QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

UKAS TESTING
4480

Leachate Analysis Certificate						
QTS Environmental Report No: 15-34919	Date Sampled	10/08/15	10/08/15			
Hill Partnerships Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Townsend Lane Harpenden	TP / BH No	WS5	WS7			
Project / Job Ref: None Supplied	Additional Refs	TL19	TL25			
Order No: None Supplied	Depth (m)	0.50 - 2.30	0.35 - 1.00			
Reporting Date: 02/09/2015	QTSE Sample No	164157	164158			

Determinand	Unit	RL	Accreditation					
Arsenic	ug/l	< 5	ISO17025	< 5	< 5			
Barium	ug/l	< 5	ISO17025	< 5	7			
Beryllium	ug/l	< 3	ISO17025	< 3	< 3			
Boron	ug/l	< 5	ISO17025	18	18			
Cadmium	ug/l	< 0.4	ISO17025	< 0.4	< 0.4			
Chromium	ug/l	< 5	ISO17025	< 5	< 5			
Copper	ug/l	< 5	ISO17025	< 5	< 5			
Lead	ug/l	< 5	ISO17025	< 5	< 5			
Mercury	ug/l	< 0.05	ISO17025	< 0.05	< 0.05			
Nickel	ug/l	< 5	ISO17025	< 5	< 5			
Selenium	ug/l	< 5	ISO17025	< 5	< 5			
Vanadium	ug/l	< 5	ISO17025	< 5	8			
Zinc	ug/l	< 2	ISO17025	3	8			

Subcontracted analysis [S]

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-34919	
Hill Partnerships Ltd	
Site Reference: Townsend Lane Harpenden	
Project / Job Ref: None Supplied	
Order No: None Supplied	
Reporting Date: 02/09/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 164148	WS4	TL16	0.60 - 1.00	13.6	Brown clayey gravel with vegetation
$ 164149	WS4	TL17	1.00 - 2.00	21.2	Light brown clay with vegetation
$ 164150	WS5	TL18	GL - 0.50	12.9	Brown clayey gravel
$ 164151	WS5	TL19	0.50 - 2.30	16.2	Light brown clay
$ 164152	WS6	TL21	GL - 0.30	11.6	Brown clayey sand
$ 164153	WS6	TL22	0.30 - 1.50	15.5	Light brown clay
$ 164154	WS7	TL24	GL - 0.35	12.9	Brown clayey sand
$ 164155	WS7	TL25	0.35 - 1.00	14.2	Brown clayey gravel
$ 164156	WS8	TL27	GL - 0.50	13.7	Brown clayey sand

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/S

Unsuitable Sample U/S

$ samples exceeded recommended holding times

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mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 4480

Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-34919
Hill Partnerships Ltd
Site Reference: Townsend Lane Harpenden
Project / Job Ref: None Supplied
Order No: None Supplied
Reporting Date: 02/09/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

QTS Environmental Ltd
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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-34919
Hill Partnerships Ltd
Site Reference: Townsend Lane Harpenden
Project / Job Ref: None Supplied
Order No: None Supplied
Reporting Date: 02/09/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by cc	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detect	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

Jeff Green
Hill Partnerships Ltd
The Power House
Gunpowder Mill
Powdermill Lane
Waltham Abbey
Essex
EN9 1BN

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QTS Environmental Report No: 15-34920

Site Reference:	Townsend Lane Harpenden
Project / Job Ref:	None Supplied
Order No:	None Supplied
Sample Receipt Date:	13/08/2015
Sample Scheduled Date:	26/08/2015
Report Issue Number:	1
Reporting Date:	04/09/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
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Soil Analysis Certificate						
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15	11/08/15	11/08/15	11/08/15	11/08/15
Hill Partnerships Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Townsend Lane Harpenden	TP / BH No	WS9	WS10	WS10	WS11	WS12
Project / Job Ref: None Supplied	Additional Refs	TL30	TL33	TL35	TL36	TL38
Order No: None Supplied	Depth (m)	GL - 0.35	GL - 0.40	1.00 - 2.00	GL - 0.70	GL - 0.48
Reporting Date: 04/09/2015	QTSE Sample No	164159	164160	164161	164162	164163

