SO <sub>4</sub>	mg/l	26	46	80	123.80	121.30	90.80	110.70	<400	136.18	133.43	99.88	121.77	
Nitrate as NO <sub>x</sub> -N	mg/l	26	46	80	1.78	1.47	4.12	3.82	<10	1.95	1.61	4.53	4.20	
Fluoride as F	mg/l	26	46	80	1.03	1.10	1.05	0.89	<1.0	1.03	1.10	1.05	0.97	
Chemical Parameter	Unit	Quaternary Catchments J22H, J22J, J23A, J23C												
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>					
		J22H	J22J	J23A	J22H	J22J	J23A		J22H	J22J	J23A	J23C		
		pH	32	26	39	7.79	7.83	7.93	7.78	5.0 – 9.5	7.01–8.56	7.05–8.61	7.14–8.72	7.00–8.56
Electrical Conductivity	mS/m	32	26	39	145.05	83.20	238.00	136.00	<150	145.05	91.52	238.00	149.60	
Calcium as Ca	mg/l	32	26	36	105.60	50.75	125.25	126.75	<150	116.16	55.83	137.78	139.43	
Magnesium as Mg	mg/l	32	26	36	38.25	20.45	16.26	32.70	<100	42.08	22.50	17.89	35.97	
Sodium as Na	mg/l	32	26	35	158.05	86.90	342.80	143.70	<200	173.86	95.59	342.80	158.07	
Chloride as Cl	mg/l	32	26	35	208.55	82.15	265.46	159.05	<200	229.41	90.37	265.46	174.96	
Sulphate as SO <sub>4</sub>	mg/l	32	26	36	225.10	117.50	497.01	112.50	<400	247.61	129.25	497.01	123.75	
Nitrate as NO <sub>x</sub> -N	mg/l	32	26	35	3.31	3.02	0.04	1.10	<10	3.64	3.32	0.04	1.21	
Fluoride as F	mg/l	32	26	33	1.09	0.90	2.14	0.69	<1.0	1.19	0.99	2.14	0.76	
Chemical Parameter	Unit	Quaternary Catchments J23D, J23F, J24A, J24B												
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>					
		J23D	J23F	J24A	J23D	J23F	J24A		J23D	J23F	J24A	J24B		
		pH	26	85	168	8.10	7.97	7.77	7.79	5.0 – 9.5	7.29–8.91	7.17–8.76	6.99–8.54	7.01–8.56
Electrical Conductivity	mS/m	26	85	168	155.00	126.70	86.30	86.54	<150	155.00	139.37	94.93	95.19	
Calcium as Ca	mg/l	26	83	168	98.95	51.07	70.60	76.59	<150	108.85	56.17	77.66	84.24	
Magnesium as Mg	mg/l	26	83	168	40.65	28.60	18.55	17.15	<100	44.72	31.46	20.41	18.87	
Sodium as Na	mg/l	26	80	168	166.55	120.85	91.25	83.50	<200	183.21	132.94	100.38	91.85	
Chloride as Cl	mg/l	26	83	168	208.95	140.10	78.80	78.20	<200	208.95	154.11	86.68	86.02	
Sulphate as SO <sub>4</sub>	mg/l	26	83	168	151.40	157.15	103.40	69.00	<400	166.54	172.86	113.74	75.90	
Nitrate as NO <sub>x</sub> -N	mg/l	26	83	168	1.89	0.12	1.85	3.45	<10	2.08	0.13	2.04	3.80	
Fluoride as F	mg/l	26	81	168	0.79	0.48	0.92	0.81	<1.0	0.86	0.52	1.01	0.89	

Chemical Parameter	Unit	Quaternary Catchments J24C, J24D, J24E, J25A															
		No. of Samples						Ambient GW quality or median <sup>1)</sup>						BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>		
		J24C	J24D	J24E	J25A	J24C	J24D	J24E	J25A	J24C	J24D	J24E	J25A	J24C	J24D	J24E	J25A
pH		112	97	18	33	7.70	7.90	7.94	7.11	5.0 - 9.5	6.93-8.47	7.11-8.69	7.15-8.73	6.40-7.8			
Electrical Conductivity	mS/m	112	97	18	33	96.70	146.70	161.50	50.90	<150	106.37	146.70	161.50	55.99			
Calcium as Ca	mg/l	112	93	18	33	68.45	94.20	106.00	14.80	<150	75.30	103.62	116.60	16.28			
Magnesium as Mg	mg/l	112	93	18	33	18.00	28.80	30.95	10.90	<100	19.80	31.68	34.05	11.99			
Sodium as Na	mg/l	112	86	18	33	103.40	162.40	198.65	50.40	<200	113.74	178.64	198.65	55.44			
Chloride as Cl	mg/l	112	95	18	33	120.20	194.50	213.80	96.50	<200	132.22	194.50	213.80	106.15			
Sulphate as SO <sub>4</sub>	mg/l	112	89	18	33	78.40	114.00	105.70	26.40	<400	86.24	125.40	116.27	29.04			
Nitrate as NO <sub>x</sub> -N	mg/l	112	95	18	32	3.90	1.76	0.82	0.02	<10	4.28	1.94	0.90	0.02			
Fluoride as F	mg/l	112	93	18	32	0.79	0.81	1.05	0.31	<1.0	0.87	0.89	1.05	0.34			

Chemical Parameter	Unit	Quaternary Catchments J25C, J31D, J32A, J32B															
		No. of Samples						Ambient GW quality or median <sup>1)</sup>						BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>		
		J25C	J31D	J32A	J32B	J25C	J31D	J32A	J32B	J25C	J31D	J32A	J32B	J25C	J31D	J32A	J32B
pH		31	48	19	15	7.11	6.54	7.68	7.86	5.0 - 9.5	6.40-7.83	5.89-7.19	6.91-8.45	7.07-8.65			
Electrical Conductivity	mS/m	31	48	19	15	50.90	14.06	165.80	187.00	<150	55.99	15.46	165.80	187.00			
Calcium as Ca	mg/l	31	43	19	15	14.80	4.92	85.60	99.50	<150	16.28	5.41	94.16	109.45			
Magnesium as Mg	mg/l	31	43	19	15	10.90	2.86	42.50	44.50	<100	11.99	3.14	46.75	48.95			
Sodium as Na	mg/l	31	41	19	15	50.40	9.30	172.20	175.10	<200	55.44	10.23	189.42	192.61			
Chloride as Cl	mg/l	31	43	19	15	96.50	23.80	203.20	242.60	<200	106.15	26.18	203.20	242.60			
Sulphate as SO <sub>4</sub>	mg/l	31	43	19	15	26.40	9.90	180.30	170.80	<400	29.04	10.89	198.33	187.88			
Nitrate as NO <sub>x</sub> -N	mg/l	31	41	19	15	0.02	0.03	3.80	0.88	<10	0.02	0.03	4.18	0.96			
Fluoride as F	mg/l	31	39	19	15	0.31	0.29	1.06	0.99	<1.0	0.34	0.32	1.06	0.99			

Chemical Parameter	Unit	Quaternary Catchments J32C, J32E, J33D, J33E															
		No. of Samples						Ambient GW quality or median <sup>1)</sup>						BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>		
		J32C	J32E	J33D	J33E	J32C	J32E	J33D	J33E	J32C	J32E	J33D	J33E	J32C	J32E	J33D	J33E
pH		29	41	40	149	7.76	7.55	7.53	6.64	5.0 - 9.5	6.98-8.54	6.80-8.30	6.78-8.29	6.98-7.30			
Electrical Conductivity	mS/m	29	41	40	149	127.40	19.80	19.80	12.10	<150	140.14	21.78	21.78	13.31			
Calcium as Ca	mg/l	29	40	39	148	80.80	11.07	11.00	2.76	<150	88.88	12.17	12.10	3.04			
Magnesium as Mg	mg/l	29	40	39	148	30.90	3.50	3.50	2.07	<100	33.99	3.85	3.85	2.27			
Sodium as Na	mg/l	29	39	38	146	143.90	12.40	12.39	13.40	<200	158.29	13.64	13.63	14.74			
Chloride as Cl	mg/l	29	40	38	147	170.70	23.87	23.64	22.99	<200	187.77	26.26	26.01	25.29			
Sulphate as SO <sub>4</sub>	mg/l	29	39	38	146	121.00	5.72	5.58	6.34	<400	133.10	6.29	6.14	6.97			
Nitrate as NO <sub>x</sub> -N	mg/l	29	39	38	147	2.15	0.04	0.04	0.19	<10	2.37	0.04	0.04	0.20			
Fluoride as F	mg/l	29	37	36	146	0.90	0.27	0.27	0.11	<1.0	0.99	0.30	0.30	0.12			

Chemical Parameter	Unit	Quaternary Catchments J33F, J34A, J34B, J34D													
		No. of Samples				Ambient GW quality or median <sup>1)</sup>				BHN Reserve <sup>2)</sup>		Groundwater Quality Reserve <sup>3)</sup>			
		J33F	J34A	J34B	J34D	J33F	J34A	J34B	J34D			J33F	J34A	J34B	J34D
pH		70	36	11	22	6.82	6.33	6.77	6.56	5.0 – 9.5		6.14–7.50	5.70–6.96	6.09–7.45	5.90–7.22
Electrical Conductivity	mS/m	70	36	11	22	44.60	19.55	114.50	12.54	<150		49.06	21.51	125.95	13.79
Calcium as Ca	mg/l	70	36	11	22	11.95	3.26	46.30	2.39	<150		13.15	3.58	50.93	2.63
Magnesium as Mg	mg/l	70	36	11	22	7.05	3.44	21.80	1.73	<100		7.76	3.78	23.98	1.91
Sodium as Na	mg/l	70	36	11	22	34.25	25.95	136.70	15.40	<200		37.68	28.55	150.37	16.94
Chloride as Cl	mg/l	70	36	11	22	61.74	40.85	<b>252.50</b>	27.36	<200		67.92	44.94	<b>252.50</b>	30.10
Sulphate as SO <sub>4</sub>	mg/l	70	36	11	22	27.50	5.22	42.20	2.50	<400		30.25	5.74	46.42	2.75
Nitrate as NO <sub>3</sub> -N	mg/l	68	36	11	22	0.08	0.17	0.37	0.22	<10		0.09	0.19	0.41	0.24
Fluoride as F	mg/l	69	36	11	22	0.22	0.11	0.29	0.08	<1.0		0.24	0.12	0.32	0.08

Chemical Parameter	Unit	Quaternary Catchments J34F, J35A, J35B, J35D													
		No. of Samples				Ambient GW quality or median <sup>1)</sup>				BHN Reserve <sup>2)</sup>		Groundwater Quality Reserve <sup>3)</sup>			
		J34F	J35A	J35B	J35D	J34F	J35A	J35B	J35D			J34F	J35A	J35B	J35D
pH		9	17	49	49	7.66	8.07	7.01	7.64	5.0 – 9.5		6.89–8.43	7.26–8.88	6.31–7.71	6.88–8.41
Electrical Conductivity	mS/m	9	17	49	49	46.60	42.00	46.20	<b>173.10</b>	<150		51.26	46.20	50.82	<b>173.10</b>
Calcium as Ca	mg/l	9	17	47	48	6.87	6.270	6.23	86.30	<150		7.55	68.97	6.85	94.93
Magnesium as Mg	mg/l	9	17	47	48	7.70	6.30	8.70	35.65	<100		8.47	6.93	9.57	39.22
Sodium as Na	mg/l	9	17	45	48	61.80	11.10	57.30	145.70	<200		67.98	12.21	63.03	160.27
Chloride as Cl	mg/l	9	17	45	48	101.64	19.10	108.70	<b>239.50</b>	<200		111.81	21.01	119.57	<b>239.50</b>
Sulphate as SO <sub>4</sub>	mg/l	9	17	47	48	27.90	11.50	4.85	95.95	<400		30.69	12.65	5.34	105.55
Nitrate as NO <sub>3</sub> -N	mg/l	9	17	45	48	0.05	0.16	4.51	0.64	<10		0.06	0.18	4.96	0.70
Fluoride as F	mg/l	9	17	43	47	0.48	0.16	0.10	0.52	<1.0		0.53	0.18	0.11	0.57

Chemical Parameter	Unit	Quaternary Catchments J40D, J40E, K10A, K10B													
		No. of Samples				Ambient GW quality or median <sup>1)</sup>				BHN Reserve <sup>2)</sup>		Groundwater Quality Reserve <sup>3)</sup>			
		J40D	J40E	K10A	K10B	J40D	J40E	K10A	K10B			J40D	J40E	K10A	K10B
pH		48	63	20	14	7.30	7.52	7.88	7.51	5.0 – 9.5		6.57–8.03	6.77–8.28	7.09–8.67	6.76–8.26
Electrical Conductivity	mS/m	48	63	20	14	83.15	<b>219.00</b>	<b>276.00</b>	<b>214.50</b>	<150		91.47	<b>219.00</b>	<b>276.00</b>	<b>214.50</b>
Calcium as Ca	mg/l	48	63	20	14	12.41	59.40	52.50	32.87	<150		13.65	65.34	57.75	36.15
Magnesium as Mg	mg/l	48	63	20	14	14.72	31.97	44.17	35.74	<100		16.19	35.17	48.58	39.32
Sodium as Na	mg/l	45	63	20	14	131.41	<b>288.45</b>	<b>399.60</b>	<b>288.65</b>	<200		144.55	<b>288.45</b>	<b>399.60</b>	<b>288.65</b>
Chloride as Cl	mg/l	48	63	20	13	<b>213.26</b>	<b>492.38</b>	<b>698.45</b>	<b>545.73</b>	<200		<b>213.26</b>	<b>492.38</b>	<b>698.45</b>	<b>545.73</b>
Sulphate as SO <sub>4</sub>	mg/l	45	63	20	14	31.69	65.21	97.08	59.60	<400		34.86	71.73	106.79	65.56
Nitrate as NO <sub>3</sub> -N	mg/l	47	62	20	12	0.09	0.04	0.05	0.27	<10		0.10	0.04	0.06	0.29
Fluoride as F	mg/l	48	63	20	13	0.14	0.22	0.22	0.25	<1.0		0.16	0.24	0.24	0.28

Chemical Parameter	Unit	Quaternary Catchments K10D, K30B, K50B										
		No. of Samples			Ambient GW quality or median <sup>1)</sup>			BHN Reserve <sup>2)</sup>	Groundwater Quality Reserve <sup>3)</sup>			
		K10D	K30B	K50B	K10D	K30B	K50B		K10D	K30B	K50B	
pH		11	47	9	7.85	6.83	7.48	5.0 – 9.5	7.07–8.64	6.15–7.51	6.73–8.22	
Electrical Conductivity	mS/m	11	47	9	<b>257.00</b>	27.72	61.90	<150	<b>257.00</b>	30.49	68.09	
Calcium as Ca	mg/l	11	43	9	30.82	4.27	15.08	<150	33.90	4.70	16.58	
Magnesium as Mg	mg/l	11	43	9	28.10	7.49	9.80	<100	30.91	8.24	10.78	
Sodium as Na	mg/l	11	41	9	<b>426.18</b>	28.35	85.57	<200	<b>426.18</b>	31.19	94.13	
Chloride as Cl	mg/l	11	42	9	<b>533.12</b>	41.92	139.99	<200	<b>533.12</b>	46.11	153.98	
Sulphate as SO <sub>4</sub>	mg/l	11	44	9	66.60	7.95	17.54	<400	73.26	8.74	19.29	
Nitrate as NO <sub>3</sub> -N	mg/l	10	43	9	0.09	7.99	0.48	<10	0.10	8.79	0.52	
Fluoride as F	mg/l	10	23	9	0.84	0.16	0.34	<1.0	0.93	1.49	0.18	

<sup>1)</sup> Based on long term groundwater quality datasets (DWS Water Management System). Minimum number of analyses used for the statistical evaluation is nine (9).

