

# PROPOSED CATO RIDGE REGIONAL LANDFILL

AIR QUALITY MANAGEMENT PLAN

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**PROPOSED CATO RIDGE  
REGIONAL LANDFILL**  
**AIR QUALITY MANAGEMENT PLAN**  
**Durban Solid Waste**

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# QUALITY MANAGEMENT

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# 1 INTRODUCTION

Durban Solid Waste (DSW) proposes a landfill site in Cato Ridge, to be known as the Cato Ridge Regional Landfill. The Final Environmental Impact Assessment Report (EIR) for the proposed site was submitted in March 2010 to the competent authority, the KwaZulu-Natal (KZN) Department of Agriculture, Environmental Affairs and Rural Development (DAEARD), now known as the KZN Department of Economic Development, Tourism and Environmental Affairs (DEDTEA). In September 2014 DEDTEA issued a letter to DSW requesting that additional information be provided to assist them to considering and take a decision in respect of the proposed Cato Ridge Regional Landfill. An Addendum Report has been prepared to expedite the decision making process. This air quality management plan (AQMP) forms part of the addendum report and Environmental Management Plan (EMP).

The original air quality impact assessment (AQIA) for the site was conducted by Margot Saner and Associates (MSA) in 2007. The aims of the original AQIA were to:

- Determine baseline air quality;
- Select appropriate environmental benchmarks in the absence of national air quality standards at the time;
- Identify local sensitive receptors;
- Assess potential impacts on each receptor; and
- Determine buffer zones around the proposed site.

A health buffer (based on ambient benzene concentrations), a dust management zone, and an odour management zone were delineated by MSA, with recommendations for community relocations from within the health buffer. In 2009, a review report by WSP Environment and Energy (WSP) questioned the use of Pietermaritzburg meteorology in the modelling assessment, and disputed the long term benzene exposure values calculated for local receptors and the use of a 1:200 000 cancer risk for health buffer delineation. Findings from the WSP modelling assessment indicated that maximum long-term benzene concentrations would be less than  $0.5 \mu\text{g}/\text{m}^3$  beyond the site boundaries, significantly lower than the 2009 annual national ambient air quality standard (NAAQS)<sup>1</sup> of  $10 \mu\text{g}/\text{m}^3$ . It was recommended by WSP that a buffer zone be determined based solely on nuisance factors (odour and dust) since health impacts were deemed not significant. This Air Quality Management Plan (AQMP) is compiled in line with the findings of this original AQIA (MSA), and the review report (WSP) and considers current legal requirements.

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<sup>1</sup> And the revised (2015) NAAQS of  $5 \mu\text{g}/\text{m}^3$ .

# 2 REGULATORY FRAMEWORK

The National Environmental Management: Air Quality Act (Act 39 of 2004) (NEM:AQA) came into effect on 11 September 2005. A staggered promulgation that iteratively replaced sections of the Atmospheric Pollution Prevention Act 45 of 1965 (APPA) saw APPA fully repealed by 1 April 2010.

Key features of the current legislation include:

- A decentralisation of air quality management responsibilities;
- The identification and quantification of significant emission sources that then need to be addressed;
- The development of ambient air quality targets as goals for driving emission reductions;
- The use of source-based (command-and-control) measures in addition to alternative measures, including market incentives and disincentives, voluntary programmes, and education and awareness;
- The promotion of cost-optimised mitigation and management measures;
- Air quality management planning by authorities, and emission management planning by sources; and
- Access to information and public consultation.

## 2.1 AMBIENT AIR QUALITY

NEM:AQA introduced a management system based on national ambient air quality standards (NAAQS) and corresponding emission limits to achieve them. Two significant regulations stemming from NEM:AQA have been published as Government Notices, namely:

- *National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) National Ambient Air Quality Standards* (Government Notice 1210, Government Gazette 32816, 2009)<sup>2</sup>.
- *National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) List of Activities Which Result in Atmospheric Emissions Which Have or May Have a Significant Detrimental Effect on the Environment, Including Health, Social Conditions, Economic Conditions, Ecological Conditions or Cultural Heritage* (Government Notice 248, Government Gazette 33064, 2010)<sup>3</sup>.

