

APPENDIX 9D1

**Sediment Testing
Results for TM-CLKL**

APPENDIX D1
SEDIMENT TESTING RESULTS
FOR TM-CLKL

D1-1 METHODOLOGY AND SCOPE

D1-1.1 The survey vessel was equipped with dGPS to ensure accurate positioning. At the sampling stations, sediment samples were collected using both vibrocore and/or surface grab. Vibrocores with internal diameter of 100mm with plastic lining were used to collect the sediment samples. Each vibrocore was pushed to penetrate the entire length of soft marine deposits (i.e., marine mud) of the specified location. The sediment depth was checked by visual observation of vibrocores and strata-logging was conducted on-site by geologists. Vibrocore sub-sampling was conducted according to **Table D1.1**. A reference sediment (surface grab) of ~30L was collected at Port Shelter (PS6, E850234, N820057).

Table D1.1 Vibrocore Sub-sampling and Laboratory Testing

Laboratory Testing	Depth of Sub-sample
Chemical and/or biological testing (ETWB 34/2002) – Sediment and Elutriate	0-1m below seabed Mid depths of vibrocore (1m) Bottom level of vibrocore (1m)
Inorganic Chemical testing – Sediment and Elutriate	Seabed Level 1m below mid-depths of vibrocore 1m above bottom level of vibrocore

D1-1.2 Once a vibrocore sample was retrieved from the site, the core with the plastic lining intact was cut into 1m sections with both end sealed with tin foil and plastic cap. For surface grab samples, food-grade plastic bags were used to contain the samples. For ambient marine water samples, a niskin sampler (or equivalent) was used to collect adequate amount of marine water for testing and running of elutriate procedure. The testing laboratory provided pre-cleaned containers for the marine water samples. The vibrocore tubes, grab sampler and niskin sampler were washed with adequate amount of ambient marine water before each deployment to minimise possible cross-contamination.

D1-1.3 The sectioned cores, grab and water samples were immediately stored in a refrigerator or ice chest on board with adequate amount of ice to keep the sample cool to 0°C (without freezing) to 4°C in dark. The samples were also kept at 0°C (without freezing) to 4°C in dark during shipment to the testing laboratory. To avoid undue temperature fluctuation and possible contamination, the duration of on-site storage were minimised and daily delivery of the collected samples to be testing laboratory was arranged. All the samples were appropriately labelled with unique code to indicate the date, station, sampling method, and sampling depth of each sample.

Chemical and Biological Screening

D1-1.4 At each station, marine sediment and ambient water were collected and tested for a suit of chemical parameters as summarised in Table D1.2. The reference sediment was also tested for comparison. Chemical screening parameters included:

- 9 metals/metalloid: cadmium, chromium, copper, mercury, nickel, lead, silver, zinc and arsenic for all vibrocore sub-samples.

- 3 organic micro-pollutants: polyaromatic hydrocarbons (PAHs) (low and high molecular weights), polychlorinated biphenyls (PCBs) (total), tributyltin (TBT) (in pore water) for all vibrocore sub-samples; and
- Chlorinated pesticides only for all grab samples.

D1-1.5 Biological screening parameters included:

- 10-day burrowing amphipod toxicity test;
- 20-day burrowing polychaete toxicity test; and
- 48-96 hours larvae (bivalve or echinoderm) toxicity test.

D1-1.6 Based on the chemical test results, the necessity and arrangement of biological tests were concluded, with a proposal of testing schedule. All analytical methods were based on the U.S. Environmental Protection Agency (U.S. EPA) or equivalent. Ancillary testing parameters including moisture content, grain size (<63 µm), total organic carbon, ammonia (as mg N/L), and salinity in porewater were analysed for those samples (composited) undergoing biological testing.

