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Hydro Aluminium Kurri Kurri – Remedial Action Works Plan, Clay Borrow Pit

Historical Aerial Photo – Removal of clay around 1994

ENVIRON

JOB NO:AS130386

DATE: December 2014

APPENDIX A

Hydro Aluminium Kurri Kurri – Remedial Action Works Plan, Clay Borrow Pit

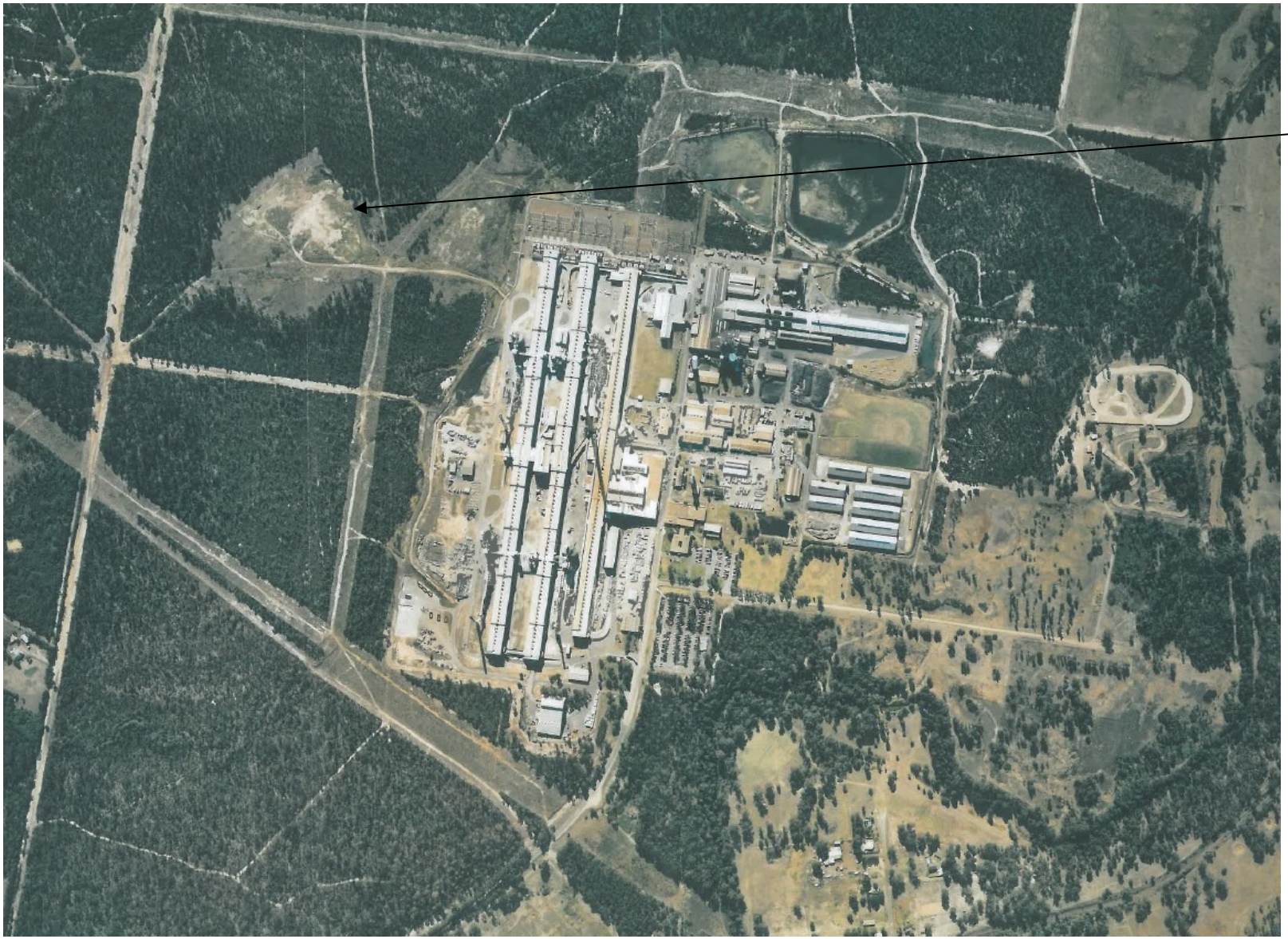
Historical Aerial Photo - 2001

ENVIRON

JOB NO:AS130386

DATE: December 2014

APPENDIX A



Hydro Aluminium Kurri Kurri – Remedial Action Works Plan, Clay Borrow Pit

Historical Aerial Photo - 2006

ENVIRON

JOB NO:AS130386

DATE: December 2014

APPENDIX A

Appendix B

EIL Site-Specific Calculations

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
7
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	100	70
Urban residential and open public spaces	150	190
Commercial and industrial	200	320

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
11
Enter soil pH (calcium chloride method) (values from 1 to 14)
6
Enter organic carbon content (%OC) (values from 0 to 50%)
1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
7
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	70	80
Urban residential and open public spaces	120	210
Commercial and industrial	170	300

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
11
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
7
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	35	35
Urban residential and open public spaces	80	180
Commercial and industrial	140	310

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
11
Enter soil pH (calcium chloride method) (values from 1 to 14)
6
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
7
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	75	170
Urban residential and open public spaces	190	480
Commercial and industrial	280	700

Appendix C

Borehole and Test Pit Logs from Phase 2 Assessment Report

BOREHOLE NUMBER MW01

ENVIRON

CLIENT Norsk Hydro ASA | PROJECT NAME Phase 2 ESA

PROJECT NUMBER DE11HDR043 | PROJECT LOCATION Kurri Kurri

DATE STARTED 11/4/12 | COMPLETED 11/4/12 | R.L. SURFACE | DATUM

DRILLING CONTRACTOR Terratest | SLOPE 90° | BEARING ---

EQUIPMENT | HOLE LOCATION Clay Borrow Pit

HOLE SIZE | LOGGED BY KJG | CHECKED BY

NOTES

Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
Pushtube							Fill Sandy Gravelly Clay: brown, med plasticity, angularcoarse gravel, clay, red with some gravel, wet.	0.3-0.4m PID 0 ppm	FILL
							Clay: black, high plasticity, moist.		ESTUARINE SEDIMENTS
				2			Clay: grey, high plasticity, some sand, moist	1.4-1.5m (DUP1) PID 0 ppm	
							Silty Clay: yellow, some sand, dry		RESIDUAL CLAY/EW SANDSTONE
				4			Clay: grey, high plasticity, some sand, moist.		
ADT	12/4/12						EW Sandstone/Residual Sandy Clay: brown-yellow, low plasticity, fine grained sand slightly moist.		
				6					
				8			grading to clay: brown, high plasticity, moist, moist to wet at 9m		
				10			EW Sandstone		EW SANDSTONE
				12			Borehole MW01 terminated at 11.5m		

BOREHOLE / TEST PIT KURRI KURRI.GPJ GINT STD AUSTRALIA.GDT 18/5/12

BOREHOLE NUMBER MW02

ENVIRON

CLIENT Norsk Hydro ASA | PROJECT NAME Phase 2 ESA

PROJECT NUMBER DE11HDR043 | PROJECT LOCATION Kurri Kurri

DATE STARTED 11/4/12 | COMPLETED 12/4/12 | R.L. SURFACE | DATUM

DRILLING CONTRACTOR Terratest | SLOPE 90° | BEARING ---

EQUIPMENT | HOLE LOCATION Clay Borrow Pit

HOLE SIZE | LOGGED BY KJG | CHECKED BY

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
Pushtube	None Encountered		0			Topsoil with some fill	0-0.05m (PID 0 ppm)	FILL
						Clay: grey, high plasticity, moist.	0.5-0.6m (PID 0 ppm)	RESIDUAL CLAY
			2			interbedded red/grey clay		
						Clay: grey, high plasticity, moist.		
ADT						Sandy Clay: red, low plasticity, dry.		
			4					
			6			grading to grey clay		
						EW Siltstone, grey, dry		EW SILTSTONE
			8					
			10					
			12					
			14					
			16			Borehole MW02 terminated at 16m		
			18					

BOREHOLE NUMBER MW03a

ENVIRON

CLIENT Norsk Hydro ASA | PROJECT NAME Phase 2 ESA

PROJECT NUMBER DE11HDR043 | PROJECT LOCATION Kurri Kurri

DATE STARTED 12/4/12 | COMPLETED 12/4/12 | R.L. SURFACE | DATUM

DRILLING CONTRACTOR Terratest | SLOPE 90° | BEARING ---

EQUIPMENT | HOLE LOCATION Clay Borrow Pit

HOLE SIZE | LOGGED BY KJG | CHECKED BY

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
ADT	None Encountered		0.0			Fill: Sandy Clay: brown		FILL
			0.5			Fill: Gravelly Sandy Clay: some white-orange gravel (bricks?), brick fragment at 1m.	0.4-0.5 (DUP2) (PID 0 ppm)	
			1.0			Topsoil: Sand, black with some angular gravel.	1.2-1.3m (PID 0 ppm)	RESIDUAL CLAY
						Clay: dark grey, high plasticity with some gravel		
			1.5			Clay: brown/grey, high plasticity, moist.		
			2.0					
			2.5					
			3.0			Borehole MW03a terminated **at 3m**		
			3.5					
			4.0					
			4.5					
			5.0					

BOREHOLE / TEST PIT KURRI KURRI.GPJ GINT STD AUSTRALIA.GDT 18/5/12

BOREHOLE NUMBER MW03b

ENVIRON

CLIENT Norsk Hydro ASA | PROJECT NAME Phase 2 ESA

PROJECT NUMBER DE11HDR043 | PROJECT LOCATION Kurri Kurri

DATE STARTED 12/4/12 | COMPLETED 12/4/12 | R.L. SURFACE | DATUM

DRILLING CONTRACTOR Terratest | SLOPE 90° | BEARING ---

EQUIPMENT | HOLE LOCATION Clay Borrow Pit

HOLE SIZE | LOGGED BY KJG | CHECKED BY

NOTES

Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
ADT	▼			0			Topsoil: Gravelly Clay: brown, low plasticity	0-0.1m (PID 0 ppm)	TOPSOIL
							Clay: grey-brown, high plasticity, moist.		RESIDUAL CLAY
				2					
				4			Clay: grey, medium plasticity		
				6			Clay: red, medium plasticity, moist		
							Clay: brown, medium plasticity, moist		
				8			Clay: grey.		
							Clay: brown.		
							Clay: khaki, high plasticity, with some gravel. wet.		
				10			EW Siltstone as Clay: dark grey, medium plasticity, dry.		EW SILTSTONE
				12			Borehole MW03b terminated at 11.5m		

BOREHOLE NUMBER MW04

ENVIRON

CLIENT Norsk Hydro ASA
PROJECT NAME Phase 2 ESA
PROJECT NUMBER DE11HDR043
PROJECT LOCATION Kurri Kurri

DATE STARTED 12/4/12 COMPLETED 12/4/12 R.L. SURFACE ___ DATUM ___
DRILLING CONTRACTOR Terratest SLOPE 90° BEARING ---
EQUIPMENT ___ HOLE LOCATION Clay Borrow Pit Entrance
HOLE SIZE ___ LOGGED BY KJG CHECKED BY ___
NOTES ___

Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
ADT	▼			0			Silty Clay: black, high plasticity, moist.	0-0.1m (PID 0 ppm)	ESTUARINE SEDIMENTS
							Clay: red, low plasticity, dry.		RESIDUAL CLAY
				2					
				4					
				6			Clay: grey, low plasticity, dry.		
				8					
							EW Siltstone, grey fine grained.		EW SILTSTONE
				10					
				12			Borehole MW04 terminated at 11.5m		

BOREHOLE / TEST PIT KURRI KURRI.GPJ GINT STD AUSTRALIA.GDT 18/5/12

BOREHOLE NUMBER MW05

ENVIRON

CLIENT Norsk Hydro ASA **PROJECT NAME** Phase 2 ESA

PROJECT NUMBER DE11HDR043 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 12/4/12 **COMPLETED** 12/4/12 **R.L. SURFACE** _____ **DATUM** _____

DRILLING CONTRACTOR Terratest **SLOPE** 90° **BEARING** ---

EQUIPMENT _____ **HOLE LOCATION** Clay Borrow Pit in old dam fill

HOLE SIZE _____ **LOGGED BY** KJG **CHECKED BY** _____

NOTES _____

Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
ADT	▼			0			Fill: Clayey Silt: medium plasticity with some gravel.		FILL
							Fill: Clay: red-grey, high plasticity.		
							Fill: Gravelly Sandy Clay: low plasticity, with some brick (red).	0.6-0.8m (PID 0 ppm)	
				1			Fill: Gravelly Clay: brown, coarse grained, angular gravel (brick).		
				2			Fill: Gravelly Clay: brown, low plasticity with some brick.	1.8-2.0m (DUP3,3A), (PID 0 ppm)	
				3			Fill: Gravelly Sand: khaki, coarse grained, wet..		
				4			Fill: Gravel: khaki, fine grained, wet.		
Pushtube							Clay: grey/red, high plasticity, moist.		RESIDUAL CLAY
				5					
				6			Borehole MW05 terminated at 6m		
				7					
				8					
				9					
				10					

BOREHOLE / TEST PIT KURRI KURRI.GPJ GINT STD AUSTRALIA.GDT 18/5/12

TEST PIT NUMBER TP1

ENVIRON

CLIENT Norsk Hydro ASA | PROJECT NAME Phase 2 ESA

PROJECT NUMBER DE11HDR043 | PROJECT LOCATION Kurri Kurri

DATE STARTED 12/4/12 | COMPLETED 12/4/12 | R.L. SURFACE | DATUM

EXCAVATION CONTRACTOR | SLOPE --- | BEARING ---

EQUIPMENT Excavator 20T | TEST PIT LOCATION Clay Borrow Pit

TEST PIT SIZE | LOGGED BY FR | CHECKED BY SC

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
E			0.5			FILL, silty SAND/sandy SILT, minor clay content, brown, moist		FILL
			1.0			FILL, sandy CLAY, brown, moist, bricks, concrete, timber, concrete to 0.2m in size. Hole unstable at 1.6m due to water ingress.		
	▼		1.5					
			2.0			Test Pit terminated at 1.8m (approx.) Borehole TP1 terminated at 1.8m		
			2.5					
			3.0					

BOREHOLE / TEST PIT KURRI KURRI.GPJ GINT STD AUSTRALIA.GDT 18/5/12

TEST PIT NUMBER TP2

ENVIRON

CLIENT Norsk Hydro ASA **PROJECT NAME** Phase 2 ESA

PROJECT NUMBER DE11HDR043 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 12/4/12 **COMPLETED** 12/4/12 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR _____ **SLOPE** --- **BEARING** ---

EQUIPMENT Excavator 20T **TEST PIT LOCATION** Clay Borrow Pit

TEST PIT SIZE _____ **LOGGED BY** FR **CHECKED BY** SC

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
E	▼		0.5 1.0			FILL, silty SAND, includes broken concrete slabs up to ~0.8m, bricks, metal bar, brown, red to yellow, slightly moist. Water ingress, hole unstable.		FILL
			1.5 2.0 2.5 3.0			Test Pit terminated at 1.2m Borehole TP2 terminated at 1.2m		

BOREHOLE / TEST PIT KURRI KURRI.GPJ GINT STD AUSTRALIA.GDT 18/5/12

TEST PIT NUMBER TP3

ENVIRON

CLIENT Norsk Hydro ASA
PROJECT NAME Phase 2 ESA
PROJECT NUMBER DE11HDR043
PROJECT LOCATION Kurri Kurri

DATE STARTED 12/4/12 COMPLETED 12/4/12
R.L. SURFACE
DATUM
EXCAVATION CONTRACTOR
SLOPE ---
BEARING ---
EQUIPMENT Excavator 20T
TEST PIT LOCATION Clay Borrow Pit
TEST PIT SIZE
LOGGED BY FR
CHECKED BY SC
NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
E			0.5			FILL, silty clayey SAND, oranga/yellow, minor rubble content.		FILL
			1.0					
			1.5					
	▼					Testpit unstable at water ingress		
			2.0			Terminated at approx. 2.0m Borehole TP3 terminated at 2m		
			2.5					
			3.0					

BOREHOLE / TEST PIT KURRI KURRI.GPJ GINT STD AUSTRALIA.GDT 18/5/12

TEST PIT NUMBER TP4

ENVIRON

CLIENT Norsk Hydro ASA | PROJECT NAME Phase 2 ESA

PROJECT NUMBER DE11HDR043 | PROJECT LOCATION Kurri Kurri

DATE STARTED 12/4/12 | COMPLETED 12/4/12 | R.L. SURFACE | DATUM

EXCAVATION CONTRACTOR | SLOPE --- | BEARING ---

EQUIPMENT Excavator 20T | TEST PIT LOCATION Clay Borrow Pit

TEST PIT SIZE | LOGGED BY FR | CHECKED BY SC

NOTES Stockpiled concrete, refractory brick, bitumen around location

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
E	None encountered		0.5			FILL, sandy CLAY, some gravel cobbles including natural rock and slag		FILL
						silty SAND; relict topsoil		TOPSOIL
			1.0			sandy CLAY, moist, stiff, orange, mottled grey, EW SANDSTONE/RESIDUAL		EW SANDSTONE
			1.5					
			2.0			Test Pit terminated at 1.6m Borehole TP4 terminated at 1.6m		
			2.5					
			3.0					

BOREHOLE / TEST PIT KURRI KURRI.GPJ GINT STD AUSTRALIA.GDT 18/5/12

TEST PIT NUMBER TP5

ENVIRON

CLIENT Norsk Hydro ASA
PROJECT NAME Phase 2 ESA
PROJECT NUMBER DE11HDR043
PROJECT LOCATION Kurri Kurri

DATE STARTED 12/4/12 COMPLETED 12/4/12
R.L. SURFACE
DATUM
EXCAVATION CONTRACTOR
SLOPE ---
BEARING ---
EQUIPMENT Excavator 20T
TEST PIT LOCATION Clay Borrow Pit
TEST PIT SIZE
LOGGED BY FR
CHECKED BY SC
NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
E	None encountered		0.5			silty SAND; topsoil, black, slightly moist		TOPSOIL
			1.0			sandy CLAY; stiff, slightly moist, mottled orange/brown/yellow, EW SANDSTONE/RESIDUAL		EW SANDSTONE
			1.5			Test pit terminated at 1.1m Borehole TP5 terminated at 1.1m		
			2.0					
			2.5					
			3.0					

BOREHOLE / TEST PIT KURRI KURRI.GPJ GINT STD AUSTRALIA.GDT 18/5/12

Appendix D

Summary of Results from Phase 2 Assessment Report

TABLE LR1 Soil Analytical Results for the Clay Borrow Pit

Sample Identification	PQL	Guideline					MW01	MW02	MW03A	MW05
Sample Depth (m)		HIL D[A]	HSL D[B]	EIL C/I[C]	Management Limits[D]	ESL C/I[E]	0.3-0.4	0-0.05	0.4-0.5	1.8-2.0
Date							11/04/2012	11/04/2012	12/04/2012	12/04/2012
Sample Profile							FILL	FILL	FILL	FILL
PAEC Sampled							CBP	CBP	CBP	CBP
Sample collected by							KJG	KJG	KJG	KJG
Metals										
Aluminium	50	NL*	-	-	-	-	10400	14400	17600	9510
Arsenic	1	3000	-	160	-	-	4.9	7.9	4.1	4.9
Cadmium	0.1	900	-	-	-	-	<0.1	<0.1	1	0.1
Chromium (VI)	1	3600	-	320 (Cr III)	-	-	14.6	22.4	27.9	16.3
Copper	2	240,000	-	300	-	-	7.9	1.8	12.4	11.1
Nickel	1	6000	-	310	-	-	13.3	4.9	35.4	15.8
Lead	2	1500	-	1800	-	-	8.4	11.1	26.2	15
Zinc	5	400,000	-	700	-	-	31.6	15.4	75.5	76.7
Mercury (inorganic)	0.05	730	-	-	-	-	<0.1	<0.1	<0.1	<0.1
Fluoride	40	17000*	-	-	-	-	310	190	2120	1030
Non Metallic Inorganics										
Total Cyanide	1	1500	-	-	-	-				
Polycyclic Aromatic Hydrocarbons (PAH)										
Naphthalene	0.5	-	-	370	-	-	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	0.5	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Acenaphthene	0.5	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Fluorene	0.5	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Phenanthrene	0.5	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Anthracene	0.5	-	-	-	-	-	<0.5	<0.5	0.8	<0.5
Fluoranthene	0.5	-	-	-	-	-	<0.5	<0.5	0.7	<0.5
Pyrene	0.5	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	0.5	-	-	-	-	-	<0.5	<0.5	0.9	0.6
Chrysene	0.5	-	-	-	-	-	<0.5	<0.5	2.2	1.4
Benzo(b)&(k)fluoranthene	1	-	-	-	-	-	1	<1	3	3
Benzo(k)fluoranthene	0.5	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	0.5	-	-	1.4	-	-	0.7	<0.5	1.2	1
Indeno(1,2,3-c,d)pyrene	0.5	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	0.5	-	-	-	-	-	<0.5	<0.5	0.5	<0.5
Benzo(g,h,i)perylene	0.5	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ		40	-	-	-	-	<0.5	<0.5	1.52	1.34
Sum of reported PAH	--	4000	-	-	-	-	0.5	<0.5	0.7	<0.5
Total Petroleum Hydrocarbons (TPH)										
TPH C6-C9	10	-	260	-	800	-				
TPH C10-C14	50	-	NL	-	1000	170				
TPH C15-C28	100	-	-	-	5000	1700				
TPH C29-C36	100	-	-	-	10,000	3300				
TPH C10-C36	--	-	-	-	-	-				
Polychlorinated Biphenyls										
Total PCBs	1	-	-	-	-	-				
Semi Volatile Organic Compounds										
Total PAHs	1	4000	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Total Phenols	1	240,000	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Phthalate Esters	5	-	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Nitrosamines	1	-	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Nitroaromatics and Ketones	1	-	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Haloethers	0.5	-	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Chlorinated Hydrocarbons	1	-	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Anilines and Benzidines	1	-	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Organochlorine Pesticides	1	-	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Organophosphorus Pesticides	0.5	-	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Miscellaneous Compounds	0.5	-	-	-	-	-	<LOR	<LOR	<LOR	<LOR
Volatile Organic Compounds										
Monocyclic Aromatic Hydrocarbons	5	-	-	-	-	-				
Oxygenated Compounds	0.5	-	-	-	-	-				
Sulfonated Compounds	1	-	-	-	-	-				
Fumigants	0.5	-	-	-	-	-				
Halogenated Aliphatic Compounds	5	-	-	-	-	-				
Halogenated Aromatic Compounds	0.5	-	-	-	-	-				
Trihalomethanes	0.5	-	-	-	-	-				

All results are in units of mg/kg.

