



# National Environment Protection (Assessment of Site Contamination) Measure 1999

as amended

made under section 14(1) of the

*National Environment Protection Council Act 1994 (Cwlth), the National Environment Protection Council (New South Wales) Act 1995 (NSW), the National Environment Protection Council (Victoria) Act 1995 (Vic), the National Environment Protection Council (Queensland) Act 1994 (Qld), the National Environment Protection Council (Western Australia) Act 1996 (WA), the National Environment Protection Council (South Australia) Act 1995 (SA), the National Environment Protection Council (Tasmania) Act 1995 (Tas), the National Environment Protection Council Act 1994 (ACT) and the National Environment Protection Council (Northern Territory) Act 1994 (NT)*

**Compilation start date:** 16 May 2013

**Includes amendments up to:** *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)*

This compilation has been split into 22 volumes

Volume 1: sections 1–6, Schedules A and B  
Volume 2: Schedule B1  
Volume 3: Schedule B2  
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Volume 6: Schedule B5a  
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Each volume has its own contents

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## About this compilation

### The compiled instrument

This is a compilation of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended and in force on 16 May 2013. It includes any amendment affecting the compiled instrument to that date.

This compilation was prepared on 22 May 2013.

The notes at the end of this compilation (the *endnotes*) include information about amending Acts and instruments and the amendment history of each amended provision.

### Uncommenced provisions and amendments

If a provision of the compiled instrument is affected by an uncommenced amendment, the text of the uncommenced amendment is set out in the endnotes.

### Application, saving and transitional provisions for amendments

If the operation of an amendment is affected by an application, saving or transitional provision, the provision is identified in the endnotes.

### Modifications

If a provision of the compiled instrument is affected by a textual modification that is in force, the text of the modifying provision is set out in the endnotes.

### Provisions ceasing to have effect

If a provision of the compiled instrument has expired or otherwise ceased to have effect in accordance with a provision of the instrument, details of the provision are set out in the endnotes.





## Appendix C Derivation of Investigation Levels for Generic Land Uses HIL A - Low Density Residential

Summary of Exposure Parameters		Abbreviation	units	Parameter	References/Notes
Soil and Dust Ingestion Rate	- Young children (0-5 years)	IR <sub>SC</sub>	mg/day	100	Schedule B7, Table 5
	- Adults	IR <sub>SA</sub>	mg/day	50	Schedule B7, Table 5
Surface Area of Skin	- Young children (0-5 years)	SA <sub>C</sub>	cm <sup>2</sup> /day	2700	Schedule B7, Table 5
	- Adults	SA <sub>A</sub>	cm <sup>2</sup> /day	6300	Schedule B7, Table 5
Soil-to-Skin Adherence Factor		AF	mg/cm <sup>2</sup> /day	0.5	Schedule B7, Table 5
Time Spent Outdoors		ET <sub>O</sub>	hours	4	Schedule B7, Table 5
Time Spent Indoors		ET <sub>I</sub>	hours	20	Schedule B7, Table 5
Lung Retention Factor		RF	-	0.375	Schedule B7, Table 5
Particulate Emission Factor		PEF <sub>O</sub>	(m <sup>3</sup> /kg)	2.9E+10	Calculated for scenario, refer to Equations 19 and 20 and assumptions in Schedule B7
Indoor Air Dust Factor		PEFI	(m <sup>3</sup> /kg)	2.6E+07	As per Equation 21 based assumptions presented in Schedule B7
Fraction of indoor dust comprised of outdoor soil		TF	-	0.5	Assume 50% soil concentration present in dust as noted in Schedule B7
Indoor Air-to-Soil Gas Attenuation Factor		α	-	0.1	Value adopted as discussed in Section 5.5 of Schedule B7
Body weight	- Young children (0-5 years)	BW <sub>C</sub>	kg	15	Schedule B7, Table 5
	- Adults	BW <sub>A</sub>	kg	70	Schedule B7, Table 5
Exposure Frequency		EF	days/year	365	Schedule B7, Table 5
Exposure Duration		ED <sub>C</sub>	years	6	Schedule B7, Table 5
	- Adults	ED <sub>A</sub>	years	29	Schedule B7, Table 5
Averaging Time (non-carcinogenic)		AT <sub>T</sub>	days	ED*365	Calculated based on ED for each relevant age group, multiplied by 24 hours for the assessment of inhalation exposures
Averaging Time (carcinogenic)		AT <sub>NT</sub>	days	25550	Based on lifetime of 70 years, multiplied by 24 hours for the assessment of inhalation exposures