Table D1.2: Summary of Laboratory Testing

Contaminant of Concern	Reporting Limit	Unit
Sediment:		
<u>Metals</u>		
Cadmium (Cd)	0.2	mg/kg dry weight
Chromium (Cr)	8	mg/kg dry weight
Copper (Cu)	7	mg/kg dry weight
Mercury (Hg)	0.05	mg/kg dry weight
Nickel (Ni)	4	mg/kg dry weight
Lead (Pb)	8	mg/kg dry weight
Silver (Ag)	0.1	mg/kg dry weight
Zinc (Zn)	20	mg/kg dry weight
<u>Metalloid</u>		
Arsenic (As)	1	mg/kg dry weight
<u>Micro-organics</u>		
Low Molecular Weight PAHs	55	mg/kg dry weight
High Molecular Weight PAHs	170	mg/kg dry weight
Total PCBs	3	mg/kg dry weight
Tributyltin (in porewater)	0.015	µg/l
Chlorinated Pesticides	0.5	mg/kg dry weight
<u>Nutrient</u>		
Ammonia Nitrogen (NH ₄ -N)	0.1	mg N/kg dry weight
Total Kjeldahl Nitrogen (TKN)	50	mg N/kg dry weight
Nitrate Nitrogen (NO ₃ -N)	1	mg N/kg dry weight
Nitrite Nitrogen (NO ₂ -N)	1	mg N/kg dry weight
Total Phosphorus (TP)	10	mg P/kg dry weight
Marine Water, Elutriate and Porewater:		
<u>Metals</u>		
Cadmium (Cd)	0.2	µg/l
Chromium (Cr)	1	µg/l
Copper (Cu)	1	µg/l
Mercury (Hg)	0.1	µg/l
Nickel (Ni)	1	µg/l
Lead (Pb)	1	µg/l

Contaminant of Concern	Reporting Limit	Unit
Silver (Ag)	1	µg/l
Zinc (Zn)	4	µg/l
<u>Metalloid</u>		
Arsenic (As)	2	µg/l
<u>Micro-organics</u>		
Low Molecular Weight PAHs	0.2	µg/l
High Molecular Weight PAHs	0.2	µg/l
Total PCBs	0.01	µg/l
Tributyltin	0.015	µg/l
Chlorinated Pesticides	0.1	µg/l
<u>Nutrient</u>		
Ammonia Nitrogen (NH ₄ -N)	0.025	mg N/l
Total Kjeldahl Nitrogen (TKN)	1	mg N/l
Nitrate Nitrogen (NO ₃ -N)	0.025	mg N/l
Nitrite Nitrogen (NO ₂ -N)	0.025	mg N/l
Total Phosphorus (TP)	0.1	mg N/l
Orthophosphate (OP)	0.1	mg P/l
Biological Testing:		
10 Day amphipod toxicity	-	-
20-day polychaete (<i>Neanthes arenaceodentata</i>) toxicity	-	-
48-96 hour bivalve (or echinoderm) larvae toxicity	-	-

Elutriate and Porewater Tests

- D1-1.7** The elutriate test (USACE, 1976) is a procedure developed to simulate the release of dissolved contaminants from a dredged disposal operation in open waters, and may be considered a laboratory simulation of release of dissolved contaminants from a mechanical dredged disposal operation (USEPA and USACE, 1998). Ambient marine water was collected at mid-depth of each monitoring station and used for elutriate test. The ambient marine water and sediment samples of the same station were mixed in a ratio of 1:4 sediment:water. The mixture was mechanically shaken vigorously for 30 minutes and allowed to settle undisturbed for 1 hour. The liquid phase was centrifuged or filtered through a 45 µm filter to remove all suspended particulate matter. The extracted liquid filtrate was the elutriate to be used for further test.
- D1-1.8** While contaminants may be released from the sediment during the elutriate process, it is also possible that contaminants in the water column be absorbed into the sediment during the process. To allow for evaluation of this possibility, the ambient marine water was tested for the same suit of metallic, metalloid, micro-organic and nutrient parameters as listed in Table D1.2.
- D1-1.9** Preparation of pore water for sediment samples was conducted in accordance with the “Method for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual, USEPA 2001”. Porewater samples were prepared by sub-sampling sufficient amount of grab sediment in a pre-cleaned container in the laboratory and centrifuged at a rotation speed at 3,000 rpm for approximately 10 minutes. After that, the supernatant was decanted without disturbing the sediment material. The porewater testing parameters and assessment were the same as those for elutriate samples as shown in Table D1.2.

