ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

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Email	beejal.patel@wsp.com
Project	**PS110641 Wentworthville Public School**
Order Number	(Not specified)
Samples	2

LABORATORY DETAILS

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SGS Reference	**SE181867 R0**
Date Received	25/7/2018
Date Reported	1/8/2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Akheeqar Beniameen
Chemist

Bennet Lo
Senior Organic Chemist/Metals Chemist

Dong Liang
Metals/Inorganics Team Leader

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Teresa Nguyen
Organic Chemist

VOC's in Soil [AN433] Tested: 26/7/2018

PARAMETER	UOM	LOR	QA01A SOIL - 18/7/2018 SE181867.001	QA02A SOIL - 18/7/2018 SE181867.002
Benzene	mg/kg	0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	<0.2
o-xylene	mg/kg	0.1	<0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 26/7/2018

PARAMETER	UOM	LOR	QA01A SOIL - 18/7/2018 SE181867.001	QA02A SOIL - 18/7/2018 SE181867.002
TRH C6-C9	mg/kg	20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 27/7/2018

PARAMETER	UOM	LOR	QA01A SOIL - 18/7/2018 SE181867.001	QA02A SOIL - 18/7/2018 SE181867.002
TRH C10-C14	mg/kg	20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100
TRH >C10-C16	mg/kg	25	<25	<25
TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110
TRH C10-C40 Total (F bands)	mg/kg	210	<210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 27/7/2018

PARAMETER	UOM	LOR	QA01A SOIL - 18/7/2018 SE181867.001	QA02A SOIL - 18/7/2018 SE181867.002
Naphthalene	mg/kg	0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	**0.2**	<0.1
Pyrene	mg/kg	0.1	**0.2**	<0.1
Benzo(a)anthracene	mg/kg	0.1	**0.1**	<0.1
Chrysene	mg/kg	0.1	**0.1**	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	**0.2**	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	**0.1**	<0.1
Benzo(a)pyrene	mg/kg	0.1	**0.1**	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	<0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	**0.2**	<0.2
Total PAH (18)	mg/kg	0.8	**1.0**	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	**1.0**	<0.8

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 30/7/2018

PARAMETER	UOM	LOR	QA01A SOIL - 18/7/2018 SE181867.001	QA02A SOIL - 18/7/2018 SE181867.002
Arsenic, As	mg/kg	1	**8**	**7**
Cadmium, Cd	mg/kg	0.3	**0.4**	<0.3
Chromium, Cr	mg/kg	0.3	**10**	**14**
Copper, Cu	mg/kg	0.5	**21**	**20**
Lead, Pb	mg/kg	1	**66**	**14**
Nickel, Ni	mg/kg	0.5	**4.1**	**1.5**
Zinc, Zn	mg/kg	2	**110**	**13**

Mercury in Soil [AN312] Tested: 30/7/2018

PARAMETER	UOM	LOR	QA01A SOIL - 18/7/2018 SE181867.001	QA02A SOIL - 18/7/2018 SE181867.002
Mercury	mg/kg	0.05	**0.09**	<0.05

Moisture Content [AN002] Tested: 30/7/2018

PARAMETER	UOM	LOR	QA01A SOIL - 18/7/2018 SE181867.001	QA02A SOIL - 18/7/2018 SE181867.002
% Moisture	%w/w	0.5	**12**	**17**

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid , mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser . Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	Carcinogenic PAHs may be expressed as Benzo(a)pyrene equivalents by applying the BaP toxicity equivalence factor (NEPM 1999, June 2013, B7). These can be reported as the individual PAHs and as a sum of carcinogenic PAHs. The sum is reported three ways, the first assuming all <LOR results are zero, the second assuming all < LOR results are half the LOR and the third assuming all <LOR results are the LOR.
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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STATEMENT OF QA/QC PERFORMANCE

SE181867 R0

CLIENT DETAILS

Contact	Beejal Patel
Client	WSP AUSTRALIA PTY LIMITED
Address	Level 27, 680 George St NSW 2000
Telephone	02 9272 1453
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Email	beejal.patel@wsp.com
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LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
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Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE181867 R0**
Date Received	25 Jul 2018
Date Reported	01 Aug 2018

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Duplicate	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	1 item

SAMPLE SUMMARY

HOLDING TIME SUMMARY

SE181867 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QA01A	SE181867.001	LB153036	18 Jul 2018	25 Jul 2018	15 Aug 2018	30 Jul 2018	15 Aug 2018	01 Aug 2018
QA02A	SE181867.002	LB153036	18 Jul 2018	25 Jul 2018	15 Aug 2018	30 Jul 2018	15 Aug 2018	01 Aug 2018

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QA01A	SE181867.001	LB152989	18 Jul 2018	25 Jul 2018	01 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018
QA02A	SE181867.002	LB152989	18 Jul 2018	25 Jul 2018	01 Aug 2018	30 Jul 2018	04 Aug 2018	01 Aug 2018

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QA01A	SE181867.001	LB152902	18 Jul 2018	25 Jul 2018	01 Aug 2018	27 Jul 2018	05 Sep 2018	31 Jul 2018
QA02A	SE181867.002	LB152902	18 Jul 2018	25 Jul 2018	01 Aug 2018	27 Jul 2018	05 Sep 2018	31 Jul 2018

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QA01A	SE181867.001	LB153059	18 Jul 2018	25 Jul 2018	14 Jan 2019	30 Jul 2018	14 Jan 2019	01 Aug 2018
QA02A	SE181867.002	LB153059	18 Jul 2018	25 Jul 2018	14 Jan 2019	30 Jul 2018	14 Jan 2019	01 Aug 2018

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QA01A	SE181867.001	LB152902	18 Jul 2018	25 Jul 2018	01 Aug 2018	27 Jul 2018	05 Sep 2018	31 Jul 2018
QA02A	SE181867.002	LB152902	18 Jul 2018	25 Jul 2018	01 Aug 2018	27 Jul 2018	05 Sep 2018	31 Jul 2018

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QA01A	SE181867.001	LB152854	18 Jul 2018	25 Jul 2018	01 Aug 2018	26 Jul 2018	04 Sep 2018	31 Jul 2018
QA02A	SE181867.002	LB152854	18 Jul 2018	25 Jul 2018	01 Aug 2018	26 Jul 2018	04 Sep 2018	31 Jul 2018

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
QA01A	SE181867.001	LB152854	18 Jul 2018	25 Jul 2018	01 Aug 2018	26 Jul 2018	04 Sep 2018	31 Jul 2018
QA02A	SE181867.002	LB152854	18 Jul 2018	25 Jul 2018	01 Aug 2018	26 Jul 2018	04 Sep 2018	31 Jul 2018

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	QA01A	SE181867.001	%	70 - 130%	84
	QA02A	SE181867.002	%	70 - 130%	82
d14-p-terphenyl (Surrogate)	QA01A	SE181867.001	%	70 - 130%	88
	QA02A	SE181867.002	%	70 - 130%	86
d5-nitrobenzene (Surrogate)	QA01A	SE181867.001	%	70 - 130%	100
	QA02A	SE181867.002	%	70 - 130%	96

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QA01A	SE181867.001	%	60 - 130%	96
	QA02A	SE181867.002	%	60 - 130%	82
d4-1,2-dichloroethane (Surrogate)	QA01A	SE181867.001	%	60 - 130%	104
	QA02A	SE181867.002	%	60 - 130%	88
d8-toluene (Surrogate)	QA01A	SE181867.001	%	60 - 130%	100
	QA02A	SE181867.002	%	60 - 130%	84
Dibromofluoromethane (Surrogate)	QA01A	SE181867.001	%	60 - 130%	94
	QA02A	SE181867.002	%	60 - 130%	80

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	QA01A	SE181867.001	%	60 - 130%	96
	QA02A	SE181867.002	%	60 - 130%	82
d4-1,2-dichloroethane (Surrogate)	QA01A	SE181867.001	%	60 - 130%	104
	QA02A	SE181867.002	%	60 - 130%	88
d8-toluene (Surrogate)	QA01A	SE181867.001	%	60 - 130%	100
	QA02A	SE181867.002	%	60 - 130%	84
Dibromofluoromethane (Surrogate)	QA01A	SE181867.001	%	60 - 130%	94
	QA02A	SE181867.002	%	60 - 130%	80

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB153036.001	Mercury	mg/kg	0.05	<0.05

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB152902.001		Naphthalene	mg/kg	0.1	<0.1
		2-methylnaphthalene	mg/kg	0.1	<0.1
		1-methylnaphthalene	mg/kg	0.1	<0.1
		Acenaphthylene	mg/kg	0.1	<0.1
		Acenaphthene	mg/kg	0.1	<0.1
		Fluorene	mg/kg	0.1	<0.1
		Phenanthrene	mg/kg	0.1	<0.1
		Anthracene	mg/kg	0.1	<0.1
		Fluoranthene	mg/kg	0.1	<0.1
		Pyrene	mg/kg	0.1	<0.1
		Benzo(a)anthracene	mg/kg	0.1	<0.1
		Chrysene	mg/kg	0.1	<0.1
		Benzo(a)pyrene	mg/kg	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	106
		2-fluorobiphenyl (Surrogate)	%	-	84
		d14-p-terphenyl (Surrogate)	%	-	90

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB153059.001	Arsenic, As	mg/kg	1	<1
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Nickel, Ni	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Zinc, Zn	mg/kg	2	<2.0

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB152902.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB152854.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	97
		d4-1,2-dichloroethane (Surrogate)	%	-	90
		d8-toluene (Surrogate)	%	-	94
		Bromofluorobenzene (Surrogate)	%	-	91
	Totals	Total BTEX	mg/kg	0.6	<0.6

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Volatile Petroleum Hydrocarbons in Soil (continued) — **Method: ME-(AU)-[ENV]AN433**

Sample Number		Parameter	Units	LOR	Result
LB152854.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	97
		d4-1,2-dichloroethane (Surrogate)	%	-	90
		d8-toluene (Surrogate)	%	-	94

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181859.012	LB153036.014	Mercury	mg/kg	0.05	0.020004186	4 0.021585789	2 200	0
SE182001.005	LB153036.024	Mercury	mg/kg	0.05	0.091779689	3 0.077699779	4 89	17

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181858.006	LB152989.022	% Moisture	%w/w	0.5	8.9931573802	9.267912772	5 41	3
SE181858.016	LB152989.033	% Moisture	%w/w	0.5	11.165048543	6 12.5	38	11
SE182001.007	LB152989.044	% Moisture	%w/w	0.5	17.048579285	06.330785267	5 36	4
SE182003.008	LB152989.011	% Moisture	%w/w	0.5	22	19	35	14

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181867.001	LB152902.024		Naphthalene	mg/kg	0.1	<0.1	0	200	0
			2-methylnaphthalene	mg/kg	0.1	<0.1	0	200	0
			1-methylnaphthalene	mg/kg	0.1	<0.1	0.01	200	0
			Acenaphthylene	mg/kg	0.1	<0.1	0.04	200	0
			Acenaphthene	mg/kg	0.1	<0.1	0.02	200	0
			Fluorene	mg/kg	0.1	<0.1	0.02	200	0
			Phenanthrene	mg/kg	0.1	<0.1	0.06	197	0
			Anthracene	mg/kg	0.1	<0.1	0.05	200	0
			Fluoranthene	mg/kg	0.1	0.2	0.28	71	29
			Pyrene	mg/kg	0.1	0.2	0.28	71	29
			Benzo(a)anthracene	mg/kg	0.1	0.1	0.15	104	22
			Chrysene	mg/kg	0.1	0.1	0.15	104	22
			Benzo(b&j)fluoranthene	mg/kg	0.1	0.2	0.19	87	17
			Benzo(k)fluoranthene	mg/kg	0.1	0.1	0.11	125	10
			Benzo(a)pyrene	mg/kg	0.1	0.1	0.13	110	8
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	0.07	197	0
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	0.01	200	0
			Benzo(ghi)perylene	mg/kg	0.1	<0.1	0.07	200	0
			Carcinogenic PAHs, BaP TEQ <LOR=0	mg/kg	0.2	<0.2	0.1765	129	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	mg/kg	0.3	<0.3	0.2875	118	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	mg/kg	0.2	0.2	0.232	100	8
			Total PAH (18)	mg/kg	0.8	1.0	1.29	99	21
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.51	30	2
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.43	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.43	30	2

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181859.012	LB153059.014	Arsenic, As	mg/kg	1	2.731214501	54.360540983	6 58	46
		Cadmium, Cd	mg/kg	0.3	0.060797583	00.119795081	9 200	0
		Chromium, Cr	mg/kg	0.3	9.535867069	420.738924590	1 33	74 ②
		Copper, Cu	mg/kg	0.5	5.710296072	54.906806557	3 39	15
		Nickel, Ni	mg/kg	0.5	3.423371601	23.291968852	4 45	4
		Lead, Pb	mg/kg	1	16.94381873	120.97372295	08 35	21
		Zinc, Zn	mg/kg	2	28.22410876	1326.49388032	78 37	6
SE182001.005	LB153059.024	Arsenic, As	mg/kg	1	1.182104775	11.292299137	9 111	9
		Cadmium, Cd	mg/kg	0.3	0.107464070	40.069478448	2 200	0
		Chromium, Cr	mg/kg	0.3	1.864088299	22.070457758	6 55	10
		Copper, Cu	mg/kg	0.5	4.025769409	04.289136206	8 42	6
		Nickel, Ni	mg/kg	0.5	0.772914660	60.856900862	0 91	10
		Lead, Pb	mg/kg	1	12.80062408	617.02221982	75 37	28
		Zinc, Zn	mg/kg	2	13.06515102	884.96102586	2C 44	14

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181867.001	LB152902.023	TRH C10-C14	mg/kg	20	<20	0	200	0
		TRH C15-C28	mg/kg	45	<45	0	200	0
		TRH C29-C36	mg/kg	45	<45	0	200	0
		TRH C37-C40	mg/kg	100	<100	0	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181867.001	LB152902.023		TRH C10-C36 Total	mg/kg	110	<110	0	200	0
			TRH C10-C40 Total (F bands)	mg/kg	210	<210	0	200	0
		TRH F Bands	TRH >C10-C16	mg/kg	25	<25	0	200	0
			TRH >C10-C16 - Naphthalene (F2)	mg/kg	25	<25	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	0	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	0	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181859.010	LB152854.014	Monocyclic	Benzene	mg/kg	0.1	0	0	200	0
		Aromatic	Toluene	mg/kg	0.1	0.01	0.01	200	0
			Ethylbenzene	mg/kg	0.1	0	0	200	0
			m/p-xylene	mg/kg	0.2	0.02	0.02	200	0
			o-xylene	mg/kg	0.1	0.01	0.01	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	0	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.37	4.18	50	4
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.44	4.21	50	5
			d8-toluene (Surrogate)	mg/kg	-	4.61	4.42	50	4
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.44	4.41	50	1
		Totals	Total Xylenes	mg/kg	0.3	0.03	0.03	200	0
			Total BTEX	mg/kg	0.6	0.04	0.04	200	0
SE181867.002	LB152854.025	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	4.2	50	5
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	4.7	50	5
			d8-toluene (Surrogate)	mg/kg	-	4.2	4.5	50	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.1	4.4	50	6
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE181859.010	LB152854.014		TRH C6-C10	mg/kg	25	1.26	0	200	0
			TRH C6-C9	mg/kg	20	1.77	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.37	4.18	30	4
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.44	4.21	30	5
			d8-toluene (Surrogate)	mg/kg	-	4.61	4.42	30	4
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.44	4.41	30	1
		VPH F Bands	Benzene (F0)	mg/kg	0.1	0	0	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	1.22	-0.04	200	0
SE181867.002	LB152854.025		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	4.2	30	5
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.4	4.7	30	5
			d8-toluene (Surrogate)	mg/kg	-	4.2	4.5	30	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.1	4.4	30	6
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB153036.002	Mercury	mg/kg	0.05	0.19	0.2	70 - 130	95

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB152902.002		Naphthalene	mg/kg	0.1	4.6	4	60 - 140	116
		Acenaphthylene	mg/kg	0.1	4.6	4	60 - 140	115
		Acenaphthene	mg/kg	0.1	4.4	4	60 - 140	109
		Phenanthrene	mg/kg	0.1	4.6	4	60 - 140	114
		Anthracene	mg/kg	0.1	4.4	4	60 - 140	110
		Fluoranthene	mg/kg	0.1	4.5	4	60 - 140	113
		Pyrene	mg/kg	0.1	4.5	4	60 - 140	112
		Benzo(a)pyrene	mg/kg	0.1	4.2	4	60 - 140	106
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	102
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	82
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	84

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB153059.002	Arsenic, As	mg/kg	1	340	336.32	79 - 120	100
	Cadmium, Cd	mg/kg	0.3	430	416.6	69 - 131	102
	Chromium, Cr	mg/kg	0.3	39	35.2	80 - 120	112
	Copper, Cu	mg/kg	0.5	380	370.46	80 - 120	103
	Nickel, Ni	mg/kg	0.5	200	210.88	79 - 120	97
	Lead, Pb	mg/kg	1	100	107.87	79 - 120	94
	Zinc, Zn	mg/kg	2	290	301.27	80 - 121	96

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB152902.002		TRH C10-C14	mg/kg	20	31	40	60 - 140	78
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	88
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	93
	TRH F Bands	TRH >C10-C16	mg/kg	25	31	40	60 - 140	78
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	113
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	95

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB152854.002	Monocyclic	Benzene	mg/kg	0.1	3.8	2.9	60 - 140	129
	Aromatic	Toluene	mg/kg	0.1	2.6	2.9	60 - 140	89
		Ethylbenzene	mg/kg	0.1	2.5	2.9	60 - 140	85
		m/p-xylene	mg/kg	0.2	5.8	5.8	60 - 140	101
		o-xylene	mg/kg	0.1	2.6	2.9	60 - 140	89
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.9	5	60 - 140	98
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.1	5	60 - 140	102
		d8-toluene (Surrogate)	mg/kg	-	4.9	5	60 - 140	98
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.2	5	60 - 140	104

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB152854.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	97
		TRH C6-C9	mg/kg	20	20	23.2	60 - 140	88
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.9	5	60 - 140	98
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.1	5	60 - 140	102
		d8-toluene (Surrogate)	mg/kg	-	4.9	5	60 - 140	98
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.2	5	60 - 140	104
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	92

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE181859.003	LB153036.004	Mercury	mg/kg	0.05	0.25	0.01469742026	0.2	117

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE181859.003	LB153059.004	Arsenic, As	mg/kg	1	51	4.18828397212	50	94
		Cadmium, Cd	mg/kg	0.3	52	0.07382404181	50	103
		Chromium, Cr	mg/kg	0.3	60	6.41777003484	50	107
		Copper, Cu	mg/kg	0.5	63	4.87238675958	50	115
		Nickel, Ni	mg/kg	0.5	54	1.78162020905	50	105
		Lead, Pb	mg/kg	1	71	20.80361498257	50	99
		Zinc, Zn	mg/kg	2	72	20.2523954703	50	103

