

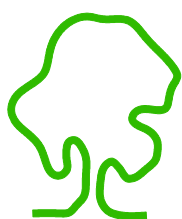
ALPINE GROUP LIMITED



YACHTHAVEN, HAYLING ISLAND

Contamination Risk Assessment - Additional Investigations

August 2018



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Environmental Assessment Services Ltd

REPORT DATA SHEET

Requirement	Data
Report Reference	Contamination Risk Assessment - Additional Investigations
Date	August 2018
Client	Alpine Group Limited
Report type	Additional Investigations Report
Purpose	Discharge Condition Nos. 20 - 22 of Planning Consent APP/13/00317
Revisions	-
Prepared by	Eur Ing Malcolm McKemey BSc (Hons), CEng, CEnv, MICE, MIEAust, MCIWEM, MIEEnvSc Signed 

ALPINE GROUP LIMITED

YACHT HAVEN SITE, HAYLING ISLAND

Contamination Risk Assessment - Additional Investigations

August 2018

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ALPINE GROUP LIMITED**YACHT HAVEN SITE, HAYLING ISLAND****Contamination Risk Assessment - Additional Investigations**

August 2018

1. THE SITE AND PROPOSED DEVELOPMENT

- 1.1 The site comprises some 0.5 ha of currently disused industrial land adjacent to Chichester Harbour previously used for a boatyard and subsequently for materials, vehicle and plant storage. The levels of much of the site were raised with fill as part of this earlier development. The site location is at Ordnance Survey Map reference SU 7289 0183. See Appendix A Figure 1 for the site location and Figure 2 for the existing site layout..
- 1.2 It is intended to restore and redevelop the site partially for residential use and partly for use as a small boatyard with marina for leisure craft. The remainder of the site will be returned to a natural habitat for environmental enhancement. See Appendix A Figure 3 Proposed Redevelopment.
- 1.3 Following the site investigation summary report of 2017, some additional investigation work was recommended to complete the requirements necessary to permit the discharge of Conditions 20 - 22 of planning permission reference APP/13/00317.

2. IDENTIFIED CONTAMINATION RISKS

- 2.1 As a consequence of:
 - The site's previous history and use as a commercial boatyard since the 1930s, wartime use for camouflage paint testing and subsequently for materials and vehicle storage.
 - The extensive made ground covering the site.
 - A recent history of burning waste at the site.
 - The proximity of the site to Chichester Harbour SSSI and to other environmentally sensitive areas.
- 2.2 It was required that the risk of contamination of the soils should be assessed particularly in respect to:
 - The risk to users of the site, particularly within the gardens of the residential development.

- The risk to persons involved during construction, particularly on groundworks and earthworks.
- The risk of contaminated runoff or leaching of contamination into Chichester Harbour with its consequent impact on the neighbouring ecologically sensitive areas.

3. HISTORY OF CONTAMINATION INVESTIGATIONS AT THE SITE

3.1 In view of the above identified contamination risks, the site has been subjected to the following site and soils investigations:

- i. The Contamination Assessment carried out by Environmental Assessment Services Ltd dated September 2002.
- ii. A site investigation including 73 trial holes and 4 boreholes with the findings logged to provide a record of the soils across the site by L R Pimenta in October 2002. This included the taking and analysis of 105 soils and groundwater samples. Landfill gas monitoring was also carried out at the four borehole positions.
- iii. Desktop Study Report prepared by L R Pimenta dated October 2010.
- iv. Additional trial pits and soil testing carried out by Environmental Assessment Services Ltd in October 2011 with the results of this testing, and of the previous investigations, assessed against the then current standards. A Contamination Risk Assessment update report was issued in October 2011.
- v. An environmental assessment was completed by Environmental Assessment Services Ltd in 2011 and an Environmental Statement (including a chapter on contamination risk) was issued in December 2011.

3.2 The conclusions from the investigations may be summarised as:

- The site lies on a variable thickness of made ground over Palaeocene Reading Beds (inter-bedded sands and clays). The site is not within a groundwater source protection zone. The site is not considered significantly hydrogeologically sensitive.
- Heavy metal and Polycyclic Aromatic Hydrocarbon contamination was found in soil samples around the site, generally confined to the made ground and concentrated in areas where burning of waste has occurred. Asbestos was not found in the surface soil samples analysed.
- Groundwater sample analysis revealed minimal contamination, and this was initially taken as an indication that the risk of contamination leaching from the site into the Chichester Harbour SSSI was low.

- Soil gas monitoring at four boreholes across the site revealed some measurable concentrations of methane and raised concentrations of carbon dioxide at one borehole.

3.3 The remediation recommendations were:

- Remove all deposited superficial waste together with demolition waste as part of site clearance. Concrete and brick from demolished buildings, etc., may be crushed and recycled on site for granular fill, road base, etc.
- All garden and soft landscaping areas to have the less suitable upper soil (made ground) removed and replaced with clean topsoil from an uncontaminated source to a depth of 0.6 m. The clean topsoil to be placed on a geotextile membrane and capillary breaker sand layer where the underlying ground is not natural undisturbed soil.
- The condition of soil exposed during site clearance, and in excavations, should be monitored during the work and any evidence of significant contamination should be investigated, treated and/or removed from site as necessary.
- During site redevelopment, extra care should be taken to ensure that no current site contaminants are displaced into the neighbouring SSSI and Ramsar sites. Guidelines should be in place prior to redevelopment commencing and adhered to throughout the construction phase.
- In the wildlife areas, the superficial waste deposits should be removed and the area should be enhanced with brash and wood piles, south facing soil banks (where practicable) and open compost heaps. Apart from the foregoing suggestions, the wildlife areas should be disturbed as little as possible.

4. ADDITIONAL INVESTIGATIONS

- 4.1 Havant Borough Council memorandum from Environmental Control Officer's consultation responses requested more information regarding the potential mobility of contaminants (possibly in the form of leachate tests) and testing for the presence of toxic anti-fouling substances, such as tributyltin (TBT), associated with boat building and repairs.

4.2 The additional investigations comprised:

- Re-examination of the site to identify changes to surface deposits, further evidence of waste burning, etc. The site has been extensively cleared, with buildings demolished and superficial waste removed from site. Only one area where waste had been burned was apparent, and that area was added to the list of trial pits to be excavated.

- Trial pits were excavated at the locations previously identified as significantly contaminated, plus the new locations identified as potentially contaminated during the site visit. The trial pits excavated were immediately adjacent to the following previous trial pit locations: D10, D11, D20, D21, D25, D33, E25, F20, F25 and G5. Five additional trial pits were excavated in the foreshore/intertidal zone to investigate evidence of contaminant migration. The foreshore trial pits were FS1, FS2, FS3, FS4 and FS5. Groundwater was encountered in one of the trial pits (D10); a small quantity of perched water was observed in the excavation, and a sample was taken for analysis. See Figure 2 in Appendix A for trial pit locations.
- The soil sample analysis included the substances previously identified as contamination, plus a full range of potential contaminants for samples from any new locations. Samples were analysed for organotin antifouling substances. Upper soil samples were analysed for asbestos.
- Leachate testing was carried out on the abovementioned samples to establish the mobility of contaminants.
- The site surface has been intensively reworked and none of the old monitoring boreholes could be found to enable the previously proposed groundwater sampling and soil gas testing.
- The results of the above have been used to update the Contamination Risk Assessment.

