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Environmental Science

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Analytical Report Number : 25-041702

Project / Site name:	Chalford Vale Recreation Ground	Samples received on:	07/08/2025
Your job number:	S3565	Samples instructed on/ Analysis started on:	07/08/2025
Your order number:	S3565	Analysis completed by:	12/08/2025
Report Issue Number:	1	Report issued on:	12/08/2025
Samples Analysed:	4 water samples		


Signed:

Joanna Wawrzeczko
Senior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Ślaska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting
air	- once the analysis is complete

Excel copies of reports are only valid when accompanied by this PDF certificate.

Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



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Environmental Science

Analytical Report Number: 25-041702

Project / Site name: Chalford Vale Recreation Ground

Your Order No: S3565

Lab Sample Number				639145	639146	639147	639148
Sample Reference				SW01	SW02	SW03	SW04
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				Surface water	Surface water	Surface water	Surface water
Depth (m)				0.00	0.00	0.00	0.00
Date Sampled				06/08/2025	06/08/2025	06/08/2025	06/08/2025
Time Taken				1000	1000	1030	1030
Analytical Parameter (Water Analysis)				Units	Test Limit of detection	Test Accreditation Status	

General Inorganics

pH (L099)	pH Units	N/A	ISO 17025	8	8	8.1	8
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
Sulphate as SO ₄	mg/l	0.045	ISO 17025	41.6	41.5	41.9	41.5
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	0.15	ISO 17025	18	17	17	17
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	27	31	25	24
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	1.86	1.85	1.52	1.86
Hardness - Total	mgCaCO ₃ /l	1	ISO 17025	259	261	261	260

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Total Xylenols & Ethylphenols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol (2,3,5-)	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16
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Analytical Report Number: 25-041702

Project / Site name: Chalford Vale Recreation Ground

Your Order No: S3565

Lab Sample Number	639145	639146	639147	639148
Sample Reference	SW01	SW02	SW03	SW04
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix	Surface water	Surface water	Surface water	Surface water
Depth (m)	0.00	0.00	0.00	0.00
Date Sampled	06/08/2025	06/08/2025	06/08/2025	06/08/2025
Time Taken	1000	1000	1030	1030
Analytical Parameter (Water Analysis)	Units	Test Limit of detection	Test Accreditation Status	

Heavy Metals / Metalloids

Aluminium (dissolved)	µg/l	1	ISO 17025	3.6	< 1.0	2.6	1.2
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.55	0.54	0.57	0.53
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.6	1.1	< 0.2	0.4
Copper (dissolved)	µg/l	0.5	ISO 17025	3.2	1.9	< 0.5	1
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	< 0.5	0.5	< 0.5	< 0.5
Selenium (dissolved)	µg/l	0.6	ISO 17025	< 0.6	< 0.6	< 0.6	< 0.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	2.8	3.4	0.9	0.8

Boron (dissolved)	µg/l	10	ISO 17025	28	29	28	29
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.024	0.007	0.006	0.005

Petroleum Hydrocarbons

TPH - Aliphatic >EC5 - EC6 _{HS_ID_AL}	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC6 - EC8 _{HS_ID_AL}	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC8 - EC10 _{HS_ID_AL}	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aliphatic >EC10 - EC12 _{EH_ID_AL_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC12 - EC16 _{EH_ID_AL_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC16 - EC21 _{EH_ID_AL_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC21 - EC35 _{EH_ID_AL_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH - Aliphatic >EC5 - EC35 _{HS+EH_ID_AL_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10

TPH - Aromatic >EC5 - EC7 _{HS_ID_AR}	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC7 - EC8 _{HS_ID_AR}	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC8 - EC10 _{HS_ID_AR}	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH - Aromatic >EC10 - EC12 _{EH_ID_AR_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH - Aromatic >EC12 - EC16 _{EH_ID_AR_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH - Aromatic >EC16 - EC21 _{EH_ID_AR_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH - Aromatic >EC21 - EC35 _{EH_ID_AR_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH - Aromatic >EC5 - EC35 _{HS+EH_ID_AR_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10

TPH Total >EC5 - EC35 _{HS+EH_ID_TOTAL_MS}	µg/l	10	NONE	< 10	< 10	< 10	< 10
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VOCs

MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Analytical Report Number : 25-041702

Project / Site name: Chalford Vale Recreation Ground

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)

Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited matrices: SW, PW, GW, except B - SW, GW, Hg - SW, PW, Al - SW, PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode	In-house method	L029-PL	W	NONE
Phenols, speciated, in water by HPLC	Determination of speciated phenols by HPLC	In-house method based on Blue Book Method	L030-PL	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR Analyser. Accredited matrices: SW, PW, GW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited matrices: SW, PW, GW, FSE, LL; PrW, DI PrW (Al, Cu, Fe, Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total Hardness of water	Determination of total hardness of water by calculation from calcium and magnesium. Accredited matrices: SW, PW, GW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045B	W	ISO 17025
Total Petroleum Hydrocarbons with carbon banding in water by GC-MS	Determination of total petroleum hydrocarbons in water by GC-MS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
Total Petroleum Hydrocarbons with carbon banding in water by GC-MS/HS-GC-MS	Determination of total petroleum hydrocarbons in water by GC-MS/HS-GC-MS with carbon banding aliphatic and aromatic (Summed Bands)	Calculation	L070B/L088-PL	W	NONE
BTEX and/or Volatile Organic Compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW, PW, GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5-diphenylcarbazide, followed by colorimetry. Accredited matrices: SW, PW, GW, FSE, LL	In-house method by continuous flow analyser	L080-PL	W	ISO 17025
Free cyanide in water	Determination of free cyanide in water by distillation followed by colorimetry. Accredited matrices: SW, PW, GW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide in water by distillation followed by colorimetry. Accredited matrices: SW, PW, GW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Chloride in water	Determination of chloride in water by colorimetry using discrete analyser. Accredited matrices: SW, PW, GW, FSE, LL	In-house based on MEWAM Method ISBN 0117516260	L082B	W	ISO 17025
Total Petroleum Hydrocarbons in water by HS-GC/MS	Determination of total petroleum hydrocarbons in water by headspace HS-GC/MS. Accredited matrices: SW, PW, GW	In-house method	L088-PL	W	ISO 17025
pH of water at 20°C (automated)	Determination of pH of water by electrochemical measurement. Accredited matrices: SW, PW, GW, FSE, LL	In-house method	L099-PL	W	ISO 17025
Speciated PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAHs) in water by extraction in dichloromethane followed by GC-MS. Accredited matrices (PAHs): SW, PW, GW	In-house method based on USEPA 8270	L102B	W	ISO 17025