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE181859.001	LB152854.004	Monocyclic	Benzene	mg/kg	0.1	3.8	0	2.9	130
		Aromatic	Toluene	mg/kg	0.1	2.7	0.01	2.9	92
			Ethylbenzene	mg/kg	0.1	2.1	0.01	2.9	73
			m/p-xylene	mg/kg	0.2	5.4	0.03	5.8	93
			o-xylene	mg/kg	0.1	2.4	0.01	2.9	84
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	0	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.6	4.9	-	93
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.0	5.07	-	99
			d8-toluene (Surrogate)	mg/kg	-	4.7	4.82	-	94
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	4.7	-	96
		Totals	Total Xylenes	mg/kg	0.3	7.9	0.04	-	-
			Total BTEX	mg/kg	0.6	16	0.06	-	-

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE181859.001	LB152854.004		TRH C6-C10	mg/kg	25	<25	0	24.65	95
			TRH C6-C9	mg/kg	20	<20	0	23.2	83
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.6	4.9	-	93
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.0	5.07	-	99
			d8-toluene (Surrogate)	mg/kg	-	4.7	4.82	-	94
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.8	4.7	-	96
		VPH F	Benzene (F0)	mg/kg	0.1	3.8	0	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	-0.06	7.25	98

MATRIX SPIKE DUPLICATES

SE181867 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

APPENDIX J

QAQC RESULTS

Table H1
Wentworthville Public School DSI
70-100 Fullagar Road, Wentworthville, NSW

		F1: C6-C10 less BTEX	F2: >C10-C16 less naphthalene	>C10-C16	F3: >C16-C34	F4: >C34-C40	Total >C10 - C40	Benzene	Toluene	Ethylbenzene	m- & p-Xylene	o-Xylene	Total xylene	Naphthalene
BH08_0.3	608844	< 20	<50	<50	<100	<100	<100	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	<0.3	< 0.5
QA01	608844	< 20	<50	<50	<100	<100	<100	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	<0.3	< 0.5
RPD (%)		-	-	-	-	-	-	-	-	-	-	-	-	-
BH08_0.3	608844	< 20	<50	<50	*<100*	*<100*	*<100*	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	<0.3	< 0.5
QA01A	SE181867	< 25	<25	<25	<90	<120	<210	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	< 0.1
RPD (%)		-	-	-	-	-	-	-	-	-	-	-	-	-
TP20_0.5	608844	< 20	<50	<50	<100	<100	<100	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	<0.3	< 0.5
QA02	608844	< 20	<50	<50	<100	<100	<100	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	<0.3	< 0.5
RPD (%)		-	-	-	-	-	-	-	-	-	-	-	-	-
TP20_0.5	608844	< 20	<50	<50	*<100*	*<100*	*<100*	< 0.1	< 0.1	< 0.1	< 0.2	< 0.1	<0.3	< 0.5
QA02A	SE181867	< 25	<25	<25	<90	<120	<210	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	< 0.1
RPD (%)		-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
All results are expressed in mg/kg for soil or µg/L for groundwater
Italics: A value equal to the PQL has been used for the calculation of RPDs

BOLD RPD exceeds acceptable levels.

Table H2
Wentworthville Public School DSI
70-100 Fullagar Road, Wentworthville, NSW

		Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1.2.3.cd)pyrene	Dibenz(a.h)anthracene	Benzo(g.h.i)perylene	Total PAH	Benzo(a)pyrene TEQ
BH08_0.3	608844	<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
QA01	608844	<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
RPD (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH08_0.3	608844	<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
QA01A	SE181867	<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
RPD (%)		-	-	-	**-**	**-**	**-**	-	**-**	-	**-**	-	**-**	-	-	**-**	-	**-**	-
TP20_0.5	608844	<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
QA02	608844	<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
RPD (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP20_0.5	608844	<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
QA02A	SE181867	<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
RPD (%)		-	-	-	**-**	**-**	**-**	-	**-**	-	**-**	-	**-**	-	-	**-**	-	**-**	-

Notes:
All results are expressed in mg/kg
Italics: A value equal to the PQL has been used for the calculation of RPDs

BOLD RPD exceeds acceptable levels.

Table H3
Wentworthville Public School DSI
70-100 Fullagar Road, Wentworthville, NSW

		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
BH08_0.3	608844	16	< 0.4	20	32	99	< 0.1	9.9	200
QA01	608844	16	< 0.4	20	26	85	< 0.1	8.4	170
RPD (%)		0%	-	0%	21%	15%	-	16%	16%
BH08_0.3	608844	16	< 0.4	20	32	99	< 0.1	9.9	200
QA01A	SE181867	8	0.4	10	21	66	0.09	4.1	110
RPD (%)		**67%**	-	**67%**	42%	40%	-	40%	**58%**
TP20_0.5	608844	20	< 0.4	25	42	25	< 0.1	6.4	28
QA02	608844	*17*	< 0.4	19	31	19	< 0.1	*5*	21
RPD (%)		16%	-	27%	30%	27%	-	25%	29%
TP20_0.5	608844	20	< 0.4	25	42	25	< 0.1	6.4	28
QA02A	SE181867	7	<0.3	14	20	14	<0.05	1.5	13
RPD (%)		**96%**	-	**56%**	**71%**	**56%**	-	**124%**	**73%**

Notes:
All results are expressed in mg/kg
Italics: A value equal to the PQL has been used for the calculation of RPDs

BOLD RPD exceeds acceptable levels.

Table H4 Summary results of QA/QC - Rinsates and trip blanks

Wentworthville Public School DSI

70-100 Fullagar Road, Wentworthville, NSW

Type of sample	Rinsate blanks	Trip blanks/spikes	
Sample ID	RB01	TRIP BLANK	TRIP SPIKE
Date sampled	18/07/18	18/07/18	18/07/18
Laboratory report no.	608844	608844	608844
Total recoverable hydrocarbons			
F1: C6-C10 less BTEX	-	-	
F2: >C10-C16 less naphthalene	-	-	-
>C10-C16	-	-	-
F3: >C16-C34	-	-	-
F4: >C34-C40	-	-	-
Total >C10 - C40	-	-	-
C6-C9	-	-	-
C10-C14	-	-	-
C15-C28	-	-	-
C29-C36	-	-	-
Total C10-C36	-	-	-
Aromatic hydrocarbons			
Benzene	<1	<0.1	100%
Toluene	<1	<0.1	110%
Ethylbenzene	<1	<0.1	110%
m- & p-Xylene	<2	<0.2	110%
o-Xylene	<1	<0.1	110%
Total Xylenes	<3	<0.3	110%
Naphthalene	<10	<0.5	-
Polycyclic aromatic hydrocarbons			
Naphthalene	-	-	-
Acenaphthylene	-	-	-
Acenaphthene	-	-	-
Fluorene	-	-	-
Phenanthrene	-	-	-
Anthracene	-	-	-
Fluoranthene	-	-	-
Pyrene	-	-	-
Benz(a)anthracene	-	-	-
Chrysene	-	-	-
Benzo(b+j)fluoranthene	-	-	-
Benzo(k)fluoranthene	-	-	-
Benzo(a)pyrene	-	-	-
Indeno(1.2.3.cd)pyrene	-	-	-
Dibenz(a.h)anthracene	-	-	-
Benzo(g.h.i)perylene	-	-	-
Total PAH	-	-	-
Benzo(a)pyrene TEQ	-	-	-
Total dissolved metals			
Arsenic	-	-	
Cadmium	-	-	
Chromiium	-	-	
Copper	-	-	
Nickel	-	-	
Lead	-	-	
Zinc	-	-	
Mercury	-	-	

APPENDIX K

AIR MONITORING RESULTS

WSP Australia Pty Limited

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ABN 80 078 004 798

NCSI Certified Quality System ISO 9001

Certificate of Analysis

LOCATION:	**Wentworthville Public School**	**CERTIFICATE NO:**	**SYD-PS110491-0001-99173**
CLIENT:	Fulton Trotter Architects	DATE\S SAMPLED:	18/07/2018
CLIENT ADDRESS:	PO BOX 1669, Bondi NSW 1355	DATE RECEIVED:	19/07/2018
TELEPHONE:	02 8383 5151	DATE ANALYSED:	19/07/2018
EMAIL:	johnw@fultontrotter.com.au	ORDER NUMBER:	NA
CONTACT:	John Ward	SAMPLED BY:	Dan Sharkey

TEST METHOD: Filters examined at WSP's Sydney Laboratory in accordance with N.O.H.S.C (April 2005) Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, WSP's Laboratory Procedure (LP4 Counting of Asbestos and Synthetic Mineral Fibres) and NATA Accreditation No:17199, accredited for compliance with ISO/IEC:17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standard

Lab No	Sample ID	Location	Results (Fibres/Field)	Concentration (Fibres/mL)
Background:				
001	645	On fencing adjacent test pit 8	0.0 / 100	<0.01
002	639	South elevation on demountable entry	1.0 / 100	<0.01
003	638	North east elevation adjacent test pit 16	0.0 / 100	<0.01
004	595	North east elevation adjacent test pit 18	0.0 / 100	<0.01
005	637	Eastern elevation adjacent entry gate	0.0 / 100	<0.01
006	634	South east elevation adjacent test pit 21	1.0 / 100	<0.01

NB: If the fibre count is less than 10 fibres per 100 fields then the count is not significantly above that of background. Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust. [N.O.H.S.C.:3003 (2005)]

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

Approved Counter

Name: Melanie Reed

Approved Signatory

Name: Clare Brockbank

AUTHORISATION DATE

Thursday, 19 July 2018

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ABN 80 078 004 798

NCSI Certified Quality System ISO 9001

Certificate of Analysis

LOCATION:	**Wentworthville Public School**	**CERTIFICATE NO:**	**SYD-PS110491-0001-99299-RevA**
CLIENT:	Fulton Trotter Architects	DATE\S SAMPLED:	19/07/2018
CLIENT ADDRESS:	PO BOX 1669, Bondi NSW 1355	DATE RECEIVED:	19/07/2018
TELEPHONE:	02 8383 5151	DATE ANALYSED:	19/07/2018
EMAIL:	johnw@fultontrotter.com.au	ORDER NUMBER:	N/A
CONTACT:	John Ward	SAMPLED BY:	Dan Sharkey

TEST METHOD: Filters examined at WSP's Sydney Laboratory in accordance with N.O.H.S.C (April 2005) Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, WSP's Laboratory Procedure (LP4 Counting of Asbestos and Synthetic Mineral Fibres) and NATA Accreditation No:17199, accredited for compliance with ISO/IEC:17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standard

This Certificate Replaces Certificate No. SYD-PS110491-0001-99299.

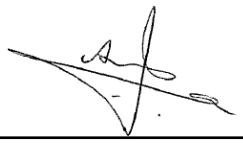
Lab No	Sample ID	Location	Results (Fibres/Field)	Concentration (Fibres/mL)
Background:				
001	632	Southern elevation, on boundary fence adjacent test pit 21	1.0 / 100	<0.01
002	599	Eastern elevation, on boundary fence adjacent test pit 19	0.0 / 100	<0.01
003	613	Northern elevation, boundary fence adjacent test pit 07	1.0 / 100	<0.01
004	649	Central location, in quiet area adjacent pit 5	0.0 / 100	<0.01

NB: If the fibre count is less than 10 fibres per 100 fields then the count is not significantly above that of background. Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust. [N.O.H.S.C.:3003 (2005)]

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

Approved Counter

Name: Sneha Shakya



Approved Signatory

Name: Clare Brockbank

AUTHORISATION DATE

Friday, 10 August 2018

APPENDIX I – Asbestos Management Plan

WALAN (NSW) PTY LTD

ASBESTOS MANAGEMENT PLAN

WENTWORTHVILLE PUBLIC SCHOOL
70-100 FULLAGAR ROAD,
WENTWORTHVILLE,
NSW 2145

NOVEMBER 2019

Question today
Imagine tomorrow
Create for the future

Asbestos Management Plan
Wentworthville Public School
70-100 Fullagar Road, Wentworthville, NSW 2145

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REV	DATE	DETAILS
A	06/11/2019	Final
B	07/11/2019	Revision
C	12/11/2019	Revision
D	19/11/2019	Revision

	NAME	DATE	SIGNATURE
Prepared by:	Christopher Virtue	19/11/2019	
Reviewed by:	Prasanna Pichai	19/11/2019	
Approved by:	Matt Murray	19/11/2019	

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

ABBREVIATIONS

ACM	Asbestos-containing materials
AMP	Asbestos management plan
ARCP	Asbestos removal control plan
DoE AMP	Department of Education Asbestos Management Plan
mAHD	Metres Australian Height Datum
mBGL	Metres below ground level
NEPM	National Environment Protection (Assessment of Site Contamination) Measure 2013
NSW EPA	New South Wales Environment Protection Authority
POEO Act	Protection of the Environment Operations Act 1997
RAP	Remediation Action Plan
SWMS	Safe work method statement

1 INTRODUCTION

1.1 BACKGROUND

WSP Australia Pty Ltd (WSP) was commissioned by Walan NSW Pty Ltd (the client) to prepare this asbestos management plan (AMP) for the proposed demolition/redevelopment of a portion of Wentworthville Public School, 70-100 Fullagar Road, Wentworthville, NSW 2145. This AMP only applies to the developable portion of Wentworthville Public School with the areas nominated as 'the site' and illustrated in Figure 1, Appendix A.

It is WSP's understanding that development works comprise the demolition of nominated demountable buildings including the removal of hazardous materials. Following demolition works, asbestos-contaminated soils within the proposed development portion of the school will be remediated as per recommendations of the WSP Remedial Action Plan (RAP) issued in September 2018. It is WSP's understanding that portions of asbestos impacted fill are surplus to site requirements, and as such offsite disposal will be required in conjunction with onsite capping of remaining in-situ impacted fill.

Asbestos impacted soils have been historically identified onsite, with emu-picking and capping of impacted areas undertaken in 2006. During the Detailed Site Investigation undertaken by WSP (2018), asbestos containing materials were identified in the form of non-friable fibre cement fragments on the ground surface and within a test pit located in fill materials. Friable asbestos in the form of loose-fibre bundles were identified within a borehole situated in the southern portion of the site. Considering the heterogeneity of fill material onsite and potential for further friable asbestos, asbestos removal works must be undertaken under friable asbestos controls.

This AMP is required under the *Work Health and Safety Regulations 2017* and has been developed specifically to outline the necessary requirements for the ongoing management of asbestos at the site during development works. This includes recommendations for proposed strategies for handling, removal, transportation and disposal procedures. The AMP identifies the potential hazards associated with the site in its current condition and outlines management strategies to mitigate these hazards during proposed site works.

The risk to human health associated with the project is considered to be low if managed in accordance with this AMP. This AMP will need to be reviewed and updated in the event that the site is developed for other uses or if site conditions change.

1.2 OBJECTIVES

The objectives of the AMP are to outline the required procedures for the handling of asbestos containing materials and asbestos impacted soils during the development in accordance with relevant National Codes of Practice and Work Health and Safety (WHS) Legislation. Specifically, the objectives are to provide:

- documentation of the existing extent of asbestos impacted soils at the site;
- safe work procedures required to ensure that works are carried out in such a way as to minimise potential health effects to both personnel engaged in the works and any health risks to the public or the operational school;
- procedures required to ensure that all personnel engaged in the works comply with the terms and conditions of the AMP;
- ongoing management requirements of the site to ensure that the risk posed by any potential asbestos impact at the site is properly managed; and
- assign responsibilities under the AMP, provide contingency plans and timeframes for application of the AMP.

1.3 CONTAMINANT TYPE AND EXPOSURE PATHWAYS

Non-friable asbestos in the form of ACM is defined by Safe Work Australia (2016) as being *"...material containing asbestos that is not friable asbestos, including material containing asbestos fibres reinforced with a bonding compound."* Mechanical disturbance of fragments of ACM may result in the release of fibres and therefore, such activities should be managed to prevent any fibres becoming airborne. The health effects of asbestos are detailed in enHealth (2005) *Management of Asbestos in the Non-Occupational Environment*. For asbestos, the exposure pathway comprises solely inhalation of fibres that may be generated from the disturbance of asbestos fragments.

Friable asbestos (AF/FA) is defined by Safe Work Australia (2016) as being *"...material that is in a powder form or that can be crumbled, pulverised or reduced to a powder by hand pressure when dry, and contains asbestos*". Asbestos fibres can range in size from 0.1 to 10 microns (1/10 the size of a grain of sand), and are a potent particulate respiratory hazard. The small fibres gain relatively easy access to the lung airways and air sacs. Damage to the respiratory tract generally tends to be time/dose dependent. An individual exposed to high doses of asbestos for long periods of time will have an increased risk of developing asbestos related diseases. In addition, the effects of asbestos related diseases are usually not detectable for 1 to 30 years after the initial exposure. This is called the latency period, and is a distinguishing feature of asbestos related diseases.

At the time of document submission, friable and non-friable asbestos has been identified in fill materials as per the documentation and anecdotal evidence provided to WSP. The extent of asbestos impact within site soils are presented in Figure 1, Appendix A.

2 APPLICATION AND RESPONSIBILITES OF THE AMP

2.1 APPLICATION OF AMP

This AMP shall apply from the commencement of ground disturbance works within the site until appropriate removal strategies have been validated.

The responsibilities for site asbestos management apply to all works from the commencement of civil works/demolition until the completion of the development, except where a more specific asbestos management or works plan will be provided by a person conducting business or undertaking (PCBU), i.e., a detailed asbestos removal plan.

2.2 PRINCIPAL CONTRACTOR RESPONSIBILITY

In accordance with the *Work Health and Safety Regulation 2017*, a principal contractor (Person Conducting a Business or Undertaking) shall be appointed for the proposed works. The principal contractor must:

- be responsible for the proposed project work at all times until the work is completed;
- ensure that all persons involved with proposed project work have undertaken occupational health and safety training;
- keep records of induction training for site workers and any site specific training;
- ensure that any subcontractors provide safe work method statements for the activities for which they are engaged;
- monitor any subcontractors to ensure that they are complying with the safe work method statements;
- maintain a hazardous substances register for all hazardous substances used or present on site; and
- comply with occupational health and safety and environmental legislation, regulations, standards, codes and the site-specific rules relating to safety contained in this AMP and the overarching Department of Education Asbestos Management Plan (DoE AMP).

2.3 LICENSED ASBESTOS REMOVALIST

A Class A (friable and non-friable) licensed asbestos removal contractor shall be engaged to supervise/manage the asbestos impacted material relocation/removal and other associated asbestos related works. WSP notes that site fill materials have been identified as containing non-friable and friable asbestos containing materials, hence a Class A licensed asbestos removal contractor is to be engaged for all asbestos in soils related works on site.

