Land Quality Management Ltd

For: North Lincolnshire Council

Review of the Assessment of Asbestos at the Midland Road Landfill Site, Scunthorpe Under Part 2A

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Final Report

July 2013

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NON-TECHNICAL SUMMARY

In June 2013, North Lincolnshire Council (NLC) commissioned Land Quality Management Ltd (LQM) to conduct a peer review of information relating to asbestos in soils at the Public Open Space area (POS) of the former Midland Road Landfill, Scunthorpe under Part 2A of the Environmental Protection Act 1990. LQM have no direct experience of the Site and a site visit was outside the remit of this review. The comments and opinions expressed in this report are based solely on the documents provided for review.

Asbestos is a term for several different naturally-occurring mineral fibres that were historically widely used in insulation and building materials but whose use has subsequently been banned due to their potential health risks. Significant health risks are only associated with the inhalation of airborne asbestos fibres. The potential health risks from asbestos-containing soils relate to asbestos-related cancers, such as lung cancer and mesothelioma, which are invariably terminal. They are normally not diagnosed until 20-60yrs after exposure. Assessing the potential risks posed by asbestos in soils is difficult and contested as there is inadequate scientific underpinning for these assessments.

The Midland Road Landfill is an old ironstone quarry that was excavated using open cast methods between 1908 and the mid 1940s. When quarrying ended the excavation void was filled with wastes. The exact nature of the wastes is no longer known. The footprint of the former landfill is now occupied by an industrial estate and public open space (POS). A thin "capping layer" is known to have been applied across the public open space area but the source and nature of the materials used is not known. It is understood that the POS is predominantly used for dog walking.

We have reviewed documents supplied by NLC that relate to the inspection of the former Midland Road landfill, Scunthorpe under Part 2A. These documents included elements of a Preliminary Risk Assessment report prepared by NLC, which describes a desk study and site walkover survey, and a Contamination Assessment report describing a detailed inspection conducted on behalf of NLC by EPG and Geocore. The Preliminary Risk Assessment, while detailed, provides little information relevant to the assessment of asbestos at the POS. In general, the Contamination Assessment report was in line with its stated objectives, which primarily involved characterising the risks from landfill gases. However, soil samples collected during the inspection indicated the presence of asbestos. In particular, two of the ten samples of near-surface soil collected at the POS demonstrated the presence of asbestos. The Phase 2 report acknowledges these results and correctly identifies the contemporary lack of authoritative UK guidance regarding the risk assessment of asbestos in soils.

The source of this asbestos is not clear. It may be associated with localised contamination (e.g. resulting from historical flytipping etc.), it could have resulted from the use of urban made ground (which commonly contains low levels of asbestos contamination) in the capping materials, or it could represent contamination from the underlying landfill materials (which are also known to contain asbestos) entrained during the placement of the capping materials.

LQM were also asked to provide an opinion regarding the status of the POS under Part 2A in relation to the potential risks from asbestos in the capping materials and near-surface soils at the POS and, if necessary, to identify information gaps and prepare a detailed sampling strategy and assessment methodology to further characterise the potential risks.

The Contamination Assessment report only describes the concentration of asbestos fibres in 2 near-surface soil samples from the POS (the concentration of asbestos was not determined in samples where asbestos-containing materials and fibre bundles were not observed during an initial examination under a microscope). This is insufficient to allow a robust quantitative estimate of any potential exposure of site users at the POS to airborne asbestos fibres to be calculated. However, LQM have provided an opinion based on:

- the necessity for asbestos fibres from the soil to become airborne for any risk to be present;

- the apparently sporadic distribution of asbestos within the near surface soils;
- the low concentrations of asbestos in soil (only marginally above the limit of detection);
- the low likelihood of any significant soil disturbing activities that might release airborne fibres;
- the lack of any substantial areas of bare exposed soil due to the extensive grass cover;
- the nature of the local climate (soils need to be dry to release appreciable amounts of dusts and asbestos fibres); and
- the limited time site users (e.g. dog walkers) are likely to be present at the Site to inhale any airborne fibres.

Our opinion also has due regard to Defra's advice regarding the implementation and interpretation of Part 2A contained within the Statutory Guidance. Based on the available evidence, LQM do not believe that the potential risks to the public would meet the definition of 'Contaminated Land' under Part 2A. Furthermore, based on the current evidence, LQM do not believe there is a reasonable possibility that additional sampling, analysis or monitoring etc. would demonstrate otherwise. Consequently, further assessment of the asbestos-related risks is not justified under Part 2A.

Although, based on the available evidence, the potential health risks to the public appear to fall outside the remit of Part 2A; NLC may wish to consider its potential responsibilities and liabilities relating to the presence of asbestos in soils at the POS under other legal contexts, including the Control of Asbestos Regulations 2012. In particular, LQM would recommend that the Council records the findings of the Site investigation in its Asbestos Register and reviews its practice, procedures and any future plans for the POS in light of these findings.

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1 INTRODUCTION

1.1 Background

(1) In June 2013, North Lincolnshire Council (NLC) commissioned Land Quality Management Ltd (LQM) to conduct a peer review of information relating to asbestos in soils at the Public Open Space area (POS) of the former Midland Road Landfill, Scunthorpe (the "Site") under Part 2A of the Environmental Protection Act 1990 (Purchase Order No. EB01748).

(2) The POS has been assumed to be that defined in Plate 1 (Page 16) of the EPG report described below.

1.2 Documents provided for review

(3) LQM have no direct experience of the Site and a site visit was outside the remit of this review.

(4) The following documents were provided in a number of emails from Liz Hamer (NLC) sent on 7th June 2013:

A. A copy of the report by North Lincolnshire Council entitled "Preliminary Risk Assessment: Midland Road Former Landfill Site, Scunthorpe, North Lincolnshire" (Final, May 2012) and associated Executive Summary and Appendices.

B. A copy of the report by Environmental Protection Group Ltd (EPG) entitled "Contamination assessment report Midland Road, Scunthorpe" version "Draft for comment 2.0" dated June 2013 (A revised version of the file compatible with earlier versions of MS Word was supplied on the 11th June 2013). The following Appendices were also supplied:

   i. EPG Final Draft Appendix of NLC information

   ii. EPG Final Draft Appendix B Trial Pit logs from Geocore Factual Report

   iii. EPG Final Draft Appendix E Chemical Analysis Soils

   iv. EPG Final Draft Appendix M Asbestos.

C. A copy of the letter entitled "Contamination Assessment Report, Midland Road Scunthorpe – Review of Draft Report" from Hugh Mallett (Buro Happold) to Sarah Mortimer (EPG) dated 17th May 2013 describing a peer review of the EPG report described above.

(5) LQM requested additional appendices from the EPG report. The following files were supplied by NLC attached to an email on the 18th June 2013:

i. Probehole exploratory hole log sheets (presumably Appendix C)

ii. Cable percussive borehole log sheets (presumably Appendix D)

iii. Rotary core borehole log sheets (presumably Appendix D)

1.3 Scope of Works

(6) The scope of the project was as follows:

Task 1. An assessment (peer review) of the documents described above to ascertain the relevance and robustness of the asbestos sampling and assessment carried out to date by EPG and the peer review comments produced by Buro Happold.

Task 2. Provision of an opinion about the asbestos contaminant linkage on the POS in relation Categories 1, 2, 3 and 4 of the current Part 2A statutory guidance (April 2012).

Task 3. Identification of information gaps in the site conceptual model associated with asbestos inhalation presented by EPG.

Task 4. (If required) Design of a detailed sampling strategy and risk assessment methodology to determine whether or not the POS meets the legal definition of "Contaminated Land" as defined under Part 2A and the current Part 2A Statutory Guidance (April 2012).

(Due to the findings of Tasks 1, 2 and 3, this task was not considered to be required and is not presented within this report)

2 TASK 1: PEER REVIEW OF THE DOCUMENTS PROVIDED BY NLC

(7) LQM have undertaken a peer review of the documents listed in Section 1.2 . Our review has centred solely on the relevance and robustness of the sampling and assessment conducted with reference to asbestos at the "public open space" (POS) area, as defined in Plate 1 (page 16) of the EPG report.

2.1 Current guidance on the assessment of risks from asbestos-containing soils

(8) There is little relevant guidance on assessing the risks from asbestos-containing soils in the UK; some guidance has been published in the US, Netherlands and Australia but its applicability to the UK is limited.

