

APPENNDIX 3

WATERBERG DISTRICT MUNICIPALITY AIR QUALITY MANAGEMENT PLAN

EXECUTIVE SUMMARY

JUNE 2009



REPORT AUTHORS

Nicola Walton	- Gondwana Environmental Solutions (Pty) Ltd
Nokulunga Ngcukana	- Gondwana Environmental Solutions (Pty) Ltd

EXECUTIVE SUMMARY

1. INTRODUCTION

The National Environmental Management: Air Quality Act 39 of 2004 (AQA) requires Municipalities to introduce Air Quality Management Plans (AQMP) that set out what will be done to achieve the prescribed air quality standards. Municipalities are required to include an AQMP as part of its Integrated Development Plan.

The Waterberg District Municipality, so called because of the numerous streams that occur in the mountain ranges during high rainfall periods, is located in the Limpopo Province in South Africa. The Waterberg District is comprised of six Local Municipalities, namely, Bela-Bela, Mogalakwena, Lephalale, Modimolle, Thabazimbi and Mookgopong. Mining, agriculture and tourism are the main economic activities in the District with manufacturing on a smaller scale, although there is significant potential for expansion. The District has eight heritage sites including the Makapan's Valley World Heritage Site, numerous nature reserves and hot-springs which contribute to this District being a major tourist attraction.

The main objective of the project is to develop an Air Quality Management Plan for the Waterberg District Municipality, as per the requirements of the Air Quality Act of 2004.

1.2 Methodological Approach for the development of an Air Quality Management Plan for the Waterberg District

The development of an Air Quality Management Plan for Waterberg District Municipality was undertaken in a phased approach, which included the following:

- **A Status Quo Assessment** – this phase included a detailed baseline assessment of the meteorological conditions and the ambient air quality situation in the District. An emissions inventory was compiled for air pollution sources in the District with specific focus on quantifiable sources such as industries, vehicles and domestic fuel burning. Dispersion modeling simulations were undertaken using the international ADMS-Urban model developed by the Cambridge Environmental Research Consultants in the United Kingdom.

- **A Feasibility Study** – this phase evaluated the current capacity of Government (Local, District and Province) for air quality management and control in terms of personnel, skills, resources and tools.
- **An Air Quality Management Plan** – findings from the Status Quo Assessment and the Feasibility Study were incorporated into the Plan. A detailed review of the responsibilities and duties of the Waterberg District in terms of the Air Quality Act of 2004 was undertaken. Emission reduction strategies were proposed for the major source contributors with achievable timeframes associated with each intervention
- **Stakeholder Engagement** – monthly stakeholder meetings were held in the District with representatives from each sphere of Government. Three public participation meetings were held in June 2009 in Lephalale, Thabazimbi and Mokopane, respectively, for input into the development of the Plan.

2. POLICY AND REGULATORY REQUIREMENTS

The National Environmental Management: Air Quality Act 39 of 2004 has shifted the approach of air quality management from source-based control to receptor-based control. The Act makes provision for the setting and formulation of National ambient air quality standards, while it is generally accepted that more stringent standards can be established at the Provincial and Local levels. Emissions are controlled through the listing of activities that are sources of emission and the issuing of emission licences for these listed activities. Atmospheric emission standards will be established for each of these activities and an atmospheric licence will be required to operate. The issuing of emission licences for Listed Activities will be the responsibility of the Metropolitan and District Municipalities. Municipalities are required to *'designate an air quality officer to be responsible for co-ordinating matters pertaining to air quality management in the Municipality'*. The appointed Air Quality Officer will be responsible for the issuing of atmospheric emission licences.

2.1 Local Air Quality By-Laws

Within the Waterberg District, no current air quality by-laws have been established at the District and Local levels. The Department of Environmental Affairs and Tourism is in the process of developing a generic air pollution control by-law for Municipalities.

3. CRITERIA POLLUTANTS AND ASSOCIATED HEALTH AND ENVIRONMENTAL EFFECTS

An overview of the potential human health and environmental impacts associated with air pollutants is given in this section. Emphasis is placed on the criteria pollutants, particulate matter (PM₁₀), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), ozone (O₃), carbon monoxide (CO) and Volatile Organic Compounds, of which benzene (C₆H₆) is the only criteria pollutant. Of these, benzene is recognized to be a human carcinogen.