<sup>2)</sup> Upper limit of Class 1 water quality [Drinking] (WRC *et al.* 2<sup>nd</sup> Edition, 1998, Volume 1: Assessment Guide); and

<sup>3)</sup> Median value plus 10%. Where a difference in the water quality values for the ambient groundwater quality and basic human needs was found, the lesser or more protective value was selected for the groundwater quality Reserve. Where the ambient groundwater quality was selected as the groundwater quality Reserve, the value was scaled up by 10 per cent provided that the value does not exceed the BHN Reserve.

**Table 6.4: Summary of the water quality class and parameters of concern**

Quaternary catchment	Water quality class (WRC, 1998)	Water quality parameters of concern
G40C	0	None
G40F	0	None
G40J	0	None
G40L	II	Sodium, Chloride
G40M	II	Chloride
G50E	I	Chloride
G50F	I	Chloride
G50H	III	Electrical Conductivity, Magnesium, Sodium, Chloride, Sulphate
G50J	II	Chloride, Sodium, Electrical Conductivity
H10A	II	Sodium, Chloride, Electrical Conductivity
H10B	0	None
H10C	I	Chloride
H10F	0	None
H10G	0	None
H10H	II	Chloride
H10L	0	None
H20A	0	None
H20B	0	None
H20D	0	None
H20E	0	None
H20F	0	None
H30A	II	Chloride
H30C	0	None
H30D	0	None
H40A	I	Electrical Conductivity, Calcium, Chloride
H40B	0	None
H40F	0	None
H70B	III	Electrical Conductivity, Magnesium, Sodium, Chloride
H70K	II	Chloride
H90D	II	Chloride
H90E	II	Electrical Conductivity, Sodium, Chloride
J11B	I	Electrical Conductivity
J11E	II	Electrical Conductivity, Chloride
J11G	II	Electrical Conductivity, Chloride
J12B	III	Electrical Conductivity, Magnesium, Sodium, Chloride
J12D	II	Electrical Conductivity, Sodium, Chloride
J12F	III	Electrical Conductivity, Sodium, Chloride
J12G	III	Electrical Conductivity, Sodium, Chloride
J12H	II	Electrical Conductivity, Chloride
J12K	III	Electrical Conductivity, Calcium, Sodium, Chloride, Sulphate
J12L	0	None
J13B	III	Electrical Conductivity, Sodium, Chloride
J21A	0	None
J21B	I	Electrical Conductivity, Sodium, Chloride
J21C	I	Electrical Conductivity
J21D	I	Electrical Conductivity, Sodium, Chloride
J21E	I	Electrical Conductivity
J22B	I	Electrical Conductivity
J22C	I	Electrical Conductivity, Sodium
J22D	I	Electrical Conductivity, Sodium, Chloride
J22E	I	Electrical Conductivity
J22F	I	Electrical Conductivity, Calcium, Chloride
J22H	II	Electrical Conductivity, Calcium, Sodium, Chloride
J22J	I	Electrical Conductivity
J23A	II	Electrical Conductivity, Sodium, Chloride, Sulphate
J23C	I	Electrical Conductivity, Calcium, Sodium, Chloride
J23D	II	Electrical Conductivity, Chloride
J23F	I	Electrical Conductivity, Sodium, Chloride
J24A	I	Electrical Conductivity
J24B	I	Electrical Conductivity
J24C	I	Electrical Conductivity, Sodium, Chloride
J24D	II	Electrical Conductivity, Chloride

Quaternary catchment	Water quality class (WRC, 1998)	Water quality parameters of concern
J24E	II	Electrical Conductivity, Chloride
J25A	0	None
J25C	0	None
J31D	0	None
J32A	II	Electrical Conductivity, Chloride
J32B	II	Electrical Conductivity, Chloride
J32C	I	Electrical Conductivity, Calcium, Sodium, Chloride
J32E	0	None
J33D	0	None
J33E	0	None
J33F	0	None
J34A	0	None
J34B	II	Chloride
J34D	0	None
J34F	I	Chloride
J35A	0	None
J35B	I	Chloride
J35D	II	Electrical Conductivity, Chloride
J40D	II	Chloride, Sodium
J40E	II	Electrical Conductivity, Sodium, Chloride
K10A	III	Electrical Conductivity, Sodium, Chloride
K10B	II	Electrical Conductivity, Sodium, Chloride
K10D	III	Electrical Conductivity, Sodium, Chloride
K30B	0	None
K50B	I	Chloride

## 7. ESTUARIES (WATER QUANTITY COMPONENT)

Table 7.1 Water Quantity

Quaternary Catchment	Estuary name	PES	REC	nMAR (MCM)	EWR nMAR) (MCM)
G40B	Rooiels	B	B	<b>*9.44</b>	n/a
G40D	Palmiet	C	B	<b>*177.94</b>	n/a
G40G	Bot/Kleinmond	C	B	<b>*77.67</b>	n/a
G40H	Onrus	E	D	<b>*4.74</b>	n/a
G40L	Klein	C	B	<b>*51.21</b>	n/a
G40M	Uilkraals	D	C	<b>*6.82</b>	n/a
G40F	Heuningnes	C	A	29.53	n/a
H70K	Breede	B	B	1785.00	954.00
H80E	Duiwenhoks	B	A	89.29	73.01
H90C	Goukou	C	B	115.95	91.73
J40B	Gouritz	C	B	623.52	377.23
K10A	Blinde	C	C	n/a	n/a
K10B	Hartenbos	D	C	n/a	n/a
K10F	Klein Brak	C	C	50.67	37.66
K20A	Groot Brak	D	C	36.79	11.11
K30A	Maalgate	B	C	41.51	24.41
K30B	Gwaing	B	C	35.07	21.7
K30C	Kaaimans	B	B	53.6	41.3

Quaternary Catchment	Estuary name	PES	REC	nMAR (MCM)	EWR nMAR) (MCM)
K30D	Wilderness system: Touws	B	A	29.66	25.15
K40D	Swartvlei	B	B	83.4	56.6
K40E	Goukamma	B	A	57.5	48.8
K50B	Kynsna	B	B	83.2	63.4
K60 E and F	Keurbooms	A/B	A/B	232	214.10
K60G	Noetsie	B	B	4.8	n/a
K60G	Piesang	D	B/C	n/a	n/a
K70A	Groot (Wes)	B	A	n/a	n/a
K70A	Matjie	B	B	5.10	n/a
K70A	Sout	A	A	11.22	n/a
K70B	Bloukrans	A	A	n/a	n/a

\*Present Day MAR

## ESTUARY WATER QUALITY COMPONENT

Table 7.2: EcoSpecs and Thresholds of Potential Concern for the Blinde Estuary

Ecological component	EcoSpecs	Thresholds of Potential Concern
Hydrology	Maintain flow regime (small system needs most flows)	MAR does not vary by more than 10% from present Floods (indicated by 1:10 year event) do not reduce by more than 5% from present Base flows do not differ by more than 5% from present
Hydrodynamics	Maintain mouth state to create the require habitat for birds, fish, macrophytes, microalgae and water quality	Closed mouth state increase/decrease by 10% from present Presence of semi-closed mouth state with continuous outflow to sea. Average water depth <0.5 m (to be confirmed by monitoring) Rate of change in water level > 30% from present
Water quality	Salinity distribution not to cause exceedance of TPCs for fish, invertebrates, macrophytes and microalgae Turbidity and dissolved oxygen not to cause exceedance of TPCs for biota Dissolved inorganic (DIN)/dissolved inorganic phosphate (DIP) concentrations not to cause exceedance of TPCs for macrophytes and microalgae Toxic substances not to cause exceedance of TPCs for biota	Salinity > 20 (expected range 5-15) Dissolved oxygen (DO) < 5 mg/l in estuary Turbidity > 10 NTU in low flow Secchi depth: to bottom DIN > 100 µg/l (average) DIP > 20 µg/l (average) Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAf, 1995) Concentrations in sediment exceed target values as per Western Indian Ocean (WIO) Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)
Sediment dynamics	Flood regime to maintain the sediment distribution patterns and aquatic habitat (in stream physical habitat) so as not to exceed TPCs for biota Changes in sediment grain-size distribution patterns not to cause exceedance of TPCs in benthic invertebrates Change in average sediment composition and characteristics Change in average bathymetry	Average sediment composition (% fractions) along estuary change from baseline (to be measured) by 30% (per survey) Average depth along main channel change from 30% of baseline (to be determined) (system expected to experience significant fluctuation in bathymetry between flood and extended closed periods)
Microalgae	Maintain low/median phytoplankton/benthic microalgae biomass Prevent formation of phytoplankton blooms	Phytoplankton > 3.5 µg/l (median) Benthic microalgae > 23 mg/m <sup>2</sup> (median) Phytoplankton > 20 µg/l and/or cell density > 10 000 cells/ml (once-off)
Macrophytes	Maintain distribution of macrophyte habitats Prevent the spread of reeds into open water Prevent an increase in nutrients and macro-algal blooms Prevent the spread of invasive trees (e.g. <i>Acacia</i> spp.) in the riparian zone	20% change in the macrophyte area. (Reeds currently cover 0.04 ha.) Reeds occupy > 0.5 ha Macro-algal blooms cover > 50% of the open water area Presence of invasive aquatic macrophytes e.g. <i>Azolla</i> , water hyacinth etc. Invasive trees cover > 50% of riparian zone
Invertebrates	Establish presence/absence of sand prawn <i>Callichirus kraussi</i> on sand banks in lower estuary Establish presence/absence of the copepod <i>Pseudodiaptomus hessei</i> or estuarine congeneric in the zooplankton of the estuary	If present populations deviate from average baselines (as determined in first three visits) by more 30%
Fish	Fish assemblage should comprise the five estuarine association categories in similar proportions (diversity and abundance) to that under the reference. Numerically, assemblage should comprise: Ia estuarine residents (50-80% of total abundance)	Ia estuarine residents < 50% Ib marine and estuarine breeders < 10% IIa obligate estuarine-dependent < 10% IIb estuarine associated species < 5% IIc marine opportunists < 20% III marine vagrants > 5% IV indigenous fish < 1%

Ecological component	EcoSpecs	Thresholds of Potential Concern
	<p>Ib marine and estuarine breeders (5-20%)            IIa obligate estuarine-dependent (10-20%)            IIb estuarine associated species (5-15%),            IIc marine opportunists (20-80%)            III marine vagrants (not more than 5%)            IV indigenous fish (1-5%)            V catadromous species (1-5%)</p> <p>Category Ia species should contain viable populations of at least two species (e.g. <i>G.aestuaria</i>, &amp; <i>Hyporamphus capensis</i>).</p> <p>Category IIa obligate dependents should be well represented by at least two large exploited species (i.e. <i>L. lithognathus</i>, <i>Lichia amia</i>).</p> <p>REI (River Estuary Interface) species dominated by both <i>Myxus capensis</i> and <i>G. aestuaria</i>.</p>	V catadromous species <1%
Birds	Maintain population of original groups of birds present on the estuary	Number of birds in any group, other than species that are increasing regionally such as Egyptian geese, drops below the baseline median (determined by past data and/or initial surveys) number of species and/or birds counted for three consecutive summer or winter counts

Table 7.3: EcoSpecs and Thresholds of Potential Concern for the Hartenbos Estuary

Ecological component	EcoSpecs	Thresholds of Potential Concern
Hydrology	Maintain at least present day base flows (to be confirmed)	MAR does not vary by more than 10% Floods (indicated by 1:10 year event) do not reduce by more than 5% from present Base flows do not increase by more than 50% from present
Hydrodynamics	Maintain mouth state to create the required habitat for birds, fish, macrophytes, microalgae and water quality	Closed mouth state does not decrease by 10% from present Average water level in system > 10% from present Tidal amplitude (when open) < 20%
Water quality	Salinity distribution not to cause exceedance of TPCs for fish, invertebrates, macrophytes and microalgae Turbidity and dissolved oxygen not to cause exceedance of TPCs for biota DIN/DIP concentrations not to cause exceedance of TPCs for macrophytes and microalgae Toxic substances not to cause exceedance of TPCs for biota	Average salinity along estuary decreases by 5 below baseline average (to be determined) DO < 5 mg/l in estuary Turbidity > 20 NTU in low flow Secchi in fresher part: <0.5 m DIN >200 µg/l average (to be confirmed) DIP > 50 µg/l average (to be confirmed) Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAf, 1995) Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)
Sediment dynamics	Flood regime to maintain the sediment distribution patterns and aquatic habitat (instream physical habitat) so as not to exceed TPCs for biota Changes in sediment grain-size distribution patterns not to cause exceedance of TPCs in benthic invertebrates Change in average sediment composition and characteristics Change in average bathymetry	Average sediment composition (% fractions) along estuary change from baseline (to be measured) by 30% (per survey) Average depth along main channel changes from 30% of baseline (to be determined) (system expected to experience significant fluctuation in bathymetry between flood and extended closed periods)

Ecological component	EcoSpecs	Thresholds of Potential Concern
Microalgae	Maintain median phytoplankton/benthic microalgae biomass Prevent formation of phytoplankton blooms	Phytoplankton >8 µg/l (median) Benthic microalgae >42 mg/m <sup>2</sup> (median) Phytoplankton >20 µg/l and/or cell density >10 000 cells/ml (once-off) Dinoflagellates, chlorophytes and/or cyanobacteria >10% of relative abundance
Macrophytes	Maintain distribution of macrophyte habitats Prevent the spread of reeds into open water Prevent an increase in nutrients and macroalgal blooms Prevent the spread of invasive trees (e.g. <i>Acacia</i> spp.) in the riparian zone. Maintain integrity of salt marsh	20% change in macrophyte area (Reeds currently cover 9 ha, saltmarsh 47 ha.) Macroalgal blooms cover > 50% of the open water area Presence of invasive aquatic macrophytes e.g. <i>Azolla</i> , water hyacinth Invasive plants cover > 10% of flood plain Increase in bare areas in salt marsh because of decrease in moisture and increase in salinity >30% of salt marsh
Invertebrates	Establish presence/absence of sand prawn <i>Callinectes kraussi</i> on sand banks in lower estuary Establish abundance of the copepod <i>Pseudodiaptomus hessei</i> or estuarine congeneric in the zooplankton of the estuary	If present populations deviate from average baselines (as determined in first three visits) by more 30%
Fish	Fish assemblage should comprise the five estuarine association categories in similar proportions (diversity and abundance) to that under the reference. Numerically, assemblage should comprise: Ia estuarine residents (20-60%) Ib marine and estuarine breeders (10-30%) IIa obligate estuarine-dependent (20-40%) IIb estuarine associated species (5-20%) IIc marine opportunists (20-80%) IV indigenous fish (1-5%) V catadromous species (1-5%)  Category Ia species should contain viable populations of at least two species (e.g. <i>G.aestuaria</i> , <i>Hyporhamphus capensis</i> , <i>Omobranchus woodii</i> ).  Category IIa obligate dependents should be well represented by large exploited species (i.e. <i>A. japonicus</i> , <i>L. lithognathus</i> , <i>P. commersonii</i> , <i>Lichia amia</i> ).  REI species dominated by both <i>Myxus capensis</i> and <i>G. aestuaria</i> .	Ia estuarine residents <20% Ib marine and estuarine breeders < 10% IIa obligate estuarine-dependent <20% IIb estuarine associated species <5% IIc marine opportunists < 20% IV indigenous fish <1% V catadromous species <1%  Ia represented only by <i>G. aestuaria</i> . IIa exploited species in very low numbers or absent REI species represented only by <i>G. aestuaria</i> , <i>Myxus capensis</i> absent
Birds	Maintain population of original groups of birds present on the estuary	Number of birds in any group, other than species that are increasing regionally such as Egyptian geese, drops below the baseline median (determined by past data and/or initial surveys) number of species and/or birds counted for three consecutive summer or winter counts