(9) LQM, in conjunction with the Institute of Occupational Medicine (IOM), are currently finalising a guidance document on this subject which is due for publication by Ciria in the near future. This research project has highlighted the lack of guidance, the uncertainties in the current science regarding potential risks from asbestos-containing soils and the unique legal context relating to asbestos exposures in the UK. These uncertainties primarily involve the ability of asbestos-containing soils to release airborne fibres and risks posed by prolonged exposures to very low concentrations of airborne asbestos. The legal complexities primarily concern potential liabilities relating to asbestos-contaminated sites under the Compensation Act 2006; under this civil legislation the burden of proof may be significantly lower than that required under land contamination legislation, such as the planning or Part 2A regimes.

(10) We have peer reviewed the documents provided by NLC, in light of the knowledge and experience obtained in writing the forthcoming Ciria guidance and other asbestos-related projects which LQM have been engaged in. However, in part due to the imminent publication of the Ciria guidance, the contaminated land industry is currently reappraising its working practices in relation to asbestos-containing soils. This includes the development of analytical methods by laboratories and the development of further guidance, such as the industry code of practice due to be prepared by the EIC-CL:AIRE Joint Industry Working Group on asbestos in soil, made ground, construction and demolition materials . LQM would recommend that any future developments in guidance and policy should be taken into account in relation to the assessment of asbestos at the Site.

2.2 Review of the report entitled "Preliminary Risk Assessment: Midland Road Former Landfill Site, Scunthorpe, North Lincolnshire" prepared by North Lincolnshire Council (Final, May 2012)

(11) The Preliminary Risk Assessment (PRA) prepared by NLC has been reviewed for details relevant to the origins of, and potential risks from, asbestos-containing soils at the POS.

(12) The site is reported to have been an opencast ironstone quarry from 1908 until the late 1940's and then used as a landfill from approximately 1952. The nature of the wastes deposited and ownership of the landfill between 1952 and 1961 are unknown. Between 1961 and 1979 the landfill site was owned and operated by Humberside County Council, which became North Lincolnshire Council in 1996.

(13) No records of the types of waste landfilled prior to 1961 were identified but the wastes may have included industrial wastes. Between 1961 and 1979, the wastes accepted reportedly included "pulverised refuse, scrap metal, construction, excavation, building waste and untreated domestic refuse". Most of these could have contained varying amounts of asbestos or asbestos-containing materials. It is reported that the landfill was "closed and restored" in 1978, but there are "no records of the depth or nature of any capping system being placed at the site". The former landfill is now the location of a NLC depot, a NLC-owned recreational field (the "POS") and commercial and industrial premises (the "industrial estate").

(14) The PRA summarises the site history and identifies potentially contaminative land uses. We assume that this is based on an assessment of the Historic mapping presented in Appendix 4.6, but it is unclear which maps are referred to and the supplied file lacks sufficient resolution to accurately locate the various features discussed. The mapping suggests that the area of the POS was allotment gardens from ~1960 but is shown as being landfilled between 1970 and 1980. A number of potential sources of asbestos are identified on, or near the Site, including mineral railway lines, possible munitions manufacture and storage, buildings of unknown use, the landfill itself, petrol storage activities, activities associated with the industrial estate (including scrap yards and garages). As far are LQM can ascertain, apart from the landfilled materials few of these sources relate directly to the POS itself. LQM also note that historic mapping (not to scale) shows a large steel works, including blast furnaces, close to the Site from 1908 until the present day; another potential source of asbestos and asbestos wastes.

(15) Following a walkover survey, the POS was described as "generally overgrown" with grass and a "wide range of tree & flower species, beech, ash, buddleia & sloe". Some dead trees were also noted. The Site was "predominantly used for dog walking" but a "playground is located on the south western boundary". Some flytipping was also noted as well as suspected "traveller fires", but the locations of these observations were not recorded.

2.2.1 LQM comments

(16) The PRA appears to be a detailed account of the historical use and development of the POS and the nearby industrial estate areas, which is also present above former landfilled areas.

(17) The PRA focuses primarily on the risks to existing residential and industrial buildings from landfill gas generation and migration, which is identified as posing "high" risks at the Site. Risks to human health relating to contaminants within the capping materials at the POS are classified as "medium" or "low" risks that do not, on their own, justify consideration under Part 2A but none the less deserve further investigation.

(18) The information presented within the PRA does not provide any significant facts pertinent to the potential asbestos risks. Indeed, the potential presence of asbestos in the capping materials is not explicitly identified but, given the lack of detailed information concerning the nature and source of the landfilled materials and the nature and source of the materials used to cap the site, this is understandable and should not detract from this generally well-scoped document.

2.3 Report entitled "Contamination Assessment Report: Midland Road, Scunthorpe" prepared by EPG (Draft for comment 2.0, June 2013)

2.3.1 Relevance and robustness of the asbestos sampling

(19) LQM have identified all information concerning the sampling and analysis of soil samples conducted by Geocore/EPG from the Certificates of Analysis (Appendix E). All analysis was conducted by ALcontrol Laboratories (Hawarden, UK). This information, together with additional details concerning the location and soil type etc., is summarised in Appendix A. This includes samples collected at all depths and at both the POS and industrial estate.

(20) EPG report that 10 samples of near-surface soils (<0.5 mbgl) were collected from the POS and subject to chemical testing, including an "Asbestos screen (with identification, if required)". In addition, made ground samples were collected at various depths at both the POS and industrial estate, primarily in order to characterise Total Organic Carbon (TOC), which is linked to gas generating potential. In order to "facilitate accredited TOC tests", 18 selected samples were also scheduled for "Asbestos screen (with identification, if required)". In total 28 samples were screened for asbestos, asbestos was found in 12 samples and was quantified in 3 samples.

(21) In addition to the above, one additional sample labelled "Skip 1"was screened for asbestos. This is assumed to have been waste materials for disposal that were tested for waste classification purposes. No asbestos was identified. This sample is recorded in Appendix A but has not been included in any subsequent assessment of the distribution on asbestos at the Site as it cannot be assigned to any specific location at the Site.

(22) Based on a telephone conversation with ALcontrol, LQM understand that the TOC test requires drying and crushing of the sample, which results in health and safety issues if samples contain, or potentially contain, asbestos. LQM also understand that, in the absence of asbestos screen results, samples are considered to potentially contain asbestos if they visually contain materials (e.g. brick fragments) that suggest an urban origin or demolition arisings etc. Consequently, six samples scheduled for TOC analysis were reported as NDP (i.e. no determination possible) because they were "unsuitable for analysis due to potential asbestos". These samples are not recorded in Appendix A as there is no definitive evidence for the presence of asbestos and they have not been included in any subsequent assessment of the distribution on asbestos at the Site.

2.3.1.1 Nature of the tests applied

(23) The analysis of asbestos differs from that of all other soil contaminants in that it is not possible to determine if asbestos is present using an automated chemical test. The identification (and quantification, if required) of asbestos in soil requires the manual identification and characterisation of fragments of potential asbestos-containing materials (ACMs), such as asbestos cement or asbestos insulation board as well as potential asbestos fibres using a microscope. Different laboratories have developed different procedures for the analysis of asbestos in soil and procedures and reporting practice are currently developing

rapidly. Many methods are based on the method described in HSG248 (HSE, 2005), which is designed for the analysis of samples of potential ACMs during building surveys.

(24) Three different tests have been applied to soil samples with respect to asbestos. ALcontrol's factsheets on these tests are provided in Appendix B. Asbestos identification tests are qualitative tests solely aimed at determining if one or more of the six types of asbestos (chrysotile, amosite, crocidolite, fibrous actinolite, fibrous anthophyllite or fibrous tremolite) are present. The test is applied to an aliquot of a homogenised and dried sample which is examined under a low power (10-40x magnification) stereo microscope. Any suspected asbestos fibres are mounted in an appropriate refractive index liquid and examined further by polarised light microscopy with a dispersion staining objective; this normally allows asbestos fibres to be definitively identified. Although no Limit of Detection (LoD) is quoted, ALcontrol suggest that this method "could have a detection limit of approximately 0.001%.

(25) Asbestos identification – bulk: According to ALcontrol, this is an "in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005)", which is designed for the assessment of individual bulk samples of suspected ACM supplied to the laboratory. This test was applied to one sample (presumably a fragment of suspected ACM) collected in TP24 at 3.0 mbgl within the industrial estate.

(26) Asbestos identification – soil: According to ALcontrol, this uses a similar in-house method to that applied to "bulk" materials but is applied to a homogenised sub-sample of soil "to determine the presence of asbestos fibres".

