An external professional service provider has been appointed over a three year period to conduct air quality monitoring for the Vissershok Landfill Site complex that consists of Vissershok South and Vissershok North.

The air quality sampling includes the following:

- Monthly Lateral Gas Migration Monitoring
- Bi-annual Lateral Gas Migration and Risk Assessment
- Bi-annual Fenceline Ambient Gaseous Monitoring
- Cumulative Ambient Air Quality Modelling

The findings and conclusions for various reports are outlined below;

**Monthly Lateral Gas Migration Monitoring Report**

**Vissershok South Landfill Site**

During 2009, an independent baseline biogas emissions study was conducted at the active landfill sites of the City of Cape Town which informed an air quality monitoring programme. Subsequently, the three year monitoring programme has been rolled out and focuses on the following:

- Monthly lateral migration monitoring;
- Bi-annual risk assessment
- Bi-annual ambient monitoring and
- Air dispersion modelling

The baseline study also informed the establishment of monitoring probes on the site. This is revisited based on the activities and monitoring results. Currently, the site houses 30 lateral migration probes that have been installed around the boundaries the site.

![Locality map of lateral monitoring probes at Vissershok South Landfill](image-url)
The findings of the October 2018 sampling showed that no landfill gas concentrations were detected in any of the buildings or offices of the site. It was established that low concentrations of carbon dioxide were detected in all the lateral probes with the highest concentration of 5.4 Vol% encountered. Ammonia was detected at 10 of the probes, with the highest concentration of 57 ppm encountered. Low concentrations of VOC’s were detected in three lateral probes. No carbon monoxide, methane or hydrogen sulphide was detected at any of the lateral probes.

The overall conclusion from the independent specialist advised that, based on the data, a low risk of landfill gas migration has been determined.

**Vissershok North Landfill Site**

The northern site has 7 lateral migration probes that have been installed at the eastern and northern perimeter of the constructed cell areas. Engineered cells have been constructed at the northern site but no waste placement has occurred at the area.

![Locality map of lateral monitoring points at Vissershok North Landfill](image)

**Figure 2: Locality map of lateral monitoring points at Vissershok North Landfill**

The findings of the October 2018 sampling concluded that no methane, carbon monoxide, ammonia, hydrogen sulphide or VOC’s were detected in any of the lateral probes. Low concentration of carbon dioxide was detected with the highest concentration of 1.6 Vol% encountered. The carbon dioxide concentrations mentioned as being lower this month compared to the previous months. The occurrence of carbon dioxide in the probes could be due to the historical evaporation ponds that were used as a method of waste disposal of liquid waste at the northern site area in the past.

The overall conclusion is that there is no risk for lateral gas migration at the site.
Bi-annual Lateral Gas Migration and Risk Assessment

Vissershok South Landfill Site
The scope of the work includes the reviewing of lateral gas migration monitoring results over a six-month period and assessing the risk of lateral gas migration potential at the site considering the potential receptors in the area.

The findings of the report for June 2018 assessed the migration monitoring performed from January 2018 up to June 2018. The findings are that no landfill gas concentrations were detected in any of the buildings or offices at the site over the period. No methane, carbon monoxide and hydrogen sulphide were detected at any of the lateral probes over the six month period. Low concentrations of carbon dioxide were detected with the highest concentration of 5.6 Vol% encountered over the period. Ammonia and VOC’s concentrations were very low and only detected in a few lateral probes.

The conclusion based on the monitoring results is that the risk for lateral gas migration is low at the site.

Vissershok North Landfill Site
The scope of the work includes the reviewing of lateral gas migration monitoring results over a six-month period and assessing the risk of lateral gas migration potential at the site considering the potential receptors in the area.

The findings of the report for June 2018 assess the migration monitoring performed from January 2018 up to June 2018. The findings were that no methane, carbon monoxide, hydrogen sulphide or VOC’s were detected at any of the lateral probes over the period. Low concentration of carbon dioxide was detected with the highest concentration of 5.0 Vol% encountered. Low concentrations of ammonia were detected intermittently at the lateral probes over the period.

The conclusion is that the risk for lateral gas migration at the site is negligible as no methane concentrations have been detected as no active landfilling operations occurring at the site area.

Bi-annual Fenceline Ambient Gaseous Monitoring

Vissershok South Landfill Site
The objective of the monitoring is to assess if the ambient gaseous conditions around the perimeter of the site comply with the South African Air Quality Standards for criteria pollutants and International Health Risk Thresholds.

Ambient gaseous monitoring was conducted in May 2018 at Vissershok South Landfill. The type of monitoring included the use of passive and active sampling at 15 locations around the perimeter of the site by means of various techniques and specialised equipment.

The conclusion of the monitoring was that the ambient concentrations of the pollutants measured were within the National Air Quality Standards and other guidelines.

Vissershok North Landfill Site
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The conclusion of the monitoring was that the ambient concentrations of the pollutants measured were within the National Air Quality Standards and other guidelines.

**Cumulative Ambient Air Quality Modelling – Both sites**

The modelling report of June 2018 forms part of the current air quality monitoring completed at Vissershok Landfill Complex.

The air pollutants and fugitive dust emissions from the Vissershok Landfill South and North were quantified and the air quality impacts determined via air dispersion modelling utilising AERMOD View 9.6.0.

The air quality impact due the landfill site operations were assessed against relevant local and international guidelines in terms of:

- Odour nuisance;
- Short-term and long-term non-carcinogenic health risk;
- Carcinogenic risk;
- Daily and annual PM10 concentrations; and
- Daily dust fallout.

The conclusion of the modelling was that the communities surrounding the landfill complex are unlikely to be affected by odour due to landfill gas emissions. Any local receptors may experience odour impacts depending on ten prevailing weather conditions and the location of the active workface area of the landfill during operational hours. The staff at the active site may also experience odour nuisances from time to time due to site operations. No health impacts are associated with odour exposure.

The health risks due to exposure to landfill gas were found to be low outside the site boundaries and the sensitive receptors examined. There were no exceedances outside the site boundaries for either non-carcinogenic or carcinogenic pollutants. The health risks for the staff exposure were considered to be low as well.

The PM$_{10}$ 24-hour and annual concentrations were well within the guidelines outside the site boundaries. The dust fallout was well within the residential guideline of 600 mg/m$^2$/day, and as such the dust nuisance impact on the sensitive receptors is considered to be very low.

The dispersion modelling indicated that elevated PM$_{10}$ concentrations and high dust deposition levels are expected along the access road and at the working face in the active landfill area. These levels are not considered dangerous for the workers’ health. However, in order to minimise the potential impacts on the staff at these areas, it is recommended that the access road close to the weighbridge be regularly swept and watered. This will minimise the accumulation of silt on the road surface and reduce the fugitive emissions caused by vehicle entrainment. In addition, watering of the access road close to the working face should be also considered. The staff operating at the weighbridge and working face should also be equipped with dust masks.