

TECHNICAL MEMORANDUM

DATE 8 January 2020

Reference No. 1667000-186-M Rev0

TO Barro Group Pty Ltd

FROM Golder Associates

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

Barro Group Pty Ltd (Barro) engaged Golder Associates (Golder) to undertake boundary monitoring for volatile organic compounds (VOCs) at 2 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 between the 18th and 22nd December 2019.

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 at 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 ^o	✓	✓
Unrestricted air flow of 270 ^o around sample inlet or 180 ^o 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 electro-polished (SUMMA) stainless steel canisters fitted with a flow restricting device. 6L canisters were used to sample 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 report between 25.5% and 47.4%.

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

Results

Volatile organic compound results above the limit of reporting (LOR) for the sampling conducted between the 18 and 22 December 2019 and are presented in Table 2. A complete list of volatile organic compound analysed are presented in Appendix A.

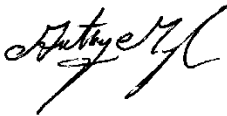
Table 2: Results: VOCs by evacuated canister

Site	North	West	North	West
Sample No	19-1847	19-1848	19-1850	19-1849
Sample start	18/12/2019 16:40	18/12/2019 16:50	21/12/2019 11:40	21/12/2019 11:30
Sample end	19/12/2019 16:36	19/12/2019 16:56	22/12/2019 10:45	22/12/2019 10:35
Compound	Concentration $\mu\text{g}/\text{m}^3$			
Ethyl Benzene	<3.2	<3.1	<3.1	7.5

Sample (19-1849) collected between the 21 - 22 December 2019 at the western boundary, has a reported ethylbenzene concentration of $7.5 \mu\text{g}/\text{m}^3$. There are currently no Victorian or National ambient air quality objectives for ethylbenzene.

Important information relating to this report

Your attention is drawn to the document, *Important Information Relating to this Report* (LEG04, RL2), which is contained in Appendix B. The statements presented in this document are intended to advise you of what your realistic expectations of this letter should be. The document is not intended to reduce the level of responsibility accepted by Golder Associates, but rather to ensure that all parties who may rely on this letter are aware of the responsibilities each assumes in so doing. We would be pleased to answer any questions the reader may have regarding this document.



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AM/MT/am

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APPENDIX A

Lab Results

Appendix A - Volatile Organic compounds

Location	North	West	North	West
Sample No	19-1847	19-1848	19-1850	19-1849
Sample Date	19/12/2019	19/12/2019	22/12/2019	22/12/2019
Compound	Concentration ($\mu\text{g}/\text{m}^3$)			
Acrolein	<3.8	<3.6	<3.6	<3.3
Acrylonitrile	<9.6	<9.2	<9.2	<8.5
tert-Amyl Methyl Ether	<3.2	<3.1	<3.1	<2.8
Benzene	<2.7	<2.6	<2.6	<2.4
Bromodichloromethane	<5.4	<5.1	<5.1	<4.7
Bromoform	<6.4	<6.1	<6.1	<5.7
Bromomethane	<4.8	<4.6	<4.6	<4.3
1,3-Butadiene	<1.6	<1.5	<1.5	<1.4
2-Butanone (Methyl Ethyl Ketone)	<2.7	<2.6	<2.6	<2.4
tert-Butyl Alcohol	<2.7	<2.6	<2.6	<2.4
n-Butylbenzene	<4.3	<4.1	<4.1	<3.8
sec-Butylbenzene	<4.3	<4.1	<4.1	<3.8
tert-Butylbenzene	<4.3	<4.1	<4.1	<3.8
Carbon Tetrachloride	<5.4	<5.1	<5.1	<4.7
Chlorobenzene	<3.2	<3.1	<3.1	<2.8
Chloroethane	<3.2	<3.1	<3.1	<2.8
Chloroform	<4.8	<4.6	<4.6	<4.3
Chloromethane	<3.8	<3.6	<3.6	<3.3
2-Chloroprene	<5.9	<5.6	<5.6	<5.2
3-Chloropropene	<3.8	<3.6	<3.6	<3.3
2-Chlorotoluene	<4.8	<4.6	<4.6	<4.3
alpha-Chlorotoluene	<3.8	<3.6	<3.6	<3.3
Cumene	<4.3	<4.1	<4.1	<3.8
Cyclohexane	<2.1	<2	<2	<1.9
o-Cymene	<4.3	<4.1	<4.1	<3.8
Dibromochloromethane	<6.4	<6.1	<6.1	<5.7
1,2-Dibromoethane (EDB)	<6.4	<6.1	<6.1	<5.7
1,2-Dichlorobenzene	<7	<6.6	<6.6	<6.2
1,3-Dichlorobenzene	<7	<6.6	<6.6	<6.2
1,4-Dichlorobenzene	<7	<6.6	<6.6	<6.2
1,1-Dichloroethane	<3.8	<3.6	<3.6	<3.3
1,2-Dichloroethane	<5.4	<5.1	<5.1	<4.7
1,1-Dichloroethene	<3.2	<3.1	<3.1	<2.8
cis-1,2-Dichloroethene	<4.3	<4.1	<4.1	<3.8
trans-1,2-Dichloroethene	<3.2	<3.1	<3.1	<2.8
1,2-Dichloropropane	<9.6	<9.2	<9.2	<8.5
cis-1,3-Dichloropropene	<3.2	<3.1	<3.1	<2.8
trans-1,3-Dichloropropene	<3.8	<3.6	<3.6	<3.3
Diisopropyl Ether	<3.8	<3.6	<3.6	<3.3
1,4-Dioxane	<3.2	<3.1	<3.1	<2.8