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025					Not Detected
pH	pH Units	N/a	MCERTS					7.1
Total Cyanide	mg/kg	< 2	NONE					< 2
Total Sulphate as SO_4	mg/kg	< 200	NONE					526
Total Sulphate as SO_4	%	< 0.02	NONE					0.05
Sulphide	mg/kg	< 5	NONE					< 5
Organic Matter	%	< 0.1	MCERTS					2.3
Total Organic Carbon (TOC)	%	< 0.1	MCERTS					1.4
Arsenic (As)	mg/kg	< 2	MCERTS	21	21	112	15	22
Barium (Ba)	mg/kg	< 5	NONE	70	68	41	102	
Beryllium (Be)	mg/kg	< 0.5	NONE	1	1	1.8	0.9	
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	1.4	< 0.2	0.3
Chromium (Cr)	mg/kg	< 2	MCERTS	29	31	29	26	30
Copper (Cu)	mg/kg	< 4	MCERTS	18	18	14	10	22
Lead (Pb)	mg/kg	< 3	MCERTS	43	41	17	22	52
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	14	15	22	14	14
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 2	NONE	49	49	97	39	
Zinc (Zn)	mg/kg	< 3	MCERTS	55	62	62	54	83
Total Phenols (monohydric)	mg/kg	< 2	NONE					< 2
EPH (C10 - C40)	mg/kg	< 6	MCERTS					< 6

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Wioletta Goral

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15				
Hill Partnerships Ltd	Time Sampled	None Supplied				
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12				
Project / Job Ref: None Supplied	Additional Refs	TL38				
Order No: None Supplied	Depth (m)	GL - 0.48				
Reporting Date: 04/09/2015	QTSE Sample No	164163				

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Soil Analysis Certificate - TPH CWG Banded						
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15				
Hill Partnerships Ltd	Time Sampled	None Supplied				
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12				
Project / Job Ref: None Supplied	Additional Refs	TL38				
Order No: None Supplied	Depth (m)	GL - 0.48				
Reporting Date: 04/09/2015	QTSE Sample No	164163				

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01				
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05				
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3				
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3				
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10				
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21				
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01				
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05				
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2				
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2				
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2				
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3				
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10				
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21				
Total >C5 - C35	mg/kg	< 42	NONE	< 42				

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15				
Hill Partnerships Ltd	Time Sampled	None Supplied				
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12				
Project / Job Ref: None Supplied	Additional Refs	TL38				
Order No: None Supplied	Depth (m)	GL - 0.48				
Reporting Date: 04/09/2015	QTSE Sample No	164163				

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2				
Toluene	ug/kg	< 5	MCERTS	< 5				
Ethylbenzene	ug/kg	< 2	MCERTS	< 2				
p & m-xylene	ug/kg	< 2	MCERTS	< 2				
o-xylene	ug/kg	< 2	MCERTS	< 2				
MTBE	ug/kg	< 5	MCERTS	< 5				

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Soil Analysis Certificate - Organochlorine Pesticides							
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15					
Hill Partnerships Ltd	Time Sampled	None Supplied					
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12					
Project / Job Ref: None Supplied	Additional Refs	TL38					
Order No: None Supplied	Depth (m)	GL - 0.48					
Reporting Date: 04/09/2015	QTSE Sample No	164163					

Determinand	Unit	RL	Accreditation					
Aldrin	mg/kg	< 0.02	NONE	< 0.02				
alpha-HCH	mg/kg	< 0.02	NONE	< 0.02				
beta-HCH	mg/kg	< 0.02	NONE	< 0.02				
cis-chlordane	mg/kg	< 0.02	NONE	< 0.02				
delta-HCH	mg/kg	< 0.02	NONE	< 0.02				
Dieldrin	mg/kg	< 0.02	NONE	< 0.02				
Endosulfan A	mg/kg	< 0.02	NONE	< 0.02				
Endosulfan B	mg/kg	< 0.02	NONE	< 0.02				
Endrin	mg/kg	< 0.02	NONE	< 0.02				
gamma-HCH (Lindane)	mg/kg	< 0.02	NONE	< 0.02				
Heptachlor	mg/kg	< 0.02	NONE	< 0.02				
Heptachlor epoxide	mg/kg	< 0.02	NONE	< 0.02				
Hexachlorobenzene (HCB)	mg/kg	< 0.02	NONE	< 0.02				
Isodrin	mg/kg	< 0.02	NONE	< 0.02				
Methoxychlor	mg/kg	< 0.02	NONE	< 0.02				
o,p' - DDD	mg/kg	< 0.02	NONE	< 0.02				
o,p' - DDE	mg/kg	< 0.02	NONE	< 0.02				
o,p' - DDT	mg/kg	< 0.02	NONE	< 0.02				
p,p' - DDD	mg/kg	< 0.02	NONE	< 0.02				
p,p' - DDE	mg/kg	< 0.02	NONE	< 0.02				
p,p' - DDT	mg/kg	< 0.02	NONE	< 0.02				
trans-chlordane	mg/kg	< 0.02	NONE	< 0.02				
Trifluralin	mg/kg	< 0.02	NONE	< 0.02				

