

TECHNICAL MEMORANDUM

DATE 21 December 2021

Project No. 1667000-590-TM-Rev0

TO Barro Group Pty Ltd,

CC

FROM Golder Associates Pty Ltd

EMAIL cvanbrink@golder.com.au

BARRO SUNSHINE LANDFILL – VOLATILE ORGANIC COMPOUNDS (VOC) MONITORING RESULTS.

Barro Group Pty Ltd (Barro) engaged Golder Associates Pty Ltd. (Golder) to undertake boundary monitoring for volatile organic compounds (VOCs) at two locations along the Barro Sunshine Landfill (the site) boundary following the identification of a hotspot in Cell 5 North. The following technical memorandum presents the results from sampling conducted on the 4th to 5th December 2021.

Sampling Location

Monitoring for VOCs was undertaken at two locations using summa canisters, located near the western boundary (“West”) and northern boundary (“North”). These locations were chosen to best represent ambient air quality conditions as close as practicable neighbouring residential properties. Details of the monitoring locations and corresponding siting assessment against criteria contained in AS3580.10.1 are presented in Table 1.

Table 1: Monitoring locations – VOCs by evacuated canister

| Siting requirements (AS 3580.1.1) | Location ID | |
|---|-----------------|------------------|
| | West | North |
| Co-ordinates (AMG) | 308579, 5820432 | 3087310, 5820691 |
| Clear sky angle 120 ⁰ | ✓ | ✓ |
| Unrestricted air flow of 270 ⁰ around sample inlet or 180 ⁰ if inlet is on side of building | ✓ | ✓ |
| Height above ground to probe 2 m – 15 m | ✓ | ✓ |
| ≥2 m from road | ✓ | ✓ |
| 10 m from any object with a height exceeding 2 m below the height of sample inlet | X* | X* |
| No extraneous sources nearby | ✓ | ✓ |

NOTE: * trees are located approximately 8 meters from the monitoring locations and are situated on the far side of the monitor to the landfill

The location of the North and West summa canisters does not meet all the siting criteria contained in AS3580.10.1 due to trees located near the site boundary. The presence of nearby trees is a common non-compliance for ambient air quality monitoring sites, however for the purpose of the monitoring it is considered satisfactory.

Sampling Methodology

The sampling for VOCs was in accordance with Golder Associates Test Method C9 “*Canister (Evacuated) Sampling for VOC and Reduced Sulphur compounds: In Ambient Air and Source Emissions*”.

Sampling was undertaken by collecting whole air samples in 6-litre electro-polished (SUMMA) stainless steel canisters fitted with a flow restricting device set to sample over a 24-hour period. The canister is under negative pressure and when opened, slowly draws a whole air sample into the canister. The canister is closed at the end of the monitoring period, while still under a negative pressure.

Sample analysis was conducted by Gas Chromatography / Mass Spectrometry (GC/MS) in accordance with USEPA Method TO-15. The method uncertainty varies with the level of component detected and has been reported between 25.5% and 47.4%.

Sampling was conducted by Golder (NATA Laboratory accreditation No. 1910). Sample analysis was conducted by SGS (NATA Laboratory Accreditation No. 2562).

Assessment Criteria

As part of the implementation of the *Environment Protection Act 2017* which came into effect on 1 July 2021, the Environment Protection Authority, Victoria (EPA Vic), published the draft Guideline for assessing and minimising air pollution in Victoria, Publication 1961, May 2021 (draft guideline). This draft air pollution guideline, when finalised, is intended to replace parts of the *State Environment Protection Policy (Air Quality Management)* (SEPP(AQM)). The *National Environmental Protection (Air Toxics) Measure*, (NEPM (Air Toxics)), describes air quality objectives and sampling methodologies at sites where significantly elevated concentrations of one or more air toxics are expected to occur.

Golder has used the SEPP (AQM) criteria for assessing the VOC results at the site since the beginning of the monitoring programme in 2019. Schedule B of the SEPP(AQM) specifies criteria as a 1-hour average and are therefore, not directly comparable to the monitored VOC concentrations collected over a 24-hour period. Twenty-four hour criteria were derived using the EPA Victoria recommended method outlined in EPA Victoria Publication 1551.

