GENERAL NOTICE

NOTICE 270 OF 2011

DEPARTMENT OF ENVIRONMENTAL AFFAIRS

NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT, 2004 (ACT NO. 39 OF 2004)

NOTICE OF INTENTION TO CONSIDER FOR APPROVALTHE HIGHVELD PRIORITY AREA AIR QUALITY MANAGEMENT PLAN

I, Bomo Edith Edna Molewa, Minister of Water and Environmental Affairs, hereby give notice under section 19(4)(a) read with section 57(1)(a) of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004), of my intention to consider for approval the draft Highveld Priority Area Air Quality Management Plan. .

Copies of the draft Air Quality Management Plan can be obtained from:

Ms Mathabo Phoshoko
Department of Environmental Affairs
Fedsure Building
315 Pretorius Street
Pretoria, 0001
Tel: (012) 310 3365
Fax: (012) 320 1167
E-mail: mphoshoko@environment.gov.za

Members of the public are invited to submit to the Minister, within 60 working days of publication of the notice in the *Gazette*, written representations on or objections to the proposed exercise of the power to the following addresses:

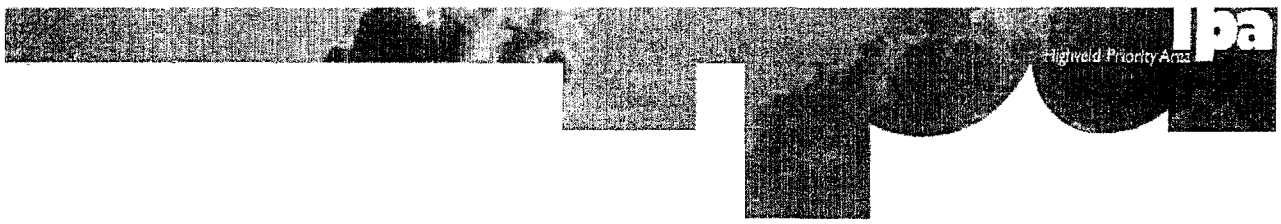
By post to: The Director-General: Environmental Affairs
Attention: Ms Mathabo Phoshoko
Private Bag X447
Pretoria, 0001

By fax to: (012) 320-1167, and by e-mail to mphoshoko@environment.gov.za

Any inquiries in connection with the draft Air Quality Management Plan can be directed to Dr. T Mdluli at (012) 310-3436 or Ms M Phoshoko at (012) 310-3365.

Comments received after the closing date may not be considered.

BOMO EDITH EDNA MOLEWA
MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS



DEPARTMENT OF ENVIRONMENTAL AFFAIRS

ENVIRONMENTAL QUALITY AND PROTECTION

CHIEF DIRECTORATE: AIR QUALITY MANAGEMENT

THE HIGHVELD PRIORITY AREA AIR QUALITY MANAGEMENT PLAN

EXECUTIVE SUMMARY

April 2011

Draft

Report compiled by: **Mark Zunckel, Yegeshni Naiker & Atham Raghunandan**
uMoya-NILU Consulting (Pty) Ltd

Theo Fischer, Hanre Crouse, Abdul Ebrahim & Warren Carter
Environmental Science Associates

Project management: **Sean O'Beirne and Brad Johnson**
SE Solutions

Public Participation: **David de Waal and Marti Moolman**
BKS

Report issued by
uMoya-NILU Consulting (Pty) Limited
P O Box 20622
Durban North, 4016
South Africa

Report issued for
Department of Environmental Affairs
Air Quality Management
Private Bag X447
PRETORIA, 0001

Report: uMN003-10 **April 2011**

ACKNOWLEDGMENTS

The following individuals and groups made valuable input through their participation in the development of the Baseline Assessment, Problem Analysis and the Air Quality Management Plan for the Highveld Priority Area (HPA);

- The Department of Environmental Affairs, in particular Peter Lukey, Thuli Mduli, Mathabo Phoshoko, Bathabile Songxaba, and Humbu Mafumo
- The provincial environmental departments in the HPA, Gauteng Department of Agriculture and Rural Development, and the Mpumalanga Department of Economic Development, Environment and Tourism
- The district, metropolitan and local municipalities in the HPA
- Stakeholders who participated in the Air Quality Officer's Forum (AQOF) and Multi-Stakeholder Reference Group (MSRG) fora, including other government departments, private sector businesses and associations, and civil society organisations
- Individuals and organisations that provided data for the determination of the baseline assessment
- Individuals and organisations who participated in the research workshop and presented research results on Highveld air quality
- The modelling peer group, who provided input into model setup and parameterisation and aided in refining the model outputs, particularly Avishkar Ramandhi of Sasol
- Those who submitted comments on the draft baseline assessment and Air Quality Management Plan (AQMP)
- Participants in the Logical framework Workshop (LFA) workshop
- Industries who submitted industrial action plans

EXECUTIVE SUMMARY

Introduction

The Highveld area in South Africa is associated with poor air quality and elevated concentrations of criteria pollutants occur due to the concentration of industrial and non-industrial sources (Held *et al*, 1996; DEAT, 2006). The Minister of Environmental Affairs and Tourism, Martinus van Schalkwyk therefore declared the Highveld Priority Area (HPA) on 23 November 2007. The priority area covers 31 106 km^2, including parts of Gauteng and Mpumalanga Provinces, with a single metropolitan municipality, three district municipalities, and nine local municipalities (Figure E1). As the area overlaps provincial boundaries, the Department of Environmental Affairs (DEA) functions as the lead agent in the management of the priority area and is required in terms of Section 19(1) of the National Environmental Management: Air Quality Act (Act 39 of 2004) (AQA) to develop an Air Quality Management Plan (AQMP) for the priority area.

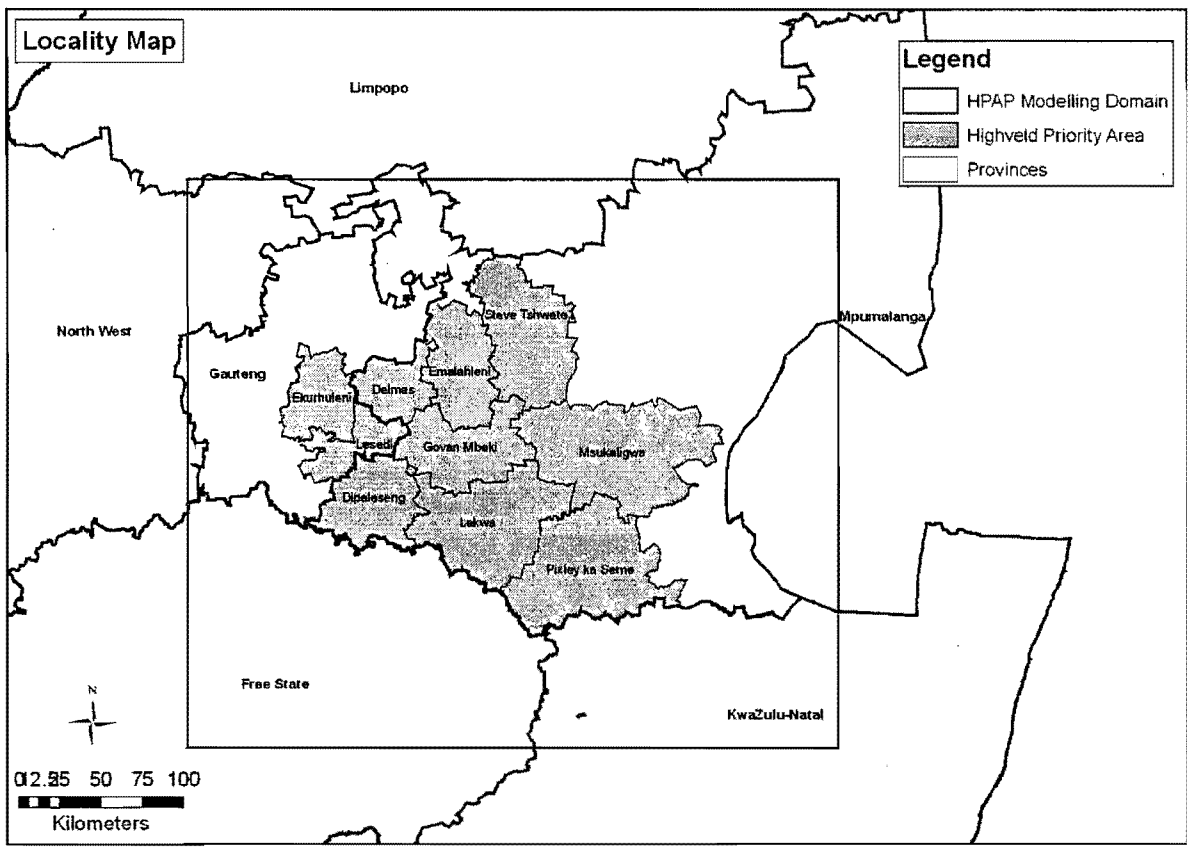


Figure E1: Locality map depicting the Highveld Priority Area (HPA), showing the three district municipalities, their constituent local municipalities and the single metropolitan municipality.

