



Land Quality Management Ltd

For

Stroud District Council

**Valley Playing Field, Chalford:
Human health risk assessment
of asbestos in soil**

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NON-TECHNICAL SUMMARY

The Chalford Vale Recreation Ground, Stroud has been closed due to the discovery of asbestos following mole activity that brought pieces of glass, ceramics and asbestos containing material (ACM) to the surface. The ACM was brought to the Site as part of levelling works in middle of the 20th Century.

Stroud previously commissioned a Site Investigation Report for the Chalford Vale Recreation Ground, Stroud from Sanctus Limited (Ref S3565 – Chalford Vale Recreation Centre, Revision D dated 17 December 2025) (Appendix 2). Among other land contamination issues the report considers risks from asbestos in the ground. Stroud commissioned LQM to provide an independent review of the report and assessment of the risks to human health (Appendix 3).

LQM's review of the Sanctus report identified the need for further specialist testing and a detailed quantitative assessment of the risk to human health from asbestos. Further respirable dust testing as well as fibre release testing have been carried out and the results used to inform a risk assessment based on the 2021 SoBRA risk assessment tool in the context of Part 2A of the Environmental Protection Act 1990 (as amended).

Conservative assumptions of the combined risk of mesothelioma and lung cancer from inhalation of asbestos fibres released from molehill materials mean the Site falls well within Category 4. If there was no vegetation or other hard cover and the entire site released asbestos fibres akin to the release from molehill materials the risk would be at the upper end of what is considered minimal risk.

Ground workers mowing grass would come under the provisions of the Control of Asbestos Regulations 2012 as they are carrying out work with asbestos.

The effects of climate change have been considered and found that overall, climate change, including extreme weather events (EWE) is a moderate influence on the level of risk that is not considered to affect the risk evaluation discussed above.

The Control of Asbestos Regulations 2012 would apply to ground maintenance and play equipment repairs or replacement involving ground excavation or disturbance. The indicative JIWG assessment (Appendix 8) could form the basis for a specific risk assessment as required by CAR 2012.

Any work to upgrade the play equipment should be designed to prevent erosion and the creation of bare earth more likely to result in asbestos at the surface. Specifically, the area beneath swings and under the zip wire could be covered with soft material both for safety of users and to prevent scuffing creating bare earth.

The activity of moles could be hindered by discouraging their presence beneath the Site. Mole eradication is unlikely to be either a permanent or a socially acceptable solution. However, rolling the ground would have the dual effect of both flattening the molehills and also densifying shallow materials and collapsing any shallow mole tunnels. Such compaction may already be routine for the football pitch. Nevertheless, it should be considered for the whole Site.

The effects of climate change include the possibility of the site being flooded by the river Frome. Such flooding is not considered likely to affect the risk assessment presented in this report.

The Site can be reopened once the protection of ground staff has been established.

APPENDIX 7 RISK ASSESSMENT OUTPUTS

APPENDIX 8 JIWG RISK ASSESSMENT OUTPUTS

1 INTRODUCTION

1.1 Terms of Reference

(1) In April 2026 Stroud District Council commissioned Land Quality Management Ltd (LQM) to undertake work in relation to the aim and objectives listed below. Our original proposal (minus cost information) is included as Appendix 1. A signed Order Confirmation letter was received on 10 April 2026.

1.2 The Site

(2) The Valley Playing Field (the Site) is situated at the end of Chalford High Street at Valley Corner next to the River Frome (Chalford Parish Council, undated). It has swings, a zip-wire, climbing equipment, an all-weather table tennis table, picnic tables, benches and a football pitch. The Site has also been referred to as the Chalford Vale Recreation Ground and the Valley Pleasure Ground.

1.3 Background

(3) The Chalford Vale Recreation Ground, Stroud has been closed due to the discovery of asbestos following “mole activity bought pieces of glass, ceramics plus pieces of cement bound asbestos to the surface”. Asbestos containing material waste was brought to the Site as part of levelling works in middle of the 20th Century.

(4) In December 2025 Stroud District Council (Stroud) commissioned Land Quality Management Ltd (LQM) to undertake a review of previous report work and carry out further risk assessment under Part 2A of the Environmental Protection Act 1990 (as amended) in relation to the aim and objectives listed below. This review identified the need for further specialist testing and a detailed quantitative assessment of the risk to human health from asbestos.

(5) Our proposal, dated 9 April 2026, (minus cost information) is included as Appendix 1. A signed Order Confirmation letter was received on 10 April 2026.

(6) Stroud previously commissioned a Site Investigation Report for the Chalford Vale Recreation Ground, Stroud from Sanctus Limited (Ref S3565 – Chalford Vale Recreation Centre, Revision D dated 17 December 2025) (Appendix 2). Among other land contamination issues the report considers risks from asbestos in the ground. Stroud commissioned LQM to provide an independent review of the report and assessment of the risks to human health. The LQM review of the Sanctus report is presented in Appendix 3. Detailed comments are included in the review. The review concluded that insufficient samples had been tested for asbestos fibre release, there was a need for further respirable dust testing, and the results should be used to inform a risk assessment based on the 2021 SoBRA risk assessment tool in the context of Part 2A of the Environmental Protection Act 1990 (as amended).

(7) The Chair of the Chalford Parish Council provided a history of the Site at the public meeting held at Christ Church on Thursday 23rd April (Box 1).