Compound	Toxicity Reference Value Oral (TRV <sub>O</sub> ) (mg/kg/day)	GI Absorption (GAF) (unitless)	Toxicity Reference Value Dermal (TRV <sub>D</sub> ) (mg/kg/day)	Oral Bioavailability BA <sub>O</sub> (%)	Dermal Absorption Factor (DAF) (unitless)	Background Intake Oral/Dermal (BI <sub>O/D</sub> ) (% of TDI)	Toxicity Reference Value Inhalation (TRV <sub>I</sub> ) (mg/m <sup>3</sup> )	Background Intake Inhalation (BI <sub>I</sub> ) (% of TC)	Plant Uptake Factor (incl % Intake) Adults (kg/day) (eqn 16)	Plant Uptake Factor (incl % Intake) Children (kg/day) (eqn 16)	Pathway Specific HILs (mg/kg)				Soil Vapour HIL (mg/m <sup>3</sup> ) (eqn 12)	Derived Interim Soil Gas HIL - Threshold (to 1 or 2 s.f.) (mg/m3)	Derived Soil HIL (not rounded) (mg/kg) (eqn 2 for relevant pathways)	Derived Soil HIL (to 1 or 2 s.f.) (mg/kg)	Notes
											Soil Ingestion (eqn 3)	Home-grown produce (eqn 15)	Dermal (eqn 6)	Dust (eqn 9)					
arsenic	0.002	1	0.002	100%	0.005	50%	0.001	0%		2.3E-05	1.5E+02	1.3E+03	2.2E+03	1.6E+05		126	100		
beryllium	0.002	0.007	0.000014	100%	0.001	30%	0.000020	0%		1.1E-05	2.1E+02	3.7E+03	1.1E+02	3.3E+03		69	70		
boron	0.2			100%		85%	0.7	85%			4.5E+03	NA	NA	1.7E+07		4499	4500		
cadmium	0.0008			100%		60%	0.000005	20%		4.8E-04	4.8E+01	2.1E+01	NA	6.6E+02		15	15	1	
chromium (VI)	0.001			100%		10%	0.0001	0%		1.5E-04	1.4E+02	1.9E+02	NA	1.6E+04		78	80	1	
cobalt	0.0014	1	0.0014	100%	0.001	20%	0.0001	0%		1.0E-04	1.7E+02	3.2E+02	1.2E+04	1.6E+04		109	100		
copper	0.14			100%		70%	0.49	70%			6.3E+03	NA	NA	2.4E+07		6298	6000		
manganese	0.16			100%		50%	0.00015	20%		3.1E-04	1.2E+04	7.8E+03	NA	2.0E+04		3822	3800		
methyl mercury	0.00023	1	0.00023	100%	0.001	80%	0.000805	80%			6.9E+00	NA	5.1E+02	2.6E+04		7	7	1	
mercury (inorganic)	0.0006	0.07	0.00042	100%	0.001	40%	0.0002	10%		6.2E-05	5.4E+01	1.7E+02	2.8E+02	3.0E+04		36	40		
nickel	0.012	1	0.012	100%	0.005	60%	0.00002	20%		9.5E-05	7.2E+02	1.5E+03	1.1E+04	2.6E+03		397	400		
selenium	0.006			100%		60%	0.021	60%		1.2E-04	3.6E+02	5.9E+02	NA	1.4E+06		224	200		
zinc	0.5	1	0.5	100%	0.001	90%	1.75	90%			7.5E+03	NA	5.6E+05	2.9E+07		7398	7400		
cyanide (free) (no VI)	0.006	1	0.006	100%	0.1	50%	0.0008	0%			4.5E+02	NA	3.3E+02	1.3E+05		191	200	1	
TCE							0.002	10%			NA	NA	NA	NA	2.2E-02		0.02		
1,1,1-TCA							5	0%			NA	NA	NA	NA	6.0E+01		60		
PCE							0.2	10%			NA	NA	NA	NA	2.2E+00		2		
cis-1,2-dichloroethene							0.007	0%			NA	NA	NA	NA	8.4E-02		0.08		
phenol	0.7	1	0.7	100%	0.1	30%	0.035	30%		2.3E-03	7.4E+04	3.1E+03	5.4E+04	4.0E+06		2848	3000		
pentachlorophenol	0.003	1	0.003	100%	0.24	0%	0.0105	0%			4.5E+02	NA	1.4E+02	1.7E+06		106	100		
cresols	0.1	1	0.1	100%	0.1	50%	0.35	50%			1.9E-03	7.5E+03	4.0E+02	5.6E+03	2.9E+07		357	400	
DDX	0.002	1	0.002	100%	0.018	0%	0.007	0%			3.0E+02	NA	1.2E+03	1.1E+06		241	240		
dieldrin and dieldrin	0.0001	1	0.0001	100%	0.1	10%	0.00035	10%			1.4E+01	NA	1.0E+01	5.2E+04		5.7	6		
chlordane	0.0005	1	0.0005	100%	0.04	0%	0.00175	0%			7.5E+01	NA	1.4E+02	2.9E+05		49	50		
endosulfan	0.006	1	0.006	100%	0.1	30%	0.021	30%			6.3E+02	NA	4.7E+02	2.4E+06		268	270		
endrin	0.0002	1	0.0002	100%	0.1	0%	0.0007	0%			3.0E+01	NA	2.2E+01	1.1E+05		13	10		
heptachlor	0.0001	1	0.0001	100%	0.1	0%	0.00035	0%			1.5E+01	NA	1.1E+01	5.7E+04		6.4	6		
HCB	0.00016	1	0.00016	100%	0.1	0%	0.00056	0%			2.4E+01	NA	1.8E+01	9.2E+04		10	10		
methoxychlor	0.005	1	0.005	100%	0.1	0%	0.0175	0%			7.5E+02	NA	5.6E+02	2.9E+06		319	300		
mirex	0.0002	1	0.0002	100%	0.1	0%	0.0007	0%			3.0E+01	NA	2.2E+01	1.1E+05		13	10		
toxaphene	0.00035	1	0.00035	100%	0.1	10%	0.001225	10%			4.7E+01	NA	3.5E+01	1.8E+05		20	20		
2,4,5-T	0.01	1	0.01	100%	0.1	0%	0.035	0%			1.5E+03	NA	1.1E+03	5.7E+06		638	600		
2,4-D	0.01	1	0.01	100%	0.05	0%	0.035	0%			1.5E+03	NA	2.2E+03	5.7E+06		895	900		
MCPA	0.01	1	0.01	100%	0.1	0%	0.035	0%			1.5E+03	NA	1.1E+03	5.7E+06		638	600		
MCPB	0.01	1	0.01	100%	0.1	0%	0.035	0%			1.5E+03	NA	1.1E+03	5.7E+06		638	600		
meoprop	0.01	1	0.01	100%	0.1	0%	0.035	0%			1.5E+03	NA	1.1E+03	5.7E+06		638	600		
picloram	0.07	1	0.07	100%	0.1	0%	0.245	0%			1.1E+04	NA	7.8E+03	4.0E+07		4468	4500		
atrazine	0.005	1	0.005	100%	0.1	0%	0.0175	0%			7.5E+02	NA	5.6E+02	2.9E+06		319	320		
chlorthrifos	0.003	1	0.003	100%	0.03	50%	0.0105	50%			2.3E+02	NA	5.6E+02	8.6E+05		160	160		
bifenthrin	0.01	1	0.01	100%	0.1	10%	0.035	10%			1.4E+03	NA	1.0E+03	5.2E+06		574	600		
PCBs	0.00002	1	0.00002	100%	0.14	0%	0.00007	0%			2.5E-04	3.0E+00	1.2E+00	1.6E+00	1.1E+04		0.6	1	
PBDE Flame Retardants (Br1-Br9)	0.0001	1	0.0001	100%	0.1	80%	0.00035	80%			2.1E-05	3.0E+00	1.4E+01	2.2E+00	1.1E+04		1.2	1	