4. METEOROLOGICAL OVERVIEW AND AMBIENT AIR QUALITY OF THE WATERBERG

4.1 Meteorological Overview

Surface meteorological data was obtained from the South African Weather Service (SAWS) stations in Bela-Bela, Lephalale, Mokopane and Thabazimbi. The Agricultural Research Commission (ARC) also operates a network of monitoring stations in the District as part of a larger National Meteorological Monitoring Network. Significant variation in the wind field is observed in the Waterberg indicative of the underlying topographical influence on the prevailing meteorological conditions

4.2 Current Ambient Air Quality Situation

Limited air quality monitoring information is available in the Waterberg District, making it difficult to accurately quantify the current state of the air quality in the District. Continuous ambient air quality monitoring is only undertaken by Eskom at Matimba power station in Lephalale. Dust fallout monitoring is undertaken by various industries and brickworks in the District Municipality. Given the availability of data, the air quality

assessment focused mainly on Lephalale as an evaluation of the air quality situation in other areas of the District could not be undertaken.

Based on the available ambient air quality monitoring data for Lephalale, the monitored concentrations indicate that:

- Ambient PM₁₀ concentrations are in compliance when compared against the current National daily standard of 180 µg/m³. However, when compared to the revised National standard of 75 µg/m³, PM₁₀ concentrations are elevated and frequently exceed the revised standard,
- Ambient SO₂ concentrations currently fall below the National daily standard, although SO₂ concentrations are potentially problematic in the short-term (hourly),
- Ambient NO₂ and O₃ concentrations are low and fall well below their respective standards.

5. STATUS QUO OF THE AMBIENT AIR QUALITY IN THE WATERBERG

5.1 Baseline Emissions Inventory

An emissions inventory for the Waterberg District was compiled for air pollution sources where information was available or where emission factors could be applied to quantify emissions. Potential air pollution sources in the Waterberg District have been identified as:

- *Power generation* – Matimba Power Station is the main source of SO₂ emissions in Lephalale. The new Medupi Power Station will also be a significant source of SO₂ emissions.
- *Mining* – mainly fugitive dust emissions from mining activities.
- *Industrial emissions* – mainly emissions from small boiler sources and brickworks in the District. These sources contribute to PM₁₀ and SO₂ concentrations.
- *Domestic fuel burning* – mainly coal and paraffin burning in informal settlements such as Mahwelereng (Mogalakwena), Marapong (Lephalale) and Regorogile and Ipeleng (Thabazimbi).

- *Vehicle emissions* – from petrol and diesel vehicles along major roads and the N1 highway in the District. Vehicles are not considered to be a significant air pollution source in the District.
- *Agricultural activities* – although not quantified, agricultural activities are considered to be an important source of ambient particulate concentrations. Thabazimbi Local Municipality is the main contributor to agricultural activities in the District, contributing to almost 40% of the District's GDP.
- *Biomass burning* – also not quantified due to the irregular and seasonal nature of this source, but also considered to be an important contributor to ambient particulate concentrations, particularly during the fire-burning season.
- *Waste Treatment and Disposal* - there are seven licenced disposal facilities (landfills) in the Waterberg District for the disposal of general waste. Incineration occurs on a small scale in the District with medical waste from hospitals and clinics outsourced to Tshumisano Waste Management.
- *Vehicle entrainment of dust from paved and unpaved roads* - emissions have not quantified as part of the AQMP.
- *Other fugitive dust sources such as wind erosion of exposed areas* - emissions have not quantified as part of the AQMP.

Particulate and gaseous emissions from industrial operations, domestic fuel burning and vehicle tailpipe emissions were quantified for this assessment, due to the availability of data for these sources. Power generation was identified to be the main contributing source to PM₁₀ emissions (68%) in the District, although this is likely to have been overestimated as many mines did not provide their emissions data, and therefore, were not possible to quantify. With the quantification of all mines in the District, mining sources are likely to be the main contributor to PM₁₀ emissions in the District. Power generation is the main contributing source to SO₂ and NO₂ emissions in the District, contributing to 95% and 93% respectively.

Estimated total emissions for each Municipality in the Waterberg District indicate that for:

- *Industrial and mining emissions* - Lephalale Local Municipality is the major source of industrial emissions, contributing to approximately 96% of emissions in

the District. Matimba Power Station and Grootegeeluk Coal Mine are the main contributing sources in this Municipality.