Box 1 History of the Valley Pleasure Ground (Chalford Parish Council, 2026)

The field, measuring 1 acre, 1 rood and 3 perches (approximately 1.25 acres), was bequeathed to the Parish in 1920 by Charles Alfred Apperley to be used as a pleasure ground. The land was vested in a charitable trust, for which the Parish Council acts as trustee. This trust, along with others, is overseen by the Parish Council's Charities Committee, while the practical maintenance and upkeep of the site is managed by the Works Committee. The Valley Pleasure Ground was noted as a highly valued community asset, alongside other local pleasure grounds at France Lynch and Bussage, both of which are well used.

Historical Parish Council records were handwritten or typed until 2013. The Deputy Clerk has been examining archived ledgers to better understand the site's past use and was pointed in the right direction by the local History Group. It was noted that **part of the site was used as a dump between approximately 1925 and the 1940s**. Swings were installed in 1939, reflecting its long-standing recreational use. **In 1946, the ground was levelled using asbestos-cement materials, reportedly surplus from Fibrecrete, a company which operated from the 1930s to the 1970s and manufactured building products containing asbestos.** The historical presence of asbestos-containing materials on the site was highlighted as significant in understanding the current context and any related considerations.

Recent Events

The Chair explained that in the early 2000s, the presence of white silty substances especially at the wood eastern end had been investigated and tested. It was found to be Fuller's Earth clay which would have been used in the wool industry. No trace asbestos was found there. The moles have been around for decades, but numbers and activity have been increasing; in March 2024 sixty molehills were recorded, and it has become more uneven impacting on the mower.

Consideration has been given to eradicating the moles but that's been discounted so far, believing that would not be a popular action to take, and in any event, our understanding is that other moles will soon take their place.

Residents had expressed concerns about increasing amounts of glass and pottery shards from March 2024.

In mid-2025 public concern was raised about the white cement pieces at the surface and whether these contained asbestos.

Our Groundsmen had been picking up the glass and pottery but in June 2025, when councillors met on site to consider the project to upgrade the play equipment, they looked at the cement pieces and a councillor with some knowledge was also concerned about the possible presence of asbestos in the white cement pieces.

1.4 Background Materials

(8) The following site specific reports provide the background to previous work on the Site:

- Sanctus Limited Site Investigation Report for the Chalford Vale Recreation Ground, Stroud from Sanctus Limited (Ref S3565 – Chalford Vale Recreation Centre, Revision D dated 17 December 2025) (245 pp).

- Land Quality Management Ltd Chalford Vale Recreation Ground, Stroud 3rd Party Review - Asbestos Site (Dated 31 March 2026)

1.5 Aim

(9) To carry out a detailed quantitative assessment of risks to human health from asbestos in the ground in the context of Part 2A of the Environmental Protection Act 1990 (As amended).

1.6 Objectives

(10) The objectives needed to meet this aim are:

1. Understand the potential for release of asbestos fibres from material brought to the surface by the action of moles
2. Advise on the level of risk posed by respirable asbestos fibres to users of the Site in the context of Part 2A of the Environmental Protection Act 1990 (As amended)
3. Identify potential future courses of action to support the safe use of the Site

1.7 Legal Context

(11) The legal context for this work is Part 2A of the Environmental Protection Act 1990 (as amended).

(12) Reference is also made to the Control of Asbestos Regulations 2012.

2 CONCEPTUAL SITE MODEL

(13) Risk assessment is underpinned by the contaminant-pathway-receptor framework and for a risk to exist all three elements of the framework must be present. The relationship between the contaminant, pathway and receptor is often called the “pollutant linkage”. The site conceptual model represents the risk assessor’s understanding of the site and potential pollutant linkages present, including the identification of uncertainties, limitations and assumptions associated with the model. The site conceptual model may be subject to review and change should further information be collected.

2.1 Site conceptual model

(14) The current DQRA is based on:

- asbestos in materials brought to the surface by the action of moles at the Site
- release of asbestos fibres from molehills
- inhalation of airborne asbestos fibres by Site users and ground maintenance staff

2.2 The Contaminants of Concern

2.2.1 Asbestos

(15) Asbestos is made up of tiny, invisible fibres that can be breathed in or rest on your clothes. Asbestos was used in many industries and buildings until it was banned in 1999. When soil that contains asbestos fibres is disturbed, fibres can be released into the air. When people inhale these fibres they can, some considerable time after exposure, cause mesothelioma and lung cancer.

(16) In the UK, asbestos in the ground is the result of deliberate or accidental human activity. Asbestos can be present as bound/ cemented into solid fragments (referred to as Asbestos Containing Material or ACM in this report), in products such as disk brakes from which fibres can be released or as individual or bundles of fibres. Further details are available on the HSE website (HSE undated) and in CIRIA C733 (Nathanail et al. 2014).

(17) In 1946, the ground at the Site was levelled using asbestos-cement materials, reportedly surplus from Fibrecrete, a company which operated from the 1930s to the 1970s and manufactured building products containing asbestos (Box 1).

2.3 The Critical Receptor(s)

(18) The critical receptor is the person most at risk from the contaminants at a site. In this case there are two possible groups of critical receptors:

- Users of the Site playing on the play equipment or football pitch or visiting the site
- Ground staff who maintain the Site on a regular basis

2.4 The Potential Exposure Pathways

(19) Asbestos is harmful when its fibres are inhaled. The risk reflects cumulative exposure over time. There is a long latency between exposure and the onset of mesothelioma and lung cancer - cancers caused by exposure to environmental asbestos.