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Analytical Report Number : 25-041702

Project / Site name: Chalford Vale Recreation Ground

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)

Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in water	Determination of ammonium/ammonia/ammoniacal nitrogen by the colorimetric salicylate/nitroprusside method using discrete analyser. Accredited matrices: SW, PW, GW, FSE, LL	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082B	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited matrices: SW, PW, GW, PrW, DI PrW, FSE, LL	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution

Appendix F Analysis Summary Tables

[illegible]



Analytical Report Number: Various
Project / Site name: Chalford Vale Recreation Ground

[illegible]



Analytical Report Number: Various
Project / Site Name: Chalford Vale Recreation Ground

Project No: S3565

Lab Sample Number	Sample Reference	Date Sampled	DWQS / WHO	EQS (Freshwater)	Accreditation Status	Limit of detection	Units	Analytical Parameter (Soil Analysis)	Total Samples	Number of Exceedances	Min Value	Max Value	Average
Petroleum Hydrocarbons													
Alkanes: C10-C25	SW01	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C10-C25	4	0	1	1.00	1.00
Alkanes: C26-C35	SW02	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C26-C35	4	0	1	1.00	1.00
Alkanes: C36-C45	SW03	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C36-C45	4	0	1	1.00	1.00
Alkanes: C46-C55	SW04	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C46-C55	4	0	1	1.00	1.00
Alkanes: C56-C65	SW05	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C56-C65	4	0	1	1.00	1.00
Alkanes: C66-C75	SW06	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C66-C75	4	0	1	1.00	1.00
Alkanes: C76-C85	SW07	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C76-C85	4	0	1	1.00	1.00
Alkanes: C86-C95	SW08	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C86-C95	4	0	1	1.00	1.00
Alkanes: C96-C105	SW09	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C96-C105	4	0	1	1.00	1.00
Alkanes: C106-C115	SW10	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C106-C115	4	0	1	1.00	1.00
Alkanes: C116-C125	SW11	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C116-C125	4	0	1	1.00	1.00
Alkanes: C126-C135	SW12	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C126-C135	4	0	1	1.00	1.00
Alkanes: C136-C145	SW13	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C136-C145	4	0	1	1.00	1.00
Alkanes: C146-C155	SW14	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C146-C155	4	0	1	1.00	1.00
Alkanes: C156-C165	SW15	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C156-C165	4	0	1	1.00	1.00
Alkanes: C166-C175	SW16	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C166-C175	4	0	1	1.00	1.00
Alkanes: C176-C185	SW17	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C176-C185	4	0	1	1.00	1.00
Alkanes: C186-C195	SW18	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C186-C195	4	0	1	1.00	1.00
Alkanes: C196-C205	SW19	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C196-C205	4	0	1	1.00	1.00
Alkanes: C206-C215	SW20	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C206-C215	4	0	1	1.00	1.00
Alkanes: C216-C225	SW21	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C216-C225	4	0	1	1.00	1.00
Alkanes: C226-C235	SW22	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C226-C235	4	0	1	1.00	1.00
Alkanes: C236-C245	SW23	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C236-C245	4	0	1	1.00	1.00
Alkanes: C246-C255	SW24	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C246-C255	4	0	1	1.00	1.00
Alkanes: C256-C265	SW25	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C256-C265	4	0	1	1.00	1.00
Alkanes: C266-C275	SW26	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C266-C275	4	0	1	1.00	1.00
Alkanes: C276-C285	SW27	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C276-C285	4	0	1	1.00	1.00
Alkanes: C286-C295	SW28	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C286-C295	4	0	1	1.00	1.00
Alkanes: C296-C305	SW29	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C296-C305	4	0	1	1.00	1.00
Alkanes: C306-C315	SW30	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C306-C315	4	0	1	1.00	1.00
Alkanes: C316-C325	SW31	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C316-C325	4	0	1	1.00	1.00
Alkanes: C326-C335	SW32	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C326-C335	4	0	1	1.00	1.00
Alkanes: C336-C345	SW33	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C336-C345	4	0	1	1.00	1.00
Alkanes: C346-C355	SW34	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C346-C355	4	0	1	1.00	1.00
Alkanes: C356-C365	SW35	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C356-C365	4	0	1	1.00	1.00
Alkanes: C366-C375	SW36	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C366-C375	4	0	1	1.00	1.00
Alkanes: C376-C385	SW37	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C376-C385	4	0	1	1.00	1.00
Alkanes: C386-C395	SW38	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C386-C395	4	0	1	1.00	1.00
Alkanes: C396-C405	SW39	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C396-C405	4	0	1	1.00	1.00
Alkanes: C406-C415	SW40	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C406-C415	4	0	1	1.00	1.00
Alkanes: C416-C425	SW41	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C416-C425	4	0	1	1.00	1.00
Alkanes: C426-C435	SW42	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C426-C435	4	0	1	1.00	1.00
Alkanes: C436-C445	SW43	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C436-C445	4	0	1	1.00	1.00
Alkanes: C446-C455	SW44	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C446-C455	4	0	1	1.00	1.00