(27) Asbestos quantification – full: The quantification test is specifically aimed at determining the amount of asbestos present in soil samples. It is a three stage analysis of a dried 500g soil sample or homogenised sub-sample. Stage 1 involves the removal of any large pieces of ACM or large fibre bundles; Stage 2 involves the examination of a further sub-sample under low power microscopy to find and remove smaller fragments and fibre bundles etc.; Stage 3 involves suspending a small portion of the sample in water and applying an aliquot to a filter, which is examined under phase contrast microscopy (PCM or PCOM) in order to identify and count individual asbestos fibres. The limit of detection is stated to be <0.001%.

2.3.1.2 Sampling of the capping materials at the POS

(28) EPG report that the capping materials at the POS varied between 0.15 and 1.3m in thickness (mean 0.5m), and are present directly above the landfill waste deposits. The capping material was described as "brown very clayey, medium sand" with localised inclusions of plastic, wood, wire and brick, particularly towards the base of the unit. The soil was generally homogenous across the POS, apart from some variation in colour and plastic content.

(29) Samples of the near-surface soils were collected at the POS from "immediately beneath the grass cover" which was described as "extensive". Ten samples were collected and screened for the presence of asbestos; the results are presented in Table 2-1. Asbestos was identified in only two samples; the level of asbestos in these samples was subsequently quantified (see Table 2-2). Some additional samples collected beneath the capping materials were also collected and screened for asbestos; these are discussed in Section 2.3.1.3 below.

Table 2-1: asbestos identification in 10 samples of capping material or near-surface soils at the POS

Location	Depth (mbgl)	Type of asbestos	Comment	Depth to landfill deposits
TP03	0.10	Not detected		No landfill deposits reported in log
TP07	0.20	Not detected		1.3 m
TP10	0.20	Not detected		0.8m
TP12	0.30	Not detected		0.7m
TP14	0.15	Not detected		0.75m
TP15	0.20	**Amosite**	Loose fibres in soil	0.5m
TP16	0.20	**Chrysotile**	Soil containing loose fibres and ACM* debris	0.45m
TP17	0.30	Not detected		0.8m
TP19	0.20	Not detected		0.25m
TP20	0.10	Not detected		0.35m

Notes: *ACM = Asbestos Containing material, which is generally any material that contains asbestos above trace quantities

(30) The EPG investigation involved 18 trial pits, 6 probe holes and 2 boreholes (total 26 locations) within the POS. Consequently, asbestos was determined at less than 50% of the locations investigated within the POS. The trial pits were located relatively randomly and were designed primarily to facilitate "assessment of ground conditions", but were not specifically designed to characterise the distribution of asbestos at the POS. The probe holes were primarily intended to facilitate ground gas monitoring at the boundary between the POS and residential properties to the south west. The boreholes were primarily intended to monitor ground gas at depth within the bedrock beneath the wastes.

Table 2-2: quantification of the concentration of asbestos in the capping material samples collected in TP 15 and TP16 at the POS

Location	Depth (mbgl)	% Asbestos (Gravimetric)	% Asbestos (PCOM)	% Asbestos (Total)
TP15[1]	0.20	<0.001	<0.001	0.0012
TP16	0.20	0.0035	<0.001	0.0039

Notes: an analyst's comment relating to TP15 reads "Loose chrysotile fibres found during gravimetric analysis"

2.3.1.3 Sampling of deeper made ground at the POS and Industrial estate

A further 17 samples of made ground and landfill deposits were also screened for the presence of asbestos; 7 at the POS and 10 at the industrial estate (see Table 2-3). Asbestos was identified in over 50% of these samples – indicating that asbestos is relatively prevalent in these deeper materials. These samples represent depths of between 1.5 and 3.6 mbgl.

(31) Asbestos was quantified in a single sample; BH104 at 3.0 mbgl within the POS. This sample reportedly contained 0.1107% asbestos (0.1103% gravimetric, <0.001 % PCOM).

Table 2-3: asbestos identification deeper made ground and landfill deposits at the public open space (POS) and industrial estate

Location	Depth (mbgl)	Type of asbestos	Comment
POS			
TP02	2.00	Not detected	
TP07	3.40	Not detected	
TP08	1.50	Not detected	
TP19	1.50	**Chrysotile**	soil containing debris typical of asbestos cement*
TP07	2.00	**Amosite**	Soil containing loose fibres and debris typical of AIB**
TP08	3.00	**Chrysotile**	Soil containing loose fibres and material typical of asbestos cement*
BH104	3.00	**Chrysotile & Amosite**	Loose fibres in soil
Industrial estate			
BH105	2.00	Not detected	
PH-H	2.00	Not detected	
PH-L	2.50	Not detected	
PH-F	2.50	Not detected	
BH105	1.50	**Chrysotile**	Soil containing loose fibres and ACM debris
TP27	1.50	**Amosite**	Soil containing loose fibres and material typical of AIB**
TP25	2.00	**Chrysotile**	Loose fibres in soil
BH106	2.00	**Chrysotile**	Soil containing loose fibres and material typical of asbestos cement*
TP24	3.00	**Chrysotile**	Typical of asbestos cement*
TP28	3.60	**Amosite**	Loose fibres in soil

Notes: * Asbestos cement is defined as "material which is predominantly a mixture of cement and chrysotile and which when in a dry state absorbs less than 30% water by weight"(CAR, 2012) **AIB=Asbestos insulating board which is defined as "any flat sheet, tile or building board consisting of a mixture of asbestos and other materials except: (a) asbestos cement; or (b) any article of bitumen, plastic, resin or rubber which contains asbestos and the thermal and acoustic properties of that article are incidental to its main purpose" (CAR, 2012.

2.3.2 Relevance and robustness of the asbestos risk assessment for the near-surface soils at the POS

(32) The assessment of asbestos in the near surface capping soils at the POS is primarily presented in section 8.3.2 of EPG's report, which presents the results of the asbestos analysis described in Section 2.3.1.2 above.

(33) EPG acknowledge that there is currently no UK guidance of the assessment of asbestos in soils but that such guidance is in preparation, specifically referring to the forthcoming EIC-CL:AIRE JIWG Industry Code of Practice.

(34) In the absence of such guidance EPG states that "typically practitioners adopt a screening value of 0.001% which is based on guidance provided in ICRCL Guidance Note 64/85" (ICRCL, 1990). EPG state that this level is exceeded in the near-surface soils at the POS but that the derivation of this value is "unlikely to be compliant with current UK human health risk assessment models"[1]. Consequently, EPG cite the 0.02% criteria for public open space end uses recommended in Western Australia (Western Australia, 2009), which is not exceeded.

(35) The assessment concludes that "there is currently insufficient confidence in the available data to categorise asbestos risks in the near surface capping soils on the POS robustly and scientifically" as required within the Statutory Guidance (Defra, 2012).

(36) EPG recommend that further assessment is needed by a specialist asbestos risk assessor and that the levels of asbestos identified in the near-surface soils be re-evaluated in light of the publication of any such guidance.

2.3.3 LQM comments

(37) The report is thorough, logical and well presented. Our review is restricted solely to the investigation and assessment of risks from asbestos at the POS, which was only a minor part of the scope of the report, which focuses on the potential gas risks associated with the former landfill.

[1] LQM have assumed that this is intended to refer to current human health risk assessment guidance in the UK, such as CLR11, SR2 and SR3 *etc.*, and not specifically to the CLEA model. It should be noted that the Environment Agency have previously stated that the CLEA model is not compatible with the assessment of asbestos.

(38) With respect to the asbestos sampling, given that the investigation was primarily focussed on characterising the potential gas risks, the adopted sampling and analytical strategy would seem reasonable. However, it is not necessarily robust enough to fully characterise the near surface capping materials, and particularly the distribution of highly heterogeneous contaminants such as asbestos.

(39) The sampling for asbestos has been targeted at shallow samples, which would be expected to be the only viable source of exposure to this contaminant given the nature of the Site (i.e. a public open space primarily used for dog walking).

(40) In the interests of cost-effectiveness, the asbestos analysis appears to have been staged with more expensive quantitative analysis only be applied to samples identified as containing asbestos using cheaper qualitative tests. The test methods employed for both the identification and quantification appear to be appropriate and in line with current industry practice and the Limit of Detection/Quantification of both methods would appear to be appropriate at around 0.001%. However, given the number of negative "asbestos not detected" results, the amount of quantitative data produced by this approach is minimal and insufficient to support any quantitative assessment of risks.