Includes factor of 2 to adjust for inclusion of metals in background food and plant uptake - see Appendix A  
 Pathway not of significance for chemical assessed (refer to Appendix A for chemical-specific details)  
 1 Calculated value differs from final HIL adopted in Schedule B7. For these compounds the calculated value, and basis, were not considered sufficiently different from the former HIL and hence the former HIL was retained - refer to Appendix A for details

Non-Threshold Effects - Lifetime Exposures (young child and adult)																		
Compound	Toxicity Reference Value Oral (TRV <sub>o</sub> ) (mg/kg/day) <sup>-1</sup>	GI Absorption (GAF) (unitless)	Non-Threshold Slope Factor Dermal (SF <sub>d</sub> ) (mg/kg/day) <sup>-1</sup>	Oral Bioavailability BA <sub>o</sub> (%)	Dermal Absorption Factor (DAF) (unitless)	Toxicity Reference Value Inhalation (TRV <sub>i</sub> ) (mg/m <sup>3</sup> ) <sup>-1</sup>	Target Risk (TR)	Plant Uptake Factor (Incl % intake) Adults (kg/day) (eqn 16)	Plant Uptake Factor (Incl % intake) Children (kg/day) (eqn 16)	Pathway Specific HILs (mg/kg)				Soil Vapour HIL (mg/m <sup>3</sup> ) (eqns 13 and 14)	Derived Interim Soil Gas IL - Threshold (to 1 or 2 s.f.) (mg/m <sup>3</sup> )	Derived Soil HIL (not rounded) (mg/kg) (eqn 2 for relevant pathways)	Derived Soil HIL (to 1 or 2 s.f.) (mg/kg)	Notes
										Soil Ingestion (eqns 4 and 5)	Home-grown produce (eqns 17 and 18)	Dermal (eqns 7 and 8)	Dust (eqns 10 and 11)					
TCE						0.004	1E-05			NA	NA	NA	NA	6.0E-02	0.06			
vinyl chloride						0.00880	1E-05			NA	NA	NA	NA	2.7E-02	0.03			
benzo(a)pyrene	0.5	1	0.5	100%	0.06	1.43E-01	1E-05			2.3E+01	1.3E+01	2.3E+04			8.2	8	2	
benzo(a)pyrene (Early-Life)	0.5	1	0.5	100%	0.06	1.43E-01	1E-05			5.6E+00	4.6E+00	9.8E+03			2.53	3	2	

NA Pathway not of significance for chemical assessed (refer to Appendix A for chemical-specific details)  
 2 Refer to Appendix A for discussion on different calculations conducted for benzo(a)pyrene and basis for HIL adopted

## Appendix C Derivation of Investigation Levels for Generic Land Uses HIL B - High Density Residential

Summary of Exposure Parameters	Abbreviation	units	Parameter	References/Notes	
Soil and Dust Ingestion Rate	- Young children (0-5 years)	IR <sub>sc</sub>	mg/day	25	25% of HIL A assumption, Schedule B7, Table 5
	- Adults	IR <sub>sa</sub>	mg/day	12.5	25% of HIL A assumption, Schedule B7, Table 5
Surface Area of Skin	- Young children (0-5 years)	SA <sub>c</sub>	cm <sup>2</sup> /day	2700	Schedule B7, Table 5
	- Adults	SA <sub>a</sub>	cm <sup>2</sup> /day	6300	Schedule B7, Table 5
Soil-to-Skin Adherence Factor	AF	mg/cm <sup>2</sup> /day	0.5	Schedule B7, Table 5	
Time Spent Outdoors	ET <sub>o</sub>	hours	1	Schedule B7, Table 5	
Time Spent Indoors	ET <sub>i</sub>	hours	20	Schedule B7, Table 5	
Lung Retention Factor	RF	-	0.375	Schedule B7, Table 5	
Particulate Emission Factor	PEF <sub>o</sub>	(m <sup>3</sup> /kg)	7.3E+10	Calculated for scenario, refer to Equations 19 and 20 and assumptions in Schedule B7	
Indoor Air Dust Factor	PEF <sub>i</sub>	(m <sup>3</sup> /kg)	2.6E+07	As per Equation 21 based assumptions presented in Schedule B7	
Fraction of indoor dust comprised of outdoor soil	TF	-	0.5	Assume 50% soil concentration present in dust as noted in Schedule B7	
Indoor Air-to-Soil Gas Attenuation Factor	α	-	0.1	Value adopted as discussed in Section 5.5 of Schedule B7	
Body weight	- Young children (0-5 years)	BW <sub>c</sub>	kg	15	Schedule B7, Table 5
	- Adults	BW <sub>a</sub>	kg	70	Schedule B7, Table 5
Exposure Frequency	EF	days/year	365	Schedule B7, Table 5	
Exposure Duration	- Young children (0-5 years)	ED <sub>c</sub>	years	6	Schedule B7, Table 5
	- Adults	ED <sub>a</sub>	years	29	Schedule B7, Table 5
Averaging Time (non-carcinogenic)	AT <sub>T</sub>	days	ED*365	Calculated based on ED for each relevant age group, multiplied by 24 hours for the assessment of inhalation exposures	
Averaging Time (carcinogenic)	AT <sub>NT</sub>	days	25550	Based on lifetime of 70 years, multiplied by 24 hours for the assessment of inhalation exposures	