The baseline assessment for the HPA provides a succinct presentation of the major issues to be addressed, specifically highlighting the geographical areas of concern within the HPA where dedicated Air Quality Management (AQM) interventions are to be focused. The

constraints and developments in the abatement technology used and available, as well as the capacity of officials who will carry the majority of the responsibility for implementation of the AQMP have also been noted as part of the baseline assessment. These issues were carried forward as gaps and priorities into the AQMP development, of which the most significant aspect was the Logical Framework Approach (LFA) workshop. The LFA workshop scrutinised the air quality problems identified in the baseline assessment and developed problem and objective trees, and specific interventions. The workshop outcomes were taken into detailed strategy analysis and intervention development, and formed the initial draft of the AQMP.

The primary motivation of the priority area AQMP is to achieve and maintain compliance with the ambient air quality standards across the HPA, using the Constitutional principle of progressive realisation of air quality improvements. The AQMP for the HPA provides the framework for implementing departments and industry to include AQM in business planning to ensure effective implementation and monitoring.

The plan has been designed at a strategic level, indicating high-level tasks for responsible parties. The specific planning at an operational level, such as budgeting, human resource allocation, and detailed activity planning, has been excluded from the plan. This is to allow parties to tailor their implementation activities to their specific context, particularly organisational constraints, while still achieving the overall objective of the AQMP. The activities listed in the plan must be unpacked further by responsible parties into organisation-specific activity and intervention plans, and captured in the policy and strategic documents, such as business and investment plans, Integrated Development Plans (IDPs), and Environmental Implementation Plans (EIPs).

Summary of immediate objectives, outputs, verifiable indicators and means of verification.

Immediate Objective	Output	Verifiable Indicator	Means of Verification
A. The Participation Objective	A.1. Efficient and effective intergovernmental coordination and cooperation	Efficient and effective intergovernmental coordination and cooperation.	Meeting Minutes.
	A.2. Efficient and effective public participation	Efficient and effective public participation.	Meeting Minutes and stakeholder feedback.
	A.3. Project website	A project webpage containing current and relevant information relating to the project as available through the department's website.	Stakeholder feedback and webpage hits.
	A.4. Public outreach events and workshops	Well-organised public events ensure broad-based public participation.	Event report and feedback.
B. The	B.1. Process Plan	A clear and unambiguous plan on how	Implementation of the

Planning Objective		Output B is to be generated.	process plan results in the desired outcome.
	B.2. Problem Analysis	The causes of current and, potential, future poor air quality in the area are clearly defined and described.	The efficiency of the plan is ensured through interventions that deal with the real causes of poor air quality in the area.
	B.3. Strategy Analysis	All possible pollution mitigation strategies are described and reviewed.	The plan is directed by practical strategies that ensure a high probability for success.
	B.4. Intervention Descriptions	Interventions are clearly described that, once implemented, will have a measurable positive impact on ambient air quality in the area.	The plan describes interventions that ensure a high probability for success.
	B.5. Draft Priority Area Air Quality Management Plan	A draft plan based on current, accurate and relevant information, informed by best practice in the field of air quality management and that provides a clear and practical plan to efficiently and effectively bring air quality in the area into sustainable compliance with National Ambient Air Quality Standards within agreed timeframes.	Draft plan published in the *Gazette* for public comment.
	B.6. Priority Area Air Quality Management Plan	A plan based on current, accurate and relevant information, informed by best practice in the field of air quality management and that provides a clear and practical plan to efficiently and effectively bring air quality in the area into sustainable compliance with National Ambient Air Quality Standards within agreed timeframes.	Plan published in the *Gazette*.
C. The Capacity Development Objective	C.1. National Priority Area Management Capacity	Active involvement of departmental staff in the implementation of the project.	Staff able to efficiently and effectively manage future priority areas
	C.2. Implementation Initiated	Assistance provided in the initial plan implementation phase.	Implementation successfully launched.

Emission sources

The total estimated annual emissions of fine particulate matter (PM_{10}) on the HPA is 279 630 tons, of which approximately half is attributed to dust entrainment on opencast mine haul roads (Table E1). The emission of PM_{10} from the primary metallurgical industry accounts for 17% of the total emission, with 12% of the total from power generation. By contrast, power

generation contributes 73% of the total estimated oxides of nitrogen (NO_x) emission of 978 781 tons per annum and 82% of the total estimated sulphur dioxide (SO_2) emission of 1 622 233 tons per annum.

The emission inventory for industrial sources was relatively complete, as well as specific methodologies used for determining residential fuel burning, coal mining, transport, biomass burning and burning coalmines and smouldering coal dump emissions. Source categories where emissions could not determined were landfills, incinerators, wastewater treatment works, tyre burning, biogenic sources, odour and agricultural dust. These gaps were taken forward into the development of the AQMP, to be addressed at a later stage through the implementation.

Industrial sources in total are by far the largest contributor of emissions in the HPA, accounting for 89% of PM_{10}, 90% of NO_x and 99% of SO_2. Major industrial sources contributors were grouped into the following categories:

1. Power Generation
2. Coal Mining
3. Primary Metallurgical Operations
4. Secondary Metallurgical Operations
5. Brick Manufacturers
6. Petrochemical Industry
7. Ekurhuleni Industrial Sources (excluding the above)
8. Mpumalanga Industrial Sources (excluding the above)

Table E1: Total emission of PM_{10}, NO_x and SO_2 from the different source types on the HPA (in tons per annum), and the percentage contribution for each source category

	PM_{10}		NO_x		SO_2	
Source category	**t/a**	**%**	**t/a**	**%**	**t/a**	**%**
Ekurhuleni MM Industrial (incl Kelvin)	8 909	3	15 636	2	25 772	2
Mpumalanga Industrial	684	0	590	0	5 941	0
Clay Brick Manufacturing	9 708	3	-		9 963	1
Power Generation	34 373	12	716 719	73	1 337 521	82
Primary Metallurgical	46 805	17	4 416	0	39 582	2
Secondary Metallurgical	3 060	1	229	0	3 223	0
Petrochemical	8 246	3	148 434	15	190 172	12
Mine Haul Roads	135 766	49	-		-	
Motor vehicles	5 402	2	83 607	9	10 059	1
Household Fuel Burning	17 239	6	5 600	1	-	
Biomass Burning	9 438	3	3 550	0	-	
TOTAL HPA	**279 630**	**100**	**978 781**	**100**	**1 622 233**	**100**