- *Domestic fuel burning emissions* – Mogalakwena is the largest contributor to domestic fuel burning emissions in the District, contributing to approximately 52% of emissions.
- *Vehicle emissions* – Thabazimbi and Lephalale are the main contributors to vehicle emissions, contributing 28% and 24% respectively. However, the contribution of Bela-Bela, Modimolle, Mogalakwena and Mookgopong to vehicle emissions may have been underestimated as vehicle volumes on the N1 highway could not be obtained.

Based on the available ambient air quality monitoring data and the emissions inventory compiled for the District, air pollution ‘hotspots’ were identified in the District. Emphasis was placed on areas with high population densities and the spatial distribution of sources in relation to residential areas.

Based on the above mentioned criteria, these areas have been identified to be:

- 1) Lephalale (Lephalale Local Municipality) – One of the largest industrial sources, Matimba Power Station, is located in this Municipality. Future developments such as Medupi Power Station and Sasol’s Coal-To-Liquids Plant will make this an important industrial area in future years.
- 2) Thabazimbi and Northam (Thabazimbi Local Municipality) – This Local Municipality includes many of the larger opencast mines such as Thabazimbi Mine, Amandelbult Platinum Mine and Northam Platinum.

5.2 Predicted Ambient Air Quality in the Waterberg District

For the identified ‘hotspot’ areas, dispersion modeling simulations have been undertaken. As dispersion modeling studies have previously been undertaken for Matimba Power Station, Medupi Power Station and Grootegeeluk Coal Mine in Lephalale, use was made of these studies to assess ambient concentrations and impact areas. Based on these studies, within Lephalale,

- Ambient PM₁₀ concentrations are elevated predominantly due to mining activities at Grootegeeluk Coal Mine. Current stack emissions from Matimba Power

Station are not a major contributor to ambient PM₁₀ concentrations as an ESP and SO₃ plant are installed. PM₁₀ emissions from Medupi Power Station are also anticipated to be acceptable as the station will be installed with a bag filter.

- Ambient SO₂ concentrations are mainly attributed to power generation in the area, with SO₂ concentrations in non-compliance with both the hourly and daily National standards.
- Ambient NO₂ concentrations are well in compliance with their respective standards.

Within Thabazimbi/Northam, emissions information was only provided by Northam Platinum, therefore only this source has been modelled. However, this mine is recognized to be an important source of SO₂ emissions as it has its own smelter. Dispersion modeling simulations undertaken for Northam Platinum indicate that SO₂ concentrations are in compliance with the current hourly, daily and annual National SO₂ standards.

6. AIR QUALITY INITIATIVES WITH PROVINCIAL AND LOCAL GOVERNMENT

6.1 Government Structure and Functions

The capacity for air quality management and control within the Waterberg District was assessed within the various spheres of Government in terms of available personnel, functions and resources.

6.1.1 Provincial and Local Government

Within the Limpopo Province, the Department of Economic Development, Environment and Tourism is responsible for air quality related functions. Air quality is primarily a function of the Air Quality Management Sub-Directorate within the Directorate of Integrated Pollution and Waste Management. Air quality functions include, amongst others, the compilation of an emissions inventory database, source identification and reviewing quarterly reports from industries.

Within the Waterberg District, Municipal Health Services (MHS) in the Department of Social Development and Community Services is responsible for air quality management and control. The District has not appointed an Air Quality Officer, and as a result air quality is one of multiple functions undertaken by the District personnel. Specific air quality related functions include the registration and monitoring of sources of pollution and air pollution complaints response.

Local Municipalities do not have enough capacity in terms of personnel, budget or equipment to undertake their air quality functions in terms of the Air Quality Act. Therefore, few air quality management or control functions are undertaken by the Local Municipalities. Air quality support is provided to the Local Municipalities from Province and District. Basic air quality management at Bela-Bela, Mookgopong and Thabazimbi Local Municipalities forms part of the functions of Environmental Health in the Department of Social Development and Community Services. Only air quality complaints are investigated by the Local Municipalities.

6.2 Air Quality Management Tools

Air quality management tools are limited to the maintenance of a complaints response database in the Waterberg District. Limited knowledge and software exists for dispersion modeling in the District. Ambient air quality monitoring is not undertaken by Government in the District, although Waterberg District has plans to install an air quality monitoring station in the near future.