Blank Cell indicates testing was not completed

PQL = Practical Quantitation Limit.

[A] NEPM (2013) Health Investigation Level 'D' (Industrial/ Commercial)

[B] NEPM (2013) Soil Health Screening Level for Vapour Intrusion 'D' Commercial/ Industrial

[C] NEPM (2013) Ecological Investigation Levels for Commercial/ Industrial

[D] NEPM (2013) Management Limits for TPH Fractions F1 to F4 in soil - note that the F1 to F4 fractions are different to the fractions reported here

[E] NEPM (2013) Ecological Screening Level for Commercial/ Industrial

* Fluoride (soluble) and aluminium Preliminary Screening Criteria from ENVIRON (2013) 'Preliminary Screening Level Health Risk Assessment for Fluoride and Aluminium'

Results shown in shading are in excess of the primary health acceptance criteria

Results showin in underline are in excess of the primary ecological acceptance criteria

<LOR = Less than the Limit of Reporting

TABLE LR2 Groundwater Analytical Results

Sample Identification	PQL	Guideline			MW01	MW01	MW03	MW03	MW04	MW04	MW05	MW05
Date		95% Fresh [A]	Irrigation	Stock	2/5/12	24/7/12	2/5/12	24/7/12	2/5/12	24/7/12	2/5/12	24/7/12
PAEC Sampled					CBP	CBP	CBP	CBP	CBP	CBP	CBP	CBP
Sample Appearance					Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Sample collected by					KJG	KJG	KJG	KJG	KJG	KJG	KJG	KJG
Metals												
Aluminium pH>6.5	10	55	5000	5000	20		590		2530		30	
Arsenic	1	24	100	500	<10	<1	<10	3	<10	<1	2	2
Cadmium	0.1	2*	10	10	<1	1.1	<1	2	3.1	2.7	0.1	0.2
Chromium	1	1	100	1000	<10	<1	<10	4	<10	<1	<1	<1
Copper	1	126*	200	1000	<10	5	<10	3	<10	4	3	3
Nickel	1	99*	200	1000	<10	58	488	420	938	600	15	15
Lead	1	91.8*	2000	100	<10	<1	<10	3	<10	<1	1	<1
Zinc	5	720*	2000	20,000	<50	64	847	1100	1840	1000	30	9
Mercury	0.1	0.6	2	2	<0.1	<0.05	<0.1	<0.05	<0.1	<0.05	<0.1	<0.05
Fluoride	100		1000	2000	1200		2500		5500		15000	
Non Metallic Inorganics												
Free Cyanide	4	7										
Total Cyanide	4	NA										
Total Petroleum Hydrocarbons (TPH)												
TPH C6-C9	20											
TPH C10-C14	50											
TPH C15-C28	10											
TPH C29-C36	50											
TPH C6-C36		7	LOR	LOR								
Polycyclic Aromatic Hydrocarbons (PAH)												
3-Methylcholanthrene	0.1											
2-Methylnaphthalene	0.1											
7.12-Dimethylbenz(a)anthracene	0.1											
Acenaphthene	0.1											
Acenaphthylene	0.1											
Anthracene	0.1	*0.4*										
Benz(a)anthracene	0.1											
Benzo(a)pyrene	0.05	0.2										
Benzo(b)fluoranthene	0.1											
Benzo(e)pyrene	0.1											
Benzo(g.h.i)perylene	0.1											
Benzo(k)fluoranthene	0.1											
Chrysene	0.1											
Coronene	0.1											
Dibenz(a.h)anthracene	0.1											
Fluoranthene	0.1	1.4										
Fluorene	0.1											
Indeno(1.2.3.cd)pyrene	0.1											
N-2-Fluorenyl Acetamide	0.1											
Naphthalene	0.1	16										
Perylene	0.1											
Phenanthrene	0.1	2										
Pyrene	0.1											
Semivolatile Organic Compounds (SVOCs)												
Organochlorine Pesticides (OCP)												
alpha-BHC	2				<2		<2		<2		<2	
HCB	2				<2		<2		<2		<2	
delta-BHC	2				<2		<2		<2		<2	
Heptachlor	2	0.09			<2		<2		<2		<2	
Aldrin	2	*0.001*			<2		<2		<2		<2	
Heptachlor epoxide	2				<2		<2		<2		<2	
Chlordane	2	0.08			<2		<2		<2		<2	
Endosulfan	2	0.2			<2		<2		<2		<2	
Dieldrin	2	*0.01*			<2		<2		<2		<2	
DDE	2	*0.03*			<2		<2		<2		<2	
Endrin	2	0.02			<2		<2		<2		<2	
DDD	2				<2		<2		<2		<2	
Endrin aldehyde	2				<2		<2		<2		<2	
Endosulfan sulfate	2				<2		<2		<2		<2	
DDT	4	0.01			<4		<4		<4		<4	

TABLE LR2 Groundwater Analytical Results

Sample Identification	PQL	Guideline			MW01	MW01	MW03	MW03	MW04	MW04	MW05	MW05
Date		95% Fresh [A]	Irrigation	Stock	2/5/12	24/7/12	2/5/12	24/7/12	2/5/12	24/7/12	2/5/12	24/7/12
PAEC Sampled					CBP	CBP	CBP	CBP	CBP	CBP	CBP	CBP
Sample Appearance					Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
Sample collected by					KJG	KJG	KJG	KJG	KJG	KJG	KJG	KJG
Organophosphorous Pesticides (OPP)												
Dichlorvos	2				<2		<2		<2		<2	
Dimethoate	2	0.15			<2		<2		<2		<2	
Diazinon	2	0.01			<2		<2		<2		<2	
Chlorpyrifos-methyl	2				<2		<2		<2		<2	
Malathion	2	0.05			<2		<2		<2		<2	
Fenthion	2	0.2			<2		<2		<2		<2	
Chlorpyrifos	2				<2		<2		<2		<2	
Bromophos-ethyl	2				<2		<2		<2		<2	
Chlorfenvinphos	2				<2		<2		<2		<2	
Prothiofos	2				<2		<2		<2		<2	
Ethion	2				<2		<2		<2		<2	
Polynuclear Aromatic Hydrocarbons												
Naphthalene	2				<2		3		<2		<2	
2-Methylnaphthalene	2				<2		<2		<2		<2	
2-Chloronaphthalene	2				<2		<2		<2		<2	
Acenaphthylene	2				<2		<2		<2		<2	
Acenaphthene	2				<2		<2		<2		<2	
Fluorene	2				<2		<2		<2		<2	
Phenanthrene	2				<2		<2		<2		<2	
Anthracene	2				<2		<2		<2		<2	
Fluoranthene	2				<2		<2		<2		<2	
Pyrene	2				<2		<2		<2		<2	
N-2-Fluorenyl Acetamide	2				<2		<2		<2		<2	
Benz(a)anthracene	2				<2		<2		<2		<2	
Chrysene	2				<2		<2		<2		<2	
Benzo(b) & Benzo(k)fluoranthene	4				<4		<4		<4		<4	
7.12-Dimethylbenz(a)anthracene	2				<2		<2		<2		<2	
Benzo(a)pyrene	2				<2		<2		<2		<2	
3-Methylcholanthrene	2				<2		<2		<2		<2	
Indeno(1.2.3.cd)pyrene	2				<2		<2		<2		<2	
Dibenz(a.h)anthracene	2				<2		<2		<2		<2	
Benzo(g.h.i)perylene	2				<2		<2		<2		<2	
Phenols												
Total Phenolics	4	320			<4		<4		<4		<4	
Phthalate Esthers												
Dimethylphthalate	2	3700			<2		<2		<2		<2	
Diethylephthalate	2	1000			<2		<2		<2		<2	
Nitrosamines												
Total Nitrosamines	2				<2		<2		<2		<2	
Nitroaromatics and Ketones												
Total Nitroaromatics and Ketones	2				<2		<2		<2		<2	
Haloethers												
Total Haloethers	2				<2		<2		<2		<2	
Chlorinated Hydrocarbons												
Total Chlorinated Hydrocarbons	2				<2		<2		<2		<2	
Anilines and Benzidines												
Total Anilines and Benzidines	2				<2		<2		<2		<2	
Miscellaneous Compounds												
Total Misscellaneous Compounds	2				<2		<2		<2		<2	

All results in µg/L

PQL = Practical Quantitation Limit.

[A] ANZECC 2000 95% Protection Level for Receiving Water Type

Guidelines in *italics* are low level reliability guidelines

[B] NHMRC Australian Drinking Water Guidelines, 20110

* 5000µg/L for Fluoride is based on the value used by another Aluminium Smelter

* Hardness Modified Trigger Values for Cd. Cu, Ni, Pb, Zn

ANZECC arsenic guideline based on As (III) for marine and As (V) for fresh, the lowest of presented guidelines.

NHMRC arsenic guidelines are based on total arsenic

ANZECC and NHMRC guidelines for chromium are based on Cr (VI)

Total Phenolics guideline based on Phenol

ANZECC guidelines for mercury are based on inorganic mercury.

NHMRC guidelines for mercury are based on total mercury.

NHMRC guidelines for total cyanide are based on cyanogen chloride (as cyanide).

Results for TRH have been compared to TPH guidelines.

Results shaded grey are in excess of the primary acceptance criteria: ANZECC 95%, NHMRC

PAECs

CBP	Clay Borrow Pit
FLS	Flammable Liquids Store
AWP	Anode Waste Pile
DSA	Diesel Spray Area
CBWB	Cathode Bay Washdown Bay
PRA	Pot Rebuild Area

Appendix E

Summary of Results from 2014 Refractory Brick Testing

TABLE 1 Refractory Brick Wastes - Batch Testing Results

Sample Identification				Summary statistics*				Exemption Criteria**		RB2	RB3	RB4	RB9	RB10	RB11	RB12	RB13	RB14	RB15	RB17	RB18	RB24	RB26	RB27	RB28	RB29	RB30	RB31	RB32	RB33	RB34	RB35	RB35
	Units	Test method	PQL	min	Average	Max	Stdev	Maximum Average Concentration	Absolute Maximum Concentration																									
Moisture Content		Inorg-008		0.1	2.8	8.8	2.14	-	-	1.3	2.7	4.4	3.3	3.1	1.2	2.6	4.1	3.1	5.1	4.7	8.8	6.8	2.5	3.1	2.3	5.3	2.5	4.5	3.9	2.1	3.5	3.1	
Metals																																	
Arsenic	mg/kg dry weight	Metals-020 ICP-AES	4	2.0	2.0	2.0	0.00	15	30	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Cadmium	mg/kg dry weight	Metals-020 ICP-AES	1	0.2	0.2	**2.0**	0.27	0.5	1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	**2**	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg dry weight	Metals-020 ICP-AES	3	0.5	2.7	20.0	4.59	40	80	2	13	<1	2	1	<1	<1	1	16	3	7	6	1	20	<1	3	<1	6	1	<1	<1	<1	2	2
Copper	mg/kg dry weight	Metals-020 ICP-AES	0.5	0.5	2.1	9.0	2.20	40	80	<1	8	1	<1	2	<1	1	<1	4	3	5	9	3	4	<1	3	3	3	3	1	<1	1	4	3
Nickel	mg/kg dry weight	Metals-020 ICP-AES	1	0.5	2.0	8.0	1.55	25	50	<1	6	2	<1	3	1	2	1	3	8	3	3	3	3	2	3	4	2	1	2	<1	2	3	3
Lead	mg/kg dry weight	Metals-020 ICP-AES	1	0.5	1.1	10.0	1.50	50	100	<1	<1	<1	<1	<1	<1	1	<1	1	2	<1	10	2	<1	<1	<1	<1	1	2	<1	<1	<1	<1	<1
Zinc	mg/kg dry weight	Metals-020 ICP-AES	1	0.5	2.0	25.0	3.95	150	300	<1	2	1	<1	2	3	3	2	4	25	1	10	3	1	<1	1	<1	1	2	1	<1	<1	2	1
Mercury		Metals-020 ICP-AES	1	0.05	0.05	0.05	0.00	0.5	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Non Metallic Inorganics																																	
Total Fluoride	mg/kg dry weight	NEPM-404	50	25.0	86.8	**730.0**	158.91	300	600	59	170	25	25	25	25	25	25	**730**	25	25	470	500	25	210	25	25	25	25	25	25	25	25
Total Cyanide	mg/kg dry weight	Inorg-013	0.5	0.0	0.0	0.0	0.00	-	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Polycyclic Aromatic Hydrocarbons (PAH)																																	
Benzo(a)pyrene	mg/kg dry weight	Org-012	0.05	0.0	0.0	0.4	0.06	-	1	NA	0.39	NA	NA	<0.05	NA	NA	<0.05	NA	NA	NA	NA	NA	NA	<0.05	NA	NA	<0.05	NA	NA	NA	NA	NA	NA
Sum of reported PAH	mg/kg dry weight	Org-012	--	0.8	1.1	3.5	0.91	-	40	NA	4	NA	NA	ND	NA	NA	ND	NA	NA	NA	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA	NA	NA	NA

NA not analysed

PQL = Practical Quantitation Limit.

*Statistics set non-detect results at 0.5 PQL concentration

** from Draft Hydro Aluminium Kurri Kurri Bake Ovens Refractory Brick Exemption 2012 (Table 2)

Results shown in bold/shading are in excess of the Exemption limits (Table 2)

chromium is total chromium

TABLE 1 Refractory Brick Wastes - Batch Testing Results

Sample Identification			PQL	Summary statistics*				Exemption Criteria**		RB36	RB37	RB38	RB39	RB40	RB41	RB42	RB43	RB44	RB45	RB46	RB47	RB48
	Units	Test method		min	Average	Max	Stdev	Maximum Average Concentration	Absolute Maximum Concentration													
Moisture Content		Inorg-008		0.1	2.8	8.8	2.14	-	-	4	3.4	3.9	4.5	3.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Metals																						
Arsenic	mg/kg dry weight	Metals-020 ICP-AES	4	2.0	2.0	2.0	0.00	15	30	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Cadmium	mg/kg dry weight	Metals-020 ICP-AES	1	0.2	0.2	**2.0**	0.27	0.5	1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg dry weight	Metals-020 ICP-AES	3	0.5	2.7	20.0	4.59	40	80	<1	<1	<1	14	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	mg/kg dry weight	Metals-020 ICP-AES	0.5	0.5	2.1	9.0	2.20	40	80	<1	<1	<1	8	<1	<1	<1	<1	2	<1	1	4	<1
Nickel	mg/kg dry weight	Metals-020 ICP-AES	1	0.5	2.0	8.0	1.55	25	50	1	2	<1	2	<1	<1	<1	<1	2	<1	2	<1	<1
Lead	mg/kg dry weight	Metals-020 ICP-AES	1	0.5	1.1	10.0	1.50	50	100	2	<1	<1	<1	<1	<1	2	1	<1	1	1	1	2
Zinc	mg/kg dry weight	Metals-020 ICP-AES	1	0.5	2.0	25.0	3.95	150	300	<1	<1	<1	2	<1	<1	1	<1	<1	<1	<1	<1	<1
Mercury		Metals-020 ICP-AES	1	0.05	0.05	0.05	0.00	0.5	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Non Metallic Inorganics																						
Total Fluoride	mg/kg dry weight	NEPM-404	50	25.0	86.8	**730.0**	158.91	300	600	25	25	200	25	25	25	25	25	25	25	25	25	25
Total Cyanide	mg/kg dry weight	Inorg-013	0.5	0.0	0.0	0.0	0.00	-	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Polycyclic Aromatic Hydrocarbons (PAH)																						
Benzo(a)pyrene	mg/kg dry weight	Org-012	0.05	0.0	0.0	0.4	0.06	-	1	NA	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.05	NA
Sum of reported PAH	mg/kg dry weight	Org-012	--	0.8	1.1	3.5	0.91	-	40	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA

NA not analysed

PQL = Practical Quantitation Limit.

*Statistics set non-detect results at 0.5 PQL concentration

** from Draft Hydro Aluminium Kurri Kurri Bake Ovens Refractory Brick Exemption 2012 (Table 2)

Results shown in bold/shading are in excess of the Exemption limits (Table 2)

chromium is total chromium

APPENDIX D – ARCHAEOLOGICAL FIND CORRESPONDENCE

Thu 6/08/2015 11:52 AM

Kerry McNaughton <kerry.mcnaughton@hydro.com>

RE: Friday's Survey

To ☐ Justin Gleeson

Cc ■ Jon Mansfield; ☐ Mark Pollard; ☐ Richard Brown; ☐ Shaun Taylor; ☐ Kirsty Greenfield; ☐ Andrew Walker; ☐ Leanne Pringle

Thanks Justin,

That's the info I've been chasing from Shaun & Andrew McLaren. Mark's advised that smelter bricks and general fill has already been removed on the western side of the silt fence up to its boundary. Don't proceed past this point, even if bricks are apparent on the eastern side of silt fence/track as this is the area that potentially could contain artefacts.

Regards,

Kerry

Kerry McNaughton
Environment Officer/Buffer Zone Supervisor
Hydro Aluminium Kurri Kurri Pty Ltd
PO Box 1
Kurri Kurri NSW 2327
Australia
Direct Phone: +61 2 4937 0667
Mobile: +61 408 863 185
Email: kerry.mcnaughton@hydro.com

From: Justin Gleeson [mailto:justing@enviropacific.com.au]
Sent: Thursday, 6 August 2015 10:06 AM
To: Mark Pollard
Cc: Kerry McNaughton
Subject: FW: Friday's Survey

G'day Mark,

Email thread and photos below as discussed.

Regards,

Justin Gleeson

ENVIROPACIFIC SERVICES

enviropacific.com.au

Start Safe Stay Safe

From: kerry.mcnaughton@hydro.com [mailto:kerry.mcnaughton@hydro.com]
Sent: Monday, 13 April 2015 11:14 AM
To: Justin Gleeson; Prue Perram; mark.pollard@hydro.com; leanne.pringle@hydro.com; Richard.Brown@hydro.com; Andrew.Walker@hydro.com
Subject: Fwd: Friday's Survey

Please be aware of the location of this site. We'll discuss fencing at Wednesday's meeting. Regards, Kerry

Sent from my iPhone

Begin forwarded message:

From: "Shaun Taylor" <staylor@environcorp.com>
Date: 13 April 2015 9:44:29 am AEST
To: "mark.pollard@hydro.com" <mark.pollard@hydro.com>,"kerry.mcnaughton@hydro.com" <kerry.mcnaughton@hydro.com>
Cc: "Andrew.Walker@hydro.com" <Andrew.Walker@hydro.com>,"Richard.Brown@hydro.com" <Richard.Brown@hydro.com>, "leanne.pringle@hydro.com" <leanne.pringle@hydro.com>
Subject: FW: Friday's Survey

Good morning,

Please see the email from Andrew McLaren of AECOM regarding Friday's Aboriginal heritage assessment.

Mark/ Kerry – could you please inform EPS ASAP about the heritage item and that it needs to be isolated and left undisturbed at this time.

Leanne – note that only two Aboriginal stakeholder groups did the fieldwork. I have asked Andrew to confirm which groups attended so you can be aware of who you should be expecting invoices from.

Regards,
Shaun

ENVIRON

Shaun Taylor | Senior Environmental Scientist
ENVIRON Australia
Eastpoint Complex | Suite 19B, Level 2
50 Glebe Road | PO Box 435 | The Junction NSW 2291
T: 02 4962 5444| F: 02 4962 5888 | M: 0408 386 663
staylor@environcorp.com

From: McLaren, Andrew [mailto:Andrew.McLaren@aecom.com]
Sent: Monday, 13 April 2015 9:22 AM
To: Shaun Taylor
Subject: Friday's Survey

Morning Shaun,

Apologies for not touching base on Friday. Day slipped away from me!

The survey went well. In the end, we had two RAP representatives present. As expected, almost all areas were found to be grossly disturbed. However, some limited areas of minimally-to-moderately disturbed terrain were also noted (mostly demarcated by extant vegetation).

One Aboriginal archaeological site was identified during survey: an isolated stone artefact which I have designated as 'Hydro-IA35-15' in line with the previously identified sites on Hydro's property. This was identified on the eastern edge of the light vehicle track that approaches the Clay Borrow Pit area from the NNW (red star on map below and photos). A sediment fence has been installed along the eastern edge of the track and the artefact has obviously been exposed through these works. Given the proximity of Hydro-IA35-15 to current works, it is advisable that the relevant contractors are notified ASAP of the site's existence that this area be fenced off to avoid any inadvertent impacts.

Based on what I saw on Friday, my initial assessment is that an Aboriginal Cultural Heritage Management Plan (ACHMP) is not warranted for the Project. Should the Project require impacts to Hydro-IA35-15, the management of this site could be addressed within our report. In addition, our report would contain a standard protocol for the management of any unanticipated finds.

Happy to discuss the above over the phone.

When you get a chance, could you please provide relevant project layout and impact GIS layers. I'll need these to complete our impact assessment and to finalise associated recommendations. Essentially, I need to know exactly what parts of the Project area will be physically impacted by the Project and in what capacity (i.e., earthworks etc).