(20) Site users can be exposed to fibres released from those molehills containing fibres. Such fibres are most likely to be released when the molehill material is dry, and fibres are then picked up by wind or physically disturbed.

(21) Ground staff are in addition potentially exposed by fibres released during grass cutting which is likely both to release fibres as the mowing passes over molehills but also the shattering of solid asbestos containing materials caught up in the mower blades. The hand picking of glass, ceramic and ACM fragments from molehills is a further exposure pathway but likely less significant than the above.

3 GENERAL APPROACH

(22) Samples of soil from molehills were taken and sent to a laboratory for two specialised tests. Ten molehills (MH1 – MH10) were sampled and two samples were taken from each location. The locations and close up photographs of each molehill are shown in Appendix 4.

(23) The samples were dispatched to Normec DETS laboratory. A respirable dust release test was carried out by Normec DETS, and a fibre release test was carried out by Normec i2. As far as LQM are aware Normec are the only laboratory that offers these tests commercially in the UK.

(24) The results of the tests are reproduced in Appendix 5 and Appendix 6 respectively.

4 **THESE RESULTS COUPLED WITH INFORMATION ABOUT HOW THE SITE IS USED REPORTED BY SANCTUS AND DISCUSSED WITH STROUD DC AND CHALFORD PC WERE USED TO POPULATE AN asbestos specific human health risk estimation tool PRODUCED BY SOBRA (AVAILABLE FROM SOBRA 2021). THE RESULTS ARE PRESENTED IN APPENDIX 7 AND INTERPRETED IN THE CONTEXT OF PART 2A IN EFFECTS OF CLIMATE CHANGE**

(25) The Chalford Parish Council emergency plan considers river flooding in Chalford to be a very high risk (Chalford Parish Council, 2022). The environmental watchpoints identified in Ciria 824 have been considered (Table 5).

Table 5 Summary of environmental watchpoints (EWPs) (From Ciria C824 Table 8.1)

Number	Details	Site information
EWP1	Are there any specific climate change-related objectives or data collection requirements for assessment?	Yes – CC is a factor to consider in the risk assessment
EWP2	Does initial climate risk screening identify any site-specific risk factors?	Yes – 1. the river Frome flows adjacent to the flat lying site 2. extreme hot dry periods
WP3	How will projected climate change effects alter the initial CSM and/or the nature of the potential linkages identified?	1. Potential for flooding of the river Frome 2. Moles driven away during EWE – deeper in hot weather and off site if flooded 3. Potential for more windblown erosion from recent uncompacted molehills during periods of excessive wind
WP4	Have potential climate change and EWE effects been considered within uncertainties and limitations of the assessment?	Yes The assessment has been conservative and not allowed for the fact that hot periods tend to result in increased soil temperatures that may prompt moles to dig deeper in search of cooler, moister conditions (REDI, 2025) resulting in fewer fresh molehills. In addition during periods of hot dry weather grass tends to need cutting less often but this has not been allowed for in the risk assessment.
WP5	Do the GACs selected at GQRA include for potential climate change and extreme weather impacts?	N/A
EWP6	Have sufficient data been collected to account for climate change impacts?	Yes Qualitatively the effects of flooding and extremely hot, dry weather would reduce the release of fibres from fresh uncompacted molehills and grass cutting may be less frequent but the risk assessment has, conservatively, not taken these mitigating factors into account.
EWP7	Have projected climate change and EWE effects and associated uncertainties been considered in the DQRA model selection and parameterisation?	No – the assumptions are conservative
EWP8	Are there any specific climate change-related objectives to be considered at options appraisal stage to inform the selection of sustainable remediation requirements?	Yes – OA has focused on pathway interruption (raising the Site levels) and rolling the site to reduce molehill height and trigger collapse of shallow mole tunnels

EWP9	Have potential long-term effects of climate change and EWEs on the remediation been considered, including its long-term durability and effectiveness?	Yes
EWP10	Has the risk of EWEs been considered in the remediation strategy and implementation plan?	N/R – not reached that stage yet
EWP11	Does the approach to monitoring and maintenance requirements consider climate change effects and potential for ongoing adaptation?	N/R – not reached that stage yet

(26) Flooding of the river Frome is a key consideration. As indicated on the Government “Flood map for planning” (Gov.uk undated), the Site lies within Flood Zone 3. Historic data show that river level could be 0.76m above normal summer levels (Gov.uk Check for flooding, undated). Flooding would affect the conceptual site model in several ways, some of which mitigate and some accentuate risk:

- Erosion of molehills removing ACM
- Erosion of surface materials exposing waste containing ACM – vegetation unlikely to be eroded
- Percolation of flood water likely to reduce mole activity for a season before moles can return.

(27) Extremely hot, dry conditions are also likely and their effects are considered in Table 6.