Threshold Calculations - Young Child Aged 2-3 years																
Compound	Toxicity Reference Value Oral (TRV <sub>o</sub> ) (mg/kg/day)	GI Absorption (GAF) (unitless)	Toxicity Reference Value Dermal (TRV <sub>d</sub> ) (mg/kg/day)	Oral Bioavailability BA <sub>o</sub> (%)	Dermal Absorption Factor (DAF) (unitless)	Background Intake Oral/Dermal (BI <sub>o</sub> ) (% of TDI)	Toxicity Reference Value Inhalation (TRV <sub>i</sub> ) (mg/m <sup>3</sup> )	Background Intake Inhalation (BI <sub>i</sub> ) (% of TC)	Pathway Specific HILs (mg/kg)			Soil Vapour HIL (mg/m <sup>3</sup> ) (eqn 12)	Derived Interim Soil Gas HIL - Threshold (to 1 or 2 s.f.) (mg/m3)	Derived Soil HIL (not rounded) (mg/kg) (eqn 2 for relevant pathways)	Derived Soil HIL (to 1 or 2 s.f.) (mg/kg)	Notes
									Soil Ingestion (eqn 3)	Dermal (eqn 6)	Dust (eqn 9)					
arsenic	0.002	1	0.002	100%	0.005	50%	0.001	0%	6.0E+02	2.2E+03	1.6E+05			471	500	
beryllium	0.002	0.007	0.000014	100%	0.001	30%	0.000020	0%	8.4E+02	1.1E+02	3.3E+03			94	90	
boron	0.2			100%		65%	0.7	65%	4.2E+04	NA	4.0E+07			41956	40000	
cadmium	0.0008			100%		60%	0.000005	20%	1.9E+02	NA	6.6E+02			149	150	
chromium (VI)	0.001			100%		10%	0.0001	0%	5.4E+02	NA	1.6E+04			523	500	
cobalt	0.001	1	0.0014	100%	0.001	20%	0.0001	0%	6.7E+02	1.2E+04	1.6E+04			614	600	
copper	0.14			100%		60%	0.49	60%	3.4E+04	NA	3.2E+07			33565	30000	
manganese	0.14			100%		50%	0.0015	20%	4.8E+04	NA	2.0E+04			13963	14000	
methyl mercury	0.00023	1	0.00023	100%	0.001	80%	0.000805	80%	2.8E+01	5.1E+02	2.6E+04			26	30	
mercury (inorganic)	0.0006	0.07	0.000042	100%	0.001	40%	0.0002	10%	2.2E+02	2.8E+02	3.0E+04			121	120	
nickel	0.012	1	0.012	100%	0.005	60%	0.00002	20%	2.9E+03	1.1E+04	2.6E+03			1217	1200	
selenium	0.006			100%		60%	0.021	60%	1.4E+03	NA	1.4E+06			1438	1400	
zinc	0.5	1	0.5	100%	0.001	80%	1.75	80%	6.0E+04	1.1E+06	5.7E+07			56870	60000	
cyanide (free) (no VI)	0.006	1	0.006	100%	0.1	50%	0.0008	0%	1.8E+03	3.3E+02	1.3E+05			281	300	
TCE							0.002	10%	NA	NA	NA	2.2E-02	0.02			
1,1,1-TCA							5	0%	NA	NA	NA	6.0E+01	60			
PCE							0.2	10%	NA	NA	NA	2.2E+00	2			
cis-1,2-dichloroethene							0.007	0%	NA	NA	NA	8.4E-02	0.08			
phenol	0.7	1	0.7	100%	0.1	30%	0.035	30%	2.9E+05	5.4E+04	4.0E+06			45419	45000	
pentachlorophenol	0.003	1	0.003	100%	0.24	0%	0.0105	0%	1.8E+03	1.4E+02	1.7E+06			129	130	
resol	0.1	1	0.1	100%	0.1	50%	0.35	50%	3.0E+04	5.6E+03	2.9E+07			4687	4700	
DDX	0.002	1	0.002	100%	0.018	0%	0.007	0%	1.2E+03	1.2E+03	1.1E+06			608	600	
aldrin and dieldrin	0.0001	1	0.0001	100%	0.1	10%	0.00035	10%	5.4E+01	1.0E+01	5.2E+04			8.4	10	
chlordane	0.0005	1	0.0005	100%	0.04	0%	0.00175	0%	3.0E+02	1.4E+02	2.9E+05			95	90	
endosulfan	0.006	1	0.006	100%	0.1	30%	0.021	30%	2.5E+03	4.7E+02	2.4E+06			394	400	
endrin	0.0002	1	0.0002	100%	0.1	0%	0.0007	0%	1.2E+02	2.2E+01	1.1E+05			19	20	
heptachlor	0.0001	1	0.0001	100%	0.1	0%	0.00035	0%	6.0E+01	1.1E+01	5.7E+04			9.4	10	
HCB	0.00016	1	0.00016	100%	0.1	0%	0.00056	0%	9.6E+01	1.8E+01	9.2E+04			15	15	
methoxychlor	0.005	1	0.005	100%	0.1	0%	0.0175	0%	3.0E+03	5.6E+02	2.9E+06			469	500	
mirex	0.0002	1	0.0002	100%	0.1	0%	0.0007	0%	1.2E+02	2.2E+01	1.1E+05			19	20	
toxaphene	0.00035	1	0.00035	100%	0.1	10%	0.001225	10%	1.9E+02	3.5E+01	1.8E+05			30	30	
2,4,5-T	0.01	1	0.01	100%	0.1	0%	0.035	0%	6.0E+03	1.1E+03	5.7E+06			937	900	
2,4-D	0.01	1	0.01	100%	0.05	0%	0.035	0%	6.0E+03	2.2E+03	5.7E+06			1621	1600	
MCPA	0.01	1	0.01	100%	0.1	0%	0.035	0%	6.0E+03	1.1E+03	5.7E+06			937	900	
MCPB	0.01	1	0.01	100%	0.1	0%	0.035	0%	6.0E+03	1.1E+03	5.7E+06			937	900	
mecoprop	0.01	1	0.01	100%	0.1	0%	0.035	0%	6.0E+03	1.1E+03	5.7E+06			937	900	
picloram	0.07	1	0.07	100%	0.1	0%	0.245	0%	4.2E+04	7.8E+03	4.0E+07			6561	6600	
atrazine	0.005	1	0.005	100%	0.1	0%	0.0175	0%	3.0E+03	5.6E+02	2.9E+06			469	470	
chlorpyrifos	0.003	1	0.003	100%	0.03	50%	0.0105	50%	9.0E+02	5.6E+02	8.6E+05			343	340	
bifenthrin	0.01	1	0.01	100%	0.1	10%	0.035	10%	5.4E+03	1.0E+03	5.2E+06			844	840	
PCBs	0.00002	1	0.00002	100%	0.14	0%	0.00007	0%	1.2E+01	1.6E+00	1.1E+04			1.4	1	
PBDE Flame Retardants (Br1-Br9)	0.0001	1	0.0001	100%	0.1	80%	0.00035	80%	1.2E+01	2.2E+00	1.1E+04			1.9	2	