Cheers,

Andrew

Dr Andrew McLaren
Archaeologist
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Andrew.McLaren@aecom.com

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APPENDIX E – NATA CERTIFIED ANALYTICAL RESULTS

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 124662

Client:

DLA Environmental Services Pty Ltd (Maitland)
42B Church St
Maitland
NSW 2320

Attention: Stephen Challinor

Sample log in details:

Your Reference:	**DLH1155 - Hydro CBP**
No. of samples:	2 soils
Date samples received / completed instructions received	06/03/15 / 06/03/15

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	13/03/15 / 11/03/15
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil			
Our Reference:	UNITS	124662-1	124662-2
Your Reference	----------	TP ESP 3	TP ESP 3
Depth	----------	2.2	2.5
Date Sampled		05/03/2015	05/03/2015
Type of sample		Soil	Soil
Date extracted	-	09/03/2015	09/03/2015
Date analysed	-	10/03/2015	10/03/2015
TRH C_6 - C_9	mg/kg	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
naphthalene	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	82	88

svTRH (C10-C40) in Soil			
Our Reference:	UNITS	124662-1	124662-2
Your Reference	----------	TP ESP 3	TP ESP 3
Depth	----------	2.2	2.5
Date Sampled		05/03/2015	05/03/2015
Type of sample		Soil	Soil
Date extracted	-	09/03/2015	09/03/2015
Date analysed	-	09/03/2015	09/03/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100
Surrogate o-Terphenyl	%	81	72

Moisture			
Our Reference:	UNITS	124662-1	124662-2
Your Reference	----------	TP ESP 3	TP ESP 3
Depth	----------	2.2	2.5
Date Sampled		05/03/2015	05/03/2015
Type of sample		Soil	Soil
Date prepared	-	9/03/2015	9/03/2015
Date analysed	-	10/03/2015	10/03/2015
Moisture	%	21	17

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/03/2015	[NT]	[NT]	LCS-2	09/03/2015
Date analysed	-			09/03/2015	[NT]	[NT]	LCS-2	09/03/2015
TRHC$_{6}$ - C$_{9}$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-2	109%
TRHC$_{6}$ - C$_{10}$	mg/kg	25	Org-016	<25	[NT]	[NT]	LCS-2	109%
Benzene	mg/kg	0.2	Org-016	<0.2	[NT]	[NT]	LCS-2	109%
Toluene	mg/kg	0.5	Org-016	<0.5	[NT]	[NT]	LCS-2	107%
Ethylbenzene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-2	107%
m+p-xylene	mg/kg	2	Org-016	<2	[NT]	[NT]	LCS-2	110%
o-Xylene	mg/kg	1	Org-016	<1	[NT]	[NT]	LCS-2	109%
naphthalene	mg/kg	1	Org-014	<1	[NT]	[NT]	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	92	[NT]	[NT]	LCS-2	93%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			09/03/2015	[NT]	[NT]	LCS-2	09/03/2015
Date analysed	-			09/03/2015	[NT]	[NT]	LCS-2	09/03/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-2	93%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	100%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	77%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	[NT]	[NT]	LCS-2	93%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	100%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	[NT]	[NT]	LCS-2	77%
Surrogate o-Terphenyl	%		Org-003	81	[NT]	[NT]	LCS-2	91%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref : ASET43345/ 46525 / 1 - 1
Your ref : DLH1155 - Hydro Clay Borrow Pit
NATA Accreditation No: 14484

4 March 2015

DLA Environmental Services Pty Ltd
42B Church Street
Maitland NSW 2320

Attn: Mr David Lane

Dear David

Asbestos Identification
This report presents the results of one sample, forwarded by DLA Environmental Services Pty Ltd on 4 March 2015, for analysis for asbestos.

1.Introduction: One sample forwarded was examined and analysed for the presence of asbestos.

2. Methods : The sample was examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Safer Environment Method 1.)**

3. Results : **Sample No. 1. ASET43345 / 46525 / 1. South-pit - Insulation.**
Approx dimensions 5.0 cm x 5.0 cm x 0.5 cm
The sample consisted of a fibrous mass of synthetic mineral fibres having some covered with bituminous material.
No asbestos detected.

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/Approved Identifier
Approved Signatory

WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

The results contained in this report relate only to the sample submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted samples are representative.

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CERTIFICATE OF ANALYSIS 131590

Client:

DLA Environmental Services Pty Ltd (Maitland)
42B Church St
Maitland
NSW 2320

Attention: Stephen Challinor

Sample log in details:

Your Reference:	**DLH1155 - Hydro CBP**
No. of samples:	2 Soils
Date samples received / completed instructions received	23/07/2015 / 23/07/2015

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	30/07/15 / 30/07/15
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

Acid Extractable metals in soil			
Our Reference:	UNITS	131590-1	131590-2
Your Reference	----------	CBP-Pond-Base	CBP-Hotspot-Base
Date Sampled	----------	22/07/2015	22/07/2015
Type of sample		Soil	Soil
Date digested	-	28/07/2015	28/07/2015
Date analysed	-	28/07/2015	28/07/2015
Cadmium	mg/kg	<0.4	<0.4

Misc Inorg - Soil			
Our Reference:	UNITS	131590-1	131590-2
Your Reference	----------	CBP-Pond-Base	CBP-Hotspot-Base
Date Sampled	----------	22/07/2015	22/07/2015
Type of sample		Soil	Soil
Date prepared	-	27/07/2015	27/07/2015
Date analysed	-	30/07/2015	30/07/2015
Fluoride (1:5 soil:water)	mg/kg	<0.5	21

Moisture			
Our Reference:	UNITS	131590-1	131590-2
Your Reference	----------	CBP-Pond-Base	CBP-Hotspot-Base
Date Sampled	----------	22/07/2015	22/07/2015
Type of sample		Soil	Soil
Date prepared	-	6/07/2015	6/07/2015
Date analysed	-	7/07/2015	7/07/2015
Moisture	%	19	20

Method ID	Methodology Summary
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Inorg-026	Fluoride determined by ion selective electrode (ISE) in accordance with APHA latest edition, 4500-F-C.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			28/07/2015	[NT]	[NT]	LCS-7	28/07/2015
Date analysed	-			28/07/2015	[NT]	[NT]	LCS-7	28/07/2015
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	LCS-7	100%
QUALITY CONTROL Misc Inorg - Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			27/07/2015	[NT]	[NT]	LCS-1	27/07/2015
Date analysed	-			30/07/2015	[NT]	[NT]	LCS-1	30/07/2015
Fluoride (1:5 soil:water)	mg/kg	0.5	Inorg-026	<0.5	[NT]	[NT]	LCS-1	103%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref : ASET43669/ 46849 / 1 - 2
Your ref : DLH1155 - Hydro CBP
NATA Accreditation No: 14484

25 March 2015

DLA Environmental Services Pty Ltd
42B Church Street
Maitland NSW 2320

Attn: Mr David Lane

Dear David

Asbestos Identification
This report presents the results of two samples, forwarded by DLA Environmental Services Pty Ltd on 25 March 2015, for analysis for asbestos.

1.Introduction: Two samples forwarded were examined and analysed for the presence of asbestos.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Safer Environment Method 1 and Australian Standard AS 4964 - 2004).**

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF**(Asbestos Fines), **FA**(Friable Asbestos and **ACM** (Asbestos Containing Material), also satisfying the requirements of the WA/ NEPM Guidelines)

3. Results : **Sample No. 1. ASET43669 / 46849 / 1. Footprint - 1.**
Approx dimensions 10.0 cm x 10.0 cm x 6.0 cm
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 2. ASET43669 / 46849 / 2. Footprint - 2.
Approx dimensions 12.0 cm x 12.0 cm x 4.3 cm
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/Approved Identifier
Approved Signatory

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites

in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service (NATA ISO/IEC17025 AUG 2014).

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported.

ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust and fragments of ACM smaller than 7mm diameter.
*** denotes asbestos detected in ACM in bonded form.**
 # denotes AF.

All samples indicating "No asbestos detected" are assumed to be less than 0.001 % unless the actual approximate weight is given.

The results contained in this report relate only to the sample submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted samples are representative.

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CERTIFICATE OF ANALYSIS 128665

Client:

DLA Environmental Services Pty Ltd (Maitland)
42B Church St
Maitland
NSW 2320

Attention: Stephen Challinor

Sample log in details:

Your Reference:	**DLH1155 - Hydro CBP**
No. of samples:	1 Soil
Date samples received / completed instructions received	28/05/2015 / 28/05/2015

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	4/06/15 / 1/06/15
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	128665-1 UFA-Fines 27/05/2015 Soil
Date extracted	-	29/05/2015
Date analysed	-	29/05/2015
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	0.2
Fluorene	mg/kg	0.1
Phenanthrene	mg/kg	1.8
Anthracene	mg/kg	0.6
Fluoranthene	mg/kg	11
Pyrene	mg/kg	11
Benzo(a)anthracene	mg/kg	12
Chrysene	mg/kg	19
Benzo(b,j+k)fluoranthene	mg/kg	37
Benzo(a)pyrene	mg/kg	11
Indeno(1,2,3-c,d)pyrene	mg/kg	9.0
Dibenzo(a,h)anthracene	mg/kg	1.4
Benzo(g,h,i)perylene	mg/kg	9.0
Benzo(a)pyrene TEQ calc (zero)	mg/kg	18
Benzo(a)pyrene TEQ calc(half)	mg/kg	18
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	18
Total Positive PAHs	mg/kg	120
Surrogate p-Terphenyl-d14	%	104

Moisture		
Our Reference:	UNITS	128665-1
Your Reference	----------	UFA-Fines
Date Sampled	----------	27/05/2015
Type of sample		Soil
Date prepared	-	29/05/2015
Date analysed	-	01/06/2015
Moisture	%	14

Method ID	Methodology Summary
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/05/2015	[NT]	[NT]	LCS-1	29/05/2015
Date analysed	-			29/05/2015	[NT]	[NT]	LCS-1	29/05/2015
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	107%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	113%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	107%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	108%
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	114%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	104%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	[NT]	[NT]	LCS-1	120%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	107	[NT]	[NT]	LCS-1	95%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

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Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

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Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

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CERTIFICATE OF ANALYSIS 128345

Client:

DLA Environmental Services Pty Ltd (Maitland)
42B Church St
Maitland
NSW 2320

Attention: Stephen Challinor

Sample log in details:

Your Reference:	**DLH1155-Hydro CBP**
No. of samples:	12 Soils
Date samples received / completed instructions received	22/05/2015 / 22/05/2015

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	29/05/15 / 27/05/15
Date of Preliminary Report:	Not Issued

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Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	128345-1	128345-2	128345-3	128345-4	128345-5
Your Reference	----------	PIT1-NW1	PIT1-NW2	PIT1-SW1	PIT1-SW2	PIT1-WW1
Depth	----------	1-2	2-4	1-2	2-4	1-2
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	91	92	94	94

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	128345-6	128345-7	128345-8	128345-9	128345-10
Your Reference	----------	PIT1-WW2	PIT1-EW1	PIT1-EW2	PIT1-EW3	PIT1-BASE-SW
Depth	----------	2-4	1	2	3	4
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	89	87	91	91

vTRH(C6-C10)/BTEXN in Soil			
Our Reference:	UNITS	128345-11	128345-12
Your Reference	----------	PIT1-BASE-NW	PIT1-BASE-NWA
Depth	----------	4	4
Date Sampled		20/05/2015	20/05/2015
Type of sample		Soil	Soil
Date extracted	-	25/05/2015	25/05/2015
Date analysed	-	25/05/2015	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
naphthalene	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	86	91

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	128345-1	128345-2	128345-3	128345-4	128345-5
Your Reference	----------	PIT1-NW1	PIT1-NW2	PIT1-SW1	PIT1-SW2	PIT1-WW1
Depth	----------	1-2	2-4	1-2	2-4	1-2
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	25/05/2015	25/05/2015	26/05/2015	26/05/2015	26/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	68	70	84	76	77

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	128345-6	128345-7	128345-8	128345-9	128345-10
Your Reference	----------	PIT1-WW2	PIT1-EW1	PIT1-EW2	PIT1-EW3	PIT1-BASE-SW
Depth	----------	2-4	1	2	3	4
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	78	79	82	82	82

svTRH (C10-C40) in Soil			
Our Reference:	UNITS	128345-11	128345-12
Your Reference	----------	PIT1-BASE-NW	PIT1-BASE-NWA
Depth	----------	4	4
Date Sampled		20/05/2015	20/05/2015
Type of sample		Soil	Soil
Date extracted	-	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100
Surrogate o-Terphenyl	%	79	74

Acid Extractable metals in soil						
Our Reference:	UNITS	128345-1	128345-2	128345-3	128345-4	128345-5
Your Reference	----------	PIT1-NW1	PIT1-NW2	PIT1-SW1	PIT1-SW2	PIT1-WW1
Depth	----------	1-2	2-4	1-2	2-4	1-2
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	8	8	8	11	9
Copper	mg/kg	4	5	5	7	3
Lead	mg/kg	7	8	24	7	43
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	2	2	2	3
Zinc	mg/kg	13	12	19	19	13

Acid Extractable metals in soil						
Our Reference:	UNITS	128345-6	128345-7	128345-8	128345-9	128345-10
Your Reference	----------	PIT1-WW2	PIT1-EW1	PIT1-EW2	PIT1-EW3	PIT1-BASE-SW
Depth	----------	2-4	1	2	3	4
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Arsenic	mg/kg	18	5	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	13	7	6	8
Copper	mg/kg	6	5	4	6	7
Lead	mg/kg	6	32	14	5	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.5
Nickel	mg/kg	3	2	1	2	2
Zinc	mg/kg	18	11	8	12	19

Acid Extractable metals in soil			
Our Reference:	UNITS	128345-11	128345-12
Your Reference	----------	PIT1-BASE-NW	PIT1-BASE-NWA
Depth	----------	4	4
Date Sampled		20/05/2015	20/05/2015
Type of sample		Soil	Soil
Date digested	-	26/05/2015	26/05/2015
Date analysed	-	26/05/2015	26/05/2015
Arsenic	mg/kg	5	8
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	12	19
Copper	mg/kg	8	18
Lead	mg/kg	15	14
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	4	7
Zinc	mg/kg	63	110

Moisture						
Our Reference:	UNITS	128345-1	128345-2	128345-3	128345-4	128345-5
Your Reference	----------	PIT1-NW1	PIT1-NW2	PIT1-SW1	PIT1-SW2	PIT1-WW1
Depth	----------	1-2	2-4	1-2	2-4	1-2
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Moisture	%	16	16	16	17	16

Moisture						
Our Reference:	UNITS	128345-6	128345-7	128345-8	128345-9	128345-10
Your Reference	----------	PIT1-WW2	PIT1-EW1	PIT1-EW2	PIT1-EW3	PIT1-BASE-SW
Depth	----------	2-4	1	2	3	4
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Moisture	%	12	20	14	16	16

Moisture			
Our Reference:	UNITS	128345-11	128345-12
Your Reference	----------	PIT1-BASE-NW	PIT1-BASE-NWA
Depth	----------	4	4
Date Sampled		20/05/2015	20/05/2015
Type of sample		Soil	Soil
Date prepared	-	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015
Moisture	%	13	16

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/05/2015	128345-1	25/05/2015 || 25/05/2015	LCS-8	25/05/2015
Date analysed	-			25/05/2015	128345-1	25/05/2015 || 25/05/2015	LCS-8	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	128345-1	<25 || <25	LCS-8	117%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	128345-1	<25 || <25	LCS-8	117%
Benzene	mg/kg	0.2	Org-016	<0.2	128345-1	<0.2 || <0.2	LCS-8	103%
Toluene	mg/kg	0.5	Org-016	<0.5	128345-1	<0.5 || <0.5	LCS-8	127%
Ethylbenzene	mg/kg	1	Org-016	<1	128345-1	<1 || <1	LCS-8	115%
m+p-xylene	mg/kg	2	Org-016	<2	128345-1	<2 || <2	LCS-8	119%
o-Xylene	mg/kg	1	Org-016	<1	128345-1	<1 || <1	LCS-8	115%
naphthalene	mg/kg	1	Org-014	<1	128345-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	96	128345-1	93 || 86 || RPD: 8	LCS-8	96%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/05/2015	128345-1	25/05/2015 || 25/05/2015	LCS-8	25/05/2015
Date analysed	-			25/05/2015	128345-1	25/05/2015 || 25/05/2015	LCS-8	25/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	128345-1	<50 || <50	LCS-8	108%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	128345-1	<100 || <100	LCS-8	109%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	128345-1	<100 || <100	LCS-8	106%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	128345-1	<50 || <50	LCS-8	108%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	128345-1	<100 || <100	LCS-8	109%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	128345-1	<100 || <100	LCS-8	106%
Surrogate o-Terphenyl	%		Org-003	75	128345-1	68 || 91 || RPD: 29	LCS-8	103%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			26/05/2015	128345-1	26/05/2015 || 26/05/2015	LCS-1	26/05/2015
Date analysed	-			26/05/2015	128345-1	26/05/2015 || 26/05/2015	LCS-1	26/05/2015
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	128345-1	<4 || 4	LCS-1	109%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	128345-1	<0.4 || <0.4	LCS-1	101%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	8 || 11 || RPD: 32	LCS-1	104%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	4 || 4 || RPD: 0	LCS-1	101%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	7 || 8 || RPD: 13	LCS-1	100%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	128345-1	<0.1 || <0.1	LCS-1	95%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	2 || 2 || RPD: 0	LCS-1	100%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	13 || 14 || RPD: 7	LCS-1	102%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	128345-11	25/05/2015 || 25/05/2015	128345-2	25/05/2015
Date analysed	-	128345-11	25/05/2015 || 25/05/2015	128345-2	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	128345-11	<25 || <25	128345-2	113%
TRHC$_6$ - C$_{10}$	mg/kg	128345-11	<25 || <25	128345-2	113%
Benzene	mg/kg	128345-11	<0.2 || <0.2	128345-2	101%
Toluene	mg/kg	128345-11	<0.5 || <0.5	128345-2	122%
Ethylbenzene	mg/kg	128345-11	<1 || <1	128345-2	111%
m+p-xylene	mg/kg	128345-11	<2 || <2	128345-2	115%
o-Xylene	mg/kg	128345-11	<1 || <1	128345-2	111%
naphthalene	mg/kg	128345-11	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	128345-11	86 || 94 || RPD: 9	128345-2	88%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	128345-11	25/05/2015 || 25/05/2015	128345-2	25/05/2015
Date analysed	-	128345-11	26/05/2015 || 26/05/2015	128345-2	25/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	128345-11	<50 || <50	128345-2	104%
TRHC$_{15}$ - C$_{28}$	mg/kg	128345-11	<100 || <100	128345-2	101%
TRHC$_{29}$ - C$_{36}$	mg/kg	128345-11	<100 || <100	128345-2	91%
TRH>C$_{10}$-C$_{16}$	mg/kg	128345-11	<50 || <50	128345-2	104%
TRH>C$_{16}$-C$_{34}$	mg/kg	128345-11	<100 || <100	128345-2	101%
TRH>C$_{34}$-C$_{40}$	mg/kg	128345-11	<100 || <100	128345-2	91%
Surrogate o-Terphenyl	%	128345-11	79 || 78 || RPD: 1	128345-2	104%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	128345-11	26/05/2015 || 26/05/2015	128345-2	26/05/2015
Date analysed	-	128345-11	26/05/2015 || 26/05/2015	128345-2	26/05/2015
Arsenic	mg/kg	128345-11	5 || 7 || RPD: 33	128345-2	87%
Cadmium	mg/kg	128345-11	<0.4 || <0.4	128345-2	97%
Chromium	mg/kg	128345-11	12 || 18 || RPD: 40	128345-2	100%
Copper	mg/kg	128345-11	8 || 10 || RPD: 22	128345-2	96%
Lead	mg/kg	128345-11	15 || 13 || RPD: 14	128345-2	94%
Mercury	mg/kg	128345-11	<0.1 || 0.2	128345-2	108%
Nickel	mg/kg	128345-11	4 || 5 || RPD: 22	128345-2	92%

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QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Zinc	mg/kg	128345-11	63 || 62 || RPD: 2	128345-2	94%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref : ASET43437/ 46617 / 1 - 6
Your ref : DLH 1155 – Hydro CBP
NATA Accreditation No: 14484

9 March 2015

DLA Environmental Services Pty Ltd
2B/30 Leighton Street
Hornsby NSW 2077

Accredited for compliance with ISO/IEC 17025.

Attn: Mr David Lane

Dear David

Asbestos Identification
This report presents the results of six samples, forwarded by DLA Environmental Services Pty Ltd on 9 March 2015, for analysis for asbestos.

1.Introduction: Six samples forwarded were examined and analysed for the presence of asbestos.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Safer Environment Method 1 and Australian Standard AS 4964 - 2004).**

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF**(Asbestos Fines), **FA**(Friable Asbestos and **ACM** (Asbestos Containing Material), also satisfying the requirements of the WA/ NEPM Guidelines)

3. Results :

Sample No. 1. ASET43437 / 46617 / 1. Well 1 - NW.
Approx dimensions 12.0 cm x 11.0 cm x 6.0 cm
Approx total weight of sample = 918.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 2. ASET43437 / 46617 / 2. Well 1 - EW.
Approx dimensions 12.0 cm x 11.0 cm x 6.2 cm
Approx total weight of sample = 1050.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 3. ASET43437 / 46617 / 3. Well 1 - SW.
Approx dimensions 12.0 cm x 12.0 cm x 6.0 cm
Approx total weight of sample = 938.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 4. ASET43437 / 46617 / 4. Well 1 - WW.
Approx dimensions 13.0 cm x 12.0 cm x 5.7 cm
Approx total weight of sample = 1100.0g
The sample consisted of a mixture of sandy soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 5. ASET43437 / 46617 / 5. Well 1 - Base.
Approx dimensions 13.0 cm x 12.0 cm x 5.9 cm
Approx total weight of sample = 1078.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 6. ASET43437 / 46617 / 6. Well 1.
Approx dimensions 10.0 cm x 6.7 cm x 0.2 cm
The sample consisted of a fragment of a fibre cement material.
Chrysotile asbestos and Amosite asbestos detected.

Analysed and reported by,

Chamath Annakkage. BSc
Environmental Technician/Approved Identifier

Mahen De Silva. BSc, MSc, Grad Dip (Occ Hyg)
Occupational Hygienist / Approved Signatory

Accredited for compliance with ISO/IEC 17025.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service (NATA ISO/IEC17025 AUG 2014).

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported.

ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust and fragments of ACM smaller than 7mm diameter.
*** denotes asbestos detected in ACM in bonded form.**
 # denotes AF.

All samples indicating "No asbestos detected" are assumed to be less than 0.001 % unless the actual approximate weight is given.

The results contained in this report relate only to the samples submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted sample is representative.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref: ASET43548/ 46728 / 1 - 4
Your ref: DLH1155 – Hydro
NATA Accreditation No: 14484

17 March 2015

DLA Environmental Services
42B Church Street
Maitland NSW 2320

Attn: Mr David Lane

1. Introduction:

This report presents the results of four control air monitoring samples forwarded for analysis by DLA Environmental Services on 17 March 2015.

