

Welcome to Asbestos 2019

Thank you to our exhibitors





Yvonne Waterman (President) & Jasper Kusters (Advisor)
present:

The Future of Asbestos: Denaturation



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Forum

What is the EAF about?

The European Asbestos Forum is an independent Foundation.

It aims to:

- bring asbestos professionals together, from all sectors and from across all borders;
- to share and learn the state of the art knowledge on asbestos;
- and ultimately to prevent new asbestos exposures and thereby new victims.

Our motto: Sharing Makes Us Stronger!



What's the problem with asbestos?

1. There have been about 200 millions tons of asbestos produced globally; not counting the production of the last decade or so. Half has been used in Europe, the other half across the globe.
2. You can't destroy asbestos in any normal way. The word itself is old-Greek for 'unquenchable' or 'unextinguishable' (as in candle wicks).
ἀσβεστος
3. It can kill you. This, we have found out the hard way.
 - Yet, two-thirds of all countries do not have an asbestos ban.
 - The asbestos industry is *still going growing!*



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What does 200 million tons look like?

US Geological Survey

The US Geological Survey estimates that Europe used half of all the produced asbestos globally, between 1920 and 2011.

This equals a hundred millions tons of asbestos in Europe:
100.000.000.000 kg,

or trucks filled with asbestos, bumper to bumper, 2,5 times around the world.

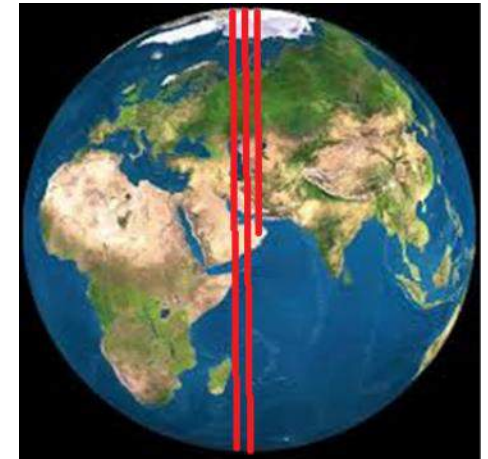
That is some major landfill!

Trucks filled with asbestos, bumper to bumper

100 million tons of asbestos



100 million tons of asbestos



+



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Imagine a landfill the size of 200 million tons...





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Another way to represent 200 million tons of asbestos





What does '200' mean in terms of victims?

Int. Journal for Env. Research and Public Health: 'The Global Asbestos Disaster (2018)'

Asbestos related diseases/year	The UK	The Netherlands
Mesothelioma	2,837	639
Lung cancer	14,056  20%	3,845  17%
Ovarian cancer	760	122
Laryngeal cancer	174	45
Asbestosis	<u>209</u> +	<u>13</u> +
Total per year	18,036	4,664
Road deaths/year in 2018	1,782 (Reported Road Casualties GB)	678 (Dutch SWOV Bureau)



The Global Asbestos Disaster (2018)






International Journal of
*Environmental Research
and Public Health*



Article

Global Asbestos Disaster

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Received: 13 April 2018; Accepted: 14 May 2018; Published: 16 May 2018



Abstract: *Introduction:* Asbestos has been used for thousands of years but only at a large industrial scale for about 100–150 years. The first identified disease was asbestosis, a type of incurable pneumoconiosis caused by asbestos dust and fibres. The latest estimate of global number of asbestosis deaths from the Global Burden of Disease estimate 2016 is 3495. Asbestos-caused cancer was identified in the late 1930's but despite today's overwhelming evidence of the strong carcinogenicity of all asbestos types, including chrysotile, it is still widely used globally. Various estimates have been made over time including those of World Health Organization and International Labour Organization:



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Is landfill the answer?

Shunting asbestos from location A to location B is not a permanent answer to any toxic material, and less so for a material that is highly indestructible.

We think that putting asbestos into a landfill is just creating a (forgotten or ignored) soil pollution and health problems for future generations.

Consider the size of a landfill that would contain all UK asbestos waste; especially as there is a growing need of clean land for an expanding population.

Bottom line: there is no immediately effective solution fit to the scale of the problem; but ultimately landfill is irresponsible.





This is where denaturation comes in!

What is denaturation of asbestos?

A process that destroys asbestos to such an extent that no fibres or mineralogically recognisable aspects remain. It is 'de-natured'.