Table 6 Relevant CSM considerations relating to the effects of hotter, drier summers including drought EWEs (Based on Ciria C824 Table 8.2)

CSM aspect	Considerations	Site information
Changes to source considerations	■ Change to source properties (eg solubility and volatility) and behaviour (eg mobility and degradation) attributed to alterations in ambient temperature or changing geochemical conditions ■ Deposition of contaminants from airborne particulates because of wind-blown dust or wildfires (on or offsite)	■ Increased in fibre release would be expected from drier soil however the fibre release tests (Appendix 6) involve vigorous disturbance of tumbled soil representing a reasonable worst case scenario ■ Wildfires are a possibility on the site and could result in loss of vegetative cover but would also drive away moles. Recovery from any wildfire damage involving ground disturbance would need to be considered under CAR 2012
Changes to human health receptor or pathway considerations	■ Increased outdoor exposure time for site users ■ Increased possibility of dust generation leading to greater inhalation and/or deposition on or offsite in wind-blown dust ■ Greater prevalence of dust inhalation pathways ■ Greater potential for wildfires, resulting in deposition and/or inhalation of airborne particulates	■ A reasonably high frequency and duration has been assumed for site visitors. Extreme heat is as likely to keep people away as it is to increase time on site ■ The fibre release tests simulate extreme dust and hence fibre release ■ The risk assessment assumes molehill materials are dry to enable fibre release ■ There is a greater potential for wildfires (See above)

(28) Overall, climate change, including extreme weather events (EWE) is a moderate influence on the level of risk. This is not considered to affect the risk evaluation discussed above.

(29) NOT USED.

4.1 Respirable test results

(30) Respirable dust (PM10) comprises airborne dust particles small enough (less than 10 microns [micrometres]) to pass through the nose and upper respiratory tracts and penetrate deep into the alveoli of the lungs. In contrast, inhalable dust comprises larger particles (generally up to around 100 microns) that enter the nose and mouth during breathing but do not penetrate down into the alveoli.

(31) The test method involves the following steps:

- *A known mass of between 8g and 12g [of soil] is removed and mixed with 1000ml of water.*
- *The mixture is stirred for 1 hour using a magnetic stirrer.*
- *A portion of the mixture is filtered through a 10 micron pore size filter, to collect a filtrate containing a sample of the respirable dust.*
- *The mass of respirable (PM10) dust per ml of the filtrate is calculated, and this value is used to decide how much of the filtrate is to be used for the rest of the analysis.*
- *Then, a known quantity of the filtrate is filtered through a cellulose-ester filter paper with a pore size of 0.8-1.2 microns.*
- *The filter is then placed onto a microscope slide, allowed to air dry, and then cleared and fixed using the acetone/triacetin method described in HSG 248 [HSE 2021].*
- *The filter is then evaluated using PCOM [Phase contrast optical microscopy].*
- *From the number of respirable fibres observed on the slide the number of respirable fibres per mg of dust is calculated.*

(32) The certificates of analysis with the results of the 10 respirable dust tests are presented in Appendix 5. The certificates show that they had to be reissued to correct a formatting error on the initial issue that was notified to the laboratory by LQM.

(33) Normec DETS reported “no asbestos detected” (NAD) in two of the ten samples (MH2 and MH3). The analyst reported chrysotile in visible and sometimes microscopic cement debris and in one case (MH5) also in bundles.

(34) Asbestos Quantification Analysis was carried out on the 8 samples in which asbestos had been detected. In all 8 cases gravimetric analysis encountered asbestos as ACM [asbestos containing material] reported as “cement”. Detailed gravimetric analysis only encountered asbestos, identified as chrysotile, on one sample (MH 5). No potentially respirable fibres were detected above the limit of quantification (LoQ) of 0.001 fibres/ g.

(35) Analysis of fibres in respirable dust was carried out on the same 8 samples. The number of fibres per milligram of soil was between 11492 and 58737 f/mg with a mean of 25378 f/mg.

4.2 Fibre release test results

(36) The fibre release test – described as “Asbestos Dustiness” by the Normec i2 laboratory – was carried out in accordance with i2’s in house method A007-PL. This uses a rotating dustiness drum and is adapted from BSEN15051-2:2013+A1:2016 (Workplace exposure-Measurement of the dustiness of bulk material) for asbestos contaminated soils and phase-contrast microscopy (PCM). All ten molehills were tested. Each sample was examined 3 times and dust was collected on the 3 separate filters. The results are presented in Appendix 6.

(37) Two such tests were also conducted by i2 for Sanctus (See Table 5-4 and Table 5-5 in Appendix 2). For LQM, i2 varied their method to give a lower Limit of Quantification (2.5 f/ml) than that reported for Sanctus (9 f/ml).

5 RISK ESTIMATION

(38) The estimation of the risk posed by asbestos brought to the surface by the action of moles has been considered using the SoBRA “Calculation Sheet for risk from cumulative exposure to asbestos in air”. The risk for both children playing on the site until age 20 and for groundworkers cutting the grass have been estimated and the outputs are in Appendix 7.

(39) The SoBRA calculation sheet requires several inputs about the nature of the asbestos and the behaviour of the receptors (Table 1).

Table 1 Input parameters for “Calculation Sheet for risk from cumulative exposure to asbestos in air”

Parameter	Selected options	Justification
Asbestos type	Chrysotile	Based on test results (See text)
Mesothelioma model	Linear	Based on SoBRA recommendation and reflecting work of Hodgson and Darnton
Lung cancer model	Non-Linear	Based on SoBRA recommendation
Lung cancer base risk population	All - population average	Based on SoBRA recommendation; no resolution on sex or extent to which site users smoke(d)
Receptor expected lifetime	Lifetime 90 years	Most conservative option; doubles the risk compared to 60 year lifetime option
Lung cancer age adjustment	Age adjustment based on latency	Adjusts for latency above the age of 45 consistent with findings of Hodgson and Darnton.