2. Methods:

In accordance with the Worksafe Australia Guidance Notes on Membrane Filter Method on estimating air borne asbestos fibres- Second Edition – NOHSC – 3003 (2005) and **(Safer Environment Method 2).**

3. Results:

Location	**Fibres/ 100 Fields**
13/3/2015	
1- ASET43548/ 46728 / 1 – 222	**0.5 / 100**
2- ASET43548/ 46728 / 2 – Cowl 7	**2.0 / 100**
3- ASET43548/ 46728 / 3 – C20	**1.0 / 100**
4- ASET43548/ 46728 / 4 – Green 1	**3.0 / 100**

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/ Approved Counter Approved Signatory

WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref: ASET43615/ 46795 / 1 - 2
Your ref: DLH1155 - Hydro CBP
NATA Accreditation No: 14484

23 March 2015

DLA Environmental Services Pty Ltd
3/38 Leighton Street
Hornsby NSW 2077

Attn: Mr David Lane

Dear David

Asbestos Identification
This report presents the results of two samples, forwarded by DLA Environmental Services Pty Ltd on 20 March 2015, for analysis for asbestos.

1.Introduction: Two samples forwarded were examined and analysed for the presence of asbestos.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Safer Environment Method 1 and Australian Standard AS 4964 - 2004).**

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF**(Asbestos Fines), **FA**(Friable Asbestos and **ACM** (Asbestos Containing Material), also satisfying the requirements of the WA/ NEPM Guidelines)

3. Results : **Sample No. 1. ASET43615 / 46795 / 1. Well 2.**
Approx dimensions 12.0 cm x 12.0 cm x 4.5 cm
Approximate total weight of soil = 814.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 2. ASET43615 / 46795 / 2. Well 2 - Area.
Approx dimensions 10.0 cm x 10.0 cm x 5.5 cm
Approximate total weight of soil = 675.0g
The sample consisted of a mixture of clayish soil, stones, plant matter, corroded metal and fragments of plaster.
No asbestos detected.

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/Approved Identifier
Approved Signatory

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites

in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service (NATA ISO/IEC17025 AUG 2014).

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported.

ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust and fragments of ACM smaller than 7mm diameter.
*** denotes asbestos detected in ACM in bonded form.**
 # denotes AF.

All samples indicating "No asbestos detected" are assumed to be less than 0.001 % unless the actual approximate weight is given.

The results contained in this report relate only to the sample submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted samples are representative.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref: ASET43616/ 46796/ 1 - 4
Your ref: DLH1155 – Hydro CBP
NATA Accreditation No: 14484

20 March 2015

DLA Environmental Services
42B Church Street
Maitland NSW 2320

Attn: Mr David Lane

1. Introduction:

This report presents the results of four control air monitoring samples forwarded for analysis by DLA Environmental Services on 20 March 2015.

2. Methods:

In accordance with the Worksafe Australia Guidance Notes on Membrane Filter Method on estimating air borne asbestos fibres- Second Edition – NOHSC – 3003 (2005) and **(Safer Environment Method 2).**

3. Results:

Location 19/3/2015	Fibres/ 100 Fields
1- ASET43616/ 46796/ 1 – Bolton	**1.0 / 100**
2- ASET43616/ 46796/ 2 – J1	**2.0 / 100**
3- ASET43616/ 46796/ 3 – Cowl 1	**1.5 / 100**
4- ASET43616/ 46796/ 4 – A92	**2.0 / 100**

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/ Approved Counter Approved Signatory

WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

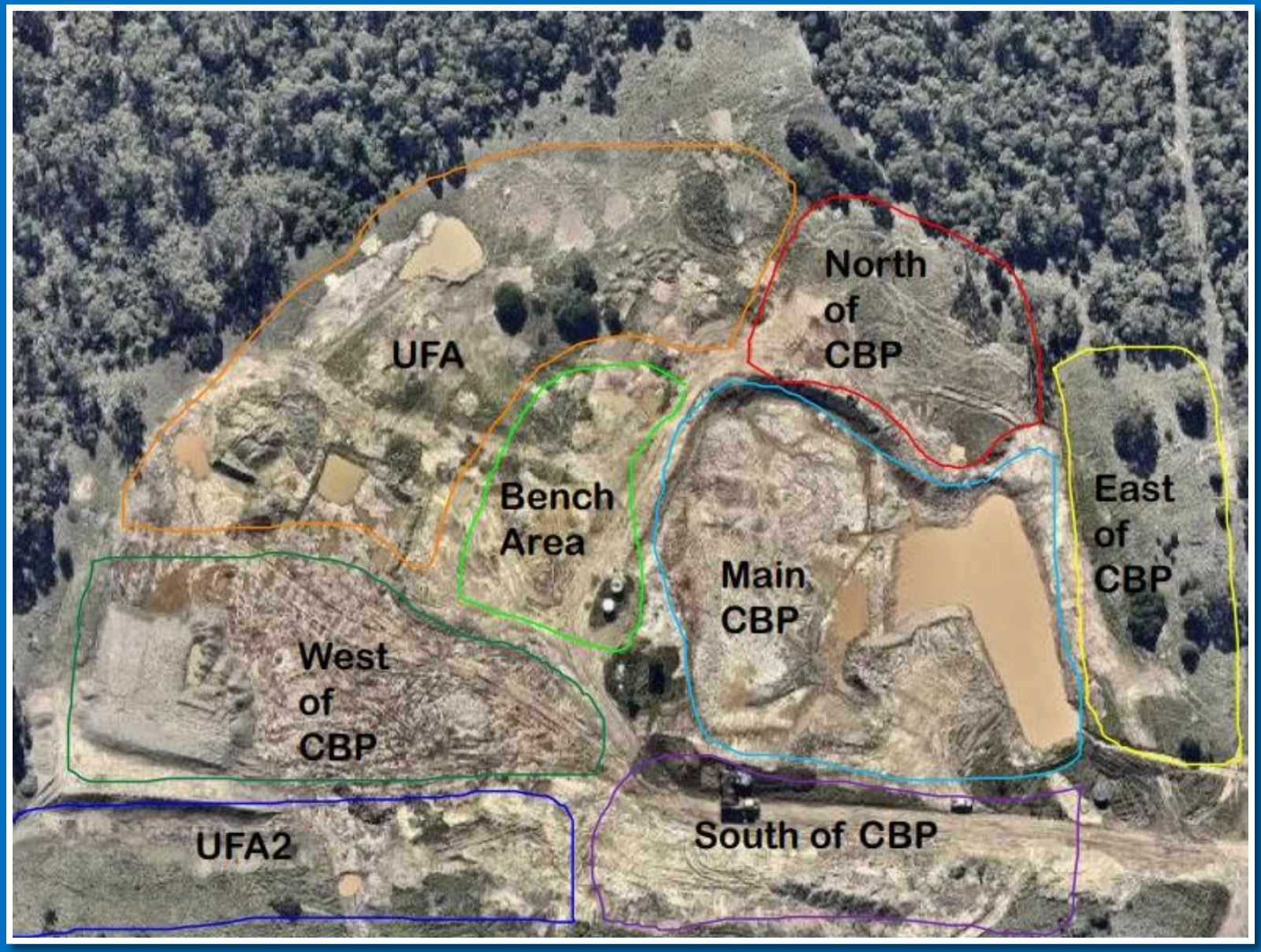
APPENDIX F – CBP HISTORICAL PHOTOS GALLERY

HYDRO ALUMINIUM KURRI KURRI CLAY BORROW PIT - DLH1155

Historical Photos Comparison

Photo Gallery

DLA Environmental Services



CBP Areas Map

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AERIAL VIEW

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HYDRO ALUMINIUM

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HYDRO ALUMINIUM

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CLAY BORROW PIT AREA

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HYDRO ALUMINIUM

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HYDRO ALUMINIUM

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- Latitude: -32 ° 47 ' 6.30782 " Longitude: 151 ° 28 ' 19.83491 "

HYDRO ALUMINIUM

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HYDRO ALUMINIUM

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A Pacific Environment company

HYDRO ALUMINIUM

DLA Environmental Services
A Pacific Environment company

- Latitude: -32 ° 47 ' 6.30782 " Longitude: 151 ° 28 ' 19.83491 "

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- Latitude: -32 ° 47 ' 6.30782 " Longitude: 151 ° 28 ' 19.83491 "

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- Latitude: -32 ° 47 ' 6.30782 " Longitude: 151 ° 28 ' 19.83491 "

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UNEXPECTED FINDS AREA

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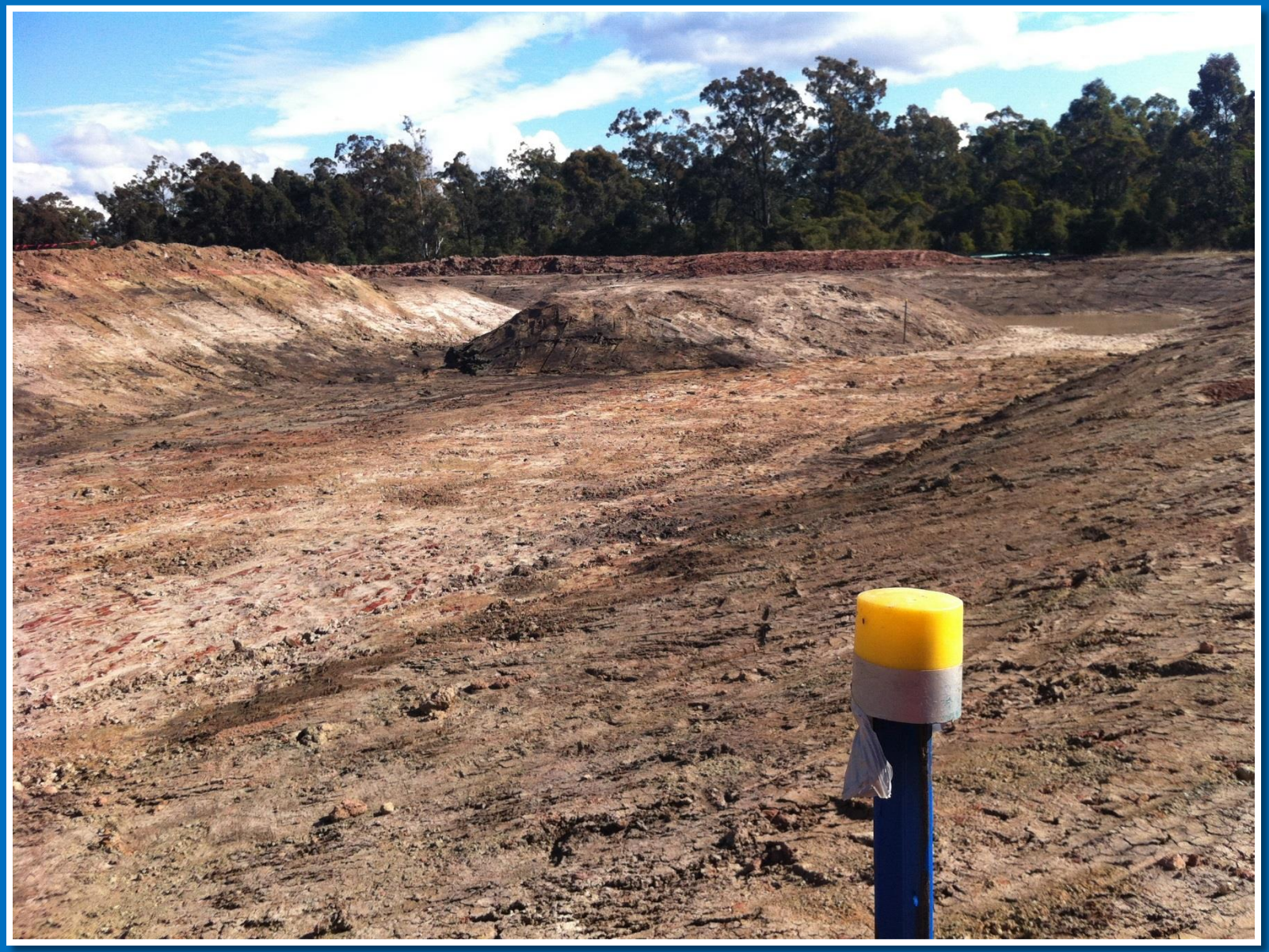

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APPENDIX G – UNEXPECTED FINDS AND HOTSPOT PHOTO GALLERY

HYDRO ALUMINIUM KURRI KURRI CLAY BORROW PIT - DLH1155

Hotspot Photo Gallery

January-September 2015

DLA Environmental Services

GALLERY INSTRUCTIONS

- A total of eight areas containing Potential Contaminants of Concern (PCoC's) required backfilling during works to facilitate the remediation of the Clay Borrow Pit area at Hydro Aluminium Kurri Kurri.
- The following gallery demonstrates the clean base and walls of these particular hotspot areas.
- All other areas identified as hotspots within the validation report were excavated to, and remain as, a natural clay base.
- The following map highlights areas that previously contained chemical contamination in yellow and asbestos contamination in green.

CBP Hotspot Areas Map

SYNTHETIC MINERAL FIBRES FIND

03/03/2015

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WELL 1

06/03/2015

DLA Environmental Services
A Pacific Environment company

WELL 1

06/03/2015

DLA Environmental Services
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WELL 2

19/03/2015

DLA Environmental Services
A Pacific Environment company

WELL 2

19/03/2015

CBP ASBESTOS FIND

13/04/2015

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CBP ASBESTOS FIND

13/04/2015 – 15/04/2015

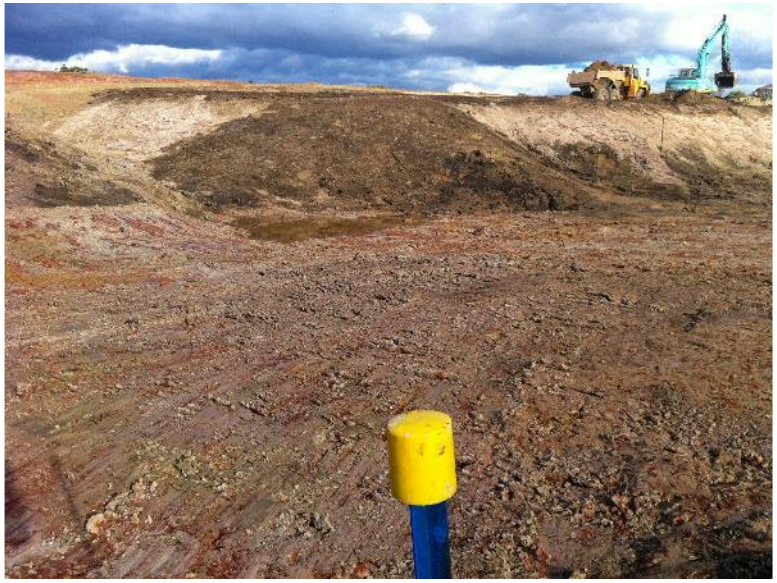
DLA Environmental Services
A Pacific Environment company

UFA PACKING COKE FIND

27/05/2015

DLA Environmental Services
A Pacific Environment company

UFA PACKING COKE FIND



05/06/2015

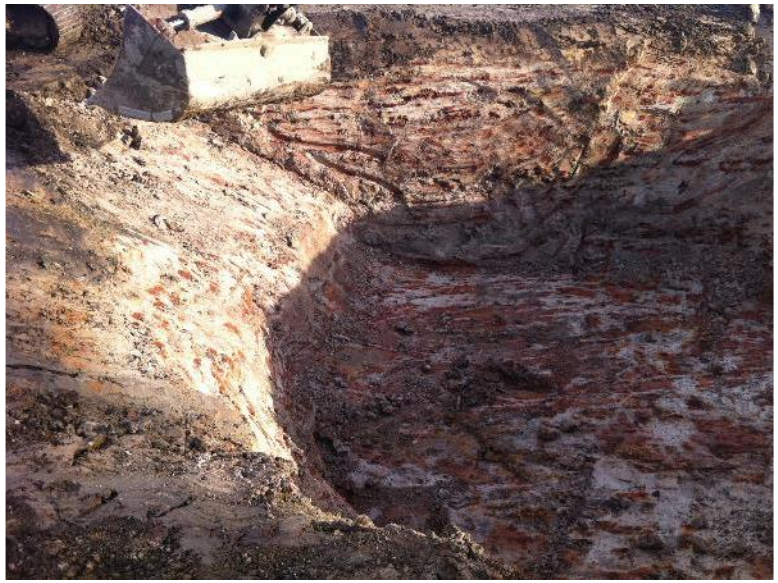
DLA Environmental Services
A Pacific Environment company

AUTOMOTIVE WASTE FIND

20/05/2015

DLA Environmental Services
A Pacific Environment company

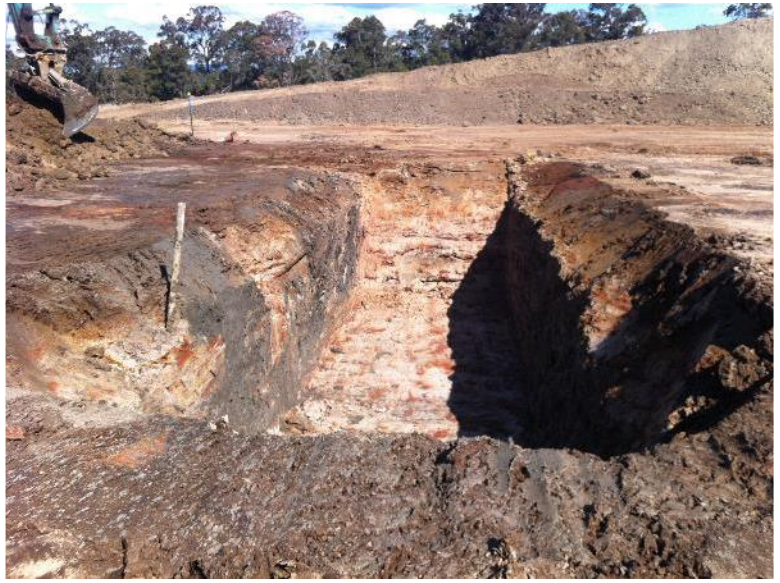
AUTOMOTIVE WASTE FIND



20/05/2015

DLA Environmental Services
A Plastic Environment company

POTROOM CONCRETE PIT



29/07/2015

DLA Environmental Services
A Pacific Environment company

POTROOM CONCRETE PIT

29/07/2015

DLA Environmental Services
A Pacific Environment company

BENCH PACKING COKE PITS

28/07/2015

DLA Environmental Services
A Pacific Environment company

BENCH PACKING COKE PITS

03/08/2015

DLA Environmental Services
A Pacific Environment company

APPENDIX H – DATA SUMMARY TABLE

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A Pacific Environment company

						NEPM (Nov 2013) Comm /ind Land Use Criteria (mg/kg)	Type	HSL-1, ESL 75	HSL-N, ESL 135	HSL-N, ESL 165	HSL-D, ESL 180	NL	C6-C 20 HSL: 260, ESL 215, ML: 700	<C10-C16 HSL-N, ESL: 170, ML: 1,000	<C16-C34 HSL-N, ESL: 1700, ML: 5,000	<C34-C40 HSL-N, ESL: 3,300, ML: 10000	HIL 40, ESL 1.4	4,000	DDT+DDD+DDE 3,600	Aldrin dieldrin 40	Chlordane 320	Endosulfan 2,000	Endrin 320	Hep bachlor 50	HCB 80	Methoxychlor 2,500	7	3,000	900	3,600	240000	1,500	720	6,000	400000	
								BTEX - Sandy soils					TRH - Sandy soils				PAH	PAH	Pesticides										Heavy Metals							
Sample ID	Depth (m)	Date	Chemical Report	Soil Description	Comment			Benz	Toluen	EthylBe	Xylene	Naph	F1	F2	F3	F4	BaP TEQ	Total	OC								OP	PCB	As	Cd	Cr VI	Cu	Pb	Hg	Ni	Zn	Fl
TP ESP 3	2.2	5/03/2015	124662	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100																			
TP ESP 3	2.5	5/03/2015	124662	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100																			
PIT1-NW1	1.50	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													<4	<0.4	8	4	7	<0.1	2	13	
PIT1-NW2	3.00	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													<4	<0.4	8	5	8	<0.1	2	12	
PIT1-SW1	1.50	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													<4	<0.4	8	5	24	<0.1	2	19	
PIT1-SW2	3.00	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													<4	<0.4	11	7	7	<0.1	2	19	
PIT1-WW1	1.50	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													<4	<0.4	9	3	43	<0.1	3	13	
PIT1-WW2	3.00	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													18	<0.4	11	6	6	<0.1	3	18	
PIT1-EW1	1.00	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													5	<0.4	13	5	32	<0.1	2	11	
PIT1-EW2	2.00	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													<4	<0.4	7	4	14	<0.1	1	8	
PIT1-EW3	3.00	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													<4	<0.4	6	6	5	<0.1	2	12	
PIT1-BASE-SW	4.00	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													<4	<0.4	8	7	10	0.5	2	19	
PIT1-BASE-NW	4.00	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													5	<0.4	12	8	15	<0.1	4	63	
PIT1-BASE-NWA	4.00	20/05/2015	128345	Soil				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100													8	<0.4	19	18	14	<0.1	7	110	
UFA-Fines	2.00	27/05/2015	128665	Soil													18	120																	
CBP-Pond-Base		22/07/2015	131590	Soil																									<0.4						<0.5
CBP-Hotspot-Base		22/07/2015	131590	Soil																									<0.4						21
INTRA-LABORATORY DUPLICATES																																			
INTER-LABORATORY DUPLICATES																																			
STATISTICAL ANALYSIS																																			
Min							-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	6.0	3.0	5.0	0.5	1.0	8.0	
Max							-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	0.0	19.0	18.0	43.0	0.5	7.0	110.0	
Avg							-	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	18.0	120.0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	9.0	#DIV/0!	10.0	6.5	15.4	0.5	2.7	26.4	
Stdev							-	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	6.2	#DIV/0!	3.5	3.9	11.8	#DIV/0!	1.6	30.0	
95% UCL							-																												

* Depth relates to Depth Below Surface Level | -- Not Tested | nd = Not Detected Above Laboratory LOR | NL = Not Limiting | **Bold** = Detected Above Laboratory LOR | RED = Exceeds HIL Criteria | * Depth relates to Depth Below Surface Level | -- Not Tested | nd = Not Detected Above Laboratory LOR | NL = Not Limi | **Bold** = Detected Above Laboratory LOR

APPENDIX I – ASBESTOS CLEARANCE CERTIFICATES

Sydney
Unit 2B 30 Leighton Place
Hornsby NSW 2077
Phone: 9476 1765
Fax: 9476 1557
Email: sydney@dlaenvironmental.com.au

Maitland
42B Church Street
Maitland NSW 2320
Phone: 4933 0001
Email: hunter@dlaenvironmental.com.au

30th September 2015

DLH1164_H00604

Mrs. Leanne Pringle
Hydro Aluminium Kurri Kurri Pty Ltd
Hart Road
Loxford NSW 2326

Subject to legal privilege and confidential – prepared at the request of legal counsel

Re: Asbestos Clearance – Asbestos Containing Material Removal, Well 1, Well 2, CBP Asbestos Find, South of CBP Mineral Fibres Find and Asbestos Stockpile Footprint, Clay Borrow Pit Area, Hydro Aluminium Kurri Kurri, Hart Road, Loxford, NSW, 2326.

