

NHT Funded Project NLP 13188

The effects of waste disposal on groundwater quality in Tasmania



Port Sorell waste depot

**Tasmanian Geological
Survey Record 2002/03**

While every care has been taken in the preparation of this report, no warranty is given as to the correctness of the information and no liability is accepted for any statement or opinion or for any error or omission. No reader should act or fail to act on the basis of any material contained herein. Readers should consult professional advisers. As a result the Crown in Right of the State of Tasmania and its employees, contractors and agents expressly disclaim all and any liability (including all liability from or attributable to any negligent or wrongful act or omission) to any persons whatsoever in respect of anything done or omitted to be done by any such person in reliance whether in whole or in part upon any of the material in this report.

Groundwater quality investigations at the Port Sorell waste depot

A. R. Ezzy

Abstract

The Port Sorell waste depot was a disposal site for general and industrial waste. The waste depot was converted to a waste transfer station in 1995. The local groundwater table slopes towards the southeast. Waste fill has a hydraulic connection with the surface water drainage system. Clay-rich sediments appear to be perching and/or storing water. Groundwater and surface water quality is degraded around the site. Surface water management, capping of both landfills, appropriate disposal of sediments contaminated by hydrocarbons, leachate management infrastructure, and protection of the public from contaminated surface and groundwater are all considered to be high priorities at the site.

INTRODUCTION

Mineral Resources Tasmania (MRT) initiated a project to investigate the effects of waste disposal on groundwater quality in Tasmania. The project was funded by MRT and the Natural Heritage Trust (NHT) and included a number of sites for detailed study. The waste depot at Port Sorell was one of these sites.

The objectives of the investigations at the Port Sorell waste depot were to:

- ☐ Determine the geological nature of the host materials;
- ☐ Identify the depth of the water table;
- ☐ Examine the quality of the groundwater; and
- ☐ Identify if a potential hydraulic connection exists between the waste fill materials and the local hydrological system.

SITE DESCRIPTION

The Port Sorell waste depot is located on Depot Road, 100 metres west of Shearwater and 1.5 kilometres northwest of Port Sorell (460 300 mE, 5 443 400 mN) (fig. 1). The waste depot was in operation between approximately 1973 and 1995. The (then) Department of Environment undertook the first inspection of the facility around 1975.

Site history and waste management

The site became a waste transfer station in 1995, at which time all waste disposal (except inert waste) ceased at the site. No engineered fill sequence was used at the site and current leachate collection is based on discharges into surface waterways.

Two landfill footprints, an in-ground waste oil tank and a historical liquid waste disposal area, exist at the site. The eastern landfill footprint represents the main historical disposal area used by the Latrobe Council. Leachate flow follows the waterway to the south of this landfill footprint (Plate 1). Plate 2 shows leachate in a surface drain to the east of the landfill footprint.

Industrial waste was deposited in the western landfill footprint at the site until 1993. Plate 3 shows the landfill footprint and surface leachate discharges from the site.

Waste oil has been stored in a cement tank at the location of borehole PSWD2000/1 for over a decade (Plate 4). Between approximately 1973 and 1995 liquid waste was disposed of in the area of borehole PWSD2000/2. The source of the liquid waste (dye) was local textile factories.

All disposal sites are located in heterogenous layers of clay and sand sediments.

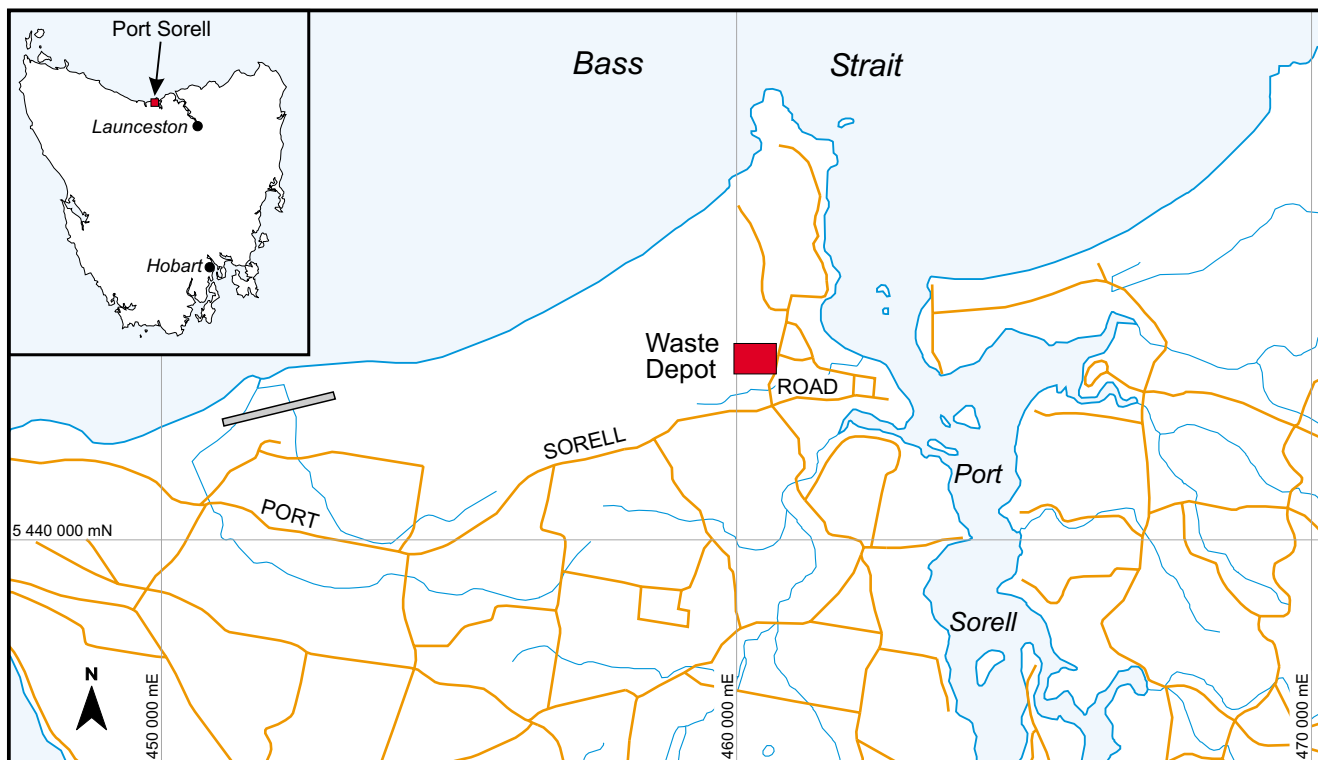


Figure 1. *Location of waste depot, Port Sorell*



Plate 1

Leachate flowing in the waterway to the south of the eastern landfill footprint.



Plate 2

Leachate flowing in the surface drain to the east of the eastern landfill footprint.



Plate 3

Landfill footprint and surface leachate discharges from the north corner of the footprint



Photo 4

Waste oil cement tank at the location of borehole PSWD2000/1

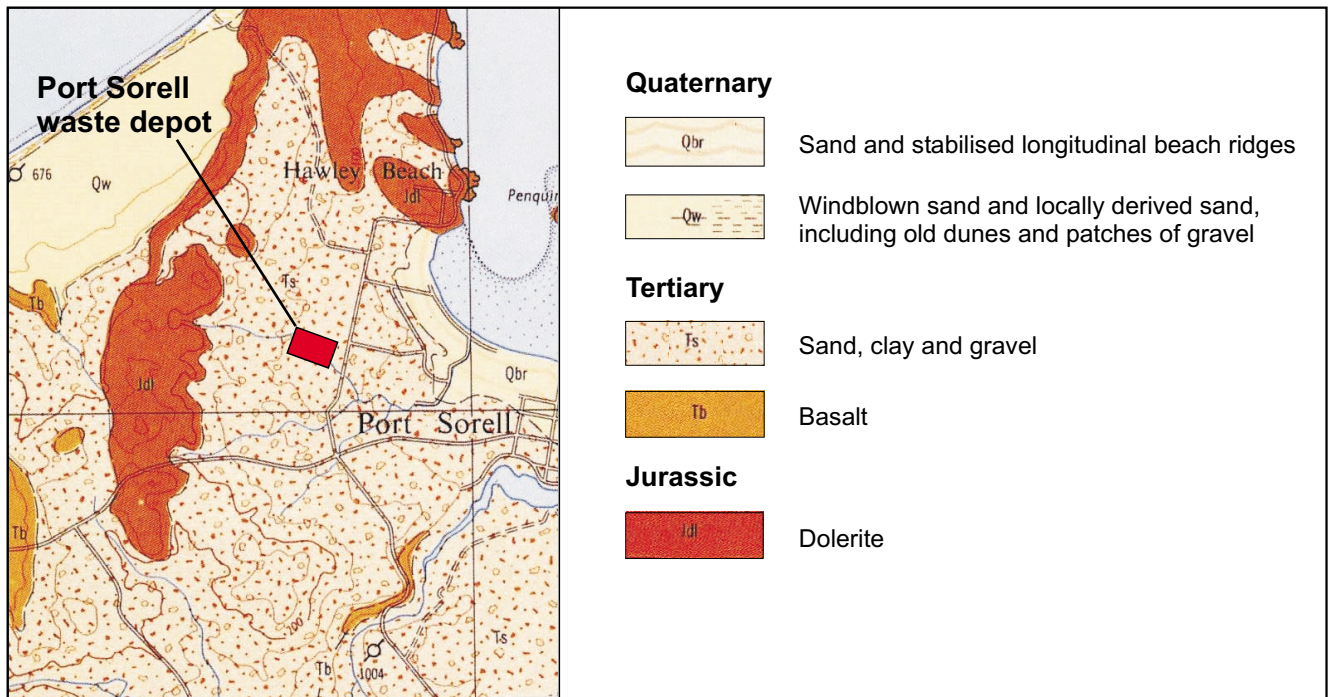


Figure 2

Extract from Beaconsfield geological map (Gee and Legge, 1971) showing the geology of the Port Sorell area.

Geology

The Tasmania Department of Mines 1:63,360 scale geological map of the area (Beaconsfield geological map sheet, Gee and Legge, 1971) indicates that the geology of the waste disposal area comprises Tertiary sediments consisting of sand, clay and gravel. The map indicates that Jurassic dolerite occurs approximately 200 metres to the west of the disposal area. Figure 2 is a modified extract from the Beaconsfield geological map.

Geological mapping during the current study indicated that the site is dominated by sand deposits within 70 metres of the waste disposal site in all directions. Council has excavated large blocks of dolerite in the area. This supports the Beaconsfield

map sheet, which indicates that the Tertiary sediments are most likely underlain by Jurassic dolerite.

Hydrology

All the waste disposal areas are located on (or in the catchment of) a tributary of Poyston Creek. Poyston Creek passes through the Shearwater Country Club approximately one kilometre downstream of the waste disposal site and discharges onto Freers Beach a further 500 metres to the east. Australian Bureau of Meteorology rainfall station 091232 (Devonport East) is the closest rainfall station to the site. The rainfall chart of average monthly recorded rainfall (fig. 3) shows that the highest rainfall occurs in autumn/winter (April to August), with an average annual rainfall for the station of 898.7 mm.

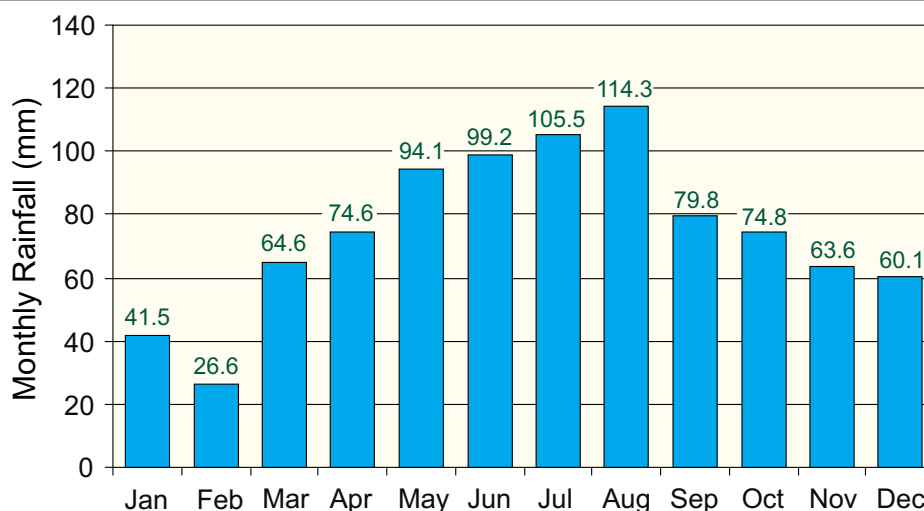


Figure 3

Average monthly rainfall for Australian Bureau of Meteorology rainfall station 091232 (Devonport East)

INVESTIGATION METHODS

Borehole drilling and installation

Six 120 mm diameter monitoring bores were auger drilled between 13 and 14 September 2000 for this project (fig. 4). Fifty millimetre PVC casing and slotted screens with bentonite seals were installed in each hole. All bores were logged in accordance with AS1726-1993; engineering logs are presented in Appendix 1.

Groundwater was encountered between 1.5 and 5.2 metres depth below ground level across the site. Flow during drilling indicated that the groundwater in all boreholes was unconfined. Yields recorded from

pumping the bores ranged between 0.020 to 0.023 l/s. Figure 5 shows two cross-sections of the site and the related standing water levels on 14 August 2001.

Both the unsaturated and saturated zones consist of heterogenous layers of fine to coarse-grained sand and low to high plasticity clays. Waste fill was intersected in boreholes PSWD2000/3, PSWD2000/5 and PSWD2000/6. A strong hydrocarbon odour was observed on returns from PSWD2000/1 and three soil samples were collected and analysed for total petroleum hydrocarbons. The laboratory report from Analytical Services Tasmania is presented in Appendix 2.

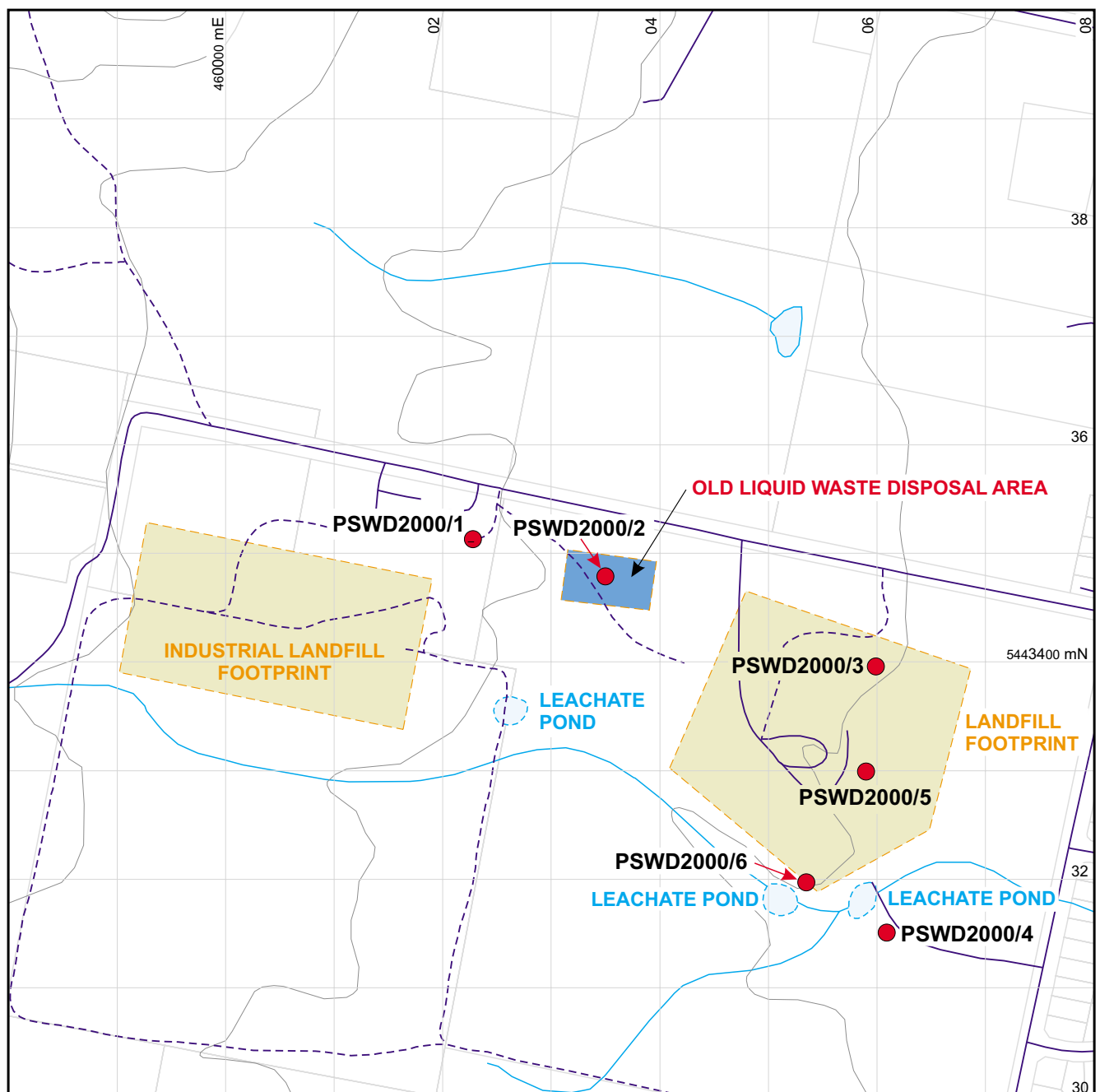


Figure 4

Locations of environmental monitoring bores installed at the Port Sorell waste depot.