Golder will compare the VOC results to the derived and applicable 24-hour criteria from each of the publications as follows:

- Twenty-four hour criteria based on SEPP (AQM) Schedule B 1-hour average criteria derived using the recommended method outlined in EPA Victoria Publication 1551. This is intended to provide continuity from previous assessments.
- the NEPM (Air Toxics) 24 hour average criteria
- Draft air pollution guideline 24 hour average criteria

Where applicable criteria are presented as parts per million (ppm), these concentrations have been converted to micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) to allow for direct comparison against the laboratory results.

Results

Volatile organic compound results above the limit of reporting (LOR) for the sampling conducted on the 4th to 5th December 2021 are presented in Table 2. A complete list of measured VOC concentrations is presented in APPENDIX A.

Table 2: Results: VOCs by evacuated canister

| Site | West | North | (SEPP(AQM)) | Draft Air Pollution Guideline (Vic) | NEPM (Air Toxics) |
|--------------------|--|-----------|-------------|---|-------------------|
| Sample No | 21-2345 | 21-2346 | | | |
| Sample start | 4/12/2021 | 4/12/2021 | | | |
| Sample end | 5/12/2021 | 5/12/2021 | | | |
| Compound | Concentration $\mu\text{g}/\text{m}^3$ | | | | |
| tert-Butyl Alcohol | <3 | 2.5 | | | |
| Freon 11 | 1.5 | 1.4 | | | |
| Freon 12 | 2.8 | 2.6 | | | |

Note: shaded cells indicate no available 24-hour criteria

The compounds listed in Table 2 were detected above the limit of reporting (LOR) in either or both samples collected 4th to 5th December.

There are currently no 24-hour Victorian or national ambient air quality objectives for tert-butyl alcohol, freon-11 and freon-12.

Important Information Relating to this Report

Your attention is drawn to the document titled - "Important Information Relating to this Report", which is included in APPENDIX B of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder Associates has under the contract between it and its client.

Golder Associates Pty Ltd



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Attachments Appendix A – Lab Reports

Appendix B – Important Information Relating to this Report

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APPENDIX A

Lab Reports

Appendix A - Volatile Organic compounds

| Location | West | North |
|----------------------------------|--|-----------|
| Sample No | 21-2345 | 21-2346 |
| Start date | 4/12/2021 | 4/12/2021 |
| End date | 5/12/2021 | 5/12/2021 |
| Compound | Concentration ($\mu\text{g}/\text{m}^3$) | |
| Acrolein | <3.2 | <3.1 |
| Acrylonitrile | <8.3 | <8.1 |
| tert-Amyl Methyl Ether | <2.8 | <2.7 |
| Benzene | <2.3 | <2.2 |
| Bromodichloromethane | <4.6 | <4.5 |
| Bromoform | <5.5 | <5.4 |
| Bromomethane | <4.2 | <4 |
| 1,3-Butadiene | <1.4 | <1.3 |
| 2-Butanone (Methyl Ethyl Ketone) | <2.3 | <2.2 |
| tert-Butyl Alcohol | <2.3 | 2.5 |
| n-Butylbenzene | <3.7 | <3.6 |
| sec-Butylbenzene | <3.7 | <3.6 |
| tert-Butylbenzene | <3.7 | <3.6 |
| Carbon Tetrachloride | <4.6 | <4.5 |
| Chlorobenzene | <2.8 | <2.7 |
| Chloroethane | <2.8 | <2.7 |
| Chloroform | <4.2 | <4 |
| Chloromethane | <3.2 | <3.1 |
| 2-Chloroprene | <5.1 | <4.9 |
| 3-Chloropropene | <3.2 | <3.1 |
| 2-Chlorotoluene | <4.2 | <4 |
| alpha-Chlorotoluene | <3.2 | <3.1 |
| Cumene | <3.7 | <3.6 |
| Cyclohexane | <1.8 | <1.8 |
| o-Cymene | <3.7 | <3.6 |
| Dibromochloromethane | <5.5 | <5.4 |
| 1,2-Dibromoethane (EDB) | <5.5 | <5.4 |
| 1,2-Dichlorobenzene | <6 | <5.8 |
| 1,3-Dichlorobenzene | <6 | <5.8 |
| 1,4-Dichlorobenzene | <6 | <5.8 |
| 1,1-Dichloroethane | <3.2 | <3.1 |
| 1,2-Dichloroethane | <4.6 | <4.5 |
| 1,1-Dichloroethene | <2.8 | <2.7 |
| cis-1,2-Dichloroethene | <3.7 | <3.6 |
| trans-1,2-Dichloroethene | <2.8 | <2.7 |
| 1,2-Dichloropropane | <8.3 | <8.1 |
| cis-1,3-Dichloropropene | <2.8 | <2.7 |
| trans-1,3-Dichloropropene | <3.2 | <3.1 |
| Diisopropyl Ether | <3.2 | <3.1 |
| 1,4-Dioxane | <2.8 | <2.7 |
| Ethyl Acetate | <3.7 | <3.6 |
| Ethyl Benzene | <2.8 | <2.7 |
| Ethyl tert-Butyl Ether | <2.3 | <2.2 |
| 4-Ethyltoluene | <2.8 | <2.7 |