DLA Environmental Services (DLA) was commissioned by Mrs Leanne Pringle of Hydro Aluminium to undertake an asbestos clearance following the removal of Asbestos Containing Material (ACM) from the Clay Borrow Pit (CBP) area at Hydro Aluminium Kurri Kurri, Hart Road, Loxford, NSW, 2326. Following visual identification during the excavation of the CBP area DLA outlined number of areas containing asbestos fibres to be present within the CBP area. Fibres are thought to originate from either building materials buried on the Site or from the old homestead previously situated on the Site. The primary objective of this letter is to provide an asbestos clearance to the identified locations to facilitate the future land use of the CBP area following their removal. The removal of all ACM was undertaken in accordance with *How to Safely Remove Asbestos Code of Practice* (Safe Work Australia, *SWA* 2011).

The Asbestos Clearance Investigation included five areas:

- Visual Asbestos Clearance Inspections
  - Inspection to confirm decontamination and removal of all potentially ACM, undertaken on the 3rd, 16th, 19th March and 16th April 2015.
- Asbestos Clearance Soil Sampling
  - Soil sampling to confirm visual inspection results, undertaken on 3rd, 6th 16th and 19th March 2015.

— Airborne Asbestos Monitoring
  - Conducted during works on 11th and 19th March 2015 and 16th April 2015.

1.0 CLEARANCE METHODOLOGY

Outlined below are the Asbestos Clearance Certification procedures and methodology as utilised by DLA following the completion of asbestos removal works. The procedures used were formulated from methods outlined in Section 3.10 "Clearance Inspection" in the *How to Safely Remove Asbestos Code of Practice* (Safe Work Australia, *SWA* 2011). These included Visual Inspections and Soil Sampling by Licensed Asbestos Assessor and Airborne Fibre Monitoring. The clearance certificate has been completed in accordance with the requirements of Clause 474 of the *NSW Health and Safety Regulation* 2011. Works were performed by appropriately qualified personnel of a Class A licensed Asbestos Removalist.

Visual Asbestos Clearance Inspection

All five areas were visually inspected to ensure the removal of ACM from the Site. The visual inspections were carried out in accordance with Section 3.10 of the *How to Safely Remove Asbestos Code of Practice* issued by Safe Work Australia and Clause 473 of the *NSW Work Health and Safety Regulation 2011.*

Airborne Asbestos Monitoring

Airborne asbestos exposure monitoring has been conducted by DLA prior to and during all potentially asbestos disturbing works within the CBP area. All monitoring and analysis was conducted in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].*

The method states that a sample is to be collected by drawing a measured quantity of air through a membrane filter by means of a sampling pump. The filter is later transformed from an opaque membrane into a transparent, optically homogeneous specimen. The respirable fibres are then sized and counted in accordance with defined geometric criteria, using a phase contrast microscope and calibrated eyepiece graticule. The result is expressed as fibres per millilitre of air, calculated from the number of fibres observed on a known area of the filter and the volume of air sampled. *[NOHSC:3003(2005)].*

"For exposure monitoring, in the absence of other technically convincing information, all particles complying with the defined geometric conditions are to be considered as respirable fibres and counted as such, thereby ensuring that under-estimates of asbestos exposure are minimised." *[NOHSC:3003(2005)].*

"It must also be recognised that the use of the MFM has limitations when applied to monitoring samples containing plate-like or acicular particles (e.g. vermiculite, talc, gypsum and certain other minerals and fibres), and consequently should not be implemented without a full qualitative understanding of the sampling environment." *[NOHSC:3003(2005)].*

"Clearance monitoring should be undertaken by a competent person who is independent from the person responsible for the removal work, after cleaning has been completed and the area dried, to check that fibre levels are below 0.01 fibres/mL. The removal work should not be considered completed until an airborne fibre level of less than 0.01 fibres/mL has been achieved, as determined by the clearance monitoring." *[NOHSC:2002(2005)].*

Monitoring occurred at the area of excavation and the Stockpile Staging area, with all monitoring indicating satisfactory results.

2.0 RESULTS

Clearance validation is based upon the CBP area being free of all potentially asbestos impacted dusts and airborne asbestos levels being <0.01 fibres/ml.

Airborne Asbestos

All exposure monitoring results are satisfactory and indicative of background concentrations, no risk to human health or the environment can be inferred. Asbestos Air Monitoring was conducted during all potentially asbestos disturbing works on 11th and 19th March 2015 and 16th April 2015.

Refer to **Appendix B** – *Asbestos Air Monitoring Reports*

Visual Inspections

Visual inspection of five areas were undertaken daily at the end of decontamination works. each day starting on 13th July 2015. All items were assessed to have been satisfactorily decontaminated with no visual potentially asbestos containing dusts remaining. The equipment and tools were then placed in

sealed 2µm thick plastic bags and/or in a sealed section of the encapsulation unit until the clearance results were finalised.

Asbestos Soil Sampling

Following the visual inspection, soil samples were collected from Well 1, Well 2, South of CBP Synthetic Mineral Fibres Find and the Asbestos Stockpile footprint as representative samples. All soil samples reported no presence of asbestos fibres, confirming the results of the visual inspection. One Fragment, Well 1, returned a detection for asbestos. Refer to Table 1 for Soils results.

Table 1: Soil Sampling Results

Sample Identification	Sampled Items	Asbestos Analysis
Well 1- EW	Soil	Absent
Well 1- SW	Soil	Absent
Well 1- WW	Soil	Absent
Well 1- NW	Soil	Absent
Well 1- Base	Soil	Absent
Well 1	Fragment	Present
Well 2	Soil	Absent
Well 2- Area	Soil	Absent
South Pit - Insulation	Fibres	Absent
Footprint- 1	Soil	Absent
Footprint- 2	Soil	Absent

Refer to **Appendix A** – *NATA Accredited Laboratory Results*

3.0 CONCLUSION

Visual inspection and laboratory analysis of soil samples has found Well 1, Well 2, South of CBP Synthetic Mineral Fibres Find, Asbestos Stockpile Footprint and CBP Asbestos Find to have been successfully decontaminated. All air monitoring results were less than 0.01 fibres/mL in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].* It is therefore considered that Well 1, Well 2, South of CBP Synthetic Mineral Fibres Find, Asbestos Stockpile Footprint and CBP Asbestos Find have been remediated in a safe and effective manner in accordance with *How to Safely Remove Asbestos Code of Practice* (Safe

Work Australia, *SWA* 2011). The CBP area is now considered to be suitable for its use in the Hydro Aluminium 'whole of site' remediation strategy.

Yours faithfully,

DLA Environmental Services

Stephen Challinor
Hunter Region Manager
Licensed Asbestos Assessor LAA001119

Appendix A

NATA Accredited Laboratory Results

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref: ASET43615/ 46795 / 1 - 2
Your ref: DLH1155 - Hydro CBP
NATA Accreditation No: 14484

23 March 2015

DLA Environmental Services Pty Ltd
3/38 Leighton Street
Hornsby NSW 2077

Attn: Mr David Lane

Dear David

Asbestos Identification
This report presents the results of two samples, forwarded by DLA Environmental Services Pty Ltd on 20 March 2015, for analysis for asbestos.

1.Introduction: Two samples forwarded were examined and analysed for the presence of asbestos.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Safer Environment Method 1 and Australian Standard AS 4964 - 2004).**

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF**(Asbestos Fines), **FA**(Friable Asbestos and **ACM** (Asbestos Containing Material), also satisfying the requirements of the WA/ NEPM Guidelines)

3. Results : **Sample No. 1. ASET43615 / 46795 / 1. Well 2.**
Approx dimensions 12.0 cm x 12.0 cm x 4.5 cm
Approximate total weight of soil = 814.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 2. ASET43615 / 46795 / 2. Well 2 - Area.
Approx dimensions 10.0 cm x 10.0 cm x 5.5 cm
Approximate total weight of soil = 675.0g
The sample consisted of a mixture of clayish soil, stones, plant matter, corroded metal and fragments of plaster.
No asbestos detected.

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/Approved Identifier
Approved Signatory

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites

in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service (NATA ISO/IEC17025 AUG 2014).

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported.

ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust and fragments of ACM smaller than 7mm diameter.
*** denotes asbestos detected in ACM in bonded form.**
 # denotes AF.

All samples indicating "No asbestos detected" are assumed to be less than 0.001 % unless the actual approximate weight is given.

The results contained in this report relate only to the sample submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted samples are representative.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref : ASET43345/ 46525 / 1 - 1
Your ref : DLH1155 - Hydro Clay Borrow Pit
NATA Accreditation No: 14484

4 March 2015

DLA Environmental Services Pty Ltd
42B Church Street
Maitland NSW 2320

Attn: Mr David Lane

Dear David

Asbestos Identification
This report presents the results of one sample, forwarded by DLA Environmental Services Pty Ltd on 4 March 2015, for analysis for asbestos.

1.Introduction: One sample forwarded was examined and analysed for the presence of asbestos.

2. Methods : The sample was examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Safer Environment Method 1.)**

3. Results : **Sample No. 1. ASET43345 / 46525 / 1. South-pit - Insulation.**
Approx dimensions 5.0 cm x 5.0 cm x 0.5 cm
The sample consisted of a fibrous mass of synthetic mineral fibres having some covered with bituminous material.
No asbestos detected.

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/Approved Identifier
Approved Signatory

WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

The results contained in this report relate only to the sample submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted samples are representative.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref : ASET43669/ 46849 / 1 - 2
Your ref : DLH1155 - Hydro CBP
NATA Accreditation No: 14484

25 March 2015

DLA Environmental Services Pty Ltd
42B Church Street
Maitland NSW 2320

Attn: Mr David Lane

Dear David

Asbestos Identification
This report presents the results of two samples, forwarded by DLA Environmental Services Pty Ltd on 25 March 2015, for analysis for asbestos.

1.Introduction: Two samples forwarded were examined and analysed for the presence of asbestos.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Safer Environment Method 1 and Australian Standard AS 4964 - 2004).**

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF**(Asbestos Fines), **FA**(Friable Asbestos and **ACM** (Asbestos Containing Material), also satisfying the requirements of the WA/ NEPM Guidelines)

3. Results : **Sample No. 1. ASET43669 / 46849 / 1. Footprint - 1.**
Approx dimensions 10.0 cm x 10.0 cm x 6.0 cm
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 2. ASET43669 / 46849 / 2. Footprint - 2.
Approx dimensions 12.0 cm x 12.0 cm x 4.3 cm
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/Approved Identifier
Approved Signatory

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites

in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service (NATA ISO/IEC17025 AUG 2014).

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported.

ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust and fragments of ACM smaller than 7mm diameter.
*** denotes asbestos detected in ACM in bonded form.**
 # denotes AF.

All samples indicating "No asbestos detected" are assumed to be less than 0.001 % unless the actual approximate weight is given.

The results contained in this report relate only to the sample submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted samples are representative.

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref : ASET43437/ 46617 / 1 - 6
Your ref : DLH 1155 – Hydro CBP
NATA Accreditation No: 14484

9 March 2015

DLA Environmental Services Pty Ltd
2B/30 Leighton Street
Hornsby NSW 2077

Accredited for compliance with ISO/IEC 17025.

Attn: Mr David Lane

Dear David

Asbestos Identification
This report presents the results of six samples, forwarded by DLA Environmental Services Pty Ltd on 9 March 2015, for analysis for asbestos.

1.Introduction: Six samples forwarded were examined and analysed for the presence of asbestos.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method **(Safer Environment Method 1 and Australian Standard AS 4964 - 2004).**

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF**(Asbestos Fines), **FA**(Friable Asbestos and **ACM** (Asbestos Containing Material), also satisfying the requirements of the WA/ NEPM Guidelines)

3. Results :

Sample No. 1. ASET43437 / 46617 / 1. Well 1 - NW.
Approx dimensions 12.0 cm x 11.0 cm x 6.0 cm
Approx total weight of sample = 918.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 2. ASET43437 / 46617 / 2. Well 1 - EW.
Approx dimensions 12.0 cm x 11.0 cm x 6.2 cm
Approx total weight of sample = 1050.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 3. ASET43437 / 46617 / 3. Well 1 - SW.
Approx dimensions 12.0 cm x 12.0 cm x 6.0 cm
Approx total weight of sample = 938.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 4. ASET43437 / 46617 / 4. Well 1 - WW.
Approx dimensions 13.0 cm x 12.0 cm x 5.7 cm
Approx total weight of sample = 1100.0g
The sample consisted of a mixture of sandy soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 5. ASET43437 / 46617 / 5. Well 1 - Base.
Approx dimensions 13.0 cm x 12.0 cm x 5.9 cm
Approx total weight of sample = 1078.0g
The sample consisted of a mixture of clayish soil, stones, plant matter and fragments of plaster.
No asbestos detected.

Sample No. 6. ASET43437 / 46617 / 6. Well 1.
Approx dimensions 10.0 cm x 6.7 cm x 0.2 cm
The sample consisted of a fragment of a fibre cement material.
Chrysotile asbestos and Amosite asbestos detected.

Analysed and reported by,

Chamath Annakkage. BSc
Environmental Technician/Approved Identifier

Mahen De Silva. BSc, MSc, Grad Dip (Occ Hyg)
Occupational Hygienist / Approved Signatory

Accredited for compliance with ISO/IEC 17025.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service (NATA ISO/IEC17025 AUG 2014).

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported.

ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust and fragments of ACM smaller than 7mm diameter.
*** denotes asbestos detected in ACM in bonded form.**
 # denotes AF.

All samples indicating "No asbestos detected" are assumed to be less than 0.001 % unless the actual approximate weight is given.

The results contained in this report relate only to the samples submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted sample is representative.

Appendix B

Asbestos Air Monitoring Reports

DLA environmental
ABN 80 601 661 634

Sydney
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Phone: 9476 1765
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Maitland
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Maitland NSW 2320
PO Box 137
Branxton NSW 2335
Phone: 4933 0001
Email: hunter@dlaenvironmental.com.au

11th March 2015

DLH1155_H00364

Hydro Aluminium Kurri Kurri
Hart Rd
Loxford, NSW 2326

Attention: Mrs Leanne Pringle

Re: Airborne Asbestos Monitoring – Stockpile Movement, Stockpile Staging Area Hydro Aluminium Hart Rd Loxford, NSW 2326.

DLA Environmental Services Pty Ltd (DLA) conducted Exposure Airborne Asbestos air monitoring on Monday 10th March surrounding the stockpile of asbestos material from former Well 1 requiring movement to the existing asbestos stockpile within the Stockpile staging area.

Summary

All monitoring results are satisfactory and indicative of background concentrations, no risk to human health or the environment can be inferred. All monitoring and analysis was conducted in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].

Table 1:- Airborne Asbestos Monitoring Results –11-3-15

Sample	Time On	Time Off	Location	Fibres/mL
B6	12:02PM	4:04PM	North of Existing Asbestos Stockpile	<0.01
J19	12:01PM	4:02PM	North West of Stockpile	<0.01
M13	12:00PM	4:00PM	East of stockpile	<0.01

All monitoring results are satisfactory and indicative of background concentrations, no risk to human health or the environment can be inferred. All monitoring and analysis was conducted in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].

The Membrane Filter Method (MFM) states that a sample is to be collected by drawing a measured quantity of air through a membrane filter by means of a sampling pump. The filter is later transformed from an opaque membrane into a transparent, optically homogeneous specimen. The respirable fibres are then sized and counted in accordance with defined geometric criteria, using a phase contrast microscope and calibrated eyepiece graticule. The result is expressed as fibres per millilitre of air, calculated from the number of fibres observed on a known area of the filter and the volume of air sampled. [NOHSC:3003(2005)].

"For exposure monitoring, in the absence of other technically convincing information, all particles complying with the defined geometric conditions are to be considered as respirable fibres and counted as such, thereby ensuring that under-estimates of asbestos exposure are minimised." [NOHSC:3003(2005)].

"It must also be recognized that the use of the MFM has limitations when applied to monitoring samples containing plate-like or acicular particles (e.g. vermiculite, talc, gypsum and certain other minerals and fibres), and consequently should not be implemented without a full qualitative understanding of the sampling environment." [NOHSC:3003(2005)].

Comments:

The airborne asbestos monitoring was conducted for 240 minutes at each location. The airborne asbestos fibre concentrations recorded for the sampling undertaken on 10th March 2015 were below the site acceptance criteria. Sample cowl B6 recorded 0.00403 fibres/mL, sample cowl J19 recorded 0.00252 fibres/mL and sample cowl M13 recorded 0.00303 fibres/mL. Asbestos fibres, therefore, are routinely reported as <0.01 fibres per millilitre of air sampled.

Monitoring results are satisfactory and indicate no significant disturbance of asbestos material has occurred during works. Airborne asbestos fibres present no risk to personnel, local residences or the environment generally.

Yours faithfully,

Stephen Challinor
Hunter Region Manager
DLA Environmental Services Pty Ltd

Appendix 1

NATA Certified Analytical Data

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref: ASET43466/ 46646/ 1 - 3
Your ref: DLH1155 – Hydro Aluminium
NATA Accreditation No: 14484

11 March 2015

DLA Environmental Services
42B Church Street
Maitland NSW 2320

Attn: Mr David Lane

1. Introduction:

This report presents the results of three control air monitoring samples forwarded for analysis by DLA Environmental Services on 11 March 2015.

2. Methods:

In accordance with the Worksafe Australia Guidance Notes on Membrane Filter Method on estimating air borne asbestos fibres- Second Edition – NOHSC – 3003 (2005) and **(Safer Environment Method 2).**

3. Results:

Location	**Fibres/ 100 Fields**
10/3/2015	
1- ASET43466/ 46646 / 1 – B6	**4.0 / 100**
2- ASET43466/ 46646 / 2 – J19	**2.5 / 100**
3- ASET43466/ 46646 / 3 – M13	**3.0 / 100**

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/ Approved Counter Approved Signatory

WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

DLA environmental
ABN 80 601 661 634

Sydney
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Maitland
42B Church Street
Maitland NSW 2320
PO Box 137
Branxton NSW 2335
Phone: 4933 0001
Email: hunter@dlaenvironmental.com.au

17th March 2015

DLH1155_H00375

Hydro Aluminium Kurri Kurri
Hart Rd
Loxford, NSW 2326

Attention: Mrs Leanne Pringle

Re: Airborne Asbestos Monitoring – Stockpile Movement, Stockpile Staging Area Hydro Aluminium Hart Rd Loxford, NSW 2326.

DLA Environmental Services Pty Ltd (DLA) conducted Exposure Airborne Asbestos air monitoring on Friday 13th March surrounding the stockpile of asbestos material in the staging area for movement to new location in southern section of the stockpile staging area where other asbestos stockpiles are located. Air monitoring was also conducted around the new stockpile location during unloading and reshaping works.

Summary

All monitoring results are satisfactory and indicative of background concentrations, no risk to human health or the environment can be inferred. All monitoring and analysis was conducted in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].

Table 1:- Airborne Asbestos Monitoring Results –11-3-15

Sample	Time On	Time Off	Location	Fibres/mL
222	7:00 AM	3:55PM	West of Existing Asbestos Stockpile	<0.01
C20	7:05AM	3:30PM	East of Existing Asbestos Stockpile	<0.01
Cowl 7	7:10AM	4:07PM	East of new Asbestos Stockpile Location	<0.01
Green 1	7:14AM	4:10PM	West of new Asbestos Stockpile Location	<0.01

All monitoring results are satisfactory and indicative of background concentrations, no risk to human health or the environment can be inferred. All monitoring and analysis was conducted in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].

The Membrane Filter Method (MFM) states that a sample is to be collected by drawing a measured quantity of air through a membrane filter by means of a sampling pump. The filter is later transformed from an opaque membrane into a transparent, optically homogeneous specimen. The respirable fibres are then sized and counted in accordance with defined geometric criteria, using a phase contrast microscope and calibrated eyepiece graticule. The result is expressed as fibres per millilitre of air, calculated from the number of fibres observed on a known area of the filter and the volume of air sampled. [NOHSC:3003(2005)].

"For exposure monitoring, in the absence of other technically convincing information, all particles complying with the defined geometric conditions are to be considered as respirable fibres and counted as such, thereby ensuring that under-estimates of asbestos exposure are minimised." [NOHSC:3003(2005)].

"It must also be recognized that the use of the MFM has limitations when applied to monitoring samples containing plate-like or acicular particles (e.g. vermiculite, talc, gypsum and certain other minerals and fibres), and consequently should not be implemented without a full qualitative understanding of the sampling environment." [NOHSC:3003(2005)].

Comments:

The airborne asbestos monitoring was conducted between 445 and 477 minutes at each location. The airborne asbestos fibre concentrations recorded for the sampling undertaken on 13th March 2015 were below the site acceptance criteria. Sample cowl 222 recorded 0.00026 fibres/mL, sample cowl 7 recorded 0.00109 fibres/mL, sample cowl C20 recorded 0.000508fobres/mL and sample cowl Green 1 recorded 0.001522 fibres/mL. Asbestos fibres, therefore, are routinely reported as <0.01 fibres per millilitre of air sampled.

Monitoring results are satisfactory and indicate no significant disturbance of asbestos material has occurred during works. Airborne asbestos fibres present no risk to personnel, local residences or the environment generally.

Yours faithfully,

Stephen Challinor
Hunter Region Manager
DLA Environmental Services Pty Ltd

Appendix 1

NATA Certified Analytical Data

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 088 095 112

Our ref: ASET43548/ 46728 / 1 - 4
Your ref: DLH1155 – Hydro
NATA Accreditation No: 14484

17 March 2015

DLA Environmental Services
42B Church Street
Maitland NSW 2320

Attn: Mr David Lane

1. Introduction:

This report presents the results of four control air monitoring samples forwarded for analysis by DLA Environmental Services on 17 March 2015.