The NAAQS relevant to this assessment are presented in

Table 1 below. Particulate matter<sup>4</sup> is the key concern associated with landfill sites, due to the potential for wind entrained dust from exposed surfaces and fine wastes. Nitrogen dioxide (NO<sub>2</sub>) and carbon monoxide (CO) are relevant during flaring operations. Benzene is a component of landfill gas. Landfill gas is passively emitted to atmosphere and can be collected and vented or flared (as will be the case at the proposed Cato Ridge Regional Landfill).

<sup>2</sup> Subsequent standards for PM<sub>2.5</sub> were published in Government Notice 486, Government Gazette 35463, 2012.

<sup>3</sup> Amendments were published in Government Notice 893, Government Gazette 37054, 2013.

<sup>4</sup> PM<sub>10</sub> comprises the component with an aerodynamic diameter less than 10 microns and PM<sub>2.5</sub> comprises the component with an aerodynamic diameter less than 2.5 microns.

Table 1: Applicable National Ambient Air Quality Standards (NAAQS)

Particulate Matter (PM)						
Averaging Period	Concentration ( $\mu\text{g}/\text{m}^3$ )		Allowable Exceedences		Compliance Date	
	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Annual	50	25	0	0	Immediate – 31/12/2014	Immediate – 31/12/2015
	40	20	0	0	01/01/2015	01/01/16 – 31/12/2029
Daily	120	65	4	4	Immediate – 31/12/2014	Immediate – 31/12/2015
	75	40	4	4	01/01/2015	01/01/16 – 31/12/2029
Nitrogen dioxide (NO <sub>2</sub> )						
Averaging Period	Concentration ( $\mu\text{g}/\text{m}^3$ )		Allowable Exceedences		Compliance Date	
Hourly	200		88		Immediate	
Annual	40		0		Immediate	
Carbon monoxide (CO)						
Averaging Period	Concentration ( $\text{mg}/\text{m}^3$ )		Allowable Exceedences		Compliance Date	
Hourly	30		88		Immediate	
8-hour	10		11		Immediate	
Benzene (C <sub>6</sub> H <sub>6</sub> )						
Averaging Period	Concentration ( $\mu\text{g}/\text{m}^3$ )		Allowable Exceedences		Compliance Date	
Annual	10		0		Immediate – 31/12/2014	
	5				01/01/2015	

## 2.2

## DUST FALLOUT

Acceptable dust fallout rates for both residential and non-residential areas (**Table 2**) were provided in the *National Dust Control Regulations* (Government Notice 827, Government Gazette 36974, 2013).

Table 2: Acceptable dust fallout rates

Restriction Areas	30 Day Average Dust Fallout ( $\text{mg}/\text{m}^2/\text{day}$ )	Permitted Frequency of Exceedence	Reference Method
Residential Area	$D < 600$	Two within a year, not sequential months	ASTM D1739
Non-Residential Area	$600 < D < 1,200$	Two within a year, not sequential months	ASTM D1739

Any person who conducts an activity that might give rise to dust in quantities that may exceed the standards above must, upon receipt of a written notice from the air quality officer (AQO), implement a dustfall monitoring program and submit a dustfall report to the AQO with a period of time specified by the AQO. A schedule for submission of subsequent reports (annually or more frequently) will be approved by the AQO. If the above standards are exceeded, and within three months of submission of the dust monitoring report, the facility must develop and submit a revised dust management plan to the AQO for approval. Such a plan must:

- Identify all possible sources of dust within the affected site;
- Detail the best practicable measures to be undertaken to mitigate dust emissions;
- Detail an implementation schedule;



- Identify the line management responsible for implementation;
- Incorporate the dust fallout monitoring plan; and
- Establish a register for recording all complaints received regarding dustfall, and for recording follow up actions and responses to the complainants.

## 2.3 ODOUR

In line with Section 35 of NEMAQA:

- The Minister or MEC<sup>5</sup> may prescribe measures for the control of offensive odours emanating from the specified activities; and
- The occupier of any premises must take all reasonable steps to prevent the emission of any offensive odour caused by any activity on such premises.