Appendix A - Volatile Organic compounds

| Location | West | North |
|---------------------------|--|-----------|
| Sample No | 21-2345 | 21-2346 |
| Start date | 4/12/2021 | 4/12/2021 |
| End date | 5/12/2021 | 5/12/2021 |
| Compound | Concentration ($\mu\text{g}/\text{m}^3$) | |
| Freon 11 | 1.5 | 1.4 |
| Freon 113 | <4.6 | <4.5 |
| Freon 114 | <1.4 | <1.3 |
| Freon 12 | 2.8 | 2.6 |
| Heptane | <3.2 | <3.1 |
| Hexachlorobutadiene | <9.2 | <9 |
| Hexane | <2.8 | <2.7 |
| 2-Hexanone | <2.8 | <2.7 |
| m,p-Xylene | <6 | <5.8 |
| Methyl Methacrylate | <3.2 | <3.1 |
| Methyl tert-butyl ether | <2.8 | <2.7 |
| 4-Methyl-2-pentanone | <2.8 | <2.7 |
| Naphthalene | <9.7 | <9.4 |
| 2-Propanol | <46 | <45 |
| Propene | <4.6 | <4.5 |
| Propylbenzene | <3.2 | <3.1 |
| Styrene | <2.8 | <2.7 |
| 1,1,1,2-Tetrachloroethane | <4.6 | <4.5 |
| 1,1,2,2-Tetrachloroethane | <3.2 | <3.1 |
| Tetrachloroethene | <5.1 | <4.9 |
| Tetrahydrofuran | <1.8 | <1.8 |
| Toluene | <2.8 | <2.7 |
| 1,2,4-Trichlorobenzene | <17 | <16 |
| 1,1,1-Trichloroethane | <3.7 | <3.6 |
| 1,1,2-Trichloroethane | <3.7 | <3.6 |
| Trichloroethene | <4.2 | <4 |
| 1,2,4-Trimethylbenzene | <3.7 | <3.6 |
| 1,3,5-Trimethylbenzene | <2.8 | <2.7 |
| 2,2,4-Trimethylpentane | <4.2 | <4 |
| Vinyl Acetate | <3.2 | <3.1 |
| Vinyl Bromide | <3.7 | <3.6 |
| Vinyl Chloride | <1.8 | <1.8 |
| o-Xylene | <2.8 | <2.7 |

Results expressed as micrograms per cubic metre of air at 0°C and 101.325 kPa

Analysis conducted by SGS (NATA Laboratory Accreditation Number 2562).

Analysis conducted on 07/12/2021, Report No ME324143A

APPENDIX B

**Important Information
Relating to this Report**

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