7. CAPACITY BUILDING WITHIN LOCAL GOVERNMENT

The current capability of the Waterberg District is limited by the shortage of personnel, skills and tools required for effective and co-ordinated air quality management. Air quality management is a relatively new function within the District as a whole, with few Local Municipalities able to undertake basic air quality functions. Air quality responsibilities are mainly limited to the investigation of public complaints. Where required, air quality support is provided to the Local Municipalities by the District Municipality and by the Province.

7.1 Vision, Mission and Objectives

A vision, mission, goals and objectives have been developed for the Waterberg District. These have been developed in accordance with National, Provincial and Local principles for air quality management in South Africa.

7.2 Human Resources

Human resources required in the District Municipality include a dedicated, skilled Air Quality Officer whose responsibilities are only related to air quality management and control. As and when ambient monitoring is undertaken in the District, a skilled, trained technician must be appointed in the District Municipality. Support for air quality management should continue to be provided to the District by the Province.

Within the Local Municipalities, it is also recommended that an Air Quality Officer be appointed in each of the Local Municipalities. However, given the resources and finances required for these appointments, it is recommended that, as a starting point, an Air Quality Officer is appointed in the Thabazimbi and Lephalale Local Municipalities. Support should be provided to the other Local Municipalities by the Waterberg District.

7.3 Air Quality Management Tools

Air quality management tools are required in the District Municipality to effectively fulfill their air quality functions. Such tools include emissions inventory software, dispersion modeling software and air quality monitoring equipment. The first step in compiling an emissions inventory for industrial and mining sources in the District has been compiled as part of this Plan. The Waterberg District, in collaboration with Limpopo Province, should complete and regularly update the emissions inventory. As and when dispersion modeling skills are available, a range of models are available either as freeware or to purchase. Appropriate models for the District could include ADMS-Urban (for smaller modeling domains in urban areas) or CALPUFF (for larger, more complex modeling domains). Air quality monitoring options include continuous ambient air quality monitoring stations or passive sampling methods. A mobile monitoring station is the recommended option for the District as this will allow for 'hotspot' monitoring in identified areas of concern.

8. EMISSION REDUCTION INTERVENTIONS

Emission reduction interventions have been recommended for air pollution sources in the District. Interventions for the major sources are described in the sections below.

8.1 Power Generation

Various emission control technologies have been installed at Matimba Power Station to reduce emissions, including an Electrostatic Precipitator (ESP) and SO₃ plant to reduce its particulate emissions (with a possible control efficiency of up to 99%). Fugitive dust emissions from Matimba's ash dump at Zwartwater are controlled with a sprinkler system. The new Medupi Power Station, which will become operational in 2011 – 2014, will be installed with a bag filter to reduce its particulate emissions. SO₂ emissions are currently not controlled from Matimba Power Station. The benefits of installing Flue Gas Desulphurisation (FGD) to reduce SO₂ emissions need to be considered in terms of cost, water usage, loss of efficiency and increased CO₂ emissions.

Eskom has also initiated a social investment project to identify air quality improvement initiatives in Marapong, as per the Medupi Record of Decision. In addition, as part of the Medupi Power station Project, energy efficiency measures have been introduced into the housing accommodating the approximately 8000 - 9000 workers working on the project. Such measures include:

- Reducing electricity consumption – the majority of houses have been equipped with solar geysers,
- Installation of energy saving light bulbs in all the houses and offices,
- Installation of LEDs in the perimeter security lights at night,
- Use of gas fired equipment in the kitchens,
- Installation of evaporative coolers in the houses to reduce electricity consumption for cooling purposes,

Recommended interventions in the *short – medium term* include:

- Development of government/community/industry liason committees to facilitate information sharing and dissemination,

- Submission of quarterly reports to the Waterberg District Municipality and Limpopo Province,
- As part of the Listed Activities and Emission Standards Setting Project, minimum emission limits will be established for the power generation industry (to be published by 11 September 2009)
- On-line stack monitoring might be a requirement of the Emission Standard Setting Project in areas identified to be of concern,
- As part of the APPA Registration Certificate Review Project, the current APPA permits for power generation have been reviewed. These will be become revised Registration Certificates and eventually Atmospheric Emission Licences (AELs),
- Eskom have proposed the installation of an ambient air quality monitoring station in collaboration with Sasol which plans to build a Coal-to-Liquids Plant in Lephalale.