Alkanes: C456-C465	SW45	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C456-C465	4	0	1	1.00	1.00
Alkanes: C466-C475	SW46	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C466-C475	4	0	1	1.00	1.00
Alkanes: C476-C485	SW47	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C476-C485	4	0	1	1.00	1.00
Alkanes: C486-C495	SW48	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C486-C495	4	0	1	1.00	1.00
Alkanes: C496-C505	SW49	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C496-C505	4	0	1	1.00	1.00
Alkanes: C506-C515	SW50	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C506-C515	4	0	1	1.00	1.00
Alkanes: C516-C525	SW51	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C516-C525	4	0	1	1.00	1.00
Alkanes: C526-C535	SW52	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C526-C535	4	0	1	1.00	1.00
Alkanes: C536-C545	SW53	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C536-C545	4	0	1	1.00	1.00
Alkanes: C546-C555	SW54	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C546-C555	4	0	1	1.00	1.00
Alkanes: C556-C565	SW55	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C556-C565	4	0	1	1.00	1.00
Alkanes: C566-C575	SW56	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C566-C575	4	0	1	1.00	1.00
Alkanes: C576-C585	SW57	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C576-C585	4	0	1	1.00	1.00
Alkanes: C586-C595	SW58	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C586-C595	4	0	1	1.00	1.00
Alkanes: C596-C605	SW59	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C596-C605	4	0	1	1.00	1.00
Alkanes: C606-C615	SW60	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C606-C615	4	0	1	1.00	1.00
Alkanes: C616-C625	SW61	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C616-C625	4	0	1	1.00	1.00
Alkanes: C626-C635	SW62	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C626-C635	4	0	1	1.00	1.00
Alkanes: C636-C645	SW63	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C636-C645	4	0	1	1.00	1.00
Alkanes: C646-C655	SW64	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C646-C655	4	0	1	1.00	1.00
Alkanes: C656-C665	SW65	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C656-C665	4	0	1	1.00	1.00
Alkanes: C666-C675	SW66	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C666-C675	4	0	1	1.00	1.00
Alkanes: C676-C685	SW67	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C676-C685	4	0	1	1.00	1.00
Alkanes: C686-C695	SW68	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C686-C695	4	0	1	1.00	1.00
Alkanes: C696-C705	SW69	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C696-C705	4	0	1	1.00	1.00
Alkanes: C706-C715	SW70	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C706-C715	4	0	1	1.00	1.00
Alkanes: C716-C725	SW71	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C716-C725	4	0	1	1.00	1.00
Alkanes: C726-C735	SW72	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C726-C735	4	0	1	1.00	1.00
Alkanes: C736-C745	SW73	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C736-C745	4	0	1	1.00	1.00
Alkanes: C746-C755	SW74	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C746-C755	4	0	1	1.00	1.00
Alkanes: C756-C765	SW75	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C756-C765	4	0	1	1.00	1.00
Alkanes: C766-C775	SW76	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C766-C775	4	0	1	1.00	1.00
Alkanes: C776-C785	SW77	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C776-C785	4	0	1	1.00	1.00
Alkanes: C786-C795	SW78	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C786-C795	4	0	1	1.00	1.00
Alkanes: C796-C805	SW79	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C796-C805	4	0	1	1.00	1.00
Alkanes: C806-C815	SW80	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C806-C815	4	0	1	1.00	1.00
Alkanes: C816-C825	SW81	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C816-C825	4	0	1	1.00	1.00
Alkanes: C826-C835	SW82	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C826-C835	4	0	1	1.00	1.00
Alkanes: C836-C845	SW83	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C836-C845	4	0	1	1.00	1.00
Alkanes: C846-C855	SW84	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C846-C855	4	0	1	1.00	1.00
Alkanes: C856-C865	SW85	06/08/2025	300	-	NONE	1	mg/kg	Alkanes: C856-C865	4	0	1	1.00	1.00
Alkanes: C866-C875	SW86	06/08/2025	300</										

Appendix G Asbestos Dustiness Technical Note

Sanctus Project Number: S3565

Sanctus Technical Note: 001

Revision: B

Date: 26/11/2025

Project: Chalford Vale Recreation Centre, Stroud

Author: [REDACTED]

Subject: Asbestos Dustiness Results



1.0 Background

Sanctus Limited (Sanctus) were appointed by Stroud District Council to undertake a Site Investigation of the Chalford Vale Recreation Centre, Stroud. This investigation was undertaken for due diligence to assess the sites suitability as a playing field to assess any contamination risks to current and future site users. The Sanctus Site Investigation (Report S3565-002), the visual evidence gathered from site and subsequent laboratory analysis provide the basis of this report.

2.0 Current Regulation, Guidance and Case Law

The Control of Asbestos Regulations (CAR) 2012 requires actions to ensure the protection of workers and general public from asbestos exposures resulting from work activities. However, current case law suggests that landowners and developers could be liable for claims under the Compensation Act 2006 in the future, even if CAR2012 and planning requirements have been satisfied. In order to avoid such claims, adequate attention needs to be paid to potential risks from asbestos-containing soils (ACSs) during all redevelopments.