(41) The results of the qualitative analysis (Table 2-1) do not correlate well with that from the quantitative analysis (Table 2-2). In the former, the samples from TP15 and TP16 are both reported as containing "loose fibres" and yet the quantitative water dispersion and PCOM examination reported <0.001% free fibres. Furthermore, qualitative analysis of the sample from TP15 only identified the presence of amosite (free fibres), but free fibres of chrysotile were reportedly identified during the subsequent quantitative analysis (presumably of a different sub-sample). This may suggest analytical errors or indicate a very heterogeneous distribution of asbestos within the capping materials. It is not clear within EPG's report if this discrepancy has been confirmed and queried with ALcontrol.

(42) With respect to the asbestos risk assessment, LQM would agree that at the time the report was written there was a lack of appropriate UK guidance on the assessment of risks from asbestos in soils.

(43) While not specifically used as an assessment criteria, EPG have quoted two potential screening values. The value of 0.001% is derived from ICRCL Guidance Note 64/85 (ICRCL, 1990) and historically practitioners have commonly, but erroneously, used this value

in the assessment of asbestos-containing soils. This value is derived from the work of Addison et al. (1988); vigorous disturbance of dry sand soil containing loose asbestos fibre at this concentration can generate airborne fibre concentrations that exceeded relevant health and safety limits (i.e. 0.01 f/ml). The ICRCL guidance recommends this as a minimum limit of detection for any soils analysis but does not suggest that it is an appropriate minimal risk criterion for use in risk assessment.

(44) A value of 0.02% is also cited from guidance produced by the state of Western Australia (2009). The use of such guidance would require careful justification within a UK policy and legal context. LQM understand that these thresholds should only be applied to data derived using the site assessment process recommended for Western Australia (2009). The EPG report does not explain if the sampling and analysis methods employed are analogous to those used in Western Australia. Furthermore, LQM understand that the 1988 opinion of the Health Council of the Netherlands (RIVM, 2003), on which the Western Australian criteria are based, is in the process of being revised downwards (Health Council of the Netherlands, 2010).

(45) In LQM's opinion, in the continued absence of UK policy, any quantitative assessment of the risks posed by asbestos needs to be based on a consideration of the likely airborne asbestos fibre concentration that may be generated during likely site activities. We do not consider either of the criteria suggested by EPG as a suitable basis for assessing whether the concentration of asbestos may represent a "significant possibility of significant harm" under Part 2A. In any case, the current dataset is insufficient to allow a meaningful quantitative assessment of the potential risks posed by asbestos in soils.

(46) We provide a qualitative assessment within Section 3 of this report.

2.4 Letter entitled "Contamination Assessment Report, Midland Road Scunthorpe – Review of Draft Report" from Hugh Mallett (Buro Happold) to EPG dated 17th May 2013

(47) This 2 page letter report contains a peer review of sections of the EPG's report (see Section 2.3 relating to human health risks relating to the capping soils at the POS.

(48) It concludes that it is a detailed and comprehensive report but makes five observations regarding the assessment of human health risks at the POS; two of these are relevant to the assessment of risks from asbestos and ACMs, namely:

- The limited number of data points for the shallow soils in the POS
- "the risk assessed for the ACMs in the shallow soils, the absence of conclusions that refer back to the Null Hypothesis and the recommendations for air monitoring". Detailed notes expand on this concern including:
    - The need for more detailed description of the asbestos data and the potential importance of the nature of the various ACMs
    - Quantification is stated to only be appropriate for waste classification; its relevance to human health assessment is questioned.
    - The assumption that the asbestos contamination is localised in the vicinity of TP 15 and TP16 is questioned, particularly given the small data set. It is suggested that it is more likely that ACMs are scattered sporadically within the made ground across the POS.

(49) A note relating to differing risks to "adult dog walkers" and children is assumed to relate to a previous version of the report, as the relevant text cannot be identified in the version sent to LQM for review.

2.4.1 LQM comments

(50) LQM note that Buro Happold's comments relate to an earlier version of EPG's report than that supplied to LQM. We note that EPG seem to have revised this earlier draft in light of some of the comments made by Buro Happold, as some of the text cited by Buro Happold is not present in the report reviewed by LQM.

(51) LQM would generally not disagree with the opinions stated in this review. We concur that the data set is insufficient to support a meaningful quantitative assessment and that a more detailed discussion of the type of asbestos (*i.e.* chrysotile vs. amosite), the form of the asbestos (*i.e.* free fibres vs. bound ACM), the condition of any ACM fragments and their relative depth will be important considerations in assessing any risks. LQM have considered such factors in our qualitative assessment described elsewhere.

(52) LQM would maintain that appropriate quantification of asbestos in soil is relevant to any detailed assessment of the risk but only as part of a 'lines of evidence' approach in combination with other data (possibly including air monitoring data) to support decisions.

(53) Without more detailed information regarding the source of the asbestos in the near surface capping soils, LQM consider it possible that the asbestos is localised in the vicinity of TP15 and TP 16 (e.g. if it results from a flytipping incident). However, on balance, given the known prevalence of dispersed asbestos contamination in urban made ground (including imported topsoil), it is probably more likely that asbestos is dispersed heterogeneously within the topsoil across the POS, as suggested by Buro Happold

3 QUALITATIVE ASSESSMENT OF THE RISKS POSED BY ASBESTOS IN SOIL AT THE POS

(54) The quantitative data reported by EPG is not sufficient to support a robust and scientifically valid quantitative risk assessment. In order to inform LQM's Part 2A interpretation, we have conducted a qualitative risk assessment based on the evidence supplied for review by NLC.

3.1 Distribution of asbestos at the POS

(55) We have investigated any spatial and depth relationships in the data. The relative locations of the near-surface samples (and samples from all depths) collected at the POS by EPG and tested for asbestos is presented in Figure 3-1. The depths of the various samples are presented in Figure 3-2. These plots clearly shows that both the near-surface samples that contained asbestos were in adjacent locations and that asbestos was detected in a higher proportion of samples taken at depth.

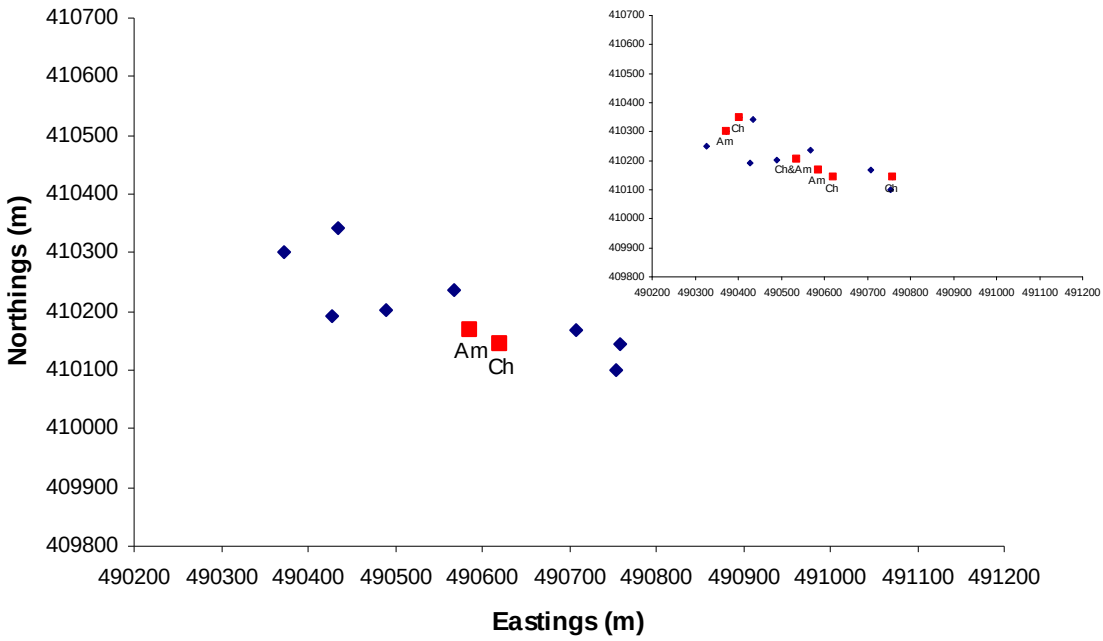

Figure 3-1: spatial distribution of samples of near-surface soils/capping materials (≤0.5 mbgl) screened for asbestos at the POS. Samples identified as containing asbestos are in red and the type of asbestos is also indicated (Ch=Chrysotile, Am=Amosite). Samples in which no asbestos was recorded are in blue. Inset: soil samples taken at all depths at the POS.

