**Appendix 1** 

**Single Site Reports** 

Part 3 East Coast Bays

# **Explanatory notes**

This appendix provides a summary of the sediment chemistry and particle size distribution data for each monitoring site. The appendix has been divided according to "Marine Reporting Areas" (MRAs):

- Part 1: Central Waitemata Harbour
- Part 2: Upper Waitemata Harbour
- Part 3: East Coast Bays
- Part 4: Hibiscus Coast
- Part 5: Tamaki Estuary
- Part 6: Tamaki Strait
- Part 7: Manukau Harbour

The summaries are given as "Single Site Reports" (SSRs), in which the key physical and chemistry data are provided in 2 pages:

- The first page provides a brief description of the site: its location; classification in terms of sediment and contaminant transport/accumulation – "Settling Zone" (SZ) or "Outer Zone" (OZ), as described in ARC Technical Publication TP 170 (ARC 2002); key physical characteristics; notable features and relevant monitoring information (e.g. location of nearby sites).
- 2. The second page gives a summary of the sediment contaminant and sediment texture data: results from each year of monitoring for Cu, Pb, Zn, "high molecular weight" PAH (HWPAH), total organic carbon (TOC), and "mud content" (defined below). The contaminant results have been compared with sediment quality guidelines (the ARC "Environmental Response Criteria", ERC). Indicative trends over time (see below), and a brief interpretative summary on key features of the data, have also been given.

Plots and summary statistics include all data reported to end of 2010, unless otherwise stated (e.g. occasional clear outlier removed before plotting & analysis). Where replicate analyses have been performed, data have been summarised as medians.

Trend data given in the SSRs have been determined by linear regression. The trend plots have been fitted with a quadratic curve "line of best fit" as an aid for visually assessing the nature of changes over time in the data series. Trend indicators, using "arrow" symbols, have been used to show the magnitude and direction of trends. No statistical significance associated with these trends is given (this is discussed in detail in the body of the Status and Trends Report). The trend indicators should be interpreted as follows:

- <±1% per annum change probably indicates no (or very little) trend;</li>
- ±1–2% per annum indicates a small, or emerging, trend. Changes of this magnitude could be largely associated with analytical and/or sampling variation, so trends in this range may not have any "real world" significance; and
- >±2% indicates a stronger trend, equivalent to > ±20 % per decade, which is probably worth investigating further to better understand possible causes.

Mud content is given as the % of the <500  $\mu$ m fraction of the sediment that is <63  $\mu$ m. Where this has been determined by more than one method in any year, the average of the values has been used.

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# 1.1 Awaruku, Long Bay (SoE)







## **Additional Notes**

Coarse textured sandy sediment with low mud fraction content has proved difficult for consistent extractable metals' analysis (<63 um fraction).





	Mud Content	Organic Carbon	Extractable Metals (mg/kg, <63 μm)			Total Me	tals (mg/kg,	HWPAH (mg/kg, <500 μm)		
Year	% <63 um	TOC (%, <500 um)	Cu	Pb	Zn	Cu	Pb	Zn	mg/kg	at 1% TOC
1998	2.0	no data	9.0	12.3	61	1.7	1.3	24	0.004	no data
1999	3.0	no data	8.4	no data	87	0.9	2.5	14	0.003	no data
2001	2.5	no data	no data	no data	no data	1.5	no data	26	0.005	no data
2003	4.0	0.09	no data	no data	no data	2.0	4.0	25	no data	no data
2005	5.4	no data	2.3	3.2	23	2.0	3.7	24	0.005	no data
2007	6.5	0.07	no data	no data	no data	2.5	3.6	24	no data	no data
2010	0.3	no data	1.5	1.2	10	2.0	3.7	25	no data	no data
Median	3.7	0.08	5.4	3.2	44	2.0	3.6	24	0.004	no data
Trend (absolute units per year)	0.2	-0.01	-0.7	-0.9	-5.8	0.1	0.1	0.3	0.000	no value
Trend (% of median per year)	<b>1</b> 5.5	-8.3	-12.7	-28.2	-13.3	<b>1</b> 3.2	1.1	7 1.1	1 5.4	no value

Environmental Response Criteria (ERC)					Trend Indicato	rs
Cu <19 Pb <30 Zn <124 PAH <0.66	Cu 19–34 Pb 30–50 Zn 124–150 PAH 0.66–1.7	Cu >34 Pb >50 Zn >150 PAH >1.7		⇒ <±1%	S ≠1 - 2%	<b>1</b> ↓ > ±2%
ERC: For Outer Zones - the greater	r of the <63 $\mu m$ and <500 um fraction data. Settling	Л	Average annual	rate of change, as %	of median per year	

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# **1.2** Brown's Bay (SoE)







# **Additional Notes**

Coarse textured sandy sediment with low mud fraction content has proved difficult for reliable extractable metals' analysis (<63 um fraction). May be little value in continuing fine fraction analysis in future.