QA/QC Requirements

D1-1.10 All the tests were commenced within 2 weeks of sample collection and/or within the allowable holding time for the relevant referenced standard methods. Field logs and site diary were maintained for all on-site sampling works with date, equipment used, site activities and observations undertaken as far as possible. Any deviation from the standard procedures and the reasons were recorded in the logs. Laboratory QA/QC requirements, including analyses by HOKLAS accredited laboratory, certified reference materials, spike recovery, blank samples, duplicate samples (for every 20 samples), negative/positive control for biological test, proper documentation (e.g. completion of chain-of-custody forms, analysis request forms), etc. were strictly followed.

D1-2 SEDIMENT QUALITY TESTING RESULTS

Chemical Screening

D1-2.1 The results of chemical screening of sediment samples are summarised in Table D1.3. There were 23 sediment sub-samples at the 10 vibrocore locations near the proposed route alignment and reclamation landings of the TM-CLKL. With reference to the chemical tests under the ETWB TC(W) No.34/2002, 18 samples exhibited compliance with the LCEL, but 5 samples showed exceedance of LCEL, which required biological tests to confirm their disposal options. The chemical exceedance included metal (Pb), metalloid (As) and micro-organic pollutants (high molecular weight PAHs) concentrations. The levels of all chemical parameters in the other sub-samples were determined to range:

- <0.20-0.40 mg/kg for cadmium;
- 25-50 mg/kg for chromium;
- 10-52 mg/kg for copper;
- 12-25 mg/kg for nickel;
- 25-54 mg/kg for lead;
- 36-120 mg/kg for zinc;
- <0.05-0.22 mg/kg for mercury;
- 6.0-20 mg/kg for arsenic;
- <0.1-0.5 mg/kg for silver.
- <0.015 µg/l in interstitial water for tributyltin;
- <55-190 µg/kg for low molecular weight PAHs (total);
- <170-3,000 µg/kg for high molecular weight PAHs (total); and
- <3 µg/kg for total PCBs.