(40) It has been assumed that someone visits the site for four hours at a time two days per week every year from birth to 60 years of age. This does not account for the fact that for some of this time the ground will in any event be too wet to release any fibres. Even a small amount of ground moisture significantly reduces fibre release (See Ciria C733).

(41) Asbestos is assumed to be released from material brought to the surface by moles. Up to 60 molehills across the Site have been reported. The rest of the Site is either grassed over or covered in hard standing and not in a condition to release fibres. If each molehill is circular with a diameter of 0.2m, it would cover an area of ca 0.13m². The Site is some 0.3 hectares (3000 m²) (Sanctus 2025). So, the total area of 60 molehills is $(60 * 0.13)/3000 = 0.0025$ or 0.25% of the whole Site.

(42) The results of the analyses commissioned by Sanctus showed that where asbestos was detected by Sanctus, all samples contained chrysotile and in addition one sample contained amosite and crocidolite (Sample STP12 at 0.15-0.6m bgl, described as Amosite, Crocidolite and Chrysotile – Loose Fibrous Debris).

(43) The results of the analyses commissioned by LQM showed that where asbestos was detected, it was in the form of chrysotile. Therefore, the Sobra calculations have been carried out for chrysotile.

(44) Risk is calculated using the work of Hodgson & Darnton (2000). Following the advice of Sobra, a linear model has been used for mesothelioma, a nonlinear model for lung cancer, a lifetime of 90 years has been assumed. To make predictions of risk from lung cancer, the percentage excess mortality measure from lung cancer has been adjusted to absolute mortality from lung cancer for the entire population and an age adjustment has been applied.

(45) The average concentration of fibres in air has been derived from the i2 fibre release tests (Appendix 6) as 0.05 fibres/ ml. This is the average for the ten samples each tested three times. However, no fibres were recorded in five of those ten samples.

(46) Exposure for site users has been assumed for the whole life from birth to 60 years age. A user has been assumed to be exposed for 4 hours a day for 104 days per year.

(47) The above result in a combined risk of lung cancer and mesothelioma of $2\text{E-}05$ or 2 in 100,000 (Appendix 7). Correcting this for the proportion of the site affected by molehills (0.25%) results in a corrected combined lung cancer and mesothelioma risk of $1.1\text{E-}08$.

(48) Defra considers an excess lifetime cancer risk (ELCR) of $1\text{E-}05$ (1 in 100,000) to be a minimal level of risk (HM Government undated). Defra's methodology for Category 4 Screening Levels (C4SLs)—which Defra considers to be strongly precautionary but more pragmatic and realistic than the "minimal" risk framework—utilizes a slightly higher risk estimate of 1 in 50,000 (2 in 100,000) or $2\text{E-}5$ as the basis for the low level of toxicological concern. A ELCR in excess of $1\text{E-}04$ (1 in 10,000) would be considered to be unacceptable.

(49) Since there is strong epidemiological evidence to link exposure to asbestos with mesothelioma and lung cancer, asbestos land contamination posing a significant possibility of significant harm (SPOSH) can be considered in terms of Category 1 rather than Category 2. The boundaries between Category 4, 3 and 1 or 2 would therefore be set at:

- Category 4-3 (upper threshold of safe): $<1\text{E-}05$ (previously this would be $1\text{E-}06$)
- Category 3-1 (lower threshold of SPOSH): $>1\text{E-}4$

6 GROUND WORKERS

(50) The above risk estimates are based on the release of asbestos fibres from molehill materials. However, the process of grass cutting is anticipated to result not only in such fibres becoming airborne but additional fibres potentially being released by shattering any fragments of asbestos containing materials by the rotating blades of the mower.

(51) Ground workers could therefore be exposed to higher levels of airborne fibres for the short period of time any additional fibres are airborne and within the zone of air being inhaled. As the mowing moves away from a molehill the concentration of asbestos fibres will diminish rapidly. While this is not expected to result in a level of risk that would reflect a significant possibility of significant harm, the risk is estimated to fall within Category 3. This is based on airborne fibre levels 100 times greater than those reported by i2 and used in the above risk estimation; mowing lasts two hours and takes place every fortnight for 26 weeks a year and a ground worker who is employed for their entire working life from age 20 to age 60.

(52) The SoBRA risk estimation (Appendix 7) shows a combined risk for lung cancer and mesothelioma of $4.9\text{E-}05$. Correcting this for the proportion of the site affected by molehills (0.25%) results in a corrected combined lung cancer and mesothelioma risk of $2.64\text{E-}08$.

(53) If however, the activities of the ground workers constitute work with asbestos” they would come within the provisions of the Control of Asbestos Regulations (CAR) (2012).

(54) A tool to assess which category of work with asbestos specific activities involving disturbing asbestos in the ground has been created by the Joint Industry Working Group on asbestos (JIWG). An indicative consideration of the mowing activities as currently undertaken has been carried out to support the risk assessment process required by CAR 2012 be carried out by the employer – in this case Chalford Parish Council.