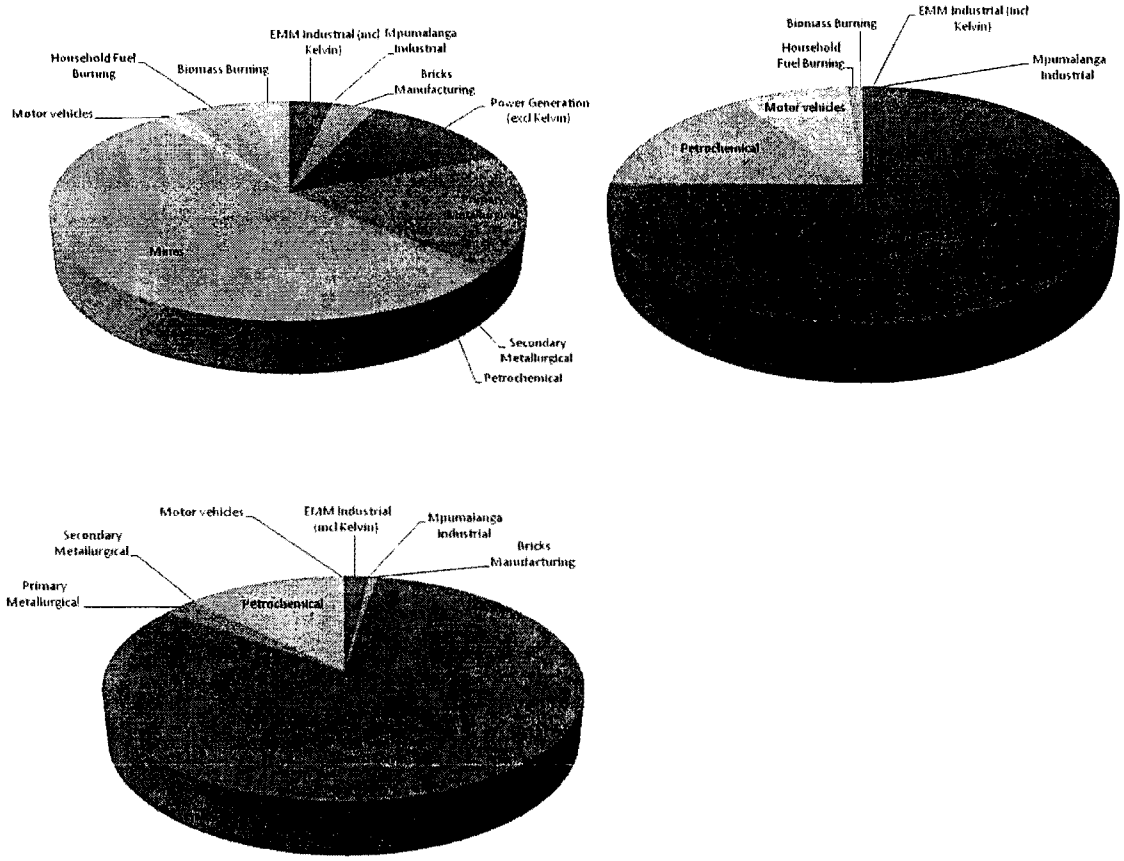


Figure E2: Relative contribution by the respective sectors to the total emission of PM_{10} (top left), NO_x (top right) and SO_2 (bottom left)

Ambient air quality

Most of the HPA experiences relatively good air quality, but ambient air quality standards for SO_2, PM_{10} and ozone (O_3) concentrations are exceeded in nine extensive areas. These "hot spots" are illustrated in Figure E3 by the number of modelled exceedances of the 24-hour SO_2 and PM_{10} standards, and are confirmed by ambient monitoring data (Table E2). The air quality hot spots result mostly from a combination of emissions from the different industrial sectors and residential fuel burning, with motor vehicle emissions, mining and cross-boundary transport of pollutants into the HPA adding to the base loading.

Available monitoring confirms that the areas of concern are in the vicinity of Witbank 2, Middelburg, Secunda, Ermelo, Standerton, Balfour, and Komati where exceedances of ambient SO_2 and PM_{10} air quality standards occur (Table E2). Kendal 2 is specifically sited to research power station impacts and is not indicative of general ambient air quality.

Table E2: Exceedances at HPA sites based on current and new monitoring data

		NO_2 *1-hr (88)*	O_3 *8-hr (11)*	PM_{10} *24-hr (4)*	SO_2 *24-hr (4); 1-hr (88)*
Emalahleni LM	Kendal 2	1	**58**		**34; 343**
	Phola	0		3	7; 27
	Witbank	37	9	**9**	**4**; 51
	Witbank 2		**17**	**25**	1; 11
Steve Tshwete LM	Columbus				
	Komati 2			**26**	1; 14
	Hendrina	1	**22**	3	1; 2
	Middelburg	71	**60**	**7**	1; 4
	Middelburg 2		1	**7**	0; 1
Govan Mbeki LM	Sasol Club	1		0	0; 25
	Langverwacht	1		0	2; 78
	Bosjesspruit				2; 27
	Elandsfontein	0	**73**	3	4; 33
	Leandra				6; 114
	eMbalenhle	2	4	**39**	0; 1
Msukaligwa LM	Camden	0	**24**	1	0; 4
	Ermelo	1	**73**	**22**	**21**; 10
Pixley Ka Seme LM	Amersfoort				
	Majuba 1				4; 87
	Majuba 2				
	Verkykkop	0	46	0	1; 7
Lekwa	Standerton	4	10	**29**	1; 6
Dipaleseng	Balfour		**29**	**8**	0; 4

NB. - Row 1: The averaging period for the relevant pollutant's standard is represented below the pollutant and following, the allowed frequency of exceedance in brackets

- Stations in grey blocks represent new monitoring data for the period 2008-2009
- Exceedances in bold are greater than the permitted frequency in the standard for the monitoring period. The permitted frequency of exceedance varies according to period for which data is presented at each monitoring site, and for Eskom and Sasol stations must be assessed against a cumulative permitted frequency of exceedance for 3 years of data

The effects of poor dispersion conditions in the winter, particularly when low-level emissions are trapped near the surface, are evident throughout the monitoring record for all pollutants, resulting in greater frequency of exceedances of the standards. PM_{10} displays this seasonal trend most strikingly, showing a sharp contrast between wintertime peaks and summer minimum values at monitoring sites. Seasonal trends are clearly observed for O_3 in the monitoring record, as springtime peaks are easily identified. Monitoring data show carbon monoxide (CO) and benzene to be within acceptable limits at the new sites. Trends in pollutant concentrations, based on current data, cannot be conclusively identified, marred in particular by poor data collection.

