Tullamarine Landfill – Community Meeting Updates

April 2018

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Operational Updates

- Groundwater, stormwater & leachate sampling occurring this week
- PCPAN received from EPA, no changes
- Routine flare maintenance & calibration was completed on 6th March.
- Received post closure environmental monitoring plan and finalized gw & leachate management plan – there are no changes from when Kieren consulted you on the drafts.

Projects update:
Stormwater concept

Design completed by Golder is currently being assessed internally.
There will be a final decision made by the next meeting.
The current system is maintaining adequate control of stormwater on the site in the interim.

Landfill Gas Extraction System

We will not be putting any penetrations into the landfill cap for gas extraction. We will only ever make improvements where & when identified to the existing system. This is undertaken through regular routine maintenance & inspections.

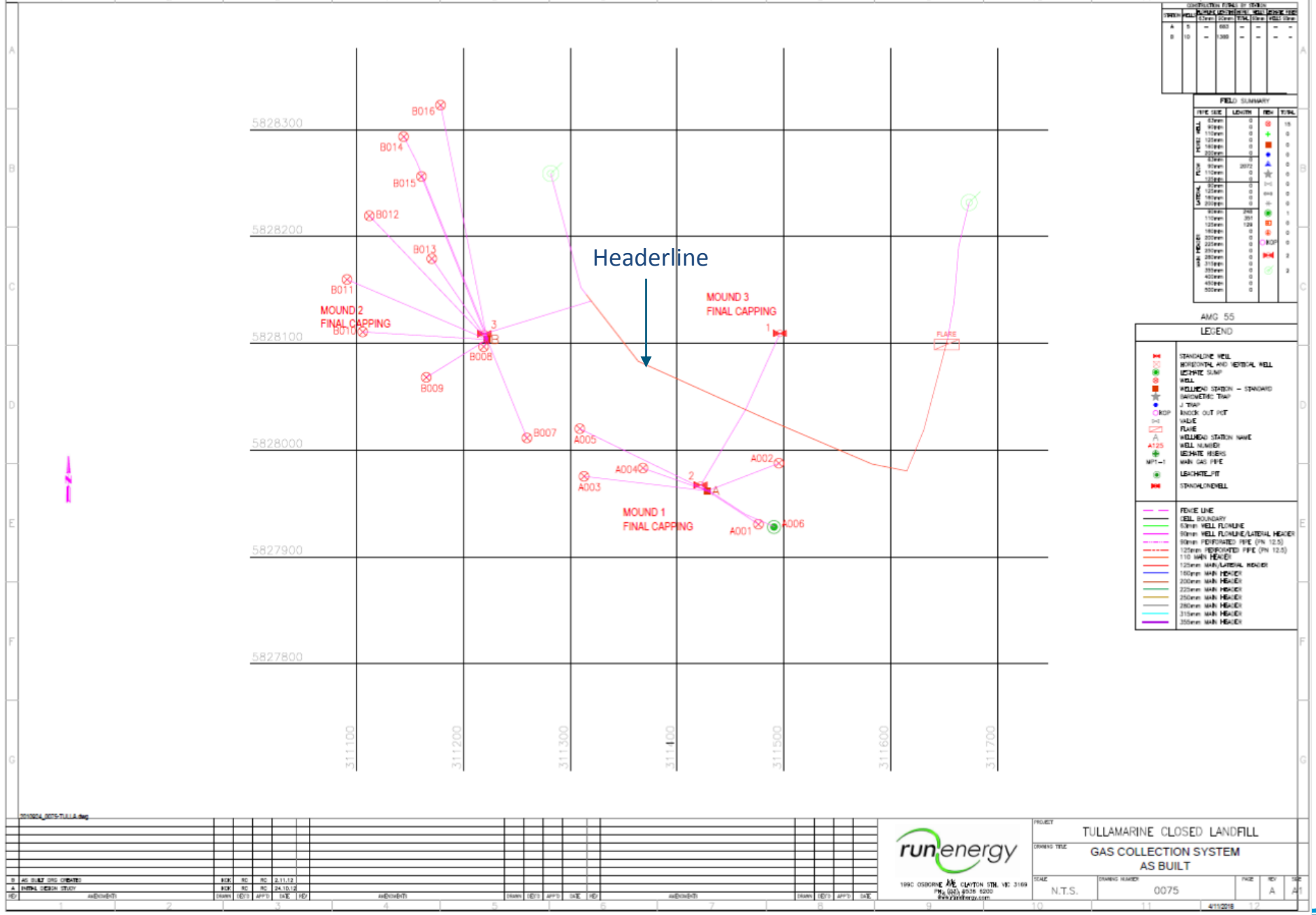
We undertook a header realignment project for the existing system to address natural landfill settlement in January which consisted of the below:

-- Expose top of pipe across the flat area and identify irregularity or fall on pipework

-- Relay pipework where required and backfill subsoil & topsoil layers

note: no penetrations were made to the cap, the system sits above the cap liner (synthetics) within the soil matrix.

Project was a success and we will continue to monitor its effect on improving LFG extraction


Headerline
MOUND 1
FINAL CAPPING
MOUND 2
FINAL CAPPING
MOUND 3
FINAL CAPPING
B016
B014
B015
B012
B013
B011
B010
B008
B009
B007
A005
A004
A003
A002
A001
A006
FLARE
5828300
5828200
5828100
5828000
5827900
5827800
311100
311200
311300
311400
311500
311600
311700
AMG 55
LEGEND
TULLAMARINE CLOSED LANDFILL
GAS COLLECTION SYSTEM
AS BUILT
N.T.S.
0075
A

Bore MB56 Groundwater sampling

Analyte		Anions and Cations																	
		Ferric Iron	Ferrous Iron	Sodium	Calcium	Magnesium	Potassium	Cyanide (total)	Sulphate	Sulfate as S	Chloride	Fluoride	Nitrite as N	Nitrate	Nitrate as N	Nitrite + Nitrate as N	Nitrite + Nitrate as N	Total Ammonia as Nitrogen	Total Kjeldahl Nitrogen
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date																		
MB56	09-Jul-15	< 0.05	< 0.05	**2,200**	**81**	**200**	**14**	-	-	**500**	**3,100**	< 0.5	< 0.02	-	**2.6**	-	**2.6**	< 0.01	**0.6**
	13-May-16	< 0.05	< 0.05	**2,100**	**91**	**240**	**21**	-	-	**470**	**3,100**	< 0.5	< 0.02	-	**2.0**	-	**2.0**	< 0.01	-
	05-Jun-17	< 0.05	< 0.5	**2,500**	**110**	**270**	**21**	< 0.005	**1,500**	-	**3,200**	-	< 0.02	**1.8**	-	**1.9**	-	< 0.01	-

Anions and Cations				Alkalinity						Inorganics
		Total Kjeldahl Nitrogen as N	Nitrogen	Bicarbonate	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Hydroxide Alkalinity as CaCO3	Total Alkalinity as CaCO3	Electrical Conductivity @ 25°C	Total Dissolved Solids
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L
Sample Name	Sample Date									
MB56	09-Jul-15	-	**3.2**	**410**	-	< 10	< 10	-	**12,000**	**7,200**
	13-May-16	< 0.2	**2.0**	-	**490**	< 10	< 10	-	**11,000**	**7,000**
	05-Jun-17	**0.4**	**2.3**	-	**460**	< 10	< 10	**460**	**14,000**	**7,800**

Analyte		Metals																	
		Aluminum	Arsenic	Barium	Boron	Cadmium	Chromium	Chromium III	Chromium VI	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date																			
MB56	09-Jul-15	< 0.05	< 0.001	< 0.02	< 0.05	< 0.0002	**0.005**	-	-	< 0.001	**0.006**	< 0.05	< 0.001	**0.008**	< 0.0001	**0.019**	**0.018**	**0.028**	-	**0.011**
	13-May-16	< 0.05	**0.001**	< 0.02	**0.3**	< 0.0002	**0.001**	-	-	< 0.001	**0.002**	< 0.05	< 0.001	**0.019**	**0.0003**	**0.019**	**0.007**	**0.039**	-	**0.004**
	05-Jun-17	-	**0.001**	-	-	< 0.0002	**0.002**	-	-	-	**0.002**	< 0.05	< 0.001	**0.077**	< 0.0001	-	**0.006**	-	-	**0.024**