The licensed asbestos removal contractor will be the primary person responsible and in charge for works on site involving ACM. Their responsibilities include:

- Notifying SafeWork NSW and preparing a site-specific Asbestos Removal Control Plan (ARCP) prior to any asbestos removal works being completed;
- ensuring compliance with relevant legislation and the conditions of this AMP and over-arching DoE AMP;
- ensuring handling and management of asbestos contaminated soils at the site is in accordance with relevant legislation;

— ensuring appropriate environmental and safety controls outlined in this AMP are maintained for the duration of the works; and

— assisting all site sub-contractors, where required, in complying with relevant legislation and the procedures outlined in this AMP.

2.4 OCCUPATIONAL HYGIENIST

Occupational hygiene panel contractors (contractors nominated to perform occupational hygiene works in accordance with the Department of Education AMP) in the form of Licensed Asbestos Assessors (LAAs) shall be engaged to assess any suspected asbestos containing materials when required and perform air-borne asbestos monitoring for the duration of asbestos related site activities:

The occupational hygienist (LAA) will:

— complete static asbestos air monitoring during asbestos removal works as well as the excavation and transport of impacted materials until such time that the final clearance inspection has been completed. All daily results of air monitoring activities are to be displayed or be readily available for the information of site workers. All air monitoring events shall be undertaken in accordance with the *National Occupational Health and Safety Commission's Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC: 3003(2005)];

— conduct clearance inspections, undertake validation sampling as required, prepare clearance certificates;

— Provide site specific asbestos awareness training for all contractors who may be impacted or involved with asbestos related tasks and maintain a register until the completion of works (if engaged for fulltime site supervision);

— audit asbestos controls and provide advice in relation to the management of asbestos issues associated with the development (if engaged for fulltime site supervision); and

— ensure that the licensed asbestos removalist complies with the AMP (if engaged for fulltime site supervision).

3 TRAINING, AWARENESS AND LEGISLATIVE REQUIREMENTS

The Principal Contractor must not allow any person to carry out project works unless he/she is satisfied that the person has undergone WHS induction training.

Work undertaken at the site is to be managed in accordance with regulatory requirements and the management systems of the site owner/operator. Prior to the commencement of any task, a safe work method statement (SWMS)/job hazard assessment (JHA) must be prepared to identify any potential for workers to be exposed to contaminants of concern.

In addition, all workers that will conduct work potentially involving asbestos on the site should have undertaken asbestos awareness training (either formal or in-formal, site specific) to ensure that workers on the site are familiar with the risks posed from asbestos and asbestos controls.

3.1 NON-COMPLIANCE WITH THE AMP

Non-compliance with the intent and procedures of the AMP may occur during the implementation of the AMP. Where a non-compliance is identified by a responsible organisation, they shall inform the site operator of the non-compliance in writing. The site operator shall have the responsibility of informing the non-complying party in writing of the non-compliance. The non-compliant party will be required to rectify the non-conformity as soon as possible, as per the requirements of the relevant procedure(s) where the non-compliance has occurred. Detail of the action taken to rectify the non-compliance shall be provided to the site owner. Where a non-compliance cannot be rectified, the AMP is to be reviewed.

3.2 LEGISLATIVE REQUIREMENTS AND GUIDELINES

Key legislation relevant to contaminated soil and asbestos related management is listed in Table 3.1 below.

Table 3.1 Key legislation and guidelines

RELEVANT KEY LEGISLATION AND GUIDELINES	APPLICABLE TO PROJECT
Contaminated Land Management Act 1997.	Establishes a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to the environment.
Protection of the Environment Operations Act 1997 (POEO Act) and *Protection of the Environment Operations Regulation 1997* (POEO Regulation)	This Act provides for the control of polluting activities in NSW in order to prevent pollution of the environment. Offences exist in relation to activities that cause water, soil and air pollution. The Regulation details requirements in relation to transportation, collection, storage or disposal of asbestos waste.
Landcom 2004, *Managing Urban Stormwater: Soils and Construction*.	Provides guidance on erosion control measures to be implemented during land development activities.
NSW EPA 2014, *Waste Classification Guidelines*.	Defines types of wastes, procedures for assessing waste, waste storage and disposal requirements, record keeping and licence requirements.

RELEVANT KEY LEGISLATION AND GUIDELINES	APPLICABLE TO PROJECT
Contaminated land management Guidelines for the NSW Site Auditor Scheme (2017) (3rd edition)	Outlines NSW EPA requirements for assessing and remediating contaminated sites to protect the environment and minimise the risk to public health from the future land use.
National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM, as amended 2013).	Provides adequate protection of human health and the environment, where site contamination has occurred, through the development of an efficient and effective approach to the assessment of site contamination.
WA Department of Health (DoH) 2009, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia.*	Provides guidance for assessing and remediating asbestos impacted sites in order to minimise the risk to public health from the future use of the site.
SafeWork Australia document *How to Safely Remove Asbestos: Code of Practice 2016.*	Provides guidance for the safe removal of ACM.
Department of Education (DoE) Asbestos Management Plan	Provides guidance with respect to the management of asbestos within school precincts

4 REMEDIATION OF IMPACTED SOILS

Please refer to the Remediation Action Plan (Report Name: *PS110641_Wentworthville Public School-RAP-CLM-REP-RevB*; Report Date: *September 2018)* provided by WSP for the detailed list of remediation recommendations. As recommended in the RAP, additional verification investigation in grassed, beneath demolished buildings and landscape areas outside of the already identified asbestos zones should be carried out.

Please refer to the following remediation options as nominated by the RAP.

4.1 SPARROW-PICKING OF ACM FRAGMENTS

Due to the identification of asbestos fragments at the northern portion of the site during the Preliminary/Detailed Site investigation undertaken by WSP (2018)., it is recommended that an emu pick be undertaken to remove asbestos fragments from ground surfaces prior to any construction works. This process is outlined below:

- Following determination of the area affected by ACMs by a competent person / asbestos assessor (hygienist) selected from the DoE hygienist panel and approval to commence works from DoE, a permit will be issued to engage a licensed asbestos removal contractor.
- It is likely that fragments of ACM are in the form of asbestos cement sheeting (ACS).
- The asbestos removal contractor approved by DoE is engaged to sequentially and systematically travel across each area and remove all instances of fragments of potential ACM from exposed ground surfaces.
- All works are to require asbestos air monitoring provided by a hygienist selected from the DoE hygienist panel.
- All works to require an asbestos clearance inspection undertaken by a hygienist selected from the DoE hygienist panel following the completion of the asbestos removal works.
- All documents, including licenses, airborne asbestos monitoring, asbestos clearance inspections and tipping dockets, is to be provided to DoE.
- All records are to be updated.

4.2 ENCAPSULATUION OF SOIL CONTAINING ACM ON-SITE

Following emu pick of the visible asbestos fragments, should the fill materials continue to remain on site, it is proposed to cap the asbestos impacted soil to prevent any exposure of asbestos to site users. The following should be implemented as a genteel guide during encapsulation of the asbestos impacted soil:

- Ensure that the area is isolated in the interim and any potential dust is managed.
- Ensure that a document such as a remedial action plan (RAP) is prepared or updated by a competent person / asbestos assessor (hygienist) selected from the DoE hygienist panel, detailing the encapsulation method (including comments on suitability for intended land use, e.g. car park) and environmental management requirements during implementation (e.g. dust and noise management).
- Ensure that a permit is received from DoE to commence works.
- That document is to be submitted to SafeWork NSW, along with a permit application to SafeWork NSW by the selected asbestos removal contractor.
- DoE to obtain written approval from EPA before work permit is granted by DoE.

- DoE to verify compliance under WH&S Act and POEO Act.
- Notification by DoE is to be made to the respective council to allow inclusion on the site s149 certificate (under the NSW EPA Act 1997).
- In addition, the area to be encapsulated is to be documented / surveyed in such a manner to accurately determine location and depth at a later date.
- Upon receipt of both above mentioned permits from DoE and SafeWork NSW, works are to commence, along with asbestos air monitoring by a hygienist selected from the DoE hygienist panel during the encapsulation process.
- Upon completion, an inspection is undertaken by the hygienist consultant to confirm activities as detailed within the RAP/AMP have been implemented and providing comment that the land has been remediated / encapsulated to allow for intended use and a site management plan is prepared to manage any future subsurface activities that may be required for the site (e.g. excavation of a trench to install new electricity cables or stormwater).

4.3 EXCAVATION OF SOIL CONTAINING ACM FROM SITE

Should excavation of fill materials be required, it is recommended that an emu pick of asbestos fragments be undertaken prior to any ground being broken. Following this, if impacted fill materials are surplus to site requirements, it is understood that remediation will comprise the excavation (to the extent of required levels) and disposal of fill at a licensed waste facility.

If excavation and removal of soils from site becomes necessary, then the following is to be implemented as a general guide:

- Ensure that the area is isolated in the interim and any potential dust is managed.
- Ensure that a document such as a remedial action plan (RAP) including an asbestos removal control plan (ARCP) is prepared by a competent person / asbestos assessor (hygienist) selected from the DoE hygienist panel providing recommendations for the excavation of soil so as to provide for environmental management requirements during implementation (e.g. dust and noise management). If the selected hygienist requires additional soil expertise, then they are to involve a suitably experienced contaminated land management consultant, preferably from within their own company and known to DoE, with experience gained from other DoE sites.
- Ensure that a permit is received from DoE to commence works.
- The ARCP will determine if the asbestos is friable / non-friable and is to be prepared by the engaged licensed asbestos removal contractor.
- That document is to be submitted to SafeWork NSW, along with notification to SafeWork NSW by the selected asbestos removal contractor.
- Upon receipt of both above mentioned permits from DoE and SafeWork NSW, works are to commence, along with asbestos air monitoring by a hygienist selected from the DoE hygienist panel during the removal process.
- Upon completion of soil removal (that portion contaminated with ACM), an inspection is undertaken by the hygienist consultant to confirm activities as detailed within the RAP/ARCP have been implemented and providing comment that those works have been completed in respect to asbestos contamination to a satisfactory level to allow for the next stage of works to commence. The site management plan (inclusive of a possible unexpected finds protocol) continues to be followed to manage any future occurrence of subsurface ACM that may be exposed during the excavation of soils on-site.

Following the investigation, the material should be classified in accordance with NSW EPA Waste Classification Guidelines – Part 1: Classification of waste 2014, and taken to an approved landfill site that is licensed to receive waste relevant to its classification.

5 ASBESTOS HANDLING AND DISTURBANCE PROCEDURES

The AMP is to be implemented at the site during works involving the disturbance of asbestos impacted soils or materials at the site. The objective of the plan is to describe procedures to minimise exposure of all site occupants to asbestos materials through the development and implementation of the management systems outlined herein.

5.1 ASBESTOS REMOVAL/DISTURBANCE PROCEDURES

The removal/disturbance of asbestos material from the site shall be conducted in accordance with SafeWork Australia document *How to Safely Remove Asbestos: Code of Practice 2016* with reference to the DoE AMP. A general procedure includes but is not limited to the following steps:

- all asbestos disturbance works to be supervised/managed by licensed Class A (friable and non-friable) SafeWork NSW Licensed Contractor;
- Notify SafeWork NSW and prepare a site-specific ARCP prior to any asbestos removal works being completed;
- works area to be isolated with appropriate barricade fencing (e.g. fence panels) and signage in accordance with Section 5.4;
- un-authorised personnel are not permitted to enter the isolated work area;
- air monitoring to be carried out for the duration of the works involving the disturbance of asbestos materials in accordance with Section 5.9;
- Licensed Asbestos Assessor to monitor asbestos related works during removal/disturbance to ensure compliance with the AMP (if engaged for fulltime site supervision);
- decontamination unit or decontamination area to be installed for personnel as described in Section 5.7;
- appropriate personal protective equipment (PPE) to be worn by all personnel entering work area as described in Section 5.3;
- light water spray to be used as required to repress possible generation of airborne fibres/dust;
- impacted stockpiles to be covered in accordance with Section 5.5;
- all tools, plant and equipment used in the removal area will be decontaminated as described in Section 5.7;
- removal of soils/rubble by trucks are to be conducted in accordance with Sections 5.2 and 5.6;
- contaminated soil to be disposed of at licensed asbestos waste facility in accordance with Section 5.2; and
- truck wheels to be cleaned prior to leaving site.

5.2 ASBESTOS DISPOSAL PROCEDURES

5.2.1 WASTE CLASSIFICATION FOR OFF-SITE DISPOSAL

Waste classifications are required for any excavated soil or fill materials which are to be disposed off-site. Fill material to be taken off-site for disposal shall be assessed in accordance with the waste classification guidelines (NSW EPA, 2014). Materials excavated from the site should be tracked from 'cradle to grave', in order to provide detailed and accurate

information about the location and quantity of all materials both on and off-site from the time of their excavation until their disposal.

For any truck or bin leaving the site, the following information would be recorded:

- origin of material;
- material type;
- approximate volume; and
- truck and/or bin registration number.

Fill material containing asbestos are to be classified as asbestos waste with the following to be applied:

- The POEO Act defines 'asbestos waste' as any waste that contains asbestos, including fragments or fibres. It is understood that as a result, the NSW EPA considers asbestos contaminated soil to be an asbestos waste. In addition, the POEO Waste Regulation provides certain requirements for the transportation of asbestos. It is understood that the NSW EPA requires any management of soil containing asbestos waste on or off the site to be at least equal to controls set out by the Regulation; and
- All asbestos contaminated soil or fill leaving the site will be transported in a leak proof covered vehicle and disposed of at a licensed facility in accordance with waste classification guidelines (NSW EPA, 2014).

All work shall be carried out in accordance with the SafeWork Australia document *How to Safely Remove Asbestos: Code of Practice 2016* made under section 274 of the Work Health and Safety Act 2017. Handling and disposal of asbestos waste material should also be carried out in accordance with the POEO Act, POEO Waste Regulation and waste classification guidelines (NSW EPA, 2014).

5.3 PERSONAL PROTECTION EQUIPMENT

PPE will be used to protect individuals from actual or potential exposure to asbestos fibres. Personnel entering the exclusion zone/asbestos removal area must be supplied with, and use, PPE that is suitable for the work being undertaken. All personnel working within the exclusion zone are to wear a level of protection as follows:

- disposable overalls (TYVEK) rated type 5, category 3 or equivalent;
- disposable gloves and booties;
- as a minimum, half face disposable or cartridge type particulate respirator – Class P3 for friable asbestos removal.

Respirators to be used will be approved for protection against asbestos. Respirator filters will be changed upon detection breakthrough, or when breathing difficulty is encountered due to particulate loading, or as per manufacturer's instructions.

Personnel will discard protective clothing which becomes torn, punctured, or appears to deteriorate under chemical action. All discarded clothing will be placed into specially marked plastic bags and disposed of as asbestos waste. If protective equipment appears to deteriorate under chemical action, the site operator is to be notified immediately.

5.3.1 CLOTHING INSPECTION

PPE should be inspected before and during use. The following checks should be made before use:

- Determine that the clothing material is correct for the specific task at hand.
- Visually inspect for:
  - imperfect seams

- tears
- malfunctioning closures.

— During the work task, periodically inspect for the following:
  - closure fails
  - punctures
  - tears
  - seam discontinuity.

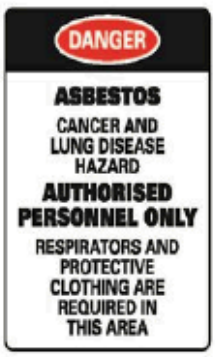
5.3.2 PLANT

All plant operators must close cabin doors and windows and set air conditioning to re-circulate when operating within the asbestos work area.

In any plant with open cabins, operators must wear PPE and respiratory protective equipment (RPE) as described above.

5.4 BARRICADING AND SIGNAGE

Necessary measures are to be in place for the effective exclusion of unauthorised persons to impacted areas. All areas of a workplace that contain asbestos, including plant, equipment or components, must be signposted with warning signs, or labels, as appropriate to ensure personnel are not unknowingly exposed to asbestos when undertaking operational activities.



The location, type and positioning of signs and labels must be decided, or authorised, by a competent person. For the removal of non-friable asbestos impacted soils, a minimum exclusion zone of 10 metres is recommended. Asbestos warning signs must comply with the requirement of AS 1319-1994 for size, illumination, location and maintenance. Warning signs may include some of the above examples. With respect to barricade fencing, chain-wire fencing/ATF with shade cloth would be considered suitable.

5.5 STOCKPILE MANAGEMENT

All stockpiles must be kept damp (not flooded) and covered by geofabric/plastic, sealed with a soil binding product (dust-bloc) or sealed with hydro mulch as soon as practical. Regular inspections of long term stockpiles should be undertaken to ensure the controls implemented are in good condition, no dust is being generated from the stockpile and no runoff is occurring.

5.6 DUST MANAGEMENT

The following information is provided as a guide to control dust during earthworks in areas of known or suspected asbestos impacted soil:

- prior to the first removal of the sub surface, dampening with water of the proposed excavation area;
- prior to movement of stockpiled materials, dampening with water across the stockpile surface;
- during soil/rubble movement, the materials should be kept sufficiently damp to minimise the emission of dust; and
- if trucks are required to enter the restricted area, the wheels of the trucks and the sides of the body should be washed down before the truck leaves the restricted area. This can be performed within a wash-bay or on sacrificial geofabric to be disposed of as asbestos waste.

The excavation surface should be continually monitored and the surface wet down as drying occurs. This process should continue until the ACM or asbestos impacted soils excavation works in the Asbestos Work Area are completed.

The above method relies on the following factors:

- use of water fogging nozzle (not high pressure hoses); and
- constant vigilance of trained operators/contractor.

5.7 DECONTAMINATION

The Licensed Asbestos Removal Contractor shall ensure that an area is established on the site for people to personally decontaminate themselves and any tools and equipment when they are entering and leaving each asbestos works zone.

The details for decontamination shall be specified in the Licensed Asbestos Removal Contractor's Asbestos Removal Control Plan and SWMS for asbestos related work and is to comply with the requirements outlined in SafeWork Australia 2016: *How to Safely Remove Asbestos*.

In summary, when leaving the work area all site personnel must enter the decontamination unit/area, wash footwear, remove obvious signs of asbestos dust/impacted soils and remove coveralls and mask and place in 200 µm thick polythene bag.

Non-reusable clothing and masks will be collected in asbestos bags for disposal by licensed asbestos removal contractors as asbestos waste. No waste will be removed from the site without the approval of the site operator. Any waste to be removed from the site would be undertaken in accordance with relevant NSW EPA guidelines.