3.0 Historical Studies

Whilst no published Generic Assessment Criteria (GAC) exists for the long-term exposure of asbestos, its presence above the limit of detection is widely regarded as a level of risk that is unacceptable to human health, which site users could potentially be exposed to.

There is little published data relating to the release of fibres from asbestos containing soils (ACS) following physical disturbances (e.g. maintenance, digging, mechanical excavation, rotavating, vehicle movements, cycling or children playing) either in the UK or elsewhere. However, it is clear that risk mainly relates to dry soils and dusts (<10 per cent moisture).

Addison et al (1988)

One of the few empirical studies was conducted by Addison et al (1988) at the Institute of Occupational Medicine (IOM). In laboratory simulations they studied the release of three types of asbestos fibre (chrysotile, amosite and crocidolite) from three spiked soils (sandy, intermediate and clay) using mechanical dust generators.

Addison et al (1988) prepared soil-asbestos mixtures for each form of asbestos and each soil type at asbestos concentrations of 1 per cent, 0.1 per cent, 0.01 per cent and 0.001 per cent mass concentration using blenders and food processors. For each of the 36 resulting mixtures, airborne fibre concentrations were measured relative to the respirable soil dust concentrations generated.

The results were discussed in relation to the prevailing occupational exposure limit for respirable nuisance dust, 5 mg/m³. The effects on fibre release of different levels of moisture content in the soils (weight water to weight dry soil percentages) were also studied.

Addison et al (1988) remains one of the most relevant studies regarding fibre release from ACSs and showed that:

- For a given combination of soil type, asbestos mineral and constant soil dust in air concentration, the concentrations of asbestos in air were roughly proportional to the percentage of asbestos in the soil.
- For a given asbestos type, sandy soil released more asbestos fibre than intermediate soil than clay.
- For a given soil type, crocidolite was released more readily than amosite which, in turn, was released more readily than chrysotile.
- At 0 per cent moisture in the soil, concentrations of airborne asbestos exceeding the occupational control limits (>0.1 fibres/ml) could be generated from soils containing as little as 0.001 per cent while respirable dust concentrations were at or below the prevailing occupational exposure limit of 5mg/m³.
- The release of airborne asbestos was strongly influenced by soil moisture content. The addition of five per cent moisture reduced airborne asbestos by 80 to 95 per cent and no airborne fibres were detected above 15 per cent moisture.
- At soil concentrations below 0.01 per cent asbestos, SEM showed that non-asbestos particles accounted for a substantial proportion of the fibre-like structures in air samples. However, many of these fibres would probably not have been counted by PCOM and so should not have unduly affected the overall results.

SOBRA 2013

This paper formed one part of SoBRA's efforts to support the wider objectives of the Joint Industry Working Group (JIWG) and support industry in the risk assessment and risk management of asbestos in soil. SoBRA identified in 2013 that establishing appropriate air quality values was a key component of the risk-based management process.

For the purposes of this White Paper, the authors adopted risk of death from cancer of 1 in 100,000 as a risk level to allow true comparison of the different air quality guidelines and calculation methodologies. Appreciating that the UK approach to assessing carcinogens is based on minimal risk rather than a defined risk level, adoption of a 1 in 100,000 risk level was felt to be a reasonable starting point for comparison purposes. While there is ongoing debate regarding non-cancer effects from exposure to asbestos fibres, the authors agreed that the focus of the White Paper should be on cancer effects (mesothelioma and lung cancer) given the weight of evidence from epidemiological studies.

The authors noted that for the risk assessment community to be able to draw conclusions as to risks from asbestos in soils, it was also important to reduce the uncertainty and lack of science relating to the relationship between asbestos in soil and asbestos fibres in air. The paper concluded that 'It is evident from the assessment presented in this paper that there is a clear requirement for further research into background air concentrations in the UK'.

4.0 Factors Influencing Exposure

The concentration of airborne fibres released is influenced by many factors including asbestos type, ACM type and condition/state, depth, distribution and concentration in soil,

soil type, and soil moisture content. There is limited data on the release of airborne fibres from soils in real world environments, but soil moisture content has a particularly significant impact.

Please see results of analysis for the Asbestos Dustiness Test undertaken on the 'worst case' sample retrieved from the Chalford Vale Recreational Centre.

Increasing amounts of fibres are likely to be released over time as ACMs deteriorate. Friable ACMs (e.g., lagging and asbestos insulating board) release fibres much more easily, and are likely to deteriorate faster, than firmly bound materials (e.g. asbestos cement), which may take a very long time to degrade, if left undisturbed. Even low-level fibre concentrations have been demonstrated to give rise to significant fibre concentrations under certain conditions.

5.0 The Process and Need for Risk Assessment

In principle, the general tiered approach to the assessment and management of potential risks posed by ACSs is the same as that for any other contaminant. However, the unique nature of asbestos means that different methods of analysis, exposure estimation and risk estimation are required. Importantly, soil and air analysis methods may need to be more detailed than those currently commonly used to demonstrate compliance with CAR2012.

The CIRIA C733 guide identifies several key areas of uncertainty in current understanding, and recommendations are made for future research and policy making in order to address them. However, due to these uncertainties, the characterisation and assessment of potential risks is not straightforward.

A 'lines of evidence' approach whereby more than one method is used to estimate the airborne fibre concentrations likely to be generated from soils at the site and potential exposure should be adopted, as measuring soil concentrations alone is unlikely to be sufficient.

Based on the estimated airborne concentrations, cumulative exposures can be estimated for exposure scenarios, and the level of risk such exposures may pose. It should be noted that these scenarios are to be based solely on the Phase 2 site investigation study conducted by Sanctus Limited (Sanctus).