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Soil Analysis Certificate - Organophosphorus Pesticides						
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15				
Hill Partnerships Ltd	Time Sampled	None Supplied				
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12				
Project / Job Ref: None Supplied	Additional Refs	TL38				
Order No: None Supplied	Depth (m)	GL - 0.48				
Reporting Date: 04/09/2015	QTSE Sample No	164163				

Determinand	Unit	RL	Accreditation				
Azinphos-methyl	mg/kg	< 0.1	NONE	< 0.1			
Chlorfenvinphos, alpha	mg/kg	< 0.1	NONE	< 0.1			
Chlorfenvinphos, beta	mg/kg	< 0.1	NONE	< 0.1			
Chlorpyriphos-methyl	mg/kg	< 0.1	NONE	< 0.1			
Diazinon	mg/kg	< 0.1	NONE	< 0.1			
Dichlorvos	mg/kg	< 0.1	NONE	< 0.1			
Dimethoate	mg/kg	< 0.1	NONE	< 0.1			
Fenitrothion	mg/kg	< 0.1	NONE	< 0.1			
Fenthion	mg/kg	< 0.1	NONE	< 0.1			
Malathion	mg/kg	< 0.1	NONE	< 0.1			
Mevinphos, €	mg/kg	< 0.1	NONE	< 0.1			
Mevinphos, (Z)	mg/kg	< 0.1	NONE	< 0.1			
Parathion-ethyl	mg/kg	< 0.1	NONE	< 0.1			
Parathion-methyl	mg/kg	< 0.1	NONE	< 0.1			
Phorate	mg/kg	< 0.1	NONE	< 0.1			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C
Subcontracted analysis [S]

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Soil Analysis Certificate - Triazine Herbicides						
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15				
Hill Partnerships Ltd	Time Sampled	None Supplied				
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12				
Project / Job Ref: None Supplied	Additional Refs	TL38				
Order No: None Supplied	Depth (m)	GL - 0.48				
Reporting Date: 04/09/2015	QTSE Sample No	164163				

Determinand	Unit	RL	Accreditation				
Atrazine	mg/kg	< 0.1	NONE	< 0.1			
Prometryn	mg/kg	< 0.1	NONE	< 0.1			
Propazine	mg/kg	< 0.1	NONE	< 0.1			
Simazine	mg/kg	< 0.1	NONE	< 0.1			
Terbuthylazine	mg/kg	< 0.1	NONE	< 0.1			
Terbutryn	mg/kg	< 0.1	NONE	< 0.1			
Ametryn	mg/kg	< 0.1	NONE	< 0.1			

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Soil Analysis Certificate - Phenyl Urea Herbicides						
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15				
Hill Partnerships Ltd	Time Sampled	None Supplied				
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12				
Project / Job Ref: None Supplied	Additional Refs	TL38				
Order No: None Supplied	Depth (m)	GL - 0.48				
Reporting Date: 04/09/2015	QTSE Sample No	164163				

Determinand	Unit	RL	Accreditation					
Chloroxuron	mg/kg	< 0.1	NONE	< 0.1				
Chlortoluron	mg/kg	< 0.1	NONE	< 0.1				
Diflubenzuron	mg/kg	< 0.1	NONE	< 0.1				
Dimefuron	mg/kg	< 0.1	NONE	< 0.1				
Diuron	mg/kg	< 0.1	NONE	< 0.1				
Isoproturon	mg/kg	< 0.1	NONE	< 0.1				
Linuron	mg/kg	< 0.1	NONE	< 0.1				
Methabenzthiazuron	mg/kg	< 0.1	NONE	< 0.1				
Metoxuron	mg/kg	< 0.1	NONE	< 0.1				
Monolinuron	mg/kg	< 0.1	NONE	< 0.1				
Monuron	mg/kg	< 0.1	NONE	< 0.1				
Pencycuron	mg/kg	< 0.1	NONE	< 0.1				