2. Methods:

In accordance with the Worksafe Australia Guidance Notes on Membrane Filter Method on estimating air borne asbestos fibres- Second Edition – NOHSC – 3003 (2005) and **(Safer Environment Method 2).**

3. Results:

Location	**Fibres/ 100 Fields**
13/3/2015	
1- ASET43548/ 46728 / 1 – 222	**0.5 / 100**
2- ASET43548/ 46728 / 2 – Cowl 7	**2.0 / 100**
3- ASET43548/ 46728 / 3 – C20	**1.0 / 100**
4- ASET43548/ 46728 / 4 – Green 1	**3.0 / 100**

Analysed and reported by,

Nisansala Maddage. BSc(Hons)
Environmental Scientist/ Approved Counter Approved Signatory

WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025.

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17th April 2015

DLH1155_H00414

Hydro Aluminium Kurri Kurri
Hart Rd
Loxford, NSW 2326

Attention: Mrs Leanne Pringle

Re: Airborne Asbestos Monitoring – Stockpile Movement, Stockpile Staging Area Hydro Aluminium Hart Rd Loxford, NSW 2326.

DLA Environmental Services Pty Ltd (DLA) conducted Exposure Airborne Asbestos air monitoring on Wednesday 15th April surrounding the excavation as asbestos contaminated material was loaded into dump trucks. Additional air monitoring was conducted at the unload area in the stockpile staging area.

Summary

All monitoring results are satisfactory and indicative of background concentrations, no risk to human health or the environment can be inferred. All monitoring and analysis was conducted in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].

Table 1:- Airborne Asbestos Monitoring Results –16-4-15

Sample	Time On	Time Off	Location	Fibres/mL
A131	6:59AM	1:00PM	East of road- unload area	<0.01
A271	7:08AM	1:28PM	East of Asbestos area	<0.01
B35	7:10AM	4:32PM	West of Asbestos area	<0.01
A250	7:03AM	1:03PM	West of Unload area	<0.01

All monitoring results are satisfactory and indicative of background concentrations, no risk to human health or the environment can be inferred. All monitoring and analysis was conducted in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].

The Membrane Filter Method (MFM) states that a sample is to be collected by drawing a measured quantity of air through a membrane filter by means of a sampling pump. The filter is later transformed

from an opaque membrane into a transparent, optically homogeneous specimen. The respirable fibres are then sized and counted in accordance with defined geometric criteria, using a phase contrast microscope and calibrated eyepiece graticule. The result is expressed as fibres per millilitre of air, calculated from the number of fibres observed on a known area of the filter and the volume of air sampled. [NOHSC:3003(2005)].

"For exposure monitoring, in the absence of other technically convincing information, all particles complying with the defined geometric conditions are to be considered as respirable fibres and counted as such, thereby ensuring that under-estimates of asbestos exposure are minimised." [NOHSC:3003(2005)].

"It must also be recognized that the use of the MFM has limitations when applied to monitoring samples containing plate-like or acicular particles (e.g. vermiculite, talc, gypsum and certain other minerals and fibres), and consequently should not be implemented without a full qualitative understanding of the sampling environment." [NOHSC:3003(2005)].

Comments:
The airborne asbestos monitoring was conducted between 300 and 322 minutes at each location. The airborne asbestos fibre concentrations recorded for the sampling undertaken on 15th April 2015 were below the site acceptance criteria. Sample cowl A131 recorded 0.00 fibres/mL, sample cowl A271 recorded 0.00 fibres/mL, sample cowl B35 recorded 0.00 fibres/mL and sample cowl A250 recorded 0.00fibres/mL. Asbestos fibres, therefore, are routinely reported as <0.01 fibres per millilitre of air sampled.

Monitoring results are satisfactory and indicate no significant disturbance of asbestos material has occurred during works. Airborne asbestos fibres present no risk to personnel, local residences or the environment generally.

Yours faithfully,

Stephen Challinor
Hunter Region Manager
DLA Environmental Services Pty Ltd

APPENDIX J -- ENVIRON EIL SITE SPECIFIC CALCULATIONS

Inputs
Select contaminant from list below
Cr_III
Below needed to calculate fresh and aged ACLs
Enter % clay (values from 0 to 100%)
1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
7
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cr III soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	100	70
Urban residential and open public spaces	150	190
Commercial and industrial	200	320

Inputs
Select contaminant from list below
Cu
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
11
Enter soil pH (calcium chloride method) (values from 1 to 14)
6
Enter organic carbon content (%OC) (values from 0 to 50%)
1
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
7
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Cu soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	70	80
Urban residential and open public spaces	120	210
Commercial and industrial	170	300

Inputs
Select contaminant from list below
Ni
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
11
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
7
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Ni soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	35	35
Urban residential and open public spaces	80	180
Commercial and industrial	140	310

Inputs
Select contaminant from list below
Zn
Below needed to calculate fresh and aged ACLs
Enter cation exchange capacity (silver thiourea method) (values from 0 to 100 cmolc/kg dwt)
11
Enter soil pH (calcium chloride method) (values from 1 to 14)
6
Below needed to calculate fresh and aged ABCs
Measured background concentration (mg/kg). Leave blank if no measured value
or for fresh ABCs only
Enter iron content (aqua regia method) (values from 0 to 50%) to obtain estimate of background
7
or for aged ABCs only
Enter State (or closest State)
NSW
Enter traffic volume (high or low)
low

Outputs		
Land use	Zn soil-specific EILs (mg contaminant/kg dry soil)	
	Fresh	Aged
National parks and areas of high conservation value	75	170
Urban residential and open public spaces	190	480
Commercial and industrial	280	700

APPENDIX K -- PACKING COKE FIND LETTER REPORT

DLA environmental
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5th June 2015

DLH1155_H000468

Hydro Aluminium Kurri Kurri Pty Ltd
Hart Road
Loxford NSW 2326

Attention: Mrs. Leanne Pringle

Re: Remediation of Clay Borrow Pit – Hart Rd, Loxford NSW 2336

Please find below a summary of validation sampling results for the packing coke material find encountered during excavation on of the western section of the Unexpected Finds Area (UFA).

On Wednesday morning 27th May 2015 works to clean up the area south of the west dam occurred. During the excavation of this area, within grid squares D3 and D4 of the Section 3 site map, a layer of bulk brick surrounded by dark black fines was encountered.

Refer to **Figure 1-** CBP Section 3 Site Map.

Following consultation with staff from Environ and Hydro it was determined the likely source of this material was transported to this area following the dismantling of B furnace in 1995. As the fines were presumed to be packing coke, sampling was undertaken to determine if the PAH content would comply with NEPM 2013 Commercial/Industrial criteria. All of this material was removed and taken down to the stockpiling area (SP23) to be placed at the end of the stockpile to enable delineation for isolation in the containment cell at a later stage.

Once the extent of the foreign material was removed, the area was scraped back to natural clay and visual validation occurred. As the material was dry enough to facilitate its entire removal it the area surrounding the find was deemed to be clean.

Sampling was conducted on the material to determine if PAH were present. Only one sample was collected of the material as it was of uniform colour and consistency and could be easily delineated from the surrounding natural clay. This sample was taken to determine if there was any PAH presence rather than taking multiple samples to obtain a representative understanding of the entire body of material present. The sample was then sent to a NATA certified lab for testing.

Following validation of the UFA the excavation will be backfilled using clean red clay and light brown sandy material previously removed from Area 5. This will be completed following the removal of the foreign material to the north of this area to allow free flowing drainage into the main Clay Borrow Pit excavation.

Although the presence of PAH were detected (BaP TEQ 18mg/kg, Total PAH 120mg/kg) the results from the monitoring indicate that the foreign material would comply with NEPM 2013 Commercial/Industrial criteria (BaP TEQ 40mg/kg, Total PAH 4000mg/kg). DLA can confirm that the area excavation surrounding the material of concern is considered to be able to form part of overall validation of the site. Validation of this area will occur as soon as the surrounding areas in the UFA have all foreign material removed.

Refer to **Appendix A-** NATA certified results.

The material that has been removed is currently being screened and will be stockpiled separately for future isolation in the whole-of-site remediation. DLA environmental recommends the final destination of the material is placed at a known location within the possible future containment cell due to the presence of PAH.

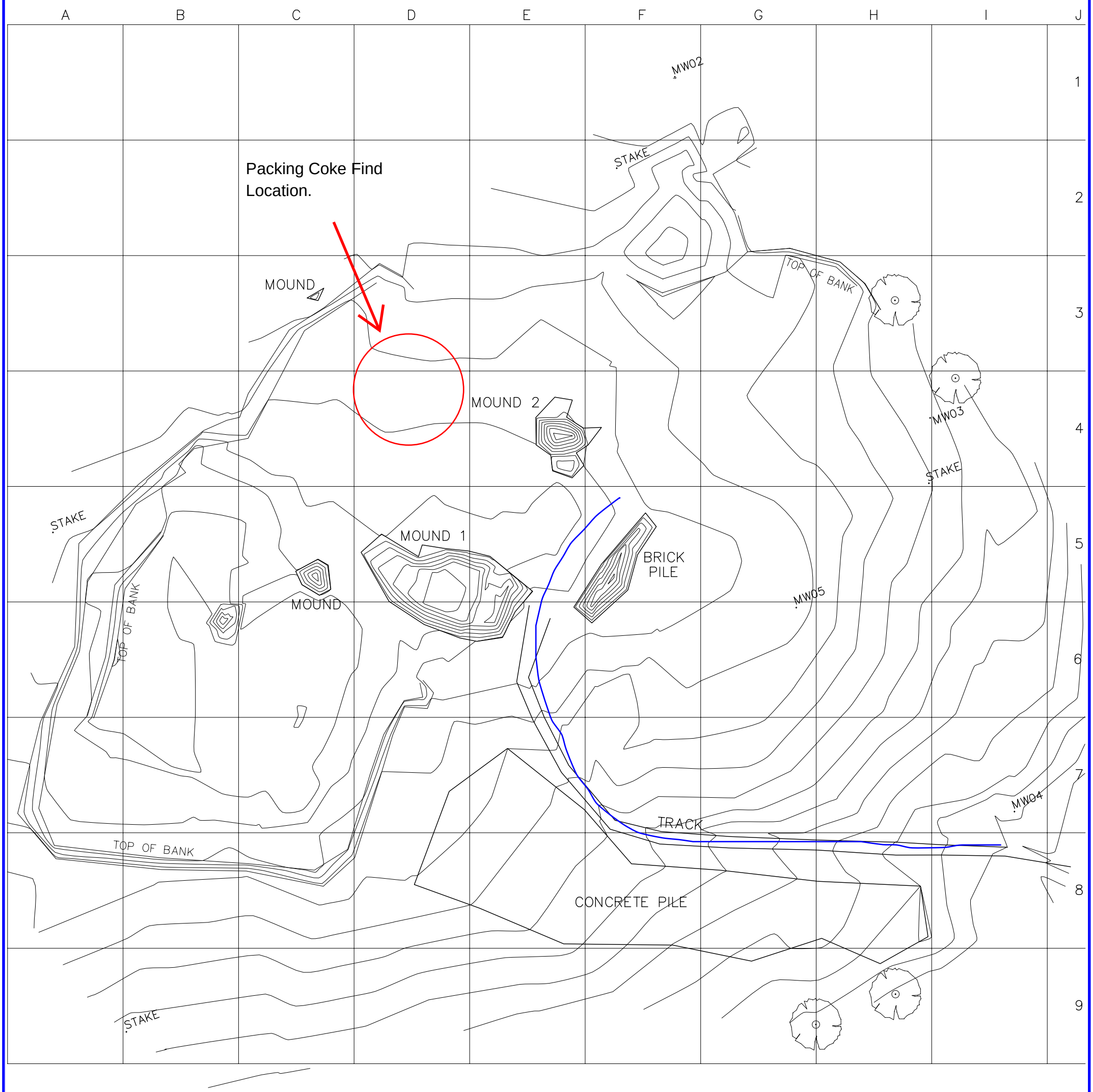
For further information please do not hesitate to contact myself or Jon Mansfield.

Yours faithfully
DLA Environmental

Stephen Challinor
Hunter Region Manager
DLA Environmental

Figure 2

Site Layout with Sampling Locations



RENNIE GOLLEDGE PTY. LTD.
SURVEYORS & PLANNERS

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HYDRO ALUMINIUM EXCAVATION SITE 3 KURRI KURRI

ENVIROPACIFIC

DATE: 12/1/15 REF: 309.14

DRAWING NOT TO SCALE

Appendix A

NATA Certified Analytical Results

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 128665

Client:

DLA Environmental Services Pty Ltd (Maitland)
42B Church St
Maitland
NSW 2320

Attention: Stephen Challinor

Sample log in details:

Your Reference:	**DLH1155 - Hydro CBP**
No. of samples:	1 Soil
Date samples received / completed instructions received	28/05/2015 / 28/05/2015

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	4/06/15 / 1/06/15
Date of Preliminary Report:	Not Issued

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	128665-1 UFA-Fines 27/05/2015 Soil
Date extracted	-	29/05/2015
Date analysed	-	29/05/2015
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	<0.1
Acenaphthene	mg/kg	0.2
Fluorene	mg/kg	0.1
Phenanthrene	mg/kg	1.8
Anthracene	mg/kg	0.6
Fluoranthene	mg/kg	11
Pyrene	mg/kg	11
Benzo(a)anthracene	mg/kg	12
Chrysene	mg/kg	19
Benzo(b,j+k)fluoranthene	mg/kg	37
Benzo(a)pyrene	mg/kg	11
Indeno(1,2,3-c,d)pyrene	mg/kg	9.0
Dibenzo(a,h)anthracene	mg/kg	1.4
Benzo(g,h,i)perylene	mg/kg	9.0
Benzo(a)pyrene TEQ calc (zero)	mg/kg	18
Benzo(a)pyrene TEQ calc(half)	mg/kg	18
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	18
Total Positive PAHs	mg/kg	120
Surrogate p-Terphenyl-d14	%	104

Moisture		
Our Reference:	UNITS	128665-1
Your Reference	----------	UFA-Fines
Date Sampled	----------	27/05/2015
Type of sample		Soil
Date prepared	-	29/05/2015
Date analysed	-	01/06/2015
Moisture	%	14

Method ID	Methodology Summary
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			29/05/2015	[NT]	[NT]	LCS-1	29/05/2015
Date analysed	-			29/05/2015	[NT]	[NT]	LCS-1	29/05/2015
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	107%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	113%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	107%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	108%
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	114%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	LCS-1	104%
Benzo(b,j+k) fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	[NT]	[NT]	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	[NT]	[NT]	LCS-1	120%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	[NT]	[NT]	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	107	[NT]	[NT]	LCS-1	95%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

APPENDIX L – AUTOMOTIVE WASTE FIND LETTER REPORT

AUTOMOTIVE WASTE REMOVAL VALIDATION

Hydro Aluminium Kurri Kurri Pty Ltd

Hart road,

Loxford NSW 2326

Prepared for:

Hydro Aluminium Kurri Kurri Pty Ltd

Hart Rd

Loxford NSW 2326

Prepared by:

DLA Environmental Services

DLH1155_H00457

June 2015

Revision R00

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ABN 80 601 661 634

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APPENDICES:

ABBREVIATIONS

ADWG	Australian Drinking Water Guidelines
AGST	Above Ground Storage Tank
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment Conservation Council
ASS	Acid Sulfate Soil
B(a)P	Benzo(a)Pyrene
BH	Borehole
BTEX	Benzene, Toluene, Ethyl Benzene, Xylene
COC	Contaminants of Concern
CLM	Contaminated Land Management
DA	Development Application
DECCW	Department of Environment Climate Change and Water
DLA	DLA Environmental Services Pty Ltd
DP	Deposited Plan
DQO	Data Quality Objective
EC	Electrical Conductivity
EIL	Ecological Investigation Level
EPA	Environment Protection Authority, New South Wales (now part of DP&E)
EQL	Estimated Quantitation Limit
HIL	Health Based Investigation Level
HM	Heavy Metals
MW	Monitoring Well
NATA	National Association of Testing Authorities, Australia
NEPM.	National Environmental Protection Measure
NHMRC	National Health and Medical Research Council
OCP	Organochlorine Pesticides
OEH	Office of Environment and Heritage
OPP	Organophosphorus Pesticides
OH&S	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PCOC	Potential Contaminants of Concern
PID	Photo-ionisation Detector
PPIL	Provisional Phyto-toxicity Investigation Levels
PQL	Practical Quantitation Limit
RAP	Remedial Action Plan
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
SAC	Site Acceptance Criteria
SEPP	State Environmental Planning Policy
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
UCL	Upper Confidence Limit
UST	Underground Storage Tank
UPSS	Underground Petroleum Storage System(s)
VOC	Volatile Organic Compounds

INTRODUCTION

DLA Environmental Services Pty Ltd (DLA) was commissioned by Hydro Aluminium to conduct a Validation Assessment on soils forming the Pit void left by removal of automotive waste. The site is identified as the Clay Borrow Pit (CBP), Loxford NSW (the Site). The Pit was located in the western section of the CBP site near area 2 of the Unexpected Finds Area (UFA).

Refer to **Figure 1** – Site Location and **Figure 2** – Site Layout

Results from the monitoring indicate that the pit would comply with NEPM 2013 commercial/industrial criteria for all analytes tested. DLA can confirm that the area of concern is considered to be able to form part of overall validation of the site. Validation of this area has occurred as the additional material within the UFA excavation has been removed.

1.1 Remediation Validation Objectives

The primary objective of the Validation Program was to ensure that the Pit was remediated to the extent that it will be suitable for the proposed land use and shall pose no unacceptable risk to human health or to the environment.

To achieve the stated objective, the following goals were set:

1. Remediate soils to comply with the most sensitive end land criteria consistent with the NSW EPA, and Schedule B1 Guideline on the Investigation Levels for Soil and Groundwater from the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 Table 1(A)1 Column D – Commercial/industrial.

2. Remove unacceptable impacts to human health and the environment to prevent the potential for release of contaminants from soil or groundwater impacting on the local environment and surroundings; as defined by the relevant NSW EPA/OEH (Office of Environment and Heritage) criteria.

3. Ensure all environmental safeguards were in place to complete any remediation in an environmentally acceptable manner.

4. Identify and obtain all necessary approvals and licences required by regulatory authorities.

5. Ensure the accurate and detailed reporting of the Remediation Validation in accordance with the NSW OEH Guidelines for Consultants Reporting on Contaminated Sites, 2011 and the NSW EPA Guidelines for the NSW Site Auditor Scheme, 2nd Edition 2006.

1.2 Data Quality Objectives

The National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPM) and Australian Standard (AS) 4482.1-2005 recommend that data quality objectives (DQOs) be implemented during the investigation of potentially contaminated sites. The DQO process described in AS 4482.1-2005 *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil Part 1: Non-Volatile and Semi-Volatile Compounds* outlines seven (7) distinct steps to outline the project goals, decisions, constraints and an assessment of the project uncertainties and how to address these when they arise. They define the quality and quantity of data needed to support decisions relating to the environmental condition of a site. They also outline the defining criteria that a data collection design should satisfy, including when, where, how and how many samples to be collected.

The Data Quality Objectives for the sampling and analysis investigations were to:

State the Problem

Determine the contamination problem, if it requires new environmental data, and what resources are available to resolve the problem within the allocated deadlines of the Project. Refer to chapters: **2.0** *Scope of Work* and **Figure 2:** Site Layout.

- The problem to be addressed is whether contamination persists within the excavation pit following the removal of the automotive waste and excavated fill to evaluate the likely human health and environmental risks associated with any contamination identified.

Identify the Decision

Determine the decisions that need to be made on the contamination and the new environmental data required to make them. Refer to chapters: **2.0** *Scope of Works;* **3.0** *Assessment Criteria;* and, **4.0** *Validation Plan*. Decisions include:

- Is the Site suitable for the proposed development?

- Does the Site require further remediation to ensure suitability for the proposed development?
- Is there any further investigation needed to determine the end land use suitability?

Identify Inputs to Decision

This step requires the identification of the environmental variables/characteristics that need measuring, identification of which media (fill, soil etc.) need to be collected, identification of the site criteria for each medium of concern and appropriate analytical testing. Inputs include:

- Concentrations of BTEX, TPH, Heavy Metals within Pit Excavations and associated service line trenches.
- Identifying current and future potential receptors and the likelihood of exposure to unacceptable levels of contamination both on and off the Site.

Define the Study Boundaries

Specify the spatial and temporal aspects of the environmental media that the data must represent to support decision. To identify the boundaries (both spatial and temporal) of the investigation and to identify any restrictions that may hinder the assessment process. This includes on and off site inspections and discussions with informed individuals. The physical study will focus on fill materials and natural soils within the confines of the proposed lot boundary.

Refer to 3.0 – Site Description, Figure 1 – Site Location and Figure 2 – Site Layout

Develop a Decision Rule

To define the parameter(s) of interest, specify the action level, and provide a logical basis for choosing from alternative actions.

Refer to **5.0** *Validation Plan.* The assessment criteria are the NSW OEH produced and/or endorsed criteria as specified in **4.0** *Assessment Criteria*.

Specify Limits on Decision Errors

Specify the decision-maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainties in the data. Incorrect decisions are caused by using data that is not representative of site conditions because of sampling or analytical error, leading to a conclusion that is inappropriate for the Site in question.

Field and laboratory quality controls are implemented to avoid error and to ensure the action levels exceed the measurement detection limits for Contaminants Of Concern (COC) detected in field blanks, rinsate blanks, volatile-spiked trip samples and laboratory method blanks. The performance of decision making inputs will be enhanced through the application of Data quality indicators (DQI), defined as follows:

Precision	A quantitative measure of the variability (or reproducibility) of data;
Accuracy	A quantitative measure of the closeness of reported data to the "true" value;
Representativeness	The confidence (expressed qualitatively) that data are representative of each media present on the Site.
Completeness	A measure of the amount of useable data from a data collection activity;
Comparability	The confidence (expressed qualitatively) that data can be considered equivalent for each sampling and analytical event.

Table 1a: Methods used to satisfy all DQI's

Data Precision and Accuracy	
Adequate Sampling Density	Sampling carried out in accordance with Table A of the NSW EPA *Contaminated Sites: Sampling Design Guidelines*, 1995, based on site area and recommended sampling. Use of analytical laboratories with adequately trained and experienced testing staff experienced in the analyses undertaken, with appropriate NATA certification.