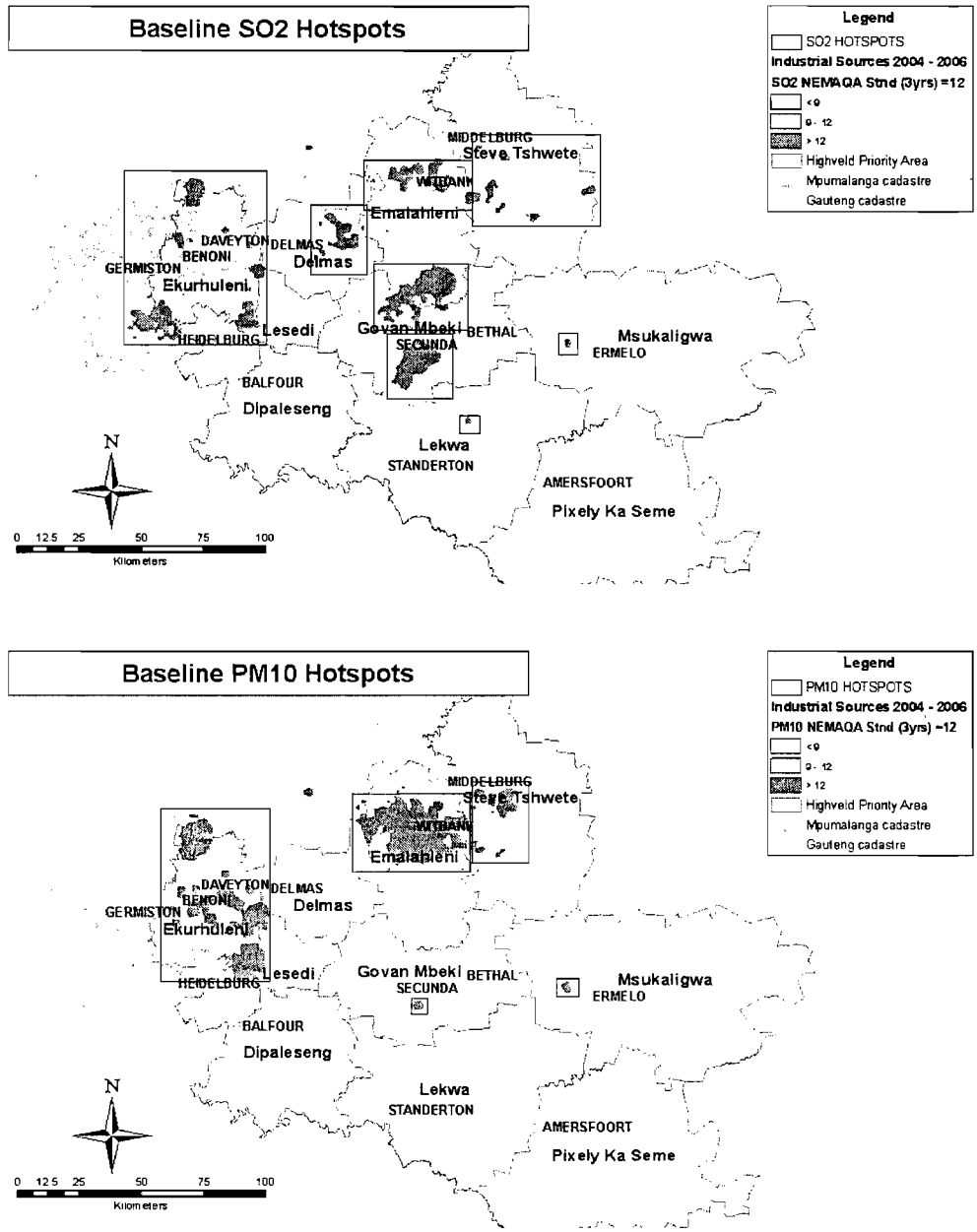


Figure E3: Modelled frequency of exceedance of 24-hour ambient SO_2 and PM_{10} standards in the HPA, indicating the modelled air quality Hot Spot areas

Exceedances of ambient air quality standards present situations where potential impacts on human health can occur. Ambient monitoring and dispersion modelling have identified nine areas on the HPA where ambient concentrations of PM_{10}, SO_2 or nitrogen dioxide (NO_2) exceed, or predicted to exceed, the ambient standards. Exposure may be high where these exceedances coincide with populated areas and the risks to human health may be significant.

The air quality hot spots on the HPA are summarised in Table E3 with an indication of the pollutants of concern.

Table E3: HPA air quality hot spots

Hot Spot	PM_{10}	SO_2	NO_2
Emalahleni	✓	✓	
Kriel		✓	
Steve Tshwete	✓	✓	✓
Ermelo	✓	✓	
Secunda	✓	✓	✓
Ekurhuleni	✓	✓	
Lekwa	✓	✓	
Balfour	✓		
Delmas		✓	

It is important to note that all residential areas where wood and coal are combusted experience high concentrations of particulates and CO, particularly those that are densely populated. Here, exposure can be particularly high. Due to the relatively local scale of their air pollution problem, they may not fall directly into one of the identified hot spot areas in Table E3. They are equally as important in terms of AQM.

High ambient ozone concentrations are a regional-scale problem with the 8-hour ambient standard frequently exceeded over much of the HPA. Ozone is not a source-specific pollutant, but its formation depends on the ideal ratios of NO_x and volatile organic compounds (VOC), together with incident ultra-violet radiation from the sun. Both NO_x and VOC are emitted by different sources on the HPA.

Air pollution and health

Mortality outcomes have been calculated for South African urban areas (Norman *et al*, 2007a). This study estimates that outdoor air pollution caused 3.7% of total mortality from cardiopulmonary disease in adults aged 30 years and older, 5.1% of mortality attributable to cancers of the trachea, bronchus, and lung in adults, and 1.1% of mortality from acute respiratory infections in children under 5 years of age.

Exposure to indoor air pollution was associated with a number of health outcomes, including chronic obstructive pulmonary disease (COPD), lung cancer, nasopharyngeal cancer, tuberculosis, cataracts, asthma, birth defects, and acute lower respiratory infections (ALRI) among children younger than 5 years (Norman *et al*, 2007b). ALRIs were the leading cause of death of children under 5 years worldwide, and similarly, fourth highest in South African children.

The total ALRI burden on children under 5 years was 24% in 2000, attributable to indoor air pollution from household fuel use (Norman *et al*, 2007b). Similarly for COPD, the female population experienced more than double the male attributable burden. Lung cancer burden was relatively minor from indoor air pollution as a result of household fuel use. Indoor air pollution from household fuel use was responsible for 2 489 deaths, or 0.5% of the total health burden on the individual, and resulted in the loss of 60 934 disability adjusted life years, or 0.4% of the total burden (Norman *et al*, 2007b).

Abatement technology problems

Table E4: Summary of technology challenges and developments in key HPA sectors

	Challenges	Developments
Industrial sources	• Management of fugitive and non-point sources • SO_2 and NO_2 emission management and control • Environmental and technical constraints on abatement choices	• Listed Activity minimum emission standards and Atmospheric Emission License (AEL) conditions may begin to address current shortcomings in abatement
Clay brick manufacturing	• Poor uptake of Tunnel kiln technology • Lack of abatement on clamp kilns, particularly of PM and CO emissions	• Tunnel kiln technology is promoted in new, regulated operations
Opencast coal mining	• Control of PM from mine haul roads	• Water spraying is a cheap and effective means of control, which needs to be consistently applied across mines in the HPA
Domestic fuel burning	• Poor uptake of technology due to economic circumstances • Pace of settlement growth	• Rollout of awareness and technology promotion activities is increasing
Motor vehicle emissions	• Slow infiltration of new technology vehicles • Growth in vehicle parc • Diffuse VOC emissions from filling stations and fuel storage facilities	• Vehicle emission standards continue to improve • Drive towards cleaner fuels and low emission vehicles is increasing • Vapour recovery units can address re-fuelling emissions

Air quality management capacity

Table E5: Summary of capacity challenges in the HPA

	Level of capacity
Human resources and skills	2 municipalities are not confident to implement the AQA 5 municipalities have not made Air Quality Officer (AQO) appointments 12 municipalities and both provincial departments have identified capacity building needs, ranging from technical to legal to general AQM training and assistance
Monitoring	6 municipalities indicated that no ambient air quality monitoring takes place Existing monitoring initiatives are not integrated, there is no standardised monitoring, reporting and quality control approach No in-house technical skills for maintenance and operation of stations
Emission inventory	12 municipalities and 1 provincial department have undertaken an emission inventory exercise The HPA project has produced a relatively comprehensive emission inventory, this needs to be completed and maintained
AEL preparation	2 district municipalities and 1 provincial department have not initiated steps to prepare for the delegation of the AEL function with the repeal of the Atmospheric Pollution Prevention Act (APPA)

AQMP overall objective

The overall objective for the HPA AQMP has been developed through multi-stakeholder interactions and is informed by policy and developments in AQM in South Africa. The overall objective is:

Ambient air quality in the HPA complies with all national ambient air quality standards

Seven goals of the AQMP each address different aspects of addressing the identified problems and meeting the overall objective, these are:

Goal 1: *By 2015, organisational capacity in government is optimised to efficiently and effectively maintain, monitor and enforce compliance with ambient air quality standards*

> To achieve the goal, it is necessary to focus on institutional arrangements, resource availability, cooperation and collaboration, and maximisation of regulatory and management tools. The goal addresses capacity development in the AQMP, looking at the necessary structures, systems, skills, incentives, inter-relationships and strategy.