Table 7.4: Eco-Specs and Thresholds of Potential Concern for the Piesang Estuary

Ecological component	EcoSpecs	Thresholds of Potential Concern
Hydrology	Maintain present day base flow as a minimum (to be confirmed)	MAR does not vary by more than 10% Floods (indicated by 1:10 year event) do not reduce by more than 5% from present. Base flows do not increase by more than 50% from present
Hydrodynamics	Maintain mouth state to create the required habitat for birds, fish, macrophytes, microalgae and water quality	Closed mouth state increase by 10% from present Average water level in system > 10% from present Tidal amplitude (when open) < 20%
Water quality	Salinity distribution not to cause exceedance of TPCs for fish, invertebrates, macrophytes and microalgae Turbidity and dissolved oxygen not to cause exceedance of TPCs for biota DIN/DIP concentrations not to cause exceedance of TPCs for macro-phytes and microalgae Toxic substances not to cause exceedance of TPCs for biota	Salinity > 20 (expected range 10-20) Salinity < 5 (expected range 10-20) DO < 5 mg/l in estuary Turbidity > 10 NTU in low flow Secchi: to bottom DIN > 100 µg/l once-off DIP > 20 µg/l once-off Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWA, 1995) Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)
Sediment dynamics	Flood regime to maintain the sediment distribution patterns and aquatic habitat (instream physical habitat) so as not to exceed TPCs for biota Changes in sediment grain-size distribution patterns not to cause exceedance of TPCs in benthic invertebrates Change in average sediment composition and characteristics Change in average bathymetry	Average sediment composition (% fractions) along estuary changes from baseline (to be measured) by 30% (per survey) Average depth along main channel changes from 30% of baseline (to be determine) (system expected to experience significant fluctuation in bathymetry between flood and extended closed periods)
Microalgae	Maintain median phytoplankton/benthic microalgae biomass Prevent formation of phytoplankton blooms	Phytoplankton > 3.5 µg/l (median) Benthic microalgae > 11 mg/m <sup>2</sup> (median) Phytoplankton > 20 µg/l and/or cell density > 10 000 cells/ml (once-off)
Macrophytes	Maintain distribution of macrophyte habitats Prevent an increase in nutrient input leading to macroalgal blooms Control the spread of invasive plants in the riparian zone	Greater than 20 % change in the area covered by macrophytes (reeds and sedges currently cover 3.14 ha, submerged macrophytes and salt marsh present) Macroalgal blooms cover > 50% of the open water area during closed mouth conditions Invasive plants cover > 5% of total habitat
Invertebrates	Maintain presence of sand prawn <i>Callichirus kraussi</i> on sand banks in lower estuary Maintain presence of the copepod <i>Pseudodiaptomus hessei</i> or estuarine congeneric in the zooplankton of the estuary	Populations deviate from average baselines (as determined in first three visits) by more 30%

Ecological component	EcoSpecs	Thresholds of Potential Concern
Fish	<p>Fish assemblage should comprise the five estuarine association categories in similar proportions (diversity and abundance) to that under the reference. Numerically, assemblage should comprise:</p> <p>Ia estuarine residents (50-80% of total abundance)            Ib marine and estuarine breeders (5-20%)            IIa obligate estuarine-dependent (10-20%)            IIb estuarine associated species (5-15%),            IIc marine opportunists (20-80%)            III marine vagrants (not more than 5%)            IV indigenous fish (1-5%)            V catadromous species (1-5%)</p> <p>Category Ia species should contain viable populations of at least two species (e.g. <i>G.aestuaria</i>, &amp; <i>Hyporhamphus capensis</i>).</p> <p>Category IIa obligate dependents should be well represented by at least two large exploited species (i.e. <i>L. lithognathus</i>, <i>Lichia amia</i>).</p> <p>REI species dominated by both <i>Myxus capensis</i> and <i>G. aestuaria</i>.</p>	<p>Ia estuarine residents &lt;50%            Ib marine and estuarine breeders &lt;10%            IIa obligate estuarine-dependent &lt;10%            IIb estuarine associated species &lt;5%            IIc marine opportunists &lt; 20%            III marine vagrants &gt; 5%            IV indigenous fish &lt;1%            V catadromous species &lt;1%</p>
Birds	Maintain population of original groups of birds present on the estuary	Number of birds in any group, other than species that are increasing regionally such as Egyptian geese, drops below the baseline median (determined by past data and or initial surveys) number of species and/or birds counted for three consecutive summer or winter counts

Table 7.5: EcoSpecs for the Groot (Wes) Estuary

Ecological component	EcoSpecs	Thresholds of Potential Concern
Hydrology	Maintain present day base flow as a minimum (to be confirmed)	MAR does not vary by more than 10% Floods (indicated by 1:10 year event) do not reduce by more than 5% from present. Base flows do not increase by more than 50% from present
Hydrodynamics	Maintain mouth state to create the required habitat for birds, fish, macrophytes, microalgae and water quality	Closed mouth state increases by 10% from present Average water level in system > 10% from present Tidal amplitude (when open) < 20%
Water quality	Salinity distribution not to cause exceedance of TPCs for fish, invertebrates, macrophytes and microalgae Turbidity and dissolved oxygen not to cause exceedance of TPCs for biota DIN/DIP concentrations not to cause exceedance of TPCs for macrophytes and microalgae Toxic substances not to cause exceedance of TPCs for biota	Average salinity along estuary decreases by 5 below baseline average (to be determined) Average salinity < 10at the head of the estuary (expected average range 5-10 for most of the system) DO < 5 mg/l in estuary Turbidity> 10 NTU in low flow Secchi: to bottom DIN >100 µg/lonce-off DIP > 20 µg/lonce-off Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAf, 1995) Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)

Ecological component	EcoSpecs	Thresholds of Potential Concern
Sediment dynamics	Flood regime to maintain the sediment distribution patterns and aquatic habitat (instream physical habitat) so as not to exceed TPCs for biota Changes in sediment grain-size distribution patterns not to cause exceedance of TPCs in benthic invertebrates Change in average sediment composition and characteristics Change in average bathymetry	Average sediment composition (% fractions) along estuary changes from baseline (to be measured) by 30% (per survey) Average depth along main channel changes from 30% of baseline (to be determined) (system expected to experience significant fluctuation in bathymetry between flood and extended closed periods)
Microalgae	Maintain median phytoplankton/benthic microalgae biomass Prevent formation of phytoplankton blooms	Phytoplankton >3.5 µg/l (median) Benthic microalgae >11 mg/m <sup>2</sup> (median) Phytoplankton >20 ug/l and/or cell density >10 000 cells/ml (once-off)
Macrophytes	Maintain distribution of macro-phyte habitats. Prevent an increase in nutrient input leading to macroalgal blooms. Control the spread of invasive plants in the riparian zone	Greater than 20 % change in the area covered by macro-phytes (reeds and sedges currently cover 2.54 ha salt marsh 0.76 ha) Macro-algal blooms cover > 50% of the open water area during closed mouth conditions. Invasive plants cover >5% of total habitat
Invertebrates	Establish presence/absence of sand prawn <i>Callichirus kraussi</i> on sand banks in lower estuary Establish presence/absence of the copepod <i>Pseudodiaptomus hessei</i> or estuarine congeneric in the zooplankton of the estuary	If present populations deviate from average baselines (as determined in first three visits) by more 30%
Fish	Fish assemblage should comprise the five estuarine association categories in similar proportions (diversity and abundance) to that under the reference. Numerically, assemblage should comprise: Ia estuarine residents (50-80% of total abundance) Ib marine and estuarine breeders (5-20%) IIa obligate estuarine-dependent (10-20%) IIb estuarine associated species (5-15%), IIc marine opportunists (20-80%) III marine vagrants (not more than 5%) IV indigenous fish (1-5%) V catadromous species (1-5%)  Category Ia species should contain viable populations of at least two species (e.g. <i>G.aestuaria</i> , & <i>Hyporamphus capensis</i> ).  Category IIa obligate dependents should be well represented by at least two large exploited species (i.e. <i>L. lithognathus</i> , <i>Lichia amia</i> ).  REI species dominated by both <i>Myxus capensis</i> and <i>G. aestuaria</i> .	Ia estuarine residents <50% Ib marine and estuarine breeders < 10% IIa obligate estuarine-dependent <10% IIb estuarine associated species <5% IIc marine opportunists < 20% III marine vagrants > 5% IV indigenous fish <1% V catadromous species <1%
Birds	Maintain population of original groups of birds present on the estuary	Number of birds in any group, other than species that are increasing regionally such as Egyptian geese, drops below the baseline median (determined by past data and or initial surveys) number of species and/or birds counted for three consecutive summer or winter counts

**Table 7.6: EcoSpecs and Thresholds of Potential Concern for the Bloukrans Estuary**

Ecological component	EcoSpecs	Thresholds of Potential Concern
Hydrology	Maintain present flow regime	Varies more than 10% of MAR
Hydrodynamics	Maintain mouth state to create the required habitat for birds, fish, macro-phytes, microalgae and water quality	Estuary mouth closes
Water quality	Salinity distribution not to cause exceedance of TPCs for fish, invertebrates, macrophytes and microalgae Turbidity and dissolved oxygen not to cause exceedance of TPCs for biota DIN/DIP concentrations not to cause exceedance of TPCs for macrophytes and microalgae Toxic substances not to cause exceedance of TPCs for biota	Average salinity < 10at the head of the estuary (expected average range >30 for most of the system) DO < 5 mg/l in estuary Turbidity > 10 NTU in low flow Secchi: to bottom DIN > 100 µg/l/once-off DIP > 20 µg/l/once-off Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DAAF, 1995) Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)
Sediment dynamics	Flood regime to maintain the sediment distribution patterns and aquatic habitat (instream physical habitat) so as not to exceed TPCs for biota Changes in sediment grain-size distribution patterns not to cause exceedance of TPCs in benthic invertebrates Change in average sediment composition and characteristics Change in average bathymetry	Average sediment composition (% fractions) along estuary change from baseline (to be measured) by 30% (per survey) Average depth along main channel change from 30% of baseline (to be determine) (system expected to significant fluctuation in bathymetry between flood and extended closed periods)
Microalgae	Maintain median phytoplankton/benthic microalgae biomass Prevent formation of phytoplankton blooms	Phytoplankton > 1.0 µg/l (median) Benthic microalgae > 11 mg/m <sup>2</sup> (median) Phytoplankton > 20 µg/l and/or cell density > 10 000 cells/ml (once-off)
Macrophytes	The estuary habitats only consists of sand/mud banks (0.63 ha) and channel (2.88 ha), no macrophytes	N/A
Invertebrates	Establish presence/absence of sand prawn <i>Callichirus kraussi</i> on sand banks in lower estuary Establish presence/absence of the copepod <i>Pseudodiaptomus hessei</i> or estuarine congeneric in the zooplankton of the estuary	If present populations deviate from average baselines (as determined in first three visits) by more 30%

Ecological component	EcoSpecs	Thresholds of Potential Concern
Fish	<p>Fish assemblage should comprise the five estuarine association categories in similar proportions (diversity and abundance) to that under the reference. Numerically, assemblage should comprise:</p> <p>Ia estuarine residents (50-80% of total abundance)            Ib marine and estuarine breeders (10-20%)            IIa obligate estuarine-dependent (10-20%)            IIb estuarine associated species (5-15%),            IIc marine opportunists (20-80%)            III marine vagrants (not more than 5%)            IV indigenous fish (1-5%)            V catadromous species (1-5%)</p> <p>Category Ia species should contain viable populations of at least 4 species (<i>G.aestuaria</i>, <i>Hyporamphus capensis</i>, <i>Omobranchus woodii</i>).</p> <p>Category IIa obligate dependents should be well represented by large exploited species (<i>A. japonicus</i>, <i>L. lithognathus</i>, <i>P. commersonii</i>, <i>Lichia amia</i>).</p> <p>REI species dominated by both <i>Myxus capensis</i> and <i>G. aestuaria</i>.</p>	<p>Ia estuarine residents &lt;50%            Ib marine and estuarine breeders &lt; 10%            IIa obligate estuarine-dependent &lt; 10%            IIb estuarine associated species &lt; 5%            IIc marine opportunists &lt; 20%            III marine vagrants &gt; 5%            IV indigenous fish &lt; 1%            V catadromous species &lt;1%</p>
Birds	Maintain population of original groups of birds present on the estuary	Number of birds in any group, other than species that are increasing regionally such as Egyptian geese, drops below the baseline median (determined by past data and or initial surveys) number of species and/or birds counted for three consecutive summer or winter counts

Table 7.7: EcoSpecs and TPCs for the Goukou Estuary

EcoSpecs	TPC
<b>Water quality</b>	
Salinity distribution not to cause exceedance of TPCs for biota.	<ul style="list-style-type: none"> <li>▪ Salinity &gt; 0 at head of estuary.</li> <li>▪ Average salinity in Zone D &gt; 5.</li> <li>▪ Average salinity in Zone C &gt; 20.</li> <li>▪ Average salinity 5 km upstream from mouth &gt; 20 more than three months of the year.</li> </ul>
System variables (pH, dissolved oxygen and turbidity) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ 6.0 &lt; pH &gt; 7.5.</li> <li>▪ DO &lt; 5 mg/L.</li> <li>▪ Suspended solids &gt;5 mg/L (low flow).</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Average turbidity &gt;10 Nephelometric Turbidity Units (NTU) (low flow).</li> <li>▪ Average 6.0 &lt; pH &gt; 8.5 (increasing with increase in salinity).</li> <li>▪ Average DO &lt; 5 mg/L.</li> </ul>
Inorganic nutrient concentrations (NO <sub>3</sub> -N, NH <sub>3</sub> -N and PO <sub>4</sub> -P) not to cause in exceedance of TPCs for macrophytes and microalgae.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ NO<sub>x</sub>-N &gt;150 µg/L over two consecutive months.</li> <li>▪ NH<sub>3</sub>-N &gt; 20 µg/L over two consecutive months.</li> <li>▪ PO<sub>4</sub>-PP &gt; 20 µg/L over two consecutive months.</li> </ul> <p>Estuary (except during upwelling or floods):</p> <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N 150 µg/L single concentration &gt; 200 µg/L.</li> </ul>

EcoSpecs	TPC
	<ul style="list-style-type: none"> <li>▪ Average NH<sub>3</sub>-N &gt; 20 µg/L during survey, single concentration &gt; 100 µg/L.</li> <li>▪ Average PO<sub>4</sub>-P &gt; 20 µg/L during survey, single concentration &gt; 50 µg/L.</li> </ul>
Presence of toxic substances (e.g. trace metals and pesticides/herbicides) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ Trace metals (to be refined and confirmed through future monitoring)</li> <li>▪ Pesticides/herbicides (to be refined and confirmed through future monitoring).</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Concentrations in water column exceed target values as per SA Water Quality Guidelines for Coastal Marine Waters (DWAF, 1995).</li> <li>▪ Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)</li> </ul>