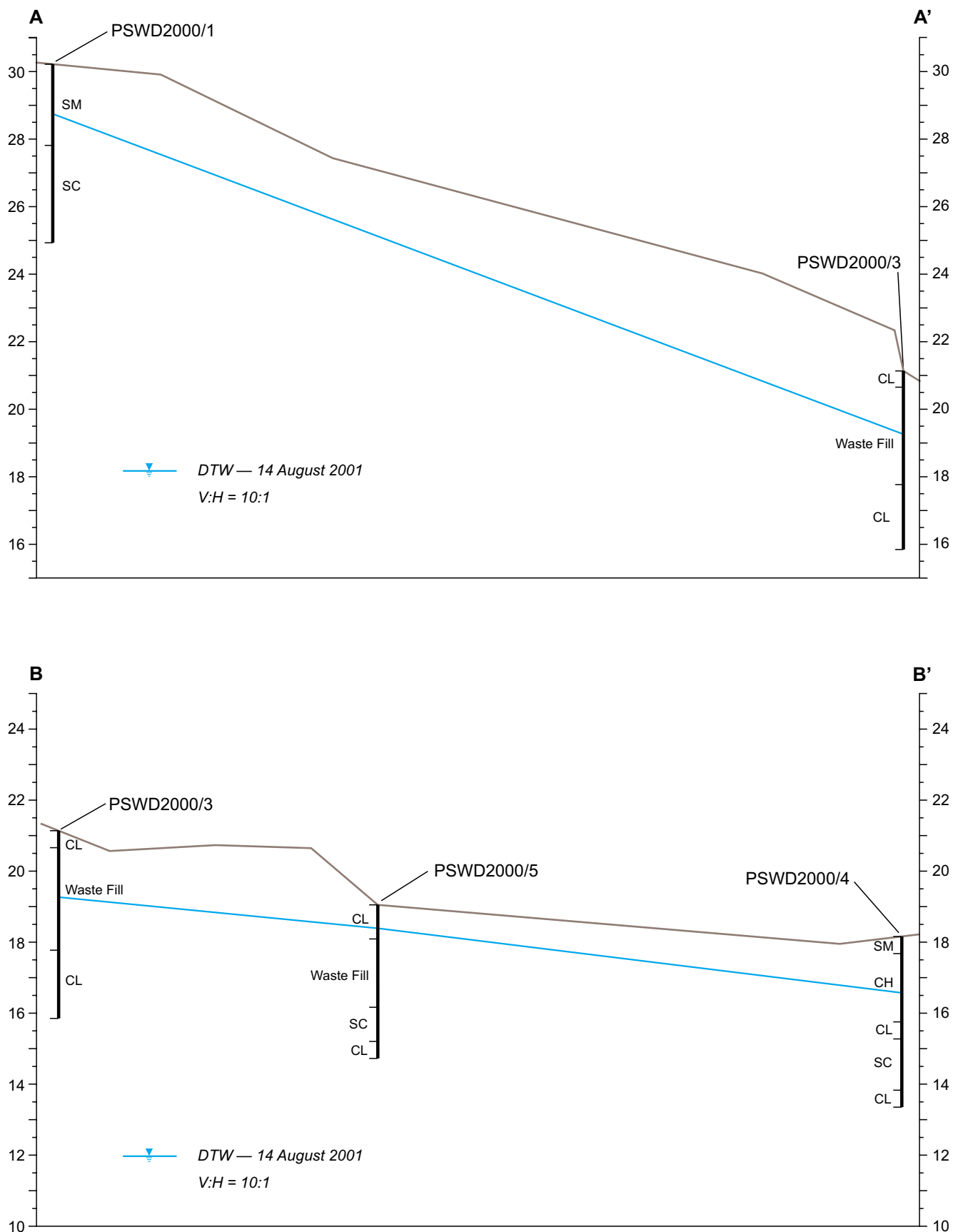


Figure 5

Cross sections and related standing water levels on 14 August 2001 for bores PSWD2000/1 AND PSWD2000/3 (A-A') and PSWD2000/3, PSWD2000/5 AND PSWD2000/4 (B-B')

In situ permeability testing

One extraction and two injection slug tests were carried out on 15 August 2001 on bores PSWD2000/6 and PSWD2000/5 respectively. Data collected during the slug tests are presented in Appendix 3.

Slug test data were analysed in the software package *AquiferWin32* (Version 2.17, Environmental Simulations Inc.). The Bouwer and Rice (1976 Unconfined Aquifer) solution was used to calculate the hydraulic conductivities depicted in Figure 6 (a), (b) and (c) for PSWD2000/5 (1st test), PSWD2000/5 (2nd test) and PSWD2000/6 respectively. This method was selected as the most appropriate available within the software package.

These data indicate that the sand material (screened in PSWD2000/6) has a permeability of around 0.1 m/day and the waste fill (screened in PSWD2000/5) is an order of magnitude more permeable at <1 m/day.

CONCEPTUAL HYDROLOGICAL MODEL

Cross sections indicate that the water table slopes towards the leachate ponds in the southeast corner of the site. Clay-rich sediments acting as aquicludes appear to be perching and/or storing water, which intercepts the waste fill material. Saturated waste fill discharges to surface waters at various locations across the site. The hydraulic conductivity of the waste fill implies rapid water infiltration and migration and consequent leachate generation.

SURFACE AND GROUNDWATER CHEMISTRY

All bores were sampled in accordance with Australian/New Zealand Standard AS/NZS 5667.11:1998 on 16 November 2000. Six additional surface water samples were also collected. Analytical Services Tasmania (in accordance with relevant Australian and international standards) carried out laboratory testing of the surface and groundwater samples; the laboratory reports are presented in Appendix 4. Groundwater values for pH ranged between 4.5 to 6.7, with conductivity ranging between 756 and 3190 $\mu\text{S}/\text{cm}$. Analytical results for surface and groundwater samples are presented on site maps in Appendix 5.

Figure 7 shows an anion Ternary plot for the results of the groundwater samples. Tables 1 and 2 are comparisons of the analytical results against international standards where a guideline/emission value is stated by the relevant standard.

The high ammonia and bicarbonate levels in the bores that intercepted waste fill, combined with near-neutral pH data, indicate an advance stage of anaerobic degradation in the landfill.

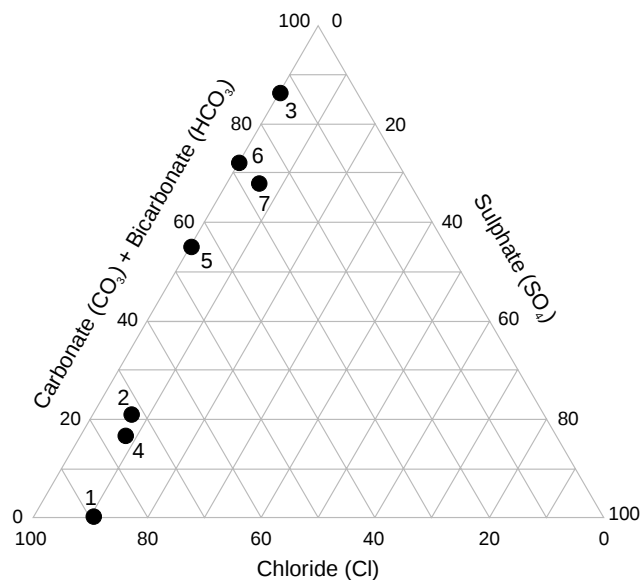


Figure 7

Anion Ternary plot for groundwater bores at the Port Sorell waste depot.

1 = PSWD2000/1; 2 = PSWD2000/2; 3 = PSWD2000/3;
4 = PSWD2000/4; 5 = PSWD2000/5; 6 = PSWD2000/6;
7 = average of all MRT groundwater records for Quaternary coastal sands.

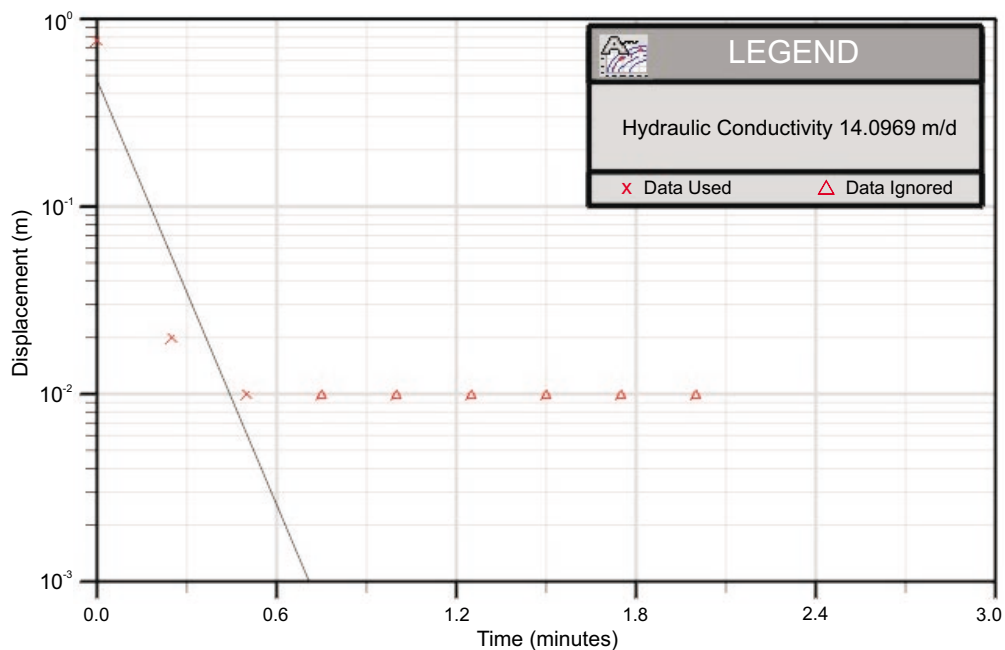
CONTAMINATION ASSESSMENT

Groundwater chemistry varies across the site with respect to the hydrological system and the pollution sources. Groundwater and sediment samples collected from bore PSWD2000/1 indicated petroleum contamination of the sediment and groundwater in the area of the waste oil tank. Chloride, aluminium, lead and zinc were also elevated in the groundwater from bore PSWD2000/1. Ammonia concentrations in bores PSWD2000/3, 5 and 6 indicate contamination of the groundwater in the area of the eastern landfill footprint. No existing bore may give a true indication of background groundwater chemistry. Because of its location and being screened in clay-rich sediments, hole PSWD2000/2 is currently thought to provide the closest data to background conditions.

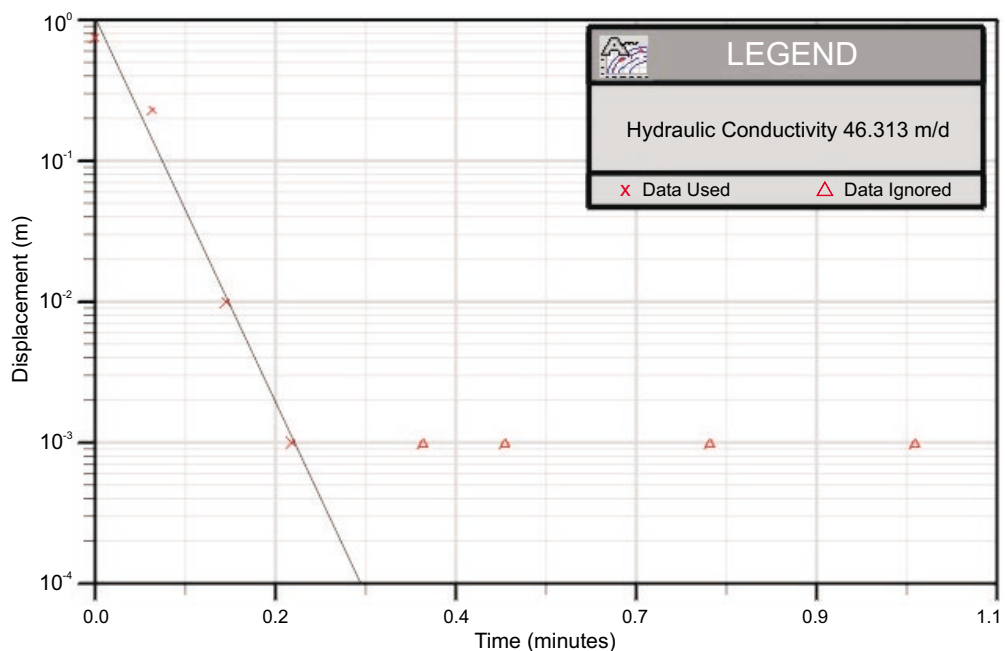
Ammonia concentrations in the surface water are consistent with the discharge of contaminated groundwater to the surface hydrological system. The elevated levels for the water quality parameters analysed for the industrial site leachate indicate that a significant degree of environmental harm may be associated with this industrial landfill.

Iron and manganese concentrations in surface water and groundwater may have contributed to aerobic and anaerobic phases of the degradation of the waste fill material. The close proximity of dolerite and clay-rich sediments may also be affecting iron and manganese concentrations at the site.

(a) PSWD2000/5, first test
($K = 14.10 \text{ m/d} / 1.63 \times 10^{-4} \text{ m/sec}$)



(b) PSWD2000/5 second test
($K = 46.31 \text{ m/d} / 5.36 \times 10^{-4} \text{ m/sec}$)



(c) PSWD2000/6 ($K = 0.11 \text{ m/d} / 1.30 \times 10^{-6} \text{ m/sec}$)

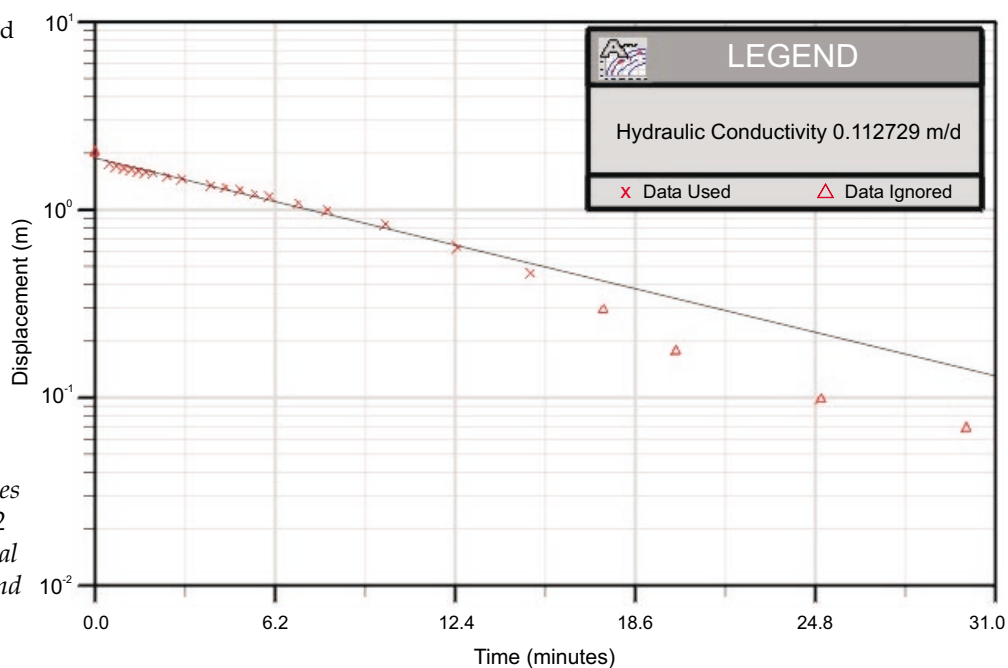


Figure 6

*Hydraulic conductivity values
calculated in AquiferWin32
(Version 2.17, Environmental
Simulations Inc.), Bouwer and
Rice (1976, Unconfined
Aquifer) solution.*

Table 1. Comparison of the analytical results against water quality standards (guideline value listed when stated by a relevant standard). Highlighted values exceed emission limits.

Parameter	PSWD 2000/1	PSWD 2000/2	PSWD 2000/3	PSWD 2000/4	PSWD 2000/5	PSWD 2000/6	Southeast pond	East outflow	East leachate pond	Northeast drain	Eastern apex drain	Industrial leachate	Emission limit
pH	4.5	5.9	6.7	6.1	6.4	6.6	-	-	-	-	-	-	N/A
Conductivity (µS/cm)	3190	756	1410	1080	979	2720	-	-	-	-	-	-	N/A: note average sea water value 36 000.
Alkalinity CO ₃ (mg/L)	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	N/A
Alkalinity HCO ₃ (mg/L)	<1	74	690	106	363	1270	-	-	-	-	-	-	N/A
Chloride (mg/L)	800	150	61	280	170	280	-	-	-	-	-	-	250* (mg/L)
Sulphate (mg/L)	130	20	1.2	41	1.9	2.4	-	-	-	-	-	-	250* (mg/L)
Ammonia (mg/L)	0.019	0.111	18.400	0.122	11.600	41.800	8.360	1.880	3.580	0.561	27.700	93.800	0.5* (mg/L) nitrogen (as ammonia)
Nitrate + Nitrite (mg/L)	2.360	0.009	0.006	0.012	0.006	0.006	0.518	1.100	0.156	0.024	0.008	0.012	10.0* (mg/L) nitrogen (as nitrate or nitrite)
Nitrite (mg/L)	0.004	<0.002	<0.002	0.003	<0.002	0.003	0.140	0.062	0.030	0.019	0.006	0.007	10.0* (mg/L) nitrogen (as nitrate or nitrite)
Ortho - P (mg/L)	0.004	0.003	0.004	0.005	0.004	0.007	0.039	0.009	0.09	0.020	0.005	0.009	2.0* as phosphorus
Aluminium (mg/L)	8.940	0.106	<0.010	0.018	0.037	<0.010	0.081	0.048	0.273	0.155	<0.010	0.022	N/A
Arsenic (mg/L)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.05* (mg/L)
Cadmium (mg/L)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01* (mg/L)
Cobalt (mg/L)	0.008	0.003	0.004	0.011	0.004	0.006	0.002	0.002	0.001	0.006	0.003	0.006	N/A
Chromium (mg/L)	0.010	0.002	0.006	0.002	0.002	0.006	0.003	0.002	0.005	0.015	<0.001	0.003	0.5* (mg/L)
Copper (mg/L)	0.008	0.013	<0.001	0.002	0.002	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	1.0* (mg/L)
Iron (mg/L)	1.410	0.255	34.400	1.910	0.762	3.800	1.580	0.313	3.420	3.390	1.210	34.200	(Combined iron and manganese total) (1.0* (mg/L))
Manganese (mg/L)	0.102	0.109	0.751	0.137	0.979	3.110	0.284	0.101	0.080	0.131	0.997	0.790	
Nickel (mg/L)	0.012	0.007	0.002	0.020	0.008	0.005	0.004	0.004	0.004	0.010	0.002	0.021	0.1** (mg/L)
Lead (mg/L)	0.044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.05* (mg/L)
Zinc (mg/L)	0.038	0.017	0.011	0.014	0.003	0.004	0.017	0.015	0.011	0.014	0.005	0.007	5.0* (mg/L)
TPH (mg/L)	12.000	-	-	-	-	-	-	-	-	-	0.278	<0.040	N/A
TPH C ₀₆ -C ₀₉ (mg/L)	11.900	-	-	-	-	-	-	-	-	-	0.014	<0.010	N/A
TPH C ₁₀ -C ₁₄ (mg/L)	<0.010	-	-	-	-	-	-	-	-	-	0.062	<0.010	N/A
TPH C ₁₅ -C ₂₈ (mg/L)	<0.010	-	-	-	-	-	-	-	-	-	0.095	<0.010	N/A
TPH C ₂₉ + (mg/L)	<0.010	-	-	-	-	-	-	-	-	-	0.106	<0.010	N/A

* Environment Protection (Water Pollution) Regulations 1974, emission into inland water

* Australian Water Quality Guidelines for Fresh and Marine Waters, 1992

N/A No emission limit available

Shaded values exceed emission limits

Table 2. Comparison of analytical results against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000.