Appendix A - Volatile Organic compounds

Location	North	West	North	West
Sample No	19-1847	19-1848	19-1850	19-1849
Sample Date	19/12/2019	19/12/2019	22/12/2019	22/12/2019
Compound	Concentration ($\mu\text{g}/\text{m}^3$)			
Ethyl Acetate	<4.3	<4.1	<4.1	<3.8
Ethyl Benzene	<3.2	<3.1	<3.1	7.5
Ethyl tert-Butyl Ether	<2.7	<2.6	<2.6	<2.4
4-Ethyltoluene	<3.2	<3.1	<3.1	<2.8
Freon 11	<1.6	<1.5	<1.5	<1.4
Freon 113	<5.4	<5.1	<5.1	<4.7
Freon 114	<1.6	<1.5	<1.5	<1.4
Freon 12	<2.1	<2	<2	<1.9
Heptane	<3.8	<3.6	<3.6	<3.3
Hexachlorobutadiene	<11	<10	<10	<9.5
Hexane	<3.2	<3.1	<3.1	<2.8
2-Hexanone	<3.2	<3.1	<3.1	<2.8
m,p-Xylene	<7	<6.6	<6.6	<6.2
Methyl Methacrylate	<3.8	<3.6	<3.6	<3.3
Methyl tert-butyl ether	<3.2	<3.1	<3.1	<2.8
4-Methyl-2-pentanone	<3.2	<3.1	<3.1	<2.8
Naphthalene	<11	<11	<11	<10
2-Propanol	<54	<51	<51	<47
Propene	<5.4	<5.1	<5.1	<4.7
Propylbenzene	<3.8	<3.6	<3.6	<3.3
Styrene	<3.2	<3.1	<3.1	<2.8
1,1,1,2-Tetrachloroethane	<5.4	<5.1	<5.1	<4.7
1,1,2,2-Tetrachloroethane	<3.8	<3.6	<3.6	<3.3
Tetrachloroethene	<5.9	<5.6	<5.6	<5.2
Tetrahydrofuran	<2.1	<2	<2	<1.9
Toluene	<3.2	<3.1	<3.1	<2.8
1,2,4-Trichlorobenzene	<19	<18	<18	<17
1,1,1-Trichloroethane	<4.3	<4.1	<4.1	<3.8
1,1,2-Trichloroethane	<4.3	<4.1	<4.1	<3.8
Trichloroethene	<4.8	<4.6	<4.6	<4.3
1,2,4-Trimethylbenzene	<4.3	<4.1	<4.1	<3.8
1,3,5-Trimethylbenzene	<3.2	<3.1	<3.1	<2.8
2,2,4-Trimethylpentane	<4.8	<4.6	<4.6	<4.3
Vinyl Acetate	<3.8	<3.6	<3.6	<3.3
Vinyl Bromide	<4.3	<4.1	<4.1	<3.8
Vinyl Chloride	<2.1	<2	<2	<1.9
o-Xylene	<3.2	<3.1	<3.1	<2.8

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 6/01/2020, Report No M191800

APPENDIX B

**Important Information Relating to
This Report**

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