6.0 Previous Site Investigation and Recommendations

No previous ground investigations have been conducted at Chalford Vale Recreation Centre.

7.0 Sanctus Ground Investigation, Soil Sampling and Asbestos in Soils

Competency of personnel undertaking the investigation included:

- Suitably qualified and competent Environmental Engineers with a level qualification relating to ground contamination and bespoke task specific asbestos training.

All personnel were adequately equipped with the relevant skills, abilities and knowledge (this taken to mean competency of those individuals) to enable them to identify and assess visible materials that potentially contained asbestos.

The investigation comprised of 20no. hand excavated trial pits to a depth of 0.60m bgl. Soil samples were obtained at varying depths throughout each trial pit. These samples were

tested to provide asbestos identification and quantification. Samples were also analysed for metals, speciated TPH and EPH, BTEX, MTBE and TOCs.

Works (including sampling and logging) were undertaken in general accordance with British Standard BS5930 & BS10175, HSG248 The Analyst Guide and other current industry guidance and best practice.

Where visible asbestos was identified, these materials were either sampled and scheduled for laboratory analysis at a UKAS accredited laboratory or presumed to contain asbestos where visually similar to materials retrieved for analysis.

Detailed descriptions of the ground conditions encountered are presented within the stratigraphical logs, included in S3565-002 Appendix B. A summary of the visible asbestos contamination and loose fibre concentrations are detailed later within this assessment.

8.0 Summary of Findings

The encountered ground conditions were generally consistent across the site with a general depth of 0.05m of topsoil overlaying Made Ground. There is no clear separation between these layers and asbestos was encountered throughout. The Made Ground was identified as having a composition with proportionally high volumes of anthropogenic materials such as brick, glass, ceramic, tiles, concrete, metal and asbestos containing materials (ACMs).

The locations and descriptions of the encountered ACMs (visible during the investigation) are detailed below.

Sample Location	Depth (m bgl)	Asbestos Type
Bulk ID		
pACM01	0.40	Chrysotile – Cement
pACM02	0.40	Chrysotile – Cement
pACM03	0.40	Chrysotile – Cement
pACM04	0.30	Chrysotile – Cement
pACM05	0.10	Chrysotile – Cement
pACM06	0.40	Chrysotile – Cement
pACM07	0.40	Chrysotile – Cement
pACM08	0.40	Chrysotile – Cement
pACM09	0.40	Chrysotile – Cement
pACM10	0.00	Chrysotile – Cement
Asbestos in Soils		
STP02	0.05 – 0.50	Chrysotile – Loose Fibres
STP03	0.05 – 0.60	Chrysotile – Loose Fibrous Debris, Asbestos Cement
STP04	0.20 – 0.60	Chrysotile – Loose Fibrous Debris, Sheeting/Board Debris
STP04	0.05 – 0.20	Chrysotile – Sheeting/Board Debris, Asbestos Cement
STP08	0.40 – 0.60	Chrysotile – Loose Fibres

Sample Location	Depth (m bgl)	Asbestos Type
STP09	0.05 - 0.30	Chrysotile – Loose Fibres
STP10	0.25 - 0.60	Chrysotile – Loose Fibres
STP11	0.05 – 0.20	Chrysotile – Asbestos Cement, Loose Fibrous Debris
STP12	0.05 – 0.15	Chrysotile – Loose Fibrous Debris
STP12	0.15 – 0.60	Chrysotile – Loose Fibrous Debris
STP13	0.05 – 0.20	Chrysotile – Loose Fibres
STP15	0.15 - 0.60	Chrysotile – Loose Fibrous Debris
STP16	0.05 – 0.20	Chrysotile – Loose Fibres
STP17	0.40 - 0.60	Chrysotile – Loose Fibres
STP19	0.05 - 0.60	Chrysotile – Loose Fibres

Visible Asbestos Containing Material

Sanctus identified chrysotile cement and sheeting/board in the above table. Out of the 10no. bulk samples of potential ACM's (pACM) retrieved; the results confirm 10no. positive asbestos identifications over 5no. separate locations.

Other fragments similar in appearance were also visually assessed by the on site engineer during the Phase 2 Site Investigation based on visual similarities, as indicated in the photo plate below.



Figure 1, Confirmed Asbestos Cement fragment.



Figure 2, Confirmed Asbestos Cement fragments.



Figure 3, Confirmed Asbestos Cement fragment.

Loose Fibre Asbestos

Loose asbestos fibres were identified within the made ground of the site. 20no. locations were analysed for loose fibres. Out of these 20no. locations, 13no. locations provided a positive result for the presence of loose fibres/loose fibrous material as indicated by the table above.

The concentration of these fibres came back between <0.001 and 9.801% for values of asbestos % by hand picking/weighing and <0.10 and 2.29% from asbestos quantification (SemiQ -0.1%).

9.0 Risk Evaluation

9.1 Inhalable and Respirable Dust

The current UK limit values for (nuisance) inhalable and respirable dust are 10 mg/m³ and 4 mg/m³ respectively. Exceedances of these limits are considered unsafe, and potential exposures must be reduced as far below these limits as is reasonably practicable.

The Control of Substances Hazardous to Health (CoSHH) definition of a substance hazardous to health includes dust of any kind, when present at a concentration in air equal to or greater than 10 mg/m³ over an 8-hour time weighted average (TWA) of inhalable dust or 4 mg/m³ over an 8-hour TWA of respirable dust. This means that any dust will be subject to COSHH if people are exposed to dust above these UK limits.