5. RESULTS OF THE ADDITIONAL INVESTIGATIONS

- 5.1 The trial pits revealed varying depths (0.3 m - 1.6 m) of made ground overlying undisturbed natural clay of the Reading Formation. The exceptions were the foreshore trial pits (no made ground) and G5, where the depth of made ground exceeded 1.8 m. The foreshore trial pits revealed soft black intertidal mud, with depths between 0.25 and 1.0 m over soft-stiff light-coloured clay. The trial pit logs are given in Appendix B.
- 5.2 The results of the analysis of the soil (and water) samples, together with the laboratory's relevant accreditations, are given in Appendix C, and summarised here below.
- 5.3 The results of the analysis have been compared with the published LQM/CIEH Category 4 Screening Levels (C4SLs) and the Suitable for Use Levels (S4UL) for Human Health Risk Assessment (2015) for residential use with home grown produce. *Copyright Land Quality Management Limited reproduced with permission; Publication Number: S4UL36001. All rights reserved.*
- 5.4 The results of the analysis generally revealed similar levels of contamination to that found in the previous investigations, with the exception of the foreshore samples, where the area had not previously been investigated.

- 5.5 pH levels for the samples were found to be in the range 6.4 - 10.6, but were generally slightly on the alkaline side of neutral. C4SL and S4UL thresholds for lead were exceeded in the made ground samples from D20, D21, and F25. The threshold for mercury was exceeded in made ground samples from D11, D21, D25 and the inter-tidal mud sample from FS2. The exceedences were minor.
- 5.6 Thresholds for various polycyclic aromatic hydrocarbons (PAHs) were exceeded in the made ground sample from F25 and, more significantly, in the inter-tidal mud sample from FS1.
- 5.7 The only petroleum hydrocarbon threshold exceedence was for the inter-tidal mud sample from FS1. The exceedence was in the C21 - C40 range, both aliphatic and aromatic, suggesting contamination from lubricant or heavy fuel oil. The hydrocarbon contamination found in FS1 may have originated from leaking fuel/lubricant from boats or casual disposal of waste oil on the foreshore. It should be noted that due to the naturally occurring black colour and strong smell of the inter-tidal mud, no visual or odour evidence of hydrocarbon contamination was distinguishable. FS1 was closest to the boat repair facilities. Traces of hydrocarbons were found in the made ground samples from F25 and G5, but these did not exceed the C4SL and S4UL thresholds for residential use with home grown produce.
- 5.8 Asbestos was found in only one sample; a very small piece of asbestos cement board in the made ground sample from F25. In view of the former ubiquitous use of this material, its presence in made ground (which includes construction waste) is not unexpected.
- 5.9 All the samples, including the water sample, were tested for the presence of organotin anti-fouling compounds. A trace of Triphenyl tin was identified in the inter-tidal mud sample from FS2. No other samples revealed evidence of anti-fouling substances.
- 5.10 The results of the leachate testing of the samples show some (vague) correlation with the levels of contaminants (heavy metals) found in the dry soil samples. However, the correlation was limited. For example; the highest arsenic concentrations in leachate were from the soil samples D20 and D33a, which had lower dry concentrations of arsenic compared with most other samples. There was not any clear correlation with previously analysed groundwater samples (which showed raised concentrations of boron and zinc, not found in the leachate). Apart from the raised arsenic concentration in the sample from D33a, all the leachates had heavy metal concentrations lower than the permitted threshold for drinking water. This suggests that the contaminants present in the soil are not significantly mobile and tend to be fixed to the soil particles. The risk of significant migration of heavy metal contamination from the site into the water of Chichester Harbour appears to be low.

6. CONCLUSIONS

- 6.1 The site had been largely cleared of fly-tipped waste, surfacing and buildings at the time of the site investigations. Whilst this has removed many of the superficial sources of contamination, and potential contamination, it also meant that the old monitoring boreholes could not be found. However, previous investigations did not reveal significant groundwater contamination or soil gas problems.
- 6.2 Ten trial pits were excavated adjacent to the locations where contamination had previously been found and nearby. In addition, five trial pits were sunk in the inter-tidal area directly offshore from the site.
- 6.3 Soil samples, plus one groundwater sample, were taken from the trial pits and analysed for toxic and phytotoxic metals/metalloids, petroleum and polycyclic aromatic hydrocarbons, sulphate, soil organic matter, organotin anti-fouling substances and pH.
- 6.4 Little significant contamination was found in the soil samples, and this occurred in the made ground in the areas where it was previously identified. However, the samples taken from the black organic mud in the foreshore trial pits revealed significant hydrocarbon contamination in one sample located adjacent to the boat repair area and a trace of Triphenyl-tin anti-fouling in another.
- 6.5 Asbestos was only found in one of the soil samples, a small piece of asbestos cement board. In view of the former ubiquitous use and widespread distribution of this material, an occasional occurrence in made ground would be anticipated.
- 6.6 The samples were subject to leachate testing and this revealed minimal contaminant leaching, suggesting that the contaminants identified were not significantly mobile. The risk of significant migration of heavy metal contamination from the site into the water of Chichester Harbour appears to be low.
- 6.7 Overall it is concluded that the remediation measures previously recommended (see Section 3.3 above) remain valid and suitable to protect the proposed residents from contamination related risks.
- 6.8 The remaining concern is how to address the contamination identified in the inter-tidal mud in front of the boat repair area. It is not considered practicable to attempt any remediation until the boat repair activity in the area has ceased. At this stage, some additional sampling could be carried out around the FS1 location to assess the extent of any hydrocarbon contamination. Any remediation option could be considered at that time. Remediation would comprise removal of any hydrocarbon hotspots in the inter-tidal mud and replacement with clean sand. It would be anticipated that bacterial action in the mud would cause the breakdown of hydrocarbon contamination in the long-term in any event.

- 6.9 The trace of antifouling compound found in one sample is not surprising for a location where boats have been maintained and moored over many years. The origin could easily be from abrasion of a coating on a yacht hull.

7. RECOMMENDATIONS

- 7.1 The principal remediation recommendations remain unchanged (see Section 3.3 above).
- 7.2 It is additionally recommended that once the existing boat repair activities in the middle of the site foreshore have ceased, the extent of any hydrocarbon contamination in the inter-tidal mud in this area may be further assessed and, where indicated, a remediation strategy may be decided at that time. It is practicably difficult to work in the soft inter-tidal and any remediation is likely to require the removal of some volume of mud down to the underlying clay and replacement with clean sand.



APPENDIX A

Figure 1: Site Location

Figure 2: Trial Pit Locations

Figure 3: Proposed Redevelopment



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ALPINE GROUP LIMITED

Yacht Haven, Copse Lane, Hayling Island, Hants, PO11 0RH
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Figure 1: Site Location

Scale 1:25000

August 2018



0 5 10 20 30 40 50 100

metres

N

Original (2002) Trial Pit Locations

THE SITE

Buildings demolished

Buildings demolished

Buildings demolished

(bonfire)

Key:

■ Trial Pit Location

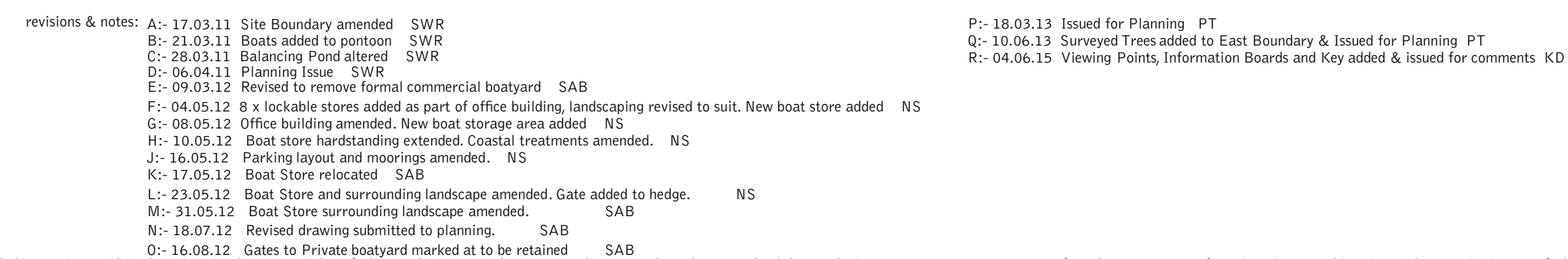
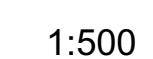
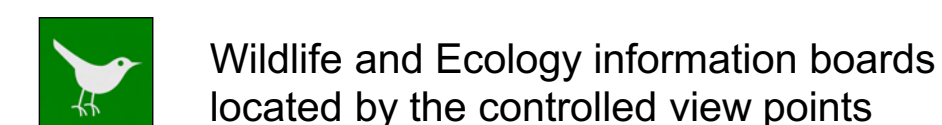
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Contamination Risk Assessment
Additional Investigations