Analyte	PORT SORELL WASTE DEPOT											ANZECC 2000		
	PSWD 2000/1	PSWD 2000/2	PSWD 2000/3	PSWD 2000/4	PSWD 2000/5	PSWD 2000/6	Southeast pond	East outflow	East leachate pond	Northeast drain	Eastern apex drain	Indus- trial leachate	Irrigation	Livestock Drinking
													STV (Short-term)	LTV (Long-term)
Standing Water Level (m)	1.55	3.58	2.42	1.29	0.87	3.12	-	-	-	-	-	-		
pH field (pH Units)	4.9	6.2	6.9	6.8	6.7	6.8	-	-	-	-	-	-	**6.0-8.5	
pH laboratory (pH Units)	4.5	5.9	6.7	6.1	6.4	6.6	-	-	-	-	-	-	**6.0-8.5	
Conductivity (µS/cm)	3190	756	1410	1008	979	2730	-	-	-	-	-	-	⁽¹⁾ (Refer Tables 4.2.3 & 4.2.4)	
Chloride (mg/L)	800	150	61	280	170	280	-	-	-	-	-	-	⁽²⁾ MT (Refer Table 4.2.6) MR (Refer Table 4.2.7)	
Sulphate (mg/L)	130	20	1.2	41	1.9	2.4	-	-	-	-	-	-		
NH ₃ -N (mg/L)	0.019	0.111	18.4	0.122	11.6	41.8	8.36	1.88	3.58	0.561	27.7	93.8		
(NO ₂ + NO ₃)-N (mg/l)	2.36	0.009	0.006	0.012	0.006	0.006	0.518	1.1	0.156	0.024	0.008	0.012		
NO ₂ -N (mg/L)	0.004	<0.002	<0.002	0.003	<0.002	0.003	0.14	0.062	0.03	0.019	0.006	0.007		
PO ₄ -P (mg/L)	0.004	0.003	0.004	0.005	0.004	0.007	0.039	0.009	0.09	0.02	0.005	0.009		
Aluminium (µg/L)	8940	106	<10	18	37	<10	81	48	273	155	<10	22	20,000	5,000
Arsenic (µg/L)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	2000	100
Cadmium (µg/L)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	50	10
Cobalt (µg/L)	8	3	4	11	4	6	2	2	1	6	3	6	100	50
Chromium (µg/L)	10	2	6	2	2	6	3	2	5	15	1	3	1,000***	100
Copper (µg/L)	8	13	<1	2	2	<1	<1	<1	<1	5	<1	<1	5,000	200
Iron (µg/L)	1410	255	34400	1910	762	3800	1580	313	3420	3390	1210	34200	10,000	200
Manganese (µg/L)	102	109	751	137	979	3110	284	101	80	313	997	790	10,000	200
Nickel (µg/L)	12	7	2	20	8	5	4	4	4	10	2	21	2000	200
Lead (µg/L)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5,000	2,000
Zinc (µg/L)	38	17	11	14	3	4	17	15	11	14	5	7	5,000	2,000

Shaded values indicate above relevant guideline levels.

Notes:

** set to limit potential for corrosion and fouling of pumping, irrigation and stock watering systems.
*** chromium (VI)

(1) Suitability depends on salt tolerance of crop & calculation of EC_{se}, the average root zone salinity. EC_{se} depends on soil type & average root zone leaching fraction.
(2) ES = Suits extremely sensitive crops.

MS = Suits moderately sensitive crops, may affect sensitive crops.
MT = Suits moderately tolerant crops.

MR = Medium risk of increasing crop cadmium concentrations.
MA = May affect crops sensitive to foliar injury through foliar absorption.

STV – Short term trigger value for contaminant in irrigation water (<20 years) use
LTV – Long term trigger value for contaminant in irrigation water (100 years) use
NST – Not sufficiently toxic

PRINCIPAL CONCLUSIONS

The combination of the direct recharge of the fill material by groundwater, rainfall and up-gradient surface water has produced discharges to the down gradient surface water that may potentially affect the groundwater.

This site will require substantial engineering works to avoid continued degradation of surface and groundwater quality within the area of the waste disposal activities. Issues include surface water management, appropriate capping of both landfills, suitable disposal of hydrocarbon contaminated sediments, leachate management infrastructure, and contaminated surface and groundwater.

FURTHER WORK

The detection of off-site transportation of polluted surface water requires an assessment of the risk to

human health in the local down-gradient hydrological system. Monitoring of additional shallow and deeper hard-rock bore holes (including background holes), combined with selective surface water sites, would allow a greater understanding of the extent of water quality degradation and any natural attenuation processes which may be occurring at the site.

On-going monitoring of the water levels in relation to the base of the fill material would give an indication of the success of future leachate control infrastructure at the site.

REFERENCES

GEE, R. D.; LEGGE, P. J. 1971. Geological atlas one mile series. Zone 7 Sheet 30. Beaconsfield. *Department of Mines Tasmania*.

[30 May 2002]

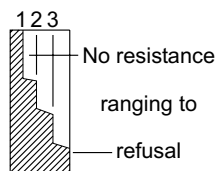
Appendix 1

Engineering logs

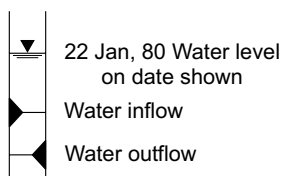
EXPLANATION SHEET FOR ENGINEERING LOGS

Borehole and excavation log

Penetration



Water



Notes — samples and tests

U50	Undisturbed sample 50 mm diameter
D	Disturbed sample
N	Standard penetrometer blow count for 300 mm
N*	SPT + Sample

Material classification

Based on Unified Soil Classification System.

In Graphic Log materials are represented by clear contrasting symbols consistent for each project.

Moisture content

D	Dry, looks and feels dry
M	Moist, no free water on hand when remoulding
W	Wet, free water on hand when remoulding
LL	Liquid limit
PL	Plastic limit
PI	Plasticity index

e.g. M>PL — Moist, moisture content greater than the plastic limit

Consistency

		: hand penetrometer
VS	Very soft	<25 (kPa)
S	Soft	25 – 50
F	Firm	50 – 100
St	Stiff	100 – 200
VSt	Very stiff	200 – 400
H	Hard	>400
Fb	Friable	

Notes: X on log is test result
— is range of results

Density index

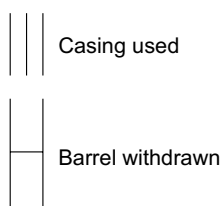
		%
VL	Very loose	0 – 15
L	Loose	15 – 35
MD	Medium dense	35 – 65
D	Dense	65 – 85
VD	Very dense	85 – 100

Fracture description

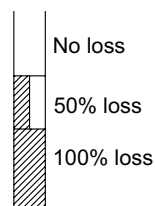
RP	Rough planar
RL	Rough irregular
SP	Smooth planar
SL	Smooth irregular

Cored borehole log

Case - lift



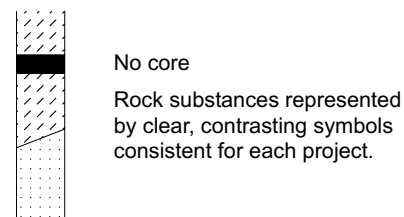
Fluid loss



Lugeons

Lugeon units (uL) are a measure of rock mass permeability. For a 46 to 74 mm diameter borehole 1 Lugeon is defined as a rate of loss of 1 litre per metre per minute. 1 Lugeon is roughly equivalent to a permeability of 1×10^{-4} mm / sec.

Graphic log



Weathering

Fr	Fresh
SW	Slightly weathered
HW	Highly weathered
EW	Extremely weathered

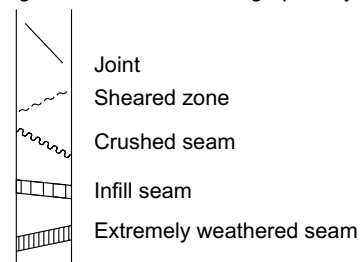
Strength

		point load strength index $1.5 \sqrt{50}$ (MPa)
EL	Extremely low	< 0.03
VL	Very low	0.03 – 0.1
L	Low	0.1 – 0.3
M	Medium	0.3 – 1
H	High	1 – 3
VH	Very high	3 – 10
EH	Extremely high	>10

Notes: X on log is test result.

Significant defects

Significant defects shown graphically



ENGINEERING LOG - BOREHOLE

 Borehole no.
PSWD 2000/1
 Sheet 1 of 2

Project			Port Sorell waste depot			Location		Depot Road, Port Sorell													
Co-ordinates			55 460228 mE 5443513 mN		Drill type		Auger		Hole commenced		13 September 2000										
					Drill method		Rotary		Hole completed		13 September 2000										
R.L.					Drill fluid		Nil		Drilled by		Mr Shane Heawood										
Inclination			Vertical						Logged by		Mr Andrew Ezzy										
Bearing									Checked by		Mr Adrian Waite										
penetration			support	water	notes	metres		graphic log	classification	material		moisture	consistency	structure, geology							
1 2 3					samples, tests	R.L. depth			symbol	soil type: plasticity or particle characteristics, colour, secondary and minor components.		condition	density index								
			No screen	Cement	D Sample ID 1	0.5			SM	SAND - fine, grey, clayey, strong hydrocarbon odour		M	S L	Tertiary sediments Hydrocarbon contaminated soil							
				Bentonite	D Sample ID 2				SM	SAND - fine, dark grey, strong hydrocarbon odour		M	S L	Tertiary sediments Hydrocarbon contaminated soil							
					D Sample ID 3				SM	SAND - fine, dark brown		D	S L	Tertiary sediments							
					D Sample ID 4				SM	SAND - fine, yellow		M	S/L	Tertiary sediments							
			2 metre slotted screen 7 mm Gravel	D Sample ID 5	SM	SAND - medium to fine, grey		W	VS L	Tertiary sediments											
				D Sample ID 6	2.0																
				D Sample ID 7											SC	SAND - medium to fine, grey, clayey		W	VS VL	Tertiary sediments	
				D Sample ID 8																	
				D Sample ID 9																	
				D Sample ID 9																	
Back in fill	Back in fill	D Sample ID 9	4.5																		

ENGINEERING LOG - BOREHOLE

Borehole no. PSWD 2000/1
Sheet 2 of 2

Project		Port Sorell waste depot		Location		Depot Road, Port Sorell	
Co-ordinates		55 460228 mE 5443513 mN		Drill type		Auger	
				Drill method		Rotary	
R.L.				Drill fluid		Nil	
Inclination		Vertical		Hole commenced		13 September 2000	
Bearing				Hole completed		13 September 2000	
				Drilled by		Mr Shane Heawood	
				Logged by		Mr Andrew Ezzy	
				Checked by		Mr Adrian Waite	

penetration	support	water	notes	metres	graphic log	classification	material	moisture	consistency	structure, geology
1	2	3	samples, tests	R.L.	depth	symbol	soil type: plasticity or particle characteristics, colour, secondary and minor components.	condition	density index	
			D Sample ID 9		5.5		(As sheet 1)			
			Sample ID numbers refer to samples stored in MRT core shed				End of hole at 5.5 m Bailed for 5 minutes. At end of bailing pH 7.7 and conductivity 910 µS/cm.			

ENGINEERING LOG - BOREHOLE

Borehole no.
PSWD 2000/2
Sheet 1 of 2

Project		Port Sorell waste depot			Location		Depot Road, Port Sorell				
Co-ordinates		55 460350 mE 5443479 mN		Drill type		Auger		Hole commenced		13 September 2000	
				Drill method		Rotary		Hole completed		13 September 2000	
R.L.				Drill fluid		Nil		Drilled by		Mr Shane Heawood	
Inclination		Vertical						Logged by		Mr Andrew Ezzy	
Bearing								Checked by		Mr Adrian Waite	
penetration		support	water	notes	metres	graphic log	classification	material	moisture	consistency	structure, geology
1 2 3				samples, tests	R.L.	depth	symbol	soil type: plasticity or particle characteristics, colour, secondary and minor components.	condition	density index	
			Cement	D Sample ID 1			SM	SAND - fine, light grey, 20% sand medium to fine dark brown, extremely weathered dolerite pebbles	M	S L	Reworked Tertiary sediments
			Bentonite	D Sample ID 2	0.5		SP	SAND - medium, yellow and red-yellow, rock fragments	D	S L	Reworked Tertiary sediments
				D Sample ID 3	1.0		SM	SAND - fine, mottled black, red-yellow and light red	M	S L	Reworked Tertiary sediments
				D Sample ID 4	1.5		SC	SAND - medium, light grey, clayey	M	F	Reworked Tertiary sediments
				D Sample ID 5	2.0		SC	SAND - medium, light yellow and grey, clayey	M	L	Reworked Tertiary sediments
				D Sample ID 6	2.5		SC	SAND - medium to fine, light grey and green-yellow, 15% clay mottles light grey	M	L	Reworked Tertiary sediments
				D Sample ID 7	3.0		CL	CLAY - medium plasticity, grey, sandy	M	F	Tertiary sediments
				D Sample ID 8	3.5		SM	SAND - fine, grey, 15% clay mottles medium plasticity grey	M	S L	Tertiary sediments
				D Sample ID 9	4.0		SC	SANDY CLAY - medium plasticity, grey, clayey sand	M	F	Tertiary sediments
				D Sample ID 10	4.5						

ENGINEERING LOG - BOREHOLE

 Borehole no.
PSWD 2000/2
 Sheet 2 of 2

Project			Port Sorell waste depot			Location		Depot Road, Port Sorell				
Co-ordinates			55 460350 mE 5443479 mN		Drill type		Auger		Hole commenced		13 September 2000	
					Drill method		Rotary		Hole completed		13 September 2000	
R.L.					Drill fluid		Nil		Drilled by		Mr Shane Heawood	
Inclination			Vertical						Logged by		Mr Andrew Ezzy	
Bearing									Checked by		Mr Adrian Waite	
penetration		support	water	notes	metres	graphic log	classification	material	moisture	consistency	structure, geology	
1 2 3				samples, tests	R.L.	depth	symbol	soil type: plasticity or particle characteristics, colour, secondary and minor components.	condition	density index		
	No screen	7 mm Gravel	D Sample ID 11	CH	CLAY - high plasticity, grey, sandy	M	F	Tertiary sediments				
			D Sample ID 12									
			D Sample ID 13									
			D Sample ID 14									
			D Sample ID 15									
	No screen		D Sample ID 16	CL	CLAY - low plasticity, grey	M	H D	Tertiary sediments				
	Sample ID numbers refer to samples stored in MRT core shed			End of hole at 8.0 m Pumped for 5 minutes at 5 L/m At end of pumping pH 7.8 and conductivity 1520 µS/cm								

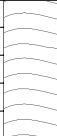
ENGINEERING LOG - BOREHOLE

Borehole no.
PSWD 2000/3
Sheet 1 of 2

Project		Port Sorell waste depot				Location		Depot Road, Port Sorell			
Co-ordinates		55 460599 mE 5443396 mN		Drill type		Auger		Hole commenced		13 September 2000	
				Drill method		Rotary		Hole completed		13 September 2000	
R.L.				Drill fluid		Nil		Drilled by		Mr Shane Heawood	
Inclination		Vertical						Logged by		Mr Andrew Ezzy	
Bearing								Checked by		Mr Adrian Waite	
penetration		support	water	notes	metres	graphic log	classification	material	moisture	consistency	structure, geology
1	2	3		samples, tests	R.L. depth		symbol	soil type: plasticity or particle characteristics, colour, secondary and minor components.	condition	density index	

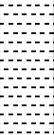
ENGINEERING LOG - BOREHOLE
 Borehole no. **PSWD 2000/3**
 Sheet **2** of **2**

Project		Port Sorell waste depot		Location		Depot Road, Port Sorell	
Co-ordinates		55 460599 mE 5443396 mN		Drill type		Auger	
				Drill method		Rotary	
R.L.				Drill fluid		Nil	
Inclination		Vertical		Hole commenced		13 September 2000	
Bearing				Hole completed		13 September 2000	
				Drilled by		Mr Shane Heawood	
				Logged by		Mr Andrew Ezzy	
				Checked by		Mr Adrian Waite	

penetration	support	water	notes	metres	graphic log	classification	material	moisture	consistency	structure, geology
1	2	3	samples, tests	R.L.	depth	symbol	soil type: plasticity or particle characteristics, colour, secondary and minor components.	condition	density index	
	No screen	Back in fill			5.5		(As sheet 1)			
			Sample ID numbers refer to samples stored in MRT core shed				End of hole at 5.5 m Bailed for 5 minutes. At end of bailing pH 7.6 and conductivity 860 µS/cm.			

ENGINEERING LOG - BOREHOLE

 Borehole no.
 PSWD 2000/4
 Sheet 1 of 2

Project			Port Sorell waste depot			Location		Depot Road, Port Sorell		
Co-ordinates			55 460609 mE 5443151 mN		Drill type	Auger		Hole commenced	14 September 2000	
					Drill method	Rotary		Hole completed	14 September 2000	
R.L.					Drill fluid	Nil		Drilled by	Mr Shane Heawood	
Inclination			Vertical					Logged by	Mr Andrew Ezzy	
Bearing								Checked by	Mr Adrian Waite	
penetration	support	water	notes	metres	graphic log	classification	material	moisture	consistency	structure, geology
1 2 3			samples, tests	R.L. depth		symbol	soil type: plasticity or particle characteristics, colour, secondary and minor components.	condition	density index	
		Cement	D Sample ID 1			SM	SAND - fine, light grey	M	S L	Tertiary sediments
		Bentonite	D Sample ID 2	0.5		CH	CLAY - high plasticity, mottled 60% light red and 40% grey, sandy	M	S L	Tertiary sediments
			D Sample ID 3	1.0						
			D Sample ID 4	1.5						
			D Sample ID 5	2.0						
		7 mm Gravel	D Sample ID 6	2.5		CL	CLAY - medium plasticity, grey, 10% sandy clay grey mottles	M	S	Tertiary sediments
			D Sample ID 7	3.0		SC	SAND - medium, grey, clayey	W	VS VL	Tertiary sediments
			D Sample ID 7	3.5						
			D Sample ID 7	4.0						
			D Sample ID 8	4.5		CL	CLAY - low plasticity, green and grey	M	D St	Tertiary sediments

ENGINEERING LOG - BOREHOLE

Borehole no. **PSWD 2000/4**
 Sheet **2** of **2**

Project		Port Sorell waste depot			Location		Depot Road, Port Sorell		
Co-ordinates		55 460609 mE 5443151 mN			Drill type		Auger		
					Drill method		Rotary		
R.L.					Drill fluid		Nil		
Inclination		Vertical			Hole commenced		14 September 2000		
Bearing					Hole completed		14 September 2000		
					Drilled by		Mr Shane Heawood		
					Logged by		Mr Andrew Ezzy		
					Checked by		Mr Adrian Waite		

penetration	support	water	notes samples, tests	metres R.L. depth	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
1 2 3			Sample ID numbers refer to samples stored in MRT core shed				End of hole at 5.0 m Bailed for 5 minutes. At end of bailing pH 8.3 and conductivity 310 μ S/cm.			

ENGINEERING LOG - BOREHOLE

Project			Port Sorell waste depot			Location			Depot Road, Port Sorell																							
Co-ordinates			55 460590 mE 5443299 mN			Drill type			Auger																							
						Drill method			Rotary																							
R.L.						Drill fluid			Nil																							
Inclination			Vertical			Hole commenced			14 September 2000																							
Bearing						Hole completed			14 September 2000																							
						Drilled by			Mr Shane Heawood																							
						Logged by			Mr Andrew Ezzy																							
						Checked by			Mr Adrian Waite																							
penetration			support			water			notes			metres			graphic log			classification			material			moisture			consistency			structure, geology		
1 2 3									samples, tests			R.L.			depth			symbol			soil type: plasticity or particle characteristics, colour, secondary and minor components.			condition			density index					
						Cement			No samples collected due to extremely poor weather conditions									CL			CLAY - medium plasticity, white, rock fragments			M			H D			Capping material		
						Bentonite						0.5						CH			CLAY - high plasticity, mottled 50% light red and 50% grey			M			F			Capping material		
						No screen						1.0									WASTE fill - Pulp wood fibre			W						Refuse		
						1.5																										
						2.0																										
						2.5																										
						3.0												SC			SAND - medium, green-yellow and grey, clayey			W			VS VL			Tertiary sediments		
						3.5																										
						4.0												CL			CLAY - medium plasticity, green and grey			M			H D			Tertiary sediments		
						4.5																										
																					End of hole at 4.5 m Pumped for 4.0 L/m for 15 minutes. At end of pumping pH 6.9 and conductivity 1290 µS/cm.											