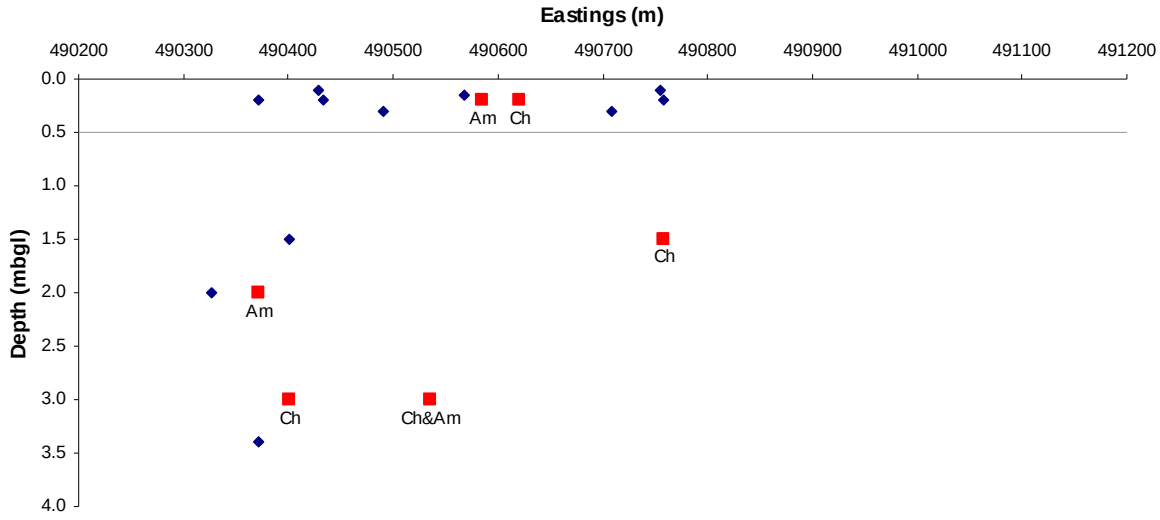

Figure 3-2: depth profile along an east-west transect of all soil samples screened for asbestos at the POS. The mean depth of near-surface soils or capping material (0.5mbgl) is indicated. Samples identified as containing asbestos are in red and the type of asbestos is also indicated (Ch=Chrysotile, Am=Amosite). Samples testing negative are in blue.

3.2 The nature of any risks

(56) There is convincing and robust evidence from epidemiological studies of workers historically exposed to airborne asbestos fibres demonstrating a link with subsequent asbestos-related diseases. Of particular concern are asbestos-related cancers, principally mesotheliomas but also other lung cancers, which occur after a significant latency period (normally over 20yrs) and are invariably terminal. The risk of developing such cancers is linked to the overall cumulative exposure, and in the case of mesothelioma to the age at which exposure begins. Consequently, the risks are higher for those exposed to higher concentrations, for prolonged periods or from an early age.

(57) Consequently, asbestos in soils only poses a risk if asbestos fibres are released into air. This process is poorly understood but is likely to be influenced by many factors, principally:

- The extent to which the soil is disturbed
- Concentration of asbestos fibres in the soil (taking account of any types of asbestos present, the degree to which they are bound in a matrix (e.g. asbestos cement), the condition of such materials (e.g. weathering and degradation) *etc.*
- The moisture content of the soil
- The extent to which bare soil is exposed (e.g. hard or vegetative cover is absent)

(58) Extent of soil disturbance

(59) Any risks from asbestos in soils are associated with the release and subsequent inhalation of airborne asbestos fibres. This can be facilitated by wind blown disturbance of the surface or physical disturbance of the soil. This could include mechanical disturbance during maintenance, excavation or digging activities through to more moderate disturbance of exposed surface soils by mountain bikes or mild disturbance by the feet of dog walkers.

(60) Assuming that the POS is primarily used for dog walking etc., there seems little likelihood of disturbing the deeper soils and any physical disturbance is likely to be extremely mild.

3.3 Concentration, form and types of asbestos present

(61) Asbestos is a collective term for 6 fibrous minerals. The potency of these different minerals with respect to asbestos-related cancers differs, but the exact potency of each mineral is contested. It is generally agreed that the potency of crocidolite > amosite > chrysotile.

(62) The screening of the ten near-surface soil samples identified asbestos in two samples. TP15 was identified as containing loose fibres of amosite, but upon quantification was reported as containing 0.0012% loose chrysotile fibres. We have assumed that the sample contains both amosite and chrysotile and that the discrepancy is due to heterogeneity between subsamples. TP16 was identified as containing 0.0039% “loose fibres and ACM debris” containing chrysotile. No information on the condition of the ACM debris or photographs of the materials is provided within the reviewed materials. All other samples were reported as “not detected”.

(63) Asbestos was also detected in 4 out of 7 deeper samples representing landfill waste deposits beneath the POS (asbestos was also detected in 6 out of 10 samples collected at depth below the adjacent industrial estate).

(64) Given the limited nature of the dataset, it is not possible to draw any robust conclusions other than that detectable concentrations of asbestos are present in the capping materials at some locations but asbestos is arguably more prevalent in the landfilled wastes etc. Neither can the likely source of the asbestos be ascertained as no information regarding the origins or

placement of the capping materials has been identified. It may, for example, be associated with localised contamination (e.g. resulting from historical flytipping), it could have resulted from the use of urban made ground (which commonly contains low levels of asbestos contamination) in the capping materials, or it could represent contamination from the underlying landfill materials entrained during the placement of the capping materials.

(65) Based on the available evidence, the asbestos present in the capping materials seems to be at concentrations marginally above the limit of detection but is present mainly in the form of free fibres (or degraded ACM) which could become airborne if disturbed. The asbestos seems to be predominantly the chrysotile form, although amosite is also present (crocidolite was not identified in any sample). Similar results would be expected of many sources of made ground in urban environments that contain low levels of historical demolition arisings or construction wastes. Such materials are likely to be relatively common in areas with an industrial heritage, such as Scunthorpe.

3.4 Extent of bare soil exposed

(66) Few details of the extent to which bare soils are exposed at the surface are provided within materials provided for review. Photographs included in Appendix 4.2 of the Preliminary Risk Assessment show large areas of dense grass cover and occasional, predominantly small, trees, but also indicate that well used paths (e.g. adjacent to Lilac Avenue, are worn to bare soil and there is also evidence that at least some areas of POS are mown. LQM understand that occasional maintenance (including mowing) of the POS is undertaken by NLC. Similar observations can be made from satellite imagery on Google Earth.

(67) The presence of dense grass would be expected to minimise, if not prevent, the release of any airborne asbestos fibres from the soil. Consequently, release of airborne fibres is likely to be largely from the exposed soil on any paths and tracks.

3.5 Soil moisture content

(68) The majority of the experimental evidence for the release of airborne asbestos fibres from soils comes from laboratory studies involving dry soils. However, Addison *et al.* (1988) showed that the release of airborne fibres was significantly reduced in damp soils, even 5% moisture appears to reduce airborne fibre release by around 90%.

(69) No data on soil moisture content in the capping materials is present in the materials provided for review. However, given the typical UK climate, it is highly unlikely that the surface soils will be completely dry for a significant period of the year, particularly given the extent and nature of the grass cover at the site. Consequently, any significant release of airborne fibres from the soil is likely to be restricted to a small number of days per year.

3.6 Conclusions

(70) The distribution of asbestos across the POS is sporadic and the concentration of asbestos in the capping materials is low, and likely to be similar to other sources of made ground in the area.

(71) Although loose fibres of both chrysotile and amosite were identified in the capping materials, there concentrations appear to be below the method detection limit (0.001%). Higher concentrations of chrysotile were present bound within pieces of ACM debris (see Table 2-2). Crocidolite was not identified in any of the samples tested.

(72) The moisture content of the surface soils is likely to minimise the release of airborne fibres on all but the driest of times.

(73) The extensive grass cover at the site is likely to further hinder any release of airborne fibres.

(74) Any potential exposure to airborne asbestos fibres is likely to be restricted to site users (e.g. dog walkers) disturbing soil on worn sections of paths during prolonged periods of dry weather.

(75) Such exposures are likely to be very low, and probably undetectable, and are unlikely to result in any apparent increase in risk from asbestos-related disease[2].

[2] It should be noted that there is a background exposure to airborne fibres in the UK and other developed nations due to the ubiquitous nature of ACMs, particularly in urban environments (Health Effects Institute, 1991). Asbestos fibres are also commonly encountered in lung tissue at post-mortem, even in individuals with no known exposure to asbestos (enHealth, 2005).