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C

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Soil Analysis Certificate - Phenoxy Acidic Herbicides						
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15				
Hill Partnerships Ltd	Time Sampled	None Supplied				
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12				
Project / Job Ref: None Supplied	Additional Refs	TL38				
Order No: None Supplied	Depth (m)	GL - 0.48				
Reporting Date: 04/09/2015	QTSE Sample No	164163				

Determinand	Unit	RL	Accreditation					
2,3,6-TBA (S)	mg/kg	< 0.1	NONE	< 0.1				
2,4,5-T (S)	mg/kg	< 0.1	NONE	< 0.1				
2,4,5-TP (fenoprop) (S)	mg/kg	< 0.1	NONE	< 0.1				
2,4-D (S)	mg/kg	< 0.1	NONE	< 0.1				
2,4-DB (S)	mg/kg	< 0.1	NONE	< 0.1				
4-CPA (S)	mg/kg	< 0.1	NONE	< 0.1				
Benazolin (S)	mg/kg	< 0.1	NONE	< 0.1				
Bentazone (S)	mg/kg	< 0.1	NONE	< 0.1				
Bromoxynil (S)	mg/kg	< 0.1	NONE	< 0.1				
Clopyralid (S)	mg/kg	< 0.1	NONE	< 0.1				
Dicamba (S)	mg/kg	< 0.1	NONE	< 0.1				
Dichlorprop (2,4-DP) (S)	mg/kg	< 0.1	NONE	< 0.1				
Diclofop (S)	mg/kg	< 0.1	NONE	< 0.1				
Flamprop (S)	mg/kg	< 0.1	NONE	< 0.1				
Flamprop-isopropyl (S)	mg/kg	< 0.1	NONE	< 0.1				
Ioxynil (S)	mg/kg	< 0.1	NONE	< 0.1				
MCPA (S)	mg/kg	< 0.1	NONE	< 0.1				
MCPB (S)	mg/kg	< 0.1	NONE	< 0.1				
MCPP (S)	mg/kg	< 0.1	NONE	< 0.1				
Pentachlorophenol (S)	mg/kg	< 0.1	NONE	< 0.1				
Picloram (S)	mg/kg	< 0.1	NONE	< 0.1				
Triclopyr (S)	mg/kg	< 0.1	NONE	< 0.1				

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C
Subcontracted analysis (S)

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Soil Analysis Certificate - Pyrethroids							
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15					
Hill Partnerships Ltd	Time Sampled	None Supplied					
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12					
Project / Job Ref: None Supplied	Additional Refs	TL38					
Order No: None Supplied	Depth (m)	GL - 0.48					
Reporting Date: 04/09/2015	QTSE Sample No	164163					

Determinand	Unit	RL	Accreditation					
Cyfluthrin (S)	mg/kg	< 0.1	NONE	< 0.1				
Cyhalothrin (S)	mg/kg	< 0.1	NONE	< 0.1				
Cypermethrin (S)	mg/kg	< 0.1	NONE	< 0.1				
Deltamethrin (S)	mg/kg	< 0.1	NONE	< 0.1				
Fenvalerate (S)	mg/kg	< 0.1	NONE	< 0.1				
Permethrin (S)	mg/kg	< 0.1	NONE	< 0.1				
Resmethrin (S)	mg/kg	< 0.1	NONE	< 0.1				
Tetramethrin (S)	mg/kg	< 0.1	NONE	< 0.1				

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C
Subcontracted analysis (S)

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Leachate Analysis Certificate						
QTS Environmental Report No: 15-34920	Date Sampled	11/08/15				
Hill Partnerships Ltd	Time Sampled	None Supplied				
Site Reference: Townsend Lane Harpenden	TP / BH No	WS12				
Project / Job Ref: None Supplied	Additional Refs	TL38				
Order No: None Supplied	Depth (m)	GL - 0.48				
Reporting Date: 04/09/2015	QTSE Sample No	164164				