Figure 2: Trial Pit Locations

Base plan from J Brotherton & Partners survey plan Ref: 2000/025-fastnet trial pits of July 2002

August 2018

Scale as shown

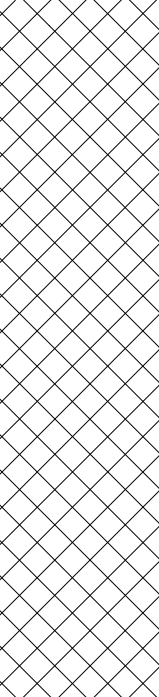
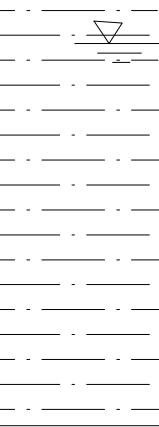


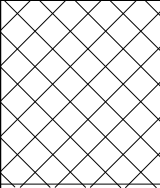
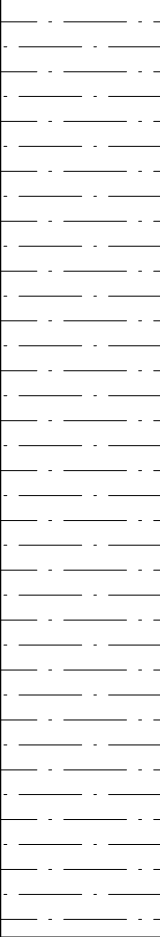
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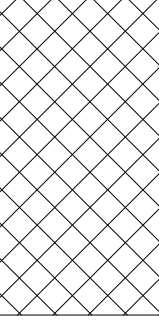
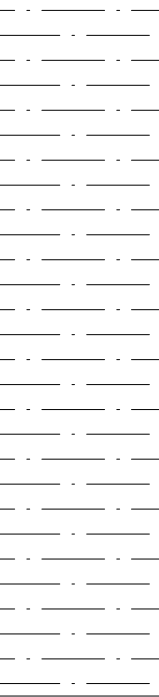
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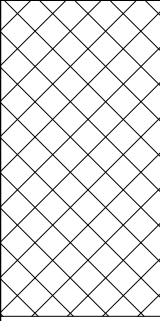
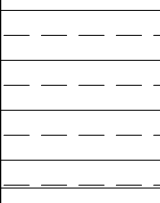
APPENDIX B

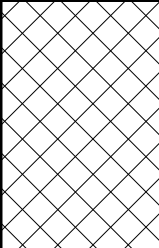
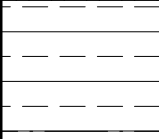
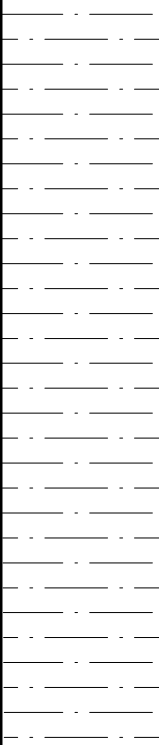
Trial Pit Logs

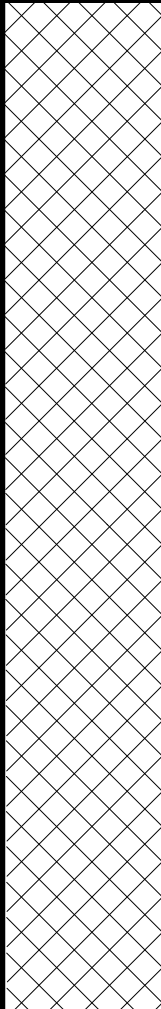
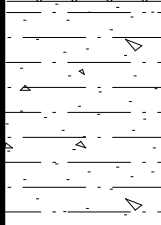
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Standpipe	Sampling			Strata					
	Type	Depths		Legend	Depth bgl	R L	Strata Description		
		From	To						
					1.1 m		Made Ground clay, stone, brick & concrete		
					1.8 m		Red - blue/grey clay (Reading Formation)		
Remarks Groundwater seepage at 1.2 m bgl							Method		
							Dimensions Dia		
							Made by		
							Job No.		
							Borehole or Trial Pit No.	D10	

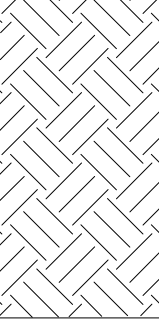
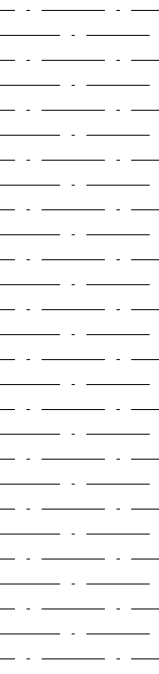
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Standpipe	Sampling			Strata					
	Type	Depths		Legend	Depth bgl	R L	Strata Description		
		From	To						
					0.3 m		Made Ground mixed dark brown soil & waste		
					1.8 m		Yellow - light brown clay (Reading Formation)		
Remarks							Method		
							Dimensions Dia		
							Made by		
							Job No.		
							Borehole or Trial Pit No.	D11	

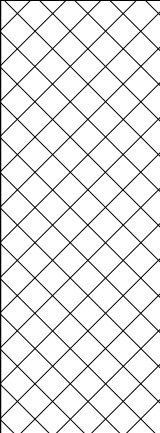
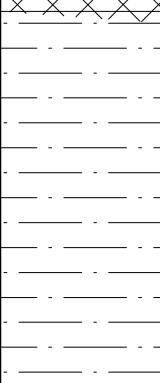
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Standpipe	Sampling			Strata						
	Type	Depths		Legend	Depth bgl	R L	Strata Description			
		From	To							
					0.5 m		Made Ground clay, stone, brick & cocrete			
							Red - blue/grey clay (Reading Formation)			
Remarks							Method			
							Dimensions Dia			
							Made by			
							Job No.			
							Borehole or Trial Pit No.	D20		

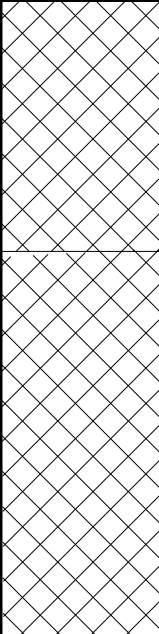
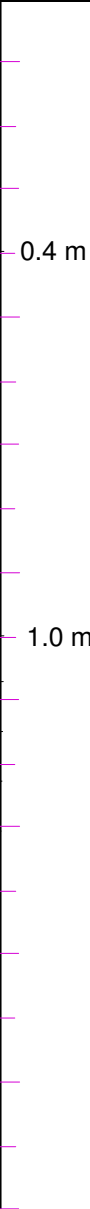
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Site: Yachthaven, Hayling Island							Date: 3 July 2018			
Standpipe	Sampling			Strata						
	Type	Depths		Legend	Depth bgl	R L	Strata Description			
		From	To							
					0.5 m		Made Ground mixed dark brown soil & waste			
							Weathered brown clay			
					0.8 m		Yellow - light brown clay (Reading Formation)			
Remarks							Method			
							Dimensions Dia			
							Made by			
							Job No.			
							Borehole or Trial Pit No.	D21		