ENGINEERING LOG - BOREHOLE

Borehole no.
PSWD 2000/6
Sheet 1 of 2

Project			Port Sorell waste depot			Location		Depot Road, Port Sorell					
Co-ordinates			55 460535 mE 5443197 mN		Drill type		Auger		Hole commenced		14 September 2000		
					Drill method		Rotary		Hole completed		14 September 2000		
R.L.					Drill fluid		Nil		Drilled by		Mr Shane Heawood		
Inclination			Vertical						Logged by		Mr Andrew Ezzy		
Bearing									Checked by		Mr Adrian Waite		
penetration			support	water	notes samples, tests	metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
1	2	3				R.L.	depth						
				Cement	D Sample ID 1				CL	CLAY - low plasticity, mottled light red, light grey and red-yellow, rock fragments	M	H	Capping material
				Bentonite	D Sample ID 2	0.5			CL	CLAY - medium plasticity, 50% light red and 50% grey	M	F	Capping material
					D Sample ID 3 & 4	1.0			SC	SAND - medium, green and grey, clayey	W	S L	Capping material
				No screen						WASTE FILL - plastic, wood, metals, sand, medium, green and grey, clayey	W		Refuse mixed with tertiary sediments
					D Sample ID 5	1.5				WASTE FILL - plastic, wood, metals, clay, medium plasticity, green-grey, sandy	M		Refuse mixed with tertiary sediments
				7 mm Gravel	D Sample ID 6	2.0				WASTE FILL - plastic, wood, metals, clay, high plasticity, mottled 90% green-grey, 10% yellow	M		Refuse mixed with tertiary sediments
					D Sample ID 7	2.5			SC	SAND - medium, dark grey, clayey	W	VS VL	Tertiary sediments
					D Sample ID 8	3.0			SC	SAND - medium, light green-grey, clayey	W	VS VL	Tertiary sediments
					D Sample ID 9	3.5							
				2.0 metre slotted screen	D Sample ID 10	4.0			SC	SAND - medium, yellow, clayey	W	VS VL	Tertiary sediments
				Back in fill	D Sample ID 11				SC	SAND - medium, yellow, clayey, sand, 15% clay medium plasticity orange	W	VS VL	Tertiary sediments
				No screen	D Sample ID 12	4.5			CL	CLAY - medium plasticity, green-grey	M	F	Tertiary sediments

ENGINEERING LOG - BOREHOLE
 Borehole no. **PSWD 2000/6**
 Sheet **2** of **2**

Project		Port Sorell waste depot			Location		Depot Road, Port Sorell		
Co-ordinates		55 460535 mE 5443197 mN			Drill type		Auger		
					Drill method		Rotary		
R.L.					Drill fluid		Nil		
Inclination		Vertical			Hole commenced		14 September 2000		
Bearing					Hole completed		14 September 2000		
					Drilled by		Mr Shane Heawood		
					Logged by		Mr Andrew Ezzy		
					Checked by		Mr Adrian Waite		

penetration			support	water	notes samples, tests	metres		graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency density index	structure, geology
1	2	3				R.L.	depth						
					Sample ID numbers refer to samples stored in MRT core shed					End of hole at 5.1 m Bailed for 10 minutes. At end of bailing pH 6.4 and conductivity 1450 μ S/cm.			

Appendix 2

Analytical Services Tasmania – Laboratory reports for samples analysed for total petroleum hydrocarbons



ANALYTICAL SERVICES TASMANIA

Sandy Bay Laboratory

c/- Chemistry Department University of Tasmania

Sandy Bay Tasmania 7005

Telephone: (03) 6226 7175 Fax: (03) 6226 7825

Email: ast.sandybay@dpiwe.tas.gov.au

Laboratory Report

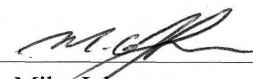
Report No: 13503 *Please quote this number when making enquiries about this report*
Submitted By: Andrew Ezzy
Client: Mineral Resources Tasmania
Site Description: PSWD2000/1
Received: 15-Sep-00 **Client Order No:**
Report Date: 06-Oct-00
Report To: Andrew Ezzy
Address: Gordons Hill Rd Rosny TAS 7018

Test Method(s) :

2403-Soil: TPH and BTEX in Soil by GC-FID

Method	Analyte	Units / Sampled On :	Lab.No.: 11405	11406	11407
			Sample Id.: PSWD 0-0.5m	PSWD 0.5-0.9m	PSWD 0.9-1.5m
			13-09-00 11:10	13-09-00 11:12	13-09-00 11:15
2403-Soil	TPH	mg/kgDMB	3210	223	40
	TPH C06-C09	mg/kgDMB	<5	<5	<5
	TPH C10-C14	mg/kgDMB	72	<5	<5
	TPH C15-C28	mg/kgDMB	1400	97	5
	TPH C29+	mg/kgDMB	1740	123	35

This document shall not be reproduced, except in full.
Samples analysed as received.


Mike Johnson
Manager

Page 1 of 1

Appendix 3

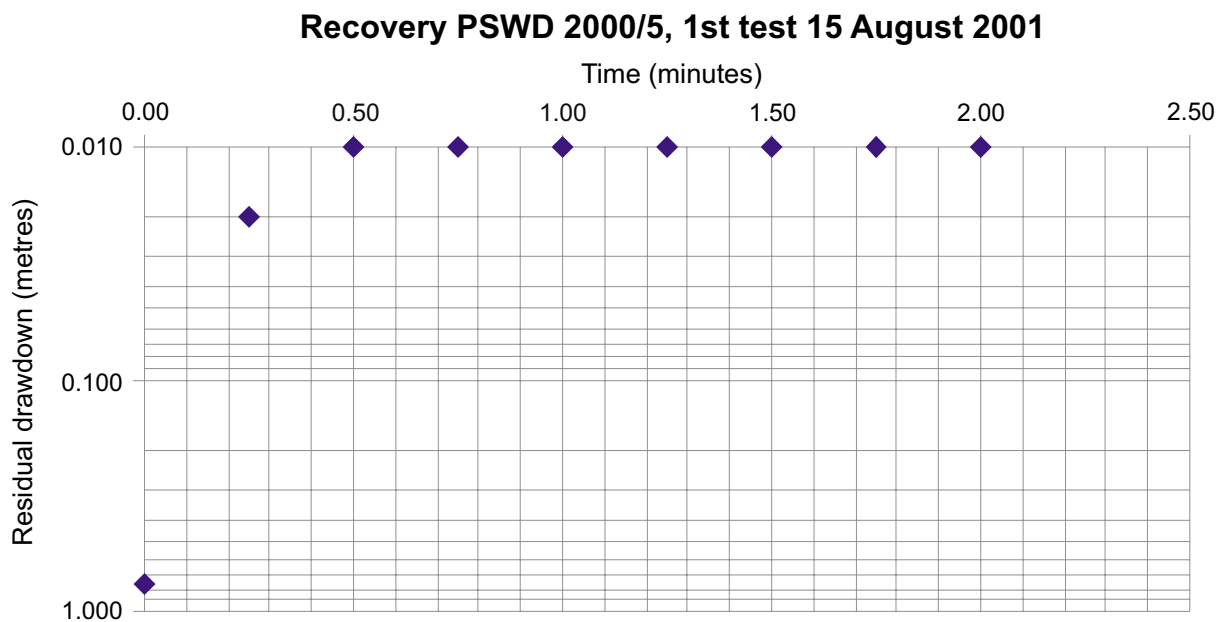
Raw data collected for slug extraction tests

Port Sorell waste depot recovery pump test – slug injection falling head data

Date: 15/08/2001
Bore: PSWD 2000/5
TD: 4.00 m
SWL: 0.75 m

Recovery data

<i>Time</i>	<i>Residual drawdown</i>	<i>Measurement</i>
0.00	0.77	0.00
0.25	0.02	0.77
0.50	0.01	0.76
0.75	0.01	0.749
1.00	0.01	0.749
1.25	0.01	0.749
1.50	0.01	0.749
1.75	0.01	0.749
2.00	0.01	0.749

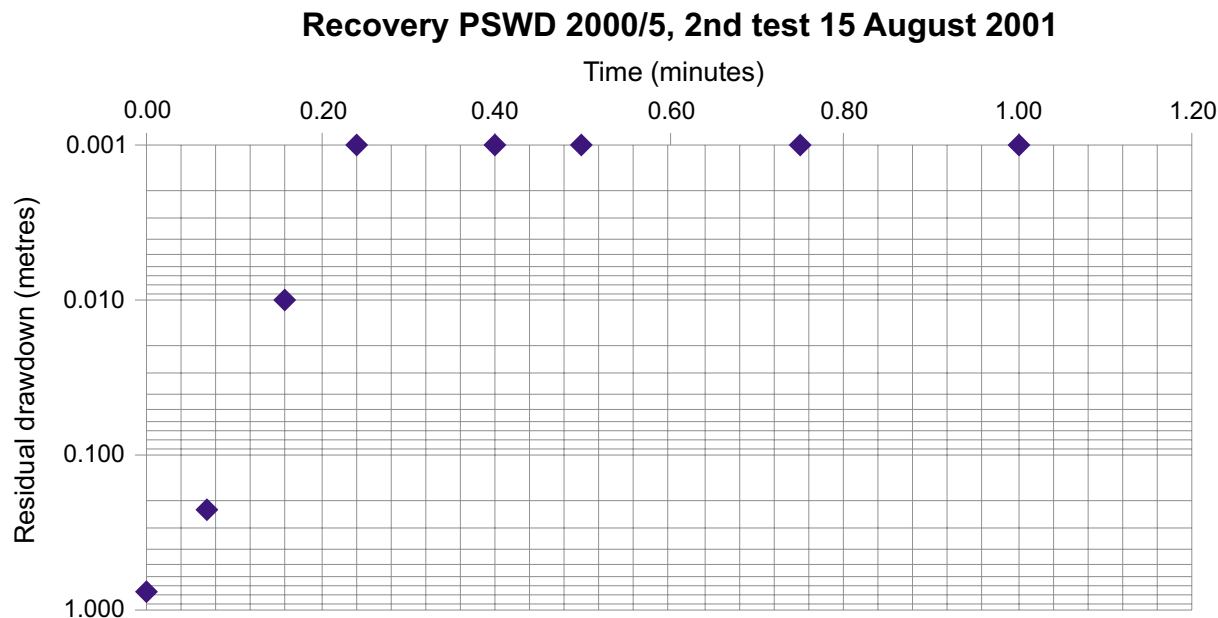


Port Sorell waste depot recovery pump test – slug injection falling head data

Date: 15/08/2001
Bore: PSWD 2000/6
TD: 5.10 m
SWL: 0.75 m

Recovery data

<i>Time</i>	<i>Residual drawdown</i>	<i>Measurement</i>
0.00	0.750	0.00
0.07	0.230	0.52
0.16	0.010	0.74
0.24	0.001	0.749
0.40	0.001	0.749
0.50	0.001	0.749
0.75	0.001	0.749
1.00	0.001	0.749

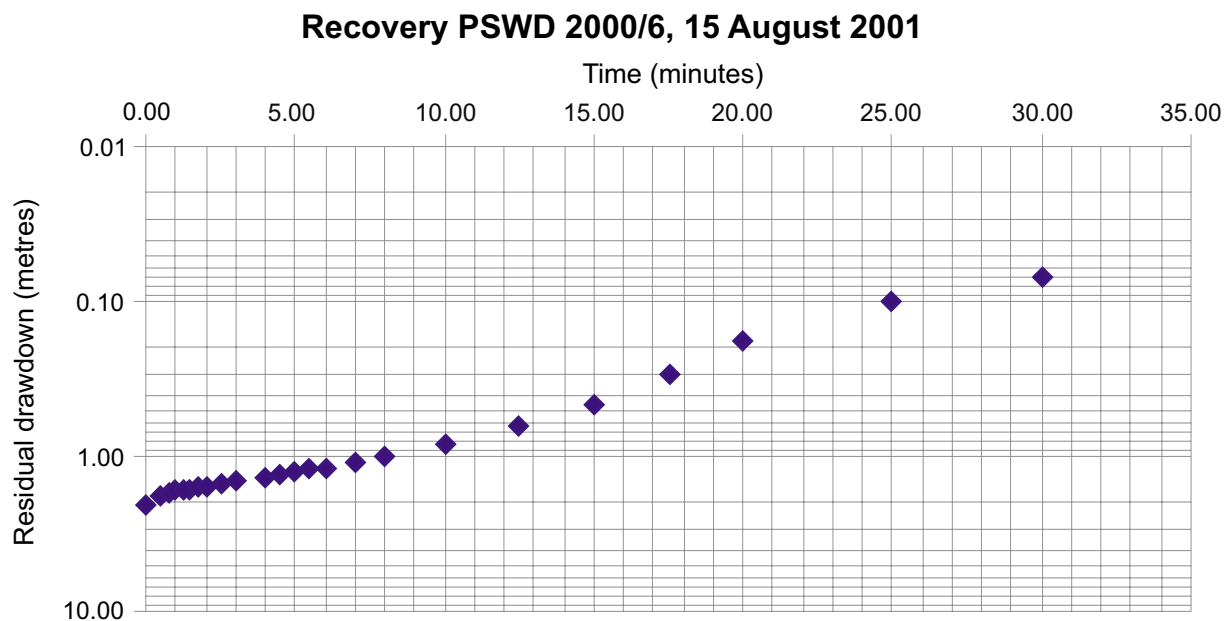


Port Sorell waste depot recovery pump test – slug extraction recovery data

Date: 15/08/2001
Bore: PSWD 2000/6
TD: 5.10 m
Flow: 4.0 l/m
SWL: 3.04 m

Recovery data

Time	Residual drawdown	Measurement
0.00	2.06	5.10
0.50	1.76	4.80
0.75	1.71	4.75
1.00	1.66	4.70
1.25	1.64	4.68
1.50	1.61	4.65
1.75	1.59	4.63
2.00	1.57	4.61
2.50	1.51	4.55
3.00	1.46	4.50
4.00	1.35	4.39
4.50	1.32	4.36
5.00	1.28	4.32
5.50	1.22	4.26
6.00	1.18	4.22
7.00	1.09	4.13
8.00	1.00	4.04
10.00	0.84	3.88
12.50	0.63	3.67
15.00	0.46	3.50
17.50	0.30	3.34
20.00	0.18	3.22
25.00	0.10	3.14
30.00	0.07	3.11



Appendix 4

Analytical Services Tasmania – Laboratory reports



ANALYTICAL SERVICES TASMANIA

Sandy Bay Laboratory

c/- Chemistry Department University of Tasmania

Sandy Bay Tasmania 7005

Telephone: (03) 6226 7175 Fax: (03) 6226 7825

Email: ast.sandybay@dpiwe.tas.gov.au



NATA Accreditation
Number: 5589

Laboratory Report

Report No: 13866 *Please quote this number when making enquiries about this report*
Submitted By: Andrew Ezzy
Client: Mineral Resources Tasmania
Site Description: Port Sorell
Received: 17-Nov-00 **Client Order No:**
Report Date: 13-Dec-00
Report To: Andrew Ezzy
Address: Gordons Hill Rd Rosny TAS 7018

Test Method(s) :

1001-Water:	pH in Water by APHA Method 4500-H
1002-Water:	Conductivity by APHA Method 2510
1101-Water:	Alkalinity by APHA Method 2320/4500-CO2
1103-Water:	Anions by Ion Chromatography APHA Method 4110C
1201-Water:	Nutrients by APHA Method 4500
1301-Water:	Metals in Water by APHA Method 3030/3120
1406-Water:	TPH and BTEX in Water by GC-FID *



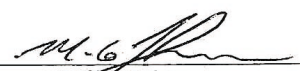
NATA endorsed test report.

This document shall not be reproduced, except in full.

Samples analysed as received.

* NATA registration does not cover the performance of this service.

NATA Accreditation Number: 5589


Mike Johnson
Manager

Page 1 of 5

Report No: 13866

Report Date: 13-Dec-00

Method	Analyte	Units / Sampled On :	Lab.No.: 13698	13699	13700	13701
			Sample Id.: PSWD 2000/1	PSWD 2000/2	PSWD 2000/3	PSWD 2000/4
			16/11/00 11:45	16/11/00 12:40	16/11/00 14:35	16/11/00 10:30
1001-Water	pH		4.5	5.9	6.7	6.1
1002-Water	Conductivity	µS/cm	3190	756	1410	1080
1101-Water	Alkalinity CO ₃	mg/L CaCO ₃	<1	<1	<1	<1
	Alkalinity HCO ₃	mg/L CaCO ₃	<1	74	690	106
1103-Water	Chloride	mg/L	800	150	61	280
	Sulphate	mg/L	130	20	1.2	41
1201-Water	Ammonia	µg-N/L	19	111	18400	122
	Nitrate+Nitrite	µg-N/L	2360	9	6	12
	Nitrite	µg-N/L	4	<2	<2	3
	Ortho-P	µg-P/L	4	3	4	5
1301-Water	Al (Dissolved)	µg/L	8940	106	<10	18
	As (Dissolved)	µg/L	<5	<5	<5	<5
	Cd (Dissolved)	µg/L	<1	<1	<1	<1
	Co (Dissolved)	µg/L	8	3	4	11
	Cr (Dissolved)	µg/L	10	2	6	2
	Cu (Dissolved)	µg/L	8	13	<1	2
	Fe (Dissolved)	µg/L	1410	255	34400	1910
	Mn (Dissolved)	µg/L	102	109	751	137
	Ni (Dissolved)	µg/L	12	7	2	20
	Pb (Dissolved)	µg/L	44	<5	<5	<5
	Zn (Dissolved)	µg/L	38	17	11	14
1406-Water	TPH	µg/L	12000			
	TPH C06-C09	µg/L	11900			
	TPH C10-C14	µg/L	<10			
	TPH C15-C28	µg/L	<10			
	TPH C29+	µg/L	<10			

Report No: 13866

Report Date: 13-Dec-00

Method	Analyte	Units / Sampled On :	Lab.No.: 13702	13703	13704	13705
			Sample Id.: PSWD 2000/5	PSWD 2000/6	SouthEastPond	EastOutflow
			16/11/00 14:10	16/11/00 13:20	16/11/00 13:40	16/11/00 11:05
1001-Water	pH		6.4	6.6		
1002-Water	Conductivity	µS/cm	979	2720		
1101-Water	Alkalinity CO3	mg/L CaCO3	<1	<1		
	Alkalinity HCO3	mg/L CaCO3	363	1270		
1103-Water	Chloride	mg/L	170	280		
	Sulphate	mg/L	1.9	2.4		
1201-Water	Ammonia	µg-N/L	11600	41800	8360	1880
	Nitrate+Nitrite	µg-N/L	6	6	518	1100
	Nitrite	µg-N/L	<2	3	140	62
	Ortho-P	µg-P/L	4	7	39	9
1301-Water	Al (Dissolved)	µg/L	37	<10	81	48
	As (Dissolved)	µg/L	<5	<5	<5	<5
	Cd (Dissolved)	µg/L	<1	<1	<1	<1
	Co (Dissolved)	µg/L	4	6	2	2
	Cr (Dissolved)	µg/L	2	6	3	2
	Cu (Dissolved)	µg/L	2	<1	<1	<1
	Fe (Dissolved)	µg/L	762	3800	1580	313
	Mn (Dissolved)	µg/L	979	3110	284	101
	Ni (Dissolved)	µg/L	8	5	4	4
	Pb (Dissolved)	µg/L	<5	<5	<5	<5
	Zn (Dissolved)	µg/L	3	4	17	15

Report No: 13866

Report Date: 13-Dec-00

Method	Analyte	Units / Sampled On :	Lab.No.: 13706	13707	13708	13709
			Sample Id.: EastLeachatePond	NorthEastDrain	EasternApexDrain	APPM Leachate
			16/11/00 11:00	16/11/00 11:10	16/11/00 13:50	16/11/00 11:50
1201-Water	Ammonia	µg-N/L	3580	561	27700	93800
	Nitrate+Nitrite	µg-N/L	156	24	8	12
	Nitrite	µg-N/L	30	19	6	7
	Ortho-P	µg-P/L	9	20	5	9
1301-Water	Al (Dissolved)	µg/L	273	155	<10	22
	As (Dissolved)	µg/L	<5	<5	<5	<5
	Cd (Dissolved)	µg/L	<1	<1	<1	<1
	Co (Dissolved)	µg/L	1	6	3	6
	Cr (Dissolved)	µg/L	5	15	<1	3
	Cu (Dissolved)	µg/L	<1	5	<1	<1
	Fe (Dissolved)	µg/L	3420	3390	1210	34200
	Mn (Dissolved)	µg/L	80	131	997	790
	Ni (Dissolved)	µg/L	4	10	2	21
	Pb (Dissolved)	µg/L	<5	<5	<5	6
	Zn (Dissolved)	µg/L	11	14	5	7
1406-Water	TPH	µg/L			278	<40
	TPH C06-C09	µg/L			14	<10
	TPH C10-C14	µg/L			62	<10
	TPH C15-C28	µg/L			95	<10
	TPH C29+	µg/L			106	<10



ANALYTICAL SERVICES TASMANIA

Sandy Bay Laboratory

c/- Chemistry Department University of Tasmania

Sandy Bay Tasmania 7005

Telephone: (03) 6226 7175 Fax: (03) 6226 7825

Email: ast.sandybay@dpiwe.tas.gov.au



NATA Accreditation
Number: 5589

Report No: 13866

Report Date: 13-Dec-00

Lab. No. Analyte

Method Used:

Client Sample ID.