Goal 2: *By 2020, industrial emissions are equitably reduced to achieve compliance with ambient air quality standards and dust fallout limit values*

> The goal will be achieved through a combination of emission determination and reduction, technological improvement, improved resource allocation and information provision. The use of regulatory tools and best practice principles is also provided for. Political and social awareness, alternative energy and energy efficiency, fugitive dust emissions and greenhouse gas emission reduction are also promoted as aspects towards achieving the goal. The maintenance of vehicles and equipment on sites and industrial plants are addressed, and spontaneous combustion is addressed as a contribution from the industrial mining sector.

Goal 3: *By 2020, air quality in all low-income settlements is in full compliance with ambient air quality standards*

> Effective interventions, research, awareness raising and education are major aspects in achieving the goal. Technological improvements are also critical, together with addressing the social and economic drivers of poor environmental practices.

Goal 4: *By 2020, all vehicles comply with the requirements of the National Vehicle Emission Strategy*

> This goal focuses on the implementation of the National Vehicle Emission Strategy, as it will provide direction on emission reduction, technological improvement, and a conducive regulatory environment. Emission testing is

recognised as a major driver for current reductions in vehicle emissions, which can be instituted by provincial and local authorities.

Goal 5: *By 2020, a measurable increase in awareness and knowledge of air quality exists*

Achieving the goal is linked to access to information, resources, improving governance and authorities' capacity, and promoting air quality issues amongst stakeholders.

Goal 6: *By 2020, biomass burning and agricultural emissions will be 30% less than current*

Management and regulatory tools are keys to achieving the goal, together with improved individual practices such as reduction of polluting inputs, awareness of unsuitable conditions and use of control measures.

Goal 7: *By 2020, emissions from waste management are 40% less than current*

In achieving the goal, it is necessary to improve waste processing, promote best practice principles and technological improvements, and address planning and delivery shortcomings, and improve regulatory control of all aspects of waste management.

In the ***Implementation Plan,*** each of the seven goals is sub-divided into logical and related objectives. In turn, activities are allocated to the respective objectives and time frames and responsibilities are allocated accordingly. The timeframes are: Short-term (1-2 years); Medium-term (3-5 years); Long-term (>5 years), and the responsibilities are allocated to the principal implementing entity (P), entities providing input (I) and entities with an oversight role only (O). Indicators to measure progress with implementation of the activities for the respective objectives are also assigned.

1. By 2015, organisational capacity in government is optimised to efficiently and effectively maintain, monitor and enforce compliance with ambient air quality standards

Objectives	Activities	Timeframe	Responsibility	Indicator
1) Goals and objectives of HPA AQMP are implemented through respective business plans	Use HPA AQMP to inform business planning for air quality function	Short, On-going	P – DEA, MDEDET, GDARD, Municipalities	• Business plans include HPA AQMP goal and objectives
	Draft municipal-level AQMP case study using HPA implementation plan	Short	P – DEA I - MDEDET, GDARD, Municipalities	• HPA AQMP incorporated within IDP/ EIPs • Council resolution passed adopting municipal AQMPs
	Adopt HPA AQMP as part of IDPs and EIPs	Short	P - MDEDET, GDARD, Municipalities	
2) Air quality function is assigned to the most appropriate section of municipalities and provinces	Consultation between local, district and provincial authorities to identify the most appropriate sphere for AQM function on behalf of each municipality	Short	P – MDEDET, GDARD, affected municipalities	• AQM function allocation or delegation made for every municipality • Functional analysis conducted and assignment made
	Create database of AQM functional analyses conducted	Short	P – DEA I – Provincial environmental authorities, Municipalities	
	Conduct functional analysis or Section 77/78 Municipal Systems Act analysis to determine suitable section/department for AQM and assign function accordingly	Short	P – MDEDET, GDARD, affected municipalities O – MDEDET, GDARD, DEA	
3) Institutional arrangements accommodate AQM function	Revise organograms to create air quality structure and designation, where needed	Short	P – affected municipalities	• AQO appointed • AQM responsibilities allocated to personnel • Staff appointed to fill
	Optimise air quality resource availability	Short	P – affected municipalities	

Objectives	Activities	Timeframe	Responsibility	Indicator
	Fill AQM posts with appropriately skilled staff	Short	P – affected municipalities	AQM posts in organogram • AQM scarce skills retention policy developed
	Develop/ revise retention policies to retain scarce AQM skills	Short	P – MDEDET, GDARD, Municipalities	
4) Cooperative governance and collaboration occurs between well- and poorly- skilled AQM sections	Establish statutory inter-governmental cooperation mechanism to harmonise AQM decision making (under IGRFA) e.g. joint licensing tribunal,	Short, On-going	P – DEA, MDEDET, GDARD, Municipalities	• Cooperation mechanism established and regular meetings held • Forum established and regular meetings held • Reports made to HPA Standing Committee
	Provide guidance and assistance in AQM to provincial and local authorities	Short, On-going	P – DEA, provinces, municipalities	
	Establish inter-governmental forum to coordinate air quality governance in the HPA and reporting mechanism for the Standing Committee,	Short, On-going	P – MDEDET, GDARD O – DEA I – Municipalities	
5) Personnel are equipped to perform AQM function and use AQM tools effectively	Cooperatively develop training guideline document to identify skills training needs for AQM	Short	P-DEA I - MDEDET, GDARD, Municipalities	• Training guideline developed • Skills gap analysis conducted • Skills development plans implemented • Standard courses used for training • Consultation with tertiary and other training institutions to develop standard and specialised AQM courses • AQM research needs
	Conduct AQM skills gap analysis to identify areas of capacity development for assigned sections/departments	Short	P – MDEDET, GDARD, Municipalities	
	Develop skills development plans to address identified gaps	Short	P – MDEDET, GDARD, Municipalities	
	Implement skills development plans	Short, On-going	P – MDEDET, GDARD, Municipalities	

Objectives	Activities	Timeframe	Responsibility	Indicator
	Engage with tertiary institutions to offer standardised, accredited AQM courses (undergraduate and post-graduate level) and other training institutions to offer specialised accredited AQM training short courses	Short, On-going	P – DEA I - MDEDET, GDARD, Municipalities	identified and communicated
	Coordinate officials' schedules to enable attendance of courses	Short, On-going	P – DEA, MDEDET, GDARD, Municipalities	
	Engage with NACA on sponsorship of AQM capacity development	Short	P – DEA I - MDEDET, GDARD, Municipalities	
	Determine areas of research needed in AQM and communicate to relevant research institutions	Short	P- DEA I - MDEDET, GDARD, Municipalities, Research institutions	
6) Financial resources are available for air quality governance	Develop AQM implementation plan and budget to give effect to adopted HPA AQMP and include in IDP/ EIP	Short	P – MDEDET, GDARD, Municipalities	• AQM implementation plan and budget developed and included in IDP/ EIP • Consultation meetings held with D-COGTA and SALGA
	Engage with D-COGTA and SALGA to address specific financial and performance management needs of priority areas	Short	P – DEA, Municipalities	
7) All AELAs and AQOs have extensive practical experience in air quality governance	Responsible personnel undergo AEL training	Short	P - AELAs	• AEL training completed • AEL system established • APPA Registration Certificates converted to AELs • Air quality noted in Environmental Impact Assessment (EIA) process
	AEL system is established by AELAs	Short	P - AELAs I - DEA	
	Convert APPA Registration Certificates to AELs	Short – medium	P - AELAs I - DEA	
	Contribute to EIA decision-making and environmental authorisations through commenting on air quality impact assessments	Short, On-going	P – MDEDET, GDARD, Municipalities	