(55) The inputs for hazard (Table 2) and exposure (Table 3) result in an assessment that the current way of grass cutting constitutes non licenced work with asbestos (Table 4). The outcome of this (Appendix 8) shows that the mowing operations would constitute non licenced work (NLW) with asbestos. However this is based on the presumption that as the cutting blades pass over or cut through recent uncompacted molehills, ACM will be caught up in the blades and heavily degraded. As such some of the inputs are based on what the process of grass cutting would do to ACM in molehill material.

Table 2 JIWG CARSoil Stage 1 Hazard factors

Stage 1 Hazard Factors		Score
Select ACM type (run model for each type to generate 'Worst Case' output)	Loose fibrous asbestos debris	3
Extent of degradation of ACMs at outset of work	Disaggregated (dominated by loose fibrous material; extreme degradation in ACM and/or free asbestos fibres/fibre bundles)	4
Friability and degree of bonding by matrix (ACM matrix, not ground materials)	Friable ACM or ACM with fibres not linked in any matrix (free dispersed fibres/fibre bundles)	4
Distribution of Visible Asbestos Across Affected Area	Sporadic/random occurrences of visible contamination by ACMs	2
Amount of asbestos fibre in selected ACM/fibre type as % of host material	Low quantities - >0.01 to <0.05 %wt/wt	2
Sub-total		15
Note: the asbestos licensing regime is unaffected by the type of asbestos fibre present in ACMs		
Hazard ranking		Medium

Table 3 JIWG CARSoil Stage 3 Exposure factors

Stage 2 Exposure Factors		Score
Anticipated airborne fibre concentration - Control Limit or SAL?	<0.1 fibres/ml (4 Hr TWA) or <0.6 fibres/ml (10 minute STEL)	2
Anticipated duration of exposure to asbestos	< 1 hour for any one person in any week (e.g. Short Duration Work)	1
Activity type and effect on deterioration of ACMs during work	Not low intensity, significant deterioration expected	4
Best description of primary host material matrix (soil/made ground)	Coarse to Fine Sand	2
Respirable fibre index for ACM - RIVM report 711701034 (2003)	High	4
Sub-total		13
Exposure ranking		Medium
Combined hazard and exposure ranking		28 Medium

Table 4 JIWG CARSoil Stage 3 Risk assessment outputs

Stage 3 Risk Assessment Outputs	
Probable Licensing Status	Non-Licensed Work
RPE*	EN140 with P3 filter half mask
Dust Suppression**	Manual/localised dust suppression
Hygiene/Decontamination***	Localised and basic personal decontamination facilities
*Where RPE has to be worn continuously for long periods (e.g. more than 1-hour), then powered RPE may be necessary.	
**Reduction in control measures possible if natural mitigation factors are present (e.g. raining, wet ground)	
***Guide only; suitability of selected personal hygiene measures may be reviewed on a site/contamination-specific basis	

6.1 Application of CAR 2012

(56) The Health and Safety Executive (HSE) Approved Code of Practice (ACOP) (HSE 2013) states that

“‘Work with asbestos’ includes:

- work which removes, repairs or disturbs asbestos;
- work which is ancillary to such work (ancillary work);
- supervising the work referred to in the two bullet points above (supervisory work).”

(57) The normal grass cutting activity is considered to potentially disturb those, fresh or recent, molehills that are not flush with the surrounding ground. Since some of those molehills tested during the current investigation contain asbestos, this activity seems to fall under CAR 2012.

(58) CAR 2012 section 3 deals with when work with asbestos does not require notification¹:

3.—(1) These [Control of Asbestos] Regulations apply to a self-employed person as they apply to an employer and an employee and as if that self-employed person were both an employer and an employee.

(2) Regulations 9 (notification of work with asbestos), 18(1)(a) (designated areas) and 22 (health records and medical surveillance) **do not apply where—**

(a) the exposure to asbestos of employees is **sporadic and of low intensity**; and

(b) it is clear from the risk assessment that the exposure to asbestos of any employee will **not exceed the control limit**; and

(c) the work involves—

(i) **short, non-continuous maintenance activities in which only non-friable materials are handled, or**

(ii) **removal without deterioration of non-degraded materials in which the asbestos fibres are firmly linked in a matrix, or**

(iii) encapsulation or sealing of asbestos-containing materials which are in good condition, or

(iv) air monitoring and control, and the collection and analysis of samples to ascertain whether a specific material contains asbestos.

(59) Exposure to asbestos of employees is “sporadic and of low intensity” if the concentration of asbestos in the air does not exceed 0.6 fibres/cm³ measured over 10 minutes². HSE recently reviewed the control limit³. HSE followed its published workplace exposure level setting process and concluded that the Great Britain (GB) asbestos control limit (CL), will remain at 0.1 fibres per millilitre (f/ml), measured as a 4-hour time-weighted average (TWA).

(60) The current way grass cutting is undertaken meets the criteria that exposure to asbestos, if any occurs, is “sporadic and low intensity” and would not exceed the control limit. The fibre release testing shows fibre concentrations far below the control limit. This assessment is backed up by the analysis carried out using the JIWG CARSOIL tool (APPENDIX 8 JIWG risk assessment outputs).

(61) If the grass cutting activities could be carried out in a way that demonstrably does not disturb the molehills then the work could be considered not to be work with asbestos. This may be able to be achieved by using a mower with a front roller that would compact molehills before being passed over by the rotating blade that is envisaged is currently disturbing the molehills and potentially disturbing and degrading asbestos. If this course of action is to be considered then the effectiveness of the front roller in compressing molehills to prevent fibre release would need to be established. This could be done by carrying out air sampling with a very low detection limit (necessitating longer than normal sampling time to ensure sufficient air volume is passed through the filters on which any fibres would be captured).