However, specific dusts such as asbestos (identified at Chalford Vale Recreation Field) and lead have been assigned their own regulations and exposure limits, and exposure to these must comply with the appropriate specified limit.

9.2 Control and Clearance Limits under Regulation

The Control Limit for asbestos is a 0.1 fibres per cubic centimetre (f/cm³) of air averaged over a continuous period of 4 hours. This is the concentration of asbestos in the atmosphere when measured in accordance with the 1997 World Health Organisation (WHO) recommended method, or by a method giving equivalent results to that method approved by the Health and Safety Executive (HSE).

The Clearance Indicator for asbestos 'airborne fibres' is a level recorded below <0.010 f/ml (the Limit of Quantification LOQ). When this level is achieved, the location or area is judged to be 'safe for reoccupation', however the airborne clearance indicator is not an acceptable permanent environmental level. It is merely a transient indicator of site cleanliness (normally used during asbestos removal, demolition or remediation operations) and does not demonstrate the location to be 'asbestos free'.

9.3 Background Air Monitoring

Background air monitoring was undertaken during the ground investigation work, and results were used to provide substantiation of the method and control measure implemented during trial pit excavation works.

Although near source monitoring was undertaken, this does not necessarily determine the potential airborne fibre levels during any future disturbance. It is not a true reflection of the potential fibre levels due to the use of control measures used to protect employees during

the investigation, and such use of control measures during normal occupancy would be considered unlikely.

All results reported no fibre concentrations above the limit of detection and were below the Clearance Indicator of 0.01f/cm³.

9.4 Dustiness Testing - Background

This testing method looks at the dust that would (or could) be released under natural or normal site conditions. Moisture concentrations have a significant impact on the potential fibre release; this is discussed in later sections.

The method is adapted from existing methodology (EN 15051-2:2013 – workplace exposure – measurement of the dustiness of bulk material. The method is a continual drop method, and air sampling is undertaken at 4 litres/minute (CIRIA C733) to mimic average (adult) respiration rates.

It should be noted that some uncertainties will remain when using this method for risk assessment, as vital capacity of the lung will differ between each person, or child as is the case with this particular site. Other factors that will influence the assigned results or average include:

- Breathing rate (frequency, BR) is the number of breaths in a minute. The range for children of school age is 12 -30 breaths per minute.
- Tidal volume (TV) is the amount of air breathed in with each normal breath.

The average tidal volume is 0.5 litres (500 ml) male 0.4 (400 ml) female.

- Minute ventilation (VE) is the total volume of air entering the lungs in a minute.
- Calculated results ($VE = BR \times TV$)

During exercise, tidal volume increases as does the depth of breathing and the rate of breathing. This is particularly relevant where airborne contamination such as asbestos is present, as there is potential that higher dose exposures may occur as a result. Given that the site is to be used as a public open space (park), this should be taken into consideration (See Section 10.0 Future Use).

9.5 Dustiness Sample – Analysis

Dustiness Testing was carried out on the sample considered to be 'worst case' in regard to the visual contamination identified. i2 Laboratory Analysis Report 25-041721-1 details the results.

The analysis was carried out in accordance with i2 in-house method A007 PL and is accredited to ISO 17025.

A representative subsample of the soil was rotated for a fixed period (3:36min) inside a sealed metal drum as a constant flow of air is passed through the apparatus. The dust generated was blown through a foam filter to remove larger dust fractions. The fibres were then caught on a nitro-cellulose filter which was subjected to fibre counting methodology using Phase Contrast Optical Microscopy (PCOM) as per HSG248 The Analyst Guide.

The focus was then on the respirable fibres, specifically fibres with a diameter of less than 3µm (microns) and length of at least 5µm (microns) and an aspect ratio (length to width) of greater than 3. These fibres are of a particle size which will penetrate beyond the terminal bronchioles into the gas exchange region of the lungs during exposure and therefore they represent a higher, more significant risk to human health.

Within the free fibre identification of the soil samples taken from the 20No hand pits test (two samples each from STP01 – STP20, 40No tests in total), Of the 40No samples taken, 15No returned positive results for the presence of asbestos and 7No of those provided results above the laboratory's limit of detection. Of those 7No samples, a maximum concentration of 9.801% w/w was detected within STP 04 at 0.05-0.20 m bgl, with an average concentration of 2.1% w/w for the 7No samples.

As well as the above noted concentrations, a significant quantity of visible asbestos was noted during the investigation at shallow depth.

Quantified bulk samples of visible materials was retrieved as they were considered visually similar to those already collected for analysis, and gross friable insulation lagging (posing a high risk) was noted. However, all suspected bulk ACMs were characterised as containing Chrysotile.

Classification scheme for rotating drum method (in accordance with BS EN 15051-2:2013 + A1:2016):

Category of dustiness	Respirable dustiness mass fraction (mg/kg)
Very low	< 10
Low	10 to 60
Moderate	> 60 to 210
High	> 210

The dustiness samples was examined 3 times at the laboratory and dust was collected on the 3 separate filters. The results were reported as:

Sample ID		STP11		General Sample Description				N/A		
Other ID		DRIED								
Depth		0.2		Moisture content of 'As received' sample				N/A		
Run no.	Volume (L)	Respirable fibres counted	Graticules counted	LOQ Fibre concentration in drum (f/ml)	Fibre concentration in drum (f/ml)	LOQ Dust in drum (mg/m³)	Dust in drum (mg/m³)	Respirable dustiness mass fraction (mg/kg)	Mean of Respirable dustiness mass fraction (mg/kg)	RSD of Respirable dustiness mass fraction
1	4	3	200	9	<9.00	20	2747	68	60	30
2	4	4	200	9	<9.00	20	3270	40		
3	4	2.5	200	9	<9.00	20	3053	73		
Comments										