At the conclusion of the works, any plant or equipment shall be parked within a designated washing area or wash bay. Decontamination should include removing all soil from the tracks, body and bucket of the plant as far as reasonably practicable.

All water generated from decontamination of asbestos impacted materials, persons or plant will be considered to be impacted by asbestos. All asbestos impacted water must be captured and prevented from movement outside the exclusion zone.

5.8 VALIDATION OF ASBESTOS REMOVAL

For the removal of friable asbestos impacted soils (previously identified), a visual clearance inspection and validation sampling of the footprint/excavation is required to be undertaken at a rate of 1 per 25m^2 base or 1 per 5 metre linear wall in accordance with the requirements of NEPM (2013) and the WA DoH (2009) asbestos guidelines. This is to be undertaken by the LAA and a clearance certificate is to be issued upon completion.

Representative stockpile sampling for characterisation purposes should be undertaken in accordance with NEPM, which also references WA DoH (2009). Sample density will be determined based on the volume of material stockpiled. Asbestos sampling will be undertaken at a rate of one sample per 70 m^3 of material (in accordance with WA DoH, 2009).

5.9 AIR MONITORING

During all asbestos excavation, transport and placement works on site involving asbestos impacted materials, airborne asbestos fibre monitoring will be undertaken by the LAA using calibrated portable air sampling pumps. Monitoring locations shall be determined by the LAA but shall include at least 6 locations surrounding the work area or site boundary. At the end of each monitoring period the pump and attached filter will be collected and analysed at a NATA-accredited laboratory.

Monitoring works shall be conducted in accordance with NOHSC Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition (NOHSC:3003 [2005]).

The results of air monitoring will be available prior to the commencement of work on the following business day (with exception to weekend monitoring). Daily air monitoring reports shall be displayed in a common area outside of the asbestos work area (e.g. site office or lunch shed) or be able to be produced upon request.

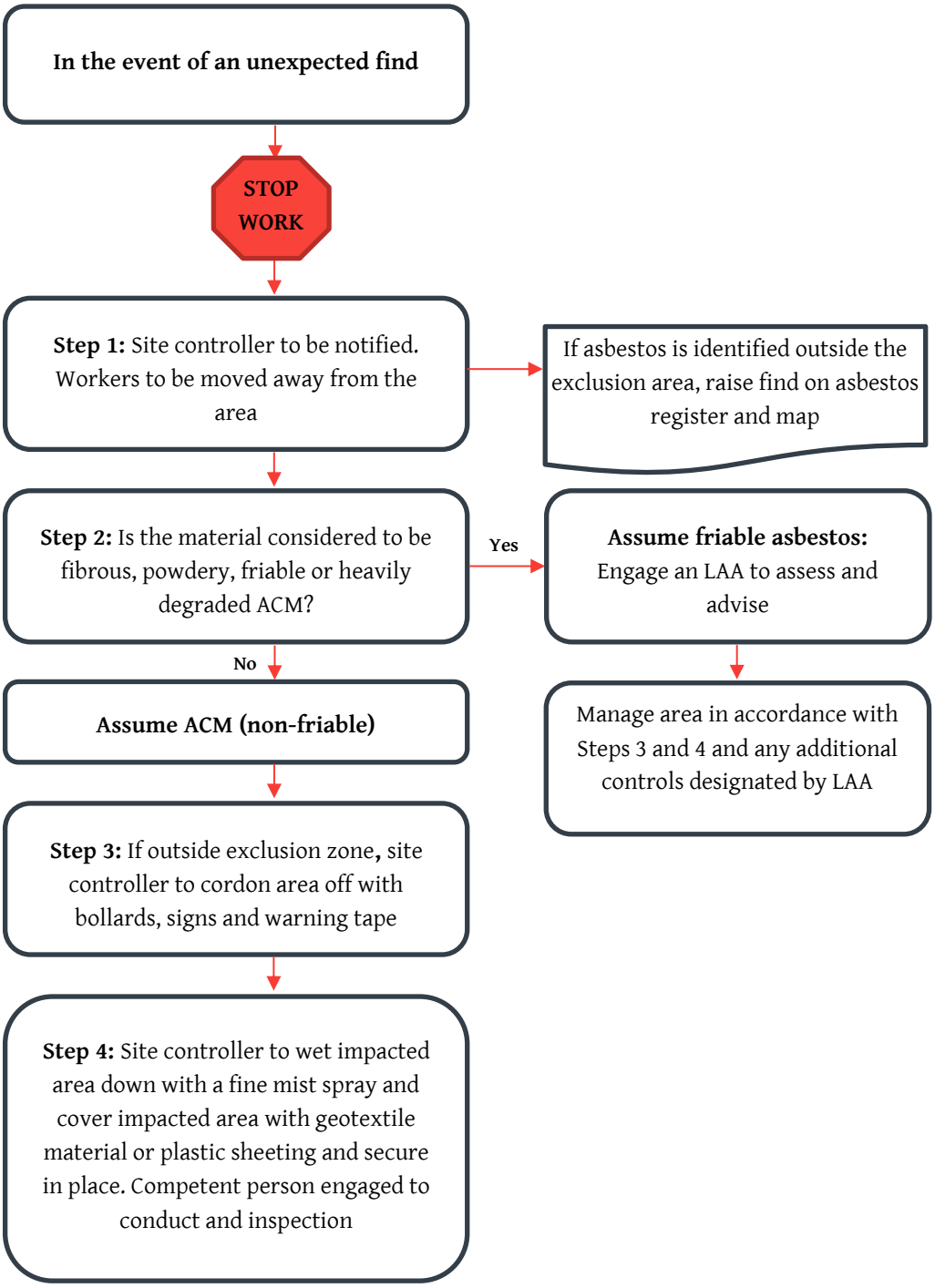
The following action levels will be applied upon receipt of daily results:

- reading of less than 0.01 fibres/mL – control measures in place are working effectively, site works to continue;
- reading between 0.01 and 0.02 fibres/mL – a review of control measures shall be completed in the work area; and
- reading greater than 0.02 fibres/mL – works shall cease until the cause of contamination is identified and rectified (the removal contractor is required to notify SafeWork regarding the level of exceedance).

5.10 UNEXPECTED FINDS PROTOCOL

It is acknowledged that previous investigations of the site have been undertaken to assess the identified contaminants of potential concern in selected parts of the site. However, ground conditions between previous sampling points may vary, and further hazards may arise from unexpected sources and/or in unexpected locations during site works. The nature of any residual hazards which may be present at the site are generally detectable through visual means such as friable asbestos lagging.

As a precautionary measure to ensure the protection of the workforce and surrounding community, should additional asbestos be identified (or any other unexpected potentially hazardous substance), the procedure summarised in the below flow chart is to be followed.


In the event of an unexpected find
STOP WORK
Step 1: Site controller to be notified. Workers to be moved away from the area
If asbestos is identified outside the exclusion area, raise find on asbestos register and map
Step 2: Is the material considered to be fibrous, powdery, friable or heavily degraded ACM?
Yes
Assume friable asbestos: Engage an LAA to assess and advise
No
Assume ACM (non-friable)
Manage area in accordance with Steps 3 and 4 and any additional controls designated by LAA
Step 3: If outside exclusion zone, site controller to cordon area off with bollards, signs and warning tape
Step 4: Site controller to wet impacted area down with a fine mist spray and cover impacted area with geotextile material or plastic sheeting and secure in place. Competent person engaged to conduct and inspection

6 REFERENCES

- National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013.
- National Occupational Health and Safety Commission 2005, Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos.
- NSW DEC 2006, Guidelines for the NSW Site Auditor Scheme (2nd Edition).
- NSW EPA 2014, Waste Classification Guidelines.
- NSW EPA (2015), Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.
- SafeWork Australia document How to Safely Remove Asbestos: Code of Practice 2016.
- SafeWork NSW 2011, Occupational Health and Safety Act (NSW).
- SafeWork NSW2017, Occupational Health and Safety Regulation (NSW).

7 LIMITATIONS

This Report is provided by WSP Australia Pty Limited (WSP) for Walan NSW Pty Ltd (Client) in response to specific instructions from the Client and in accordance with WSP's proposal dated 05 November 2019 and agreement with the Client dated 05 November 2019 (Agreement).

PERMITTED PURPOSE

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (Permitted Purpose).

QUALIFICATIONS AND ASSUMPTIONS

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (Conclusions) are based in whole or in part on information provided by the Client and other parties identified in the report (Information), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

The Conclusions are reflective of the current Site conditions and cannot be regarded as absolute without further extensive intrusive investigations, outside the scope of the services set out in the Agreement and are indicative of the environmental condition of the Site at the time of preparing the Report. As a general principle, vertical and horizontal soil or groundwater conditions are not uniform. No monitoring, common or intrusive testing or sampling technique can eliminate the possibility that monitoring or testing results or samples taken, are not totally representative of soil and / or groundwater conditions encountered at the Site. It should also be recognised that Site conditions, including subsurface conditions can change with time due to the presence and concentration of contaminants, changing natural forces and man-made influences.

Within the limitations imposed by the scope of the services undertaken by WSP, the monitoring, testing (intrusive or otherwise), sampling for the preparation of this Report has been undertaken and performed in a professional manner in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the Report.

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This Report can only be relied upon for the Permitted Purpose and may not be relied upon for any other purpose. The Report does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial

commitment or otherwise. It is the responsibility of the Client to accept (if the Client so chooses) the Conclusions and implement any recommendations in an appropriate, suitable and timely manner.

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APPENDIX A

FIGURES

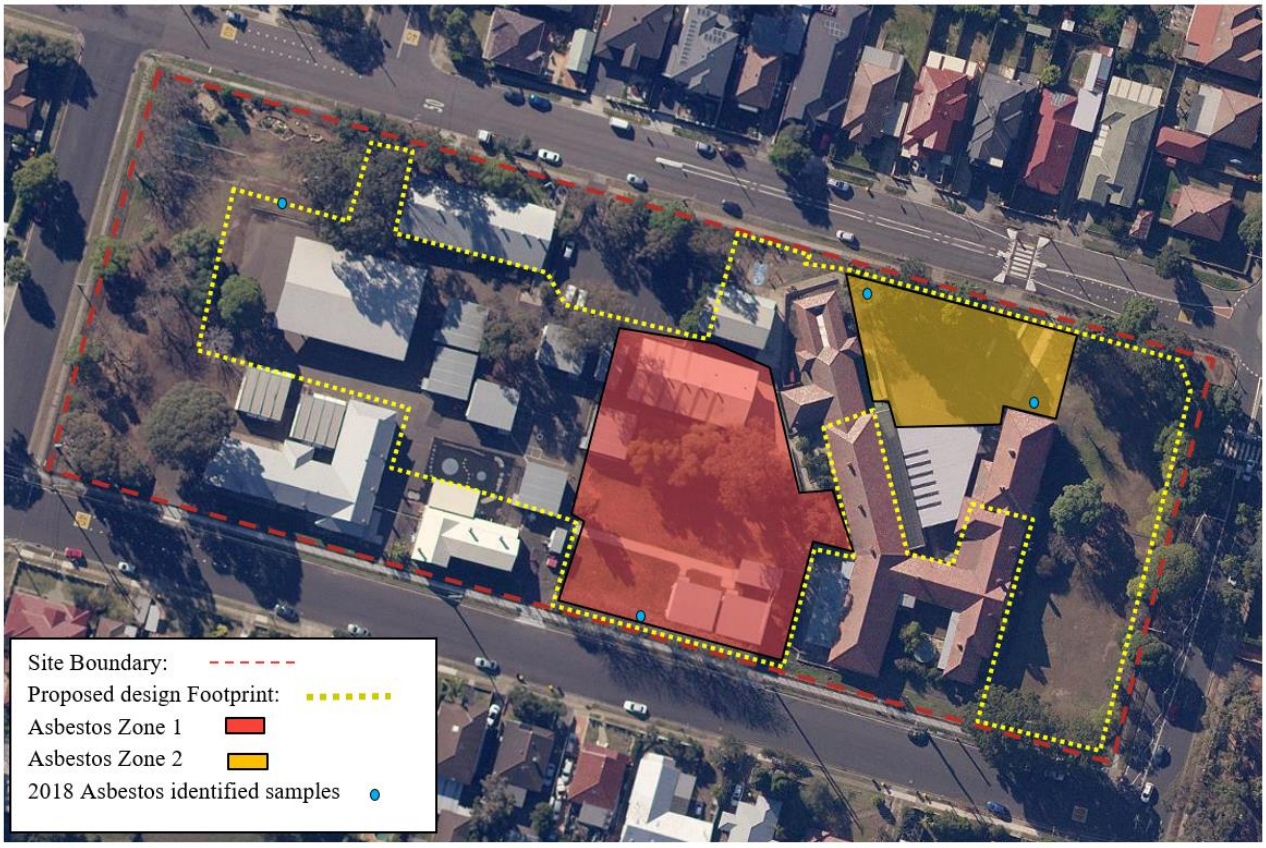

Figure 1. Site location depicting approximate locations of the proposed design foot print and previously identified asbestos soil zones.

APPENDIX B

ASBESTOS IN SOILS REPORTS

WSP Australia Pty Limited

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ABN 80 078 004 798
NCSI Certified Quality System ISO 9001

Certificate of Analysis

LOCATION:	**Wentworthville Public School**	**CERTIFICATE NO:**	**SYD-110641-99425**
CLIENT:	Fulton Trotter Architects	DATE\S SAMPLED:	18/07/2018 to 19/07/2018
CLIENT ADDRESS:	PO BOX 1669, Bondi NSW 1355	DATE RECEIVED:	23/07/2018
TELEPHONE:	02 8383 5151	DATE ANALYSED:	25/07/2018
EMAIL:	johnw@fultontrotter.com.au	ORDER NUMBER:	N/A
CONTACT:	John Ward	SAMPLED BY:	Claire Williamson

TEST METHOD: Qualitative identification of Asbestos fibre in bulk and soil samples at WSP Corporate Laboratories, by polarised light microscopy, including dispersion staining techniques using AS4964 (2004) and supplementary in house laboratory procedure (LP3 - Identification of Asbestos Fibres). This document is issued in accordance with NATA's requirements under NATA accreditation No. 17199, accredited for compliance with ISO/IEC: 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standard.

Lab No	Sample ID	Location	Sample Description	Sample Dimensions	Identification Type
001	BH11_0.1	Southern portion	Soil	20 gm	OF, NAD
002	BH12_0.5	Southern portion	Soil	65 gm	OF, NAD
003	BH08_0.3	Southern portion	Soil	45 gm	OF, NAD
004	BH09_0.1	Southern portion	Soil	46 gm	OF, NAD
005	BH03_0.5	Southern portion	Soil- loose fibre bundles	55 gm	A, CH, OF
005A			Fibre Cement Debris		CH
006	BH10_0.1	Southern portion	Soil	41 gm	OF, NAD
007	BH13_0.4	Southern portion	Soil	46 gm	OF, NAD
008	BH14_0.1	Southern portion	Soil	40 gm	OF, NAD
009	BH15_0.5	Southern portion	Soil	43 gm	OF, NAD
010	BH05_0.1	North and Eastern portion	Soil	50 gm	OF, NAD
011	Fragment 1	Found under silver bench opposite TP17	Fibre Cement Sheet	36 gm	A, CH, OF

LEGEND:

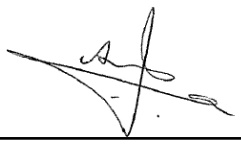
NAD	-	No Asbestos Detected
CH	-	Chrysotile Asbestos Detected
A	-	Amosite Asbestos Detected
C	-	Crocidolite Asbestos Detected
UMF	-	Unknown Mineral Fibres Detected
SMF	-	Synthetic Mineral Fibres Detected
OF	-	Organic Fibres Detected

Hand picked refers to small discrete amounts of asbestos distributed unevenly in a large body of non asbestos material.

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

Approved Identifier

Name: Sneha Shakya



Approved Signatory

Name: Clare Brockbank

AUTHORISATION DATE

Wednesday, 25 July 2018

Notes:
If no asbestos is detected in vinyl tiles, mastics, sealants, epoxy resins and ore samples then confirmation by another independent analytical technique is advised due to the nature of the samples.
The results contained within this report relate only to the sample(s) submitted for testing. WSP accepts no responsibility for the initial collection, packaging or transportation of samples submitted by external persons. NATA does not accredit the sampling process, therefore sampling is not covered by the scope of accreditation. This document may not be reproduced except in full.

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NCSI Certified Quality System ISO 9001

Certificate of Analysis

LOCATION: **Wentworthville Public School** **CERTIFICATE NO:** **SYD-110641-99425**

Lab No	Sample ID	Location	Sample Description	Sample Dimensions	Identification Type
012	Fragment 2	Found in fill in TP16	Fibre Cement Sheet	35 gm	A, CH, OF

LEGEND:

NAD	-	No Asbestos Detected
CH	-	Chrysotile Asbestos Detected
A	-	Amosite Asbestos Detected
C	-	Crocidolite Asbestos Detected
UMF	-	Unknown Mineral Fibres Detected
SMF	-	Synthetic Mineral Fibres Detected
OF	-	Organic Fibres Detected

Hand picked refers to small discrete amounts of asbestos distributed unevenly in a large body of non asbestos material.

NATA
ACCREDITED FOR
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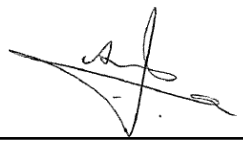
COMPETENCE

Approved Identifier

Name: Sneha Shakya



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WSP

GRAVIMETRIC DETERMINATION AND QUANTIFICATION OF ASBESTOS IN SOIL

WENTWORTHVILLE PUBLIC SCHOOL

JULY 2018

GRAVIMETRIC DETERMINATION AND QUANTIFICATION OF ASBESTOS IN SOIL

WENTWORTHVILLE PUBLIC SCHOOL

WSP

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WSP.COM

REV	DATE	DETAILS
A	25/07/18	Wentworthville Public School_SYD-PS110641-99426

	NAME	DATE	SIGNATURE
Prepared by:	Sneha Shakya	25/07/18	
Reviewed by:	Clare Brockbank	25/07/18	

ABBREVIATIONS

A	Amosite Asbestos Detected
ACM	Asbestos Containing Material
AF	Asbestos Fines
C	Crocidolite Asbestos Detected
CH	Chrysotile Asbestos Detected
FA	Fibrous Asbestos
NAD	No Asbestos Detected
NEPM	National Environment Protection Measures
OF	Organic Fibres Detected
PLM	Polarised Light Microscopy
SMF	Synthetic Mineral Fibres Detected
UMF	Unknown Mineral Fibres Detected

ANALYSIS METHODOLOGY

AS 4964-2004 - Soils: Samples received by the laboratory are analysed in accordance with section 8.2.3 *Soil Samples* of Australian Standard (AS 4964-2004). Trace analysis is conducted in accordance with section 8.4 *Trace analysis criteria* of the standard. Asbestos analysis is conducted in accordance with the standard section 8.3.3 *Analytical criteria*, and follows methodology outlined in Appendix D *Simplified flowchart for bulk asbestos identification.*

Quantification of Asbestos in Soils: There is no accepted valid analytical method in Australia for estimating the concentration of asbestos in soils. NATA does not accredit facilities for the estimation of the concentration of ACM or free asbestos fibres in soils. 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 – May 2009* and Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater [National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)].