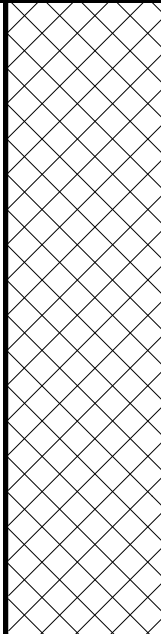
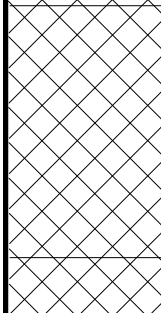
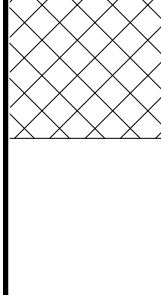
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Site: Yachthaven, Hayling Island							Date: 3 July 2018		
Standpipe	Sampling			Strata					
	Type	Depths		Legend	Depth bgl	R L	Strata Description		
		From	To						
					0.4 m		Made Ground clay, stone, brick & cocrete		
					0.6 m		Weathered brown clay		
					1.8 m		Yellow - light brown clay (Reading Formation)		
Remarks						Method			
						Dimensions Dia			
						Made by			
						Job No.			
						Borehole or Trial Pit No.	D25		

Environmental Assessment Services Limited									
Site: Yachthaven, Hayling Island								Date: 3 July 2018	
Standpipe	Sampling			Strata					
	Type	Depths		Legend	Depth bgl	R L	Strata Description		
		From	To						
							Bonfire residuals at surface		
							Made Ground		
							Mixed sandy soil, gravel, brick concrete & waste		
									
									
									
									
									
									
									
									
									
									
									
									
									
Remarks									
						Method			
						Dimensions Dia			
						Made by			
						Job No.			
						Borehole or Trial Pit No.	D33		

Environmental Assessment Services Limited									
Site: Yachthaven, Hayling Island							Date: 3 July 2018		
Standpipe	Sampling			Strata					
	Type	Depths		Legend	Depth bgl	R L	Strata Description		
		From	To						
					0.5 m		Rich brown organic topsoil with roots		
					1.6 m		Stiff brown/grey clay (Reading Formation)		
Remarks							Method		
							Dimensions Dia		
							Made by		
							Job No.		
							Borehole or Trial Pit No.	E25	

Environmental Assessment Services Limited									
Site: Yachthaven, Hayling Island							Date: 3 July 2018		
Standpipe	Sampling			Strata					
	Type	Depths		Legend	Depth bgl	R L	Strata Description		
		From	To						
					0.7 m		Made Ground Mixed stones and soil		
					1.3 m		Black organic silty clay becoming lighter with depth		
Remarks							Method		
							Dimensions Dia		
							Made by		
							Job No.		
							Borehole or Trial Pit No.	F20	

Environmental Assessment Services Limited									
Site: Yachthaven, Hayling Island								Date: 3 July 2018	
Standpipe	Sampling			Strata					
	Type	Depths		Legend	Depth bgl	R L	Strata Description		
		From	To						
							Made Ground Mixed soil + old topsoil & roots <		

Environmental Assessment Services Limited									
Site: Yachthaven, Hayling Island								Date: 3 July 2018	
Standpipe	Sampling			Strata					
	Type	Depths		Legend	Depth bgl	R L	Strata Description		
		From	To						
							Made Ground Mixed silty soil & gravel		
					1.0 m		Chalk fill		
					1.4 m		Mixed silty soil & gravel		
					1.7 m				
Remarks						Method			
						Dimensions Dia			
						Made by			
						Job No.			
						Borehole or Trial Pit No.	G5		

Environmental Assessment Services Limited

Site: Yachthaven, Hayling Island

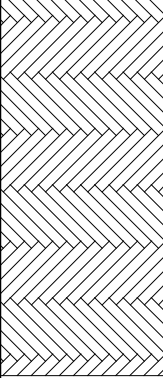
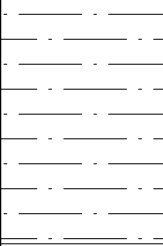
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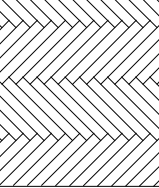
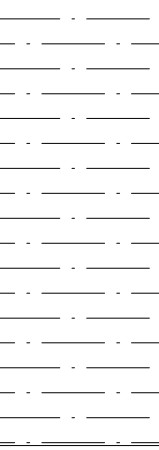
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		From	To				
Remarks						Method	
						Dimensions Dia	
						Made by	
						Job No.	
						Borehole or Trial Pit No.	FS1

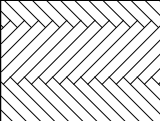
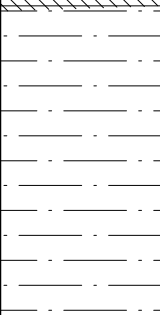
Environmental Assessment Services Limited

Site: Yachthaven, Hayling Island

Date:
3 July 2018

Standpipe	Sampling			Strata			
	Type	Depths		Legend	Depth bgl	R L	Strata Description
		From	To				
					0.6 m		Soft black inter-tidal mud
					1.0 m		Stiff brown grey-blue clay
Remarks						Method	
						Dimensions Dia	
						Made by	
						Job No.	
						Borehole or Trial Pit No.	FS2

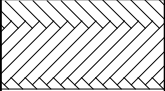
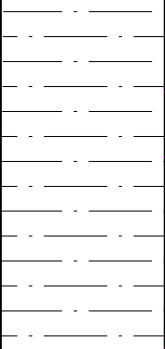
Environmental Assessment Services Limited										
Site: Yachthaven, Hayling Island							Date: 3 July 2018			
Standpipe	Sampling			Strata						
	Type	Depths		Legend	Depth bgl	R L	Strata Description			
		From	To							
					0.3 m		Soft black inter-tidal mud Soft brown/grey clay			
					1.0 m					
Remarks							Method			
							Dimensions Dia			
							Made by			
							Job No.			
							Borehole or Trial Pit No.	FS3		

Environmental Assessment Services Limited										
Site: Yachthaven, Hayling Island							Date: 3 July 2018			
Standpipe	Sampling			Strata						
	Type	Depths		Legend	Depth bgl	R L	Strata Description			
		From	To							
					0.2 m		Soft black inter-tidal mud Stiff brown/grey clay			
					0.7 m					
Remarks							Method			
							Dimensions Dia			
							Made by			
							Job No.			
							Borehole or Trial Pit No.	FS4		

Environmental Assessment Services Limited

Site: Yachthaven, Hayling Island

Date:
3 July 2018

Standpipe	Sampling			Strata			
	Type	Depths		Legend	Depth bgl	R L	Strata Description
		From	To				
					0.15 m		Soft black inter-tidal mud
					0.7 m		Stiff grey/brown clay
Remarks						Method	
						Dimensions Dia	
						Made by	
						Job No.	
						Borehole or Trial Pit No.	FS5

APPENDIX C

Soil & Water Sample Analysis Certificates

Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial
Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 751149-1

Date of Report: 25-Jul-2018

Customer: Environmental Assessment Services
Unit 3 Westside
London Road
Hickstead
Haywards Heath
West Sussex
RH17 5LZ

Customer Contact: Mr Malcolm McKemey

Customer Job Reference:

Customer Site Reference: Yachthaven

Date Job Received at Concept: 11-Jul-2018

Date Analysis Started: 12-Jul-2018

Date Analysis Completed: 25-Jul-2018

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Aislinn Arthey
Customer Service Advisor