Table D1.3: Chemical Screening Results of Sediment

Sample Reference		Heavy Metals ¹ (mg/kg)								Metalloid ¹ (mg/kg)	Organo- metallics (µg/L in porewater)	Organic PAHs (µg/kg)		Organic non-PAHs (µg/kg)	Classification Under ETWB TC(W) 34/2002
Drillhole No.	Depth (m) From-To	Cd	Cr	Cu	Pb	Hg	Ni	Zn	Ag	As	TBT	Total LMW PAH	Total HMW PAH	Total PCB	
AN01	0.0-0.9m	0.22	41	48	54	0.18	24	120	0.50	11	<0.015	<55	<170	<3.0	Category L
AN01	0.9-1.9m	0.22	43	41	50	0.22	25	110	0.48	11	<0.015	<55	<170	<3.0	Category L
AN02	0.0-0.9m	<0.20	25	10	29	0.11	15	61	<0.10	8.2	<0.015	190	630	<3.0	Category L
AN02	1.9-2.9m	<0.20	25	11	31	0.07	15	62	<0.10	7.9	<0.015	<55	<170	<3.0	Category L
AN03	0.0-0.9m	0.22	42	52	52	0.23	24	110	0.36	12	<0.015	<55	<170	<3.0	Category L
AS01	0.1-0.9m	0.26	35	30	45	0.10	22	96	0.25	12	<0.015	<55	<170	<3.0	Category L
AS01	12.0-12.9m	0.40	31	16	51	0.07	19	84	0.10	<u>16</u>	<0.015	<55	<170	<3.0	Category M
AS02	0.2-0.9m	<0.20	42	27	48	0.21	27	86	0.12	<u>14</u>	<0.015	<55	<170	<3.0	Category M
AS02	6.0-6.9m	<0.20	33	11	31	<0.05	22	67	<0.10	7.5	<0.015	<55	<170	<3.0	Category L
AS02	8.9-9.4m	<0.20	41	12	24	0.06	12	71	<0.10	7.3	-- ²	<55	<170	<3.0	Category L
LS01	0.2-0.9m	<0.20	32	13	32	0.05	23	83	<0.10	9.0	<0.015	220	1100	<3.0	Category L
LS01	8.9-9.9m	<0.20	35	12	32	<0.05	23	72	<0.10	7.0	-- ²	<55	<170	<3.0	Category L
LS01	12.0-12.9m	<0.20	35	12	32	<0.05	23	71	<0.10	6.3	-- ²	<55	<170	<3.0	Category L
LS02	0.0-0.9m	<0.20	31	12	31	0.08	21	76	<0.10	8.0	<0.015	<55	<170	<3.0	Category L
LS02	8.9-9.9m	<0.20	32	12	31	0.07	21	66	<0.10	6.4	<0.015	<55	<170	<3.0	Category L
LS02	12.0-12.9m	<0.20	30	13	34	0.06	19	66	<0.10	11	<0.015	<55	<170	<3.0	Category L
LS03	0.0-0.9m	0.20	38	25	46	0.11	22	91	0.15	<u>13</u>	<0.015	230	<170	<3.0	Category M
LS03	6.0-6.9m	<0.20	30	12	32	0.06	20	70	<0.10	6.0	<0.015	400	<u>3,000</u>	<3.0	Category M
LS03	10.9-11.8m	<0.20	50	13	52	0.06	12	36	<0.10	<u>20</u>	<0.015	<55	<170	<3.0	Category M
LS04	0.2-0.9m	<0.20	32	13	34	0.08	23	78	<0.10	10	<0.015	<55	<170	<3.0	Category L
LS04	6.0-6.9m	<0.20	34	13	33	0.05	22	75	<0.10	7.4	<0.015	<55	<170	<3.0	Category L
LS04	8.9-9.9m	<0.20	34	12	32	<0.05	23	66	<0.10	8.6	<0.015	<55	<170	<3.0	Category L
LS05	0.2-0.9m	<0.20	31	12	31	0.07	21	78	<0.10	6.0	<0.015	<55	<170	<3.0	Category L
R01G	-	<0.20	28	13	36	0.06	20	72	0.12	6.4	<0.015	<55	<170	<3.0	Category L

¹ Values exceeding the LCELs are shown in bolded, italic and underlined with grey highlight; and

² Insufficient porewater was collected for the sample.

Biological Screening

D1-2.2 Biological screening was conducted for 5 sub-samples showing exceedance of LCEL (Category M) to determine the subsequent disposal options according to the schedule summarised in **Table D1.4**. The results of 10-day burrowing amphipod toxicity test, 20-day burrowing polychaete toxicity test, and 48-96 hours larvae (bivalve or echinoderm) toxicity test are summarised in Tables **D1.4 to D1.8** respectively, whereas the results of ancillary parameters including grain size, moisture content, total organic carbon (TOC), ammonia, and salinity are summarised in **Table D1.8**. All of the 5 samples with exceedance of LCEL passed the biological test. In summary, two classifications of sediment material were identified, comprising Category L and Category M, that passes the biological testing (Mp). The material is suitable for disposal in Type 1 open sea and Type 1 Open Sea (Dedicated) disposal.

Table D1.4: Schedule of Biological Screening

Sample ID	Details of Sub-samples
AS01	Vibrocore AS01 at depth 0.1-0.9m
AS02	Vibrocore AS02 at depth 0.2-0.9m
LS03a	Vibrocore LS03 at depth 0.0-0.9m
LS03b	Vibrocore LS03 at depth 6.0-6.9m
LS03c	Vibrocore LS03 at depth 10.9-11.8m

Table D1.5: Amphipod Survival in Relation to Reference Sediment

Sample ID	Survival in Relation to Reference Site (%)	Statistical Difference from Reference Sediment (t-test)	Conclusion
AS01	101.0	N/A	Pass
AS02	97.9	N/A	Pass
LS03a	96.9	N/A	Pass
LS03b	101.0	N/A	Pass
LS03c	99.0	N/A	Pass

Note: N/A – As the average survival rate of amphipods for test sediment was over 80% to that of reference sediment, statistical analysis was not required.