There are four basic techniques:

1. Chemical
2. Thermal
3. Mechanical/kinetic
4. Biological



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Chemical denaturation I: Asbetter Acids



- A combination of processing discharged industrial (waste) acids and asbestos cement together, while avoiding CO² costs.
- A simple acid-base reaction: the cement reacts to the acid, thus neutralising the acid and destroying the asbestos at the same time.
- Suitable to eliminate chrysotile (white), amosite (brown) and crocidolite (blue) asbestos.
- Every fibre, every mineralogical aspect is destroyed (amorphisation), only safe dust remains.



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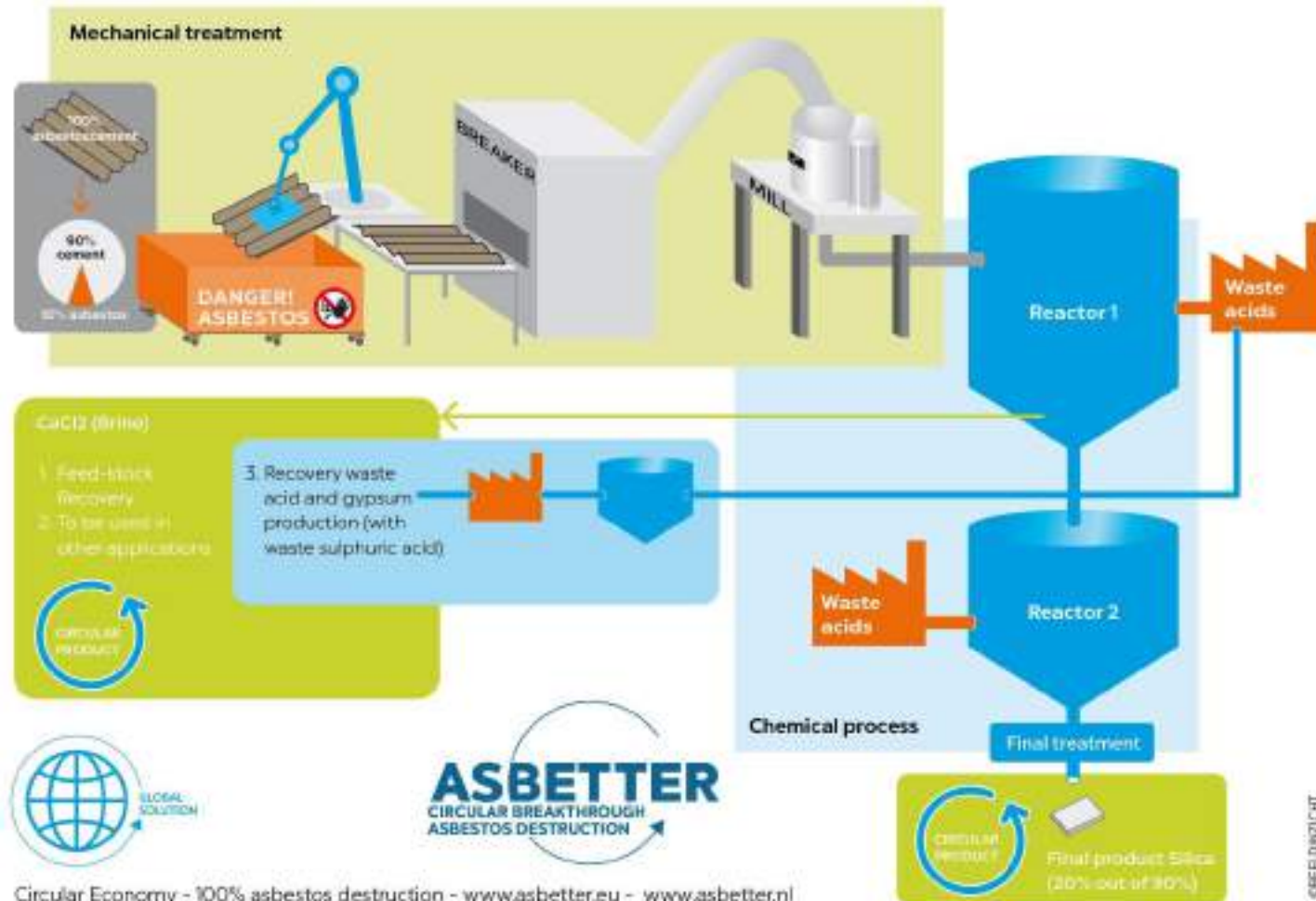
Chemical denaturation II: Asbetter Acids



- The Asbetter process aims to be as circular as possible. It produces 70-100% CO² reduction per ton of processed asbestos cement. Also, 30% re-usable resources such as silica and gypsum for the concrete and cement industry.
- Asbetter has already built a laboratory and pilot installation. Next year, a pilot XL plant will be built in Rotterdam; this will lead to a full scale factory for 40-50,000 tons of asbestos cement per year.
- The financial return time is a maximum of four years.
- Last but not least: *safety first* is always Asbetter's starting point.