13698 TPH (Water)

1406-Water

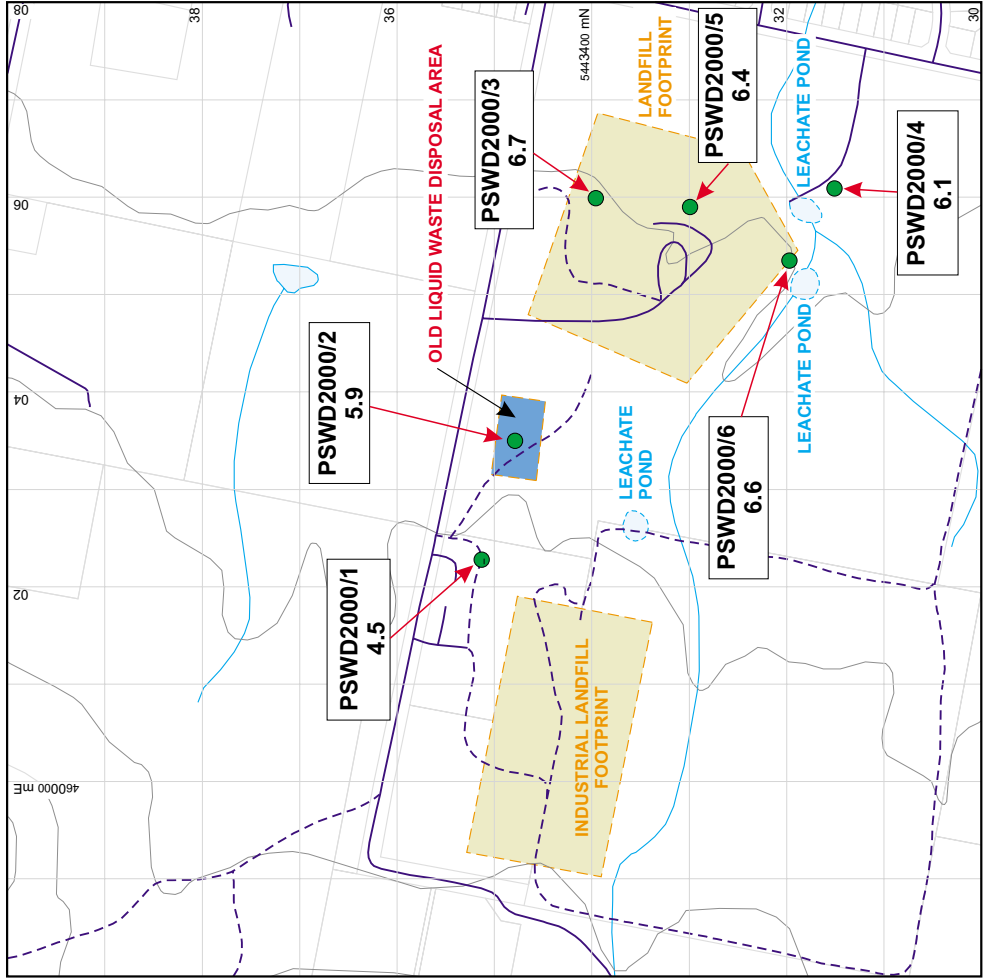
PSWD 2000/1

The positive C6-C9 TPH result is attributed the presence of a single peak, which has been tentatively identified by gas chromatography-mass spectrometry as Cyclohexanone.

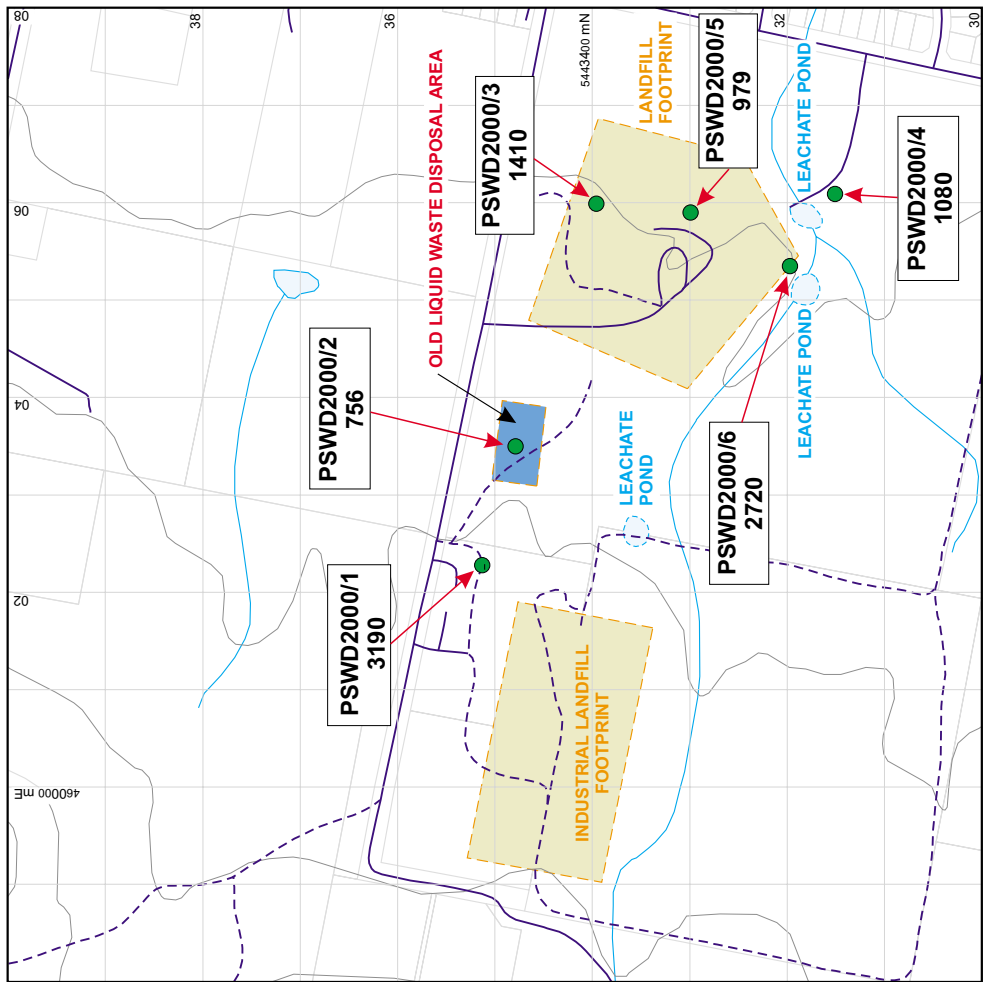
Appendix 5

Analytical results on site map

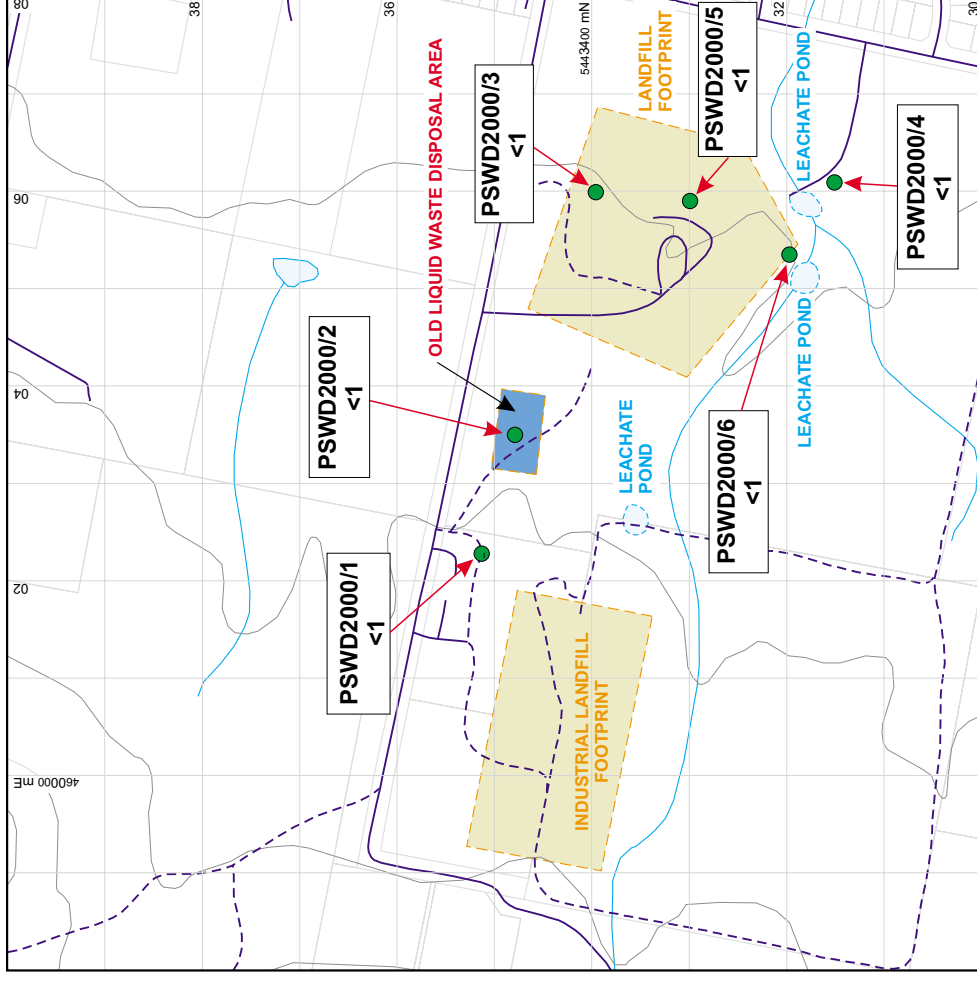
Port Sorell Waste Depot
November 2000
pH



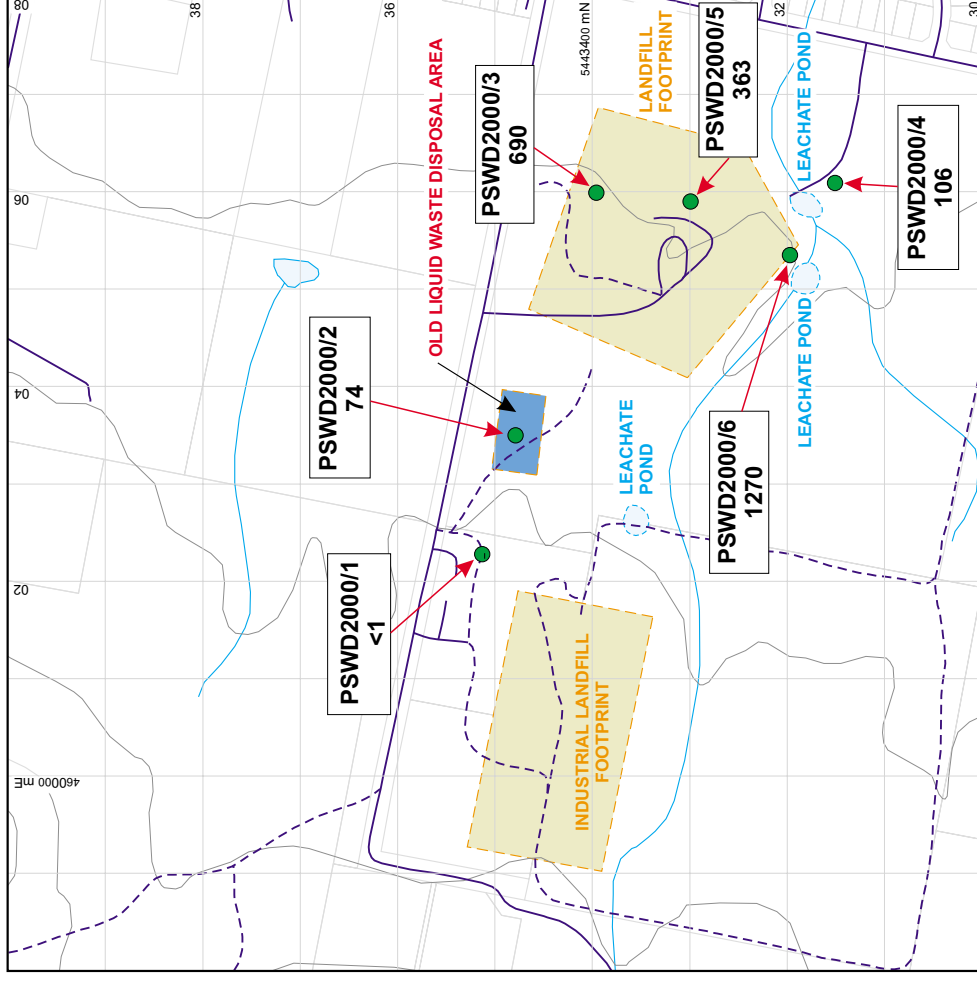
Port Sorell Waste Depot
November 2000
Conductivity ($\mu\text{S}/\text{cm}$)



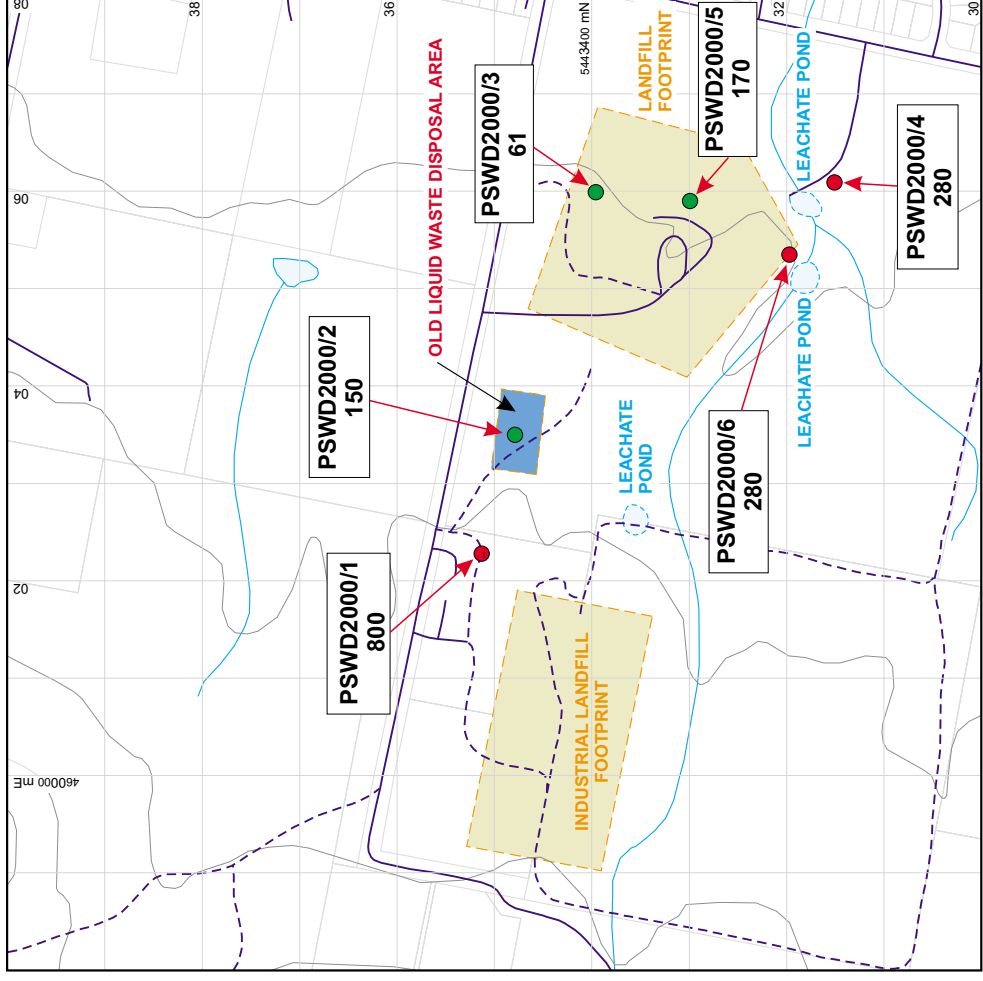
Port Sorell Waste Depot
November 2000
Alkalinity CO₃ (mg/L CaCO₃)