Determinand	Unit	RL	Accreditation					
Arsenic	ug/l	< 5	ISO17025	< 5				
Barium	ug/l	< 5	ISO17025	9				
Beryllium	ug/l	< 3	ISO17025	< 3				
Boron	ug/l	< 5	ISO17025	9				
Cadmium	ug/l	< 0.4	ISO17025	< 0.4				
Chromium	ug/l	< 5	ISO17025	< 5				
Copper	ug/l	< 5	ISO17025	5				
Lead	ug/l	< 5	ISO17025	< 5				
Mercury	ug/l	< 0.05	ISO17025	< 0.05				
Nickel	ug/l	< 5	ISO17025	< 5				
Selenium	ug/l	< 5	ISO17025	< 5				
Vanadium	ug/l	< 5	ISO17025	< 5				
Zinc	ug/l	< 2	ISO17025	8				

Subcontracted analysis (S)

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 15-34920	
Hill Partnerships Ltd	
Site Reference: Townsend Lane Harpenden	
Project / Job Ref: None Supplied	
Order No: None Supplied	
Reporting Date: 04/09/2015	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 164159	WS9	TL30	GL - 0.35	12.6	Brown clayey sand
$ 164160	WS10	TL33	GL - 0.40	14.3	Brown clay
$ 164161	WS10	TL35	1.00 - 2.00	12.4	Light brown clayey sand
$ 164162	WS11	TL36	GL - 0.70	12.5	Brown clayey gravel
$ 164163	WS12	TL38	GL - 0.48	13.1	Brown clayey gravel

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

$ samples exceeded recommended holding times

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-34920
Hill Partnerships Ltd
Site Reference: Townsend Lane Harpenden
Project / Job Ref: None Supplied
Order No: None Supplied
Reporting Date: 04/09/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10 C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-34920
Hill Partnerships Ltd
Site Reference: Townsend Lane Harpenden
Project / Job Ref: None Supplied
Order No: None Supplied
Reporting Date: 04/09/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by co	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detect	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

Jeff Green
Hill Partnerships Ltd
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Gunpowder Mill
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QTS Environmental Report No: 15-34922

Site Reference:	Townsend Lane Harpenden
Project / Job Ref:	None Supplied
Order No:	None Supplied
Sample Receipt Date:	13/08/2015
Sample Scheduled Date:	26/08/2015
Report Issue Number:	1
Reporting Date:	01/09/2015

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

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Soil Analysis Certificate						
QTS Environmental Report No: 15-34922	Date Sampled	11/08/15	12/08/15	12/08/15	12/08/15	
Hill Partnerships Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Townsend Lane Harpenden	TP / BH No	WS13	WS14	WS15	WS16	
Project / Job Ref: None Supplied	Additional Refs	TL42	TL44	TL46	TL48	
Order No: None Supplied	Depth (m)	0.40 - 2.10	1.00 - 2.00	GL - 0.40	GL - 0.48	
Reporting Date: 01/09/2015	QTSE Sample No	164167	164168	164169	164170	

Determinand	Unit	RL	Accreditation					
Arsenic (As)	mg/kg	< 2	MCERTS	30	10	20	16	
Barium (Ba)	mg/kg	< 5	NONE	50	45	72	87	
Beryllium (Be)	mg/kg	< 0.5	NONE	2	0.5	1.1	1.1	
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.3	
Chromium (Cr)	mg/kg	< 2	MCERTS	30	22	36	23	
Copper (Cu)	mg/kg	< 4	MCERTS	16	8	20	20	
Lead (Pb)	mg/kg	< 3	MCERTS	20	14	44	58	
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	25	6	16	17	
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	
Vanadium (V)	mg/kg	< 2	NONE	68	33	51	39	
Zinc (Zn)	mg/kg	< 3	MCERTS	64	22	60	67	

Analytical results are expressed on a dry weight basis where samples are dried at less than 30°C
Analysis carried out on the dried sample is corrected for the stone content
Subcontracted analysis (S)

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410

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Soil Analysis Certificate - Sample Descriptions
QTS Environmental Report No: 15-34922
Hill Partnerships Ltd
Site Reference: Townsend Lane Harpenden
Project / Job Ref: None Supplied
Order No: None Supplied
Reporting Date: 01/09/2015