Issued by :
Aislinn Arthey
Customer Service Advisor

Concept Reference: 751149									
Project Site: Yachthaven									
Customer Reference:									
Soil					Analysed as Soil				
Soil Suite 1									
Concept Reference					751149 001	751149 002	751149 004	751149 005	751149 006
Customer Sample Reference					D10	D11	D20	D21	D25a (Made)
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Clay	Clay	Sandy Soil	Clay	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T257	A40	2	mg/kg	20	13	10	23	13
Boron (water-soluble)	T257	A40	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	0.3	0.3	1.7	0.7	<0.1
Chromium	T257	A40	0.5	mg/kg	31	25	16	30	19
Copper	T245	A40	1	mg/kg	25	180	110	280	49
Lead	T245	A40	1	mg/kg	37	170	290	330	84
Nickel	T257	A40	0.5	mg/kg	13	16	16	18	9.2
Selenium	T6	A40	3	mg/kg	<3	<3	<3	<3	<3
Mercury	T6	A40	1	mg/kg	<1	3	<1	12	2
Zinc	T245	A40	2	mg/kg	330	470	470	590	110
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected
SO4(Total)	T102	A40	0.02	%	0.05	0.07	0.07	0.13	0.15
pH	T7	A40			7.8	7.9	8.4	8.0	7.2
Soil Organic Matter	T287	A40	0.1	%	0.7	3.4	3.4	2.4	5.2
Cyanide(Total)	T921	AR	1	mg/kg	<1	<1	<1	<1	<1

Concept Reference: 751149									
Project Site: Yachthaven									
Customer Reference:									
Soil					Analysed as Soil				
Soil Suite 1									
Concept Reference					751149 008	751149 010	751149 016	751149 018	751149 019
Customer Sample Reference					D33a	E25	F20a	F25	G5
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T257	A40	2	mg/kg	10	5	10	10	9
Boron (water-soluble)	T257	A40	1	mg/kg	3	2	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	0.3	<0.1	0.5	0.2	0.3
Chromium	T257	A40	0.5	mg/kg	20	15	17	22	17
Copper	T245	A40	1	mg/kg	32	40	51	41	29
Lead	T245	A40	1	mg/kg	98	60	140	430	110
Nickel	T257	A40	0.5	mg/kg	13	6.6	13	13	15
Selenium	T6	A40	3	mg/kg	<3	<3	<3	<3	<3
Mercury	T6	A40	1	mg/kg	<1	<1	<1	<1	<1
Zinc	T245	A40	2	mg/kg	420	44	230	190	140
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected	Chrysotile Detected	Asbestos not detected
								Asbestos Cement	
SO4(Total)	T102	A40	0.02	%	0.30	0.32	0.19	0.93	0.08
pH	T7	A40			10.6	6.4	8.2	8.7	8.3
Soil Organic Matter	T287	A40	0.1	%	3.3	14	3.3	3.1	2.9
Cyanide(Total)	T921	AR	1	mg/kg	2	2	<1	<1	<1

Concept Reference: 751149 Project Site: Yachthaven Customer Reference:							
Soil				Analysed as Soil			
Soil Suite 2							
Concept Reference				751149 007	751149 009	751149 017	
Customer Sample Reference				D25b	D33b	F20b	
Date Sampled				03-JUL-2018	03-JUL-2018	03-JUL-2018	
Matrix Class				Clay	Sandy Soil	Clay	
Determinand	Method	Test Sample	LOD	Units			
Arsenic	T257	A40	2	mg/kg	6	10	11
Boron (water-soluble)	T257	A40	1	mg/kg	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	<0.1	0.6	0.5
Chromium	T257	A40	0.5	mg/kg	20	16	25
Copper	T245	A40	1	mg/kg	35	54	44
Lead	T245	A40	1	mg/kg	34	120	110
Nickel	T257	A40	0.5	mg/kg	6.1	17	28
Selenium	T6	A40	3	mg/kg	<3	<3	<3
Mercury	T6	A40	1	mg/kg	<1	<1	<1
Zinc	T245	A40	2	mg/kg	21	230	710
SO4(Total)	T102	A40	0.02	%	0.48	0.11	0.51
pH	T7	A40			7.7	8.6	7.9
Cyanide(Total)	T921	AR	1	ma/ka	<1	<1	<1

Concept Reference: 751149									
Project Site: Yachthaven									
Customer Reference:									
Soil					Analysed as Soil				
Soil Suite 3									
Concept Reference					751149 011	751149 012	751149 013	751149 014	751149 015
Customer Sample Reference					FS1	FS2	FS3	FS4	FS5
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Other	Other	Other	Other	Other
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T257	A40	2.0	mg/kg	21	15	15	14	19
Boron (water-soluble)	T257	A40	1	mg/kg	4	3	5	5	4
Cadmium	T257	A40	0.1	mg/kg	0.2	0.2	0.2	0.2	0.1
Chromium	T257	A40	0.5	mg/kg	23	27	22	22	22
Copper	T245	A40	1.0	mg/kg	47	62	40	52	30
Lead	T245	A40	1	mg/kg	150	66	100	140	38
Nickel	T257	A40	0.5	mg/kg	15	14	13	14	16
Selenium	T6	A40	3	mg/kg	<3	<3	<3	<3	<3
Mercury	T6	A40	1	mg/kg	1	2	<1	<1	<1
Zinc	T245	A40	2	mg/kg	150	100	150	120	93
SO4(Total)	T102	A40	0.02	%	0.65	0.61	0.62	0.79	0.93
pH	T7	A40			7.9	8.6	7.8	7.5	7.5
Soil Organic Matter	T287	A40	0.1	%	3.1	2.1	3.1	5.0	5.7
Cyanide(Total)	T921	AR	1	mg/kg	<1	<1	<1	<1	<1

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Soil Analysed as Soil Total and Speciated USEPA16 PAH (SE) (MCERTS)									
Concept Reference					751149 001	751149 002	751149 004	751149 005	751149 006
Customer Sample Reference					D10	D11	D20	D21	D25a (Made)
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Clay	Clay	Sandy Soil	Clay	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Acenaphthene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	⁽²⁾ <0.3	<0.1
Acenaphthylene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	⁽²⁾ <0.3	<0.1
Anthracene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	⁽²⁾ <0.3	<0.1
Benzo(a)Anthracene	T1086	AR	0.1	mg/kg	<0.1	0.1	0.8	0.9	<0.1
Benzo(a)Pyrene	T1086	AR	0.1	mg/kg	<0.1	0.3	1.2	1.2	<0.1
Benzo(b)fluoranthene	T1086	AR	0.1	mg/kg	<0.1	0.3	1.4	1.3	<0.1
Benzo(ghi)Perylene	T1086	AR	0.1	mg/kg	<0.1	0.2	0.6	⁽²⁾ <0.3	<0.1
Benzo(k)fluoranthene	T1086	AR	0.1	mg/kg	<0.1	0.3	0.9	0.9	<0.1
Chrysene	T1086	AR	0.1	mg/kg	<0.1	0.4	1.0	1.1	<0.1
Dibenzo(ah)Anthracene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	⁽²⁾ <0.3	<0.1
Fluoranthene	T1086	AR	0.1	mg/kg	<0.1	0.8	1.2	1.9	<0.1
Fluorene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	⁽²⁾ <0.3	<0.1
Indeno(123-cd)Pyrene	T1086	AR	0.1	mg/kg	<0.1	0.2	0.4	⁽²⁾ <0.3	<0.1
Naphthalene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	0.3	<0.1
Phenanthrene	T1086	AR	0.1	mg/kg	<0.1	0.5	0.4	0.9	<0.1
Pyrene	T1086	AR	0.1	mg/kg	<0.1	0.6	1.2	1.6	<0.1
PAH(total)	T1086	AR	0.1	mg/kg	<0.1	3.7	9.1	10	<0.1