Odour performance criteria guide decision makers on odour management and can be used to assess whether odour control and management techniques need to be implemented. Since specific measures for the assessment and control of offensive odours in South Africa are yet to be promulgated, international guidance generally is sought in odour assessments.

## 2.4 EXTRACTION OF LANDFILL GAS

*Section 7: National Norms and Standards* of The National Environmental Management: Waste Act 59 of 2008 (NEM:WA) makes provision for the *National Standards for the Extraction, Flaring or Recovery of Landfill Gas* (Government Notice 924, Government Gazette 37086, 2013). The standards control the extraction, flaring or recovery of landfill gas to minimise potential harmful impacts on the environment.

Any extraction of landfill gas at the Cato Ridge Regional Landfill would need to comply with regulations set out in **Government Notice 924**. With respect to air quality, the following subsections are relevant:

- Section 5: Requirements during planning or preparation phase:
  - (1)(a) Identify and list all environmental aspects or hazards of the proposed project and associated potential negative impacts or risks on the biological and socio-economic environments.
  - (1)(b) Evaluate the level of significance of such impacts or risks.
- Section 10: Monitoring and reporting requirements:
  - (6) Air quality monitoring should be conducted throughout the landfill gas flaring period at the perimeter of the site as a safety precaution.
  - (10) The (required) annual environmental performance audit should include the following:
    - (e) Confirmation of compliance with the Air Quality Plan of the project.
- Section 11: General requirements:
  - (3) Gaseous emissions from the venting, flaring or electricity generation process must comply with the requirements of NEM:AQA.

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<sup>5</sup> Member of the Executive Council

# 3 RECOMMENDATIONS

In line with findings of the AQIA (MSA), review report (WSP) and updated legal requirements, the following are recommended for the management of air quality at the proposed Cato Ridge Regional Landfill.

## 3.1 DUST MANAGEMENT

### CONSTRUCTION PHASE

- Shade cloth along the active working area / fenceline to limit the transfer of dust offsite.
- Use of side screens during excavation activities.
- Reduction, where feasible, of the drop heights of excavated materials.
- Excavation work should be halted during high wind conditions (>20 km/hr).
- Wetting of stockpiles of excavated materials. Regular light wetting tends to be most effective at limiting dust.
- Daily sweeping of paved roads onsite (or more regularly if dust concerns persist).
- Regular wetting of unpaved roads using a vehicle water spray. Regular light wetting tends to be most effective at limiting dust.
- An onsite speed limit of 20 km/hr must be strictly maintained.
- Wheel wetting of vehicles leaving the site can limit the transfer of dusty materials offsite.
- Any complaints from the public must be logged on a complaints register, which must also document the prevailing weather conditions, likely source of dust and corrective actions.

### OPERATIONAL PHASE

- A vegetation barrier along the fenceline should be established to limit the transfer of dust offsite.
- Use of side screens during excavation activities.
- Reduction where feasible of the drop heights of excavated materials.
- Excavation work should be limited during high wind conditions (>20 km/hr).
- Wetting of stockpiles of excavated materials. Regular light wetting tends to be most effective at limiting dust.
- Daily covering of the active face.
- Immediate covering of completed cells using a capping layer.
- Fine, friable cover materials must be avoided.
- The size of the exposed face must be limited as much as possible.
- Dusty waste should be delivered in sealed bags with pre-notification of delivery.
- Wetting of dusty wastes if bags are opened for disposal.
- All arrivals must be inspected to ensure that dusty wastes are delivered with pre-notification and disposed of appropriately.
- Dusty wastes must not be disposed of during high wind conditions or during high particulate events, e.g. sugarcane fire episodes.
- Dusty wastes can be pre-treated with a water spray.
- No waste burning onsite.
- Roads must be paved where feasible.

- Daily sweeping of paved roads onsite (or more regularly if dust concerns persist).
- Regular wetting of unpaved roads using a vehicle water spray. Regular light wetting tends to be most effective at limiting dust.
- An onsite speed limit of 20 km/hr must be strictly maintained.
- Wheel wetting of vehicles leaving the site can limit the transfer of dusty materials offsite.
- Any complaints from the public must be logged on a complaints register, which must also document the prevailing weather conditions, likely source of dust and corrective actions.
- Dust fallout monitoring reports must be submitted to the AQO within the timeframes stipulated by the AQO (annually or more frequently).
- If non-compliances are recorded, within three months of the submission of the dust fallout monitoring report, the dust management plan must be revised and submitted to the AQO for approval.