Sample ID		STP17		General Sample Description				N/A			
Other ID		DRIED									
Depth		0.1		Moisture content of 'As received' sample				N/A			
Run no.	Volume (L)	Respirable fibres counted	Graticules counted	LOQ Fibre concentration in drum (f/ml)	Fibre concentration in drum (f/ml)	LOQ Dust in drum (mg/m³)	Dust in drum (mg/m³)	Respirable dustiness mass fraction (mg/kg)	Mean of Respirable dustiness mass fraction (mg/kg)	RSD of Respirable dustiness mass fraction	
1	4	0	200	9	<9.00	20	872	31	49	38	
2	4	1	200	9	<9.00	20	1335	48			
3	4	2	200	9	<9.00	20	2317	69			
Comments											
-											

The dustiness values obtained were screened against those displayed in the table above. The mean value for both samples were used against these values. STP11 displays a respirable dustiness mass of 60 mg/kg. This falls on the upper limit of the "Low" category. Similarly, STP17 displayed a mean respirable dustiness mass of 49mg/kg which is also within the "Low" category of dustiness.

10.0 Anticipated Future Use

For the purpose of assessment and the exposure scenario, the future use of the site is assumed to be:

- Public Open Space (Park)

Maintenance – cutting grass and general upkeep of football pitch and landscaped areas.

For ease and sensitivity of the receptor comparisons to the activities by children have been considered. These children are assumed to be between the ages typically associated with a school child.

Model Parameter	Input Value
Critical receptor	Visiting children, as most likely to have a greater exposure frequency (weekly)
The age at which exposure started	1 years old
The age at which exposure will finish	18 years old
Total exposure years (Yi)	17 years
Exposure duration (Ti)	2 hours
Exposure frequency (Fi)	52 visits per year
Estimated airborne concentrations (Ci)	0.02 (Addison Et al 1988 Sandy Soil) f/ml
Realistic observed airborne concentrations (Ci2) Dustiness testing	9.00 f/ml

Estimated airborne fibre concentration 0.02 fibres/ml (Ci) in the using conservative estimated (Addison et al 1988).

Dustiness testing on a sample has produced 6No. fibre concentrations below the limit of quantification within the dustiness drum equipment. As such, for a conservative equivalent, this limit of detection yielded an equivalent of 9.00 f/ml. From the actual fibre count during the dustiness test, over the required 4 litres of air, a maximum fibre count of 4 fibres were counted on the 2nd run of STP17. This would create an actual fibre count of 0.001 fibres/ml. This fibre count is also a conservative estimate of asbestos fibres, as no discrimination can be made during the count between asbestos and non-asbestos fibres which achieve the size ratios used to determine a respirable fibre count, hence the actual number of asbestos fibres may actually to lower.

For conservatism assumptions have been made that the soil will be dry and dusty on 100 days per year (28% of the time). This reduction from 52 visits per year, to a modelled average of 14.56 (28% of 52 visits) is seen between the conservative and refined scenarios seen below.

It is also assumed that this assessment is for repeated exposure to an area with average concentration of free fibre asbestos (0.002%) with 50% of the surface disturbed or partially vegetated.

The table below shows a conservative estimate based on literature and that of a measured dustiness test.

A1: Event Number	B1: Estimated Concentration (Ci) (f/ml)	B2: Assumed fibres can be released from 50% of site	C1: Frequency (Fi) (per year)	D1: Time Period (Ti) (hours)	E1: Ei (Output) F/ml.hrs	Years	Total fm.hr (cumulative)	Potential Exposure Fml.hr to yrs
1 - Soil	0.02	0.01	14.56	2	0.2912	17	4.9504	0.002475
2 – Dustiness (conservative)	9.00	4.5	52	2	468	17	7956	3.978
3 – Dustiness (refined)	0.001	0.0005	14.56	2	0.01456	17	0.24752	0.000124

11.0 Conclusions

The initial “conservative” average respirable dustiness mass result is categorised as “low”, with further refinements to the initial assumptions, reducing this risk to “very low”.

The assessed exposure levels indicate a non-zero risk from asbestos fibres under the current site conditions. Given that the site is expected to be used predominantly during the hotter and drier months when ground conditions increase the likelihood of fibre release, a management only approach is not recommended for addressing the known soil contamination.

Claims under the Compensation Act may apply where 'a person ("the responsible person" (taken to be landowner)) has negligently or in breach of statutory duty caused or permitted another person ("the victim") to be exposed to asbestos.

The 'duty' is to take reasonable care to ensure that any person is not exposed to a foreseeable risk of asbestos-related injury.

The cases of *Sienkiewicz v Greif (UK) Limited* and *Knowsley Metropolitan Borough Council v Willmore*, [2011, UKSC 10] and *Williams v Birmingham University* [2011] (EWCA Civ 1242) provide further detail and clarification on the landowner or 'responsible persons' legal duty and liability regarding low level asbestos exposure.

Failing to implement a Management Plan and to actively manage contaminated soils on site may constitute a breach of statutory duty, as would the absence of an appropriate remediation solution. It is therefore recommended that access to the park is restricted until:

- An Asbestos Management Plan (AMP) is prepared, setting out how asbestos risks will be mitigated, managed or removed; and
- Either the park is formally closed to the public and maintenance teams with additional secure fencing installed, or remedial measures, such as removal of contaminated soils or installation of a clean cover system, are implemented, as outlined in Section 8 of the main ground investigation report. (S3565-002 Rev B).