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Analyte		Inorganics	Anions and Cations			Natural Attenuation Parameters	Anions and Cations	Natural Attenuation Parameters	Alkalinity			Inorganics	Anions and Cations				Natural Attenuation Parameters	Metals
		Total dissolved solids	Ferrous Iron	Ferric Iron	Chloride	Sulfate as SO4	Sulfate as S	Methane	Total Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Bicarbonate Alkalinity as CaCO3	Total Organic Carbon	Nitrite + Nitrate as N	Nitrite + Nitrate as N	Nitrate as N	Nitrite as N	Dissolved Iron	Manganese
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date																	
MB56	09-Jul-15	**7,200**	< 0.05	< 0.05	**3,100**	-	**500**	< 0.05	-	**410**	-	-	-	**2.6**	**2.6**	< 0.02	< 0.05	**0.008**
	13-May-16	**7,000**	< 0.05	< 0.05	**3,100**	-	**470**	< 0.05	-	-	**490**	-	-	**2.0**	**2.0**	< 0.02	< 0.05	**0.019**
	05-Jun-17	**7,800**	< 0.5	< 0.05	**3,200**	**1,500**	-	< 0.05	**460**	-	**460**	-	**1.9**	-	-	< 0.02	< 0.05	**0.077**

Analyte		Polycyclic Aromatic Hydrocarbons																	
		Naphth-alene	2-Methyl-naphthalene	Acena-phthylene	Acena-phthene	Fluorene	Phena-nthrene	Anthr-acene	Fluor-anthene	Pyrene	Chrysene	Benz-o[a]anth-racene	Benzo-[k]fluora nthene	Benzo[b] & Benzo[j]fl uoranthen	Benzo-[a]-pyrene	Indeno[1,2,3-c,d]pyrene	Dibenz[a,h]-anthracene	Benzo[g,h,i]perylene	Total PAH
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date																		
MB56	05-Jun-17	< 0.01	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Analyte		Natural Attenuation Parameters	Light Hydrocarbons			Anions and Cations	
		Methane	Ethane	Ethene	Ethene	Nitrogen	Nitrogen
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date						
MB56	09-Jul-15	< 0.05	-	-	< 0.1	**3.2**	-
	13-May-16	< 0.05	-	-	< 0.1	**2.0**	-
	05-Jun-17	< 0.05	< 0.1	-	< 0.1	**2.3**	-

Analyte		Organochlorine Pesticides				
		Hexachlorobenzene	Hexachlorocyclopentadiene	Hexachloroethane	Hexachlorophene	Hexachloropropene
Units		mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date					
MB56	09-Jul-15	< 0.0001	< 0.0001	< 0.0001	-	-
	13-May-16	< 0.0001	< 0.0001	< 0.0001	-	-

Analyte		Phenolic Compounds (Non-Chlorinated)											
		Phenol	2-Methylphenol (o-Cresol)	3- & 4-Methylphenol (m&p cresol)	Cresols	2-Nitrophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	4-Nitrophenol	Dinoseb	2-Cyclohexyl-4,6-dinitrophenol	4,6-Dinitro-2-methylphenol	Non-Halogenated Phenols (Sum of total)
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date												
MB56	05-Jun-17	< 0.003	< 0.003	< 0.006	-	< 0.01	< 0.003	< 0.03	< 0.03	< 0.1	< 0.1	< 0.03	< 0.1

Analyte		Phenolic Compounds (Chlorinated)											
		2-Chlorophenol	4-Chloro-3-methylphenol	4-Chlorophenol	2,4-Dichlorophenol	2,6-Dichlorophenol	2,3-Dichlorophenol	2,4,6-Trichlorophenol	2,4,5-Trichlorophenol	2,3,4,6-Tetrachlorophenol	Tetrachlorophenols (Sum of total)	Pentachlorophenol	Halogenated Phenols (Sum of total)
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date												
MB56	05-Jun-17	< 0.003	< 0.01	-	< 0.003	< 0.003	-	< 0.01	< 0.01	-	< 0.03	< 0.01	< 0.01