Table 7.8: Water Quality EcoSpecs and TPCs for the Gouritz Estuary

Component	EcoSpecs	Thresholds of Potential Concern
Water Quality	Salinity distribution not to cause exceedance of TPCs for biota.	<ul style="list-style-type: none"> <li>▪ Salinity &gt; 0 at head of estuary</li> <li>▪ Average salinity in Site 11, 1 km upstream of bridge &gt; 5</li> <li>▪ Average salinity in Zone C &gt; 20</li> <li>▪ Average salinity 11 km upstream from mouth &gt; 20 more than three months of the year</li> <li>▪ Salinity &gt; 40 in saltmarsh sediments (linked to decrease in moisture and drying of floodplain habitat).</li> </ul>
	System variables (pH, dissolved oxygen and turbidity) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ 7.0 &lt; pH &gt; 8.3</li> <li>▪ DO &lt; 5 mg/l</li> <li>▪ Suspended solids &gt; 5 mg/l (low flow)</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Average turbidity &gt; 10 NTU (low, calm condition flow, wind mixing can increase turbidity to 20-40 NTU)</li> <li>▪ Average 7.0 &lt; pH &gt; 8.5 (increasing with increase in salinity)</li> <li>▪ Average DO &lt; 5 mg/l</li> </ul>
	Inorganic nutrient concentrations (NO <sub>3</sub> -N, NH <sub>3</sub> -N and PO <sub>4</sub> -P) not to cause exceedance of TPCs for macrophytes and microalgae.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ NO<sub>x</sub>-N &gt; 100 µg/l over two consecutive months</li> <li>▪ NH<sub>3</sub>-N &gt; 20 µg/l over two consecutive months</li> <li>▪ PO<sub>4</sub>-P &gt; 20 µg/l over two consecutive months</li> </ul> <p>Estuary (except during upwelling or floods):</p> <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N &gt; 100 µg/l single concentration &gt; 150 µg/l</li> <li>▪ Average NH<sub>3</sub>-N &gt; 20 µg/l during survey, single concentration &gt; 100 µg/l</li> <li>▪ Average PO<sub>4</sub>-P &gt; 20 µg/l during survey, single concentration &gt; 50 µg/l</li> </ul>
	Presence of toxic substances (e.g. trace metals and pesticides/herbicides) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ Trace metals (to be confirmed)</li> <li>▪ Pesticides/herbicides (to be confirmed)</li> </ul> <p>Estuary</p> <ul style="list-style-type: none"> <li>▪ Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAF, 1995)</li> </ul> <p>Concentrations in sediment exceed target values as per Western Indian Ocean (WIO) Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)</p>

**Table 7.9: Eco Specs and TPCs for the Klein Brak Estuary**

Component	EcoSpecs	Thresholds of Potential Concern
Water quality	Salinity distribution not to cause exceedance of TPCs for biota.	<ul style="list-style-type: none"> <li>▪ No salinity gradient in the upper reaches of the estuary (Zone D and F)</li> <li>▪ No REI in the upper reaches of the estuary (Zone D and F)</li> <li>▪ Salinity &gt; 35</li> </ul>
	System variables (pH, dissolved oxygen and turbidity) not to cause exceedance of TPCs for biota.	River inflow: <ul style="list-style-type: none"> <li>▪ 7.0 &lt; pH &gt; 8.5</li> <li>▪ DO &lt; 5 mg/ℓ</li> <li>▪ Suspended solids &gt; 5 mg/ ℓ (low flow)</li> </ul> Estuary: <ul style="list-style-type: none"> <li>▪ Average turbidity &gt;10 NTU (low flow)</li> <li>▪ Average 7.0 &lt; pH &gt; 8.5 (increasing with increase in salinity)</li> <li>▪ Average DO &lt; 5 mg/ℓ</li> </ul>
	Inorganic nutrient concentrations (NO <sub>3</sub> -N, NH <sub>3</sub> -N and PO <sub>4</sub> -P) not to cause in exceedance of TPCs for macro-phytes and microalgae.	River inflow: <ul style="list-style-type: none"> <li>▪ NO<sub>x</sub>-N &gt;150 µg/ℓ over two consecutive months</li> <li>▪ NH<sub>3</sub>-N &gt; 20 µg/ℓ over two consecutive months</li> <li>▪ PO<sub>4</sub>-P &gt; 20 µg/ℓ over two consecutive months</li> </ul> Estuary (except during upwelling or floods): <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N &gt; 150 µg/ℓ during survey, single concentration &gt; 200 µg/ℓ</li> <li>▪ Average NH<sub>3</sub>-N &gt; 20 µg/ℓ during survey, single concentration &gt; 100 µg/ℓ</li> <li>▪ Average PO<sub>4</sub>-P &gt; 20 µg/ℓ during survey, single concentration &gt; 50 µg/ℓ</li> </ul>
	Presence of toxic substances (e.g. trace metals and pesticides/herbicides) not to cause exceedance of TPCs for biota.	River inflow: <ul style="list-style-type: none"> <li>▪ Trace metals (to be confirmed)</li> <li>▪ Pesticides/herbicides (to be confirmed)</li> </ul> Estuary <ul style="list-style-type: none"> <li>▪ Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAf, 1995)</li> <li>▪ Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)</li> </ul>

**Table 7.10: EcoSpecs and TPCs for the Wilderness System**

Component	EcoSpecs	Thresholds of Potential Concern
Water quality	Salinity	Estuary in the closed state: <ul style="list-style-type: none"> <li>▪ Average salinity in Zone A &lt; 12,</li> <li>▪ Average salinity in Zone B: &lt; 10</li> <li>▪ Average salinity in Zone C &lt; 5</li> </ul> Lakes average salinity +2 from baseline (2013) and variability do not increase as below: <ul style="list-style-type: none"> <li>▪ Serpentine: 12 ± 10</li> <li>▪ Eilandvlei: 8 ± 5</li> <li>▪ Langvlei: 10 ± 4</li> <li>▪ Rondevlei: 10 ± 5</li> </ul>

System variables (pH, dissolved oxygen and turbidity) not to cause exceedance of TPCs for biota.		<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ 6.0 &lt; pH &gt; 7.0 (Touw)</li> <li>▪ 7.0 &lt; pH &gt; 8.0 (Duiwe)</li> <li>▪ DO &lt; 5 mg/l</li> <li>▪ Suspended solids &gt; 5 mg/ l (low flow)</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Average turbidity &gt; 5 NTU (low flow)</li> <li>▪ Average 6.0 &lt; pH &gt; 8.5 (increasing with increase in salinity)</li> <li>▪ Average DO &lt; 5 mg/l</li> </ul> <p>Lakes:</p> <ul style="list-style-type: none"> <li>▪ Average turbidity &gt; 5 NTU</li> <li>▪ Average 7.0 &lt; pH &gt; 8.5</li> <li>▪ Average DO &lt; 5 mg/l</li> </ul>
Inorganic nutrient concentrations (NO <sub>3</sub> -N, NH <sub>3</sub> -N and PO <sub>4</sub> -P) not to cause exceedance of TPCs for macro-phytes and microalgae.		<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ NO<sub>x</sub>-N &gt; 50 µg/l over two consecutive months</li> <li>▪ NH<sub>3</sub>-N &gt; 10 µg/l over two consecutive months</li> <li>▪ PO<sub>4</sub>-P &gt; 10 µg/l over two consecutive months</li> </ul> <p>Estuary (except during upwelling or floods):</p> <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N &gt; 50 µg/l single concentration &gt; 100 µg/l</li> <li>▪ Average NH<sub>3</sub>-N &gt; 10 µg/l during survey, single concentration &gt; 100 µg/l</li> <li>▪ Average PO<sub>4</sub>-P &gt; 10 µg/l during survey, single concentration &gt; 50 µg/l</li> </ul> <p>Lakes:</p> <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N &gt; 50 µg/l during survey, single concentration &gt; 100 µg/l</li> <li>▪ Average NH<sub>3</sub>-N &gt; 20 µg/l during survey (to be confirmed)</li> <li>▪ Average PO<sub>4</sub>-P &gt; 20 µg/l during survey (to be confirmed)</li> </ul>
Presence of toxic substances (e.g. trace metals and pesticides/herbicides) not to cause exceedance of TPCs for biota.		<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ Trace metals (to be confirmed)</li> <li>▪ Pesticides/herbicides (to be confirmed)</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAF, 1995)</li> <li>▪ Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)</li> </ul>

Table 7.11: Water quality present state assessment for H8DUIW-EWR1

Water Quality Constituents	PES Value	Category/Comment
<b>Inorganic salt ions (mg/l)</b>		
Sulphate as SO <sub>4</sub>	N/A	-
Sodium as Na	382.2	Exceeds the ≤ 70 mg/L (TWQR) for Agricultural Use: Irrigation.
Magnesium as Mg	67.4	No guideline.
Calcium as Ca	55.0	No guideline.
Chloride as Cl	805.4	Exceeds the ≤ 100 mg/L (TWQR) for Agricultural Use: Irrigation.
Potassium as K	9.25	No guideline.
<b>Electrical conductivity (mS/m)</b>		
	272	E/F: RC = 80 mS/m.
<b>Nutrients (mg/l)</b>		
SRP	0.014	A
TIN	0.118	A

Water Quality Constituents	PES Value	Category/Comment
<b>Physical variables</b>		
pH (5 <sup>th</sup> + 95 <sup>th</sup> %ile)	6.6 and 8.1	B
Temperature (°C)	N/A	A/B. Impacts expected at low flows.
Dissolved oxygen (mg/L)	N/A	B. Impacts expected at low flows.
Turbidity (NTU)	N/A	B. Changes in turbidity appear to be largely related to natural with minor man-made modifications, e.g. gravel mining upstream
<b>Response variables</b>		
Chl-a: phytoplankton (ug/L)	N/A	N/A
Macroinvertebrate score (MIRAI) SASS score ASPT score	50.7% 78 56	D
Diatoms	11.1	C/D (n = 1, Jan 2014)
Fish score (FRAI)	51.6%	D (all estuarine spp. that moved into the freshwater zone and aliens).
<b>Toxics</b>		
Ammonia (as N)	0.003	A
Fluoride (as F)	0.33	A
<b>OVERALL SITE CLASSIFICATION (PAI model)</b>		<b>C (73.2%)</b>

(a) N/A- No data were available for this assessment.

**Table 7.12: H8DUIW-EWR1: Water quality (C category) EcoSpecs and TPCs**

Metrics	EcoSpecs	TPCs
<b>Inorganic salt ions</b>		
Sulphate as SO <sub>4</sub>	N/A	N/A
Sodium as Na	The 95 <sup>th</sup> percentile of the data must be ≤ 380 mg/L.	The 95 <sup>th</sup> percentile of the data must be 300 - 380 mg/L.
Magnesium as Mg	The 95 <sup>th</sup> percentile of the data must be ≤ 67 mg/L.	The 95 <sup>th</sup> percentile of the data must be 53.5 - 67 mg/L.
Calcium as Ca	The 95 <sup>th</sup> percentile of the data must be ≤ 55 mg/L.	The 95 <sup>th</sup> percentile of the data must be 44 - 55 mg/L.
Chloride as Cl	The 95 <sup>th</sup> percentile of the data must be ≤ 800 mg/L.	The 95 <sup>th</sup> percentile of the data must be 640 - 800 mg/L.
Potassium as K	The 95 <sup>th</sup> percentile of the data must be ≤ 9 mg/L.	The 95 <sup>th</sup> percentile of the data must be 7 - 9 mg/L.
<b>Physical Variables</b>		
Electrical conductivity (mS/m)	The 95 <sup>th</sup> percentile of the data must be ≤ 270 mS/m.	The 95 <sup>th</sup> percentile of the data must be 210 - 270 mS/m.
pH	The 5 <sup>th</sup> percentile of the data must be 6.5. – 8.0, and the 95 <sup>th</sup> percentile 8.0 - 8.8.	The 5 <sup>th</sup> percentile of the data is ≤ 6.3 and the 95 <sup>th</sup> percentile is ≥ 8.6.
Temperature <sup>(a)</sup>	Natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen <sup>(a)</sup> (DO)	The 5 <sup>th</sup> percentile of the data must be ≥ 7.0 mg/L.	The 5 <sup>th</sup> percentile of the data must be 7.2 - 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity <sup>(a)</sup>	Changes in turbidity are related to minor man-made modifications (e.g. gravel mining upstream). Some silting of habitats is expected.	Initiate baseline monitoring for this variable.
<b>Nutrients</b>		

Metrics	EcoSpecs	TPCs
TIN	The 50 <sup>th</sup> percentile of the data must be ≤ 0.25 mg/L.	The 50 <sup>th</sup> percentile of the data must be 0.2 - 0.25 mg/L.
PO <sub>4</sub> -P	The 50 <sup>th</sup> percentile of the data must be ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data must be 0.012 - 0.015 mg/L.
<b>Response variables</b>		
Chl-a phytoplankton	The 50 <sup>th</sup> percentile of the data must be < 15 µg/L.	The 50 <sup>th</sup> percentile of the data must be 12 - 15 µg/L.
Chl-a periphyton	The 50 <sup>th</sup> percentile of the data must be ≤ 12 mg/m <sup>2</sup> .	The 50 <sup>th</sup> percentile of the data must be 10 - 12 mg/m <sup>2</sup> .
<b>Toxics</b>		
Fluoride	The 50 <sup>th</sup> percentile of the data must be ≤ 1.5 mg/L.	The 50 <sup>th</sup> percentile of the data must be 1.2 - 1.5 mg/L.
Ammonia (NH <sub>3</sub> -N)	The 50 <sup>th</sup> percentile of the data must be ≤ 0.015 mg/L.	The 50 <sup>th</sup> percentile of the data must be 0.012 - 0.015 mg/L.
Other toxics	The 95 <sup>th</sup> percentile of the data must be within the Target Water Quality Range (TWQR) as stated in DWAF (1996) or the A Category boundary as stated in DWAF (2008).	An impact is expected if the 95 <sup>th</sup> percentile of the data exceeds the TWQR as stated in DWAF (1996) or the upper limit of the A Category boundary as stated in DWAF (2008).

(a) N/A- No data were available for this assessment

Table 7.13: EcoSpecs and TPCs for the Duiwenhoks Estuary

Component	EcoSpecs	Thresholds of Potential Concern
Water quality	Salinity distribution not to cause exceedance of TPCs for biota.	<ul style="list-style-type: none"> <li>▪ Salinity &gt; 0 at head of estuary</li> <li>▪ Average salinity in Zone D &gt; 5</li> <li>▪ Average salinity in Zone C &gt; 20</li> <li>▪ Average salinity 5 km upstream from mouth &gt; 20 more than three months of the year</li> </ul>
	System variables (pH, dissolved oxygen and turbidity) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ 6.0 &lt; pH &gt; 7.5</li> <li>▪ DO &lt; 5 mg/l</li> <li>▪ Suspended solids &gt; 5 mg/l (low flow)</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Average turbidity &gt; 10 NTU (low flow)</li> <li>▪ Average 6.0 &lt; pH &gt; 8.5 (increasing with increase in salinity)</li> <li>▪ Average DO &lt; 5 mg/l</li> </ul>
	Inorganic nutrient concentrations (NO <sub>3</sub> -N, NH <sub>3</sub> -N and PO <sub>4</sub> -P) not to cause an exceedance of TPCs for macrophytes and microalgae.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ NO<sub>x</sub>-N &gt; 150 µg/l over 2 consecutive months</li> <li>▪ NH<sub>3</sub>-N &gt; 20 µg/l over 2 consecutive months</li> <li>▪ PO<sub>4</sub>-P &gt; 20 µg/l over 2 consecutive months</li> </ul> <p>Estuary (except during upwelling or floods):</p> <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N &gt; 150 µg/l single concentration &gt; 200 µg/l</li> <li>▪ Average NH<sub>3</sub>-N &gt; 20 µg/l during survey, single concentration &gt; 100 µg/l</li> <li>▪ Average PO<sub>4</sub>-P &gt; 20 µg/l during survey, single concentration &gt; 50 µg/l</li> </ul>
	Presence of toxic substances (e.g. trace metals and pesticides/herbicides) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ Trace metals (to be confirmed)</li> <li>▪ Pesticides/herbicides (to be confirmed)</li> </ul> <p>Estuary</p> <ul style="list-style-type: none"> <li>▪ Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAF, 1995)</li> <li>▪ Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)</li> </ul>