Chemical denaturation III: Asbetter Acids





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Thermal denaturation I: Thermal Recycling



- Heat treatment: *state of the art kiln* in terms of burner technology, fuel efficiency and precision ability to control the temperature and the length of the heat exposure.
- Now in commissioning testing phase for achieving maximum efficiency; demonstration plant will open soon in Wolverhampton.
- At present: only cement bonded roof sheets of chrysotile asbestos, but different kinds of ACM's will be possible in time.



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Thermal denaturation II: Thermal Recycling

THERMALRECYCLING 





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Thermal denaturation II: Thermal Recycling



- Cheaper than landfill
- Permission to treat 29,500 tons a year. The demonstration plant will have a capacity of 4 - 5,000 tons.
- Use of the burned remains: initially as an aggregate. Long-term aim: full-scale plant for producing finished products such as building blocks or cement tiles.
- **Safety measures for environment and workers – of paramount importance.** Compliance of all relevant H & S Executive and Environmental Agency requirements.





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Thermal denaturation III: PMC

Purified Metal Company

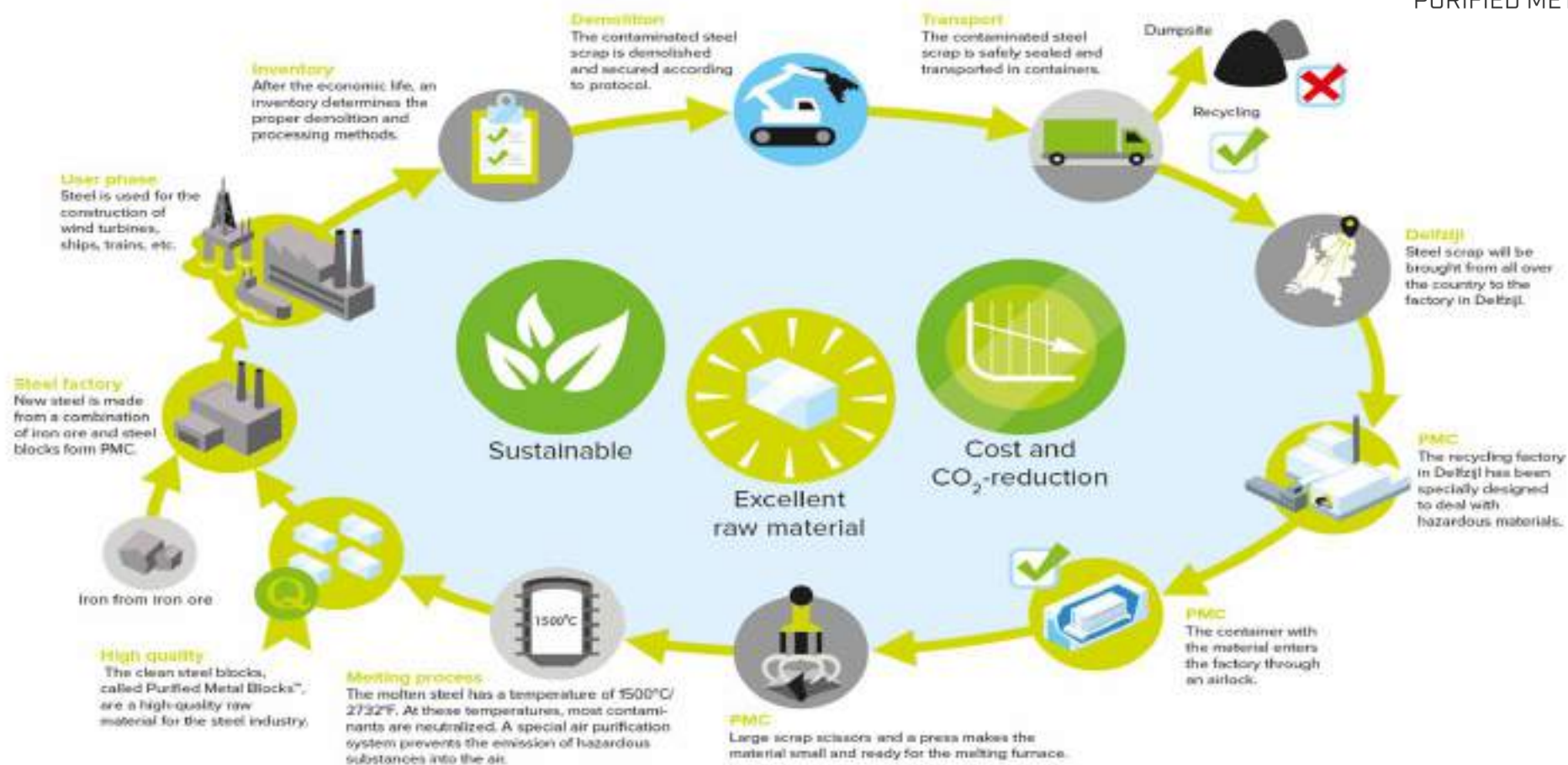
- Recycling of (asbestos) contaminated steel and metal scrap
- Patented, proven and safe processes
- Also a circular and CO² saving solution to dangerous waste
- Recycling: the end product makes a high-quality steel scrap, named **Purified Metal Blocks™** (PMB's).
- Validated business model with all permits
- Factory is being build now in Delfzijl (NL)