NA Pathway not of significance for chemical assessed (refer to Appendix A for chemical-specific details)

Non-Threshold Effects - Lifetime Exposures [young child and adult]															
Compound	Toxicity Reference Value Oral (TRV <sub>o</sub> ) (mg/kg/day) <sup>-1</sup>	GI Absorption (GAF) (unitless)	Non-Threshold Slope Factor Dermal (Sf <sub>d</sub> ) (mg/kg/day) <sup>-1</sup>	Oral Bioavailability BA <sub>o</sub> (%)	Dermal Absorption Factor (DAF) (unitless)	Toxicity Reference Value Inhalation (TRV <sub>i</sub> ) (mg/m <sup>3</sup> ) <sup>-1</sup>	Target Risk (TR)	Pathway Specific HILs (mg/kg)			Soil Vapour HIL (mg/m <sup>3</sup> ) (eqns 13 and 14)	Derived Interim Soil Gas HIL - Threshold (to 1 or 2 s.f.) (mg/m3)	Derived Soil HIL (not rounded) (mg/kg) (eqn 2 for relevant pathways)	Derived Soil HIL (to 1 or 2 s.f.) (mg/kg)	Notes
								Soil Ingestion (eqns 4 and 5)	Dermal (eqns 7 and 8)	Dust (eqns 10 and 11)					
TCE						0.004	1E-05	NA	NA	NA	6.0E-02	0.06			
vinyl chloride						0.0088	1E-05	NA	NA	NA	2.7E-02	0.03			
benzo(a)pyrene	0.5	1	0.5	100%	0.06	1.43E-01	1E-05	9.2E+01	1.3E+01	2.3E+04			11	10	1
benzo(a)pyrene (Early-Life)	0.5	1	0.5	100%	0.06	1.43E-01	1E-05	2.3E+01	4.6E+00	8.5E+03			3.8	4	1

NA Pathway not of significance for chemical assessed (refer to Appendix A for chemical-specific details)

1 Refer to Appendix A for discussion on different calculations conducted for benzo(a)pyrene and basis for HIL adopted



**Appendix C Derivation of Investigation Levels for Generic Land Uses  
HIL C - Recreational**

Summary of Exposure Parameters		Abbreviation	units	Parameter	References/Notes
Soil and Dust Ingestion Rate	- Young children (0-5 years)	IR <sub>SC</sub>	mg/day	50	50% of HIL A assumption, Schedule B7, Table 5
	- Adults	IR <sub>SA</sub>	mg/day	25	50% of HIL A assumption, Schedule B7, Table 5
Surface Area of Skin	- Young children (0-5 years)	SA <sub>C</sub>	cm <sup>2</sup> /day	2700	As per enHealth (2012)
	- Adults	SA <sub>A</sub>	cm <sup>2</sup> /day	6300	As per enHealth (2012) for male and female combined
Soil-to-Skin Adherence Factor		AF	mg/cm <sup>2</sup> /day	0.5	Schedule B7, Table 5
Time Spent Outdoors		ET <sub>O</sub>	hours	2	Schedule B7, Table 5
Time Spent Indoors		ET <sub>I</sub>	hours	0	Schedule B7, Table 5
Lung Retention Factor		RF	-	0.375	Schedule B7, Table 5
Particulate Emission Factor		PEF <sub>O</sub>	(m <sup>3</sup> /kg)	2.6E+07	As per Equation 21 based assumptions presented in Schedule B7
Outdoor Air-to-Soil Gas Attenuation Factor		α	-	0.05	Value adopted as discussed in Section 5.5 of Schedule B7
Body weight	- Young children (0-5 years)	BW <sub>C</sub>	kg	15	Schedule B7, Table 5
	- Adults	BW <sub>A</sub>	kg	70	Schedule B7, Table 5
Exposure Frequency		EF	days/year	365	Schedule B7, Table 5
Exposure Duration	- Young children (0-5 years)	ED <sub>C</sub>	years	6	Schedule B7, Table 5
	- Adults	ED <sub>A</sub>	years	29	Schedule B7, Table 5
Averaging Time (non-carcinogenic)		AT <sub>T</sub>	days	ED*365	Calculated based on ED for each relevant age group, multiplied by 24 hours for the assessment of inhalation exposures
Averaging Time (carcinogenic)		AT <sub>NT</sub>	days	25550	Based on lifetime of 70 years, multiplied by 24 hours for the assessment of inhalation exposures