Table D1.6: Total Dry Weight of Polychaete in Relation to Reference Sediment

Sample ID	Total Dry Weight in Relation to Reference Site (%)	Statistical Difference from Reference Sediment (t-test)	Conclusion
AS01	89.9	P=0.278 Assuming equal variance	Pass
AS02	90.9	N/A	Pass
LS03a	93.1	N/A	Pass
LS03b	76.7	P=0.115 Assuming equal variance	Pass
LS03c	86.5	P=0.234 Assuming equal variance	Pass

Note: N/A – As the average total dry weight for the test sediment was greater than 90% of that of the reference sediment, statistical analysis was not required.

Table D1.7: Normality Survival of Bivalve Larvae in Relation to Reference Sediment

Sample ID	Normality Survival in Relation to Reference Site (%)	Statistical Difference from Reference Sediment (t-test)	Conclusion
AS01	102.2	N/A	Pass
AS02	98.0	N/A	Pass
LS03a	98.1	N/A	Pass
LS03b	99.9	N/A	Pass
LS03c	95.5	N/A	Pass

Note: N/A – As the average survival rate of bivalve larvae for the test sediment was greater than 80% of that of the reference sediment, statistical analysis was not required.

Table D1.8: Test Results of Ancillary Parameters

Sample ID	Interstitial Ammonia (mgNH ₃ /L)	Interstitial Salinity (ppt)	Grain Size <63m (%)	Moisture Content (%)	TOC (% Wet Weight)	TOC (% Dry Weight)
AS01	2.8	32	59	94	0.11	0.21
AS02	1.6	29	99	94	0.37	0.72
LS03a	0.9	29	97	98	0.42	0.83
LS03b	1.8	24	97	96	0.45	0.88
LS03c	5.5	26	76	39	0.07	0.10

Moisture content was calculated as (Sample Wet Weight – Sample Dry Weight) x 100%.

N/A - Insufficient porewater could be obtained for analysis, so interstitial ammonia not measured.

Elutriate

D1-2.3 Elutriate tests of grab samples were carried out for the purpose of water quality assessment of the extent of contaminant release when dredging activities take place. The testing parameters included heavy metals (cadmium, chromium, copper, mercury, nickel, lead, zinc and silver), metalloid (arsenic) and organic micro-pollutants (PCB, PAHs and TBT), chlorinated pesticides and nutrients including TKN, NO₃-N, NO₂-N, NH₄-N, PO₄-P and total phosphorus. The results are summarised in Tables D1.9 and D1.10. In general, the levels of cadmium, silver, TBT, PAHs, PCBs and Pesticides were all below the reporting limits, whereas other metals and metalloid including chromium, copper, mercury, nickel, lead, zinc and cadmium, nutrients including NH₃-N, NO₂-N, NO₃-N, TKN, PO₄-P and total phosphorus in elutriates varied among sediment samples from different locations.