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 164167	WS13	TL42	0.40 - 2.10	12.1	Light brown clay
$ 164168	WS14	TL44	1.00 - 2.00	13	Light brown clay
$ 164169	WS15	TL46	GL - 0.40	12.7	Brown clay with vegetation
$ 164170	WS16	TL48	GL - 0.48	8.2	Light brown clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample I/S

Unsuitable Sample U/S

$ samples exceeded recommended holding times

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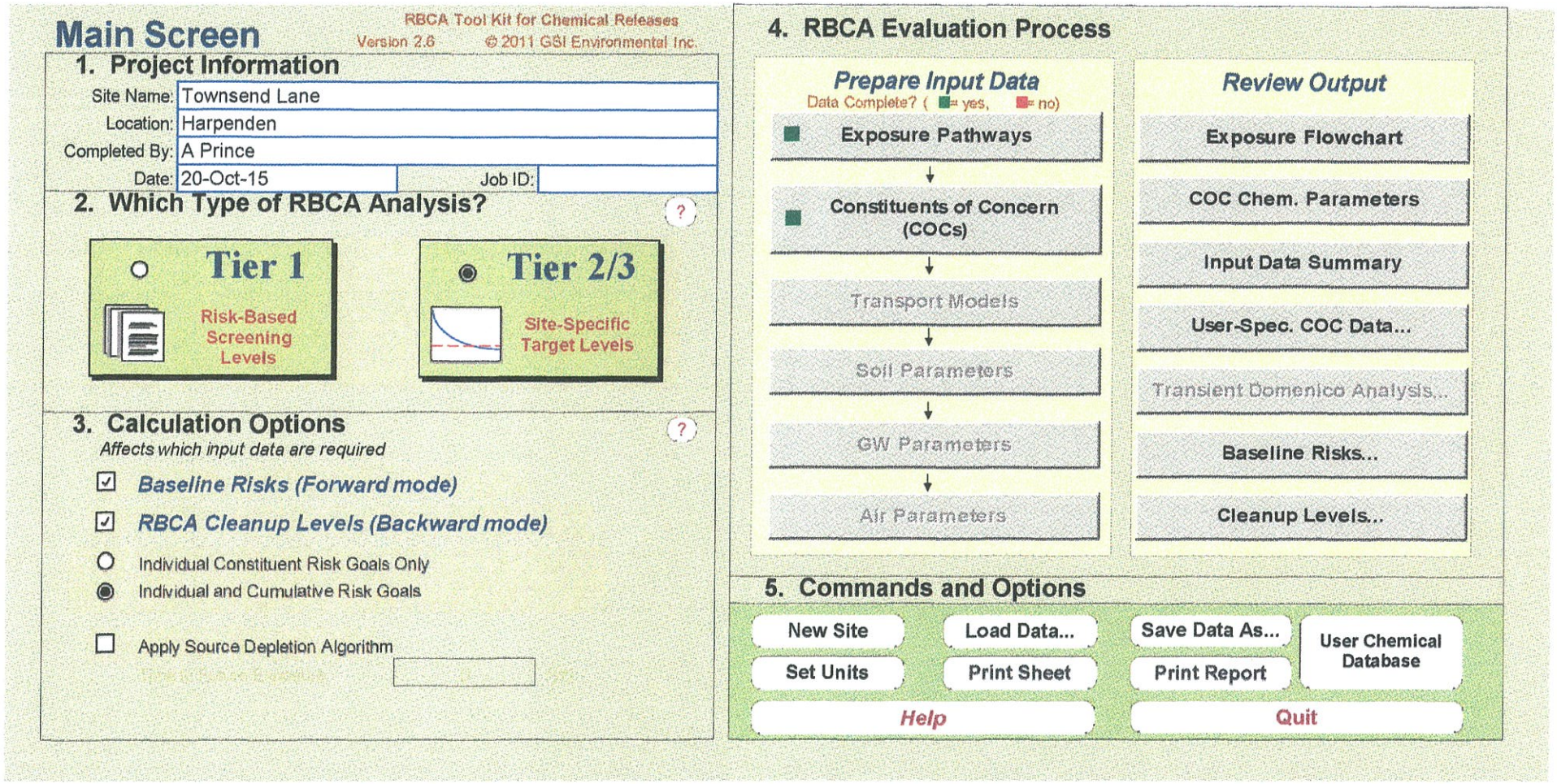
Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 15-34922
Hill Partnerships Ltd
Site Reference: Townsend Lane Harpenden
Project / Job Ref: None Supplied
Order No: None Supplied
Reporting Date: 01/09/2015