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4 TASK 2: PART 2A INTERPRETATION AND LEGAL CONSIDERATIONS

(76) The below discussion is intended to present LQM's interpretation of the Site's status under Part 2A with respect solely to asbestos-containing soils and to draw a number of other legal considerations to the attention of NLC. It is not in any way intended to be a legal opinion or to usurp NLC's ultimate decision under Part 2A.

4.1 Revised Part 2A Statutory Guidance

(77) In April 2012 Defra issued revised Statutory Guidance (Defra, 2012) in accordance with Section 78YA of the Environmental Protection Act 1990 (EPA 1990). This Statutory Guidance replaces the previous version issued in 2006 (Defra, 2006).

4.1.1 The definition of Contaminated Land

(78) Contaminated land is defined under Part 2A ' as any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that

a) significant harm is being caused or there is a significant possibility of such harm being caused; or

b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused'.

4.1.2 Significant harm to human health

(79) With respect to human health, "The following health effects should always be considered to constitute significant harm to human health: death; life threatening diseases (e.g. cancers); other diseases likely to have serious impacts on health; serious injury4; birth defects; and impairment of reproductive functions" (Defra, 2012 Section 4.5).

(80) In addition the local authority may consider that other health effects constitute significant harm e.g. respiratory tract effects, skin aliments etc on the basis of the seriousness of the harm in question, including the impact on health and quality of life and the scale of the harm.

(81) If the authority considers harm is occurring but it is not significant harm then it should consider whether such harm might be relevant in the consideration of the 'significant

possibility of significant harm'.

(82) There is good evidence that prolonged exposure to airborne asbestos fibres can result in *significant harm* in the form of terminal cancers.

4.1.3 Significant possibility of significant harm (SPOSH) to human health

(83) In determining whether SPOSH exists the local authority must first understand the possibility of significant harm (POSH) from the relevant contaminant linkages together with the level of uncertainty.

(84) In deciding whether the 'possibility of significant harm' being caused is significant the local authority is deciding whether the possibility of significant harm is sufficiently high that regulatory action should be taken to reduce it.

(85) Defra (2012) (Section 4.17) introduces 4 categories of land condition that the authority should use in deciding whether or not a significant possibility of such harm exists. Categories 1 and 2 encompass land that meets the definition of contaminated land and Categories 3 and 4 encompass land that does not meet the definition of contaminated land.

- **Category 1 Human Health:** would include land where the authority considers there is an unacceptably high probability, supported by robust science-based evidence that significant harm would occur if no action is taken to stop it. This would include land where the authority is aware that similar land or situations or similar degrees of exposure (via any medium) are known, or strongly suspected to have caused such harm in the UK or elsewhere. Category 1 Human Health cases would also include land where the authority considers that significant harm may already have been caused and there is an unacceptable risk that it might continue or occur again if no action is taken.
- **Category 2 Human Health:** would include land where the authority concludes, on the basis that there is a strong case for considering that the risks from the land are of sufficient concern that the land poses SPOSH having regard to the broad aims of the regime. This may include land where there is little or no direct evidence that similar land, situations or levels of exposure have caused harm before, but nonetheless the authority considers on the basis of available evidence, including expert opinion, that there is a strong case for taking action under Part 2A on a precautionary basis
- **Category 3 Human Health:** if the authority considers that the strong case above does not exist and the legal test for SPOSH has not been met then land should be placed in

Category 3. Category 3 land may include land where the risks are not low but the authority considers that regulatory action is not warranted.

- **Category 4 Human Health:** would include land where no relevant contaminant linkage has been identified; land where only normal concentrations of contaminants in soil are present; land where the contaminant levels do not exceed relevant GAC; and land where exposure to the contaminants in soil is likely to form only a small proportion of the receptor's overall exposure.

4.2 Detailed inspection

(86) As part of its strategic inspection under Part 2A of the Environmental Protection Act 1990, LQM understand that NLC have identified two potentially 'significant contaminant linkages' at the former Midland Road Landfill (the "Site");

- Potential gas/vapour risks to both on-site and off-site dwellings/residents via lateral/vertical migration/ingress; and

- Potential human health risks associated with direct contact pathways via exposure to soils within the Public Open Space (POS).

(87) A subsequent detailed inspection has been conducted on behalf of NLC by Geocore Ltd (ground investigation contractor) and Environmental Protection Group Ltd (consultant). This investigation was targeted primarily at the risks associated with gas migration at the Site, but also collected limited data characterising potential risks from contamination within the near-surface soils at the POS.

(88) EPG have provided their opinion on the status of the POS with respect to several other potential contaminant linkages within their report, but, EPG was unable to adequately assess the potential risks relating to asbestos and subsequently determine the relevant categorisation of the POS with respect to this contaminant due to insufficient confidence in the available data concerning asbestos risk.

4.3 LQM opinion relating to asbestos in near-surface soils at the POS

(89) The quantitative data provided by NLC for review is insufficient to support a quantitative assessment of the potential risks posed by the asbestos identified in the near-

surface soils at the POS. LQM have presented a qualitative assessment within Section 3. This concludes that, based on the available evidence, any exposure to airborne asbestos fibres from the soil will be restricted to those using worn areas of the path during prolonged periods of dry weather and that such exposures are likely to be very low and unlikely to result in any detectable increased risk of asbestos-related cancers.

(90) Based on this assessment, LQM **do not** believe that the current evidence suggests that the levels of asbestos present in the capping materials represent a "significant possibility of significant harm" (SPOSH). Consequently, with respect to asbestos, the POS does not meet the definitions of either Category 1: Human Health or Category 2: Human Health, as defined in the Statutory Guidance (Defra, 2012).

(91) Furthermore, the extent of the asbestos contamination identified in the near-surface soils is likely to be similar to that found in other areas of Scunthorpe and thus may represent "normal levels of contamination" as defined in Para 3.23b of the Statutory Guidance (Defra, 2012). It is also possible that exposures to asbestos related to the soils at the POS are insignificant compared to background exposures relating to environmental exposures to asbestos in ambient air and exposures in indoor air in homes, schools, offices and other buildings containing ACMs.

4.4 Need for further investigation

(92) Para 2.13 of the Statutory Guidance (Defra, 2012) states that "If at any stage the local authority considers, on the basis of information obtained from inspection activities, that there is no longer a reasonable possibility that a significant contaminant linkage exists on the land, the authority should not carry out any further inspection in relation to that linkage".

(93) Likewise Para 3.13 states that "For land to proceed to the next stage of risk assessment there should be evidence that an unacceptable risk could reasonably exist. If the authority considers there is little reason to consider that the land might pose an unacceptable risk, inspection activities should stop at that point".

(94) Furthermore, Para 5.3 "recognises that the nature of soil contamination means it is never possible to know the exact contamination status of any land with absolute certainty, and that scientific understanding of risks may evolve over time. However, such a lack of certainty should not stop the authority from deciding that land is not contaminated land. The starting

assumption of Part 2A is that land is not contaminated land unless there is reason to consider otherwise".

(95) In LQM's opinion there is no "reasonable possibility" that the levels of asbestos currently reported in the surface soils at the Site would result in a "significant possibility of significant harm" or in an "unacceptable risk". Hence, in the opinion of LQM, the asbestos in near-surface soils at the POS would not constitute a significant contaminant linkage. Consequently, no further investigation of this linkage is justified under Part 2A given the information currently available.

4.5 Documenting the presence of asbestos

(96) The Control of Asbestos Regulations 2012 (CAR 2012), applies to all not-domestic properties, LQM understand that this would apply to the POS owned by NLC. Under these regulations employers (and landowners) have a duty to record the presence of any asbestos at the premises. Traditionally this has been interpreted as restricted to within buildings and structures, but legally "premises" includes the land within the curtilage of ownership.

(97) LQM would recommend that NLC considers the most appropriate way to record the asbestos detected at the Site, in order to ensure that any exposure of employees and the public are minimised (*i.e.* comply with CAR 2012). For example, it could be added to the Council's Asbestos Register

4.6 Other potential legislation and liabilities

(98) The Compensation Act 2006 may result in civil liabilities for owners of land where asbestos is present in soils. Under this legislation any employee or members of the public (or, following their death, their family) who contract mesothelioma can claim compensation if it resulted from negligent exposure to asbestos. Claims attract "joint and several" liability; meaning that anyone causing a "material contribution" to the claimant's mesothelioma risk can be held liable for fully compensating the claimant. Although LQM are not aware of any claims with respect to asbestos-containing soils, we understand that there is no reason why landowners could not be subject to such claims in the future.