Table 7.14: EcoSpecs and TPCs for the Goukou Estuary

EcoSpecs	TPC
<b>Water quality</b>	
Salinity distribution not to cause exceedance of TPCs for biota.	<ul style="list-style-type: none"> <li>▪ Salinity &gt; 0 at head of estuary.</li> <li>▪ Average salinity in Zone D &gt; 5.</li> <li>▪ Average salinity in Zone C &gt; 20.</li> <li>▪ Average salinity 5 km upstream from mouth &gt; 20 more than three months of the year.</li> </ul>
System variables (pH, dissolved oxygen and turbidity) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ 6.0 &lt; pH &gt; 7.5.</li> <li>▪ DO &lt; 5 mg/L.</li> <li>▪ Suspended solids &gt;5 mg/L (low flow).</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Average turbidity &gt;10 Nephelometric Turbidity Units (NTU) (low flow).</li> <li>▪ Average 6.0 &lt; pH &gt; 8.5 (increasing with increase in salinity).</li> <li>▪ Average DO &lt; 5 mg/L.</li> </ul>
Inorganic nutrient concentrations (NO <sub>3</sub> -N, NH <sub>3</sub> -N and PO <sub>4</sub> -P) not to cause in exceedance of TPCs for macrophytes and microalgae.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ NO<sub>x</sub>-N &gt;150 µg/L over two consecutive months.</li> <li>▪ NH<sub>3</sub>-N &gt; 20 µg/L over two consecutive months.</li> <li>▪ PO<sub>4</sub>-PP &gt; 20 µg/L over two consecutive months.</li> </ul> <p>Estuary (except during upwelling or floods):</p> <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N 150 µg/L single concentration &gt; 200 µg/L.</li> <li>▪ Average NH<sub>3</sub>-N &gt; 20 µg/L during survey, single concentration &gt; 100 µg/L.</li> <li>▪ Average PO<sub>4</sub>-P &gt; 20 µg/L during survey, single concentration &gt; 50 µg/L.</li> </ul>
Presence of toxic substances (e.g. trace metals and pesticides/herbicides) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ Trace metals (to be refined and confirmed through future monitoring).</li> <li>▪ Pesticides/herbicides (to be refined and confirmed through future monitoring).</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Concentrations in water column exceed target values as per SA Water Quality Guidelines for Coastal Marine Waters (DAAF, 1995).</li> <li>▪ Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)</li> </ul>

Table 7.15: Water Quality EcoSpecs and TPCs for the Gouritz Estuary

Component	EcoSpecs	Thresholds of Potential Concern
Water Quality	Salinity distribution not to cause exceedance of TPCs for biota.	<ul style="list-style-type: none"> <li>▪ Salinity &gt; 0 at head of estuary</li> <li>▪ Average salinity in Site 11, 1 km upstream of bridge &gt; 5</li> <li>▪ Average salinity in Zone C &gt; 20</li> <li>▪ Average salinity 11 km upstream from mouth &gt; 20 more than three months of the year</li> <li>▪ Salinity &gt; 40 in saltmarsh sediments (linked to decrease in moisture and drying of floodplain habitat).</li> </ul>
	System variables (pH, dissolved oxygen and turbidity) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ 7.0 &lt; pH &gt; 8.3</li> <li>▪ DO &lt; 5 mg/l</li> <li>▪ Suspended solids &gt; 5 mg/l (low flow)</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Average turbidity &gt; 10 NTU (low, calm condition flow, wind mixing can increase turbidity to 20-40 NTU)</li> <li>▪ Average 7.0 &lt; pH &gt; 8.5 (increasing with increase in salinity)</li> <li>▪ Average DO &lt; 5 mg/l</li> </ul>
	Inorganic nutrient concentrations (NO <sub>3</sub> -N, NH <sub>3</sub> -N and PO <sub>4</sub> -P) not to cause exceedance of TPCs for macrophytes and microalgae.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ NO<sub>x</sub>-N &gt; 100 µg/l over two consecutive months</li> <li>▪ NH<sub>3</sub>-N &gt; 20 µg/l over two consecutive months</li> <li>▪ PO<sub>4</sub>-P &gt; 20 µg/l over two consecutive months</li> </ul> <p>Estuary (except during upwelling or floods):</p> <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N &gt; 100 µg/l single concentration &gt; 150 µg/l</li> <li>▪ Average NH<sub>3</sub>-N &gt; 20 µg/l during survey, single concentration &gt; 100 µg/l</li> <li>▪ Average PO<sub>4</sub>-P &gt; 20 µg/l during survey, single concentration &gt; 50 µg/l</li> </ul>
	Presence of toxic substances (e.g. trace metals and pesticides/herbicides) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ Trace metals (to be confirmed)</li> <li>▪ Pesticides/herbicides (to be confirmed)</li> </ul> <p>Estuary</p> <ul style="list-style-type: none"> <li>▪ Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAf, 1995)</li> </ul> <p>Concentrations in sediment exceed target values as per Western Indian Ocean (WIO) Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)</p>

Table 7.16: EcoSpecs and TPCs for the Wilderness System

Component	EcoSpecs	Thresholds of Potential Concern
Water quality	Salinity	<p>Estuary in the closed state:</p> <ul style="list-style-type: none"> <li>▪ Average salinity in Zone A &lt; 12,</li> <li>▪ Average salinity in Zone B: &lt; 10</li> <li>▪ Average salinity in Zone C &lt; 5</li> </ul> <p>Lakes average salinity +2 from baseline (2013) and variability do not increase as below:</p> <ul style="list-style-type: none"> <li>▪ Serpentine: 12 ± 10</li> <li>▪ Eilandvlei: 8 ± 5</li> <li>▪ Langvlei: 10 ± 4</li> <li>▪ Rondevlei: 10 ± 5</li> </ul>
	System variables (pH, dissolved oxygen and turbidity) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ 6.0 &lt; pH &gt; 7.0 (Touw)</li> <li>▪ 7.0 &lt; pH &gt; 8.0 (Duiwe)</li> <li>▪ DO &lt; 5 mg/l</li> <li>▪ Suspended solids &gt; 5 mg/ l (low flow)</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Average turbidity &gt; 5 NTU (low flow)</li> <li>▪ Average 6.0 &lt; pH &gt; 8.5 (increasing with increase in salinity)</li> <li>▪ Average DO &lt; 5 mg/l</li> </ul> <p>Lakes:</p> <ul style="list-style-type: none"> <li>▪ Average turbidity &gt; 5 NTU</li> <li>▪ Average 7.0 &lt; pH &gt; 8.5</li> <li>▪ Average DO &lt; 5 mg/l</li> </ul>
	Inorganic nutrient concentrations (NO <sub>3</sub> -N, NH <sub>3</sub> -N and PO <sub>4</sub> -P) not to cause exceedance of TPCs for macro-phytes and microalgae.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ NO<sub>x</sub>-N &gt; 50 µg/l over two consecutive months</li> <li>▪ NH<sub>3</sub>-N &gt; 10 µg/l over two consecutive months</li> <li>▪ PO<sub>4</sub>-P &gt; 10 µg/l over two consecutive months</li> </ul> <p>Estuary (except during upwelling or floods):</p> <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N &gt; 50 µg/l single concentration &gt; 100 µg/l</li> <li>▪ Average NH<sub>3</sub>-N &gt; 10 µg/l during survey, single concentration &gt; 100 µg/l</li> <li>▪ Average PO<sub>4</sub>-P &gt; 10 µg/l during survey, single concentration &gt; 50 µg/l</li> </ul> <p>Lakes:</p> <ul style="list-style-type: none"> <li>▪ Average NO<sub>x</sub>-N &gt; 50 µg/l during survey, single concentration &gt; 100 µg/l</li> <li>▪ Average NH<sub>3</sub>-N &gt; 20 µg/l during survey (to be confirmed)</li> <li>▪ Average PO<sub>4</sub>-P &gt; 20 µg/l during survey (to be confirmed)</li> </ul>
	Presence of toxic substances (e.g. trace metals and pesticides/herbicides) not to cause exceedance of TPCs for biota.	<p>River inflow:</p> <ul style="list-style-type: none"> <li>▪ Trace metals (to be confirmed)</li> <li>▪ Pesticides/herbicides (to be confirmed)</li> </ul> <p>Estuary:</p> <ul style="list-style-type: none"> <li>▪ Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DAAF, 1995)</li> <li>▪ Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)</li> </ul>

## 8. WETLANDS

Table 8.1: Wetlands - Quaternary Protection Specification

Quaternary catchment	EIS	PES	REC	How to achieve the REC
K10A	Moderate	C	C	Control invasive alien vegetation, erosion and land-use encroachment.
K10B	Moderate	C	C	
K10C	Moderate	B/C	B/C	
K10D	Moderate	B/C	B/C	
K10E	Moderate	B/C	B/C	
K10F	Moderate	C	C	
K20A	Moderate	C	C	
K30A	High	C	C	Buffers in urban and agricultural areas, manage water quality, erosion and invasive vegetation.
K30B	High	D	C/D	
K30C	Moderate	D	D	Control invasive alien vegetation, erosion and land-use encroachment.
K30D	Very High	B	B	
K40A	Moderate	D	D	
K40B	Moderate	C	C	
K40C	Moderate	C	C	
K40D	Very High	B	B	
K40E	Moderate	B/C	B/C	
K50A	Moderate	B/C	B/C	Protect and improve the condition of remaining wetland patches, control invasive vegetation.
K50B	High	C/D	C	
K60A	Moderate	B	B	Control invasive alien vegetation, erosion and land-use encroachment.
K60B	Moderate	B	B	
K60C	Moderate	B	B	
K60D	High	A	A	
K60E	High	C	C	
K60F	High	C	C	
K60G	Moderate	C	C	
K70A	Moderate	C	C	
K70B	Low	A	A	
H80A	HIGH	C/D	C	
H80B	Moderate	C	C	
H80C	Moderate	D	D	
H80D	Moderate	D	D	
H80E	Moderate	C/D	C/D	
H90A	Moderate	C	C	

Quaternary catchment	EIS	PES	REC	How to achieve the REC
H90B	Moderate	D	D	Control invasive alien vegetation, erosion and land-use encroachment.
H90C	Moderate	D	D	
H90D	Moderate	C	C	
H90E	Moderate	C/D	C/D	
J11D	Low	C	C	
J11F	Moderate	C	C	
J11G	Moderate	B	B	
J12A	Moderate	B	B	
J12B	Moderate	B	B	
J12J	Moderate	B	B	
J12K	Moderate	B	B	
J12L	Moderate	C	C	
J21A	Moderate	B/C	B/C	
J21B	Moderate	B	B	
J22B	Moderate	B	B	
J22G	Moderate	B	B	
J22K	Low	B/C	B/C	
J23E	Low	C	C	
J23J	Moderate	B	B	
J24F	Low	C	C	
J25A	Low	B	B	
J33B	Low	C	C	
J33E	Low	C	C	
J34C	Low	C	C	
J34D	Low	C	C	
J34E	Low	C/D	C/D	
J34F	Low	D	D	
J40B	Low	B	B	
J40C	Moderate	C/D	C/D	
J40D	Moderate	D	D	
J40E	High	C	C	