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Appendix H

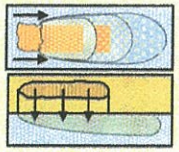
RBCA Data Sheets


Main Screen
RBCA Tool Kit for Chemical Releases
Version 2.6
© 2011 GSI Environmental Inc.
1. Project Information
Site Name: Townsend Lane
Location: Harpenden
Completed By: A Prince
Date: 20-Oct-15
Job ID:
2. Which Type of RBCA Analysis?
Tier 1
Risk-Based Screening Levels
Tier 2/3
Site-Specific Target Levels
3. Calculation Options
Affects which input data are required
Baseline Risks (Forward mode)
RBCA Cleanup Levels (Backward mode)
Individual Constituent Risk Goals Only
Individual and Cumulative Risk Goals
Apply Source Depletion Algorithm
4. RBCA Evaluation Process
Prepare Input Data
Data Complete? (yes, no)
Exposure Pathways
Constituents of Concern (COCs)
Transport Models
Soil Parameters
GW Parameters
Air Parameters
Review Output
Exposure Flowchart
COC Chem. Parameters
Input Data Summary
User-Spec. COC Data...
Transient Domenico Analysis...
Baseline Risks...
Cleanup Levels...
5. Commands and Options
New Site
Load Data...
Save Data As...
User Chemical Database
Set Units
Print Sheet
Print Report
Help
Quit

Exposure Pathway Identification

Site Name: Townsend Lane
Location: Harpenden
Compl. By: A Prince
Job ID:
Date: 20-Oct-15

1. Groundwater Exposure



Groundwater Ingestion/ Surface Water Impact

	On-site	Off-site1	Off-site2
Receptor:	None	None	None
Distance:	0	0	0 (m)

Source Media:
- ☐ Affected Groundwater
- ☐ Affected Soils Leaching to Groundwater

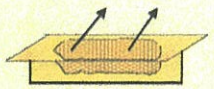
Option:
- ☐ Apply MCL value as Ingestion RBEL (backward mode only)

GW Discharge to Surface Water Exposure

- ☐ Swimming
- ☐ Fish Consumption
- ☐ Specified Water Quality Criteria

Enter Criteria

2. Surface Soil Exposure



Combined Exposure

Receptor: Res. | On-site

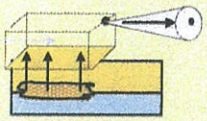
Source Media:
- ☑ Direct Ingestion
- ☑ Dermal Contact
- ☐ Inhalation (vol+part)
- ☑ Vegetable Ingestion

Construction Worker ☑

Option:
- ☑ Apply UK (CLEA) SGV as soil concentration limit

Veg Options

3. Air Exposure



Volatilization and Particulates to Outdoor Air Inhalation

	On-site	Off-site1	Off-site2
Receptor:	None	None	None
Distance:	0	0	0 (m)

Source Media:
- ☐ Construction worker
- ☐ Affected Soils–Volatilization to Ambient Outdoor Air
- ☐ Affected Groundwater–Volatilization to Ambient Outdoor Air
- ☐ Affected Surface Soils–Particulates to Ambient Outdoor Air

Volatilization to Indoor Air Inhalation

	On-site	Off-site1	Off-site2
Receptor:	None	None	None
Distance:	0	0	0 (m)

Source Media:
- ☐ Affected Soils–Volatilization to Enclosed Space
- ☐ Affected Soils Leaching to GW–Volatilization to Enclosed Space
- ☐ Affected Groundwater–Volatilization to Enclosed Space