Percentages for asbestos content in materials and reporting limits of percentage weight for weight asbestos in soil are based on values outlined in Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater [National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)]. Non-Friable (ACM) weight is calculated based on the assumption of 15% asbestos by weight in non-friable ACM products used in Australia. Friable asbestos weight, including Fibrous Asbestos (AF) and Asbestos Fines (AF), is calculated based on the assumption of 100% asbestos by weight.

The reporting limit of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This reporting limit is not applicable to free fibres (Respirable Fibres). Loose respirable fibres are detected under criteria set by Australian Standard (AS 4964-2004), section 8.4 *Trace analysis criteria*, with an implied detection and reporting limit of 0.1g/kg.

METHOD SPECIFIC DEFINITION

- Asbestos Containing Materials (ACM) - comprises asbestos-containing-material which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin (e.g. asbestos fencing and vinyl tiles). This term is restricted to material that cannot pass a 7 mm x 7 mm sieve.
- Fibrous Asbestos (FA) - comprises friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This type of friable asbestos is defined here as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. This material is typically unbonded (non-friable) or was previously bonded and is now significantly degraded (crumbling).
- Asbestos Fines (AF) - AF includes free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve.

All calculations of percentage Asbestos under this method are approximate and should be used as a guide only. Such results cannot be used in place of field evaluations.

These quantitative results are not covered by the scope of NATA accreditation.

ANALYSIS RESULTS

	UNIT	LIMIT OF REPORTING	SAMPLE: BH01_0.1	SAMPLE: BH02_0.5	SAMPLE: BH04_1.0	SAMPLE: BH06_0.1	SAMPLE: BH07_0.1	SAMPLE: TP16_0.1	SAMPLE: TP16_0.5
Total Soil Weight	g	1	604	553	649	569	749	802	774
Asbestos Type Detected	N/A	-	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Free Fibres (Respirable Fibres) in <2mm Sample	g/kg	0.1	No	No	No	No	No	No	No
ACM in >7mm Sample	g	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
FA & AF	g	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
ACM in >7mm Sample (as 15% Asbestos)	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
FA & AF (as 100% asbestos)	%w/w	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

These quantitative results are not covered by the scope of NATA accreditation.

LEGEND:

NAD	No Asbestos Detected
CH	Chrysotile Asbestos Detected
A	Amosite Asbestos Detected
C	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected

ANALYSIS RESULTS

	UNIT	LIMIT OF REPORTING	SAMPLE: TP17_1.2	SAMPLE: TP18_0.1	SAMPLE: TP19_0.5	SAMPLE: TP20_0.5	SAMPLE: TP21_0.1	SAMPLE: TP21_0.5
Total Soil Weight	g	1	677	823	747	549	741	644
Asbestos Type Detected	N/A	-	NAD	NAD	NAD	NAD	NAD	NAD
Free Fibres (Respirable Fibres) in <2mm Sample	g/kg	0.1	No	No	No	No	No	No
ACM in >7mm Sample	g	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
FA & AF	g	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
ACM in >7mm Sample (as 15% Asbestos)	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
FA & AF (as 100% asbestos)	%w/w	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

These quantitative results are not covered by the scope of NATA accreditation.

LEGEND:

NAD	No Asbestos Detected
CH	Chrysotile Asbestos Detected
A	Amosite Asbestos Detected
C	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected

APPENDIX C

WSP CV'S

Matthew Murray

Senior Occupational Hygienist, Hazardous Materials & Environment

7 years of experience

Areas of expertise

Occupational Hygiene

Hazardous Materials

Contaminated Land

LANGUAGES

English

PROFILE

Matthew is an experienced consultant currently employed as a Senior Occupational Hygienist with WSP. With more than eight years of experience in hygiene and contaminated land, Matthew has worked on some of Australia's largest infrastructure and civil projects including Barangaroo Headland Park, Australian Technology Park Precinct redevelopment and Curtis Island gas processing facility.

EDUCATION

Bachelors of Science in Agriculture, University of Sydney	2008

PROFESSIONAL ASSOCIATIONS

Australian Institute of Occupational Hygiene	AIOH
Australian Land and Groundwater Association	ALGA

PROFESSIONAL EXPERIENCE

Senior Occupational Hygienist – WSP Australia Pty Limited

As a senior occupational hygienist for WSP, I currently manage the Department of Education portfolio which includes all school assets both primary and high school.

Occupational Hygiene/Contaminated Land Project Manager – JBS&G Australia Pty Ltd

- **Ashmore Estate Redevelopment, Sydney, NSW, Australia (2018): Greenland Golden Horse Trust Pty Ltd, Project Manager.**

  Responsible for managing the occupational hygiene and contaminated land remediation works during the redevelopment of approximately seven hectares of heavily impacted industrial land. Activities included management of civil and demolition contractors, liaising with stakeholders and ensuring deliverables.

- **Australian Technology Park Precinct, Sydney, NSW, Australia (2016 & 2017): Mirvac Construction Pty Ltd, Project Manager.**

  The site was previously utilized as locomotive workshops/carparks and involved the remediation of three separate lots comprising approximately three hectares. In my role as project manager, I was responsible for managing occupational hygiene and remediation works and proactively engaging and liaising with CFMEU representatives and the client to ensure the successful delivery of project outcomes.

- **Sydney Water, Property Portfolio Management, Sydney, NSW, Australia (2016 & 2017): Sydney Water, Project Manager.**

  Environmental site assessments (PSIs/DSIs) /hazardous material surveys (HMS) of property and infrastructure portfolio including the auditing of external environmental consultants HMS. Asbestos assessment of impacted properties with the provision of AMPs/RAPs followed by validation reports.

- **Endeavour Energy, Sydney, NSW, Australia (2015 & 2016): Senior Field Consultant/ Project Manager.**

  Combined HMS and environmental site assessments of properties comprising substations or other related infrastructure suitable for divestment.

- **Westmead Hospital/Nepean Hospital, Sydney, NSW, Australia (2015, 2016 & 2018): Health & Infrastructure, Senior Field Consultant.**

  HMS of hospital structures and asbestos quantification works for in-situ soils prior to the redevelopment of the hospitals. During demolitions and remediation works, I ensured

compliance with the AMP and RAP and conducted monitoring works and consultation with the client.

Environmental/Hazardous Materials Consultant – RPS Group Pty Ltd

- **Curtis Island, Gas Processing Facility, Gladstone, QLD, Australia (2013): Bechtel, Consultant.**

  During the development of the Queensland Gas Company processing facility on Curtis Island, I was responsible for daily monitoring activities involving hazardous materials, surface water contaminant levels and ecological surveys to ensure compliance with environmental and OH&S safety requirements.

- **South-East Queensland, Gas Infrastructure Assessments, QLD, Australia (2012 - 2013): QGC & Santos, Field Scientist.**

  Environmental and Strategic Cropping Land assessments of more than 30 proposed CSG infrastructure sites prior to development;

- **Due Diligence, Environmental and Hazardous Materials Assessments, Brisbane, QLD, Australia (2012 - 2013): Bunnings Warehouse/ Officeworks, Field Scientist.**

  Performed environmental due diligence works for proposed site acquisitions. Works involved site inspections, structure assessments and desktop studies.

Technical Officer – Department of Primary Industries

- **Elizabeth Macarthur Agriculture Institute, Department of Primary Industries (2009 - 2011): Technical Officer.**

  Supporting the principal researcher, I performed tasks including sample collection, reporting and data anlaysis.

PROFESSIONAL HISTORY

WSP Australia Pty Ltd	Current
JBS&G Australia Pty Ltd	2014 – 2018
RPS Group Pty Ltd	2012 – 2013
Department of Primary Industries	2009 – 2011

PROFESSIONAL DEVELOPMENT

- *NSW Licensed Asbestos Assessor (License No LAA001203)*
- *CPCCBC4051A Supervise Asbestos Removal (1348804)*
- *CPCCDE3014A Remove Non-Friable Asbestos (245802)*

PRASANNA PICHAI

Team Leader, Occupational Hygiene, Sydney

4 years with WSP

7 years of experience

Areas of expertise

Asbestos assessment

Occupational Hygiene

LANGUAGES

English

PROFILE

Prasanna is a Licensed Asbestos Assessor (LAA) and has seven years' experience within the asbestos and HAZMAT industry and has been involved in air monitoring, bulk identification, asbestos removal and site supervision, surveying (auditing), and asbestos management in buildings. He has a strong scientific and analytic background on the environmental processes within a NATA accredited laboratory. He has an extensive understanding of the various environmental guidelines for soil, water and air monitoring and codes of practice and a proven track record of building and maintaining customer relationships from effectively managing various environmental projects.

EDUCATION

Graduate diploma in Secondary Science Education, Australian Catholic University, Sydney	2009
Master of Science in Biotechnology, Macquarie University, Sydney	2008
Bachelor of Science in Microbiology, Madras University, India	2006

PROFESSIONAL ASSOCIATIONS

Licenced Asbestos Assessor	LAA001145

PROFESSIONAL EXPERIENCE

Asbestos assessment

- **Team Leader, Sydney, NSW, Australia (2018–present): WSP, Occupational Hygiene, South**

  Prasanna is currently a Team Leader within the Occupational Hygiene, South (Sydney). His responsibilities include oversight of the numerous projects and managing a team of 5 consultants. Other responsibilities include training and development of staff, business development and improving operational efficiency of the Sydney Team.

- **Occupational Hygiene & HAZMAT Consultant, Australia (2015–2018): WSP**

- Prasanna was involved in asbestos audits; licensed asbestos assessor at Mr Fluffy removal sites in occupational hygiene consulting for a coal tar removal site at Hickson Road, Barangaroo, Sydney in sampling and removal advice (ARCP) for various Brookfield global integrated services sites, including Paddington and Rosebay police stations. As sampling and risk-assessments; asbestos management plans (AMP); supervision of friable/non-friable asbestos removal and clearance inspections; air quality monitoring control and exposure monitoring for air-borne asbestos fibres, lead, inhalable dust and volatile organic compounds; analysis of asbestos fibre air monitoring filter samples using the membrane filter method.

- **HAMAT Consultant, Sydney, NSW, Australia (2013–2015): Greencap NAA (Noel Arnold and Associates), Property Risk Consultant.**

  Roles included asbestos audits; sampling and risk-assessments; asbestos management plans (AMP);supervision of friable/non-friable asbestos removal and clearance inspections; air quality monitoring – control and exposure monitoring for air-borne asbestos fibres, lead; analysis of asbestos fibre air-monitoring filter samples using the membrane filter method; providing a detailed hazardous materials management plan (HMMP) based on the findings of hazmat audits; issuing asbestos clearance certificates by supervision of non-friable asbestos removal works and conducting clearance air monitoring submitting proposals for asbestos/hazmat audits, risk assessments, management plans and asbestos removal plans.

- **Client Services Officer, Sydney, NSW, Australia (2012–2013): SGS Australia, Consultant. Role/ Client Services Officer.**

  Role included in assess and evaluate environmental projects prior to submitting a quotation based on our NATA scope of accreditation and laboratory capabilities; suggest effective solutions and come up with alternative schemes of planning (subcontracting to third party labs both locally and internationally) in the events of incompatibility. And understanding the project brief and the associated guideline thoroughly and put together a detailed quotation; end to end management and coordination of environmental projects ranging from providing sampling guidance and advice on technical holding times to sample disposal to provide on-site face to face consultation to clients on but not limited to necessary testing requirements, negotiate turnaround times, implication of results. Prasanna coordinated with section heads and manage the work-load in the laboratory by prioritising samples based on urgency for analysis; generate and send various reporting formats like – ESdat, EQUIS and other CSV files; managing budgets for assigned key accounts and ensure re-test and re analysis is carried within the set quote.

PROFESSIONAL DEVELOPMENT

WorkCover NSWOHS Construction Induction (White Card) Infront staffing and training	2012
Asbestos Awareness Training – AlertForce NSW	2013

PROFESSIONAL HISTORY

WSP	2015 – Present

CHRISTOPHER VIRTUE

OCCUPATION HYGIENE CONSULTANT

4 months with WSP

2.25 years of experience

Areas of expertise

Project Management

Hazardous Materials

Asbestos Assessment

Microbial Assessment

LANGUAGES

English

PROFILE

Christopher is a Licensed Asbestos Assessor (LAA) and has two years' experience within the Occupational Hygiene and HAZMAT industry and has been involved in Project Management, air monitoring, asbestos removal and site supervision, asbestos in soils investigations and remediation, surveying (auditing), asbestos management in buildings, workplace health monitoring, microbial assessment, and microbial sampling. He has an extensive understanding of the various guidelines for soil, air monitoring, microbial assessment, sampling techniques and codes of practice/guidelines.

EDUCATION

Bachelor of Environmental Science (Honours) 2017

PROFESSIONAL ASSOCIATIONS

SafeWork NSW Licensed Asbestos Assessor LAA001352

PROFESSIONAL EXPERIENCE

— Project Management of asbestos in soils bulk remediation project for the University of Wollongong. Including, client liaison, budget management, technical report review, managing KPI's and deadlines.

— Hazardous Material Register Surveys and Updates for various sites throughout Sydney and the greater Illawarra region including, but not limited to:

- Sydney Trains
- Wollongong City Council
- Wingecarribee Shire Council
- Southern Youth and Family Services
- Bluescope Steel Limited (Port Kembla)
- AJ Grant Group Pty Ltd

— Asbestos remediation, airborne asbestos monitoring and removal supervision for a variety of clients:

- Wollongong City Council
- Wingecarribee Shire Council
- Kiama Municipal Council
- Shellharbour City Council
- Department of Defence
- Department of Education
- Bluescope Steel Limited
- University of Wollongong (JBG Contractors)
- Downer-Seymour White Joint Venture (Cardno)
- Lendlease
- Abergeldie Complex Infrastructure
- TAFE NSW

- Asbestos and contaminated soil investigation and remediation, HMAS Albatross, Nowra.
- Mould assessment and clearance for Spotless, Defence force, Shoalhaven City Council, Wingecarribee Shire Council and Department of education.
- Asbestos in Soil Remediation for University of Wollongong, Downer-Seymour White Joint Venture, Department of Defence and Wollongong City Council.
- Occupational Hygiene assessments including assessment and remediation for a range of gases, dusts and air quality parameters for Wollongong City Council, Shoalhaven City Council, Interface Australia.

PROFESSIONAL HISTORY

WSP	2019 – Present
Clearsafe Environmental Solutions	2017 – 2019

APPENDIX J – Remediation Action Plan

FULTON TROTTER ARCHITECTS

SEPTEMBER 2018

REMEDIATION ACTION PLAN

WENTWORTHVILLE PUBLIC SCHOOL- 70-100 FULLAGAR ROAD, NSW

Question today
Imagine tomorrow
Create for the future

Remediation Action Plan
Wentworthville Public School- 70-100 Fullagar Road, NSW

Fulton Trotter Architects

WSP
Level 27, 680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001

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wsp.com

REV	DATE	DETAILS
A	10/09/18	Draft for comment
B	04/10/2018	Final

	NAME	DATE	SIGNATURE
Prepared by:	Claire Williamson	10/09/18	
Reviewed by:	Julie Porter	10/09/18	
Approved by:	Julie Porter	4/10/18	

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

ABBREVIATIONS

ACM	Asbestos containing material
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
B(a)P	Benzo (a) pyrene
BTEXN	Benzene, toluene, ethylbenzene, xylene and naphthalene
CEMP	Construction environmental management plan
DSI	Detailed site investigation
EMP	Environmental management plan
EPA	Environment Protection Authority
mAHD	Meters Australian Height Datum
mBGL	Metres below ground level
NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)
PPE	Personal protective equipment
RAP	Remedial action plan
SOPA	Sydney Olympic Park Authority
VENM	Virgin excavated natural material
PAHs	Polycyclic aromatic hydrocarbons
PPE	Personal protective equipment
RAP	Remedial action plan
TEQ	Toxicity equivalent quotient
TRH	Total recoverable hydrocarbons
VENM	Virgin excavated natural material

1 PROJECT BACKGROUND

1.1 INTRODUCTION

WSP Australia Pty Ltd (WSP) was commissioned by Fulton Trotter Architects (FTA) on behalf of the Department of Education to prepare a remediation action plan (RAP) for the upgrade of Wentworthville Public School campus which is located at 70-100 Fullagar Road, Wentworthville NSW. It is understood that FTA has been engaged by the Department of Education as the head design consultant for the demolition and upgrade of a portion of the school. The upgrade will provide 31 new permanent teaching spaces by replacing demountables with permanent facilities.

The portion of the school proposed for redevelopment is referred to as 'the site'. The proposed design footprint is presented on Figure 2 and 3 in Appendix A. A combined preliminary site investigation (PSI) and detailed site investigation (DSI) was undertaken by WSP in July 2018 to determine the current contamination status of the soil beneath the site. A hazardous materials survey was commissioned by FTA as a separate study and report.

1.2 OBJECTIVES

This RAP has been prepared to provide remediation and validation methodologies for soil at the site that is impacted with asbestos containing materials (ACM): The objectives are to:

- document the procedures and standards to be followed in order to manage any risk posed by contamination (asbestos) identified during previous investigation
- outline a working plan for the remediation and validation strategy to ensure the site is remediated to a suitable standard for the development works (primary school land use)
- outline a contingency plan to address issues which may arise during the remediation, including an unexpected finds protocol for handling asbestos or other potential contamination not previously identified on site.

1.3 SCOPE

The RAP includes:

- a summary of site conditions and surrounding environment
- a summary of the contamination status at the site
- identification of remediation goals and strategy
- material characterisation and handling methodology
- contingency management issues and controls
- work, health and safety issues and controls.

1.4 LEGISLATIVE FRAMEWORK

The legislative framework for the RAP is based on guidelines that have been issued and/or endorsed by the NSW Environment Protection Authority (EPA) under the following acts and/or policies:

- Section 105 of the Contaminated Land Management Act 1997 (CLM Act; NSW).
- State Environmental Planning Policy No 55 - Remediation of Land (SEPP 55).

— Protection of the Environment Operations Act 1997 (POEO Act; NSW).

— Waste Avoidance and Resource Recovery Act 2001 (WARR Act); NSW.