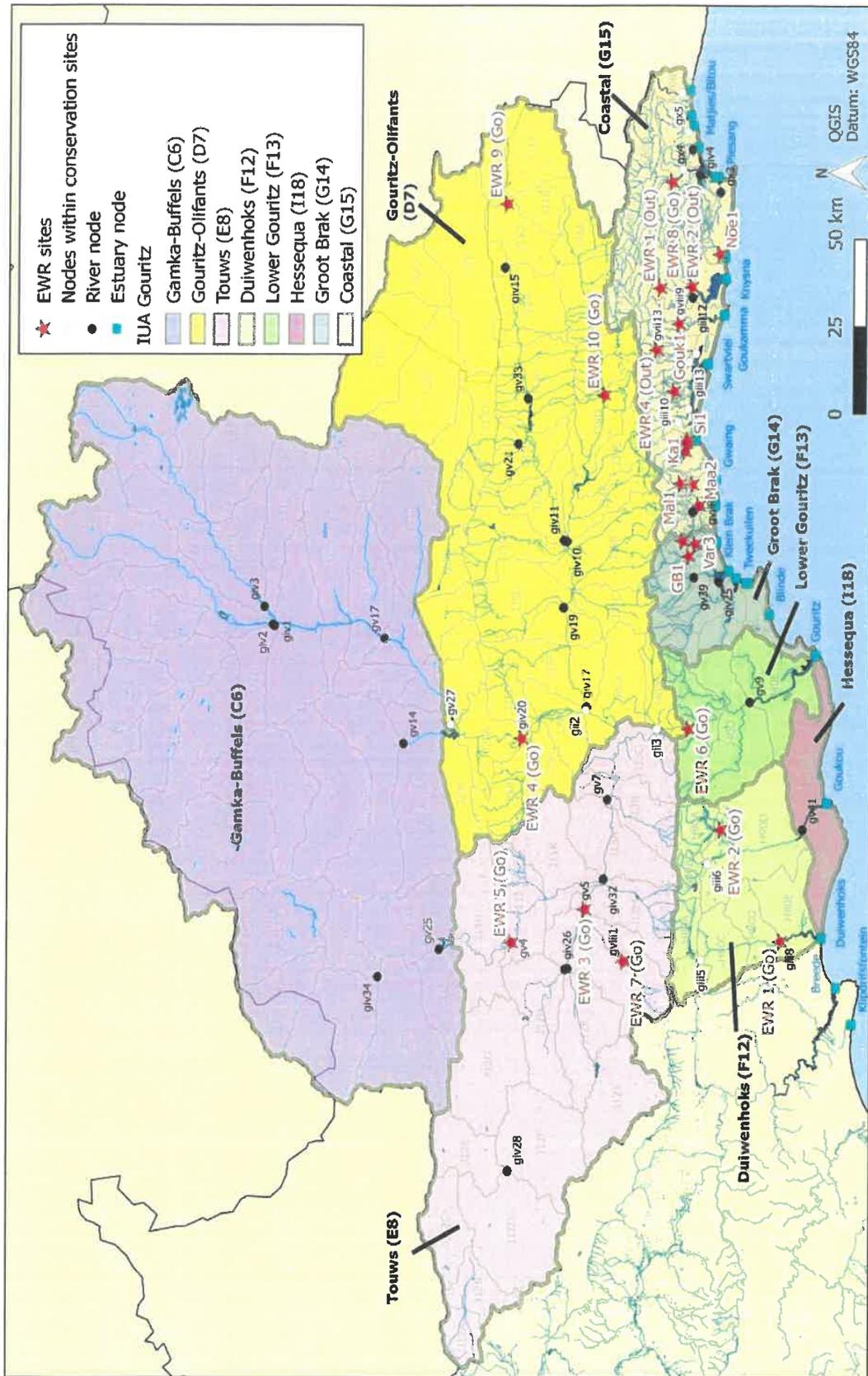


Figure 1: Locations of Gouritz region river/estuary nodes and EWR sites

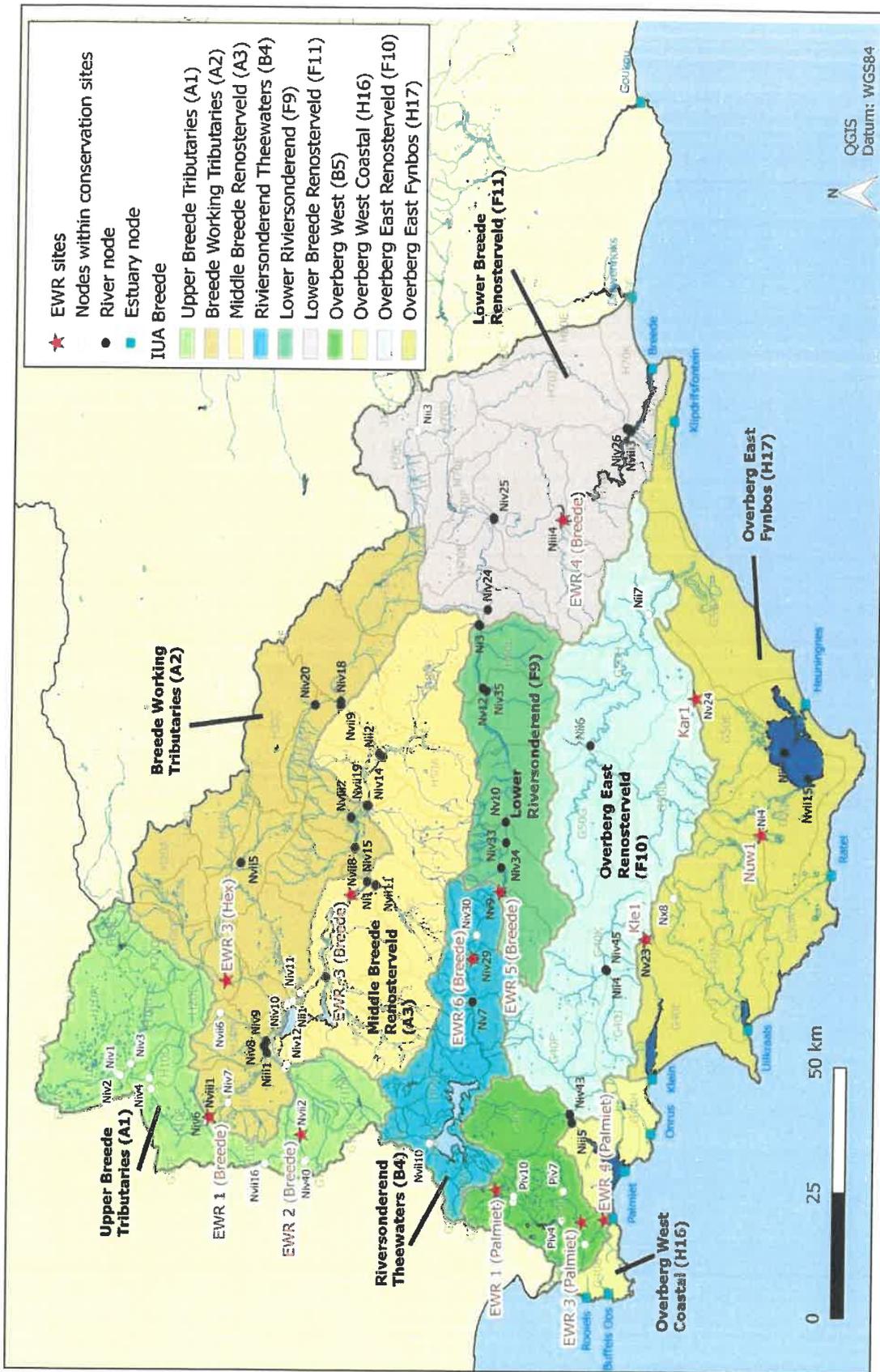


Figure 2: Locations of Breede-Overberg region river/estuary nodes and EWR sites

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**GENERAL NOTICES • ALGEMENE KENNISGEWINGS**

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**DEPARTMENT OF AGRICULTURE, LAND REFORM AND RURAL DEVELOPMENT****NOTICE 454 OF 2021**

**National Agricultural  
Marketing Council**  
Promoting market access for South African agriculture

Block A | 4th Floor | Meintjiesplein Building | 536 Francis Baard Street | Arcadia | 0002  
Private Bag X935 | Pretoria | 0001  
Tel: 012 341 1115 | Fax: 012 341 1811/1911  
<http://www.namc.co.za>

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**FRUIT INDUSTRY****REQUEST FOR AN *AD HOC* AREA BASED PER HECTARE STATUTORY LEVY  
TO FUND *BACTROCERA DORSALIS* (BD) ERADICATION PROGRAMMES  
IN SPECIFIC PRODUCTION REGIONS**

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**NAMC REQUESTING COMMENTS / INPUTS FROM INDUSTRY ROLE PLAYERS**

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On 27 July 2021, the Minister of Agriculture, Land Reform and Rural Development received a request from FruitFly Africa (Pty) Ltd (FFA) for the implementation, of a new area based, per hectare *ad hoc*, statutory levy for the funding of *Bactrocera dorsalis* (BD) (also known as the Oriental Fruit Fly) programmes in specific production regions to be implemented from January 2022 for a four year period.

The Department of Agriculture, Land Reform and Rural Development (DALRDD) supports the application and BD control strategy and will continue to support co-funding operational expenses *via* the Public Private Partnership arrangement between DALRRD and the participating producers *via* FruitFly Africa (Pty) Ltd. Currently, DALRRD run an initiative for the surveillance and eradication of BD in South Africa. The proposed application sets out a strategy that will lighten the burden on DALRRD's human resources and ensure fast reaction times to potential threats are available on grass roots level.

It is proposed that a maximum levy of R1 160-00/ha per year be introduced in the production regions (indicated below) based on the need for eradication within a specific year subject to the number of hectares to be treated. FFA calculated that between R47 442 813 (2022) and R54 920 986 (2025) will be required to run the eradication programme.

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**Council Members:** Mr. A. Petersen (Chairperson), Ms. T. Ntshangase (Deputy Chairperson), Prof. A. Jooste, Mr. S.J. Mhlabi, Ms. F. Mkile, Ms. N. Mokose, Ms. S. Naidoo, Mr. G. Schutte and Dr. S.T. Xaba.

**These funds will only be levied in areas and in years where eradication measures are required.** If approved, this will be a separate statutory levy, meaning that the existing statutory levies in the fruit industry (to finance research, information, transformation etc) will remain unchanged.

The eradication programme will be available in the following production regions, namely:

- Elgin-Grabouw-Vyeboom (EGV1);
- Hex River Valley (Incl. De Wet & Brandwacht);
- Witzenberg (Warm Bokkeveld, Wolseley, Tulbagh, Koue-Bokkeveld, Agter-Witzenberg and Bo-Swaarmoed); and
- Langkloof.

The NAMC believes that the statutory levy requested are consistent with the objectives of the Marketing of Agricultural Products Act (as set out in section 2 of the Act).

Directly affected groups in the fruit industry are kindly requested to submit any comments, in writing, regarding the proposed statutory levy, to the NAMC on or before 27 August 2021, to enable the Council to finalise its recommendation to the Minister in this regard.

**ENQUIRIES:**

National Agricultural Marketing Council  
Mathilda van der Walt  
e-mail: [mathildavdw@namc.co.za](mailto:mathildavdw@namc.co.za)

**DEPARTMENT OF HIGHER EDUCATION AND TRAINING**

NOTICE 455 OF 2021

**USE OF OFFICIAL LANGUAGES ACT, 2012 (ACT NO. 12 OF 2012)****THE DEPARTMENT OF HIGHER EDUCATION AND TRAINING REVISED  
LANGUAGE POLICY**

I, Bonginkosi Emmanuel Nzimande, Minister of Higher Education, Science and Innovation in terms of section 4(2)(h) of the Use of Official Languages Act, 2012 (Act No. 12 of 2012), hereby publish the revised Department of Higher Education and Training Language Policy for public knowledge.

**Dr BE Nzimande, MP****Minister of Higher Education, Science and Innovation****Date:** 31/03/2021



**higher education  
& training**

Department:  
Higher Education and Training  
REPUBLIC OF SOUTH AFRICA

## LANGUAGE POLICY

<b>Policy Custodian</b>	Corporate Communication
<b>Policy Version</b>	Version 2
<b>Approval Date</b>	Date of signature by Director General
<b>Implementation Date</b>	After policy has been gazetted
<b>Status of Policy</b>	Policy review
<b>Author</b>	Directorate Communication

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**1. ACRONYMS**

<b>ACRONYMS</b>	<b>DEFINITION</b>
<b>DHET</b>	Department of Higher Education and Training
<b>DG</b>	Director-General
<b>DLPS</b>	Directorate: Language Practice Services
<b>CIO</b>	Chief Information Officer
<b>IRC</b>	Information Resources Centre
<b>PANSALB</b>	Pan South African Language Board

**2. DEFINITIONS**

<b>TERM</b>	<b>DEFINITION</b>
<b>Act</b>	Use of Official Languages Act No. 12 of 2012
<b>Constitution</b>	The Constitution of the Republic of South Africa, 1996
<b>Department</b>	Department of Higher Education and Training
<b>Official languages</b>	Languages as contemplated in Section 6(1) of the constitution, namely Sepedi, Sesotho, Setswana, siSwati, Tshivenda, Xitsonga, Afrikaans, English, isiNdebele, isiXhosa and isiZulu.
<b>Policy</b>	DHET Language Policy

### 3. BACKGROUND

The Department of Higher Education and Training Language Policy, fulfills the prescripts of the Constitution of the Republic of South Africa (1996), amplified in the Use of Official Languages Act No.12 of 2012. The Constitution provides for recognition and use of eleven (11) official languages.

The Use of Official Languages Act No.12 of 2012 provides for, amongst other requirements, the regulation and monitoring of the use of official languages by national government for government purposes; requires the adoption of language policies for establishment of departmental language units by national government departments, national public entities and national public enterprises; and it provides for the establishment of a national language unit by the Department of Arts and Culture.

The Act came into operation on 02 May 2013 by Proclamation No. 10 published in Government Gazette No. 36392 of 26 April 2013. The Regulations to the Act came into effect on 5 February 2014 through Government Notice No. 10140 promulgated in Government Gazette No. 37398 of 28 February 2014.

In order for the Department to deliver on its mandate of providing national strategic leadership in support of the Post-School Education and Training system to all citizens of the Republic of South Africa, the Department commits to the recognition of all official languages.

Although most South Africans speak an indigenous African language as their mother tongue, they often defer to English or Afrikaans for business, education and even politics.

Government departments, public entities and public enterprises need to acknowledge the importance of languages in South Africa. According to the latest census in the country, English still remain the dominant language in domains such as government, even though the majority of South Africans speak indigenous languages.

The DHET is therefore no exception, currently the Department uses English as the main language of business, starting from meetings to documents, publications and communication, etc.

The other languages are therefore not given the same status as English and the incorporation of other languages into the programmes and business of the Department is not prioritized financially.

The DHET currently does not have a language unit or language practitioners who would assist with the promotion of multilingualism in the Department.

Through the development of a language policy, the Department will ensure that these official languages enjoy parity of esteem and equitable treatment through and in all its communication and interaction with communities and individuals.

The Department takes into consideration the multilingual diversity of South Africa and that promoting multilingualism will become the tool through which to break the linguistic systematic exclusions and to enhance access to information and services. The Department recognizes that this Language Policy will promote inclusivity and that language should not be a barrier to information and service delivery access.

If implemented successfully, this language policy will result in the recognition and usage of the previously marginalized languages in the day to day business of the Department.

#### **4. LEGISLATIVE FRAMEWORK**

4.1 This policy is developed in accordance with requirements of **Section 6 of the Constitution of the Republic of South Africa, 2016.** and, particularly Section 4 of the Use of Official Languages Act No. 12 of 2012.

4.1.1 The Constitution provides for recognition and use of eleven (11) official languages. Further, recognises the diminished use and inferior status of indigenous languages, therefore requiring government departments to take practical and positive measures to elevate the status and use of indigenous languages. In addition, the Constitution requires all official languages to be afforded parity of esteem and equitable treatment.

4.1.2 Section 6(3) of the Constitution empowers national and provincial governments to use any particular official languages for purposes of government, taking into account usage, practicality, expense, regional circumstances and balance of needs and preferences of the population.

4.2 The **Use of Official Languages Act No. 2 of 2012**, provides for, amongst other requirements, the regulation and monitoring of the use of official languages by national government for government purposes; requires the adoption of a language policy and provides for the establishment of a national language unit by the department. Sub-section 4(1) requires that a national department and its entities must adopt a language policy on the use of all official languages.

4.3 Further, that the DHET complies with requirements of sub-section 4(4.2 (b)) which requires that the DHET must adopt at least three official languages

4.4 In addition, the policy is also guided by the following legislative instruments:

4.4.1 **Promotion of Access to Information Act , 2000 (Act No. 2 of 2000)**, which gives effect to the constitutional right of access to data and information held by the State that is required for the exercise or protection of any rights. It provides a framework for requesting such data and information. The Act aims to foster a culture of transparency and accountability in public and private bodies, and to actively promote a society in which the people of South Africa have effective

access to information. In promoting access to information, the Act also recognizes the use of official languages by allowing requesters to state their language of preference when requesting records. Furthermore it directs public bodies to compile their section 14 manuals in at least three official languages.

**4.4.2 The White Paper for Post-School Education and Training: building an expanded, effective and integrated post-school system**, approved by the Cabinet on 20 November 2013.

The White Paper takes cognisance of the demise of African Languages in the academic space has posed a serious threat to linguistic diversity in South Africa. It recognizes the importance of developing and elevating the status and advancing the use of all South African languages including Sign Language.

## **5. PURPOSE**

5.1 The purpose of the policy is to promote the use of official languages, the spirit of multilingualism and social cohesion, as well as to empower previously marginalised languages in the DHET. The language policy of the DHET seeks to give guidance on how language matters should be applied in order to comply with the Constitution and the Act as well as to enhance communication and information provision to the citizens.

5.2 This policy further outlines the reasonable steps that the DHET takes to ensure meaningful access to its services and activities by all citizens of the Republic of South Africa.

## **6. OBJECTIVES**

The objectives of this policy, based on Section 2 of the Use of Official Languages Act No.12 of 2012, are:

- 6.1 to promote and elevate the status of the previously marginalised official indigenous languages.
- 6.2 to promote equitable use of official languages in the day to day business of the DHET.
- 6.3 to promote good language management by DHET for efficient public service administration and to meet the needs of the public.
- 6.4 to protect language diversity and respect for multilingualism.
- 6.5 to promote parity of esteem and equitable treatment of official languages in the Republic of South Africa;
- 6.6 to facilitate equitable access to DHET services and information; and

6.7 to encourage compliance with the Use of Official Languages Act No. 12 of 2012 by the DHET;

## 7. SCOPE OF APPLICATION

7.1 This policy applies to all employees of the national office of the DHET and its Regional Offices, for both internal and external interaction.

7.2 Public higher education institutions, Technical Vocational Education and Training colleges as well as Community Education and Training colleges should, with necessary changes, align their respective language policies with this policy.

7.3 The Director-General (DG) is the Information Officer of the DHET, and therefore the overseer of the implementation of this policy by staff within the DHET.

7.4 Heads of DHET institutions must ensure the adoption and use of official languages in line with this policy and when required, report to the DG on the status of the use of official languages within the institutions.

## 8. KEY PRINCIPLES

8.1 **Inclusivity:** Promote inclusiveness and social cohesion, while guarding against exclusivity and marginalization.

8.2 **Transformation:** Transformative in attending to historical injustices, recognizing the diminished use and status of indigenous languages and promote justice and equality.

8.3 **Value:** Recognize the intrinsic value of the diverse range of linguistic backgrounds that the public and employees bring to the Department.

8.4 **Multilingualism:** Promote multilingualism in all South African languages.

8.5 **Sustainability:** Be sustainable and practicable within the context of the Department's financial, staffing and infrastructural resources.

## 9. USE OF OFFICIAL LANGUAGES

The application of this policy takes into account the language needs and cultural dynamics at national level and provincial contexts as outlined in 9.1 and in Table 1.

The following factors have been taken into consideration in arriving at the choice of official languages the DHET will use in each context/situation:

- Usage;
- Practicability;
- Expense;
- Regional circumstances; and
- The balance of the needs and preferences of the public it serves.

The official languages for DHET head office are:

- **English**
- **Sepedi and**
- **isiZulu**

9.1 Regional offices must use at **least three** official languages taking into consideration the language distribution in each province (see Table 1 below)

9.2 All the three official languages will enjoy the same status and treatment and any of them can be used for recording purposes with translations into the other two languages when required.

9.3 The DHET will make provision for the use of the South African Sign Language for citizens that requires services in this language.