Objectives	Activities	Timeframe	Responsibility	Indicator
	Conduct regular inspections to monitor plant performance and compliance	Short, On-going	P – MDEDET, GDARD, Municipalities I - DEA	• Industrial plant comply with AEL conditions • Emission reporting regulation published • Emission reports submitted regularly • Mechanism developed for recognition of good performance • Presentations made and discussion held on AQM activities
	Develop and publish emission reporting regulation for reporting to authorities	Short	P – DEA I – MDEDET, GDARD	
	Enforce emission reporting regulation	Short, On-going	P - AELAs	
	Submit industrial non-compliance reports regularly to relevant authorities	Short, On-going	P - AELAs	
	Acknowledge good performance/compliance e.g. annual awards	Medium, On-going	P - MDEDET, GDARD I – DEA, Municipalities	
	Carry out enforcement action on all non-compliant incidences	Short, On-going	P - AELAs I – Other non-AELA municipalities	
	Use established inter-governmental governance forum as an experience-sharing platform	Short, On-going	P – MDEDET, GDARD, Municipalities I/O - DEA	
8) Development planning in the HPA recognises the objectives of the AQMP	Include air quality in environmental decision-making tools for land use planning	Short, On-going	P – MDEDET, GDARD, Municipalities	• Air quality criteria are included in planning decision-making and discussed in policy • Status quo case study prepared
	Align and integrate municipal and provincial AQMPs and other environmental planning tools with the IDP/ EIP in the HPA	Short, On-going	P – MDEDET, GDARD, Municipalities	

Objectives	Activities	Timeframe	Responsibility	Indicator
	Draft status quo assessment case study for use in AQMPs and other planning tools	Short	P – DEA I - MDEDET, GDARD, Municipalities	
	Develop HPA pilot for national AQMP support programme	Short	P - DEA	
9) Use of air quality management tools such as ambient monitoring, emission inventories, dispersion modelling, etc. are optimised and expanded	Develop monitoring station purchase and operation guideline, including capacity development activities	Short	P – DEA, I - MDEDET, GDARD, EMM	• Improved data availability at stations • Publicly available data has undergone quality assurance and control and is up-to-date • Annual monitoring and emission reports are available • Annual reports are presented at Air Quality Governance Lekgotla • Updated HPA emission database is available • Emission database is 80 % complete • Scenario modelling is carried out for HPA
	Conduct quality control and assurance on all data to assist compliance monitoring	Short, On-going	P – DEA, MDEDET, GDARD, EMM	
	Upload monitoring data to SAAQIS routinely	Short, On-going	P – DEA, MDEDET, GDARD, EMM	
	Compile annual reports on monitored data, for technical and AQM purposes	Short, On-going	P – DEA, MDEDET, GDARD, EMM	
	Improve HPA emission data base to make it current and representative	Short	P – DEA I – MDEDET, GDARD, Municipalities	
	Maintain the database to ensure it remains current and representative	Short, On-going	P – DEA I – MDEDET, GDARD, Municipalities	
	Compile annual reports on emissions data, for technical and AQM purposes	Short, On-going	P – DEA I - MDEDET, GDARD, Municipalities, Industries	
	Configure HPA dispersion model	Short	P - DEA	

Objectives	Activities	Timeframe	Responsibility	Indicator
	Use HPA dispersion model to assist planning and decision making	Short, On-going	P –DEA I – MDEDET, GDARD, Municipalities	
10) Progress on the implementation of the HPA AQMP is monitored	Establish a Standing Committee with governance stakeholders to assess and report on progress with the HPA AQMP implementation	Short, On-going	P –DEA I – MDEDET, GDARD, Municipalities	• Standing Committee established and operational • Progress reports on AQMP implementation available
	Develop progress reports regularly	Short, On-going	P –DEA, MDEDET, GDARD, Municipalities	

2. By 2020, industrial emissions are equitably reduced to achieve compliance with ambient air quality standards and dust fallout limit values

Objectives	Activities	Timeframe	Responsibility	Indicator
1) Emissions are quantified from all sources	Establish and maintain an site emission inventory that includes all point and diffuse sources for all significant pollutants	Short, On-going	P - Industries	• Site emission inventories completed • Emission reports available
	Submit emission inventory report as per emission reporting regulation	Short, On-going	P - Industries O - AELAs	
2) Gaseous and particulate emissions are reduced	Determine equitable emission reduction for specific industries: • Identify significant emitters in HPA • Submit AIR's using a regulated modelling approach • Determine equitable emission reduction using AIR submissions and industrial action plans (Appendix 5) • Issue AELs with emission reduction requirements and industrial action plan commitments	Short	P – DEA, AELAs, Industries I – Other non-AELA municipalities	• AELs issued with emission reductions • Emission reduction measures implemented by industries • Maintenance plans implemented • Reduced disruptions to plant operations
	Develop and implement maintenance plan for each plant	Short	P – Industries	
	Schedule and conduct repairs to coincide with plant offline times	On-going	P – Industries	
	Incorporate equipment changes into maintenance schedule	On-going	P – Industries	
	Operate plants with minimum disruption e.g. back-up plan for energy consumption/ generation	Short, On-going	P – Industries	
3) Fugitive emissions are minimised	Develop fugitive emission management plan	Short	P – Industries I - DEA, AELAs	• Fugitive emission management plan developed and implemented • Reduction in fugitive emissions
	Implementation of appropriate interventions e.g. LDAR programme	Short, On-going	P – Industries O - DEA, AELAs	

Objectives	Activities	Timeframe	Responsibility	Indicator
4) Emissions from dust-generating activities are reduced	Develop and implement dust reduction programmes in line with industry best practice, considering technology and management interventions	Short, On-going	P – Industries O - DEA, AELAs	• Dust reduction programme implemented • Fleet maintenance carried out • Alternate haulage and waste management investigated
	Investigate feasibility of using alternative means for haulage e.g. conveyer, rail	Medium	P – Industries	
	Plan and carry out regular fleet maintenance	Short, On-going	P – Industries	
	Investigate opportunities to market waste as raw material inputs to other industries e.g. discard coal	Medium	P – Industries	
5) Greenhouse gas emissions are reduced	Include greenhouse gas emissions in site emission inventory	Short	P – Industries	• Site greenhouse gas emission inventories compiled • Energy efficiency plans implemented
	Develop and implement a site energy efficiency plan	Short	P – Industries I - DEA, MDEDET, GDARD, Municipalities	
	Consider climate change implications in AQM decision-making	Short, On-going	P – Industries	
	Investigate opportunities for co-generation e.g. off-gas as an energy source	Short – Medium	P – Industries	
	Investigate feasibility of renewable energy	Short – Medium	P – Industries	
6) Incidences of spontaneous combustion are reduced	Promote research needs regarding spontaneous combustion	Short	P – DEA I - MDEDET, GDARD, Municipalities	• Research needs communicated • Consultation with DMR on abandoned mines • Reduced incidences of spontaneous combustion
	Communicate the need to determine abandoned mine ownership to facilitate rehabilitation and/or closure	Short	P – DEA	

Objectives	Activities	Timeframe	Responsibility	Indicator
	Promote the need for compliance monitoring of abandoned mines	Short	P – DEA	
	Implement and enforce discard dump management regulations	Short	P – DEA	
	Improve supply and demand forecasting to reduce coal stockpile size and limit coal stockpile retention time	Medium	P – Industries	
7) Abatement technology is appropriate and operational	Install and/or maintain appropriate air pollution abatement technology compliant with requirements of AEL and achieving Section 21 emission standards	Short – Long	P – Industries	• Air pollution abatement technology installed • Equipment operated optimally • Individual technology benchmarks completed
	Train operators to ensure optimal operation of abatement equipment	On-going	P – Industries	
	Promote individual benchmarking of abatement technology	Medium	P - DEA	
	Motivate for and undertake research to improve abatement technology and reduce retrofitting costs	Medium	P – DEA, Industries, Research institutions	
8) Industrial AQM decision making is robust and well-informed, with necessary information available	Establish sector information sharing fora	Short	P – Industries	• Sector fora established • Sector best practice guidelines available • Benchmarking promoted
	Compile best practice documents for the sectors	Short – Medium	P – DEA I - AELAs	
	Conduct international benchmarking within the sectors	Medium	P – Industries O – DEA	
	Make sector emission performance information available for company benchmarking	Medium	P – DEA I – Industries	
	Make best practice information available on SAAQIS	Medium	P - DEA	
9) Clean technologies and processes are implemented	Incorporate cleaner technology considerations into AEL	Short	P - AELAs I - DEA	• AEL includes clean technology