**Threshold Calculations - Young Child Aged 2-3 years**

Compound	Toxicity Reference Value Oral (TRV <sub>O</sub> ) (mg/kg/day)	GI Absorption (GAF) (unitless)	Toxicity Reference Value Dermal (TRV <sub>D</sub> ) (mg/kg/day)	Bioavailability BA <sub>O</sub> (%)	Dermal Absorption Factor (DAF) (unitless)	Background Intake Oral/Dermal (BI <sub>O</sub> ) (% of TDI)	Toxicity Reference Value Inhalation (TRV <sub>I</sub> ) (mg/m <sup>3</sup> )	Background Intake Inhalation (BI <sub>I</sub> ) (% of TC)	Pathway Specific HILs (mg/kg)			Soil Vapour HIL (mg/m <sup>3</sup> ) (eqn 12)	Derived Interim Soil Gas HIL - Threshold (to 1 or 2 s.f.) (mg/m <sup>3</sup> )	Derived Soil HIL (not rounded) (mg/kg) (eqn 2 for relevant pathways)	Derived Soil HIL (to 1 or 2 s.f.) (mg/kg)	Notes
									Soil Ingestion (eqn 3)	Dermal (eqn 6)	Dust (eqn 9)					
arsenic	0.002	1	0.002	100%	0.005	50%	0.001	0%	3.0E+02	2.2E+03	8.2E+05		264	300		
beryllium	0.002	0.007	0.000014	100%	0.001	30%	0.000020	0%	4.2E+02	1.1E+02	1.6E+04		86	90		
boron	0.2			100%		65%	0.7	65%	2.1E+04	NA	2.0E+08		20998	20000		
cadmium	0.0008			100%		60%	0.000005	20%	9.6E+01	NA	3.3E+03		93	90		
chromium (VI)	0.001			100%		10%	0.0001	0%	2.7E+02	NA	8.2E+04		269	300		
cobalt	0.001	1	0.0014	100%	0.001	20%	0.0001	0%	3.4E+02	1.2E+04	8.2E+04		326	300		
copper	0.14			100%		60%	0.49	60%	1.7E+04	NA	1.6E+08		16798	17000		
manganese	0.16			100%		50%	0.00015	20%	2.4E+04	NA	9.8E+04		19296	19000		
methyl mercury	0.00023	1	0.00023	100%	0.001	80%	0.000805	80%	1.4E+01	5.1E+02	1.3E+05		13	13		
mercury (inorganic)	0.0006	0.07	0.000042	100%	0.001	40%	0.0002	10%	1.1E+02	2.8E+02	1.5E+05		78	80		
nickel	0.012	1	0.012	100%	0.005	60%	0.00002	20%	1.4E+03	1.1E+04	1.3E+04		1157	1200		
selenium	0.006			100%		60%	0.021	60%	7.2E+02	NA	6.9E+06		720	700		
zinc	0.5	1	0.5	100%	0.001	80%	1.75	80%	3.0E+04	1.1E+06	2.9E+08		29208	30000		
cyanide (free) (no VI)	0.006	1	0.006	100%	0.1	50%	0.0008	0%	9.0E+02	3.3E+02	6.6E+05		243	240		
TCE							0.002	10%	NA	NA	NA	4.3E-01	0.4			
1,1,1-TCA							5	0%	NA	NA	NA	1.2E+03	1200			
PCE							0.2	10%	NA	NA	NA	4.3E+01	40			
cis-1,2-dichloroethene							0.007	0%	NA	NA	NA	1.7E+00	2			
phenol	0.7	1	0.7	100%	0.1	30%	0.035	30%	1.5E+05	5.4E+04	2.0E+07		39651	40000		
pentachlorophenol	0.003	1	0.003	100%	0.24	0%	0.0105	0%	9.0E+02	1.4E+02	8.6E+06		120	120		
resols	0.1	1	0.1	100%	0.1	50%	0.35	50%	1.5E+04	5.6E+03	1.4E+08		4054	4000		
BDX	0.002	1	0.002	100%	0.018	0%	0.007	0%	6.0E+02	1.2E+03	5.7E+06		404	400		
aldrin and dieldrin	0.0001	1	0.0001	100%	0.1	10%	0.00035	10%	2.7E+01	1.0E+01	2.6E+05		7.3	10		
chlordane	0.0005	1	0.0005	100%	0.04	0%	0.00175	0%	1.5E+02	1.4E+02	1.4E+06		72	70		
endosulfan	0.006	1	0.006	100%	0.1	30%	0.021	30%	1.3E+03	4.7E+02	1.2E+07		341	340		
endrin	0.0002	1	0.0002	100%	0.1	0%	0.0007	0%	6.0E+01	2.2E+01	5.7E+05		16	20		
heptachlor	0.0001	1	0.0001	100%	0.1	0%	0.00035	0%	3.0E+01	1.1E+01	2.9E+05		8.1	10		
HCB	0.00016	1	0.00016	100%	0.1	0%	0.00056	0%	4.8E+01	1.8E+01	4.6E+05		13	10		
methoxychlor	0.005	1	0.005	100%	0.1	0%	0.0175	0%	1.5E+03	5.6E+02	1.4E+07		405	400		
mirex	0.0002	1	0.0002	100%	0.1	0%	0.0007	0%	6.0E+01	2.2E+01	5.7E+05		16	20		
toxaphene	0.00035	1	0.00035	100%	0.1	10%	0.001225	10%	9.5E+01	3.5E+01	9.0E+05		26	30		
2,4,5-T	0.01	1	0.01	100%	0.1	0%	0.035	0%	3.0E+03	1.1E+03	2.9E+07		811	800		
2,4-D	0.01	1	0.01	100%	0.05	0%	0.035	0%	3.0E+03	2.2E+03	2.9E+07		1277	1300		
MCPA	0.01	1	0.01	100%	0.1	0%	0.035	0%	3.0E+03	1.1E+03	2.9E+07		811	800		
MCPB	0.01	1	0.01	100%	0.1	0%	0.035	0%	3.0E+03	1.1E+03	2.9E+07		811	800		
mecoprop	0.01	1	0.01	100%	0.1	0%	0.035	0%	3.0E+03	1.1E+03	2.9E+07		811	800		
picloram	0.07	1	0.07	100%	0.1	0%	0.245	0%	2.1E+04	7.8E+03	2.0E+08		5676	5700		
atrazine	0.005	1	0.005	100%	0.1	0%	0.0175	0%	1.5E+03	5.6E+02	1.4E+07		405	400		
chlorpyrifos	0.003	1	0.003	100%	0.03	50%	0.0105	50%	4.5E+02	5.6E+02	4.3E+06		249	250		
bifenthrin	0.01	1	0.01	100%	0.1	10%	0.035	10%	2.7E+03	1.0E+03	2.6E+07		730	730		
PCBs	0.00002	1	0.00002	100%	0.14	0%	0.00007	0%	6.0E+00	1.6E+00	5.7E+04		1.3	1		
PBDE Flame Retardants (Br1-Br9)	0.0001	1	0.0001	100%	0.1	80%	0.00035	80%	6.0E+00	2.2E+00	5.7E+04		1.6	2		

NA Pathway not of significance for chemical assessed (refer to Appendix A for chemical-specific details)