**TABLE 1**

<b>A. PROVINCE</b>	<b>B. LANGUAGES USED</b>
Gauteng	English; Setswana; and isiZulu South African Sign Language
Mpumalanga	English; Sepedi Xitsonga; IsiNdebele; and siSwati South African Sign Language
Free State	English; Sesotho; and Afrikaans South African Sign Language
Northern Cape	English; Sesotho; and Afrikaans

A. PROVINCE	B. LANGUAGES USED
	South African Sign Language
Eastern Cape	English; IsiXhosa; and Afrikaans  Sesotho  South African Sign Language
Western Cape	English; Afrikaans; and IsiXhosa  South African Sign Language
North West	English; Setswana; and Afrikaans  South African Sign Language
Limpopo	English; Sepedi; Xitsonga; and Tshivenda  South African Sign Language
KwaZulu-Natal	English; isiZulu and isiXhosa  South African Sign Language

9.4 Notwithstanding the above languages, the DHET will also use other official languages as and when required.

9.5 The importance of the service which the DHET provides to the public is self-evident. Accordingly, the DHET takes all measures possible to provide language services sufficient to ensure that all citizens of the Republic enjoy comparable access to its services.

## 10. LANGUAGE USE FOR INTERNAL COMMUNICATION

10.1 The languages used for written internal communication in the DHET shall be isiZulu, Sepedi and English. Where a document is originally produced in English, it shall be translated into isiZulu and Sepedi and the other way round.

10.2 Documents shall also be originated in isiZulu or Sepedi, with a view to elevate the status of these languages and to promote multilingualism.

10.3 In conducting meetings, members of the meeting should agree on the language that should be

used, taking into consideration the language distribution of the members as well as language understanding. The choice of a language should not be used to exclude any member.

- 10.4 Where needed, interpreting services shall be provided for meetings to ensure that no member is excluded on account of language.
- 10.5 Records of meetings and of any other official engagements shall be kept in the language it was conducted in and translated to the other two languages.

## **11. LANGUAGE USE FOR EXTERNAL COMMUNICATION**

- 11.1 DHET, in its spoken communication will as far as possible strive to serve all their clients in the language of their choice amongst the eleven official languages.
- 11.2 During engagement with citizens, such as imbizo, the languages spoken in the area will be prioritized as the languages of communication. Departmental publications, policies, forms, notices and adverts that are exclusively intended for public use will be translated into regional languages as outlined in Table 1 above.
- 11.3 Promotional material and information such as campaign products shall be made available in official languages based on the geographical area.
- 11.4 When providing services to citizens through the DHET Call Centre, they will be given an option to choose a preferred language of communication from the eleven official languages.
- 11.5 Training will be provided to call centre and client services agents in all the eleven official languages, including South African Sign Language.

## **12. COMMUNICATION WITH PERSONS WITH DISABILITIES**

- 12.1 The DHET will strive to provide for the needs of people with special language needs.
- 12.2 At first contact with members of the public, the designated staff members of the DHET will inform the individual that the DHET will provide an interpreter in South African Sign Language or any other official language other than those chosen by the Department.
- 12.3 The DHET will on request provide for South African Sign Language interpretation services to facilitate communication with the people with hearing disabilities.
- 12.4 A citizen who wishes to communicate in South African Sign Language with DHET, must notify the Department in at least 4 hours in advance, before a physical visit.
- 12.5 The Department will train its front line staff on the South African Sign Language so they can provide immediate assistance on basic and simple requests.
- 12.6 The Department will also enter into partnerships with Organizations for the Deaf to provide South African Sign Language interpreters on call for more complex requests.

- 12.7 Individuals or groups requiring assistance in languages other than those nominated are required to apply for assistance to the Director-General ten (10) office days in advance of engagement with the Department.

### **13. LANGUAGE UNIT**

- 13.1 The Department shall establish a Language Unit, as required by the Use of Official Languages Act, 2012.
- 13.2 This Language unit shall play a central role in ensuring the sustained use of the official languages as required by the language policy.
- 13.3 The Language Unit shall strive to elevate the status of the previously marginalized languages by providing services such as translation, interpretation, terminology development, etc
- 13.4 In order to promote multilingualism, the Department may revive the language learning programme which will provide a platform for colleagues to learn each other's languages.
- 13.5 The Head of Language Unit shall be responsible for facilitating the adoption, use of official languages, monitoring and redress where required.
- 13.6 The Language unit shall be responsible for the implementation and administration of this language policy.

### **14. OPERATING PROCEDURE**

- 14.1 Individuals who may wish to lodge a complaint shall do so in writing to the Director-General not more than thirty (30 days ) from the date on which language assistance was denied or was not of a minimum standard.
- 14.2 Any complaint lodged must provide full names, address and contact information of the complainant.
- 14.3 Any complaint lodged must provide full and detailed description of the complaint.
- 14.4 The DG will acknowledge the complaint within 14 days of receiving it.
- 14.5 The DG will consider the complaint and conduct an investigation into the matter within 30 days from the date of acknowledgement of receipt.
- 14.6 The DG will respond in writing not later than 60 days after the complaint was lodged, informing the complainant of the decision.

## 15. ROLES AND RESPONSIBILITIES

- 15.1 The Director-General is the Information Officer of the DHET. The DG is the overseer of the implementation of this policy by staff within the DHET, colleges and all other public institutions directly accountable to the DHET.
- 15.2 Regional managers and Heads of DHET colleges must ensure the adoption and use of official languages in line with this policy and, report annually to the DG on the status of the use of official languages within their institutions.
- 15.3 The Head of the Language Unit will take the responsibility to implement the language policy and monitor its implementation.
- 15.4 The Director General of the Department will report annually to the Minister of Sport, Arts and Culture and the Pan South African Language Board (PanSALB)

## 16. ADVOCACY, COMMUNICATION AND DISSEMINATION PLAN

- 16.1 This policy will be translated into all official languages according to the grid in Table 1.
- 16.2 This policy will be published on the DHET website and on the websites of its institutions.
- 16.3 The Language Unit as well as the Communication Unit will take the responsibility to ensure that the policy is disseminated to all stakeholders of the Department.
- 16.4 This policy will be made available for reading or reference in all institutions of the DHET, in the IRC and DLPS.
- 16.5 The DHET will post in a conspicuous place in the reception area, a clear statement translated into the languages most commonly used among the local populace, of the availability of interpreter services. A statement to this effect will also be posted on the DHET website.

## 17. IMPLEMENTATION PLAN

- 17.1 The Head of the language unit must ensure the implementation of this policy and continuous monitoring thereof.
- 17.2 Monitoring reports must be submitted to the Director-General of the department by the end of each financial year.
- 17.3 The implementation plan for this policy is attached as **Annexure A**.

## 18. REVIEW

- 18.1 This policy will be reviewed when necessary or at least once within a period of five years.

**DEPARTMENT OF HIGHER EDUCATION AND TRAINING LANGUAGE POLICY****APPROVAL**

DEPARTMENT	DIRECTOR-GENERAL	SIGNATURE	DATE SIGNED
Higher Education and Training	G F QONDE		03/05/2021

EFFECTIVE DATE: 03/05/2021

## **LANGUAGE POLICY IMPLEMENTATION PLAN FOR THE DEPARTMENT OF HIGHER EDUCATION AND TRAINING (DHET)**

### **1. Introduction**

In terms of the Use of Official Languages Act no. 12 of 2012, every national department, national public entity and national public enterprise must adopt a language policy, which should be gazetted and they should establish language units.

The following is the plan for the implementation of the Department of Higher Education and Training (DHET) language policy, in compliance with the Use of Official Languages Act, 2012.

Languages chosen for government business were selected in accordance with language prevalence in various provinces.

### **2. Purpose**

The implementation plan provides details regarding the structure, processes and resources required to operationalize the language policy, and its financial implications for the DHET.

### **3. Fundamentals of implementation**

The implementation of the language policy will be characterised by the following key principles:

- The implementation of the language policy will be done through a phased-in approach over a period of two years.
- Multilingual publications will be phased-in over a period of two years.
- The process of implementation will occur within a period of three years from the date of publication of this policy.
- Capacity will be built incrementally over a period of 3 years, between 2020 and 2023 for meaningful and effective implementation.

- The Director General shall provide the financial, human resources and any other resources required to support the implementation of this policy.
- An increased demand for translation and editing, in various official languages is to be expected and provided for. Interpreters and translators shall be appointed by the Department on a permanent and contract basis to deal with the expected increase in the demand for these services.
- Priority will be given to further skills training in translation and editing, interpreting, lexicography and terminography.

#### **4. Phasing-in of the Language Policy**

The establishment of the language unit for the DHET will be prioritized to ensure compliance and successful implementation of the language policy.

In the interim, the Director: Communication will take the responsibility of implementing the policy until the Department establishes the language unit.

#### **5. Establishment of a language unit for the DHET**

The DHET, like all national departments, is required in terms of the Act to establish a language unit which will be responsible for implementing the language policy and providing language services.

The language unit will be devoted to managing the implementation of the language policy. This language unit will play a central role in ensuring the sustained use of the official languages as required by the language policy. It will also support efforts to implement and promote multilingualism.

The basic requirements for the establishment of the language unit will include amongst others,

- provision of financial resources
- provision of human resources capacity requirements,
- physical and virtual space,
- equipment and tools, as well as
- training and capacity building.

### 5.1 The structure of the language unit

The language unit should be incorporated into the organizational structure of the department.

The language unit will be referred to as the Directorate: Language Practice Services. It is essential to place this unit on a Directorate level, as there will be increased demand for language services and to ensure a good standard and quality of this service. The population of this unit will however be done on a phasing in approach, building towards the desired level at which the unit will be.

At least three Sub-Directorates, specializing in particular areas of language services, will be required for a successful unit.

It is proposed that the language unit be placed under the Chief Directorate: Media Liaison and National Communication.

Below is the organizational structure for the DHET language unit:

Directorate: Language Practice Services  1 Director  1 Personal Assistant		
Sub-Directorate: Translation, Interpreting and Editing   1x Deputy Director  3x Assistant Directors	Sub-Directorate: policy implementation, promotion, research and monitoring  1x Deputy Director  1 x Assistant Director  3 Language Practitioners	Sub-Directorate: Quality Control   1 x Deputy Director  3 ASDs

10 Language practitioners (including South African Sign Language)		
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## 5.2 Functions of the Language Unit

The functions of the DHET language unit will be as follows:

- Advise the Director-General on the development, adoption and implementation of the language policy for the department.
- Monitor and assess the use of official languages and compliance with the language policy by the department.
- Compile and submit reports to the Minister of Arts and Culture and to the Pan South African Language Board (PANSALB) on:
  - The activities of the DHET language unit,
  - Implementation of the DHET language policy in compliance with the Act, and
  - Any complaints received and how they were dealt with.
- Promote parity of esteem and equitable treatment of official languages in the Republic.
- Facilitate equitable access to services and information of the department.
- Provide and manage language support services in the form of professional translation, editing and interpretation and other language services for the department

Creating awareness on the language policy within the department.

## 6. Activity plan

Activities	Output Indicator	Time Frame	Responsibility

Approve the policy and its publication in the Government Gazette	Approved submission	28 February 2021	The Minister
Publish reviewed language policy in the government gazette	Reviewed Language policy published is in the Government Gazette	30 April 2021	Communication Unit
Provide funding for the establishment of language unit	Language unit funding has been allocated	1 April 2021	Director-General
Incorporate language unit on organogram	Language unit incorporated into the organogram	1 April 2021	Human Resources Management Unit
Establish language Unit	Language unit established	31 May 2021	Communication Unit
Advertise posts for language units	Language unit posts advertised	31 May 2021	Human Resources Management Unit
Appointment of personnel in Language unit (phase one)	Language unit personnel appointed	01 July 2021	Human Resources Management Unit
Appointment of personnel in Language unit (phase two)	Language unit personnel appointed	30 September 2021	Human Resources Management Unit
Request for office space and resources	Office space request submitted	01 June 2021	Communication Unit

Acquisition of office space and resources	Office space identified and provided	30 June 2021	Facilities Management
Translate the policy into different languages	Language policy translated into various languages	30 June 2021	Communication Unit
Distribution of language policy	Language policy distributed to all relevant stakeholders	31 May 2021	Communication Unit
Develop and implement awareness programmes	Awareness programmes are implemented	31 December 2021	Language Unit
Submit report to Department of Arts and Culture and PansSalb	Report submitted	31 March every year	Director-General

## DEPARTMENT OF EMPLOYMENT AND LABOUR

## NOTICE 456 OF 2021

Notice published by the Essential Services Committee ('the Committee') in terms of section 71, read with section 70(B)(1)(d) of the Labour Relations Act, 1995 (Act No 66 of 1995 as amended)

- A.** Notice is hereby given in terms of section 71, read with section 70(B)(1)(d) of the Labour Relations Act, 1995 (Act No 66 of 1995 as amended), that the Committee is in the process of conducting an investigation as to whether the following services are essential:
1. General health screening; testing; and control of infectious and communicable diseases; and Port Health [Section 70(B)(1)(d)]
  2. The following services in the mining industry:
    - 2.1. Cage Operations Services
    - 2.2. Security/ Protection Services
    - 2.3. Ventilation Services
    - 2.4. Control Room Services
    - 2.5. Medical Health and Emergency Services
    - 2.6. Coal Supply Services
  3. The service of refining Manganese Ore
  4. The manufacture/production, supply and distribution of steel
- B.** Notice is hereby given that the Committee will hear oral representations in the following cities/towns for the above investigations. All health services investigations and mining related services investigations will commence at 10h00; and all investigations for Manganese Ore and the manufacture / production, supply and distribution of steel will commence at 13h00.

The venues and the dates for the investigations will be as follows:

- (i) Date: 31 August 2021 in Johannesburg  
Venue: CCMA Offices, 28 Harrison Street, 10th floor
- (ii) Date: 02 September 2021 in Bloemfontein  
Venue: CCMA Offices, Cnr Elizabeth & West Burger Streets
- (iii) Date: 03 September 2021 in Cape Town  
Venue: CCMA Offices, 78 Darling Street
- (iv) Date: 07 September 2021 in Durban  
Venue: CCMA Offices, 275 Anton Lembede Street, Embassy House
- (v) Date: 09 September 2021 in Mpumalanga  
Venue: CCMA House, 69 Kruger Street, Witbank
- (v) Date: 10 September 2021 in Port Elizabeth  
Venue: CCMA Offices, 97 Govan Mbeki Avenue

**D. Any interested party requiring an opportunity to make oral representations must:**

1. Indicate its intention to do so, in writing, to the ESC on or before 25 August 2021 (to either SibusisoL@CCMA.org.za or to fax: 086 660 6132);
2. State the nature of the interest in the investigation;
3. State whether it relies or intends to rely on any expert evidence, and if so, provide a brief summary of that expert evidence; and
4. Specify its address, telephone and telefax numbers and e-mail contact address.

**NB: Kindly note that the ESC will convene an information sharing session regarding the above investigations on the 18<sup>th</sup> of August 2021 @ 10:00 at the CCMA National Office 28 Harrison Street. Kindly confirm your attendance to the session by no later than the 11<sup>th</sup> of August 2021 to [SibusisoL@ccma.org.za](mailto:SibusisoL@ccma.org.za).**

For all Inquiries, please contact Sibusiso Lukhele on [SibusisoL@CCMA.org.za](mailto:SibusisoL@CCMA.org.za)



**OFFICE OF THE CHIEF OF JUSTICE****NOTICE 457 OF 2021****AMENDMENT NOTICE FOR THE WESTERN CAPE DIVISION OF THE HIGH COURT OF SOUTH AFRICA**

By virtue of the powers vested in me in terms of section 7(1) read with section 8(6) (d) of the Superior Courts Act, 2013 (10 of 2013) I, **John Mandlakayise Hlophe**, in my capacity as the Judge President of the Western Cape Division of the High Court, issue the attached notice in respect of the Western Cape Division of the High Court of South Africa.