The RAP was prepared in accordance with the following:

— Australian and New Zealand Environment and Conservation Council (ANZECC)/Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

— Department of Urban Affairs and Planning 1998, *Managing Land Contamination Planning Guidelines: State Environmental Planning Policy (SEPP) No. 55 – Remediation of Land.*

— *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM, as amended 2013).

— National Occupational Health and Safety Commission 1995, *Exposure Standards for Atmospheric Contaminants in the Occupational Environment.*

— NSW Department of Environment and Conservation 2007, *Guidelines for the Assessment and Management of Contaminated Groundwater*.

— NSW EPA 1995, *Contaminated Sites: Sampling Design Guidelines.*

— NSW EPA 2011, *Guidelines for Consultants Reporting on Contaminated Sites.*

— NSW EPA 2014, *Waste Classification Guidelines – Part 1: Classifying Waste*.

— *Work Health and Safety Act 2011* (NSW).

2 SITE DETAILS

2.1 SITE IDENTIFICATION

The site is currently being used as a primary school and kindergarten. Pertinent site information is provided in Table 2.1.

Table 2.1 Site details

Property address	70-100 Fullagar Road, Wentworthville, NSW
Site area (proposed development footprint)	1 hectares (ha)
Local government	Cumberland Council
Title identification details	Lot 1 to 23 and Lot 69 to 92 in Deposited Plan 963
Zoning Current site use	R2 Low density residential land use under the Cumberland Council Local Environment Plan (LEP) Kindergarten and primary school
Proposed future site use	Continued use as a kindergarten and primary school

2.2 SITE DESCRIPTION

At the time of the latest investigation, in July 2018, the site was fully fenced off as a school campus. The site was accessed via a gate off Fullagar Road to the north. The school grounds are comprised of permanent teaching buildings (identified as block A, block B, block C), 10 demountable buildings across the school, a library and administration building at the northern portion, open and shaded paved courtyards, paved walkways, a playing field, portions of grassed land and a carpark located at the northern and north-eastern portions of the school.

The site comprises a large portion of the school including part of block A, the playing field, the library and the central portion of the school.

2.3 SURROUNDING LAND USE

Other surrounding land uses include the following:

- To the north – Fullagar Road, residential properties and Wentworthville train station beyond
- To the east – Station Street, residential properties and Parramatta beyond
- To the south – Monash Street, the Western Motorway and residential properties beyond
- To the west – Garfield Street, Cumberland Highway with Ringrose Park and residential properties beyond.

2.4 PHYSICAL SETTING

2.4.1 TOPOGRAPHY

The site is situated at approximately 40 metres Australian Height Datum (mAHD). Topography at the school generally slopes from the west to east.

The nearest surface water body is Finlaysons Creek located approximately 180 m east of the site.

2.4.2 GEOLOGY

The Department of Minerals and Energy, 1991, 1:100,000 Penrith Geological Map Sheet 9030 indicates that the regional geology in the vicinity of the site is identified as Bringelly Shale described as shale, carbonaceous claystone, laminite of the Wianamatta Group.

2.4.3 ACID SULFATE SOILS

The CSIRO Australian Soil Resource Information System (ASRIS), http://www.asris.csiro.au/index_ie.html, accessed July 2018, indicates that soils underlying the site are mapped as having an extremely low probability of occurrence of acid sulfate soils (ASS).

2.4.4 HYDROLOGY AND HYDROGEOLOGY

A review of the licensed borehole register on the NSW Government Water Information website (https://realtimedata.waternsw.com.au/water.stm) accessed July 2018 indicated that there were eight registered groundwater bores within a 1 km radius of the site. The registered bores were installed for monitoring purposes.

Table 3.2 provides a summary of the available information.

Table 2.2 Registered Groundwater Bores within 1 km Radius

BORE ID	PROXIMITY TO SITE	TOTAL DEPTH	PURPOSE	STANDING WATER LEVEL (MBTOC)
GW113429	Approximately 50 m south-east	-	Monitoring bore	-
GW113430	Approximately 50 m south-east	-	Monitoring bore	-
GW113431	Approximately 60 m south-east	-	Monitoring bore	-
GW113432	Approximately 60 m south-east	-	Monitoring bore	-
GW113433	Approximately 60 m south-east	-	Monitoring bore	-
GW113434	Approximately 60 m south-east	-	Monitoring bore	-
GW113435	Approximately 65 m south-east	-	Monitoring bore	-
GW113436	Approximately 65 m south-east	-	Monitoring bore	-

Based on the surrounding topography, it is considered that groundwater is likely to flow south.

2.4.5 PROPOSED DEVELOPMENT WORKS

The proposed development of the site includes the upgrade and demolition of several sections of school Building A to the east and the central portion of the site (refer to Appendix B). The new development (Building G) will be constructed on the grassed area on the eastern and northern border lines. Building G also includes a new library. The current library building in the central portion of the site (Building E) will be refurbished and extended to create a new administration

building (Building H). To the west of the site, a building complex is proposed to house an after-school care centre, canteen room as well as toilets and storeroom along with a school hall. Further development is proposed to occur to the north-west of the site where the existing administration building (Building F) will be refurbished and extended to create a special needs building, this will include a play area directly to the south.

2.5 SITE HISTORY

Historical records indicate that all lots currently identified onsite are registered under the minister for education (previously identified as Her Most Gracious Majesty Queen Victoria) from 1880 to date, indicating that the land has been used as a school campus since then. Aerial imagery shows that the school was gradually constructed to its current configuration between 1943 and present.

The historical review has not identified any uses or owners which suggest grossly contaminating activities have been undertaken on the site. Wentworthville Swimming Centre located approximately 600 m north of the school was identified on the POEO Act register with a surrendered S.80 license for miscellaneous licensed discharge to waters. Surrounding land has been occupied by residential plots since at least the 1940s and no potentially significant contaminating activities have been identified for surrounding land uses immediately adjacent to the school.

2.6 PREVIOUS SITE ASSESSMENTS

WSP reviewed a WSP 2017, *NSW Public Works Asbestos in Grounds, Asbestos Management Plan, Wentworthville Public School, Wentworthville, NSW* (AMP). The asbestos management plan (AMP) was prepared to provide management requirements to target asbestos identified at two areas on site in 2006. Asbestos was identified in the form of fibre cement fragments in subsurface material at the main playing field and mulched garden areas at the southern portion of the school. It is understood emu picking work was undertaken across the identified asbestos zones. Following emu picking, geofabric was placed along the surface of the main playing field and raised mulched garden beds were installed along the southern boundary of the site. The AMP recommended the identified asbestos zones be regularly monitored for fragments. Identified asbestos zones are presented on Figure 3, Appendix A, Zone 1 represents the extent of geo-fabric capping that was installed in 2006 after asbestos was identified across the area.

2.6.1 SUMMARY OF SITE CONTAMINATION STATUS

The July DSI investigation (WSP, 2018) identified three location across the site impacted by asbestos contamination potentially presenting a risk to human health under certain conditions. In the central area of the site to the north of block A, a small fragment of asbestos was identified within TP16 at a depth of 300 mm. A second fragment was identified on the surface to the north west of the site near the open grassed area. Also, at a depth of 500 mm within bore hole HA03 to the south of the site (see Figure 2 in Appendix A for sampling locations and Appendix D for asbestos laboratory results) a loose asbestos fibre bundle was detected.

During intrusive investigation across the site indicators of buildings rubble were recorded, as such this RAP should be applied to all areas across the site. Appendix D presents the asbestos results from WSP's internal laboratory describing the composition of the asbestos fragments, presence or absence samples, as well as NEPM sieving conducted during the DSI works.

A loose fragment of ACM was also observed resting between the brick wall of Block A and the adjacent asphalt surface.

All results for contaminants of potential concern (COPC) total recoverable hydrocarbon (TRH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN) and polycyclic aromatic hydrocarbons (PAHs) were found to be below laboratory limits of reporting (LOR's). Concentrations of zinc were reported in some primary samples only slightly above the adopted site Ecological Investigation Levels (EILs). Concentrations of all other heavy metals analysed were reported below the adopted site criteria.

The results of the DSI investigation indicate the identified design footprint in the school is impacted with asbestos in soil. It is likely that the identified asbestos will be disturbed during development works. This RAP will therefore focus primarily on asbestos related management including geo-fabric capping recommendations for the proposed re-development works. It is also strongly recommended that the AMP (WSP, 2017) continue to be implemented on a perpetual basis for permanent and visiting workers.

3 REMEDIAL STRATEGY

3.1 REMEDIAL OBJECTIVE

The objective of this RAP is to mitigate the asbestos contamination at the site to render it suitable for the proposed worksite use as a primary school. The identified contamination at the site, comprising asbestos containing material (ACM) in soil, requires remediation or management during redevelopment and during the ongoing use of the site as a primary school and kindergarten.

3.2 PREFERRED REMEDIATION STRATEGY

The preferred order of options for remediation, as detailed in the NEPM (2013), is:

1. on-site treatment of the contaminant so that it is destroyed or the associated risk is reduced to an acceptable level
2. off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after with the soil is returned to the site
3. consolidation and isolation of the soil by containment with a properly designed barrier
4. removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material.

The NEPM also notes that where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, an appropriate management strategy should be implemented.

No appropriate on- or off-site treatment methods are available for asbestos in soil. Therefore, the preferred remediation strategy is management through consolidation and isolation on-site using an appropriately constructed barrier to prevent exposure.

3.2.1 PHYSICAL BARRIER SYSTEMS ('CAPPING')

Physical barrier systems (or capping) limit access to the impacted material, mitigate surface water infiltration through the underlying material and control or reduce migration of the substances into the surrounding environment. This option can include creating barriers around and on top of the impacted material in place, or relocating the impacted material to a constructed encapsulation area. This option also offers potential sustainability benefits by minimising waste to landfill and reducing associated waste transportation impacts. A capping approach results in contamination remaining on the site and necessitates long-term site management.

Given the volume of contaminated fill that would potentially require disposal in the southern and northern portion of the site, capping is considered the best approach to prevent exposure to ACM in that area. It is also considered that the new school building and hardstand areas will provide an effective barrier to remove exposure pathways to the contaminated fill. Capping will also be used in landscape / non-paved areas in order to isolate any potentially remaining impacted soils from future site users of the site.

3.3 IMPLEMENTATION OF REMEDIAL STRATEGY

Excavation of contaminated soils during the proposed redevelopment may include bulk excavation in areas of cut-to-fill, excavation of building footings, trench excavation for the laying of services and tree planting sites. Given that asbestos (bonded) was randomly located in material on the site, an asbestos management plan needs to be developed prior to the commencement of the redevelopment works that documents asbestos removal procedures and management measures for

the site, in accordance with current guidelines. It is considered that asbestos management could be incorporated into the construction environmental management plan (CEMP).. The following protocols should be detailed in the AMP:

- Site inductions, during which workers are to be advised on the contamination status of the site including the location, nature, type, concentration and risk associated with the asbestos present
- The location and methods of the field identification of contamination hotspots
- The occupational health and safety monitoring to be undertaken (as required by site conditions) in areas reported to contain contamination hotspots and areas outside contamination hotspots
- The occupational health and safety controls to mitigate the risks, including personal protective equipment (PPE).

3.3.1 EARTHWORKS

In view of the nature of the works, the heterogeneity and chemical composition of fill soils, it is important that the contactor ensures dust suppression techniques are implemented at all times. Any earthworks are to be in accordance with the AMP including the following protocols which must be maintained:

- All earthworks plant should incorporate air-conditioned cabs and cabs should be:
  - enclosed at all times during operation
  - cleaned daily to remove accumulated dust and dirt
  - monitored for dust and asbestos
- Appropriate PPE to be available within the cab
- Work is to cease immediately if odours, unusual discolouration or previously unidentified ACM are encountered in site soils.
- Barricading and signage should be used at all locations which are subject to isolation and should not be worked upon until clearance has been given
- Water carts are to be available at all times and to be used as needed for dust suppression
- Environmental dust monitoring stations should be in place
- Occupational health dust monitoring should be operated as required.

3.3.2 SURFACE EMU-PICK

Prior to any ground disturbance or construction works occurring, a site wide emu-pick must be undertaken to remove any asbestos fragments visible on the site surface. Care should be taken to identify smaller fragments that may be present around the edges of buildings where potential gaps in the asphalt surface may have occurred. The emu pick activities shall include: -

- A licensed asbestos Contractor shall be engaged to undertake an emu pick of the subject area. As far as practicable the Contractor shall conduct a slow traverse of the area on a grid pattern. The surfaces will be viewed closely to detect evidence of asbestos debris or fragments to remove any visible ACM
- Any ACM collected will be double bagged and labelled as asbestos waste with subsequent disposal to a licensed landfill facility.
- An independent Licensed Asbestos Assessor (LAA) will conduct a post emu pick surface inspection which will be recorded in a Surface Asbestos Clearance Certificate.

3.3.3 CAPPING DESIGN

The proposed cap will be suitable to prevent exposure of site users to asbestos-impacted soil. The cap needs to be installed above the previously identified ACM (refer to Zone 1 and Zone 2, Appendix A, Figure 3) and any additional areas of ACM impact that may be uncovered during construction.

In areas which will be covered by concrete, asphalt, buildings or other impermeable barriers, the asbestos-impacted soil should be covered with geofabric as a marker layer and the surface development can be placed directly above the marker layer with no clean fill required. The marker layer will need to be sturdy enough to withstand damage from equipment during the placement of the capping layer. For grassed and landscaped areas, asbestos-impacted soil will be covered with geofabric marker layer and a minimum of 300 mm of clean virgin excavated natural material (VENM).

3.3.3.1 . CAPPING DESIGN FOR THE SOUTHERN PORTION OF THE SITE – ZONE 1

Following the identification of ACM in Zone 1 (see Appendix A, Figure 3) in 2006, an emu-pick was conducted across the area to remove surface asbestos fragments, a geo-fabric marker layer was then installed.. This marker layer was then landscaped with raised mulch garden beds and grass.

At the completion of construction works across the site, it is recommended that the geo-fabric capping in Zone 1 be inspected and confirmed to be intact and in suitable condition for its intended purpose of preventing exposure of site users to asbestos-impacted soil. If the marker layer is identified as damaged, the re-instatement of the marker layer at the appropriate position should occur at the completion of works. A minimum 300 mm capping layer should be present above the marker layer

During the works, excavation of material below the existing Zone 1 capping (if required) should be managed in accordance with the AMP. Excavation should be undertaken such that ACM impacted fill does not cross-contaminate the “clean” capping (i.e. any over excavation of the fill placed as part of the cut and fill works into the sub-surface).

3.3.3.2 CAPPING DESIGN FOR THE PROPOSED UPGRADED AREA – ZONE 2

After the site-wide emu-pick and excavation works have been complete in Zone 2, it is recommended that Zone 2 (see Appendix A, Figure 3) be capped with geo-fabric material at a consistent depth of 300 mm below proposed finished ground level, with 300 mm of clean material (VENM or otherwise suitable) placed on top of this marker layer.

In areas which will be covered by concrete, asphalt, buildings or other impermeable barriers, the asbestos-impacted soil should be covered with geofabric as a marker layer and the surface development can be placed directly above the marker layer with no clean fill required. Any VENM used on site should be accompanied with the appropriate documents stating the nature and origin of the material. The VENM should be inspected during delivery to ensure that the material is visibly “clean” and consistent with the material description presented on the VENM certificate.

3.4 VALIDATION

Validation of the remediation strategy will be based on:

— the visual confirmation of marker layer and, where required, clean fill capping material

— additional verification investigation in grassed and landscape areas outside of the identified asbestos zones

— analytical results and/or VENM material certification for any material imported to the site to construct the cap

— survey data confirming the cap thickness

— material tracking for any soil removed from the site.

3.4.1 UNPAVED AREAS (WITH NO PREVIOUSLY IDENTIFIED ACM)

Due to the non-homogeneous nature of asbestos as a contaminant a final validation of grassed and landscape areas shall be undertaken. The following applies to grassed and landscape areas where a marker layer and clean cap has not been installed: -

- soil testing should be undertaken by a suitably qualified and experienced consultant
- mark out sample locations across the unpaved area on a maximum 10 m grid
- hand auger to a depth of 300 mm at each sample location and inspect the material for visible ACM
- record the presence of ACM (if identified)
- collect a minimum 500 ml soil sample for laboratory asbestos testing.

If asbestos is detected within the top 300 mm of material, capping measure should be installed across the impacted area in accordance with Section 3.3.3 of this RAP.

3.4.2 VALIDATION OF THE CAP

Placement of the marker layer should be visually confirmed and photographed. Topographic surveys prior to and following placement of "clean" capping materials above the marker layer should be undertaken by registered surveyors. The survey results should be included in the validation report.

All material imported to site for capping or backfill must be accompanied with validation/classification certificates stating that the material is VENM. Approval for the importation of the fill material to the site is to be provided only after the validation and classification certificates are received. The imported material delivered to the site must be inspected prior to backfilling to ensure that that the material is visibly "clean" and consistent with the material description presented on the VENM certificate..

3.4.3 VALIDATION CRITERIA FOR THE SITE

To assess the contamination status, the NSW EPA refers to *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM; as amended 2013), specifically Schedule B1, Investigation Levels for Soil and Groundwater. Schedule B1 provides a framework for the use of investigation and screening levels based on a matrix of human health and ecological risks. The NEPM provides criteria depending on current or proposed land use of the site. Scenario "C" relates to recreational land use and applies to open space such as parks, playgrounds, playing fields, secondary schools and footpaths. As the current land use and proposed future land use at the site is a secondary school, the recreational/open space criteria have been adopted.

As no sensitive ecological receptors or contaminants which may provide a vapour inhalation risk have been identified at the site, only health investigation level (HIL) criteria are considered relevant for validation of excavated areas. Any imported material will be assessed against both the *Health-based investigation levels (HIL-A) for l Low density residential* and the *Health screening levels (HSL-A) for low density residential* assuming a sandy geology in shallow soils (0 - 1 m) and/or the NSW EPA ENM order criteria. The HIL-A criteria are presented in Table 4.1. The HSL-A criteria are presented in Table 4.2 and Table 4.3. The Asbestos Health Screening Levels are presented in Table 4.3 and the ENM exemption order criteria is presented in Table 4.4.