## CLOSURE

- Capping and vegetating of all cells.
- Maintenance of a vegetated fenceline.
- No burning onsite.
- Sweeping of paved roads in daily use (daily sweeping or more regularly if dust concerns persist).
- Wetting of any unpaved roads in daily use using a vehicle water spray. Regular light wetting tends to be most effective at limiting dust.
- An onsite speed limit of 20 km/hr must be strictly maintained.
- Wheel wetting of vehicles leaving the site can limit the transfer of dusty materials offsite.
- Any complaints from the public must be logged on a complaints register, which must also document the prevailing weather conditions, likely source of dust and corrective actions.
- Dust fallout monitoring reports must be submitted to the AQO within the timeframes stipulated by the AQO (annually or more frequently).
- If non-compliances are recorded, within three months of the submission of the dust fallout monitoring report, the dust management plan must be revised and submitted to the AQO for approval.

## 3.2

## ODOUR MANAGEMENT

### OPERATIONAL PHASE

- Vegetation (shrubs and trees) along the fenceline will limit the transfer of odorous dust offsite. Until a vegetation screen is established, shade cloth along the fenceline offers an effective barrier.
- Efficient timetabling of arrivals and clear instructions to drivers will ensure prompt offloading of waste.
- Particularly odorous wastes should be delivered with pre-notification. These wastes should be treated with odour neutralisers and promptly covered.
- The provision of adequate covering of offloaded waste. At the close of each day or earlier, the active face must be covered.
- Immediate covering of completed cells using a capping layer.

- Effective leachate management<sup>6</sup>.
- Effective contaminated runoff management<sup>7</sup>.
- Effective landfill gas management (including collection and combustion)<sup>8</sup>.
- Any complaints from the public must be logged on a complaints register, which must also document the prevailing weather conditions, likely source of odour and corrective actions.

## CLOSURE

- Capping and vegetating of all cells.
- Maintenance of a vegetated fenceline.
- Effective leachate management post closure remains essential to limit odour onsite.
- Effective landfill gas management (including collection and combustion) post closure remains essential to limit odour onsite.
- Any complaints from the public must be logged on a complaints register, which must also document the prevailing weather conditions, likely source of odour and corrective actions.

### 3.3

## MONITORING

- Continuous (12 months per annum) dust fallout monitoring at six fenceline and at four community receptor locations (**Table 3** and **Figure 1**).
  - One baseline (pre-construction) monitoring campaign should be conducted.
  - Once the site is operational, if monitoring results are consistently below relevant standards (**Table 2**), monitoring frequency can be revised to seasonal or biannual and only at the site boundary; or as stipulated by authorities.
- Seasonal benzene and hydrogen sulphide (H<sub>2</sub>S) monitoring (one week sampling period, four times annually) at six fenceline and at four community receptor locations (**Table 3** and **Figure 1**).
  - One baseline (pre-construction) monitoring campaign should be conducted.
  - Once the site is operational, if monitoring results are consistently below relevant standards<sup>9</sup>, monitoring frequency can be revised to biannual or annual and only at the site boundary.
- In line with Government Notice 924 of 2013, fenceline monitoring should take place during a landfill gas flaring event to assess the ambient impacts of flaring.
  - It is recommended that continuous (once off) CO and NO<sub>2</sub> takes place during a landfill gas flaring event at the fenceline locations F1 to F4. A portable measuring device should measure at each point for 10-20 minute intervals.
- Installation of an onsite weather station.
  - Onsite meteorological data will guide interpretation of ambient monitoring results.
  - Onsite meteorological data should be documented at the time of complaints.
  - Critical onsite wind speeds can be identified at which excavation work and disposal should cease to limit dust emissions.