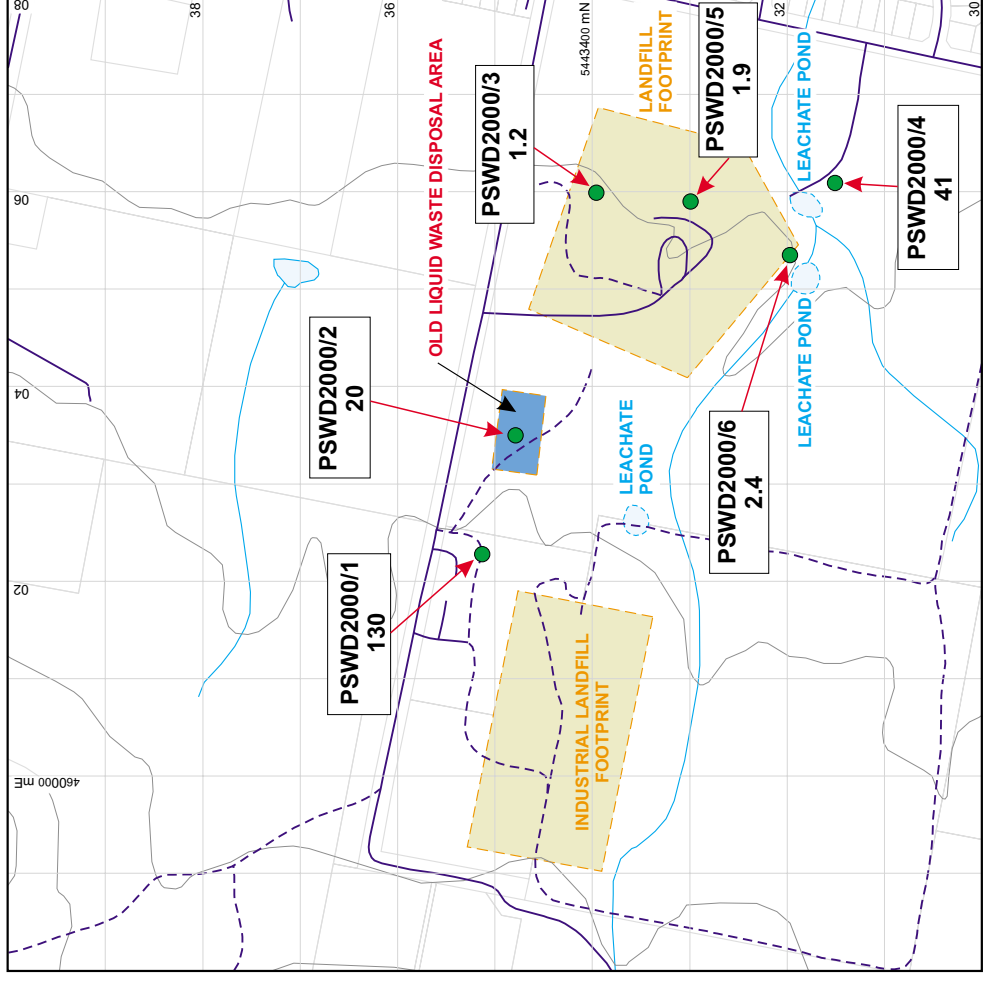
Port Sorell Waste Depot
November 2000
Alkalinity HCO₃ (mg/L CaCO₃)



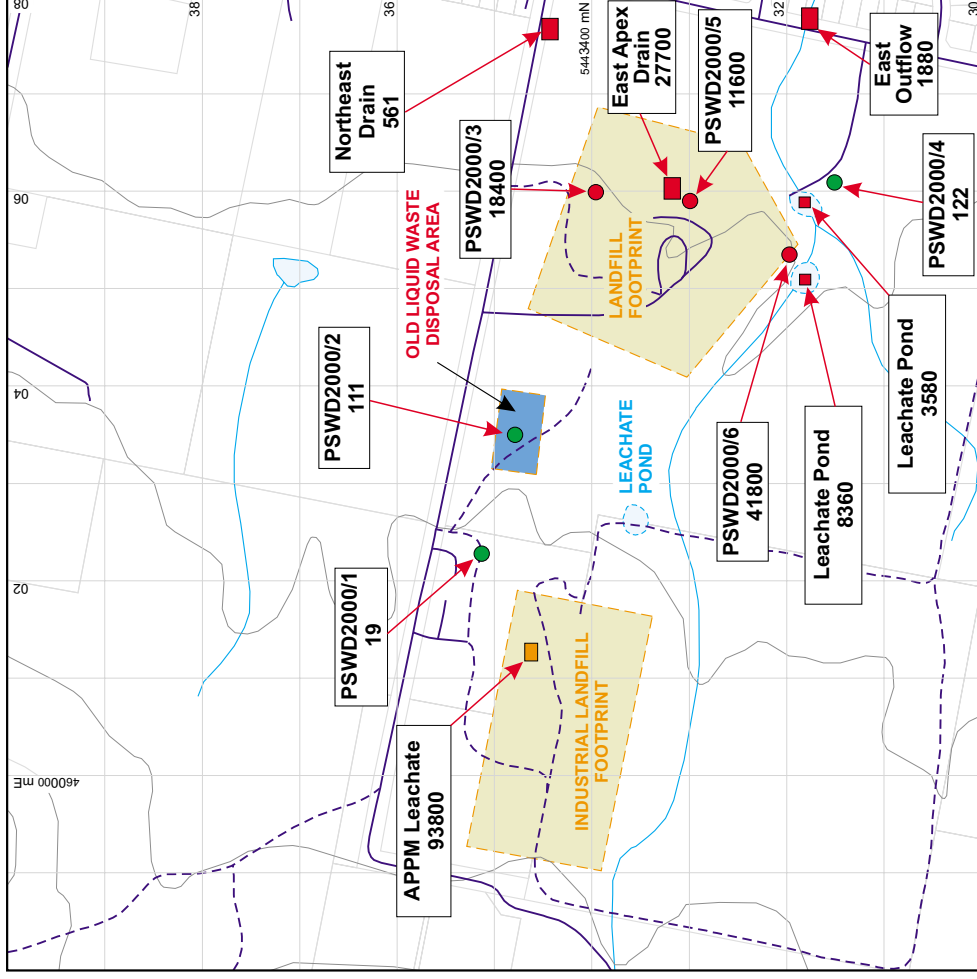
Port Sorell Waste Depot
November 2000
Chloride (mg/L)



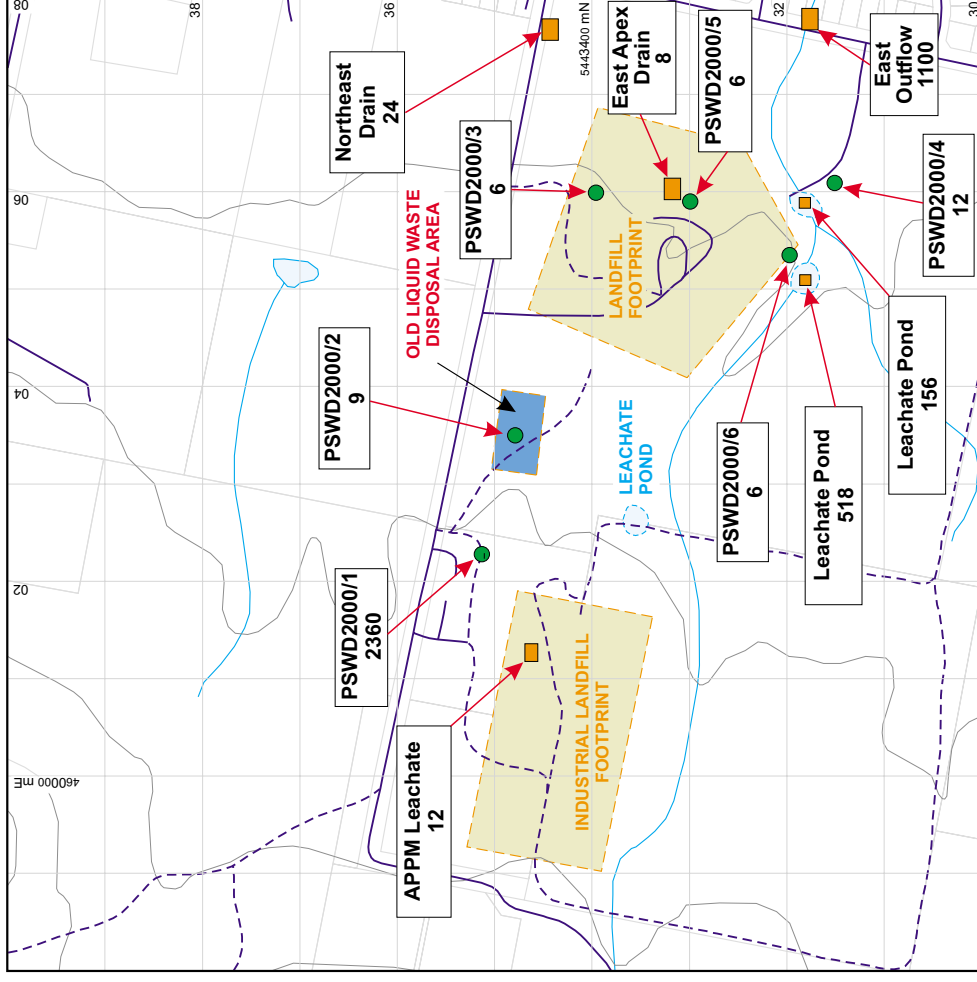
Port Sorell Waste Depot
November 2000
Sulphate (mg/L)



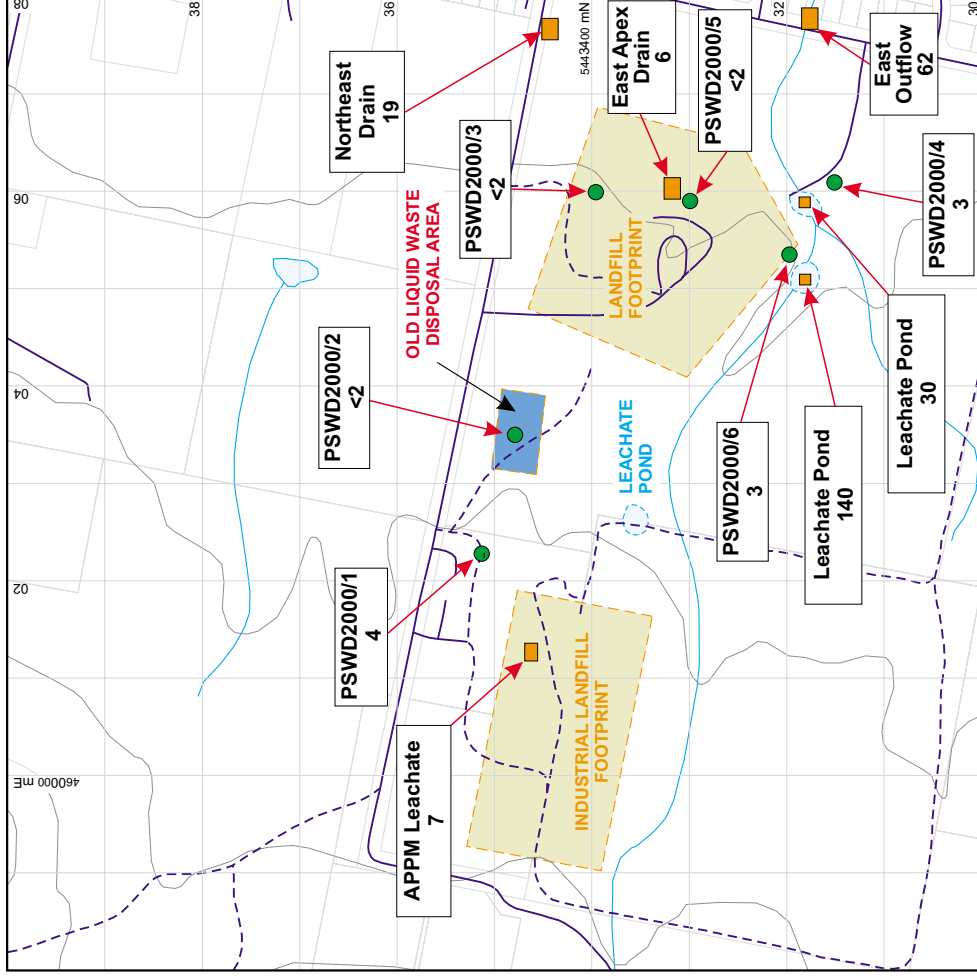
Port Sorell Waste Depot November 2000 Ammonia ($\mu\text{g-N/L}$)



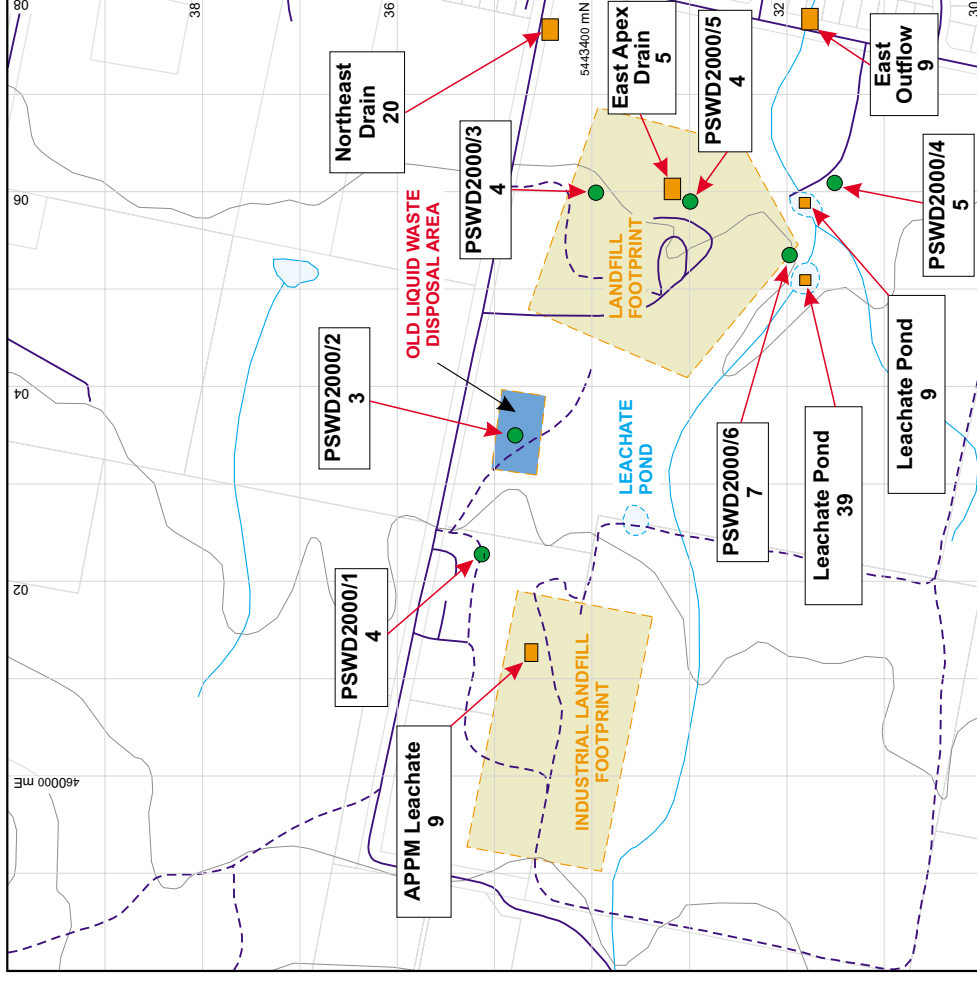
Port Sorell Waste Depot November 2000 Nitrate + Nitrite ($\mu\text{g-N/L}$)



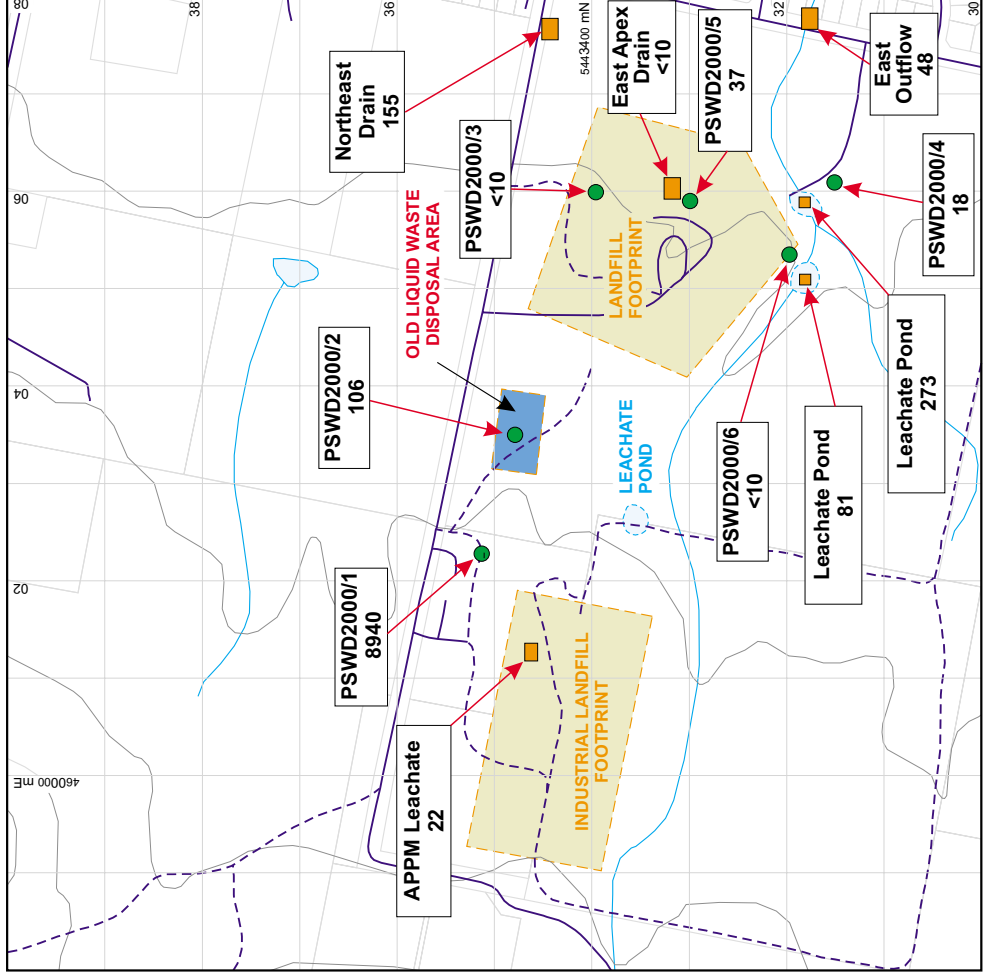
Port Sorell Waste Depot
November 2000
Nitrite ($\mu\text{g-N/L}$)



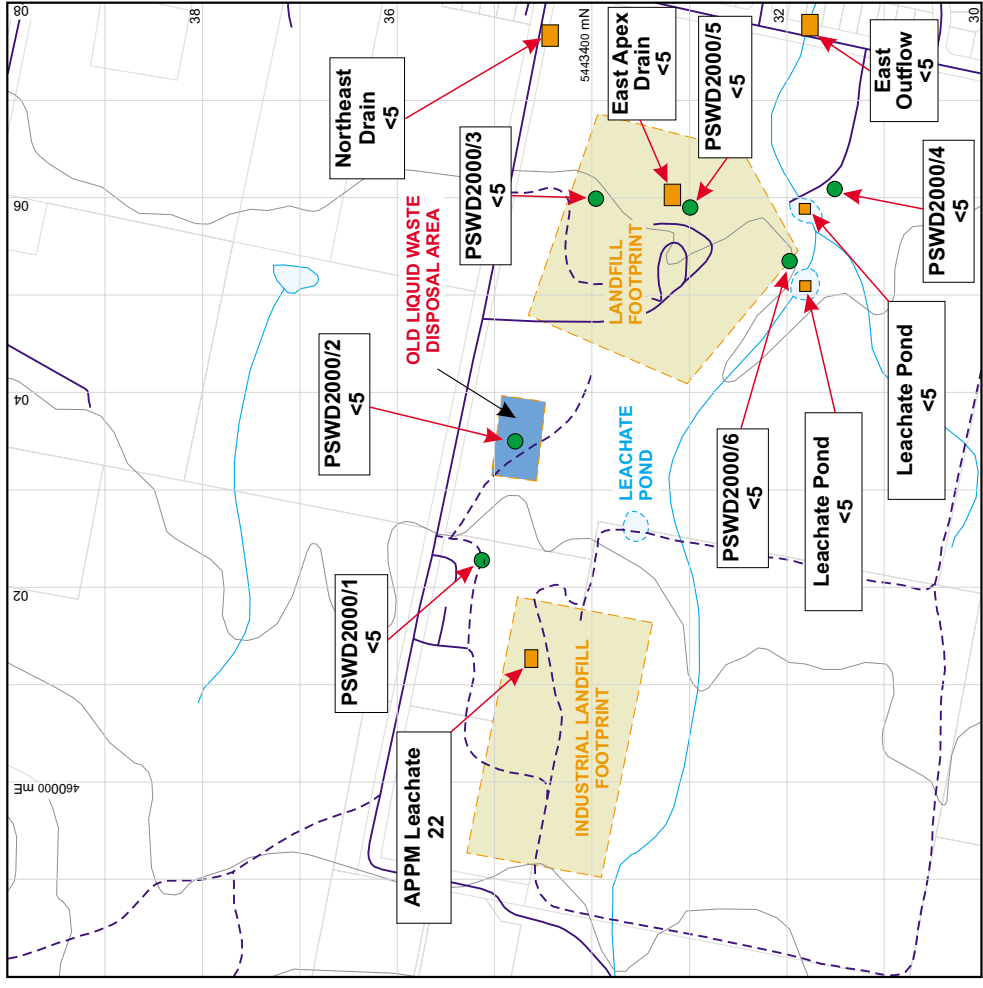
Port Sorell Waste Depot
November 2000
Ortho-P ($\mu\text{g-N/L}$)