(99) There is existing case law relating to employees who have successful claimed compensation under this act. Such case law, currently suggests that even very small increases

in risk will be considered a "material contribution" to a claimants risk. In the Sienkowicz case[3], the judge in the lower court established that an increase in risk of only 0.4 in 100,000 was a "material contribution".

(100) Consequently, NLC may want to review their policies and practices with respect to the POS to ensure that they comply with CAR 2012 and manage any ongoing civil liabilities with respect to asbestos at the Site.

[3] The judgement of the UK Supreme Court in the case of Sienkiewicz v Greif (UK) Limited and Knowsley Metropolitan Borough Council v Willmore, [2011, UKSC 10] available at http://www.supremecourt.gov.uk/decided-cases/docs/UKSC_2009_0219_Judgment.pdf

5 TASKS 3 AND 4: INFORMATION GAPS AND DESIGN OF A DETAILED SAMPLING STRATEGY AND RISK ASSESSMENT METHODOLOGY

(101) LQM do not consider that the current dataset is sufficient to support a robust and defensible quantitative risk assessment of the risks posed by asbestos in the near-surface soils at the POS. However, given the low intensity of the landuse (public open space), LQM do consider that the current dataset is sufficient to support a valid qualititative assessment of the potential risks. This is presented in Section 3. LQM consider that this assessment is a sufficient basis to conclude that inhalation of asbestos from the near-surface soils does not constitute a significant contaminant linkage and that no further investigation of this linkage is justified under Part 2A at this time.

(102) However, if NLC considers that further assessment is necessary under Part 2A, or another legal context, further data will be required to inform a detailed quantitative risk assessment. Based on our involvement in preparing the forthcoming Ciria guidance, we would maintain that a more robust quantitative risk assessment would require an estimate of the likely concentration of airborne asbestos fibre that could be generated from the soils at the Site. Estimated exposures could then be calculated for likely exposure scenarios and the associated Excess Lifetime Cancer Risks calculated. Due to the large uncertainties involved in the release of airborne fibres from soils, however, a "lines of evidence" approach would be needed in order to support any decision. These could include some or all of the following:

- The collection of further samples for quantitative analysis and detailed description in order to adequately characterise the distribution of asbestos in the surface soils. This would best be obtained using a grid-based sampling approach. Large numbers of samples may be required if the distribution is highly heterogeneous.

- Analysis of representative samples using novel "fibre release potential tests" to directly measure potential airborne fibre concentrations.

- Direct monitoring of the airborne concentration of asbestos fibres at the Site. Any such monitoring should **not be** based on normal occupational techniques, such as those described in HSG248 (HSE, 2005), which can only achieve limits of detection of ~0.01 f/ml. Methods should be adopted that can achieve limits of detection relevant to evaluating long-term environmental exposures. This would

preferably involve sampling over long periods (~7 days) during dry weather and the use of highly sensitive electron microscopy techniques to quantify and identify any asbestos fibres. Under CAR 2012, all such analysis should be UKAS accredited.

- Alternatively, activity-based sampling could be employed whereby suitable qualified and competent contractors simulate likely site activities while wearing high flow occupational air monitors. Again any such monitoring should be conducted during dry conditions and all analysis should be UKAS accredited.

(103) To comply with CAR 2012, a suitable asbestos risk assessment should be prepared prior to any such works to determine if the work meets the requirements of "licencable work" or "non-licencable notifiable work" and to determine the levels of training and PPE and RPE that may be required.

(104) Other information that would reduce the uncertainty in any assessment includes:

- Regional meteorological data or soil moisture data relevant to the site (and possibly wind speed and direction data)

- Details of the amount of exposed soil at the site and the established maintenance regime

- Details of the likely "critical receptor" for asbestos at the Site based on the range of potential users. Including details of the likely exposure frequencies and exposure durations involved (e.g. how many hours does a dog walkers normally spend on the site per year and for how many years over a lifetime).

(105) It should be noted, however, that the costs of such an investigation and assessment are likely to be significant. As the risks are likely to be low, it may be difficult to justify such expenditure on a cost-benefit basis.

6 CONCLUSIONS

(106) A peer review has been conducted of the information relating to the former Midland Road landfill, Scunthorpe that was supplied by NLC. This review has solely considered the potential risks from asbestos in the capping materials and near-surface soils at the POS.

- The preliminary Risk Assessment conducted by NLC, while detailed, provides little information relevant to the assessment of asbestos at the Site.

- The investigation and characterisation of the capping materials and near-surface soils at the POS conducted by EPG and Geocore is in line with their stated objectives, which primarily involved characterising the risks from landfill gases. However, the analysis of ten samples of near-surface soils demonstrated the presence of asbestos in 2 samples but provides insufficient quantitative data to allow a robust quantitative assessment of any related risks.

- The peer review conducted by Buro Happold correctly noted the limited dataset and the need for a more detailed consideration of the type, nature and condition of the asbestos found at the Site. We also agree that the asbestos contamination is less likely to be a localised phenomenon and more likely to be sporadically and heterogeneously distributed across the POS.

(107) LQM consider that the available evidence is, however, sufficient to support a defensible qualitative risk assessment. Based on the land use, the low probability of any significant disturbance of the soil, the apparently sporadic nature of the contamination and the low concentrations of asbestos (marginally above the LoD) identified in the near-surface soils, the extensive grass coverage over almost the entire site and the limited period that the soils surface is likely to be completely dry, LQM **do not** believe that the risk would meet the definition of 'Contaminated Land' under Part 2A. Furthermore, LQM **do not** believe that further detailed inspection of this linkage is justified. Particularly, as any such investigation is likely to be expensive.

(108) However, NLC may wish to consider its treatment of the Site with respect to other legal aspects, including the Control of Asbestos Regulations 2012. In particular, LQM would recommend that the Council records the findings of the Site investigation in its Asbestos

Register and review its practice, procedures and any future plans for the POS in light of these findings.

7 LIMITATIONS

LQM obtained, reviewed and evaluated information from the client. LQM's conclusions, opinions and recommendations are based solely on this information.
The conclusions and recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted industry practices at this time and location and as such are not a guarantee that the Site is free from hazardous materials or conditions.

This report was prepared by LQM for our client. Any third party using this report does so entirely at their own risk. LQM makes no warranty or representation whatsoever, express or implied, with respect to the use by a third party of any information contained in this report or its suitability for any purpose. LQM assumes no responsibility for any costs, claims, damages or expenses (including any consequential damages) resulting from use of this report or any information contained within this report by a third party.
This report was prepared by

26 July 2013

Richard Ogden Date
Senior Environmental Scientist
For and on behalf of Land Quality Management Ltd

This report was reviewed by

26 July 2013

Paul Nathanail Date
Director
For and on behalf of Land Quality Management Ltd

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APPENDIX A:

COLLATED ASBESTOS DATA

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Asbestos related data extracted from Appendices B, C, D And E of the report "Contamination Assessment Report: Midland Road, Scunthorpe" (Draft for Comment 2.0, June 2013) prepared by EPG ltd