	Mud Content	Organic Carbon	Extractable Metals (mg/kg, <63 µm)		Total M	etals (mg/kg, ·	HWPAH (mg/kg, <500 μm)			
Year	% <63 um	TOC (%, <500 um)	Cu	Pb	Zn	Cu	Pb	Zn	mg/kg	at 1% TOC
1998	17.6	no data	no data	no data	no data	2.3	4.6	44	0.012	no data
1999	2.1	no data	10.4	2.1	133	1.3	3.9	22	0.013	no data
2001	1.6	no data	no data	no data	no data	2.0	no data	43	0.012	no data
2003	2.6	0.08	no data	no data	no data	no data	no data	no data	no data	no data
2005	2.8	0.08	3.6	5.9	41	1.9	5.3	34	0.009	0.092
2007	4.3	0.07	no data	no data	no data	2.0	4.5	34	no data	no data
2009	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data
Median	2.6	0.08	6.6	4.7	84	2.0	4.6	34	0.012	0.092
Trend (absolute units per year)	-0.3	0.00	-1.1	0.6	-15.2	0.0	0.1	-0.2	0.000	no value
Trend (% of median per year)	-10.0	-4.2	-17.3	13.1	-18.1	➡ 0.5	7 1.4	-0.6	-3.3	no value

	Environmental Response Criteria (ERC)			Trend Indicator	s	
Cu <19 Pb <30 Zn <124 PAH <0.66	Cu 19–34 Pb 30–50 Zn 124–150 PAH 0.66–1.7	Cu >34 Pb >50 Zn >150 PAH >1.7	Ш	⇒ <±1%	₩ Z ±1 - 2%	<b>1</b> ↓ > ±2%
ERC: For Outer Zones - the greater	r of the <63 $\mu m$ and <500 um fraction data. Settling	Л	Average annual ra	te of change, as % o	of median per year	

# **1.3** Cheltenham Beach (SoE)









	Mud Content	Organic Carbon	Extractable Metals (mg/kg, <63 μm)		Total M	etals (mg/kg, <	HWPAH (mg/kg, <500 μm)			
Year	% <63 um	TOC (%, <500 um)	Cu	Pb	Zn	Cu	Pb	Zn	mg/kg	at 1% TOC
1998	4.5	no data	11.1	39.5	87	2.8	11.0	47	0.322	no data
1999	4.3	no data	10.1	28.5	105	1.7	7.2	27	0.174	no data
2001	6.4	no data	11.5	10.3	116	2.2	5.1	49	0.083	no data
2003	8.0	0.15	no data	no data	no data	no data	no data	no data	no data	no data
2005	5.3	0.18	no data	no data	no data	2.8	10.9	42	0.319	1.689
2007	11.2	0.20	no data	no data	no data	2.5	8.6	39	no data	no data
2009	1.1	no data	3.6	14.0	44	2.5	9.1	37	no data	no data
Median	6.3	0.18	10.5	27.0	97	2.5	8.9	39	0.227	1.689
Trend (absolute units per year)	0.3	0.01	-0.6	-1.5	-4.9	0.0	0.1	-0.3	0.008	no value
Trend (% of median per year)	4.2	6.9	-5.7	-5.6	-5.0	1.1	⇒ 0.9	-0.7	3.5	no value

	Environmental Response Criteria (ERC)		$\left( \right)$	Trend Indicators
Cu <19 Pb <30 Zn <124 PAH <0.66	Cu 19–34 Pb 30–50 Zn 124–150 PAH 0.66–1.7	Cu >34 Pb >50 Zn >150 PAH >1.7	Ш	⇒ < ±1%  \$\$ < ±1 - 2%  \$\$ < ±2%
ERC: For Outer Zones - the greater	of the <63 $\mu m$ and <500 um fraction data. Settling Z	ones - the <500 μm fraction data .	Л	Average annual rate of change, as % of median per year

# 1.4 Vaughan's, Long Bay (SoE)







# **Additional Notes**

Coarse textured sandy sediment with low mud fraction content has proved difficult for consistent extractable metals' analysis (<63 um fraction).





	Mud Content	Organic Carbon	Extractable	Extractable Metals (mg/kg, <63 µm)		Total Me	etals (mg/kg, «	HWPAH (mg/kg, <500 μm)		
Year	% <63 um	TOC (%, <500 um)	Cu	Pb	Zn	Cu	Pb	Zn	mg/kg	at 1% TOC
1998	1.6	no data	no data	no data	no data	1.4	no data	22	0.002	no data
1999	2.4	no data	9.5	no data	78	1.4	4.2	18	0.002	no data
2001	2.3	no data	no data	no data	no data	1.2	no data	25	0.003	no data
2003	2.6	0.08	no data	no data	no data	2.0	3.1	22	no data	no data
2005	2.8	0.09	1.8	1.9	17	1.7	2.9	21	0.004	0.043
2007	5.7	0.07	no data	no data	no data	1.9	3.2	22	no data	no data
2010	0.2	no data	1.6	0.8	6.0	2.0	3.0	21	no data	no data
Median	2.5	0.08	1.8	1.3	17	1.9	3.0	21	0.003	0.043
Trend (absolute units per year)	0.2	0.00	-0.7	-0.4	-6.9	0.1	-0.1	0.0	0.000	no value
Trend (% of median per year)	6.5	-2.1	-40.0	-27.0	-41.1	2.9	-2.9	-0.2	10.1	no value

	Environmental Response Criteria (ERC)		Trend Indicators	
Cu <19 Pb <30 Zn <124 PAH <0.66	Cu 19–34 Pb 30–50 Zn 124–150 PAH 0.66–1.7	Cu >34 Pb >50 Zn >150 PAH >1.7		⇒ <±1% <> ±1 - 2%  \$\\$ >±2%
ERC: For Outer Zones - the greate	r of the <63 $\mu m$ and <500 um fraction data. Settling	Л	Average annual rate of change, as % of median per year	