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Soil Analysed as Soil Total and Speciated USEPA16 PAH (SE) (MCERTS)									
Concept Reference					751149 007	751149 008	751149 009	751149 010	751149 011
Customer Sample Reference					D25b	D33a	D33b	E25	FS1
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Clay	Sandy Soil	Sandy Soil	Sandy Soil	Other
Determinand	Method	Test Sample	LOD	Units					
Acenaphthene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	<0.1	20
Acenaphthylene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	<0.1	⁽²⁾ <0.3
Anthracene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	<0.1	5.4
Benzo(a)Anthracene	T1086	AR	0.1	mg/kg	<0.1	⁽²⁾ <0.5	0.7	<0.1	4.7
Benzo(a)Pyrene	T1086	AR	0.1	mg/kg	<0.1	⁽²⁾ <0.5	1.0	<0.1	4.6
Benzo(b)fluoranthene	T1086	AR	0.1	mg/kg	<0.1	⁽²⁾ <0.5	1.1	0.1	4.0
Benzo(ghi)Perylene	T1086	AR	0.1	mg/kg	<0.1	⁽²⁾ <0.5	0.5	<0.1	10
Benzo(k)fluoranthene	T1086	AR	0.1	mg/kg	<0.1	⁽²⁾ <0.5	0.7	<0.1	3.6
Chrysene	T1086	AR	0.1	mg/kg	<0.1	⁽²⁾ <0.5	0.8	0.1	4.5
Dibenzo(ah)Anthracene	T1086	AR	0.1	mg/kg	<0.1	⁽²⁾ <0.5	⁽²⁾ <0.3	<0.1	7.8
Fluoranthene	T1086	AR	0.1	mg/kg	<0.1	<0.1	1.3	0.2	20
Fluorene	T1086	AR	0.1	mg/kg	<0.1	<0.1	⁽²⁾ <0.3	<0.1	12
Indeno(123-cd)Pyrene	T1086	AR	0.1	mg/kg	<0.1	⁽²⁾ <0.5	⁽²⁾ <0.3	<0.1	9.1
Naphthalene	T1086	AR	0.1	mg/kg	<0.1	0.2	⁽²⁾ <0.3	<0.1	11
Phenanthrene	T1086	AR	0.1	mg/kg	<0.1	<0.1	0.5	<0.1	24
Pyrene	T1086	AR	0.1	mg/kg	<0.1	<0.1	1.2	0.2	15
PAH(total)	T1086	AR	0.1	mg/kg	<0.1	<0.5	7.8	0.5	150

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Soil Analysed as Soil Total and Speciated USEPA16 PAH (SE) (MCERTS)									
Concept Reference				751149 012	751149 013	751149 014	751149 015	751149 016	
Customer Sample Reference				FS2	FS3	FS4	FS5	F20a	
Date Sampled				03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	
Matrix Class				Other	Other	Other	Other	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units					
Acenaphthene	T1086	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	(2) <0.3
Acenaphthylene	T1086	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	(2) <0.3
Anthracene	T1086	AR	0.1	mg/kg	<0.1	<0.1	0.1	0.1	0.4
Benzo(a)Anthracene	T1086	AR	0.1	mg/kg	0.1	0.4	0.5	0.4	1.5
Benzo(a)Pyrene	T1086	AR	0.1	mg/kg	0.1	0.4	0.5	0.3	1.8
Benzo(b)fluoranthene	T1086	AR	0.1	mg/kg	0.2	0.3	0.5	0.3	1.7
Benzo(ghi)Perylene	T1086	AR	0.1	mg/kg	<0.1	0.2	0.4	0.2	0.7
Benzo(k)fluoranthene	T1086	AR	0.1	mg/kg	0.1	0.3	0.4	0.3	1.4
Chrysene	T1086	AR	0.1	mg/kg	0.1	0.4	0.5	0.3	1.7
Dibenzo(ah)Anthracene	T1086	AR	0.1	mg/kg	<0.1	<0.1	0.1	<0.1	(2) <0.3
Fluoranthene	T1086	AR	0.1	mg/kg	0.3	0.8	1.5	1.0	3.1
Fluorene	T1086	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	(2) <0.3
Indeno(123-cd)Pyrene	T1086	AR	0.1	mg/kg	<0.1	0.2	0.3	0.2	0.6
Naphthalene	T1086	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	(2) <0.3
Phenanthrene	T1086	AR	0.1	mg/kg	<0.1	0.1	0.5	0.3	1.0
Pyrene	T1086	AR	0.1	mg/kg	0.3	0.8	1.3	0.8	2.7
PAH(total)	T1086	AR	0.1	mg/kg	1.3	3.9	6.7	4.2	16

Concept Reference: 751149								
Project Site: Yachthaven								
Customer Reference:								
Soil			Analysed as Soil					
Total and Speciated USEPA16 PAH (SE) (MCERTS)								
Concept Reference					751149 017	751149 018	751149 019	
Customer Sample Reference					F20b	F25	G5	
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	
Matrix Class					Clay	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units				
Acenaphthene	T1086	AR	0.1	mg/kg	0.3	0.5	(2) <0.3	
Acenaphthylene	T1086	AR	0.1	mg/kg	<0.1	(2) <0.3	(2) <0.3	
Anthracene	T1086	AR	0.1	mg/kg	0.4	2.2	(2) <0.3	
Benzo(a)Anthracene	T1086	AR	0.1	mg/kg	0.5	6.7	0.4	
Benzo(a)Pyrene	T1086	AR	0.1	mg/kg	0.5	5.5	0.7	
Benzo(b)fluoranthene	T1086	AR	0.1	mg/kg	0.6	4.7	0.7	
Benzo(ghi)Perylene	T1086	AR	0.1	mg/kg	<0.1	2.4	(2) <0.3	
Benzo(k)fluoranthene	T1086	AR	0.1	mg/kg	0.4	4.9	0.5	
Chrysene	T1086	AR	0.1	mg/kg	0.7	6.3	0.5	
Dibenzo(ah)Anthracene	T1086	AR	0.1	mg/kg	<0.1	0.7	(2) <0.3	
Fluoranthene	T1086	AR	0.1	mg/kg	2.0	14	0.8	
Fluorene	T1086	AR	0.1	mg/kg	0.4	0.6	(2) <0.3	
Indeno(123-cd)Pyrene	T1086	AR	0.1	mg/kg	<0.1	2.2	(2) <0.3	
Naphthalene	T1086	AR	0.1	mg/kg	<0.1	0.6	(2) <0.3	
Phenanthrene	T1086	AR	0.1	mg/kg	1.6	6.7	0.3	
Pyrene	T1086	AR	0.1	mg/kg	1.5	11	0.7	
PAH(total)	T1086	AR	0.1	mg/kg	8.8	69	4.5	

Concept Reference: 751149									
Project Site: Yachthaven									
Customer Reference:									
Soil					Analysed as Soil				
TPH (CWG) C5-C40									
Concept Reference					751149 012	751149 013	751149 014	751149 015	751149 016
Customer Sample Reference					FS2	FS3	FS4	FS5	F20a
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Other	Other	Other	Other	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	0.016	<0.010	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	<1
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	1	2	<1	1	<1
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	1	4	<1	3	<1
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	76
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	9	31	7	8	480
TPH (C35-C40 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1	<1	25
TPH (C35-C40 aromatic)	T8	AR	1	mg/kg	<1	2	<1	1	4
TPH (Aliphatic) total	T85	AR		mg/kg	1.0	2.5	0.70	1.3	100
TPH (Aromatic) total	T85	AR		mg/kg	11	37	8.3	15	490
TPH (Aliphatic+Aromatic) (sum)	T85	AR		mg/kg	12.0	40.0	9.00	13.0	589

Concept Reference: 751149							
Project Site: Yachthaven							
Customer Reference:							
Soil				Analysed as Soil			
TPH (CWG) C5-C40							
Concept Reference					751149 017	751149 018	751149 019
Customer Sample Reference					F20b	F25	G5
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Clay	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units			
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	<1	<1	<1
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	<1	17	<1
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	<1	22	<1
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	<1	320	42
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	6	400	230
TPH (C35-C40 aliphatic)	T8	AR	1	mg/kg	<1	170	17
TPH (C35-C40 aromatic)	T8	AR	1	mg/kg	<1	55	<1
TPH (Aliphatic) total	T85	AR		mg/kg	0.39	510	59
TPH (Aromatic) total	T85	AR		mg/kg	6.3	480	230
TPH (Aliphatic+Aromatic) (sum)	T85	AR		mg/kg	7.00	984	295