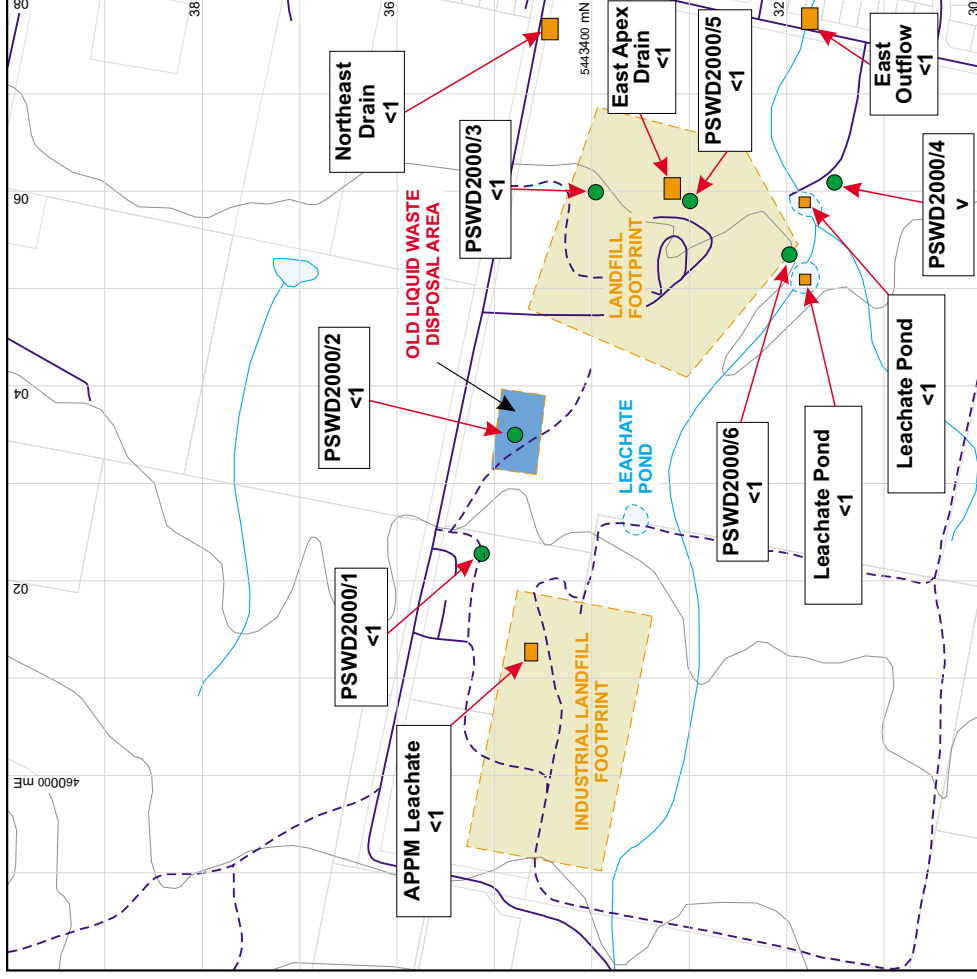
Port Sorell Waste Depot November 2000 Al ($\mu\text{g/L}$)



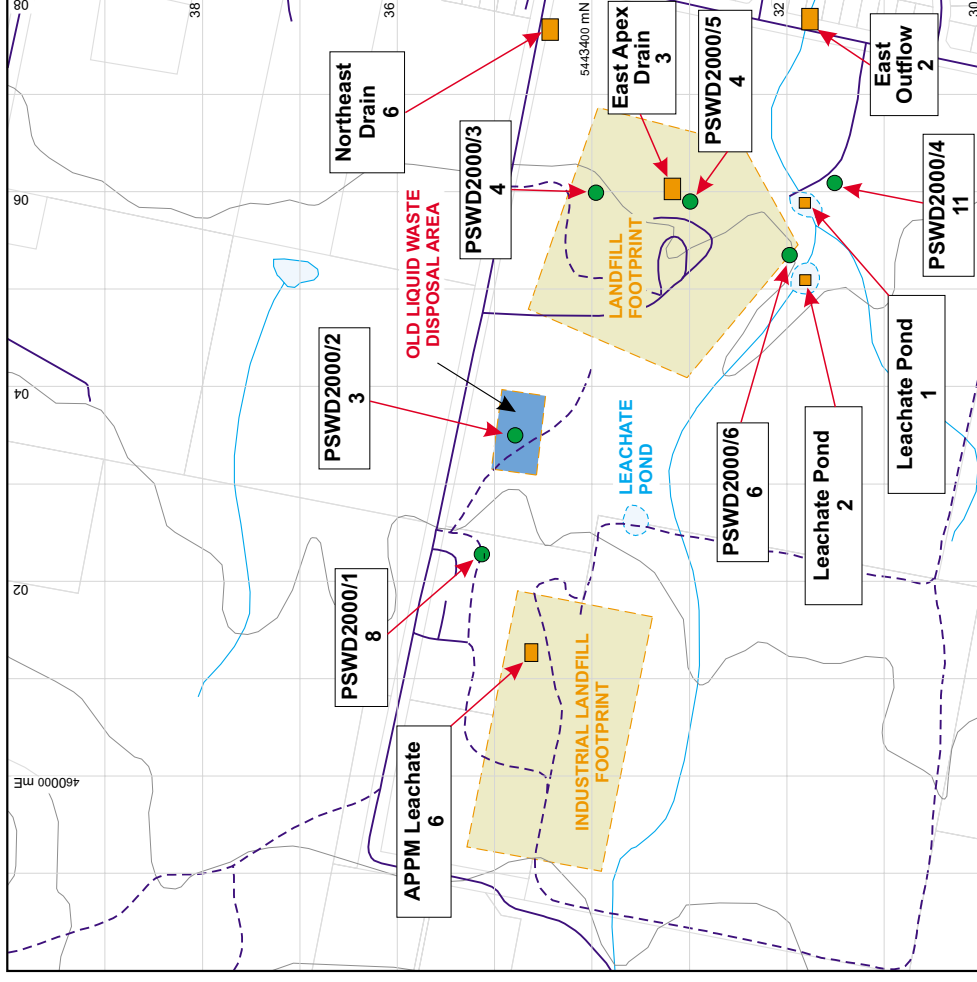
Port Sorell Waste Depot November 2000 As ($\mu\text{g/L}$)



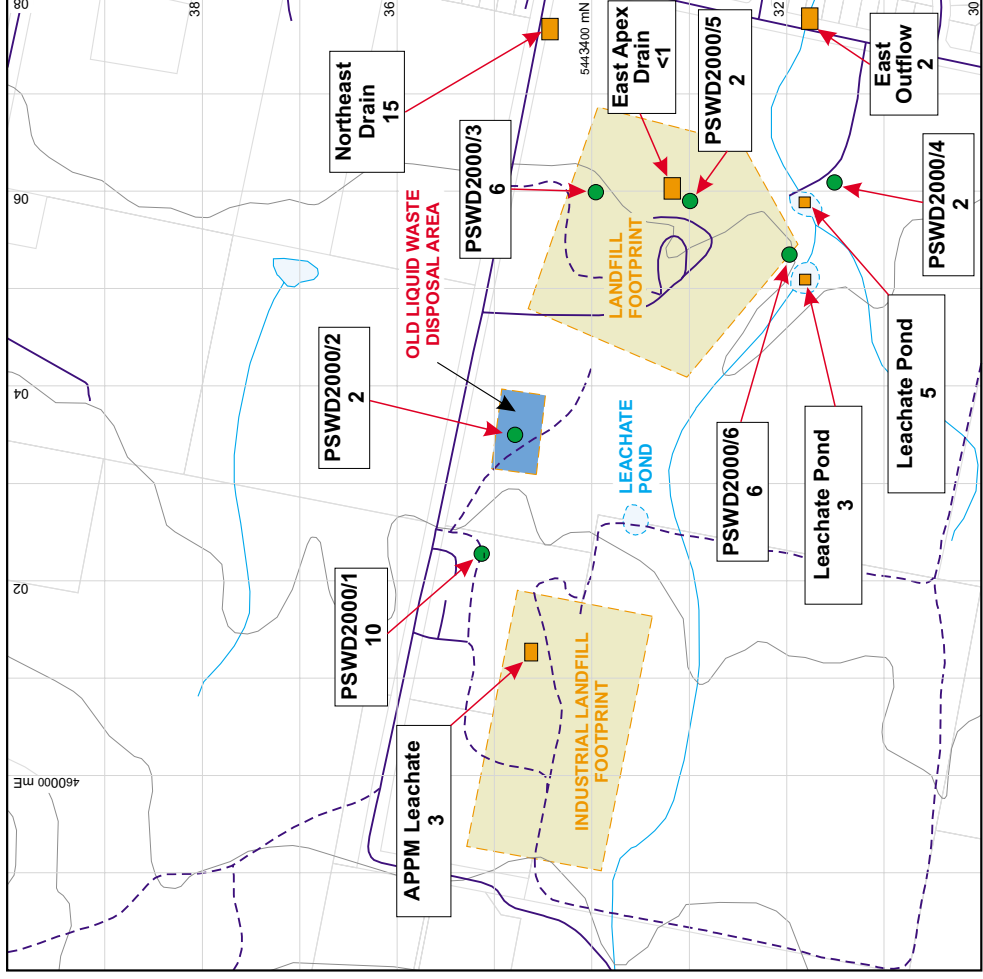
Port Sorell Waste Depot
November 2000
Cd ($\mu\text{g/L}$)



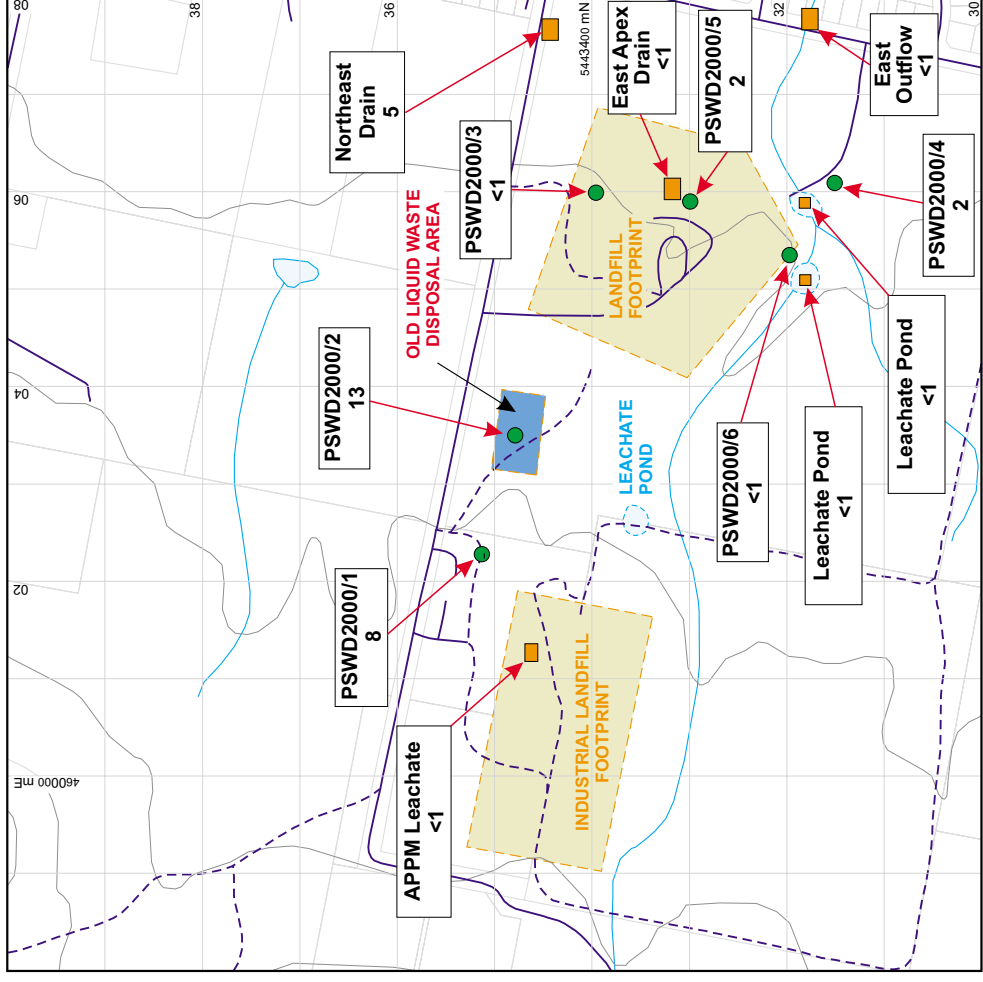
Port Sorell Waste Depot
November 2000
Co ($\mu\text{g/L}$)



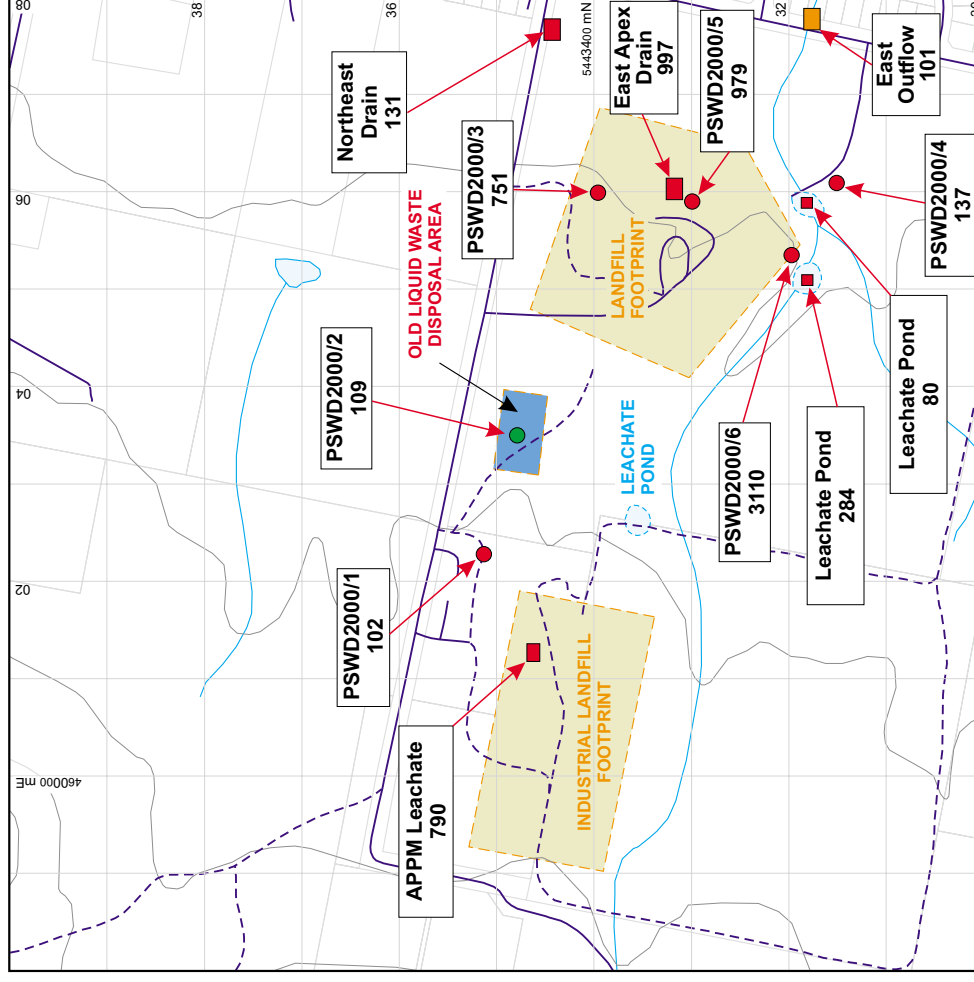
Port Sorell Waste Depot
November 2000
Cr (µg/L)



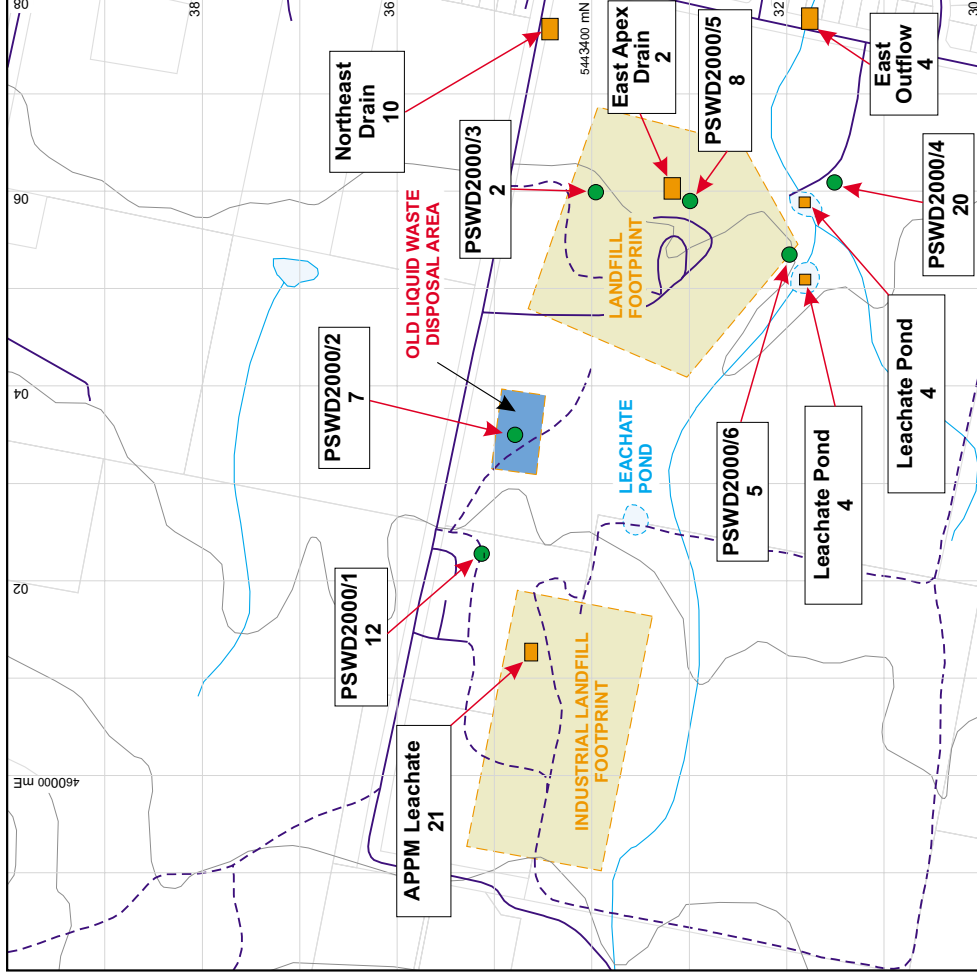
Port Sorell Waste Depot
November 2000
Cu (µg/L)