Table 3.1 Adopted health investigation levels

ANALYTE	HIL A – LOW DENSITY RESIDENTIAL[1] (mg/kg)
Metals	
Arsenic	100
Cadmium	20

Copper	6000
Lead	300
Mercury	40
Nickel	400
Zinc	7400
Polycyclic aromatic hydrocarbons	
Carcinogenic PAHs (as benzo(a)pyrene TEQ)	3
Total PAHs	300
Organochlorinated pesticides	
DDT+DDE+DDD	240
Aldrin and dieldrin	6
Chlordane	50
Endosulfan	270
Endrin	10
Heptachlor	6
HCB	10
Methoxychlor	300
Mirex	10
Polychlorinated biphenyls	
PCBs	1

(1) NEPM (2013) Schedule B1, Table 1A (1)

Table 3.2 Adopted health screening levels

ANALYTE	HSL C – RECREATIONAL[1] (mg/kg)
Benzene	0.5
Toluene	160
Ethylbenzene	55
Xylenes	40
Naphthalene	3
TRH C_6 - C_{10} Fraction minus BTEX (F1)	45
TRH >C_{10}-C_{16} less Naphthalene (F2)	110

(1) NEPM (2013) Schedule B1, Table 1A (3)

NL – Non limiting

Table 3.3 Asbestos health screening levels

Analyte	HSL (w/w per cent)
	RECREATIONAL LAND USE
Bonded ACM	0.01 per cent
FA an AF (friable asbestos)	0.001 per cent
All forms of asbestos	No visible asbestos for surface soil

Table 3.4 NSW EPA ENM order criteria

ANALYTE	MAXIMUM AVERAGE CONCENTRATION[1] (mg/kg)	ABSOLUTE MAXIMUM CONCENTRATION[1] (mg/kg)
Metals		
Arsenic	20	40
Cadmium	0.5	1
Chromium	75	150
Copper	100	200
Lead	50	100
Mercury	0.5	1
Nickel	30	60
Zinc	150	300
Hydrocarbons		
Benzo(a)pyrene	0.5	1
Total PAHs	20	40
Benzene	NA	0.5
Toluene	NA	65
Ethylbenzene	NA	25
Xylenes	NA	15
TRH C_{10} - C_{36}	250	500
Other criteria		
pH (pH units)	5 to 9	4.5 to 10
Electrical conductivity (dS/m)	1.5	3.0
Foreign material (%)	0.05	0.10

(2) NSW EPA ENM order, Table 4

All material requiring offsite disposal will be assessed against the NSE EPA Waste classification criteria presented in Table 4.5.

Table 3.5 Waste classification guidelines

Chemicals	CT (without TCLP)(1)		SCC (with TCLP)(1)			
	General solid (CT1)	Restricted solid (CT2)	General solid		Restricted solid	
			TCLP1	SCC1	TCLP2	SCC2
	(mg/kg)	(mg/kg)	(mg/l)	(mg/kg)	(mg/l)	(mg/kg)
Petroleum hydrocarbons						
TRH C_6-C_9	650[2]	2,600[2]	NA	650	NA	2,600
TRH C_{10}-C_{36}	10,000[2]	40,000[2]	NA	10,000	NA	40,000
Benzene	10	40	2	18	2	72
Toluene	288	1,152	57.6	518	57.6	2,073
Ethylbenzene	600	2,400	120	1080	120	4,320
Total xylene	1,000	4,000	200	1,800	200	7,200
PAHs						
Benzo(a)pyrene	0.8	3.2	0.04	10	0.16	23
Total PAHs	200[2]	800[2]	NA	200	NA	800
Heavy metals						
Arsenic	100	400	5	500	20	2,000
Cadmium	20	80	1	100	4	400
Chromium (VI)	100	400	5	1,900	20	7,600
Lead	100	400	5	1,500	20	6,000
Mercury	4	16	0.2	50	0.8	200
Nickel	40	160	2	1,050	8	4,200
Polychlorinated biphenyls						
Total PCBs	<50[2]	<50[2]	NA	<50	NA	<50

(1) Table 1 and Table 2 in Waste Classification Guidelines. Part 1: Classifying Waste (NSW EPA, 2014)
(2) These contaminants are assessed using the SCC values only.

3.5 REPORTING

A report shall be prepared following successful remediation and validation of the site. The report shall contain all relevant information and shall conform to:

— NSW EPA 2011, *Contaminated sites: Guidelines for consultants reporting on contaminated sites.*

— NSW EPA 2017, *Contaminated land management: Guidelines for the NSW site auditor scheme* (3rd edition.

— NEPM (2013).

The validation report shall include the recommendations for preparation of a long-term environmental management plan (EMP). The long-term EMP should include details for the ongoing management and maintenance/inspection

requirements of the proposed permanent capping structure. The long-term EMP should also detail management/mitigation measures to adopt should there be a breach of the cap material due to erosion or unplanned excavation works, as well as details on post-development inspections to evaluate the integrity of the cap.

4 CONTINGENCY MANAGEMENT

Contingency plans for anticipated environmental problems that may arise during the course of the remediation work are summarised in Table 5.1.

Table 4.1 Contingency management plan

ISSUE	CORRECTIVE ACTIONS
Unknown types of materials	In the event that greater volumes of potentially contaminated material are identified during the remedial works that exceed quantities estimated from the site investigations, an assessment of the material should be conducted in accordance with Section 4. The procedures to be followed include: — stop work, contact site supervisor/manager — contractor to prevent access by any unauthorised personnel to the unexpected substance(s) and install appropriate stormwater/sediment controls — contractor to contact client and arrange inspection by a qualified environmental consultant — environmental consultant to conduct site inspection, sampling and laboratory analysis (where required) — environmental consultant to evaluate field screening and/or analytical results against remediation criteria — if substance(s) assessed as not presenting an unacceptable risk to human health or environment then: — contractor to remove safety barricades and environmental controls and resume work — environmental consultant to include outcomes of additional assessment/validation into a validation report. — if substance assessed as presenting an unacceptable risk to human health/environment then: — environmental consultant to assess extent of additional remediation required and undertake validation sampling — once validated, contractor to remove safety barricades and environmental controls and continue work — environmental consultant to include outcomes of additional assessment/ validation into a validation report.
Excessive dust	Use water sprays to suppress the dust or stop site activities generating the dust until it abates.
Excessive noise	Identify the source, isolate the source if possible, and modify the actions of the source.
Excessive odours/vapours	If excessive organic odours/vapours are being generated, stop works and monitor ambient air across the site for organic vapours with a PID and odours at site boundaries. Implement control measures including respirators for site workers, use of odour suppressants, wetting down of excavated soil.
Excessive rainfall	Ensure sediment and surface water controls are operating correctly. If possible divert surface water away from active work areas or excavations.
Hazardous ground gases	In the event that hazardous ground gases/soil vapour concentrations are found to be unacceptable during remediation, stop work and follow the procedures documented in the CEMP.

ISSUE	CORRECTIVE ACTIONS
ACM encountered	In the event that previously unidentified ACM is identified during earthworks an assessment of the material should be conducted in accordance with Appendix E. The procedures to be followed include: — stop work, contact site supervisor/manager — contractor to prevent access by any unauthorised personnel — contractor to contact client and arrange inspection by a qualified environmental consultant — environmental consultant to conduct site inspection, sampling and laboratory analysis (where required).
Leaking machinery or equipment	Stop the identified leak (if possible). Clean up the spill with absorbent material. Stockpile the impacted soil in a secure location, sample and determine the appropriate disposal/treatment option.
Failure of erosion or sedimentation control measures	Stop work, repair the failed control measure.
Equipment failures	Ensure that spare equipment is on hand at the site, or ensure that the failed equipment can be serviced by site personnel or a local contractor.
Complaint management	All complaints should be dealt with immediately by the contractor and should be directed to the client's nominated representative as required.
Acid sulfate soil	If acid sulfate soil is suspected, stop works and assess the material. If actual or potential acid sulfate soil is present, an acid sulfate soil management plan should be prepared.

5 UNEXPECTED FINDS PROTOCOL

5.1 MANAGEMENT MEASURES AND MITIGATION STRATEGIES

This unexpected finds protocol (UFP) is aimed at ensuring the health and safety of staff, contractors and visitors with regards to contaminated soil, asbestos or soil potentially containing contamination or asbestos outside identified impacted zones. The plan is to be implemented during intrusive works on site.

The objective of the UFP is to describe procedures minimising exposure of all site occupants to ACM and possible contamination potentially found within soil through the development and implementation of the management systems outlined herein.

It is the responsibility of the principal contractor to ensure that each time an action is undertaken, that the action is recorded and signed off.

Typical indicators of contamination include:

- unusual odours
- stained soil
- evidence of ash material
- the presence of foreign material, such as waste or building rubble which could be a source of contamination
- sheens on soil or water
- unusual colours
- crystalline or powdery substances
- presence of drums
- underground storage tanks.

If asbestos or asbestos containing materials are discovered on site an assessment of the material should be conducted in accordance with Appendix E. Refer to Section 3.3.3 for the necessary actions that should be taken if the presence of ACM is confirmed.

In the interests of ensuring worker health and safety, and protection of the environment, any unexpected findings should be handled with care including segregation of the area from general site workers and the public, and obtaining specialist advice on the handling and disposal of the material.

6 LIMITATIONS

This Report is provided by WSP Australia Pty Limited (WSP) for Fulton Trotter Architects (Client) in response to specific instructions from the Client and in accordance with WSP's proposal dated [15 June 2018] and agreement with the Client dated [21 June 2018] (Agreement).

PERMITTED PURPOSE

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (Permitted Purpose).

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APPENDIX A

SITE FIGURES

Map: PS110641_GIS_001_A	Author: Angela.Sun
Date: 15/08/2018	Approved by: BP

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, LPI 2017

0 50 100 m

1:5,000

Coordinate system: GDA 1994 MGA Zone 56
Scale ratio correct when printed at A3

Wentworthville Public School
70-100 Fullagar Road, Wentworthville, NSW

Figure 1
Site Location

Map: PS110641_GIS_002_A	Author: Angela.Sun		0 10 20 m 1:1,000 Coordinate system: GDA 1994 MGA Zone 56 Scale ratio correct when printed at A3
Date: 15/08/2018	Approved by: BP		
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, LPI 2017			

Wentworthville Public School
70-100 Fullagar Road, Wentworthville, NSW

Figure 2
Sampling locations

Map: PS110641_GIS_003_A2	Author: OrfanosM		0 10 20 m 1:1,000
Date: 5/09/2018	Approved by: BP		Coordinate system: GDA 1994 MGA Zone 56 Scale ratio correct when printed at A3

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, LPI 2017

Wentworthville Public School
70-100 Fullagar Road, Wentworthville, NSW

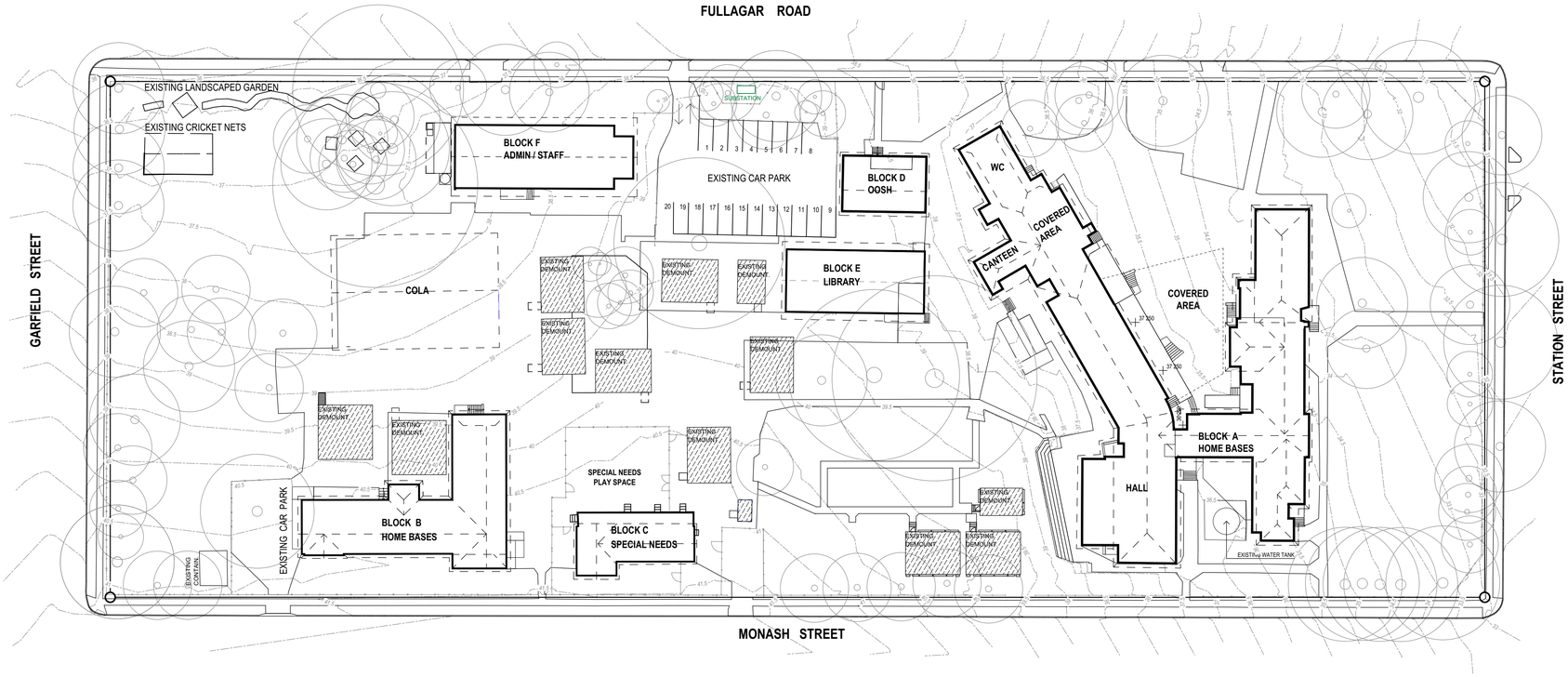
Figure 3
Location of asbestos

APPENDIX B

PROPOSED CONSTRUCTION PLANS

EXISTING SITE PLAN LEGEND

- EXISTING BUILDINGS
- EXISTING DEMOUNTABLES
- EXISTING TREES
- ROOF OVER
- CONTOURS
- FENCE



1 **PLAN**
EXISTING SITE PLAN
SCALE: 1:500

REV.	DESCRIPTION	DATE	INIT.
P3	EFSG Review	31/07/18	LW
P4	Consultant Issue	06/08/18	LW
P5	Draft Schematic Design Issue	04/09/2018	JFK
P6	Issued For TSG Review	20/09/2018	JFK
P7	SSDA Consultant Report Issue	05/10/18	WG
P8	SD / SSDA Client Review Issue	11/10/18	JFK
P9	SSDA Final Coordination Issue	9/11/18	JFK

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PHASE **SCHEMATIC DESIGN**

CLIENT NSW Department of Education

PROJECT Wentworthville Public School

ADDRESS 70-100 Fullagar Road
WENTWORTHVILLE, NSW

DRAWING **EXISTING SITE PLAN**

Figured dimensions take precedence over scale dimensions. Contractors must verify all dimensions on site before commencing any work or making shop drawings.

PROJECT NUMBER	DIRECTOR	CHECKED
7068WV01	JW	

DRAWING NUMBER	REVISION
AEX-1001	P9

150mm @ A1 | 100 | 50

50 100 150mm @ A1

plot date: Friday, 9 November 2018 file location: BIM Server: sydbimsyd 21 - BIM Server 21/7068 WVPS

PROPOSED SITE PLAN LEGEND

EXISTING BUILDINGS TO BE RETAINED

EXISTING BUILDINGS TO BE REFURBISHED

PROPOSED BUILDINGS

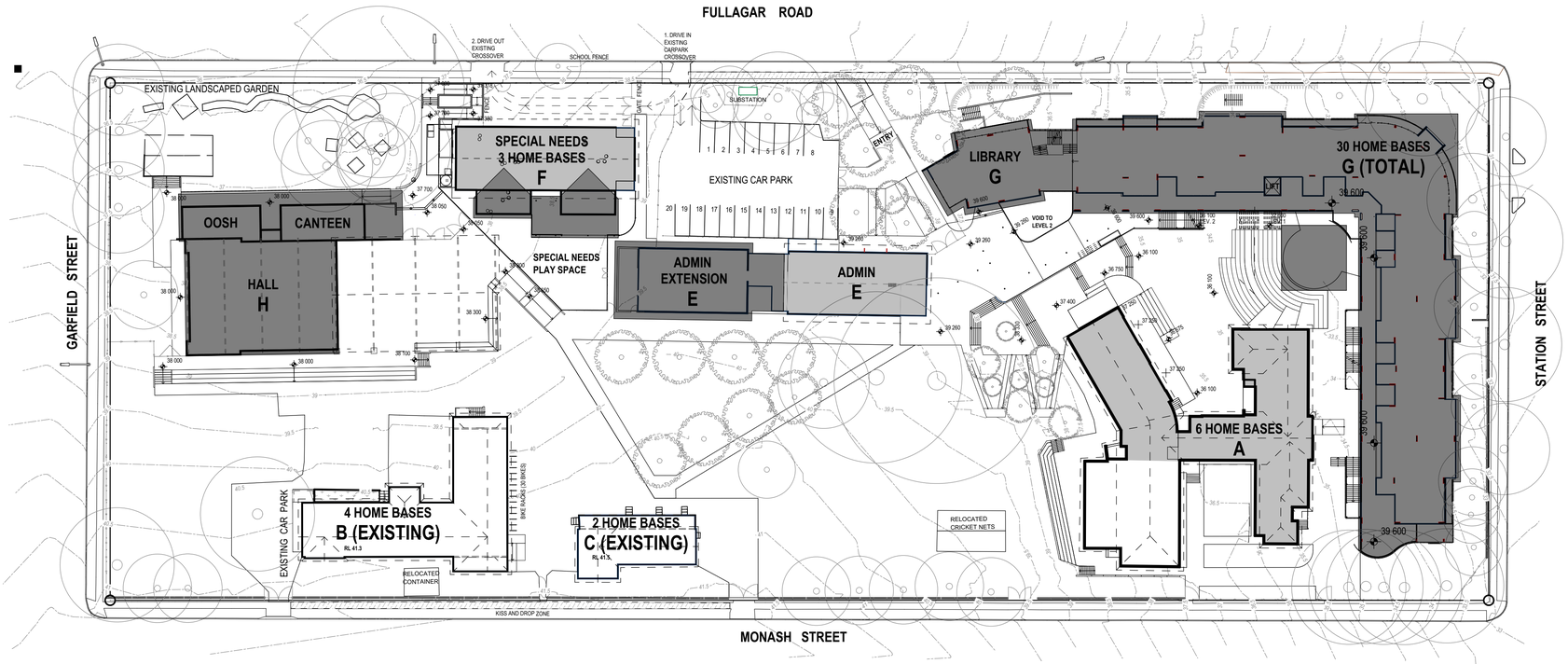
EXISTING TREES:

PROPOSED TREES

ROOF OVER

CONTOURS

FENCE



1 **PLAN**

PROPOSED SITE PLAN L3 (APPROX RL 39)

SCALE: 1:500

REV.	DESCRIPTION	DATE	INIT.
P5	Consultant Issue	06/08/18	LW
P6	Draft Schematic Design Issue	04/09/2018	JFK
P7	Issued For TSG Review	20/09/2018	JFK
P8	SSDA Consultant Report Issue	05/10/18	WG
P9	SD / SSDA Client Review Issue	11/10/18	JFK
P10	SSDA Draft Issue	6/11/18	JFK
P11	SSDA Final Coordination Issue	9/11/18	JFK

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Paul Trotter fraia		NSW 7177	QLD 2646
Ryan Loveday raia			QLD 4500
Robert Wesener fraia		NSW 5802	QLD 2633

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PHASE **SCHEMATIC DESIGN**

CLIENT NSW Department of Education

PROJECT Wentworthville Public School

ADDRESS 70-100 Fullagar Road
WENTWORTHVILLE, NSW

DRAWING **LEVEL 3 - PROPOSED SITE PLAN**

Figured dimensions take precedence over scale dimensions. Contractors must verify all dimensions on site before commencing any work or making shop drawings.