Table D1.9: Elutriate Test Results for Metals, Metalloid and PAHs

Sample ID	Metals (µg/L)								Metalloid (µg/L)	Organic-PAHs (µg/L)	
	Cd	Cr	Cu	Ni	Pb	Zn	Hg	Ag	As	LMW PAH	HMW PAH
AN01	<0.2	<1	<1	<1	<1	<4	<0.1	<1	8	<0.20	<0.20
AN01	<0.2	<1	<1	<1	<1	<4	<0.1	<1	11	<0.20	<0.20
AN02	<0.2	3	2	<1	2	6	<0.1	<1	26.0	<0.20	<0.20
AN02	<0.2	3	2	2	2	<4	<0.1	<1	18.0	<0.20	<0.20
AN03	<0.2	<1	2	<1	<1	<4	<0.1	<1	6	<0.20	<0.20
AS01	<0.2	<1	<1	3	<1	<4	0.34	<1	2	<0.20	<0.20
AS01	<0.2	<1	<1	<1	<1	<4	<0.1	<1	3	<0.20	<0.20
AS02	<0.2	<1	<1	1	<1	<4	<0.1	<1	7	<0.20	<0.20
AS02	<0.2	<1	<1	2	<1	7	<0.1	<1	5.1	<0.20	<0.20
AS02	<0.2	<1	2	9	1	5	<0.1	<1	<2	<0.20	<0.20
LS01	<0.2	<1	<1	2	<1	<4	<0.1	<1	20.0	<0.20	<0.20
LS01	<0.2	<1	<1	2	<1	<4	<0.1	<1	6.3	<0.20	<0.20
LS01	<0.2	<1	<1	2	<1	<4	<0.1	<1	12.0	<0.20	<0.20
LS02	<0.2	<1	<1	<1	<1	<4	<0.1	<1	70.0	<0.20	<0.20
LS02	<0.2	<1	<1	2	<1	<4	<0.1	<1	19.0	<0.20	<0.20
LS02	<0.2	<1	<1	<1	<1	<4	<0.1	<1	7	<0.20	<0.20
LS03	<0.2	<1	1	3	<1	4	<0.1	<1	3	<0.20	<0.20
LS03	<0.2	<1	2	3	<1	<4	<0.1	<1	15.0	<0.20	<0.20
LS03	<0.2	<1	<1	3	<1	<4	<0.1	<1	2	<0.20	<0.20
LS04	<0.2	<1	<1	1	<1	<4	<0.1	<1	14	<0.20	<0.20
LS04	<0.2	<1	<1	2	<1	<4	<0.1	<1	22.0	<0.20	<0.20
LS04	<0.2	<1	3	3	<1	5	<0.1	<1	3.7	<0.20	<0.20
LS05	<0.2	<1	<1	2	<1	<4	<0.1	<1	17.0	<0.20	<0.20

Table 1.10: Elutriate Test Results for PCBs, TBT, Chlorinated Pesticides and Nutrients

Sample ID	Organic-non-PAHs (µg/L)	Organo-metallics (µg/L)	Chlorinated Pesticides (µg/L)	NH ₃ -N (mg/L)	NO ₂ -N (mg/L)	NO ₃ -N (mg/L)	TKN (mg/L)	Total P (mg/L)	Ortho-P (mg/L)
	Total PCBs	TBT							
AN01	<0.01	<0.015	<0.1	<0.025	<0.025	<0.025	<1.0	0.62	0.67
AN01	<0.01	<0.015	<0.1	<0.025	0.03	1.8	<1.0	0.11	<0.10
AN02	<0.01	<0.015	<0.1	<0.025	<0.025	<0.025	<1.0	0.23	0.16
AN02	<0.01	<0.015	<0.1	<0.025	<0.025	0.34	<1.0	<0.10	<0.10
AN03	<0.01	<0.015	<0.1	<0.025	<0.025	<0.025	<1.0	0.11	<0.10
AS01	<0.01	<0.015	<0.1	0.034	0.065	0.26	<1.0	0.1	<0.10
AS01	<0.01	<0.015	<0.1	0.95	0.081	0.33	1.2	<0.10	<0.10
AS02	<0.01	<0.015	<0.1	<0.025	<0.025	0.15	<1.0	<0.10	<0.10
AS02	<0.01	<0.015	<0.1	0.055	0.23	0.22	<1.0	<0.10	<0.10
AS02	<0.01	<0.015	<0.1	0.084	0.38	0.29	<1.0	<0.10	<0.10
LS01	<0.01	<0.015	<0.1	<0.025	<0.025	0.34	<1.0	<0.10	<0.10
LS01	<0.01	<0.015	<0.1	5.1	0.12	0.36	5.3	<0.10	<0.10