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i2 Analytical Ltd.
7 Woodshots Meadow
Croxley Green Business Park
Watford
WD18 8YS



Environmental Science

Client: SANCTUS

Site: Chalford Vale Recreation Ground

Sample date: 06/08/2025

Sample received: 07/08/2025

Sample instructed: 07/08/2025

Analysis Completed: 20/08/2025

Certificate of Analysis - Asbestos Dustiness

Analytical Report no. 25-041721, Sample Number 639280

The analysis was carried out in accordance to in house method A007- PL, using rotating dustiness drum adapted BS EN 15051-2:2013 + A1:2016 (Workplace exposure - Measurement of the dustiness of bulk material) for asbestos contaminated soils and phase-contrast microscopy (PCM).

Analytical Results:

The same sample was examined 3 times and dust was collected on the 3 separate filters.

Asbestos Analyst ID: DBU

Results tabulated below:

Sample ID	STP11		General Sample Description					N/A		
Other ID	DRIED									
Depth	0.2		Moisture content of 'As received' sample					N/A		
Run no.	Volume (L)	Respirable fibres counted	Graticules counted	LOQ Fibre concentration in drum (f/ml)	Fibre concentration in drum (f/ml)	LOQ Dust in drum (mg/m ³)	Dust in drum (mg/m ³)	Respirable dustiness mass fraction (mg/kg)	Mean of Respirable dustiness mass fraction (mg/kg)	RSD of Respirable dustiness mass fraction (%)
1	4.0	3.0	200	9.00	<9.00	20	2747	68.0	60.0	30.0
2	4.0	4.0	200	9.00	<9.00	20	3270	40.0		
3	4.0	2.5	200	9.00	<9.00	20	3053	73.0		

Comments

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Table 1. Classification scheme for rotating drum method (in accordance with BS EN 15051-2:2013 + A1:2016)

Category of dustiness	Respirable dustiness mass fraction (mg/kg)
Very low	< 10
Low	10 to 60
Moderate	> 60 to 210
High	> 210



4041

i2 Analytical Ltd.
7 Woodshots Meadow
Croxley Green Business Park
Watford
WD18 8YS



Environmental Science

Client: SANCTUS

Site: Chalford Vale Recreation Ground

Sample date: 06/08/2025

Sample received: 07/08/2025

Sample instructed: 07/08/2025

Analysis Completed: 20/08/2025

Certificate of Analysis - Asbestos Dustiness

Analytical Report no. 25-041721, Sample Number 639281

The analysis was carried out in accordance to in house method A007- PL, using rotating dustiness drum adapted BS EN 15051-2:2013 + A1:2016 (Workplace exposure - Measurement of the dustiness of bulk material) for asbestos contaminated soils and phase-contrast microscopy (PCM).

Analytical Results:

The same sample was examined 3 times and dust was collected on the 3 separate filters.

Asbestos Analyst ID: DBU

Results tabulated below:

Sample ID		STP17			General Sample Description			N/A		
Other ID		DRIED								
Depth		0.1			Moisture content of 'As received' sample			N/A		
Run no.	Volume (L)	Respirable fibres counted	Graticules counted	LOQ Fibre concentration in drum (f/ml)	Fibre concentration in drum (f/ml)	LOQ Dust in drum (mg/m³)	Dust in drum (mg/m³)	Respirable dustiness mass fraction (mg/kg)	Mean of Respirable dustiness mass fraction (mg/kg)	RSD of Respirable dustiness mass fraction (%)
1	4.0	0.0	200	9.00	<9.00	20	872	31.0	49.0	38.0
2	4.0	1.0	200	9.00	<9.00	20	1335	48.0		
3	4.0	2.0	200	9.00	<9.00	20	2317	69.0		

Comments

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Table 1. Classification scheme for rotating drum method (in accordance with BS EN 15051-2:2013 + A1:2016)

Category of dustiness	Respirable dustiness mass fraction (mg/kg)
Very low	< 10
Low	10 to 60
Moderate	> 60 to 210
High	> 210



Supplementary Information – Asbestos Dustiness

Method:

The analysis was carried out in accordance to in house method A007- PL, using rotating dustiness drum adapted BS EN 15051-2:2013 + A1:2016 (Workplace exposure - Measurement of the dustiness of bulk material) for asbestos contaminated soils and phase-contrast microscopy (PCM).

Approximately 50 g of each sample was loaded into the rotating drum and three subsequent dust samples were obtained. Dust was extracted from the sample in accordance with the membrane filter method (adapted from BS EN 15051-2:2013 + A1:2016 ISBN: 1 920763 81 3).

Fibre measurement and counting was carried out in accordance with HSG248

This method is accredited to ISO 17025.

This method was carried out by i2 Analytical Ltd at ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Quality Control:

Each sample is preceded by a blank sample.

Method References:

1. BS EN 15051-2:2013 + A1:2016 Workplace exposure - Measurement of the dustiness of bulk material
2. EH40/2005 – Workplace exposure limits in UK
3. Development and validation of an analytical method to determine the amount of asbestos in soils and loose aggregates; Addison et al.; HSE Contract Research Report No. 83/1996;
4. Asbestos: The Analysts' Guide; HSG248, HSE; 2021



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Environmental Science

Analytical Report Number : 25-041721

Project / Site name: Chalford Vale Recreation Ground

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)

Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos Dustiness in Soil	See Attached Dustiness Report	Asbestos Dustiness Testing - In-house Method A007	A007B	D	ISO 17025
Sample available for Asbestos Dustiness analysis		In-house method	A007B	D	NONE

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.

The result for sum should be interpreted with caution

Appendix H Envirocheck Report