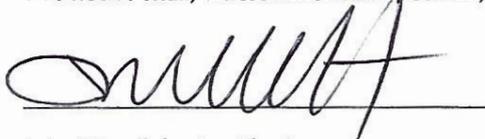
**DECLARATION OF CIRCUIT COURTS WITHIN THE POLLSMOOR MEDIUM A CORRECTIONAL CENTRE; GOODWOOD CORRECTIONAL CENTRE; DRAKENSTEIN MAXIMUM CORRECTIONAL CENTRE; MALMESBURY MEDIUM A CORRECTIONAL CENTRE AND GEORGE CORRECTIONAL CENTRE FOR THE WESTERN CAPE DIVISION OF THE HIGH COURT OF SOUTH AFRICA ISSUED BY JUDGE PRESIDENT JOHN MANDLAKAYISE HLOPHE IN TERMS OF SECTION 7 (1) OF THE SUPERIOR COURTS ACT 10 OF 2013.**

**NOTICE:**

- Circuit Courts situate at the Pollsmoor Medium A Correctional Centre, Tokai within the district of Wynberg; Goodwood Correctional Centre, Goodwood within the district of Cape Town; Drakenstein Maximum Correctional Centre within the district of Paarl and Malmesbury Medium A Correctional Centre within the district of Malmesbury will sit as a High Court with effect from the 18 January 2021 (as per Govt Notice 11 of 2021 published in Govt Gazette 44086 dated 22 January 2021). In addition, the George Correctional Centre within the district of George, will sit as a High Court with effect from the 01 August 2021.
- The Pollsmoor Medium A Correctional Centre, Goodwood Correctional Centre, Drakenstein Maximum Correctional Centre, Malmesbury Medium A Correctional Centre and George Correctional Centre Circuit Courts shall have jurisdiction in respect of criminal trials, criminal pre-trials, criminal trial postponements, plea and sentence agreements in terms of section 105A of Act 51 of 1977 and bail applications or the amendment of bail conditions in terms of section 63 of Act 51 of 1977 emanating from the Provincial and Local Circuit Divisions of the Western Cape High Court.
- Furthermore, the George Correctional Centre Circuit Court will in addition have jurisdiction to hear criminal appeals and attend to criminal review applications as and when directed by the Judge President.
- Judges presiding in criminal matters as envisaged in para 2 above shall sit as and when so directed by the Judge President.

**EFFECTIVE DATE:**

This notice shall, unless otherwise specified, become effective from **01 AUGUST 2021**.



**John Mandlakayise Hlophe**

**Judge President of the Western Cape Division of the High Court of South Africa**

**Date: 22 JULY 2021**

**DEPARTMENT OF TRADE, INDUSTRY AND COMPETITION****NOTICE 458 OF 2021****COMPETITION TRIBUNAL****NOTIFICATION OF COMPLAINT REFERRAL**

The Competition Tribunal gives notice in terms of Section 51(3) & (4) of the Competition Act 89 of 1998 as amended, that it received the c  
COVCR074Jul20omplaint referrals listed below. The complaint(s) alleges that the respondent(s) engaged in a prohibited practice in  
contravention of the Competition Act 89 of 1998.

Case No.	Complainant	Respondent	Date received	Sections of the Act
CR032Jun21	Competition Commission	Cromco Trading (Pty) Ltd	11/06/2021	4(1)(b)(i),4(1)(b)(iii)

**The Chairperson  
Competition Tribunal**

**DEPARTMENT OF TRADE, INDUSTRY AND COMPETITION****NOTICE 459 OF 2021****COMPETITION TRIBUNAL  
NOTIFICATION OF DECISION TO APPROVE MERGER**

The Competition Tribunal gives notice in terms of rules 34(b)(ii) and 35(5)(b)(ii) of the "Rules for the conduct of proceedings in the Competition Tribunal" as published in Government Gazette No. 22025 of 01 February 2001 that it approved the following mergers:

Case No.	Acquiring Firm	Target Firm	Date of Order	Decision
LM012Apr21	Motus Group Ltd	North Motors Group (Pty) Ltd	07/06/2021	Approved
LM127Sep20	Air Liquide Large Industries South Africa (Pty) Ltd	The Business of Owning and Operating 16 Air	11/06/2021	Approved Subject to Conditions
LM010Apr21	FFS Refiners	OTGC Terminals	23/06/2021	Approved Subject to Conditions
LM011Apr21	Texmex 57 (Pty) Ltd	Bidvest Car Rental (Pty) Ltd	23/06/2021	Approved Subject to Conditions
LM020May21	GEPP	Leasehold Rights	23/06/2021	Approved
LM023May21	AIF I Africa C and I Renewably Energy	Reunert Investment Company No 2	23/06/2021	Approved
LM026May21	Community Property Company (Pty) Ltd	Vukile Property Fund Ltd	23/06/2021	Approved
LM003Apr21	Sandvik Aktiebolag PLC	DSI Underground Holdings S.A.R.L	07/06/2021	Approved Subject to Conditions

**The Chairperson  
Competition Tribunal**

## DEPARTMENT OF TRANSPORT

## NOTICE 460 OF 2021

**INTERNATIONAL AIR SERVICE ACT, (ACT NO.60 OF 1993)****GRANT /AMENDMENT OF INTERNATIONAL AIR SERVICE LICENSE**

Pursuant to the provisions of section 17 (12) of Act No.60 of 1993 and Regulation 15 (1) and 15 (2) of the International Air Regulations,1994, it is hereby notified for general information that the applications, detail of which appear in the Schedules hereto, will be considered by the International Air Services Council (Council) Representation in accordance with section 16(3) of the Act No. 60 of 1993 and regulation 25(1) of International Air Services Regulation, 1994, against or in favour of an application, should reach the Chairman of the International Air Services Council at Department of Transport, Private Bag X 193, Pretoria, 0001, within 28 days of the application hereof. It must be stated whether the party or parties making such representation is / are prepared to be represent or represented at the possible hearing of the application.

**APPENDIX II**

(A) Full name, surname and trade name of the applicant. (B) Full business or residential address of the applicant. (C) Class and number of licence in which the amendment is made. (D) Type of International Air Service in respect which amendment was made. (E) Category or kind of aircraft in respect of which license was made. (F) Airport in respect of which the amendment was made. (G) Area to be served. (H) Frequency of flight of which the amendment was made. (I) Condition under which amendment was made.

**(A) Airlink (Pty) Ltd; Airlink.** (B)#3 Greenstone Hill Office Park, Emerald Boulevard, Greenstone Hill, Modderfontein, 1609. (C) Class I; I/S073. Type S1. (E) Category A1. OR Tambo International Airport. **Changes to MP:** Mr Samuel Tjatji Mampshika is appointed as the RP: Aircraft, **change to shareholding:** Barrie James Webb has 3.33%, Mikela Jade Foster has 11.50%, Thomas Alexander Foster has 11.50%, Corocap Legacy (Pty) Ltd has 33.50, SIOC-CDT Strategy Ventures (Pty) Ltd has 33.50% & Tamryn Naude has 3.33% & **(G) & (H) Adding the following.**

State	Destination	Frequencies.
Zimbabwe.	Harare	Ten (10) return flights per week
Kenya	Nairobi	Seven (7) return flights per week
Seychelles	Victoria	Seven (7) return flights per week

**(A) Safair Operation (Pty) Ltd; Safair / Flysafair.** (B) Northern Perimeter Road, OR Tambo International Airport, Bonaero Park,1619. (C) Class I, II & III; I/S328, I/N203 & I/G204. (D) Type S1, N1, N2, N3, N4, G3, G7, G11, G13 & G16 (Aerial Cargo delivery and Search and Rescue. (E) Category A1. (F) OR Tambo International Airport & Cape Town International Airport. (G) & (H) **Adding the following.**

State	Destination	Frequencies.
ORTIA: Namibia	Windhoek	Two (2) return flights per week.
CTIA: Namibia	Windhoek	Two (2) return flights per week.

**(A) Civair Helicopters and Aeroplane (Pty) Ltd, Civair.** (B) 402 Majorca, island Club, Canal Walk, Century City, Cape Town. (C) Class II; I/N077. (D) Type N1 & N4. (E) Category A2, A3 & A4. **Changes to the MP:** Mr A. J. W. replaces Mr T. E. Warner as the RP: Aircraft & Mr C. M. Visser replaces Mr J. Kichenbrand as the Air Service Safety Officer.

## DEPARTMENT OF TRANSPORT

## NOTICE 461 OF 2021

**AIR SERVICE LICENSING ACT, 1990 (ACT NO.115 OF 1990)**  
**APPLICATION FOR THE GRANT OR AMENDMENT OF DOMESTIC AIR**  
**SERVICE LICENCE**

Pursuant to the provisions of section 15 (1) (b) of Act No. 115 of 1990 and Regulation 8 of the Domestic Air Regulations, 1991, it is hereby notified for general information that the application detail of which appear in the appendix, will be considered by the Air Service Licensing Council. Representation in accordance with section 15 (3) of the Act No. 115 of 1990 in support of, or in position, an application, should reach the Air Service Licensing Council. Private Box X 193, Pretoria, 0001, within 21 days of date of the publication thereof.

## APPENDIX I

(A) Full name and trade name of the applicant. (B) Full business or residential address of the applicant. (C) Class of licence applied for. (D) Type of air service to which application applies. (E) Category of aircraft to which application applies.

**(A) Outsourced Insurer Services.** (B) Nicol Corner, 2 Nicol Road, Bedfordview, 2007. (C) Class III. (D) Type G2, G3, G4 & G16 (RPAS). (E) Category H1.

**(A) Vanz Aviation (Pty) Ltd.** (B) Hangar 22 South, Springs Airfield, Springs, 1559. (C) Class III. (D) Type G16 (Flipping / Sightseeing). (E) Category A4.

## APPENDIX II

(A) Full Name and trade name of the applicant. (B) Full business or residential address of the applicant. (C) The Class and number of license in respect of which the amendment is sought (D) Type of air service and the amendment thereto which is being applied for (E) Category of aircraft and the amendment thereto which is being applied for.

**(A) Air Ventures Hot Air Ballooning CC; Air Ventures Hot Air Ballooning.** (B) 105 clinic road, Muldersdrift, 1747. (C) Class II & III; N873D & G874D. (D) Type N1 & G2. (E) Category A3 & A4. **Changes to the MP:** M. M. S. van Aswegen replaces m. j. de Souza as the Air Service Safety Officer.

**(A) Black Eagle Aviation Services CC; Black Eagle Aviation Services.** (B) Office 18 Main Terminal Building, Virginia Airport, Durban North, KZN, 4051. (C) Class II & III; N1058D & G1050D. (D) Type N1, N2, G2, G3, G4, G5, G6, G7, G8, G10, G13, G14, G15 & G16 (Ship to shore). (E) Category A2, A3, H1 & H2. **Changes to the MP:** Segran Govender replaces Jannike Bester as the Accountable Manager, Caren Kok replaces Segran Govender as the RP: Aircraft, Tjaart Boshoff replaces Jannike Bester as the RP: Flight Operations & Jannike Bester replaces Dewdney as the Air Service Safety.

**(A) Grace Air (Pty) Ltd.** (B) 477 Witherite Road, The Willows, Pretoria. (C) Class III; G903D. (D) Type G3, G4, G8, G10, G15 & G16 (Flipping). (E) Category A4 & H2. **Change to the MP:** Mr E. White replaces Mr E Viljoen as the Air Service Safety Officer and **addition** of category A3

**(A) Mercy Air South Africa; Mercy Air.** (B) Section 7, Heidelberg Farm, Brondal Road, White River. (C) Class II; N799D. (D) Type N1 & N2. (E) Category A3 & A4. **Changes to the MP:** J.D.L Boddington replaces J.A. Luus as the Chief Executive Officer, P. Middleton replaces J.A. Luus as the RP: Flight Operations, J.E. Herbert replaces H. Ziessler as the RP: Aircraft & P. Henning replaces P. Middleton as the Air Service Safety Officer

**(A) Safomar Aviation Operations (Pty) Ltd; Safomar Aviation.** (B) 3 New Road, Glen Austin AH, Grand Central Airport, Midrand. (C) Class II & III; N1261D & G1262D. (D) Type N1, N2, G5, G10 & G15. (E) Category A3, A4 & H2. **Change to the Shareholding:** The Shalem Family Trust has 100% & **change to the MP:** Mr Y. Shalem replaces N. Duvenhage as the Chief Executive Officer, Chezelle Bothma replaces Francois Alphen as the RP: Aircraft & Jean Kichenbrand replaces D. Steytler as the Air Service Safety Officer

**(A) Civair Helicopters and Aeroplane (Pty) Ltd, Civair.** (B) 402 Majorca, island Club, Canal Walk, Century City, Cape Town. (C) Class I, II & III; S601D, N111D & G112D. (D) Type S1, S2, N1, N2, G2, G3, G4, G5, G7, G8, G10, G11, G15 & G16 (Ship to shore & RPAS Operations). (E) Category A2, A3, A4, H1 & H2. **Changes to the MP:** Mr A. J. W. replaces Mr T. E. Warner as the RP: Aircraft & Mr C. M. Visser replaces Mr J. Kichenbrand as the Air Service Safety Officer.

**(A) Springbok Airsprayers CC.** (B) Farm: Oakdene, District: Ritz. Class III; G089D. (D) Type G5, G8, G13 & G14. (E) Category A3 & A4. **Changes to the MP:** Mr B. C. Adams replaces Mr J. J. de Vries as the Air Service Safety Officer.

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**BOARD NOTICES • RAADSKENNISGEWINGS**

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**BOARD NOTICE 97 OF 2021****FINANCIAL SECTOR CONDUCT AUTHORITY****FINANCIAL MARKETS ACT, 2012****APPROVED AMENDMENTS TO THE STRATE RULES**

The Financial Sector Conduct Authority (FSCA) hereby gives notice under section 71(3)(c)(ii) of the Financial Markets Act, 2012 (Act No. 19 of 2012) that the amendments to the Strate Rules have been approved. Please be advised that the rules have been published on the official website of FSCA ([www.fsc.co.za](http://www.fsc.co.za)) and the website of Strate ([www.strate.co.za](http://www.strate.co.za)).

The amendments come into operation on date of publication.

**B TOPHAM****FINANCIAL SECTOR CONDUCT AUTHORITY**

**BOARD NOTICE 98 OF 2021**  
**SOUTH AFRICAN COUNCIL FOR NATURAL SCIENTIFIC PROFESSIONS**  
**RECOMMENDED CONSULTATION FEES**

The South African Council for Natural Scientific Professions herewith retract Board Notice 111 of 2019 as published on 12 July 2019 in Government Gazette No. 42576.

The South African Council for Natural Scientific Professions has under article 35 (1) of the Natural Scientific Professions Act, 2003 (Act 27 of 2003), determined the amended tariff of recommended fees in this Schedule, which has been approved.

**SCHEDULE**

Definitions

In this Schedule the definitions are as follows:

**"Category A"**, in respect of a private consulting practice in natural sciences, shall mean a top practitioner whose expertise is nationally or internationally recognised and who provides advice at a level of specialisation where such advice is recognised as that of an expert;

**"Category B"**, in respect of a private consulting practice in natural sciences, shall mean a partner, a sole proprietor, a director, or a member who, jointly or severally with his other partners, co-directors or co-members, bears the risk of the business, takes full responsibility for the liabilities of such practice, performs work of a conceptual nature in natural sciences and development, provides strategy guidance in planning and executing a project and/or carries responsibility for quality management pertaining to a project;

**"Category C"**, in respect of a private practice in natural sciences, shall mean all salaried professional and technical staff performing work of a natural scientific nature and who carry the direct technical responsibility for one or more specific activities related to a project. A person referred to in Category B may also fall in this category if such person performs work of a natural scientific nature at this level;

**"Category D"**, in respect of a private consulting practice in natural sciences, shall mean all other salaried technical staff with adequate expertise and relevant experience performing work of a natural scientific nature with direction and control provided by any person contemplated in Categories A or B or C.

**RECOMMENDED RATES**

CATEGORY OF STAFF	Indicative Rates per hour in Rands (2021)
A	R2 536.00
B	R2 168.00
C	R1 286.00
D	R 924.00



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