Table 1a: Methods used to satisfy all DQI's Cont.

Data Precision and Accuracy	
Acceptable field and laboratory Relative Percentage Difference (RPD) for duplicate comparison*	>10 x LOR: 30% inorganics; 50% organics (Field) <10 x LOR: Assessed on individual basis (Field) >5 x LOR: 50% (laboratory) <5 x LOR: No Limit (laboratory) *Done in accordance with AS4482.1 – 2005 field duplicate RPD criteria is increased with organic analytes and for low concentrations. These criteria cannot reasonably exceed the laboratory's precision, therefore laboratory criteria have been adopted.
Trip Blanks/ Rinsate Blanks	No Detection above LOR
Trip Spikes	Recoverable concentrations of volatiles between 60 – 140%
Adequate laboratory performance	Based on acceptance criteria of laboratory as specified on certificate of analysis: includes: blank samples, matrix spikes, control samples, and surrogate spike samples

Data Representativeness	
Sample and analysis selection	Representativeness of all potential contaminants
Trip Blanks/ Rinsate Blanks	No Detection above LOR
Trip Spikes	Recoverable concentrations of volatiles between 60 – 140%
Duplicate Samples	Adequate duplicate, split, rinsate and trip blank sample numbers
Laboratory selection	Adequate laboratory internal quality control and quality assurance methods, complying with the NEPM.
Documentation Completeness	
chain of custody records	Laboratory sample receipt information received confirming receipt of samples intact and appropriate chain of custody NATA registered laboratory results certificates provided
Data Completeness	
	Analysis for all potential contaminants of concern. Field duplicate sample numbers complying with NEPM Rinsate samples recovered regularly Trip spike samples prepared and sent with field samples regularly
Comparability	
	Use of NATA registered laboratories Test methods consistent for each sample in accordance with the Sampling Analysis and Quality Plan Detailed logs of all sample locations to be recorded Test methods comparable between primary and secondary laboratory Acceptable RPD's between original samples and field duplicates and inter-laboratory triplicate samples.

Optimise the Design for Obtaining Data

Identify a resource-effective sampling and analysis design for data collection that satisfy the DQO's. The sampling and analytical plan is designed to avoid Type 1 and Type 2 errors and includes defining minimum sample numbers required to detect contamination as determined with procedures provided in the NSW EPA 1995 Sampling Design Guidelines and AS 4482.1 - 2005 and appropriate quality control procedures.

Refer to 5.0 Remediation Validation Plan.

1.3 Limitations of This Report

The conclusions presented in this report are relevant to the present condition of the Site and the state of legislation currently enacted as at the date of this report for the purpose of review. DLA Environmental do not make any representation or warranty that the conclusions in this report will

be applicable in the future as there may be changes in the condition of the Site, applicable legislation or other factors that would affect the conclusions contained in this report.

DLA Environmental has used a degree of skill and care ordinarily exercised by reputable members of our profession practicing in the same or similar locality. Conclusions are based on representative samples on the Site, the intensity of those samples being in accordance with the usual levels of testing carried out for this type of investigation. Due to the inherent variability in natural soils we cannot warrant that the whole overall condition of the Site is identical or substantially similar to the representative samples.

SCOPE OF WORK

1.4 Remediation

The study area was remediated with the implementation of the following:

- On Wednesday morning 20th May 2015 works to clean up the area south of the west dam occurred. A section of imported fill was found surrounded by natural clay material, following investigation it was found that there was automotive material buried at depth. All material was removed and transported to the stockpiling area and retained as a separate stockpile.

- The water (slurry) in the excavation had a visible sheen and hydrocarbon odour. The intended removal of the slurry via the water cart to facilitate transport to the onsite oil separator was unable to be completed. This was due to the heavy consistency of the slurry. An alternative measure was put in place to mix the slurry with gravel fill and brick material to facilitate excavation. It was then transported and stockpiled next to the automotive to facilitate the 'whole of site' remediation strategy.

- Once all of the foreign material was removed, the area was scraped back and visual validation occurred. Validation samples were then taken in order to ensure that confirmation could be made that all contaminated material had been removed from the area.

- The excavation was then backfilled using clean red clay and light brown sandy material previously removed from Area 5. This was completed due to the impending rain event to prevent ponding of water in the excavation. This was undertaken in line with NSW EPA, Guidelines for Assessing Service Station Sites, 1994, and NSW DECC Guidelines for the NSW Site Auditor Scheme.

1.5 Validation Process

1.5.1 Sample Collection and Analysis

Base and wall samples were collected from the tank pit excavation to confirm successful remediation of any contamination, in accordance with the methodology outlined in the NSW EPA *Guidelines for Assessing Service Station Sites.*

Samples were to be sufficiently analysed to provide strategic information for characterising all Potential Contaminants of Concern (PCOC) in residual soil horizons, allow assessment against the acceptance criteria and ensure the effective removal of all contamination.

SITE DESCRIPTION

1.6 Site Identification

The Clay Borrow Pit (CBP) Area is located adjacent to the western boundary of the Hydro Kurri Kurri Aluminium Smelter Site and is located on the crest and eastern flank of a broad north east to west trending ridge, with slopes generally 1 to 3 degrees. The current Site layout consists of an undulating surface profile with a number of stockpiles present. The area is undergoing remediation, with excavation to natural clay. The surrounding area is covered with grass and vegetation with mature eucalypt and scrub vegetation occurring to the East and North. The Pit is located within the south-western section of the Unexpected Finds Area (UFA), which occupies the western area of the CBP site.

Refer to **Figure 1** – *Site Location*

ASSESSMENT CRITERIA

1.7 Rationale for the Selection of Assessment Criteria

The criteria selected have been chosen in accordance with current Australian and NSW OEH guidelines. Australian Guidelines have been used in preference to international guidelines where available. These criteria are the most current and widely accepted guidelines in use at present in Australia, and have generally been developed using a risk-based approach. Therefore, the selected guidelines provide a satisfactory framework for the Site assessment.

1.8 Soil Criteria

The following publications have been reviewed with respect to the assessment of soils at the Site:

- NSW EPA Guidelines for Assessing Service Station Sites, 1994.
- Schedule B1 Guideline on the Investigation Levels for Soil and Groundwater from the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 Table 1(A)1 Column D – Commercial/Industrial
- NSW EPA Guidelines for the NSW Site Auditor Scheme, second edition 2006.

The acceptance criteria for soils presented in Table **4a, 4b and 4c** below:

Table 4a : Site Accepted Criteria -Soil – Commercial/Industrial

Analytes	Thresholds (mg/kg dry wt)
Arsenic	3000
Cadmium	900
Chromium	3600
Copper	240 000
Lead	1500
Mercury	730
Nickel	6000
Zinc	400 000

Table 4b : Site Accepted Criteria - Site TPH Vapour Intrusion Criteria – Commercial/Industrial

	TPH Criteria for Commercial/Industrial Properties in clay soils			
	0m to <1m	1m to <2m	2m to <4m	4m +
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylene (total)	NL	NL	NL	NL
Naphthalene	NL	NL	NL	NL
Benzene	4	6	9	20
F1 – C_6-C_{10}	310	480	NL	NL
F2 – C_{10}-C_{16}	NL	NL	NL	NL
#F3 – C_{16}-C_{34}	--	--	--	--
#F4 – C_{34}-C_{40}	--	--	--	--

No vapour criteria has been provided due to the non-volatile nature of the hydrocarbons and are "therefore not of concern for vapour intrusion" (Schedule B1, Section 2.4.6 Petroleum hydrocarbon compounds and fraction, NEMP 2013)

NL – Not Limiting

Note: Site soils were identified as clay

Table 4c : Site Accepted Criteria - Ecological Screening Levels and Management Limits* (NEPM Sch. B1 2013) *Commercial/Industrial.

Analyte	ESL Commercial/Industrial (mg/kg)	ML Commercial Industrial (mg/kg)
F1 C6-C10	215*	800
F2 >C10-C16	170*	1000
F3 >C16-C34	2500	5000
F4 >C34-C40	6600	10000
Benzene	95	-
Toluene	135	-
Ethylbenzene	185	-
Xylenes	95	-
Benzo(a)pyrene	0.7	-

Note: ESLs are of low reliability except where indicated by a * which indicates that the ESL is of moderate reliability

Limitations of the Assessment Criteria

All criteria have limitations. Not all chemical analytes are covered by each set of guidelines, requiring some criteria to be sourced from elsewhere. This is particularly relevant to the Dutch guidelines, which provide a guideline for assessment for some analytes not covered by the Australian guidelines.

REMEDIATION VALIDATION PLAN

The likelihood of residual contamination was assessed by comparison of Validation results with NSW OEH produced or endorsed criteria available at the time this report was produced. The following publications have been reviewed with respect to the assessment of soils at the Site:

- NSW EPA Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites;
- Schedule B1 Guideline on the Investigation Levels for Soil and Groundwater from the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 Table 1(A)1 Column D – Commercial/Industrial
- NSW EPA Guidelines for Assessing Service Station Sites, 1994;
- NSW EPA Contaminated Sites: Sampling Design Guidelines, 1995;
- NSW EPA Guidelines for the NSW Site Auditor Scheme, second edition 2006.

An objective of all remediation is to avoid generating excessive or unnecessary waste, therefore every effort was made to isolate, with confidence, uncontaminated material located within the remediation area and reuse onsite. Details of Beneficially Reused material and waste disposal are provided in Section **7.0** – Material Re-Use and Disposal.

1.9 Remedial Works

1.9.1 UFA Pit.

On Wednesday morning the 20th May 2015 works to clean up the area south of the west dam occurred. A section of imported fill was found surrounded by natural clay material, following investigation it was found that there was automotive material buried at depth. All of this material was removed and taken down to the stockpiling area for isolation in the containment cell at a later stage. The approximate size of the total pit excavated was 250m^3 in situ.

The water (slurry) in the excavation had a visible sheen and hydrocarbon odour. The intended removal of the slurry via the water cart to facilitate transport to the oil separator was unable to be completed. This was due to the heavy consistency of the slurry. An alternative measure was put in place to mix the slurry with gravel fill and brick material to facilitate excavation. It was then

transported and stockpiled next to the automotive waste (SP23) for future reuse as part of the 'whole of site' remediation strategy.

The excavation was then backfilled using clean red clay and light brown sandy material previously removed from Area 5. This was completed due to the impending rain event to prevent ponding of water in the excavation.

1.9.2 Groundwater

Groundwater was not encountered during excavation of the pit to a depth of 4 m below the existing ground surface. No impact on groundwater was evident, based on the visual and olfactory condition of the tank pit base soils and water.

1.10 Field Investigations

The following key professional personnel were identified in the Validation process:

Mr Jonathan Mansfield
Mr Stephen Challinor

1.11 Sampling Strategy

Sampling and analysis for the validation process were carried out to obtain an indication of the following:

Nature, location and likely distribution of potential soil contaminants persisting on the Site.
The risk that the contaminants (if present) pose to human health or the environment under the conditions of the proposed development.

The risk of harm to human health and the environment was determined through comparison of validation results with NSW OEH produced or endorsed criteria available at the time this report was produced.

The sampling regime for the investigation area of the validation Site was in accordance with the requirements as outlined in the NSW EPA Service Station Guidelines 1994, the NSW OEH Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites and the NSW EPA

Contaminated Sites: Sampling Design Guidelines, taking into consideration the requirements of the NEPM 2013 and AS 4482.1-2005.

Site sampling incorporated pit validation and fill validation. All validation processes were conducted by staff of DLA Environmental, who were responsible for visually assessing the Site, locating the sample locations, recovery of soil samples and preparation of samples for delivery to NATA accredited laboratories.

Once all of the foreign material was removed, the area was scraped back and visual validation occurred. Validation samples were then taken in order to ensure that confirmation could be made that all contaminated material had been removed from the area. In order to ensure compliance with the NEPM 2013 commercial/industrial criteria proposed for the final landform samples were collected from the north, south, east and west walls at both 1-2m BGL and 2-4m BGL. In addition samples were collected from the north and south base areas of the pit. These samples were then transported to a NATA accredited lab for testing to determine if there was any presence of TRH (petroleum hydrocarbons relating to fuel/ oils remaining in the engines/ fuel tanks) and heavy metals (metal scrap in contact with the clay). Duplicate samples were also taken of the north wall base to ensure QA/QC compliance measures were met.

The justification of the sampling point regime for the assessment was based on the investigator's knowledge, experience and history of the Site. All historical investigations and anecdotal evidence supported the sampling approach adopted and provided for samples to be collected in an unbiased manner.

All samples were collected by staff of DLA Environmental who are specifically trained in hazardous waste field investigation techniques and health and safety procedures. All techniques used are specified in DLA Environmental Field Manual for Contaminated Sites, which are based on methods specified by the United States Environment Protection Agency (US EPA) and The National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013.

Refer to **Figure 2** - Site Layout with Sampling Locations

1.12 Laboratory Analysis

Soil samples were analysed for contaminant indicators that may be associated with past and present land uses, i.e. UST contamination. Samples were analysed by Envirolab Services Pty Ltd of Chatswood for the following:

Inorganic

- Arsenic (As).
- Cadmium (Cd).
- Chromium (Cr).
- Copper (Cu).
- Lead (Pb).
- Mercury (Hg).
- Nickel (Ni).
- Zinc (Zn).

Organic

- Total Recoverable Hydrocarbons (TRHs),
- Monocyclic aromatic hydrocarbons consisting of Benzene, Toluene, Ethylbenzene and Xylene (BTEX),

Refer to **Appendix A –** NATA Certified Analytical Data

1.12.1 Laboratory Detection Limits

Typical methods used for analysis and their respective level of reporting for Envirolab laboratories, used for analysis, are outlined below:

Table 5a – Detection Limits and Methods – Envirolab

Analyte	Method	Level of Reporting Soil mg/kg
Metals	Metals-020 ICP-AES	As……4
	Metals-020 ICP-AES	Cd……0.4
	Metals-020 ICP-AES	Cr……1
	Metals-020 ICP-AES	Cu……1
	Metals-020 ICP-AES	Pb……1
	Metals-020 ICP-AES	Hg……0.1
	Metals-020 ICP-AES	Ni……1
	Metals-020 ICP-AES	Zn……1
BTEX	Org-016	Benzene……0.2
	Org-016	Toluene……0.5
	Org-016	Ethylbenzene……1
	Org-016	Total Xylene……3
	Org-014	Napthalene……1
	Org-016	F1……25
TRH	Org-003	F2……50
	Org-003	F3……100
	Org-003	F4……100

1.12.2 Laboratory Analytical and Quality Plan

The integrity of analytical data provides the second step in the QA/QC process for total data compliance. Envirolab's quality control data complied with relevant laboratory requirements. The data validation techniques adopted by DLA Environmental are based upon techniques published by the US EPA and in line with methods and guidelines adopted by the NSW DECC and outlined in the NEPM, 2013.

1.12.1 Evaluation of Quality Assurance

Soil samples were collected, contained contaminant concentrations generally below the laboratory LOR, therefore, Relative Percentage Difference (RPD) calculations were 0% for all analytes except Arsenic, Chromium, Copper, Lead, Nickel and Zinc. The RPD calculation and the concentrations in the samples used in the RPD calculations are outlined below:

Table 5b – RPD calculations for detected analytes

	Arsenic (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
RPD between 2 samples	46%	45%	77%	7%	55%	54%
PIT1-BASE-NW	5	12	8	15	4	63
PIT1-BASE-NWA	8	19	18	14	7	110

Refer to **Appendix B** – RPD Data

The objectives of DLA Environmental were to provide an indication of contamination within the tank pit on the Site. It is considered that the analytical data generated is of an acceptable degree of accuracy, representativeness, comparability, completeness and precision for the purpose of assessing the soil quality on the Site. Laboratory QA/QC on all samples analysed included calculation of %RPD, matrix spike recovery and blank determinations. Comment on the acceptability of data was given with each analytical report generated.

RESULTS

The results of the soil samples collected from the pit are summarised in the following section. All soils are analysed in accordance with the NSW EPA Guidelines for Assessing Service Station Sites, 1994 and NEPM, 2013.

A total of twelve (12) soil samples including a duplicate were collected on 20th May 2015 for validation and QAQC purposes. 9 samples from the walls of the UFA pit. 3 from the eastern wall at 1.0m, 2.0m and 3.0m BGL. 2 from each of the North, South and West walls at 1.0-2.0m BGL and 2.0-4.0m BGL. 3 samples from the base of the UST pit at 4.0m BGL.

1.13 Field Observations

The surface was capped with light brown sandy fill material. The upper 1m of light brown gravel fill. Grey natural clays with red mottling were encountered from approximately 1m to 4.0m BGL. All walls were scraped back to a natural clay colour and had no discolouration. No free product was observed during the excavation or in the excavated stockpiled materials. The pit had water pooled in the bottom during excavation that had been perched in the automotive waste encountered. This water was mixed with brick and fill material to allow the slurry to be removed and stockpiled adjacent to the automotive waste.

1.14 Soil Chemical Results

Total Recoverable Hydrocarbons (TRHs):

All twelve (12) soil samples returned concentrations of TRH below the laboratory Limit of Reporting (LOR) and subsequently complied with the site criteria. For the ESLs, the clay samples were define as "fine" soil texture, rather than "coarse" for comparison with the NEPM Sch. B1 2013.

Petroleum Hydrocarbons (BTEX):

All twelve (12) soil samples returned concentrations of BTEX including naphthalene below the laboratory Limit of Reporting (LOR) and subsequently complied with the site criteria. The samples also complied with the HSLs for vapour intrusion.

Heavy Metals:

All twelve (12) samples were submitted for analysis of all 8 metal analytes. There were several instances where soil samples returned concentrations of Heavy Metals above the laboratory Limit of Reporting (LOR), however all twelve (12) soil samples were well within the site accepted criteria.

Table 6a – Heavy Metal Results

Sample ID	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (VI) (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
PIT1-NW1	<4	<0.4	8	4	7	<0.1	2	13
PIT1-NW2	<4	<0.4	8	5	8	<0.1	2	12
PIT1-SW1	<4	<0.4	8	5	24	<0.1	2	19
PIT1-SW2	<4	<0.4	11	7	7	<0.1	2	19
PIT1-WW1	<4	<0.4	9	3	43	<0.1	3	13
PIT1-WW2	18	<0.4	11	6	6	<0.1	3	18
PIT1-EW1	5	<0.4	13	5	32	<0.1	2	11
PIT1-EW2	<4	<0.4	7	4	14	<0.1	1	8
PIT1-EW3	<4	<0.4	6	6	5	<0.1	2	12
PIT1-BASE-SW	5	<0.4	8	7	10	0.5	2	19
PIT1-BASE-NW	8	<0.4	12	8	15	<0.1	4	63

MATERIAL REUSE AND DISPOSAL

1.15 UFA Pit Material

The Automotive waste was removed from the Pit and stockpiled separately to other material excavated on site (SP23). The slurry that was removed from the base of the excavation was also stockpiled next to SP23. The final destination for this material following site remediation is to be utilised as part of the 'whole of site' remediation strategy.

1.16 Backfill Soils

The UFA Pit excavation was backfilled with clean red clay and light brown fill material that had been stockpiled separately to material with inclusions from the CBP excavation.

CONCLUSION/DISCUSSION

The pit was validated visually and chemically through a well-defined scope of work resulting in an efficient remediation and validation of the UFA Pit void. No problems were encountered during the validation works. The validation results indicate compliant concentrations of TRH, BTEX, and Heavy metal compounds in the soils surrounding the Automotive Waste excavation. It is therefore the opinion of DLA Environmental that the UFA Pit has been satisfactorily remediated in accordance with the intended land use.

The completion of this report concludes that the validation objectives, according to the acceptance criteria, have been satisfied. The study area is in compliance with NSW EPA Service Station Guidelines, 1994 and is suitable for the proposed most sensitive end land use consistent with Schedule B1 Guideline on the Investigation Levels for Soil and Groundwater from the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 Table 1(A) 1 Column D – Commercial/Industrial.

REFERENCES

NSW EPA (1994), Guidelines for Assessing Service Station Sites.

Contaminated Land Management Act (1997).

Schedule B1 Guideline on the Investigation Levels for Soil and Groundwater from the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013:
- Table 1A(3) soil HSLs for vapour intrusion
- Table 1(A)(5) Column D – Commercial/Industrial.
- Table 1B(6) ESLs for TPH fractions F1 – F4, BTEX and benzo(a)pyrene in soil

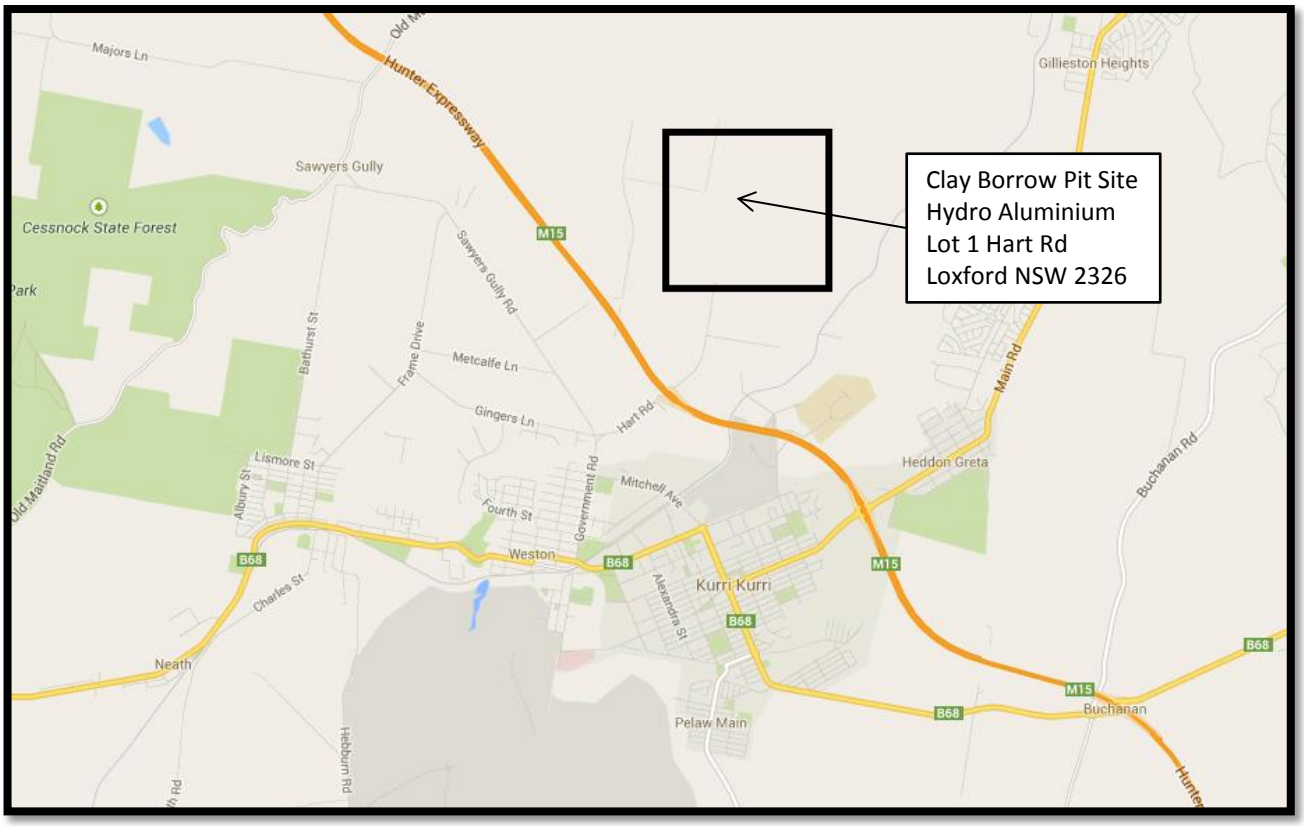
NSW EPA (1995), Contaminated Sites: Sampling Design Guidelines.