		1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,1-Dichloropropene	1,2-Dichloroethane	1,2,3-Trichloropropane	1,3-Dichloropropane	Anionic Surfactants as MBAS
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date											
MB56	09-Jul-15	< 0.001	< 0.001	< 0.001	**0.003**	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	-
	13-May-16	< 0.001	< 0.001	< 0.001	**0.001**	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	-
	05-Jun-17	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	-

Analyte		1,3-Dichloropropene, total	Bromomethane	Bromochloromethane	Carbon tetrachloride	Chloroethane	Chloromethane	cis-1,2-Dichloroethene	Dibromomethane	Dichlorodifluoromethane	Dichloromethane	1,3,5-Trichlorobenzene
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date											
MB56	09-Jul-15	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0001
	13-May-16	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0001
	05-Jun-17	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-

Analyte		1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Chlorotoluene	4-Chlorotoluene	Benzyl chloride	Bromobenzene	Chlorobenzene	Pentachlorobenzene	1,2,3,4-Tetrachlorobenzene	Benzal chloride
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date											
MB56	09-Jul-15	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.0001
	13-May-16	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0001	< 0.0001	< 0.0001
	05-Jun-17	< 0.001	< 0.001	< 0.001	-	< 0.001	-	< 0.001	< 0.001	-	-	-

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Analyte		Benzotrichloride	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Isopropylbenzene	Propylbenzene	Styrene	Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	2-Butanone (MEK)	4-Methyl-2-pentanone (MIBK)	Acrylonitrile
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date													
MB56	09-Jul-15	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	-
	13-May-16	< 0.0001	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	-
	05-Jun-17	-	< 0.001	< 0.001	< 0.001	-	< 0.001	< 0.001	< 0.001	< 0.005	< 0.001	< 0.001	< 0.001	-

Analyte		Formaldehyde	Acetone	Allyl chloride	1,2-Dibromoethane	1,2-Dichloropropane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	Carbon disulfide	Decane	Undecane	Tridecane	Dodecane	Methane	Ethane
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date														
MB56	09-Jul-15	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.05	-
	13-May-16	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.05	-
	05-Jun-17	< 0.2	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	-	-	-	< 0.05	< 0.1

Analyte		Ethene	Ethylene
Units		mg/L	mg/L
Sample Name	Sample Date		
MB56	09-Jul-15	< 0.1	-
	13-May-16	< 0.1	-
	05-Jun-17	< 0.1	-

Analyte		BTEXN							Total Petroleum Hydrocarbons					Total Recoverable Hydrocarbons					
		Benzene	Toluene	Ethylbenzene	meta- & para-Xylene	ortho-Xylene	Total Xylenes	Naphthalene	C_6 - C_9	C_{10} - C_{14}	C_{15} - C_{28}	C_{29} - C_{36}	C_{10} - C_{36} sum	C_6 - C_{10}	C_6 - C_{10} minus BTEX (F1)	>C_{10} - C_{16}	>C_{10} - C_{16} minus Naphthalene (F2)	>C_{16} - C_{34}	>C_{34} - C_{40}
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sample Name	Sample Date																		
MB56	09-Jul-15	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001	< 0.003	< 0.02	< 0.02	< 0.05	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.05	< 0.1	< 0.1
	13-May-16	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001	< 0.003	< 0.01	< 0.02	< 0.05	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.05	< 0.1	< 0.1
	05-Jun-17	< 0.001	< 0.001	< 0.001	< 0.002	< 0.001	< 0.003	< 0.01	< 0.02	< 0.05	< 0.1	< 0.1	< 0.1	< 0.02	< 0.02	< 0.05	< 0.05	< 0.1	< 0.1

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PROJECT:	20143795.001A
DATE DRAWN:	12.11.14
DRAWN BY:	LZ
CHECKED BY:	MW
FILE NAME:	20143795.001A-2.dwg

GROUNDWATER MONITORING LOCATIONS

2014 TECHNICAL REPORT FOR AUDITOR REVIEW
TULLAMARINE CLOSED LANDFILL
WESTERN AVENUE
WESTMEADOWS, VICTORIA

FIGURE **2**

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Questions?