Sample ID	Organic-non-PAHs (µg/L)	Organo-metallics (µg/L)	Chlorinated Pesticides (µg/L)	NH ₃ -N (mg/L)	NO ₂ -N (mg/L)	NO ₃ -N (mg/L)	TKN (mg/L)	Total P (mg/L)	Ortho-P (mg/L)
	Total PCBs	TBT							
LS01	<0.01	<0.015	<0.1	6.1	0.094	0.39	6.5	<0.10	<0.10
LS02	<0.01	<0.015	<0.1	<0.025	<0.025	<0.025	<1.0	<0.10	<0.10
LS02	<0.01	<0.015	<0.1	2.5	4.6	<0.025	2.5	<0.10	<0.10
LS02	<0.01	<0.015	<0.1	<0.025	5.4	<0.025	<1.0	<0.10	<0.10
LS03	<0.01	<0.015	<0.1	<0.025	<0.025	0.066	<1.0	0.12	<0.10
LS03	<0.01	<0.015	<0.1	3.5	0.51	0.17	4.1	<0.10	0.14
LS03	<0.01	<0.015	<0.1	4.3	0.058	0.41	4.3	<0.10	<0.10
LS04	<0.01	<0.015	<0.1	<0.025	<0.025	0.2	<1.0	<0.10	<0.10
LS04	<0.01	<0.015	<0.1	3.5	0.12	0.33	3.6	<0.10	<0.10
LS04	<0.01	<0.015	<0.1	4.3	0.099	0.31	5.1	<0.10	<0.10
LS05	<0.01	<0.015	<0.1	<0.025	<0.025	0.12	<1.0	<0.10	<0.10

Porewater

D1-2.4 Porewater tests were conducted also for the purpose of water quality assessment of the potential of contaminant release when dredging and filling activities take place. The testing parameters included heavy metals (cadmium, chromium, copper, mercury, nickel, lead, zinc and silver), metalloid (arsenic) and organic micro-pollutants (PCB, PAHs and TBT), chlorinated pesticides and nutrients including NH₄-N, PO₄-P, and total phosphorus.

D1-2.5 The porewater test results of this investigation are summarised in Tables D1.11 and D1.12. In general, the levels of cadmium, lead, mercury, silver, PAHs, PCBs and TBT were all below the reporting limits, whereas other metals and metalloid including chromium, copper, nickel, zinc and arsenic, nutrients including NH₃-N, NO₂-N, NO₃-N, TKN, PO₄-P and total phosphorus in porewater samples varied among sediment samples from different locations.

Table D1.11: Porewater Test Results for Metals, Metalloid and PAHs

Sample ID	Metals (mg/kg)								Metalloid (mg/kg)	Organic-PAHs (µg/kg)	
	Cd	Cr	Cu	Ni	Pb	Zn	Hg	Ag	As	LMW PAH	HMW PAH
AN01	<0.2	<1	2	<1	<1	<4	<0.1	<1	13	<0.20	<0.20
AN02	<0.2	<1	2.9	30	<1	6.3	<0.1	<1	26	<0.20	<0.20
AN03	<0.2	<1	3.1	1.6	<1	4.4	<0.1	<1	3.3	<0.20	<0.20
AS01	<0.2	<1	2.6	1	<1	<4	<0.1	<1	4.4	<0.20	<0.20
AS02	<0.2	<1	2	1.4	<1	5.2	<0.1	<1	6	<0.20	<0.20

Table D1.12: Porewater Test Results for PCBs, TBT, Chlorinated Pesticides and Nutrients

Sample ID	Organic-non-PAHs (µg/L)	Organo-metallics (µg/L)	Chlorinated Pesticides (µg/L)	NH ₃ -N (mg/L)	NO ₂ -N (mg/L)	NO ₃ -N (mg/L)	TKN (mg/L)	Total P (mg/L)	Ortho-P (mg/L)
	Total PCBs	TBT							
AN01	<0.01	<0.015	<0.1	0.06	1.2	7.6	<1.0	2.4	2.3
AN02	<0.01	<0.015	<0.1	0.053	3.4	18	<1.0	1.3	1.8
AN03	<0.01	<0.015	<0.1	<0.025	0.059	0.16	<1.0	0.18	0.11
AS01	<0.01	<0.015	<0.1	0.73	0.17	0.09	<1.0	0.27	0.19
AS02	<0.01	<0.015	<0.1	1.6	0.14	0.086	1.9	0.23	0.14