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Soil Analysed as Soil Organotin Analysis									
Concept Reference					751149 001	751149 002	751149 004	751149 005	751149 006
Customer Sample Reference					D10	D11	D20	D21	D25a (Made)
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Clay	Clay	Sandy Soil	Clay	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Dibutyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Tetrabutyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Tributyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
Triphenyl Tin	T72	AR	0.01	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Soil Analysed as Soil Organotin Analysis									
Concept Reference					751149 008	751149 010	751149 011	751149 012	751149 013
Customer Sample Reference					D33a	E25	FS1	FS2	FS3
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Sandy Soil	Sandy Soil	Other	Other	Other
Determinand	Method	Test Sample	LOD	Units					
Dibutyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	(100) <0.10	<0.01	<0.01
Tetrabutyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	(100) <0.10	<0.01	<0.01
Tributyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	(100) <0.10	<0.01	<0.01
Triphenyl Tin	T72	AR	0.01	mg/kg	<0.01	<0.01	(100) <0.10	1.2	<0.01

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Soil Analysed as Soil Organotin Analysis									
Concept Reference					751149 014	751149 015	751149 016	751149 018	751149 019
Customer Sample Reference					FS4	FS5	F20a	F25	G5
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Other	Other	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Dibutyl tin	T72	AR	0.01	mg/kg	<0.01	(100) <0.10	<0.01	<0.01	<0.01
Tetrabutyl tin	T72	AR	0.01	mg/kg	<0.01	(100) <0.10	<0.01	<0.01	<0.01
Tributyl tin	T72	AR	0.01	mg/kg	<0.01	(100) <0.10	<0.01	<0.01	<0.01
Triphenyl Tin	T72	AR	0.01	mg/kg	<0.01	(100) <0.10	<0.01	<0.01	<0.01

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Soil Analysed as Soil Miscellaneous									
Concept Reference					751149 001	751149 002	751149 004	751149 005	751149 006
Customer Sample Reference					D10	D11	D20	D21	D25a (Made)
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Clay	Clay	Sandy Soil	Clay	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Moisture @105C	T162	AR	0.1	%	17	19	7.5	16	27
Retained on 2mm	T2	A40	0.1	%	32.8	28.1	57.6	20.7	14.9

Concept Reference: 751149									
Project Site: Yachthaven									
Customer Reference:									
Soil					Analysed as Soil				
Miscellaneous									
Concept Reference					751149 007	751149 008	751149 009	751149 010	751149 011
Customer Sample Reference					D25b	D33a	D33b	E25	FS1
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Clay	Sandy Soil	Sandy Soil	Sandy Soil	Other
Determinand	Method	Test Sample	LOD	Units					
Moisture @105C	T162	AR	0.1	%	22	0.6	8.9	27	55
Retained on 2mm	T2	A40	0.1	%	0.8	20.7	47.1	0.2	4.9

Concept Reference: 751149									
Project Site: Yachthaven									
Customer Reference:									
Soil					Analysed as Soil				
Miscellaneous									
Concept Reference					751149 012	751149 013	751149 014	751149 015	751149 016
Customer Sample Reference					FS2	FS3	FS4	FS5	F20a
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Other	Other	Other	Other	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Moisture @105C	T162	AR	0.1	%	48	53	45	58	6.5
Retained on 2mm	T2	A40	0.1	%	4.9	9.2	5.5	<0.1	50.4

Concept Reference: 751149							
Project Site: Yachthaven							
Customer Reference:							
Soil				Analysed as Soil			
Miscellaneous							
Concept Reference				751149 017	751149 018	751149 019	
Customer Sample Reference				F20b	F25	G5	
Date Sampled				03-JUL-2018	03-JUL-2018	03-JUL-2018	
Matrix Class				Clay	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units			
Moisture @105C	T162	AR	0.1	%	23	18	13
Retained on 2mm	T2	A40	0.1	%	36.6	40.3	19.1

Concept Reference: 751149									
Project Site: Yachthaven									
Customer Reference:									
Leachate to BS EN 12457-2 (10:1)					Analysed as Water				
Leachate - Metals Analysis									
Concept Reference					751149 001	751149 002	751149 004	751149 005	751149 006
Customer Sample Reference					D10	D11	D20	D21	D25a (Made)
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Clay	Clay	Sandy Soil	Clay	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
As (Dissolved)	T281	10:1	0.0002	mg/l	0.0005	0.0004	0.0091	0.0032	0.0014
B (Dissolved)	T281	10:1	0.05	mg/l	<0.05	<0.05	<0.05	<0.05	0.08
Cd (Dissolved)	T281	10:1	0.00002	mg/l	<0.00002	<0.00002	0.00031	<0.00002	0.00003
Cr (Dissolved)	T281	10:1	0.001	mg/l	<0.001	0.003	0.004	0.021	<0.001
Cu (Dissolved)	T281	10:1	0.0005	mg/l	0.0015	0.0017	0.020	0.0047	0.0021
Pb (Dissolved)	T281	10:1	0.0003	mg/l	<0.0003	<0.0003	0.030	0.0005	0.0024
Hg (Dissolved)	T281	10:1	0.00005	mg/l	<0.00005	<0.00005	0.00032	0.00015	<0.00005
Ni (Dissolved)	T281	10:1	0.001	mg/l	<0.001	<0.001	0.001	<0.001	<0.001
Se (Dissolved)	T281	10:1	0.0005	mg/l	0.0009	0.0008	<0.0005	<0.0005	<0.0005
Zn (Dissolved)	T281	10:1	0.002	mg/l	0.008	0.003	0.031	0.002	0.011

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Leachate to BS EN 12457-2 (10:1) Analysed as Water Leachate - Metals Analysis									
Concept Reference					751149 008	751149 010	751149 016	751149 018	751149 019
Customer Sample Reference					D33a	E25	F20a	F25	G5
Date Sampled					03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018	03-JUL-2018
Matrix Class					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
As (Dissolved)	T281	10:1	0.0002	mg/l	0.022	0.0014	0.0035	0.0020	0.0019
B (Dissolved)	T281	10:1	0.05	mg/l	0.30	0.49	<0.05	0.11	0.05
Cd (Dissolved)	T281	10:1	0.00002	mg/l	0.00002	0.00006	0.00003	<0.00002	0.00002
Cr (Dissolved)	T281	10:1	0.001	mg/l	0.007	0.001	0.001	0.008	0.004
Cu (Dissolved)	T281	10:1	0.0005	mg/l	0.0098	0.015	0.0061	0.0024	0.0041
Pb (Dissolved)	T281	10:1	0.0003	mg/l	0.0005	0.011	0.0030	0.0006	0.0074
Hg (Dissolved)	T281	10:1	0.00005	mg/l	0.00012	<0.00005	<0.00005	0.00014	<0.00005
Ni (Dissolved)	T281	10:1	0.001	mg/l	0.003	0.002	<0.001	0.007	0.002
Se (Dissolved)	T281	10:1	0.0005	mg/l	0.0028	<0.0005	<0.0005	0.0006	<0.0005
Zn (Dissolved)	T281	10:1	0.002	mg/l	0.004	0.021	0.004	0.10	0.021

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Water Analysed as Water Miscellaneous					
Concept Reference					751149 003
Customer Sample Reference					D11 Groundwater
Date Sampled					03-JUL-2018
Determinand	Method	Test Sample	LOD	Units	
pH	T7	AR			7.61

Concept Reference: 751149 Project Site: Yachthaven Customer Reference: Water Analysed as Water Organo-Tins analysis					
Concept Reference					751149 003
Customer Sample Reference					D11 Groundwater
Date Sampled					03-JUL-2018
Determinand	Method	Test Sample	LOD	Units	
Dibutyl tin	T72	AR	0.01	µg/l	<0.01
Tetrabutyl tin	T72	AR	0.1	µg/l	<0.1
Tributyl tin	T72	AR	0.01	µg/l	<0.01
Triphenyl Tin	T72	AR	0.01	µg/l	<0.01