<sup>6</sup> The collection and treatment systems for leachate onsite have been fully integrated with site operations as described in Sections 5.6.3 of the Final Environmental Impact Report (2010).

<sup>7</sup> The collection and treatment systems for contaminated runoff have been fully integrated with site operations as described in Sections 5.6.2 of the Final Environmental Impact Report (2010).

<sup>8</sup> The extraction and use of landfill gas have been fully integrated with site operations as described in in Section 5.7 of the Final Environmental Impact Report (2010).

<sup>9</sup> This would be the annual standard for benzene (5 µg/m<sup>3</sup>) in the absence of a short term standard, and the United States Environmental Protection Agency's odour threshold for H<sub>2</sub>S (11 µg/m<sup>3</sup>).

- Onsite meteorological data will provide inputs for further atmospheric dispersion modelling assessments.

**Table 3: Recommended fenceline and community monitoring points**

Label	Category	Distance from site centre (km)	Direction from site centre	Justification for site
F1	Fenceline	0.74	WSW	Prevailing wind (ENE)
F2	Fenceline	0.81	NNW	Prevailing wind (SSE)
F3	Fenceline	1.13	NNE	Proximate receptor
F4	Fenceline	0.58	E	Proximate receptor
F5	Fenceline	1.10	SE	Prevailing wind (NW)
F6	Fenceline	1.03	SSW	Proximate receptor
C1	Community	1.98	WSW	Receptor on prevailing wind (ENE)
C2	Community	2.42	NNW	Receptor on prevailing wind (SSE)
C3	Community	1.29	NE	Proximate receptor
C4	Community	1.42	SE	Receptor on prevailing wind (NW)



Figure 1: Recommended fenceline and community air quality and dust fallout monitoring points

### 3.4

## MANAGEMENT OF COMMUNITY HEALTH AND NUISANCE IMPACTS

- The original AQIA (MSA) recommended community relocations in the vicinity of the site. This was on the basis model outputs using a meteorological file from Pietermaritzburg and the application of a buffer based on 1:200,000 cancer risk ( $0.65 \mu\text{g}/\text{m}^3$ ). Using a local (Cato Ridge) meteorological file, WSP found that offsite benzene concentrations do not exceed  $0.5 \mu\text{g}/\text{m}^3$ . In light of these revised findings, relocation is not deemed necessary unless exceedences of the NAAQS of  $5 \mu\text{g}/\text{m}^3$  are recorded at community receptors once the site is operational. The modelling results suggest that it is highly unlikely that values will approach  $5 \mu\text{g}/\text{m}^3$ .
- The MSA report suggests that if the site is well operated, odour should not be detected beyond the boundary of the site. An odour management zone was delineated on the basis of a single incidence of 2 odour units from the dispersion model. It is suggested that  $\text{H}_2\text{S}$  is remodelled with an appropriate meteorological file to assess likely odour impacts offsite.
- The dust buffer in the original AQIA was based on an annual average  $\text{PM}_{10}$  concentration of  $25 \mu\text{g}/\text{m}^3$ . In line with the current NAAQS, a  $40 \mu\text{g}/\text{m}^3$  buffer should be considered for an assessment of health impacts, but this cannot be directly correlated with a dust nuisance impact.
  - Dust fallout modelling is recommended to delineate a nuisance dust buffer. This is lacking from the original AQIA.
  - $\text{PM}_{10}$  remodelling with an appropriate meteorological file is also recommended.

# 4

## SUMMARY

This document provides recommendations for air quality management at the proposed Cato Ridge Regional Landfill in line with findings from a 2007 AQIA (MSA), 2009 revision report (WSP) as interpreted with current legal requirements on:

- ambient air quality;
- dust fallout;
- odour; and
- extraction of landfill gas.

Specific recommendations are made to limit offsite impacts of dust and odour. Furthermore the installation of an onsite weather station and a fenceline and community air quality monitoring network are specified. Monitoring results will indicate whether sufficient mechanisms are in place to maintain odour and dust at acceptable levels, while onsite meteorological data allows for an interpretation of the source of any odour or dust events. It is recommended that the monitoring of dust, benzene and odour occurs before any community relocations are considered in line with modelling outputs subsequent to the original AQIA.