NSW EPA Guidelines for the NSW Site Auditor Scheme, second edition 2006.

NSW DECCW 2009 Waste Classification Guidelines.

Figure 1

Site Location



DLA environmental

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Hornsby NSW 2077
2335
Tel: 02-94761765
Fax: 02-94761557

Maitland
42B Church Street
Maitland NSW

Tel: 02-49330001

Title: Clay Borrow Pit Site - Hydro Aluminium
Lot 1 Hart Rd Loxford NSW 2326

Figure:	Project no::
1	DLH1155
Date:	Revision:
16/04/2014	1

Figure 2

Site Layout with Sampling Locations

LEGEND

Clay Borrow Pit Remediation Area

DLA environmental

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Unit 2B/30 Leighton Place
Hornsby NSW 2077
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Fax: 02-94761557

Maitland
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Maitland NSW 2335
Tel: 02-49330001

Title: Hydro Aluminium – Clay Borrow Pit Remediation Area	
Figure: 3	Project no:: DLH1155
Date: 9.4.2014	Revision: 1

A B C D E F G H I J

1 2 3 4 5 6 7 8 9

MW02

STAKE

MOUND

TOP OF BANK

Automotive Waste Find
Automotive Find
Location
Pit Location

MOUND 2

MW03

STAKE

STAKE

MOUND 1

BRICK
PILE

MOUND

TOP OF BANK

MW05

MW04

TRACK

TOP OF BANK

CONCRETE PILE

STAKE

30m

DRAWING NOT TO SCALE

RENNIE GOLLEDGE PTY. LTD.
SURVEYORS & PLANNERS

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DATE: 12/1/15

REF: 309.14

HYDRO ALUMINIUM EXCAVATION SITE 3 KURRI KURRI

ENVIROPACIFIC

Appendix A

NATA Certified Analytical Results

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 128345

Client:

DLA Environmental Services Pty Ltd (Maitland)
42B Church St
Maitland
NSW 2320

Attention: Stephen Challinor

Sample log in details:

Your Reference:	**DLH1155-Hydro CBP**
No. of samples:	12 Soils
Date samples received / completed instructions received	22/05/2015 / 22/05/2015

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	29/05/15 / 27/05/15
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	128345-1	128345-2	128345-3	128345-4	128345-5
Your Reference	----------	PIT1-NW1	PIT1-NW2	PIT1-SW1	PIT1-SW2	PIT1-WW1
Depth	----------	1-2	2-4	1-2	2-4	1-2
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	91	92	94	94

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	128345-6	128345-7	128345-8	128345-9	128345-10
Your Reference	----------	PIT1-WW2	PIT1-EW1	PIT1-EW2	PIT1-EW3	PIT1-BASE-SW
Depth	----------	2-4	1	2	3	4
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	92	89	87	91	91

vTRH(C6-C10)/BTEXN in Soil			
Our Reference:	UNITS	128345-11	128345-12
Your Reference	----------	PIT1-BASE-NW	PIT1-BASE-NWA
Depth	----------	4	4
Date Sampled		20/05/2015	20/05/2015
Type of sample		Soil	Soil
Date extracted	-	25/05/2015	25/05/2015
Date analysed	-	25/05/2015	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25
Benzene	mg/kg	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1
m+p-xylene	mg/kg	<2	<2
o-Xylene	mg/kg	<1	<1
naphthalene	mg/kg	<1	<1
Surrogate aaa-Trifluorotoluene	%	86	91

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	128345-1	128345-2	128345-3	128345-4	128345-5
Your Reference	----------	PIT1-NW1	PIT1-NW2	PIT1-SW1	PIT1-SW2	PIT1-WW1
Depth	----------	1-2	2-4	1-2	2-4	1-2
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	25/05/2015	25/05/2015	26/05/2015	26/05/2015	26/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	68	70	84	76	77

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	128345-6	128345-7	128345-8	128345-9	128345-10
Your Reference	----------	PIT1-WW2	PIT1-EW1	PIT1-EW2	PIT1-EW3	PIT1-BASE-SW
Depth	----------	2-4	1	2	3	4
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	78	79	82	82	82

svTRH (C10-C40) in Soil			
Our Reference:	UNITS	128345-11	128345-12
Your Reference	----------	PIT1-BASE-NW	PIT1-BASE-NWA
Depth	----------	4	4
Date Sampled		20/05/2015	20/05/2015
Type of sample		Soil	Soil
Date extracted	-	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100
Surrogate o-Terphenyl	%	79	74

Acid Extractable metals in soil						
Our Reference:	UNITS	128345-1	128345-2	128345-3	128345-4	128345-5
Your Reference	----------	PIT1-NW1	PIT1-NW2	PIT1-SW1	PIT1-SW2	PIT1-WW1
Depth	----------	1-2	2-4	1-2	2-4	1-2
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Arsenic	mg/kg	<4	<4	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	8	8	8	11	9
Copper	mg/kg	4	5	5	7	3
Lead	mg/kg	7	8	24	7	43
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	2	2	2	3
Zinc	mg/kg	13	12	19	19	13

Acid Extractable metals in soil						
Our Reference:	UNITS	128345-6	128345-7	128345-8	128345-9	128345-10
Your Reference	----------	PIT1-WW2	PIT1-EW1	PIT1-EW2	PIT1-EW3	PIT1-BASE-SW
Depth	----------	2-4	1	2	3	4
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date digested	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Arsenic	mg/kg	18	5	<4	<4	<4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	11	13	7	6	8
Copper	mg/kg	6	5	4	6	7
Lead	mg/kg	6	32	14	5	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.5
Nickel	mg/kg	3	2	1	2	2
Zinc	mg/kg	18	11	8	12	19

Acid Extractable metals in soil			
Our Reference:	UNITS	128345-11	128345-12
Your Reference	----------	PIT1-BASE-NW	PIT1-BASE-NWA
Depth	----------	4	4
Date Sampled		20/05/2015	20/05/2015
Type of sample		Soil	Soil
Date digested	-	26/05/2015	26/05/2015
Date analysed	-	26/05/2015	26/05/2015
Arsenic	mg/kg	5	8
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	12	19
Copper	mg/kg	8	18
Lead	mg/kg	15	14
Mercury	mg/kg	<0.1	<0.1
Nickel	mg/kg	4	7
Zinc	mg/kg	63	110

Moisture						
Our Reference:	UNITS	128345-1	128345-2	128345-3	128345-4	128345-5
Your Reference	----------	PIT1-NW1	PIT1-NW2	PIT1-SW1	PIT1-SW2	PIT1-WW1
Depth	----------	1-2	2-4	1-2	2-4	1-2
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Moisture	%	16	16	16	17	16

Moisture						
Our Reference:	UNITS	128345-6	128345-7	128345-8	128345-9	128345-10
Your Reference	----------	PIT1-WW2	PIT1-EW1	PIT1-EW2	PIT1-EW3	PIT1-BASE-SW
Depth	----------	2-4	1	2	3	4
Date Sampled		20/05/2015	20/05/2015	20/05/2015	20/05/2015	20/05/2015
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	25/05/2015	25/05/2015	25/05/2015	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015	26/05/2015	26/05/2015	26/05/2015
Moisture	%	12	20	14	16	16

Moisture			
Our Reference:	UNITS	128345-11	128345-12
Your Reference	----------	PIT1-BASE-NW	PIT1-BASE-NWA
Depth	----------	4	4
Date Sampled		20/05/2015	20/05/2015
Type of sample		Soil	Soil
Date prepared	-	25/05/2015	25/05/2015
Date analysed	-	26/05/2015	26/05/2015
Moisture	%	13	16

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/05/2015	128345-1	25/05/2015 || 25/05/2015	LCS-8	25/05/2015
Date analysed	-			25/05/2015	128345-1	25/05/2015 || 25/05/2015	LCS-8	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	128345-1	<25 || <25	LCS-8	117%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	128345-1	<25 || <25	LCS-8	117%
Benzene	mg/kg	0.2	Org-016	<0.2	128345-1	<0.2 || <0.2	LCS-8	103%
Toluene	mg/kg	0.5	Org-016	<0.5	128345-1	<0.5 || <0.5	LCS-8	127%
Ethylbenzene	mg/kg	1	Org-016	<1	128345-1	<1 || <1	LCS-8	115%
m+p-xylene	mg/kg	2	Org-016	<2	128345-1	<2 || <2	LCS-8	119%
o-Xylene	mg/kg	1	Org-016	<1	128345-1	<1 || <1	LCS-8	115%
naphthalene	mg/kg	1	Org-014	<1	128345-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	96	128345-1	93 || 86 || RPD: 8	LCS-8	96%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			25/05/2015	128345-1	25/05/2015 || 25/05/2015	LCS-8	25/05/2015
Date analysed	-			25/05/2015	128345-1	25/05/2015 || 25/05/2015	LCS-8	25/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	128345-1	<50 || <50	LCS-8	108%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	128345-1	<100 || <100	LCS-8	109%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	128345-1	<100 || <100	LCS-8	106%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	128345-1	<50 || <50	LCS-8	108%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	128345-1	<100 || <100	LCS-8	109%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	128345-1	<100 || <100	LCS-8	106%
Surrogate o-Terphenyl	%		Org-003	75	128345-1	68 || 91 || RPD: 29	LCS-8	103%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			26/05/2015	128345-1	26/05/2015 || 26/05/2015	LCS-1	26/05/2015
Date analysed	-			26/05/2015	128345-1	26/05/2015 || 26/05/2015	LCS-1	26/05/2015
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	128345-1	<4 || 4	LCS-1	109%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	128345-1	<0.4 || <0.4	LCS-1	101%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	8 || 11 || RPD: 32	LCS-1	104%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	4 || 4 || RPD: 0	LCS-1	101%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	7 || 8 || RPD: 13	LCS-1	100%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	128345-1	<0.1 || <0.1	LCS-1	95%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	2 || 2 || RPD: 0	LCS-1	100%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	128345-1	13 || 14 || RPD: 7	LCS-1	102%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	128345-11	25/05/2015 || 25/05/2015	128345-2	25/05/2015
Date analysed	-	128345-11	25/05/2015 || 25/05/2015	128345-2	25/05/2015
TRHC$_6$ - C$_9$	mg/kg	128345-11	<25 || <25	128345-2	113%
TRHC$_6$ - C$_{10}$	mg/kg	128345-11	<25 || <25	128345-2	113%
Benzene	mg/kg	128345-11	<0.2 || <0.2	128345-2	101%
Toluene	mg/kg	128345-11	<0.5 || <0.5	128345-2	122%
Ethylbenzene	mg/kg	128345-11	<1 || <1	128345-2	111%
m+p-xylene	mg/kg	128345-11	<2 || <2	128345-2	115%
o-Xylene	mg/kg	128345-11	<1 || <1	128345-2	111%
naphthalene	mg/kg	128345-11	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	128345-11	86 || 94 || RPD: 9	128345-2	88%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	128345-11	25/05/2015 || 25/05/2015	128345-2	25/05/2015
Date analysed	-	128345-11	26/05/2015 || 26/05/2015	128345-2	25/05/2015
TRHC$_{10}$ - C$_{14}$	mg/kg	128345-11	<50 || <50	128345-2	104%
TRHC$_{15}$ - C$_{28}$	mg/kg	128345-11	<100 || <100	128345-2	101%
TRHC$_{29}$ - C$_{36}$	mg/kg	128345-11	<100 || <100	128345-2	91%
TRH>C$_{10}$-C$_{16}$	mg/kg	128345-11	<50 || <50	128345-2	104%
TRH>C$_{16}$-C$_{34}$	mg/kg	128345-11	<100 || <100	128345-2	101%
TRH>C$_{34}$-C$_{40}$	mg/kg	128345-11	<100 || <100	128345-2	91%
Surrogate o-Terphenyl	%	128345-11	79 || 78 || RPD: 1	128345-2	104%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	128345-11	26/05/2015 || 26/05/2015	128345-2	26/05/2015
Date analysed	-	128345-11	26/05/2015 || 26/05/2015	128345-2	26/05/2015
Arsenic	mg/kg	128345-11	5 || 7 || RPD: 33	128345-2	87%
Cadmium	mg/kg	128345-11	<0.4 || <0.4	128345-2	97%
Chromium	mg/kg	128345-11	12 || 18 || RPD: 40	128345-2	100%
Copper	mg/kg	128345-11	8 || 10 || RPD: 22	128345-2	96%
Lead	mg/kg	128345-11	15 || 13 || RPD: 14	128345-2	94%
Mercury	mg/kg	128345-11	<0.1 || 0.2	128345-2	108%
Nickel	mg/kg	128345-11	4 || 5 || RPD: 22	128345-2	92%

Client Reference: DLH1155-Hydro CBP

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Zinc	mg/kg	128345-11	63 || 62 || RPD: 2	128345-2	94%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Appendix B

RPD results

Field Duplicate Samples				Site Accepted Criteria mg/kg							
				500	100	CrIII-60% CrVI-500	5000	1500	75	3000	35000
Sample ID	**Depth**	**Date**	**Report**	**Heavy Metals**							
				As	**Cd**	**Cr**	**Cu**	**Pb**	**Hg**	**Ni**	**Zn**
PIT1-BASE-NW	4.00	20-May-15	EnvLab128345	5	nd	12	8	15	nd	4	63
PIT1-BASE-NWA	4.00	20-May-15	EnvLab128345	8	nd	19	18	14	nd	7	110
RPD				46%	0%	45%	77%	7%	0%	55%	54%
Shaded samples = RPD>DQO + concentrations>5xLOR + concentrations >5% difference relative to land use Criteria											

APPENDIX M – QUANLITY ASSURANCE / QUALITY CONTROL

APPENDIX C1 – FIELD QUALITY CONTROL

During the assessment of contaminated sites, the integrity of data collected is considered paramount. With the assessment of the Site, a number of measures were taken to ensure the quality of the data. These included:

Sample Containers

Soil samples collected during the investigation were placed immediately into laboratory prepared glass jars with Teflon lid inserts. Standard identification labels were adhered to each individual container and labelled according to depth, date, sampling team and media collected.

Decontamination

All equipment used in the sampling program which includes a hand auger, spades and mixing bowl was decontaminated prior to use and between samples to prevent cross contamination. Decontamination of equipment involved the following procedures:

- Cleaning equipment in potable water to remove gross contamination;
- Cleaning in a solution of Decon 90; and,
- Rinsing in clean demineralised water then wiping with clean lint free cloths.

Sample Tracking, Identification and Holding Times

All samples were forwarded to Envirolab Services and ASET under recognised chain of custodies with clear identification outlining the date, location, sampler and sample ID. All samples were recorded by the laboratory as meeting their respective holding times. The sample tracking system is considered adequate for the purposes of sample collection.

Sample Transport

All samples were packed into an esky with ice from the time of collection. These were transported under chain of custody from the site to Envirolab Services Pty Ltd and SGS Australia, NATA registered laboratories located in Chatswood and Alexandria respectively. During the project, the laboratory reported that all the samples arrived intact and were analysed within holding times for the respective analytes. Samples were kept below 4°C at all times. All Trip Spike results were within acceptance criteria providing validation that the transport procedures were satisfactory.

Field Duplicate Samples

Field duplicate samples for soil were prepared in the field through the following process:

- A larger than normal quantity of soil is recovered from the sample location selected for duplication;

- The sample is placed in a decontaminated stainless bowl and mixed as thoroughly as practicable before being divided into equal parts;
- Two portions of the sub-sample are immediately transferred, one for an intra-laboratory duplicate and another as a sample; and,
- Samples are placed into a labelled, laboratory supplied 250ml glass jar and sealed with an airtight, Teflon screw top lid. The fully filled jars are labelled as the sample and duplicate and immediately placed in a chilled esky.

Duplicate samples were prepared on the basis of sample numbers recovered during the field work. The duplicate sample frequency was computed using the total number of samples analysed as part of this assessment. The duplicate sample frequencies are shown below:

SOIL SAMPLES	**12 Samples**	1 intra-laboratory duplicate	8.3%

Comparisons were made of the laboratory test results for the duplicate samples with the original samples and the Relative Percentage Difference (RPD) calculated as difference / average in order to assess the accuracy of the sampling and laboratory test procedures. The comparisons between the duplicates and original samples indicate acceptable RPDs when they comply with criteria which are commonly set at:

- Less than 30% for inorganics and 50% for organics;
- Less than five times the Laboratory LOR; and,
- The difference between concentrations is less than 5% of the relevant HIL concentration.

Table C3 gives details of intra laboratory and inter laboratory chemical duplicates.

Table C3 – Calculated Intra-Laboratory RPDs for Heavy Metal Samples

DUPLICATE	HEAVY METALS							
	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
PIT1-BASE-NW	5	nd	12	8	15	nd	4	63
PIT1-BASE-NWA	8	nd	19	18	14	nd	7	110
RPD	46%	0%	45%	77%	7%	0%	55%	54%
Criteria RPD%	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
LOR	**4/3**	**0.5/0.3**	**1/0.3**	**1/0.5**	**1/1**	**0.1/0.05**	**1/0.5**	**1/0.5**

Field duplicates provide an indication of the whole validation process, including the sampling process, sample preparation and analysis. The one intra laboratory duplicate exceeded the DQO of 30% for five heavy metal concentrations. The differences in concentrations of the following intra-laboratory duplicate pairs were for reported concentrations of less than 5% of the relevant HIL concentration:

- PIT1-BASE-NW AND PIT1-BASE-NWA.

It is to be noted that for samples with concentrations of less than the LOR, the concentration has been modified to half the LOR value to assist in statistical RPD calculations and data quality assessment.

APPENDIX C2 – LABORATORY ANALYTICAL AND QUALITY PLAN

The integrity of analytical data provides the second step in the QA/QC process for total data compliance. The data validation techniques adopted by DLA are based upon techniques published by the USEPA and in line with methods and guidelines adopted by the NSW EPA and outlined in the NEPM (NEPC, 2013). Descriptions are provided of the specific mechanisms used in the assessment of accuracy, precision and useability of analytical data within the project.

Blanks

Blanks were used for the identification of false positive data. Laboratory blank samples were analysed. No cross contamination of samples is said to have occurred as a result of laboratory techniques provided all blanks show concentrations below the levels of detection. No results on blank samples were above the level of reporting for any determination during the project.

Spikes and Control Samples

Control sample spikes were utilised for determination of matrix recovery analysis. This involves analysis of spiked control samples and their duplicates, spiked with a known concentration of relative analyte. Accuracy was assessed by calculation of the percent recovery (%R). The duplicate sample spikes were used to assess the precision of the methods used. The recoveries for all matrix spike analysis were within the acceptance criteria of 60-140%.

Duplicates

Laboratory Duplicates are tested to ensure the results meet the requirements of QA/QC. The %RPD for all intra-laboratory duplicates had concentrations that complied with the criteria set for acceptable RPDs.

Surrogates

To assess the performance of individual organic analysis the laboratory used surrogates. Recoveries were calculated for each surrogate providing an indication of analytical accuracy. Surrogate recoveries for soil samples were all within recommended control limits, indicating that there was an acceptable degree of accuracy in analysing for organic compounds.

Laboratory Detection Limits

Laboratory detection limits for soil and water analyses by Envirolab are outlined in **Table C5** below:

Table C5 – Method of Soil Analysis: Envirolab

ANALYTE	METHOD	LEVEL OF REPORTING Soil mg/kg	
PAH	USEPA SW-846 Method 8270,	0.1 (Ind. Analyte)	
Metals	USEPA 200.7 USEPA 7471A	Hg	<0.10
		As-Cd-Cr-Cu	<0.10
		Ni-Pb-Zn	<0.5
Pesticides	USEPA SW-846 Method 8081 USEPA SW-846 Method 8140 USEPA SW-846 Method 8080 USEPA SW-846 Method 8870	OCP	0.10
		OPP	0.10
PCB	USEPA SW-846 Method 8080 USEPA SW-846 Method 8081	PCB	0.10
BTEX	USEPA SW-846 Method 8260	Benzene	1.0
		Toluene	1.0
		Ethylbenzene	1.0
		Total Xylene	3.0
TRH	USEPA SW-846 Method 8260 USEPA SW-846 Method 8000	C6-C9	25
		C10-C14	50
		C15-C28	100
		C29-C36	100

APPENDIX N – AUTOMOTIVE FIND RPD DATA

Field Duplicate Samples				Site Accepted Criteria mg/kg							
				500	100	CrIII-60% CrVI-500	5000	1500	75	3000	35000
Sample ID	**Depth**	**Date**	**Report**	**Heavy Metals**							
				As	**Cd**	**Cr**	**Cu**	**Pb**	**Hg**	**Ni**	**Zn**
PIT1-BASE-NW	4.00	20-May-15	EnvLab128345	5	nd	12	8	15	nd	4	63
PIT1-BASE-NWA	4.00	20-May-15	EnvLab128345	8	nd	19	18	14	nd	7	110
RPD				46%	0%	45%	77%	7%	0%	55%	54%
Shaded samples = RPD>DQO + concentrations>5xLOR + concentrations >5% difference relative to land use Criteria											