Objectives	Activities	Timeframe	Responsibility	Indicator
	Investigate feasibility of introducing clean technologies on plant-specific basis	Medium	P – Industries	recommendations • Clean technology feasibility studies conducted • Clean technology options implemented
	Implement feasible technology options on plant-specific basis	Medium – Long	P – Industries	
	Investigate regulatory mechanisms to facilitate introduction of new technology	Medium	P – DEA, MDEDET, GDARD	
	Investigate feasibility of switching to clean fuels at times of poor dispersion	Medium	P – Industries	
	Investigate alternative design and process options to improve plume dispersion	Medium	P – Industries	
	Implement feasible alternative design and process options	Medium - Long	P – Industries	
10) Adequate resources are available for AQM in industry	Revise organograms to create air quality structure and designation, where needed	Short	P – Industries	• AQM personnel designated • Abatement and measurement financial planning complete
	Optimise environmental management resource availability to accommodate air quality function	Short	P – Industries	
	Fill AQM posts with appropriately skilled staff, where needed	Short	P – Industries	
	Input into financial planning to implement emission abatement and measurement requirements of AEL and Section 21 emission standards	Short	P – Industries	
	Investigate the possible use of offset programmes to reduce financial investments	Medium	P – Industries I - DEA, AELAs	
11) Ambient air quality standard and dust fallout limit value exceedances as a result of	Conduct ambient air quality monitoring in accordance with AEL requirements	Short, On-going	P – Industries O - AELAs I – DEA	• Ambient air quality and dust fallout monitoring carried out

Objectives	Activities	Timeframe	Responsibility	Indicator
industrial emissions are assessed	Conduct dust fallout monitoring in accordance with legislative requirements, and consider advances in monitoring technology	Short, On-going	P – Industries O - AELAs I – DEA	• Monitoring results reported and available on SAAQIS • AIRs updated to include monitoring results
	Report ambient monitoring results, to relevant AQO and publish on SAAQIS	Short, On-going	P – Industries O – DEA, AELAs	
	Update AIR submissions	Short, On-going	P – Industries O – DEA, AELAs	
12) A line of communication exists between industry and communities	Conduct quarterly consultative community meetings	Short, On-going	P – Industries	• Quarterly meetings held between industry and communities

3. By 2020, air quality in all low income settlements is in full compliance with ambient air quality standards

Objectives	Activities	Timeframe	Responsibility	Indicator
1) Implementation of the strategy for dense low income settlements has air quality benefits	Promote the objectives of the strategy in dense low income settlements on the HPA	Medium, On-going	P – MDEDET, GDARD I – DEA, Municipalities	• Planning of dense low income settlements considers the objectives of the strategy
2) Clean fuels and technology are used that are affordable and easily available	Coordinate BnM rollout in HPA PM_{10} "hot spot" settlements	Short, On-going	P – MDEDET, GDARD I – DEA, Municipalities, DoE, Industries	• BnM demonstrations held across HPA • Mechanisms to provide clean energy are investigated
	Communicate the air quality benefits of subsidy provision for clean combustion technology (stoves) and clean fuels (anthracite coal, gas) to implementing stakeholders	Short, On-going	P – DEA I – MDEDET, GDARD, Municipalities	
	Motivate for other regulatory and financial mechanisms to improve affordability of clean energy	Short, On-going	P – DEA I – MDEDET, GDARD, Municipalities	
	Communicate the benefit of accessing CDM funding for fuel switching projects in HPA	Short, On-going	P – DEA I – MDEDET, GDARD, Municipalities	
3) Service delivery to low income residential areas is improved	Communicate the air quality benefits of improved service delivery to relevant departments, particularly: • Electrification • Road surfacing • Refuse removal • Greening	Short, On-going	P – DEA, MDEDET, GDARD, Municipalities	• Benefits of service provision are understood in relevant departments • Electrification program is revised to address identified air quality hot spots as priority
	Participate in development of prioritisation methodology for electricity provision	Short	P – DEA, MDEDET, GDARD, Municipalities	
	Engage Eskom to electrify areas of poor air quality in hot spots as a priority	Short, On-going	P – DEA, MDEDET, GDARD	

4) Adequate scientific, health and economic information is available on domestic fuel burning and air quality	Identify and communicate research needs to research institutions and organisations to motivate research on domestic fuel use, particularly emission reduction measures	Short, On-going	P – DEA I – MDEDET, GDARD, Municipalities	• Research on domestic fuel burning and related topics conducted • Research available on SAAQIS
	Develop linkage between HPA website and SAAQIS database of available information	Short, On-going	P – DEA I - MDEDET, GDARD, Municipalities, Research institutions, Industries	
5) Low-income and informal households are energy efficient	Participate in the revision of low cost housing design principles	Short	P – DEA, DoHousing, MDEDET, GDARD, Municipalities	• Low cost housing design principles consider energy efficiency
	Communicate the air quality benefits of large-scale subsidised solar water heating and other energy efficient fittings	Short	P – DEA	
	Communicate the benefit of accessing CDM funding for energy efficiency projects in HPA	Short	P – DEA	
6) Social upliftment and development has air quality benefits	Promote air quality-related corporate social investment in low income communities in hot spot areas	Short, On-going	P – DEA, MDEDET, GDARD, Municipalities	• Corporate investment occurs in low income communities in hot spot areas

4. By 2020, all vehicles comply with the requirements of the National Vehicle Emission Strategy

Objectives	Activities	Timeframe	Responsibility	Indicator
1) Regulations for motor vehicle emission reduction is in place	Implement requirements of the national vehicle emission strategy	Short - Medium	P – DEA, DoT, DoE	• National vehicle emission strategy implemented
2) Emission testing capacity is extended	Develop emission testing regulation	Short	P – relevant municipalities	• Emission testing regulated and implemented • Emission testing report compiled
	Acquire emission testing equipment	Short	P – relevant municipalities	
	Conduct training programme for testing personnel	Short	P – relevant municipalities I – MDEDET, GDARD, EMM, Other municipalities with testing function	
	Conduct regular inspections	Short, On-going	P - relevant municipalities	
	Compile report on emission testing activities and effectiveness	Short, On-going	P - relevant municipalities	

5. By 2020, a measurable increase in awareness and knowledge of air quality exists

Objectives	Activities	Timeframe	Responsibility	Indicator
1) Air quality information is easily accessible to all stakeholders	Simplify technical reports and management plans for public consumption	Short, On-going	P – DEA, MDEDET, GDARD, Municipalities	• Air quality information is available in hard copy and electronic formats • Air quality information is available in official languages • Simplified technical information is available
	Disseminate information in areas accessible to all stakeholders (e.g. community libraries in the HPA)	On-going	P – DEA, MDEDET, GDARD, Municipalities	
	Use media to share information on air quality	Short, On-going	P – DEA, MDEDET, GDARD, Municipalities	
	Use organisations' websites for distribution of information	Short, On-going	P – DEA, MDEDET, GDARD, Municipalities	
	Develop educational material on air quality impacts in relevant official languages aimed at individuals, communities and government officials	Short	P - DEA	
2) Air quality information is communicated to all stakeholders	Conduct educational campaigns within all HPA communities	Short, On-going	P – MDEDET, GDARD, Municipalities	• Educational campaigns conducted across HPA • Stakeholder fora established • Training and awareness-raising courses held for community leaders and councillors • Air quality criteria considered in development planning policy and initiatives • Use of fire danger index promoted • Reduction in incidents of
	Conduct educational awareness programmes at schools which host monitoring stations	Short, On-going	P – DEA, MDEDET, EMM	
	Establish a community forum/fora (NGOs, CBOs and FBOs) to address stakeholder education, awareness and capacity building	Short	P – MDEDET, GDARD, Municipalities	
	Organise seminars, workshops and training courses for community leaders and councillors on air quality issues	Short	P – DEA, MDEDET, GDARD, Municipalities	
	Conduct air quality awareness raising activities accompanied by elected officials	Short	P – DEA, MDEDET, GDARD, Municipalities	