Non-Threshold Effects - Lifetime Exposures [young child and adult]															
Compound	Toxicity Reference Value Oral (TRV <sub>o</sub> ) (mg/kg/day) <sup>-1</sup>	GI Absorption (GAF) (unitless)	Non-Threshold Slope Factor Dermal (SF <sub>d</sub> ) (mg/kg/day) <sup>-1</sup>	Oral Bioavailability BA <sub>o</sub> (%)	Dermal Absorption Factor (DAF) (unitless)	Toxicity Reference Value Inhalation (TRV <sub>i</sub> ) (mg/m <sup>3</sup> ) <sup>-1</sup>	Target Risk (TR)	Pathway Specific HILs (mg/kg)			Soil Vapour HIL (mg/m <sup>3</sup> ) (eqns 13 and 14)	Derived Interim Soil Gas IL - Threshold (to 1 or 2 s.f.) (mg/m3)	Derived Soil HIL (not rounded) (mg/kg) (eqn 2 for relevant pathways)	Derived Soil HIL (to 1 or 2 s.f.) (mg/kg)	Notes
								Soil Ingestion (eqns 4 and 5)	Dermal (eqns 7 and 8)	Dust (eqns 10 and 11)					
TCE						0.004	1E-05	NA	NA	NA	1.2E+00	1			
vinyl chloride						0.0088	1E-05	NA	NA	NA	5.5E-01	0.5			
benzo(a)pyrene	0.5	1	0.5	100%	0.06	1.43E-01	1E-05	4.6E+01	1.3E+01	1.1E+05		9.9	10	1	
benzo(a)pyrene (Early-Life)	0.5	1	0.5	100%	0.06	1.43E-01	1E-05	1.1E+01	4.6E+00	4.3E+04		3.3	3	1	

NA Pathway not of significance for chemical assessed (refer to Appendix A for chemical-specific details)  
1 Refer to Appendix A for discussion on different calculations conducted for benzo(a)pyrene and basis for HIL adopted

## Appendix C Derivation of Investigation Levels for Generic Land Uses HIL D - Commercial/Industrial

Summary of Exposure Parameters	Abbreviation	units	Parameter	References/Notes
Soil and Dust Ingestion Rate - Adults	IR <sub>SA</sub>	mg/day	25	50% of HIL A assumption, Schedule B7, Table 5
Surface Area of Skin - Adults	SA <sub>A</sub>	cm <sup>2</sup> /day	3800	Based on 19% total skin area of 20000 cm <sup>2</sup> exposed (Schedule B7, Table 5)
Soil-to-Skin Adherence Factor	AF	mg/cm <sup>2</sup> /day	0.5	Schedule B7, Table 5
Time Spent Outdoors	E <sub>To</sub>	hours	1	Schedule B7, Table 5
Time Spent Indoors	E <sub>Ti</sub>	hours	8	Schedule B7, Table 5
Lung Retention Factor	RF	-	0.375	Schedule B7, Table 5
Particulate Emission Factor	PEF <sub>o</sub>	(m <sup>3</sup> /kg)	3.7E+10	Calculated for scenario, refer to Equations 19 and 20 and assumptions in Schedule B7
Indoor Air Dust Factor	PEF <sub>i</sub>	(m <sup>3</sup> /kg)	2.6E+07	As per Equation 21 based assumptions presented in Schedule B7
Fraction of indoor dust comprised of outdoor soil	TF	-	0.5	Assume 50% soil concentration present in dust as noted in Schedule B7
Indoor Air-to-Soil Gas Attenuation Factor	α	-	0.1	Value adopted as discussed in Section 5.5 of Schedule B7
Body weight - Adults	BW <sub>C</sub>	kg	70	Schedule B7, Table 5
Exposure Frequency	EF	days/year	240	Schedule B7, Table 5
Exposure Duration - Adults	ED <sub>C</sub>	years	30	Schedule B7, Table 5
Averaging Time (non-carcinogenic)	AT <sub>T</sub>	days	ED*365	Calculated based on ED for each relevant age group, multiplied by 24 hours for the assessment of inhalation exposures
Averaging Time (carcinogenic)	AT <sub>NT</sub>	days	25550	Based on lifetime of 70 years, multiplied by 24 hours for the assessment of inhalation exposures