8.2 Mines

Recommended interventions for the mining industry in the *short – medium term* include:

- Development of government/community/industry liason committees to facilitate information sharing and dissemination,
- Submission of quarterly reports to the Waterberg District Municipality and Limpopo Province,
- Comprehensive emissions inventories need to be developed/obtained for each mine in the District,
- All small mines and quarrying operations that were not included in the AQMP need to be identified and quantified, where possible,
- Regular maintenance and annual roadworthy checks of all mine vehicles is recommended to be undertaken by each mine,
- The rehabilitation of old mine dumps and slimes dams should be encouraged,
- Ambient air quality monitoring, in particular, dust fallout and PM10 monitoring should be undertaken by the mines to determine ambient particulate levels.

8.3 Industries

Recommended interventions in the *short-medium term* include:

- The electronic database of all small industries developed as part of this AQMP should be updated (to account for the 63% of industries that did not respond) and regularly updated by the District Municipality in conjunction with the Limpopo Province,
- Periodic site inspections and emissions measurements should be undertaken by the District Municipality,
- DEAT should develop a permit system for all non-listed activities,
- Model scheduled trade by-laws. This is the responsibility of the District Municipality.
- As part of the current standards setting process, standards for small boilers will be proposed (expected to be gazette by end August 2009). Waterberg District Municipality should review these standards for possible inclusion into the Municipal by-laws.

8.2 Domestic Fuel Burning

Recommended interventions in the *short-medium term* include:

- The domestic fuel burning emissions inventory should be reviewed with updated population statistics as these become available. A National Census has been planned for 2011,
- An awareness raising programme through media campaigns and community forums should be developed to educate the public around the negative health impacts of domestic fuel burning,
- The District should encourage the distribution of alternative forms of energy such as low smoke fuels (by replacing coal with cheaper low smoke char briquettes) and liquid petroleum gas (LPG),
- The roll-out of safer illuminating paraffin stoves should be initiated by the CEF, DEAT and DME,
- Energy efficiency measures should be integrated into low-cost houses such as housing insulation, solar panels and stove maintenance and replacement,

- Electrification in informal areas such as Regorogile, Ipeleng, Marapong and Mahwelereng should be actively undertaken.

8.4 Transportation

Recommended interventions in the *short-medium term* include:

- The vehicle emissions database should be reviewed with updated traffic count data as these become available,
- A comprehensive emissions monitoring and diesel testing programme should be initiated in congested areas,
- A detailed assessment of the vehicle fleet in the District should be undertaken including information on vehicle numbers, type, age and fuel usage.
- The future regulation of diesel-drive vehicles. The Future Emitters Project and the Norms and Standards Setting Project will develop regulations, although this will not be applicable to on-road vehicles. Local authorities will be expected to establish control measures for on-road vehicles through local by-laws,
- Vehicles are likely to be declared the first controlled emitters in South Africa,
- Improved fuel quality with a reduction in the sulphur content (50 ppm).

8.4 Agriculture and Biomass Burning

Recommended interventions for agriculture in the *short-long term* include:

- The District Municipality should obtain information on the quantity of pesticides consumed in the District.
- Crop spraying should only take place under favourable atmospheric conditions to reduce spray drift,
- Agricultural burning should also only be allowed under favourable dispersion conditions to reduce the air quality impact.

Recommended interventions for biomass burning in the *short-long term* include:

- Emissions from biomass burning need to be accurately quantified,
- The role of the fire services in air pollution control needs to be identified in each Local Municipality,

- Each local Fire Department should maintain and update a database of the locations of veld fires and the extent of the areas burnt. This will assist with the quantification of biomass burning emissions,
- Regional scheduled burning areas should be published for agricultural and management fires,
- A biomass burning advisory line should be established by the District to assist with agricultural burning.

8.5 Waste Disposal and Treatment

Recommendations interventions for waste treatment and disposal in the short-*medium term* include:

- The District should develop a detailed emissions inventory of all waste sources in the area, including incinerators, sewage and waste water treatment works and landfills,
- All operating incinerators should be permitted and operating within their permit requirements,
- All waste disposal sites should be in compliance with the DWAF minimum requirements for landfills,
- The District should introduce awareness raising programmes around waste minimization and recycling initiatives,
- Efficient service delivery in residential areas will reduce illegal dumping and burning,
- The Landfill Permitting Backlog Project currently being undertaken by DEAT will delegate the responsibility to Province to ensure that all landfills are permitted and operating legally.