¹ <https://www.legislation.gov.uk/uksi/2012/632/regulation/3>

² <https://www.hse.gov.uk/asbestos/licensing/non-licensed-work.htm>

³ <https://press.hse.gov.uk/2026/05/18/asbestos-control-limit-review-published/>

7 FUTURE WORKS DISTURBING THE GROUND

(62) Any future work involving disturbing the ground would need to be planned and carried out in the knowledge that there is asbestos containing material beneath the surface. This would be “work with asbestos” and come under the Control of Asbestos Regulations 2012.

(63) The anticipated upgrade to the play equipment is an example of such work.

8 EFFECTS OF CLIMATE CHANGE

(64) The Chalford Parish Council emergency plan considers river flooding in Chalford to be a very high risk (Chalford Parish Council, 2022). The environmental watchpoints identified in Ciria 824 have been considered (Table 5).

Table 5 Summary of environmental watchpoints (EWPs) (From Ciria C824 Table 8.1)

Number	Details	Site information
EWP1	Are there any specific climate change-related objectives or data collection requirements for assessment?	Yes – CC is a factor to consider in the risk assessment
EWP2	Does initial climate risk screening identify any site-specific risk factors?	Yes – 3. the river Frome flows adjacent to the flat lying site 4. extreme hot dry periods
WP3	How will projected climate change effects alter the initial CSM and/or the nature of the potential linkages identified?	4. Potential for flooding of the river Frome 5. Moles driven away during EWE – deeper in hot weather and off site if flooded 6. Potential for more windblown erosion from recent uncompacted molehills during periods of excessive wind
WP4	Have potential climate change and EWE effects been considered within uncertainties and limitations of the assessment?	Yes The assessment has been conservative and not allowed for the fact that hot periods tend to result in increased soil temperatures that may prompt moles to dig deeper in search of cooler, moister conditions (REDI, 2025) resulting in fewer fresh molehills. In addition during periods of hot dry weather grass tends to need cutting less often but this has not been allowed for in the risk assessment.
WP5	Do the GACs selected at GQRA include for potential climate change and extreme weather impacts?	N/A
EWP6	Have sufficient data been collected to account for climate change impacts?	Yes Qualitatively the effects of flooding and extremely hot, dry weather would reduce the release of fibres from fresh uncompacted molehills and grass cutting may be less frequent but the risk assessment has, conservatively, not taken these mitigating factors into account.
EWP7	Have projected climate change and EWE effects and associated uncertainties been considered in the DQRA model selection and parameterisation?	No – the assumptions are conservative
EWP8	Are there any specific climate change-related objectives to be considered at options appraisal stage to inform the selection of sustainable remediation requirements?	Yes – OA has focused on pathway interruption (raising the Site levels) and rolling the site to reduce molehill height and trigger collapse of shallow mole tunnels
EWP9	Have potential long-term effects of climate change and EWEs on the remediation been considered, including its long-term durability and effectiveness?	Yes
EWP10	Has the risk of EWEs been considered in the remediation strategy and implementation plan?	N/R – not reached that stage yet
EWP11	Does the approach to monitoring and maintenance requirements consider climate change effects and potential for ongoing adaptation?	N/R – not reached that stage yet

(65) Flooding of the river Frome is a key consideration. As indicated on the Government “Flood map for planning” (Gov.uk undated), the Site lies within Flood Zone 3. Historic data show that river level could be 0.76m above normal summer levels (Gov.uk Check for flooding, undated). Flooding would affect the conceptual site model in several ways, some of which mitigate and some accentuate risk:

- Erosion of molehills removing ACM
- Erosion of surface materials exposing waste containing ACM – vegetation unlikely to be eroded
- Percolation of flood water likely to reduce mole activity for a season before moles can return.

(66) Extremely hot, dry conditions are also likely (Table 6).

Table 6 Relevant CSM considerations relating to the effects of hotter, drier summers including drought EWEs (Based on Ciria C824 Table 8.2)

CSM aspect	Considerations	Site information
Changes to source considerations	■ Change to source properties (eg solubility and volatility) and behaviour (eg mobility and degradation) attributed to alterations in ambient temperature or changing geochemical conditions ■ Deposition of contaminants from airborne particulates because of wind-blown dust or wildfires (on or offsite)	■ Increased in fibre release would be expected from drier soil however the fibre release tests (Appendix 6) involve vigorous disturbance of tumbled soil representing a reasonable worst case scenario ■ Wildfires are a possibility on the site and could result in loss of vegetative cover but would also drive away moles. Recovery from any wildfire damage involving ground disturbance would need to be considered under CAR 2012
Changes to human health receptor or pathway considerations	■ Increased outdoor exposure time for site users ■ Increased possibility of dust generation leading to greater inhalation and/or deposition on or offsite in wind-blown dust ■ Greater prevalence of dust inhalation pathways ■ Greater potential for wildfires, resulting in deposition and/or inhalation of airborne particulates	■ A reasonably high frequency and duration has been assumed for site visitors. Extreme heat is as likely to keep people away as it is to increase time on site ■ The fibre release tests simulate extreme dust and hence fibre release ■ The risk assessment assumes molehill materials are dry to enable fibre release ■ There is a greater potential for wildfires (See above)

(67) Overall, climate change, including extreme weather events (EWE) is a moderate influence on the level of risk. This is not considered to affect the risk evaluation discussed above.