	Increase awareness of development planners to consider air quality criteria in planning decision-making	Short	P – MDEDET, GDARD, Municipalities	burning (controlled and uncontrolled)
	Conduct awareness-raising activities and educational programmes on correct use of fire and vegetation management	Short, On-going	P – DEA, DoA, MDEDET, GDARD, Municipalities	
	Publicise the existing fire danger index as part of AQM	Short	P – MDEDET, GDARD, Municipalities	
	Promote the "Follow the smoke" campaign	Short	P – DEA I - MDEDET, GDARD, Municipalities	
3) Research is considerate of stakeholders in the area of study	Consult communities, local leaders, community organisations etc as part of research process	Short, On-going	P – Research institutions	• Community knowledge is included in air quality studies
	Incorporate indigenous information/ knowledge into air quality studies	Short, On-going	P – MDEDET, GDARD, Municipalities, Research institutions	
4) Opportunities for public participation and involvement in air quality decision-making are readily available	Use stakeholder fora to provide communication platform to communities	Short, On-going	P – Municipalities	• Community communication platform established • Community are able to access AQM officials in emergencies
	Publish contact details of relevant AQOs in communities	Short	P – Municipalities	
	Investigate feasibility of establishing a toll free number for air quality incidents for the HPA	Short	P – DEA, MDEDET, GDARD	

6. By 2020, biomass burning and agricultural emissions will be 30% less than current

Objectives	Activities	Timeframe	Responsibility	Indicator
1) Emissions from biomass burning and agricultural activities on the HPA are quantified	Develop emission estimate for biomass burning (natural and controlled)	Short	P – DEA I – DoA, DoAFF	• Current emission estimate available for biomass burning and agriculture
	Maintain information on fires on HPA using AFIS and other resources	On-going	P – DEA	
	Develop emission estimate for agriculture: • Pesticides • Odour-related pollutants • Dust	Short	P – DEA I – DoA, GDARD	
2) Management alternatives to burning are available	Promote grass cutting and baling in agricultural, protected and road reserve areas, to be used as a resource e.g. fodder, compost, smokeless fuel	Short, On-going	P – DEA, DoA, DoT I – MDEDET, GDARD	• Reduction in burning in agricultural, protected and road reserve areas
	Motivate for research on veld management practices/ strategies for alternatives to burning and on the relationship between fire and environmental factors	Short	P – DEA, DoA	
3) Legal requirements discourage vegetation burning	Optimise the use of existing regulatory tools to prevent agricultural burning in poor conditions	Short	P – DEA, DoA	• Regulation restricting burning is promulgated
	Motivate for specific conditions for creating fire breaks in Veld and Forest Fires Act	Short – Medium	P – DEA, DoAFF	
	Motivate for regulation of burning in sensitive ecosystems and surrounding areas	Medium	P – DEA, DoA, DoAFF	
4) Dust entrainment, odour, and pesticide emissions are reduced	Cooperatively investigate the feasibility of the development and publication of weather forecasts for optimum ploughing time and spraying of pesticides	Short	P – DEA, SAWS, DoA	Feasibility report prepared on agricultural forecast available

7. By 2020, emissions from waste management are 40% less than current

Objectives	Activities	Timeframe	Responsibility	Indicator
1) Emissions from waste management activities on the HPA are quantified	Develop and maintain emission estimate for landfills, waste water treatment works and incinerators	Short	P – DEA	• Emission estimates available for waste management facilities • Greenhouse gas emission estimates available
	Include Greenhouse gas emissions in emission inventory	Short	P – DEA	
2) Management of waste processing sites considers air pollutant and greenhouse gas emission reductions	Develop emission reduction plan for all process and fugitive sources	On-going	P – Operating Entities O – DEA, AELAs	• Emission reduction plans developed and implemented
	Implement emission reduction and maintenance plan for all emission sources resulting from waste management activities	Short, On-going	P – Operating Entities O – DEA, AELAs	
	Investigate feasibility of methane extraction for energy generation	Short – Medium	P - Operating Entities	
	Promote the use of best available technology in waste management	Medium	P – DEA, MDEDET, GDARD, Municipalities	
3) Emissions from burning of waste are reduced	Motivate for regular collection of waste from skips	Short	P – Municipalities	• Waste burning is regulated
	Apply/ develop regulatory tools to control waste burning	Short – Medium	P - MDEDET, GDARD, Municipalities I – DEA	
	Motivate for enforcement action on incidences of waste burning	Short – Medium	P - MDEDET, GDARD, Municipalities	

Co-benefits from projects by other governance departments

As part of the AQMP development, work by stakeholders not directly related to air quality but having co-benefits for improved air quality in the HPA has been included. The projects listed are under development, have been implemented, or are proposed following consultation, and possible collaboration.

Table E6: Collaborative working and support projects

Implementing agent	Project
Department of Health	• Implementation of the guideline on indoor air pollution • Cooperatively develop healthcare admission methodology to include air pollution exposure parameters
Department of Transport	• Motivate for the inclusion of emission testing as part of roadworthiness certification
Department of Energy	• Revision of fuel specifications as part of National Vehicle Emissions Strategy
Department of Energy, Eskom	• Develop promotional material and tools to inform energy efficient and alternative energy choices
Department of Education	• Promote revision of school curriculum to include AQM • Distribute DEA air quality educational material to educators in the HPA • Promote AQM as a career path at schools and tertiary institutions
Department of Justice	• Motivate for stricter enforcement action through prosecution and stiff penalties for arson offenders
Department of Agriculture	• Promote research on improving farming techniques and good agricultural practices e.g. minimum tillage, application of pesticides • Promote best practice for the conversion of animal waste to manure and fertiliser
Department of Water Affairs and DEA	• Compile best practice documents for the waste management sector
	• Develop promotional material on air quality benefits of household waste minimisation

Monitoring

Monitoring the progress of the implementation of the AQMP is a key factor in maintaining momentum for the rollout of interventions and provides a means to update key stakeholders. Working groups are the preferred mechanism for monitoring, as they are the primary means for initiation of implementation. The outcomes of the meetings will be taken forward into the annual evaluation exercise.

Responsibility	DEA, Working Groups
Method	Progress meeting/Level of completion of interventions
Timeframe	6 months

Evaluation

On-going evaluation is an essential element of AQMP implementation as it allows for a thorough assessment of the AQMP. Evaluation is an internal mechanism to measure the performance of the AQMP implementation. Annual evaluation of the AQMP is suggested as

a minimum timeframe and is ideally incorporated into the annual performance review mechanisms.

AQMP evaluation comprises an internal evaluation of the final AQMP, and an on-going evaluation, which addresses implementation outcomes. This component is regarded as a limited peer review mechanism, as the MSRG has technical and management background in AQM and is able to refine the AQMP. An evaluation checklist is provided in DEA's AQMP Manual, which deals with all aspects that require assessment.

Indicators have been developed for the AQMP implementation plan. These are ideally incorporated into the annual reports to be submitted to the Minister, as indicated in Section 17 of the AQA. These reports, together with the regular progress reports proposed in the implementation, will be incorporated into the National AQO's Annual Report, which is submitted to the Minister as well, and available to all stakeholders.

Review

AQMP review comprises internal and external review components, and addresses further developments in the science as well as management of air quality.

With regard to the formal review of the AQMP and the implementation, a review period of every *five years* is recommended in the DEA Manual. The definition of the review period is subject to funding and political cycles, as well as implementation outcomes.

The process of five-yearly review is anticipated to be initiated through an internal review mechanism and incorporate the annual evaluation exercise, effectively assessing the five-year performance of the AQMP.

Responsibility	DEA, Working Groups, MSRG
Method	Compilation of annual evaluations
Timeframe	5 year