Bldg Options

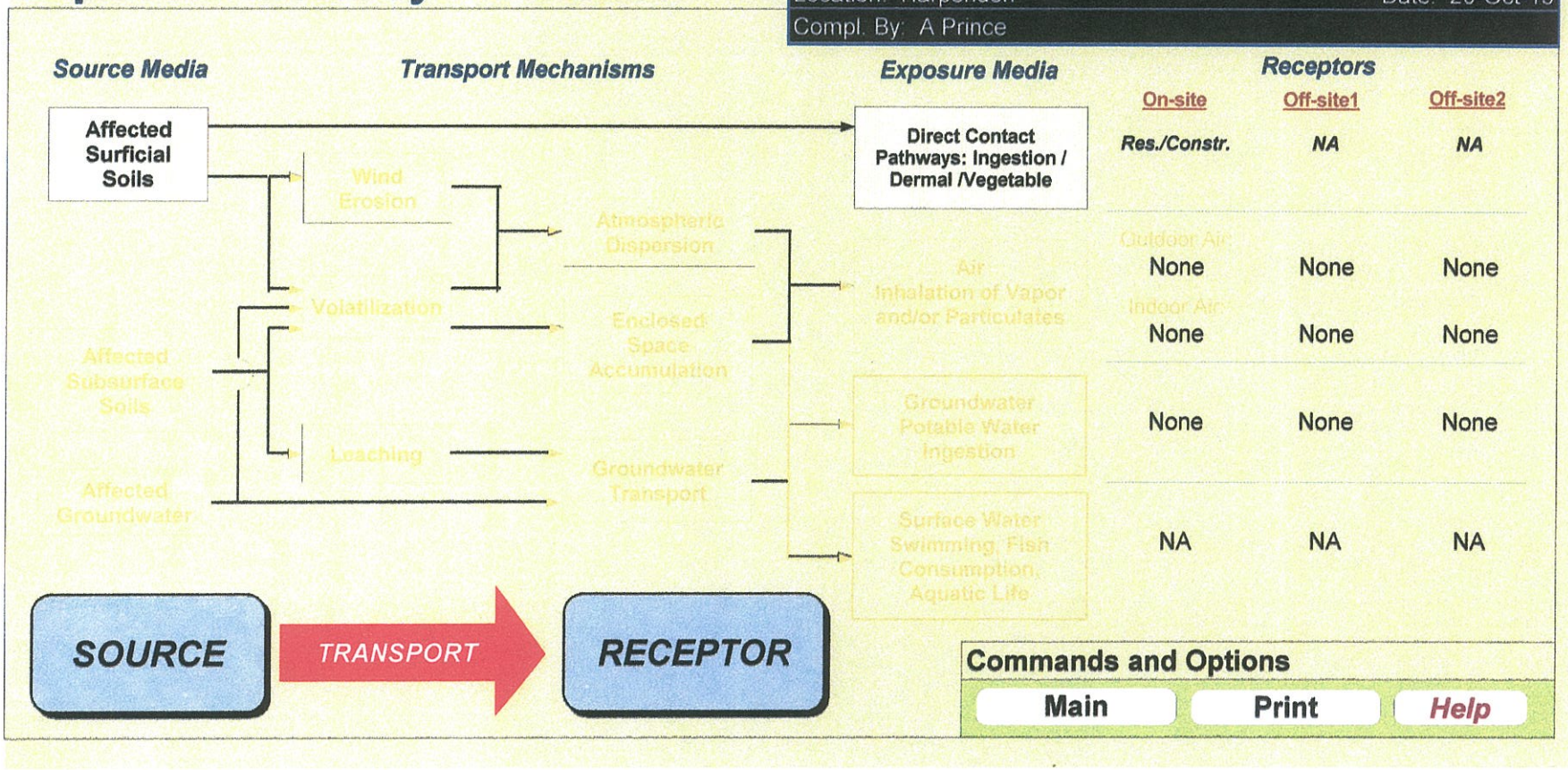
4. Commands and Options

Main | Print | Set | Help

Exposure Factors & Target Risks | Exposure Flowchart

Exposure Pathway Flowchart

Site Name: Townsend Lane | Job ID:
Location: Harpenden | Date: 20-Oct-15
Compl. By: A Prince



Receptors	On-site	Off-site1	Off-site2
	Res./Constr.	*NA*	*NA*
Outdoor Air	None	None	None
Indoor Air	None	None	None
Groundwater Potable Water Ingestion	None	None	None
Surface Water Swimming, Fish Consumption, Aquatic Life	NA	NA	NA

Commands and Options

Main | Print | *Help*