9 CONCLUSIONS

(68) Five of the ten molehill samples had measured asbestos fibre release. In all cases the fibres released were below the method limit of detection. The reported fibre counts were nevertheless used to estimate fibre concentrations in air. Fibres in the ten samples taken by LQM were reported as being chrysotile. Only one of the samples analysed for Sanctus contained any amosite or crocidolite.

(69) The area of molehill materials is a small (0.25%) proportion of the Site area.

(70) Conservative assumptions of the combined risk of mesothelioma and lung cancer from inhalation of asbestos fibres released from molehill materials fall well within Category 4. If there was no vegetation or other hard cover and the entire site released asbestos fibres akin to the release from molehill materials the risk would be at the upper end of what is considered minimal risk.

(71) Ground workers mowing grass would come under the provisions of the Control of Asbestos Regulations 2012 as they are carrying out work with asbestos.

(72) The effects of climate change have been considered and found that overall, climate change, including flooding and extreme weather events (EWE) is a moderate influence on the level of risk that is not considered to affect the risk evaluation discussed above.

10 RECOMMENDATIONS

- (73) The Control of Asbestos Regulations 2012 would apply to ground maintenance and play equipment repairs or replacement involving ground excavation or disturbance. The indicative JIWG assessment (Appendix 8) could form the basis for a specific risk assessment as required by CAR 2012.
- (74) Any work to upgrade the play equipment should be designed to prevent erosion and the creation of bare earth more likely to result in asbestos at the surface. Specifically, the area beneath swings and under the zip wire could be covered with soft material both for safety of users and to prevent scuffing creating bare earth.
- (75) The activity of moles could be hindered by discouraging their presence beneath the Site. Mole eradication is unlikely to be either a permanent or a socially acceptable solution. However, rolling the ground would have the dual effect of both flattening the molehills and also densifying shallow materials and collapsing any shallow mole tunnels. Such compaction may already be routine for the football pitch. Nevertheless, it should be considered for the whole Site.
- (76) Using a mower with a front roller would flatten molehills before they were passed over by the cutting blades thereby potentially not disturbing and degrading any ACM in the molehills.
- (77) The effects of climate change include the possibility of the site being flooded by the river Frome. Such flooding is not considered likely to affect the risk assessment presented in this report.
- (78) The Site can be reopened once the risk assessment and plan to protect ground workers has been established.

11 REFERENCES

11.1 Site-Specific Documents

- Chalford Parish Council (2021) *Parish Emergency Plan* <https://www.chalford-glos.gov.uk/UserFiles/Files/Emergency%20Plan%20PC%202022.pdf>
- Chalford Parish Council (2026) *Minutes of a Public Meeting Held at Christ Church on Thursday 23rd April Regarding the Valley Pleasure Ground* <https://www.chalford-glos.gov.uk/UserFiles/Files/Minutes%20of%20Public%20Meeting%20April%2023%202026.pdf>
- Chalford Parish Council (undated) *Recreation Grounds: The Valley Playing Field* https://www.chalford-glos.gov.uk/Recreation_Grounds_34830.aspx
- Gov.uk (undated) *Flood Map for Planning* <https://flood-map-for-planning.service.gov.uk/map?seg=fz,fzpd&cz=390446,202585.9,19.507008>
- Gov.uk Check for flooding (undated) *River Frome (Severn) level at Chalford* <https://check-for-flooding.service.gov.uk/station/2175>
- Land Quality Management Ltd (2026) Chalford Vale Recreation Ground, Stroud 3rd Party Review - Asbestos Site (Dated 31 March 2026) (Appendix 3)
- Sanctus Limited (2025) Site Investigation Report for the Chalford Vale Recreation Ground, Stroud from Sanctus Limited (Ref S3565 – Chalford Vale Recreation Centre, Revision D dated 17 December 2025) (245 pp). (Appendix 2)

11.2 Generic documents and websites

- CIRIA (2014) C733 guidance on asbestos in soil and made ground (Nathanail et al. 2014) <https://www.ciria.org/ItemDetail?iProductCode=C733>)
- HM Government (undated) *Information Sheet 2: Generic screening criteria* https://assets.publishing.service.gov.uk/media/5d9de705ed915d399eb2163f/Information_Sheet_2.pdf
- HSE (2021) *Asbestos: The analysts' guide. HSG248*. 2nd edn. Available at: <https://www.hse.gov.uk/pubns/books/hsg248.htm> (Accessed: 31 July 2026)
- HSE (2013) *Managing and working with asbestos: Control of Asbestos Regulations 2012. Approved Code of Practice and guidance*. L143 (Second edition). Bootle: HSE Books. Available at: <https://www.hse.gov.uk/pubns/books/l143.htm> (Accessed: 31 July 2026).
- HSE (undated) website on asbestos <https://www.hse.gov.uk/asbestos/location-materials.htm>)
- REDI (2025) *How Do Weather Conditions Affect Mole Activity?* <https://redinational.com/how-do-weather-conditions-affect-mole-activity/>
- SoBRA (2021) *Guidance On Asbestos* <https://sobra.org.uk/category/asbestos/>