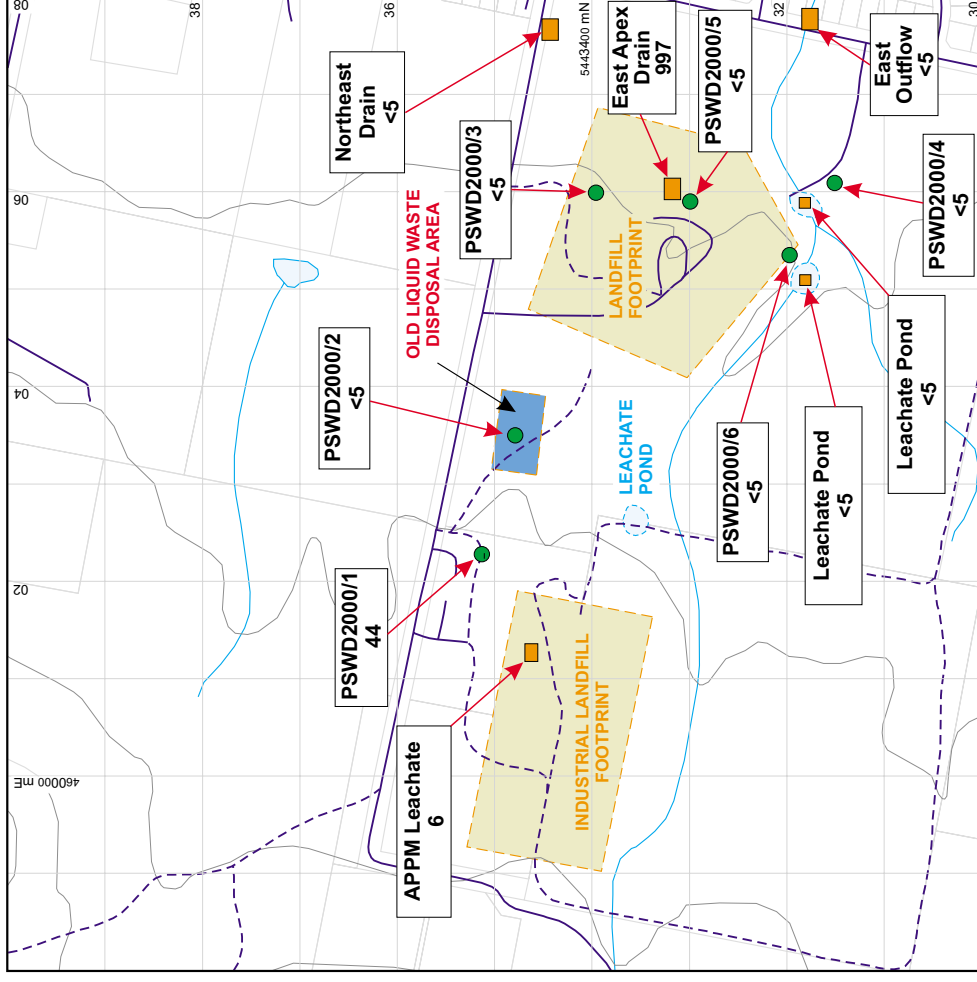
Port Sorell Waste Depot
November 2000
Mn (µg/L)



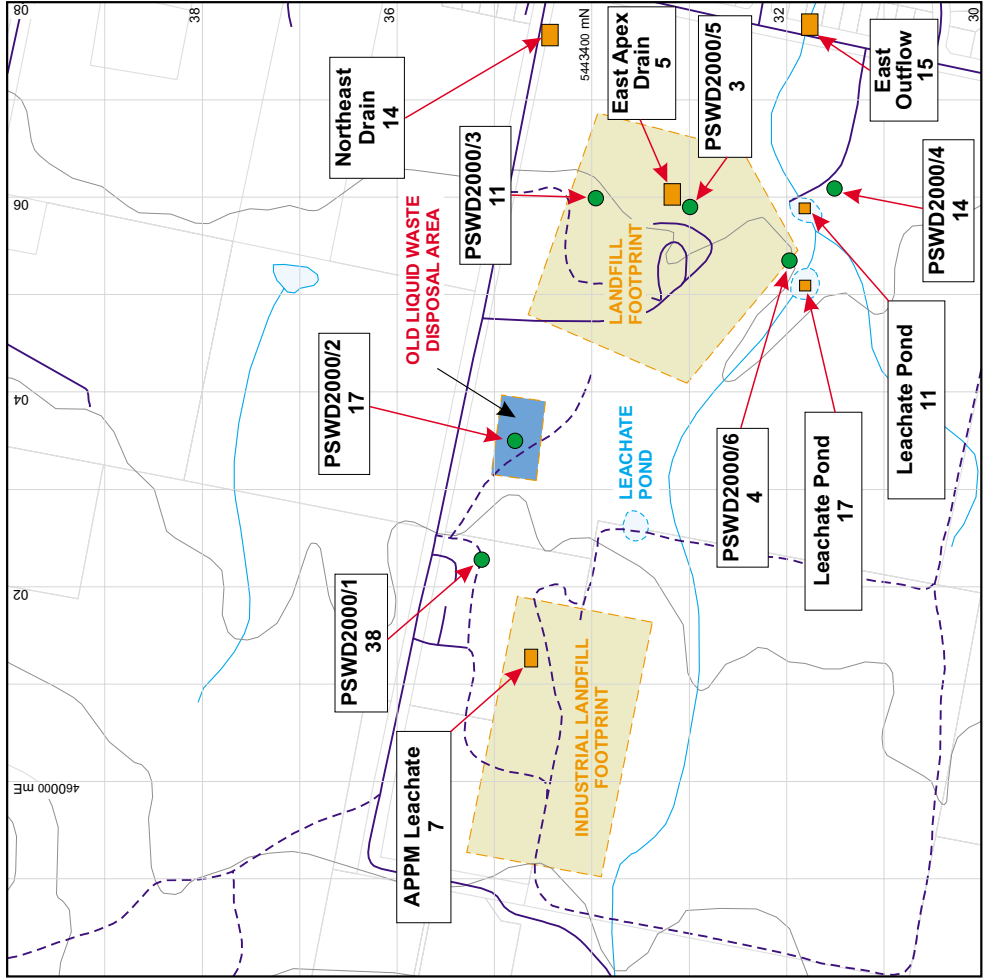
Port Sorell Waste Depot November 2000 Ni (µg/L)



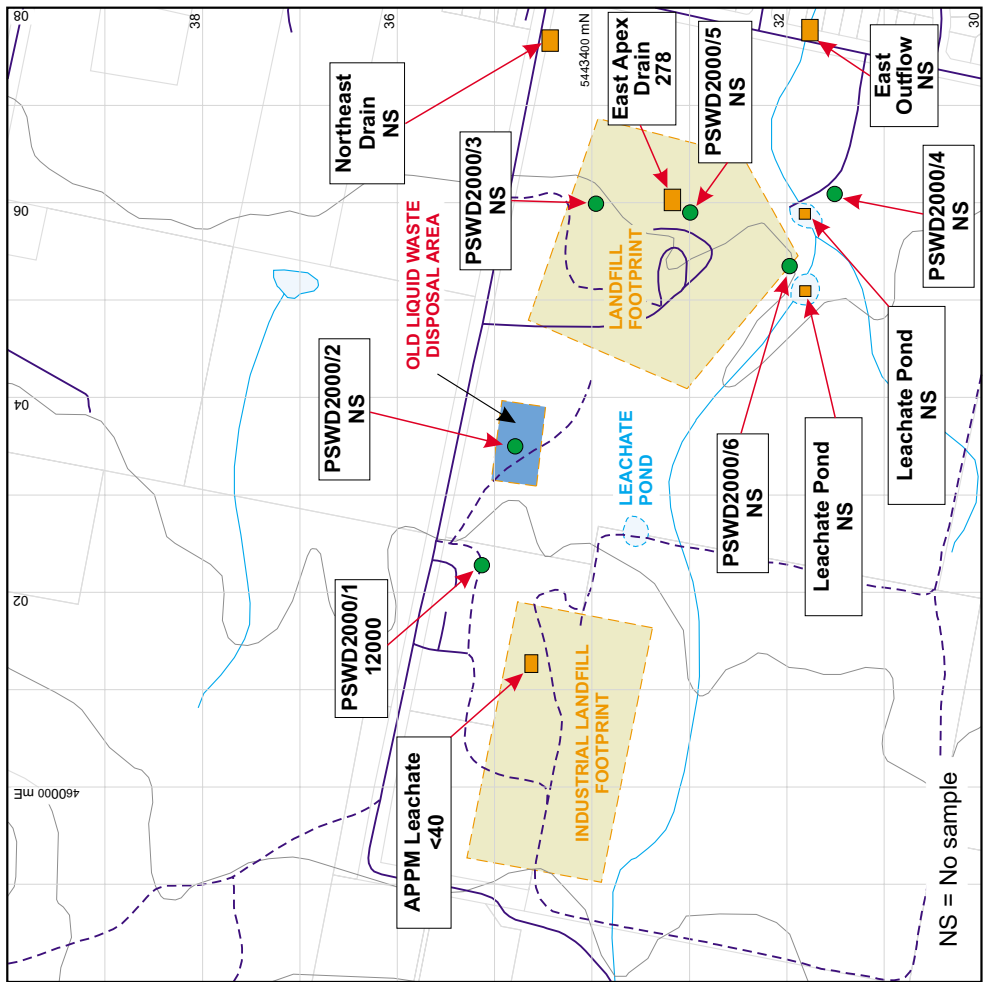
Port Sorell Waste Depot November 2000 Pb (µg/L)



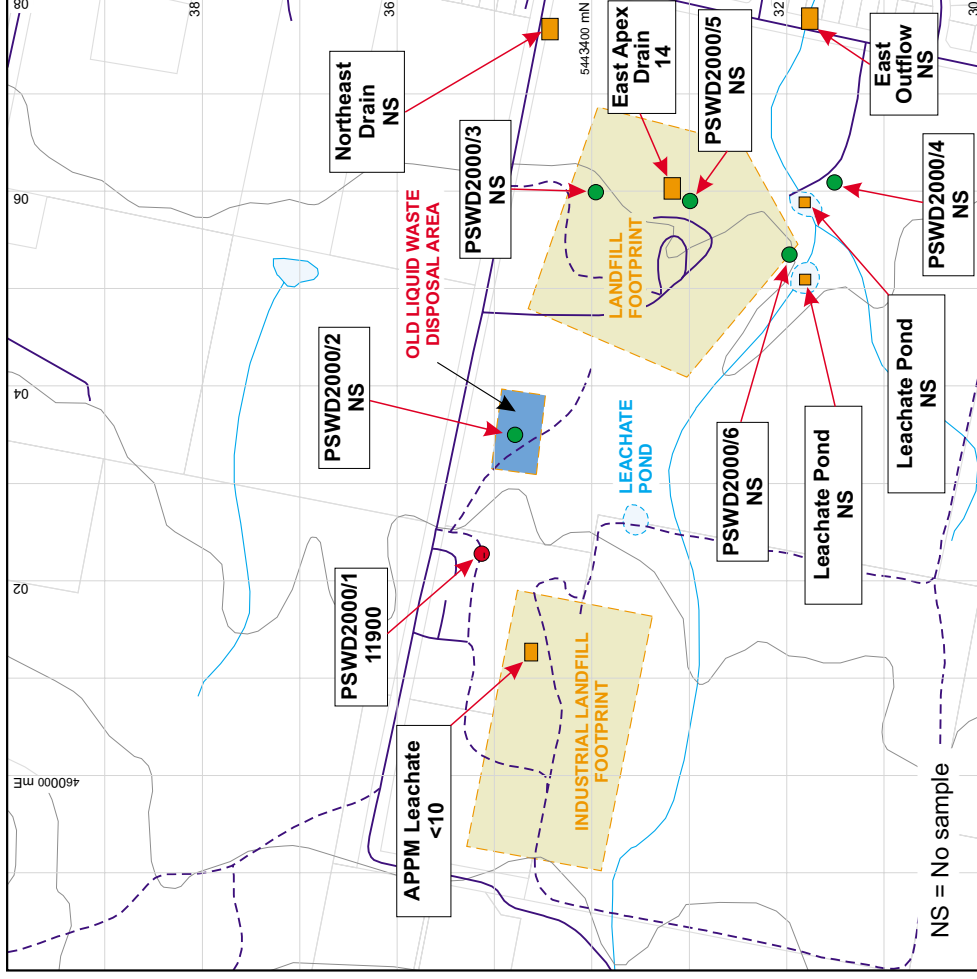
Port Sorell Waste Depot
November 2000
Zn (µg/L)



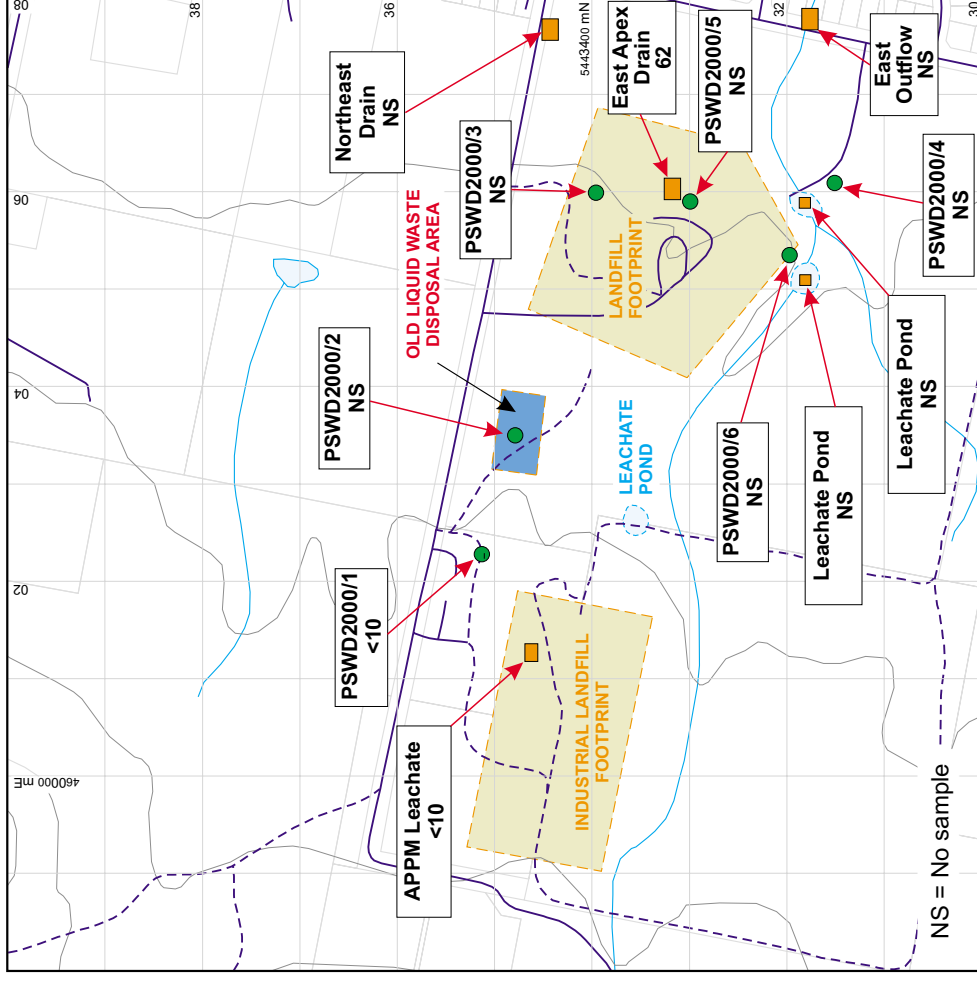
Port Sorell Waste Depot
November 2000
TPH (µg/L)



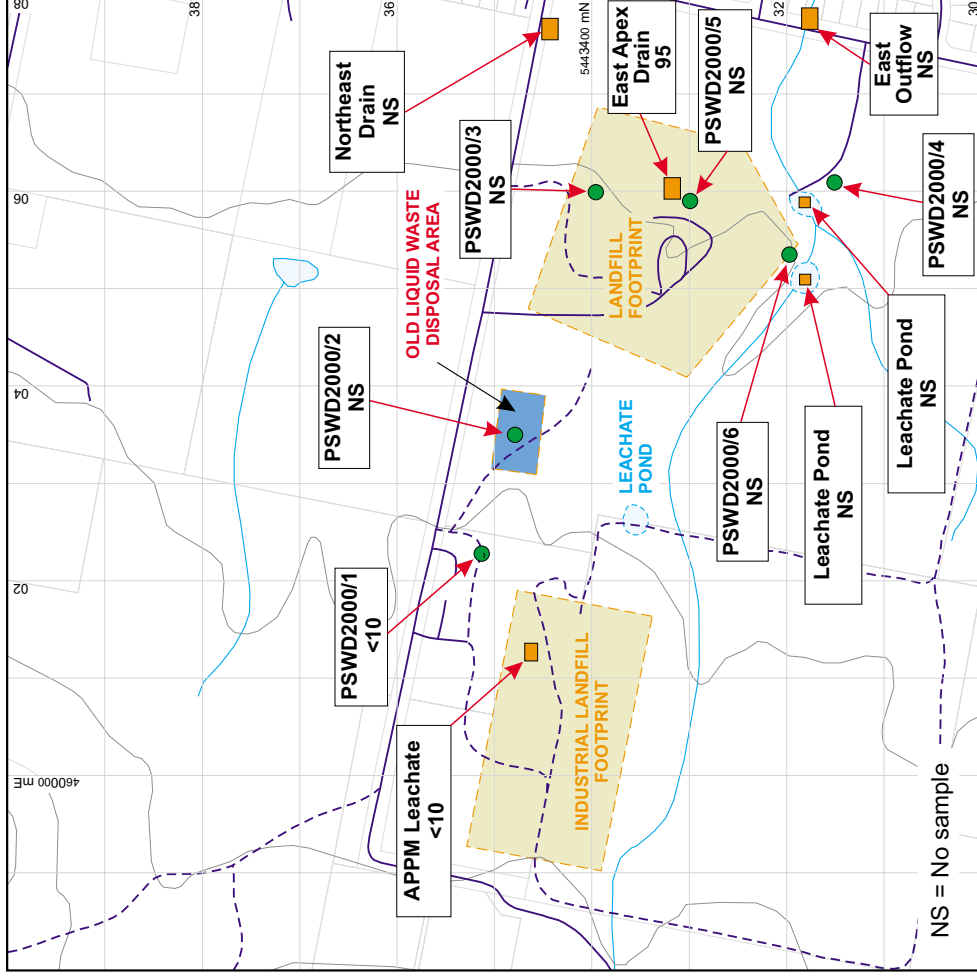
Port Sorell Waste Depot
November 2000
TPH C06–C09 (µg/L)



Port Sorell Waste Depot
November 2000
TPH C10–C14 (µg/L)



Port Sorell Waste Depot
November 2000
TPH C₁₅–C₂₈ (µg/L)



Port Sorell Waste Depot
November 2000
TPH C₂₉+ (µg/L)