									Asbestos Screen/ID			Asbestos quantification		
Report Number	Eastings	Northings	Soil Type	POS or Industrial estate	Location name	Min depth (mbgl)	Max depth (mbgl)	Asbestos Test type	Asbestos Detected	Asbestos Type(s)	Comments	% asbestos (Gravimetric)	% asbestos (PCOM)	% asbestos (Total)
207068	490998.0	409974.4	Made ground	Industrial	BH105	2.00	2.1	Soil	N					
207068	490757.8	410143.5	Made ground	POS	TP19	0.20		Soil	N					
207068	490754.9	410101.5	Made ground	POS	TP20	0.10		Soil	N					
207068	490717.1	410452.6	Made ground	Industrial	TP27	0.30		Soil	N					
207192	490433.9	410342.4	Made ground	POS	TP10	0.20		Soil	N					
207475	490490.1	410202.6	Made ground	POS	TP12	0.30		Soil	N					
207491	490567.7	410236.0	Made ground	POS	TP14	0.15		Soil	N					
207491	490708.7	410169.1	Made ground	POS	TP17	0.30		Soil	N					
208303	490326.0	410251.4	Landfill deposit	POS	TP02	2.00		Soil	N					
208306	491126.5	409909.5	Made ground	Industrial	PH-H	2.00		Soil	N					
208378	491126.5	409909.5	Made ground	Industrial	PH-L	2.50		Soil	N					
208419	490372.1	410300.2	Made ground	POS	TP07	0.20		Soil	N					
208419	490372.1	410300.2	Landfill deposit	POS	TP07	3.40		Soil	N					
208419	490401.7	410350.3	Landfill deposit	POS	TP08	1.50		Soil	N					
208905	491126.5	409909.5	Made ground	Industrial	PH-F	2.50		Soil	N					
208932	490428.1	410193.7	Made ground	POS	TP03	0.10		Soil	N					
207068	490998.0	409974.4	Made ground	Industrial	BH105	1.50	1.6	Soil	Y	Chrysotile	Soil containing loose fibres and ACM debris			
207068	490757.8	410143.5	Landfill deposit	POS	TP19	1.50		Soil	Y	Chrysotile	soil containing debris typical of asbestso cement			
207068	490717.1	410452.6	Landfill deposit	Industrial	TP27	1.50		Soil	Y	Amosite	Soil containing loose fibres and material typical of AIB			
208419	490372.1	410300.2	Landfill deposit	POS	TP07	2.00		Soil	Y	Amosite	Soil containing loose fibres and debris typical of AIB			
208419	490401.7	410350.3	Landfill deposit	POS	TP08	3.00		Soil	Y	Chrysotile	Soil containing loose fibres and material typical of asbestos cement			
208837	490480.9	410386.7	Landfill deposit	Industrial	TP25	2.00		Soil	Y	Chrysotile	Loose fibres in soil			
208932	490535.6	410204.8	Landfill deposit	POS	BH104	3.00	3.1	Soil/Full	Y	Chrysotile & Amosite	Loose fibres in soil		0.1103	<0.001	0.1107
208932	490526.9	410584.6	Made ground	Industrial	BH106	2.00		Soil	Y	Chrysotile	Soil containing loose fibres and material typical of asbestos cement			
208932	490975.6	409927.8	Made ground	Industrial	TP24	3.00		Bulk	Y	Chrysotile	Typical of asbestos cement			
208932	490726.6	410577.8	Made ground	Industrial	TP28	3.60		Soil	Y	Amosite	Loose fibres in soil			
209013	490585.3	410167.1	Made ground	POS	TP15	0.20		Soil/Full	Y	Amosite	Loose fibres in soil	<0.001	<0.001		0.0012
209015	490620.5	410144.2	Made ground	POS	TP16	0.20		Soil/Full	Y	Chrysotile	Soil containing loose fibres and ACM debris		0.0035	<0.001	0.0039
209323					Skip1			Soil	N					

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APPENDIX B:

DETAILS OF THE ASBESTOS ANALYSIS METHODS PRESUMED TO HAVE BEEN USED

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Identification of Asbestos in Soils, Ballasts, Aggregates and Bulk Materials

Scope and Range

This method will be used to determine the presence of the six regulated asbestos types: Chrysotile, Amosite, Crocidolite, Fibrous Anthophyllite, Fibrous Actinolite and Fibrous Tremolite in soil samples and a variety of bulk materials. The bulk samples include, but are not limited to, cement, insulation board, insulation material, woven materials, bituminous materials and others.

As this is a qualitative, not a quantitative test, no indication of the amount of asbestos in the material will be reported except where only one or two fibres are found after careful searching of the sample, when the result will be reported as 'Trace'.

Principle

Preparation.

Soil, ballast and aggregate samples will be prepared for analysis by homogenising the sample before taking an aliquot and drying the sample. The dried sample will them be examined under low powered magnification by stereo microscope (10 – 40x magnification). Any suspect fibres will be removed and mounted in the appropriate refractive index liquid.

The bulk samples will be examined visually and under low powered magnification by stereo microscope (10x to 40x magnification) to determine fibre content. Other preparation may be necessary to release fibres from the matrix such as breaking the sample or using an acid wash to dissolve the matrix. Once the fibres have been released they will be mounted in the appropriate refractive index liquid determined by examining the fibres characteristics.

To ensure confidence in a result of 'Not detected' for all asbestos types, two dust/pinch samples are taken and mounted in a refractive index liquid and analysed using the polarised light microscope.

Analysis.

Analysis of all fibres will be carried out using a polarised light microscope with a dispersion-staining objective. By making several observations we will be able to determine which fibre type is present in the material.

Reporting.

The report will include information on which asbestos types have been detected (if any) in the sample, together with information on who analysed the sample, the date it was analysed and any pertinent comments made by the analyst.

For soil samples the comment will state whether loose fibres and/or ACM were present in the sample. If a result of 'Trace' is reported, this means that only 1-2 fibres were found after carefully searching through the sample, or if they were found during the evaluation of the two dust slides that are prepared when no fibres are found during the low powered microscope search. These slides are prepared by talking a small amount of the soil and mounting them in a refractive index before searching through them using the polarised light microscope.

Although this method is not a quantitative method, it has been suggested in some research documents that soil analysis of this nature could have a detection limit of approximately 0.001%.

Identification of Asbestos in Soils, Ballasts, Aggregates and Bulk Materials

However, to obtain an accurate figure of the asbestos content, quantitative analysis of the soil must be carried out.
For bulk samples any comments will indicate the most likely identity of the material that has been examined but as these comments are the analysts opinions, further testing of the material should be carried out to confirm the identity of the material type.

More information on the analysis of asbestos fibres can be found in HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures.
Information on ACM's and their asbestos content can be found in HSG 264; The survey guide.
Both guides can be found on the HSE website as free to download documents or available to purchase as hard copies from the HSE bookshop.

Interferences

Certain non-asbestos fibres and minerals can cause interference with the identification of asbestos. These include, but are not limited to, cobwebs, feathers, fibrous brucite (Nemalite) and fibrous wollastonite. However, with a little experience, an analyst should be able to determine the difference between these and asbestos fibres. More information can be found in HSG 248.

Asbestos Quantification in Soils.

Scope.

This method will be used to determine the amount of asbestos present in soils using gravimetric stages and a sedimentation stage followed by analysis by phase contrast microscopy (PCM or PCOM).

Principle

Asbestos quantification is a three stage process carried out on a dried soil; stage 1 & 2 are a gravimetric measurement of the asbestos content and stage 3 uses a sedimentation stage followed by examination using Phase Contrast Microscopy (PCM or PCOM)

Preparation.

For smaller sample volumes, the entire container will be dried. For larger sample volumes (>500g), the sample will be homogenised and a sub sample removed so that a weight of approximately 500g of dried soil is obtained.

Analysis

Stage 1 – Visual removal of large ACM pieces and very large fibre bundles from the dried soil and weighed.
Stage 2 – A sub sample of the soil used in stage 1 is examined by low-powered optical microscopy. Smaller ACM fragments and smaller fibres & fibre bundles are removed and weighed.
Stage 3 – A small portion of the soil from stage 2 is accurately weighed and mixed with water, briefly allowed to settle before an aliquot is removed and filtered. The filter is mounted on a slide which is then examined using PCM. The length, diameter and type of fibres are recorded and the density is calculated. Using the calculated density, the amount of fine asbestos fibres in the soil is calculated. The fibres types are determined from morphology alone and are classified as either chrysotile or amphibole asbestos.
The amount of asbestos present in the soil is then calculated from the combined results and reported as a percentage.

We offer two types of Quantification analysis; Quantification for Waste Categorisation and Full Asbestos Quantification. If the Waste categorisation analysis is requested, then the test will be stopped if, during stage 1 or 2, the calculated percentage reaches a value greater than 0.1%.
If this limit is not reached, or the full Quantification test is requested, then analysis must continue to stage 3. It is the fine fibres that are considered the greater risk to human health.

We cannot offer analysis that relies only on the gravimetric stages, unless the Waste categorisation analysis is requested *and* the result of these stages give an asbestos percentage of >0.1%.

The Limit of Quantification for the analysis is <0.001%.

Asbestos Quantification in Soils.

Should any additional asbestos fibres types be found that weren't identified during the initial asbestos analysis of the soil, then an attempt will be made to positively identify the fibres type, using our in house method based on HSG 248.

Interference;

Some non-asbestos fibres, fine glass fibres in particular, can be mistakenly identified as asbestos during the PCM evaluation. This could lead to elevated levels of asbestos being reported. Should the analyst carrying out stage 1 & 2 of the evaluation find such fibres, then a comment will be reported stating this.

Reference:

HSE Contract Research Report N° 83/1996; Development and validation of an analytical method to determine the amount of asbestos in soils and loose aggregates.
HSG 264: Asbestos; The survey Guide.

Asbestos – Accredited Analysis Options