Index to symbols used in 751149-1

Value	Description
10:1	Leachate to BS EN 12457-2 (10:1)
AR	As Received
A40	Assisted dried < 40C
N.D.	Not Detected
100	LOD determined by sample aliquot used for analysis
2	LOD Raised Due to Matrix Interference
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Organo-tins analysis transferred to Concept Life Sciences Manchester
Asbestos subcontracted to REC Limited
Retained on 2mm is removed before analysis
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except Organo-tins

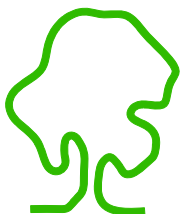
Method Index

Value	Description
T2	Grav
T54	GC/MS (Headspace)
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T281	ICP/MS (Filtered)
T6	ICP/OES
T8	GC/FID
T921	Colorimetry (CF) (MCERT)
T27	PLM
T7	Probe
T162	Grav (1 Dec) (105 C)
T1086	GC/MS (GSOP12A)
T72	GC/MS (Deriv.)
T85	Calc
T287	Calc TOC/0.58
T102	ICP/OES (HCl extract)
T245	ICP/OES (Aqua Regia Extraction)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	001-002,004-019
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	001-002,004-019
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	001-002,004-019
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	001-002,004-019
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	001-002,004-019
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	001-002,004-019
TPH (C10-C12 aliphatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (C10-C12 aromatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (C12-C16 aliphatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (C12-C16 aromatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (C16-C21 aliphatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (C16-C21 aromatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (C21-C35 aliphatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (C21-C35 aromatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (C35-C40 aliphatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (C35-C40 aromatic)	T8	AR	1	mg/kg	N	001-002,004-019
TPH (Aliphatic) total	T85	AR		mg/kg	N	001-002,004-019
TPH (Aromatic) total	T85	AR		mg/kg	N	001-002,004-019
TPH (Aliphatic+Aromatic) (sum)	T85	AR		mg/kg	N	001-002,004-019
Acenaphthene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Acenaphthene	T1086	AR	0.1	mg/kg	N	011-015
Acenaphthylene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Acenaphthylene	T1086	AR	0.1	mg/kg	N	011-015
Anthracene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Anthracene	T1086	AR	0.1	mg/kg	N	011-015
Benzo(a)Anthracene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Benzo(a)Anthracene	T1086	AR	0.1	mg/kg	N	011-015
Benzo(a)Pyrene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Benzo(a)Pyrene	T1086	AR	0.1	mg/kg	N	011-015
Benzo(b)fluoranthene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Benzo(b)fluoranthene	T1086	AR	0.1	mg/kg	N	011-015
Benzo(ghi)Perylene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Benzo(ghi)Perylene	T1086	AR	0.1	mg/kg	N	011-015
Benzo(k)fluoranthene	T1086	AR	0.1	mg/kg	N	001-002,004-019
Chrysene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Chrysene	T1086	AR	0.1	mg/kg	N	011-015
Dibenzo(ah)Anthracene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Dibenzo(ah)Anthracene	T1086	AR	0.1	mg/kg	N	011-015

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Fluoranthene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Fluoranthene	T1086	AR	0.1	mg/kg	N	011-015
Fluorene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Fluorene	T1086	AR	0.1	mg/kg	N	011-015
Indeno(123-cd)Pyrene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Indeno(123-cd)Pyrene	T1086	AR	0.1	mg/kg	N	011-015
Naphthalene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Naphthalene	T1086	AR	0.1	mg/kg	N	011-015
Phenanthrene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Phenanthrene	T1086	AR	0.1	mg/kg	N	011-015
Pyrene	T1086	AR	0.1	mg/kg	M	001-002,004-010,016-019
Pyrene	T1086	AR	0.1	mg/kg	N	011-015
PAH(total)	T1086	AR	0.1	mg/kg	N	001-002,004-019
Dibutyl tin	T72	AR	0.01	µg/l	N	003
Tetrabutyl tin	T72	AR	0.1	µg/l	N	003
Tributyl tin	T72	AR	0.01	µg/l	N	003
Triphenyl Tin	T72	AR	0.01	µg/l	N	003
Moisture @105C	T162	AR	0.1	%	N	001-002,004-019
Retained on 2mm	T2	A40	0.1	%	N	001-002,004-019
Arsenic	T257	A40	2	mg/kg	M	001-002,004-010,016-019
Boron (water-soluble)	T257	A40	1	mg/kg	N	001-002,004-019
Cadmium	T257	A40	0.1	mg/kg	M	001-002,004-010,016-019
Chromium	T257	A40	0.5	mg/kg	M	001-002,004-010,016-019
Copper	T245	A40	1	mg/kg	M	001-002,004-010,016-019
Lead	T245	A40	1	mg/kg	M	001-002,004-010,016-019
Nickel	T257	A40	0.5	mg/kg	M	001-002,004-010,016-019
Selenium	T6	A40	3	mg/kg	M	001-002,004-010,016-019
Mercury	T6	A40	1	mg/kg	M	001-002,004-010,016-019
Zinc	T245	A40	2	mg/kg	M	001-002,004-010,016-019
Asbestos ID	T27	A40			SU	001-002,004-006,008,010,016,018-019
SO4(Total)	T102	A40	0.02	%	M	001-002,004-010,016-019
pH	T7	A40			M	001-002,004-010,016-019
Soil Organic Matter	T287	A40	0.1	%	N	001-002,004-006,008,010-016,018-019
Cyanide(Total)	T921	AR	1	mg/kg	M	001-002,004-010,016-019
Dibutyl tin	T72	AR	0.01	mg/kg	N	001-002,004-006,008,010-016,018-019
Tetrabutyl tin	T72	AR	0.01	mg/kg	N	001-002,004-006,008,010-016,018-019
Tributyl tin	T72	AR	0.01	mg/kg	N	001-002,004-006,008,010-016,018-019
Triphenyl Tin	T72	AR	0.01	mg/kg	N	001-002,004-006,008,010-016,018-019
pH	T7	AR			U	003
As (Dissolved)	T281	10:1	0.0002	mg/l	U	001-002,004-006,008,010,016,018-019
B (Dissolved)	T281	10:1	0.05	mg/l	U	001-002,004-006,008,010,016,018-019
Cd (Dissolved)	T281	10:1	0.00002	mg/l	U	001-002,004-006,008,010,016,018-019
Cr (Dissolved)	T281	10:1	0.001	mg/l	U	001-002,004-006,008,010,016,018-019
Cu (Dissolved)	T281	10:1	0.0005	mg/l	U	001-002,004-006,008,010,016,018-019
Pb (Dissolved)	T281	10:1	0.0003	mg/l	U	001-002,004-006,008,010,016,018-019
Hg (Dissolved)	T281	10:1	0.00005	mg/l	U	001-002,004-006,008,010,016,018-019
Ni (Dissolved)	T281	10:1	0.001	mg/l	U	001-002,004-006,008,010,016,018-019
Se (Dissolved)	T281	10:1	0.0005	mg/l	U	001-002,004-006,008,010,016,018-019
Zn (Dissolved)	T281	10:1	0.002	mg/l	U	001-002,004-006,008,010,016,018-019
Arsenic	T257	A40	2.0	mg/kg	N	011-015
Cadmium	T257	A40	0.1	mg/kg	N	011-015
Chromium	T257	A40	0.5	mg/kg	N	011-015
Copper	T245	A40	1.0	mg/kg	N	011-015
Lead	T245	A40	1	mg/kg	N	011-015
Nickel	T257	A40	0.5	mg/kg	N	011-015
Selenium	T6	A40	3	mg/kg	N	011-015
Mercury	T6	A40	1	mg/kg	N	011-015
Zinc	T245	A40	2	mg/kg	N	011-015
SO4(Total)	T102	A40	0.02	%	N	011-015
pH	T7	A40			N	011-015
Cyanide(Total)	T921	AR	1	mg/kg	N	011-015



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