Threshold Calculations - Adult Worker															
Compound	Toxicity Reference Value Oral (TRV <sub>o</sub> ) (mg/kg/day)	GI Absorption (GAF) (unitless)	Toxicity Reference Value Dermal (TRV <sub>d</sub> ) (mg/kg/day)	Oral Bioavailability BA <sub>o</sub> (%)	Dermal Absorption Factor (DAF) (unitless)	Background Intake Oral/Dermal (BI <sub>o</sub> ) (% of TDI)	Toxicity Reference Value Inhalation (TRV <sub>i</sub> ) (mg/m <sup>3</sup> )	Background Intake Inhalation (BI <sub>i</sub> ) (% of TC)	Pathway Specific HILs (mg/kg)			Soil Vapour HIL (mg/m <sup>3</sup> ) (eqn 12)	Derived Interim Soil Gas HIL - Threshold (to 1 or 2 s.f.) (mg/m <sup>3</sup> )	Derived Soil HIL (not rounded) (mg/kg) (eqn 2 for relevant pathways)	Derived Soil HIL (to 1 or 2 s.f.) (mg/kg)
									Soil Ingestion (eqn 3)	Dermal (eqn 6)	Dust (eqn 9)				
arsenic	0.002	1	0.002	100%	0.005	50%	0.001	0%	4.3E+03	1.1E+04	6.2E+05			3071	3000
beryllium	0.002	0.007	0.000014	100%	0.001	30%	0.000020	0%	6.0E+03	5.5E+02	1.2E+04			483	500
boron	0.2			100%		65%	0.7	65%	3.0E+05	NA	1.5E+08			297503	300000
cadmium	0.0008			100%		60%	0.000005	20%	1.4E+03	NA	2.5E+03			881	900
chromium (VI)	0.001			100%		10%	0.0001	0%	3.8E+03	NA	6.2E+04			3611	3600
cobalt	0.001	1	0.0014	100%	0.001		0.0001	0%	4.8E+03	6.3E+04	6.2E+04			4138	4000
copper	0.14			100%		60%	0.49	60%	2.4E+05	NA	1.2E+08			238002	240000
manganese	0.16			100%		50%	0.00015	20%	3.4E+05	NA	7.5E+04			61373	60000
methyl mercury	0.00023	1	0.00023	100%	0.001	80%	0.000805	80%	2.0E+02	2.6E+03	1.0E+05			182	180
mercury (inorganic)	0.0006	0.07	0.000042	100%	0.001	40%	0.0002	10%	1.5E+03	1.4E+03	1.1E+05			730	730
nickel	0.012	1	0.012	100%	0.005	60%	0.00002	20%	2.0E+04	5.4E+04	1.0E+04			5963	6000
selenium	0.006			100%		60%	0.021	60%	1.0E+04	NA	5.2E+06			10200	10000
zinc	0.5	1	0.5	100%	0.001	80%	1.75	80%	4.3E+05	5.6E+06	2.2E+08			395040	400000
cyanide (free) (no VI)	0.006	1	0.006	100%	0.1	50%	0.0008	0%	1.3E+04	1.7E+03	5.0E+05			1481	1500
TCE							0.002	10%	NA	NA	NA	8.2E-02	0.08		
1,1,1-TCA							5	0%	NA	NA	NA	2.3E+02	230		
PCE							0.2	10%	NA	NA	NA	8.2E+00	8		
cis-1,2-dichloroethene							0.007	0%	NA	NA	NA	3.2E-01	0.3		
phenol	0.7	1	0.7	100%	0.1	30%	0.035	30%	2.1E+06	2.7E+05	1.5E+07			238835	240000
pentachlorophenol	0.003	1	0.003	100%	0.24	0%	0.0105	0%	1.3E+04	7.0E+02	6.6E+06			664	660
cresols	0.1	1	0.1	100%	0.1	50%	0.35	50%	2.1E+05	2.8E+04	1.1E+08			24752	25000
DDX	0.002	1	0.002	100%	0.018	0%	0.007	0%	8.5E+03	6.2E+03	4.4E+06			3594	3600
aldrin and dieldrin	0.0001	1	0.0001	100%	0.1	10%	0.00035	10%	3.8E+02	5.0E+01	2.0E+05			44.6	45
chlordane	0.0005	1	0.0005	100%	0.04	0%	0.00175	0%	2.1E+03	7.0E+02	1.1E+06			527	530
endosulfan	0.006	1	0.006	100%	0.1	30%	0.021	30%	1.8E+04	2.4E+03	9.2E+06			2079	2000
endrin	0.0002	1	0.0002	100%	0.1	0%	0.0007	0%	8.5E+02	1.1E+02	4.4E+05			99	100
heptachlor	0.0001	1	0.0001	100%	0.1	0%	0.00035	0%	4.3E+02	5.6E+01	2.2E+05			49.5	50
HCB	0.00016	1	0.00016	100%	0.1	0%	0.00056	0%	6.8E+02	9.0E+01	3.5E+05			79	80
methoxychlor	0.005	1	0.005	100%	0.1	0%	0.0175	0%	2.1E+04	2.8E+03	1.1E+07			2475	2500
mirex	0.0002	1	0.0002	100%	0.1	0%	0.0007	0%	8.5E+02	1.1E+02	4.4E+05			99	100
toxaphene	0.00035	1	0.00035	100%	0.1	10%	0.001225	10%	1.3E+03	1.8E+02	6.9E+05			156	160
2,4,5-T	0.01	1	0.01	100%	0.1	0%	0.035	0%	4.3E+04	5.6E+03	2.2E+07			4950	5000
2,4-D	0.01	1	0.01	100%	0.05	0%	0.035	0%	4.3E+04	1.1E+04	2.2E+07			8868	9000
MCPA	0.01	1	0.01	100%	0.1	0%	0.035	0%	4.3E+04	5.6E+03	2.2E+07			4950	5000
MCPB	0.01	1	0.01	100%	0.1	0%	0.035	0%	4.3E+04	5.6E+03	2.2E+07			4950	5000
mecoprop	0.01	1	0.01	100%	0.1	0%	0.035	0%	4.3E+04	5.6E+03	2.2E+07			4950	5000
picloram	0.07	1	0.07	100%	0.1	0%	0.245	0%	3.0E+05	3.9E+04	1.5E+08			34653	35000
atrazine	0.005	1	0.005	100%	0.1	0%	0.0175	0%	2.1E+04	2.8E+03	1.1E+07			2475	2500
chlorpyrifos	0.003	1	0.003	100%	0.03	50%	0.0105	50%	6.4E+03	2.8E+03	3.3E+06			1946	2000
bifenthrin	0.01	1	0.01	100%	0.1	10%	0.035	10%	3.8E+04	5.0E+03	2.0E+07			4455	4500
PCBs	0.00002	1	0.00002	100%	0.14	0%	0.00007	0%	8.5E+01	8.0E+00	4.4E+04			7.3	7
PBDE Flame Retardants (Br1-Br9)	0.0001	1	0.0001	100%	0.1	80%	0.00035	80%	8.5E+01	1.1E+01	4.4E+04			9.9	10

NA Pathway not of significance for chemical assessed (refer to Appendix A for chemical-specific details)

Non-Threshold Effects - Lifetime Exposures [adult]														
Compound	Toxicity Reference Value Oral (TRV <sub>o</sub> ) <sup>-1</sup> (mg/kg/day) <sup>-1</sup>	GI Absorption (GAF) (unitless)	Non-Threshold Slope Factor Dermal (SF <sub>d</sub> ) (mg/kg/day) <sup>-1</sup>	Oral Bioavailability BA <sub>o</sub> (%)	Dermal Absorption Factor (DAF) (unitless)	Toxicity Reference Value Inhalation (TRV <sub>i</sub> ) (mg/m <sup>3</sup> ) <sup>-1</sup>	Target Risk (TR)	Pathway Specific HILs (mg/kg)			Soil Vapour HIL (mg/m <sup>3</sup> ) (eqns 13 and 14)	Derived Interim Soil Gas HIL - Threshold (to 1 or 2 s.f.) (mg/m <sup>3</sup> )	Derived Soil HIL (not rounded) (mg/kg) (eqn 2 for relevant pathways)	Derived Soil HIL (to 1 or 2 s.f.) (mg/kg)
								Soil Ingestion (eqns 4 and 5)	Dermal (eqns 7 and 8)	Dust (eqns 10 and 11)				
TCE						0.004	1E-05	NA	NA	NA	2.7E-01	0.3		
vinyl chloride						0.00880	1E-05	NA	NA	NA	1.2E-01	0.1		
benzo(a)pyrene	0.5	1	0.5	100%	0.06	1.43E-01	1E-05	2.0E+02	4.4E+01	1.0E+05			35.7	40

NA Pathway not of significance for chemical assessed (refer to Appendix A for chemical-specific details)