PROJECT NUMBER	DIRECTOR	CHECKED
7068WV01	JW	

DRAWING NUMBER	REVISION
SD-1001	P11

150mm @ A1 | 100 | 50

50 100 150mm @ A1

plot date: Friday, 9 November 2018 file location: BIM Server: sydbimsyd 21 - BIM Server 21/7068 WVPS

APPENDIX C

PHOTOGRAPHIC LOG

PHOTOGRAPH LOG

19/07/2018 Photograph 1 – A surface asbestos fragment found to the west of the site (Fragment 1).	
19/07/2018 Photograph 2 – The location of Fragment 1 relative to the central-west play area.	

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19/07/2018 Photograph 3 – An asbestos fragment was found at a depth of 300 mm in TP16 to the north of the site (Fragment 2).	
19/07/2018 Photograph 4 – Fragment 2 within the fill stockpile during test pitting.	

19/07/2018 Photograph 5 – An asbestos fragment was found within a crack between the asphalt and bricks of Block A to the north of the site opposite TP17.	
19/07/2018 Photograph 6 – The crack where another asbestos fragment was discovered.	

APPENDIX D

ASBESTOS LABORATORY CERTIFICATES

WSP Australia Pty Limited

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ABN 80 078 004 798
NCSI Certified Quality System ISO 9001

Certificate of Analysis

LOCATION:	**Wentworthville Public School**	**CERTIFICATE NO:**	**SYD-110641-99425**
CLIENT:	Fulton Trotter Architects	DATE\S SAMPLED:	18/07/2018 to 19/07/2018
CLIENT ADDRESS:	PO BOX 1669, Bondi NSW 1355	DATE RECEIVED:	23/07/2018
TELEPHONE:	02 8383 5151	DATE ANALYSED:	25/07/2018
EMAIL:	johnw@fultontrotter.com.au	ORDER NUMBER:	N/A
CONTACT:	John Ward	SAMPLED BY:	Claire Williamson

TEST METHOD: Qualitative identification of Asbestos fibre in bulk and soil samples at WSP Corporate Laboratories, by polarised light microscopy, including dispersion staining techniques using AS4964 (2004) and supplementary in house laboratory procedure (LP3 - Identification of Asbestos Fibres). This document is issued in accordance with NATA's requirements under NATA accreditation No. 17199, accredited for compliance with ISO/IEC: 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standard.

Lab No	Sample ID	Location	Sample Description	Sample Dimensions	Identification Type
001	BH11_0.1	Southern portion	Soil	20 gm	OF, NAD
002	BH12_0.5	Southern portion	Soil	65 gm	OF, NAD
003	BH08_0.3	Southern portion	Soil	45 gm	OF, NAD
004	BH09_0.1	Southern portion	Soil	46 gm	OF, NAD
005	BH03_0.5	Southern portion	Soil- loose fibre bundles	55 gm	A, CH, OF
005A			Fibre Cement Debris		CH
006	BH10_0.1	Southern portion	Soil	41 gm	OF, NAD
007	BH13_0.4	Southern portion	Soil	46 gm	OF, NAD
008	BH14_0.1	Southern portion	Soil	40 gm	OF, NAD
009	BH15_0.5	Southern portion	Soil	43 gm	OF, NAD
010	BH05_0.1	North and Eastern portion	Soil	50 gm	OF, NAD
011	Fragment 1	Found under silver bench opposite TP17	Fibre Cement Sheet	36 gm	A, CH, OF

LEGEND:

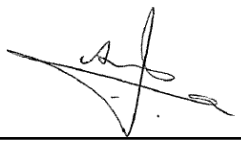
NAD - No Asbestos Detected
CH - Chrysotile Asbestos Detected
A - Amosite Asbestos Detected
C - Crocidolite Asbestos Detected
UMF - Unknown Mineral Fibres Detected
SMF - Synthetic Mineral Fibres Detected
OF - Organic Fibres Detected

Hand picked refers to small discrete amounts of asbestos distributed unevenly in a large body of non asbestos material.

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Approved Identifier

Name: Sneha Shakya



Approved Signatory

Name: Clare Brockbank

AUTHORISATION DATE

Wednesday, 25 July 2018

Notes:
If no asbestos is detected in vinyl tiles, mastics, sealants, epoxy resins and ore samples then confirmation by another independent analytical technique is advised due to the nature of the samples.
The results contained within this report relate only to the sample(s) submitted for testing. WSP accepts no responsibility for the initial collection, packaging or transportation of samples submitted by external persons. NATA does not accredit the sampling process, therefore sampling is not covered by the scope of accreditation. This document may not be reproduced except in full.

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NCSI Certified Quality System ISO 9001

Certificate of Analysis

LOCATION: **Wentworthville Public School** **CERTIFICATE NO:** **SYD-110641-99425**

Lab No	Sample ID	Location	Sample Description	Sample Dimensions	Identification Type
012	Fragment 2	Found in fill in TP16	Fibre Cement Sheet	35 gm	A, CH, OF

LEGEND:

NAD	-	No Asbestos Detected
CH	-	Chrysotile Asbestos Detected
A	-	Amosite Asbestos Detected
C	-	Crocidolite Asbestos Detected
UMF	-	Unknown Mineral Fibres Detected
SMF	-	Synthetic Mineral Fibres Detected
OF	-	Organic Fibres Detected

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NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Approved Identifier

Name: Sneha Shakya

Approved Signatory

Name: Clare Brockbank

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WSP

GRAVIMETRIC DETERMINATION AND QUANTIFICATION OF ASBESTOS IN SOIL

WENTWORTHVILLE PUBLIC SCHOOL

JULY 2018

GRAVIMETRIC DETERMINATION AND QUANTIFICATION OF ASBESTOS IN SOIL

WENTWORTHVILLE PUBLIC SCHOOL

WSP

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WSP.COM

REV	DATE	DETAILS
A	25/07/18	Wentworthville Public School_SYD-PS110641-99426

	NAME	DATE	SIGNATURE
Prepared by:	Sneha Shakya	25/07/18	
Reviewed by:	Clare Brockbank	25/07/18	

ABBREVIATIONS

A	Amosite Asbestos Detected
ACM	Asbestos Containing Material
AF	Asbestos Fines
C	Crocidolite Asbestos Detected
CH	Chrysotile Asbestos Detected
FA	Fibrous Asbestos
NAD	No Asbestos Detected
NEPM	National Environment Protection Measures
OF	Organic Fibres Detected
PLM	Polarised Light Microscopy
SMF	Synthetic Mineral Fibres Detected
UMF	Unknown Mineral Fibres Detected

ANALYSIS METHODOLOGY

AS 4964-2004 - Soils: Samples received by the laboratory are analysed in accordance with section 8.2.3 *Soil Samples* of Australian Standard (AS 4964-2004). Trace analysis is conducted in accordance with section 8.4 *Trace analysis criteria* of the standard. Asbestos analysis is conducted in accordance with the standard section 8.3.3 *Analytical criteria*, and follows methodology outlined in Appendix D *Simplified flowchart for bulk asbestos identification.*

Quantification of Asbestos in Soils: There is no accepted valid analytical method in Australia for estimating the concentration of asbestos in soils. NATA does not accredit facilities for the estimation of the concentration of ACM or free asbestos fibres in soils. 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 – May 2009* and Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater [National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)].

Percentages for asbestos content in materials and reporting limits of percentage weight for weight asbestos in soil are based on values outlined in Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater [National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013)]. Non-Friable (ACM) weight is calculated based on the assumption of 15% asbestos by weight in non-friable ACM products used in Australia. Friable asbestos weight, including Fibrous Asbestos (AF) and Asbestos Fines (AF), is calculated based on the assumption of 100% asbestos by weight.

The reporting limit of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This reporting limit is not applicable to free fibres (Respirable Fibres). Loose respirable fibres are detected under criteria set by Australian Standard (AS 4964-2004), section 8.4 *Trace analysis criteria*, with an implied detection and reporting limit of 0.1g/kg.

METHOD SPECIFIC DEFINITION

- Asbestos Containing Materials (ACM) - comprises asbestos-containing-material which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin (e.g. asbestos fencing and vinyl tiles). This term is restricted to material that cannot pass a 7 mm x 7 mm sieve.
- Fibrous Asbestos (FA) - comprises friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This type of friable asbestos is defined here as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. This material is typically unbonded (non-friable) or was previously bonded and is now significantly degraded (crumbling).
- Asbestos Fines (AF) - AF includes free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve.

All calculations of percentage Asbestos under this method are approximate and should be used as a guide only. Such results cannot be used in place of field evaluations.

These quantitative results are not covered by the scope of NATA accreditation.

ANALYSIS RESULTS

	UNIT	LIMIT OF REPORTING	SAMPLE: BH01_0.1	SAMPLE: BH02_0.5	SAMPLE: BH04_1.0	SAMPLE: BH06_0.1	SAMPLE: BH07_0.1	SAMPLE: TP16_0.1	SAMPLE: TP16_0.5
Total Soil Weight	g	1	604	553	649	569	749	802	774
Asbestos Type Detected	N/A	-	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Free Fibres (Respirable Fibres) in <2mm Sample	g/kg	0.1	No	No	No	No	No	No	No
ACM in >7mm Sample	g	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
FA & AF	g	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
ACM in >7mm Sample (as 15% Asbestos)	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
FA & AF (as 100% asbestos)	%w/w	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

These quantitative results are not covered by the scope of NATA accreditation.

LEGEND:

NAD	No Asbestos Detected
CH	Chrysotile Asbestos Detected
A	Amosite Asbestos Detected
C	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected

ANALYSIS RESULTS

	UNIT	LIMIT OF REPORTING	SAMPLE: TP17_1.2	SAMPLE: TP18_0.1	SAMPLE: TP19_0.5	SAMPLE: TP20_0.5	SAMPLE: TP21_0.1	SAMPLE: TP21_0.5
Total Soil Weight	g	1	677	823	747	549	741	644
Asbestos Type Detected	N/A	-	NAD	NAD	NAD	NAD	NAD	NAD
Free Fibres (Respirable Fibres) in <2mm Sample	g/kg	0.1	No	No	No	No	No	No
ACM in >7mm Sample	g	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
FA & AF	g	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
ACM in >7mm Sample (as 15% Asbestos)	%w/w	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
FA & AF (as 100% asbestos)	%w/w	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

These quantitative results are not covered by the scope of NATA accreditation.

LEGEND:

NAD	No Asbestos Detected
CH	Chrysotile Asbestos Detected
A	Amosite Asbestos Detected
C	Crocidolite Asbestos Detected
UMF	Unknown Mineral Fibres Detected

APPENDIX A

AS 4964 LABORATORY CERTIFICATES

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CLIENT ADDRESS:	PO BOX 1669, Bondi NSW 1355	DATE RECEIVED:	23/07/2018
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Lab No	Sample ID	Location	Sample Description	Sample Dimensions	Identification Type
001	BH01_0.1	Northern and eastern portion	Soil	604 gm	OF, NAD
002	BH02_0.5	Northern and eastern portion	Soil	553 gm	OF, NAD
003	BH04_1.0	Northern and eastern portion	Soil	649 gm	OF, NAD
004	BH06_0.1	Northern and eastern portion	Soil	569 gm	OF, NAD
005	BH07_0.1	Northern and eastern portion	Soil	749 gm	OF, NAD
006	TP16_0.1	Northern and eastern portion	Soil	802 gm	OF, NAD
007	TP16_0.5	Northern and eastern portion	Soil	774 gm	OF, NAD
008	TP17_1.2	Northern and eastern portion	Soil	677 gm	OF, NAD
009	TP18_0.1	Northern and eastern portion	Soil	823 gm	OF, NAD
010	TP19_0.5	Northern and eastern portion	Soil	747 gm	OF, NAD
011	TP20_0.5	Northern and eastern portion	Soil	549 gm	OF, NAD
012	TP21_0.1	Northern and eastern portion	Soil	741 gm	OF, NAD

LEGEND:

NAD	-	No Asbestos Detected
CH	-	Chrysotile Asbestos Detected
A	-	Amosite Asbestos Detected
C	-	Crocidolite Asbestos Detected
UMF	-	Unknown Mineral Fibres Detected
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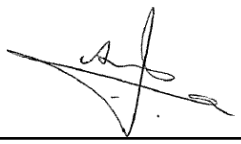

Approved Signatory

Name: Clare Brockbank

AUTHORISATION DATE

Wednesday, 25 July 2018

Notes:
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ABN 80 078 004 798

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Certificate of Analysis

LOCATION: **Wentworthville Public School** **CERTIFICATE NO:** **SYD-110641-99426**

Lab No	Sample ID	Location	Sample Description	Sample Dimensions	Identification Type
013	TP21_0.5	Northern and eastern portion	Soil	644 gm	OF, NAD

LEGEND:

NAD	-	No Asbestos Detected
CH	-	Chrysotile Asbestos Detected
A	-	Amosite Asbestos Detected
C	-	Crocidolite Asbestos Detected
UMF	-	Unknown Mineral Fibres Detected
SMF	-	Synthetic Mineral Fibres Detected
OF	-	Organic Fibres Detected

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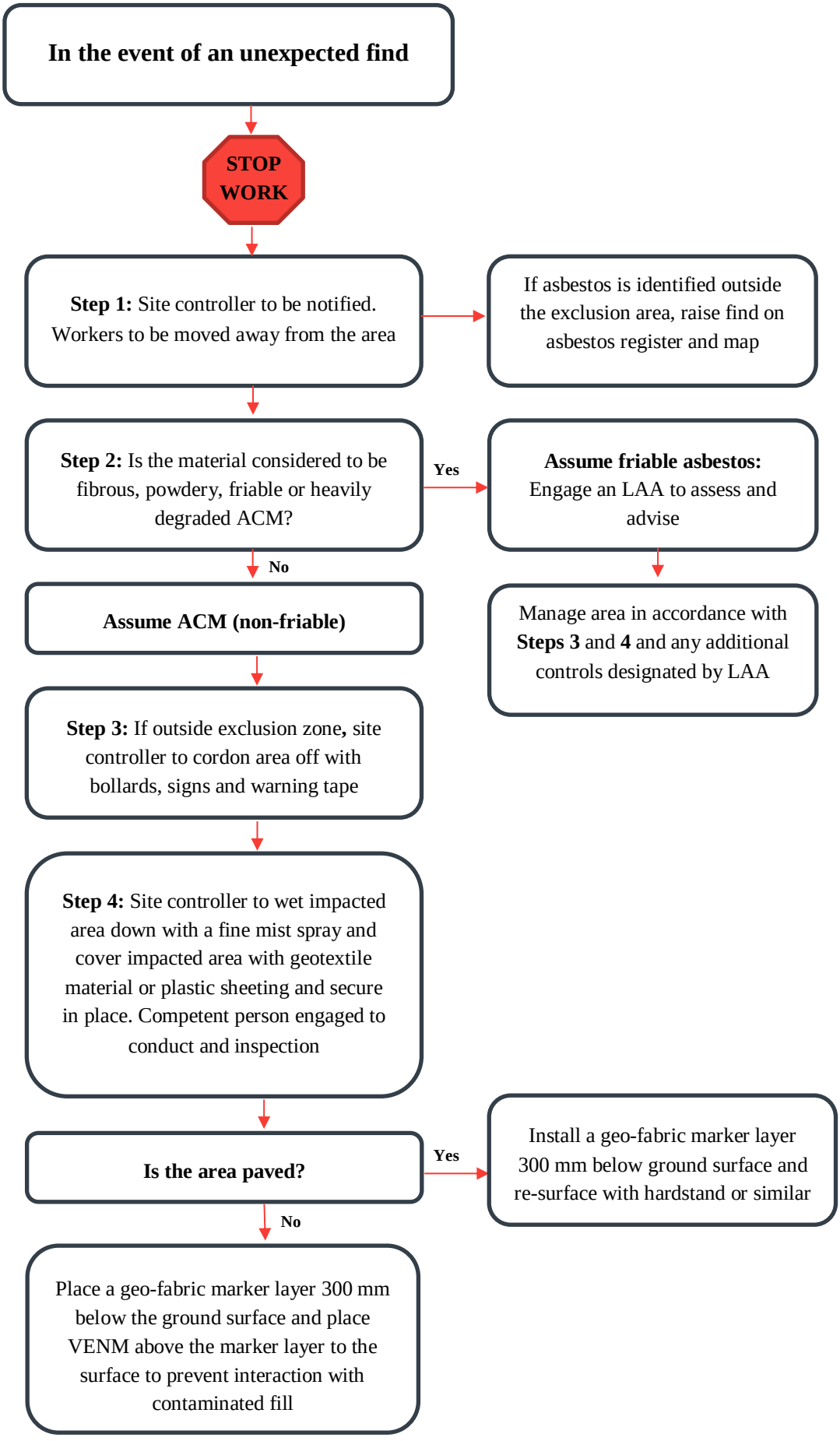
APPENDIX E

UNEXPECTED FINDS PROTOCOL FLOW CHART


In the event of an unexpected find
STOP WORK
Step 1: Site controller to be notified. Workers to be moved away from the area
If asbestos is identified outside the exclusion area, raise find on asbestos register and map
Step 2: Is the material considered to be fibrous, powdery, friable or heavily degraded ACM?
Yes
Assume friable asbestos: Engage an LAA to assess and advise
No
Assume ACM (non-friable)
Manage area in accordance with Steps 3 and 4 and any additional controls designated by LAA
Step 3: If outside exclusion zone, site controller to cordon area off with bollards, signs and warning tape
Step 4: Site controller to wet impacted area down with a fine mist spray and cover impacted area with geotextile material or plastic sheeting and secure in place. Competent person engaged to conduct and inspection
Is the area paved?
Yes
Install a geo-fabric marker layer 300 mm below ground surface and re-surface with hardstand or similar
No
Place a geo-fabric marker layer 300 mm below the ground surface and place VENM above the marker layer to the surface to prevent interaction with contaminated fill