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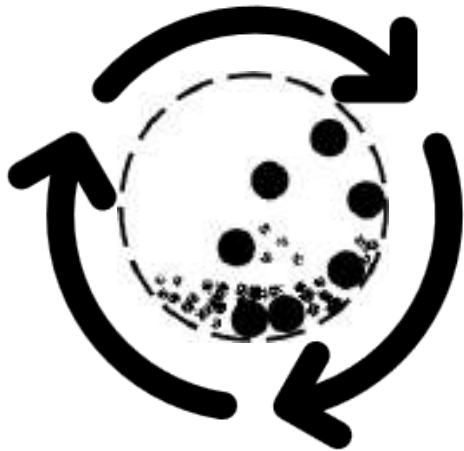
Thermal denaturation IV: PMC





Mechanical/kinetic denaturation I

Imagine a washing machine, filled with steel balls and ACW's, spinning around at high speed ('ball milling' or 'ultra grinding').



The result: release of high kinetic energy and (moderate) heat, resulting in the complete amorphisation of the fibrous/crystalline structure of the asbestos

In other words: all that is left is dust without any structure, no trace of asbestos mineral or fibre left.



Mechanical/kinetic denaturation II

Advantages

- Very fast and simple operation: capacity for huge amounts in short space of time.
- Requires relatively little energy (= cheap)
- Can be installed anywhere, perhaps even mobile?
- Remains can be used for the concrete and brick industries as a filler – circular economy

Disadvantages

- Still in laboratory phase
- Prephase: ACW's need to be cut up into small pieces

Safety precautions

- E.g. perfectly closed airflows and heavy filters
- Prephase?? Qualities of end product?





Biological denaturation

Fungi: possibly suitable for denaturation of asbestos in soil and roofs

- Science is still early days (University of Turin, TNO, Arcadis)
- No 'real life' tests as yet
- Slow and cheap ('no harm in trying'), but long-term site management is necessary
- Method: using fungi (yeast, mold, mushrooms) to feed on the iron in the asbestos
- Only suitable for loose chrysotile fibres
- Not suitable for land fill (plastic bags)





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What we should take home with us

- The EAF Foundation fervently stands behind a global asbestos ban. All the scientific evidence proves that asbestos is carcinogenic and has no safe exposure limit.
- We cannot expect to fill landfills to the tune of 200+ millions tons of asbestos.
- No passing the buck to other countries or to the next generations.
- There isn't really any alternative choice: we MUST denaturalise asbestos and start to do so soon. A commercially viable method is recommendable, but safety must always be the first concern.

DENATURATION IS THE FUTURE OF ASBESTOS

The EAF foundation thanks you for your kind
attention!



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BOHS ASBESTOS 2019 CONFERENCE



Steve Forster BSc, MSc, CEnv, FGS, MEnvSc
Director, Remedia Group Ltd/Chair, JIWG

**Asbestos in Soil and C&D Materials
Reuse of Secondary Materials
Contaminated with Asbestos
in Construction:
Avoiding Liabilities**

Crowne Plaza Hotel, Nottingham

20th November 2019

Outline

1. Overview:
 - Health vs. commercial risks/liabilities
2. Asbestos Management Consultants:
 - How to 'add value'?
 - Upstream deficiencies → downstream problems
3. What actually is 'the problem': drilling down
 - Upstream deficiencies → downstream problems

Asbestos in Recycled Aggregate ('RA')

What are the risks and liabilities?

1. Human Health

- Risk-based assessment framework
- No safe exposure level identified
- If ACM fragments in RA, these materials have already been crushed, damaging matrix, releasing fibres
- RA is coarse/abrasive, hard fragments can cause further deterioration of ACMs, increasing 'releasability', but ...



Asbestos in Recycled Aggregate ('RA')

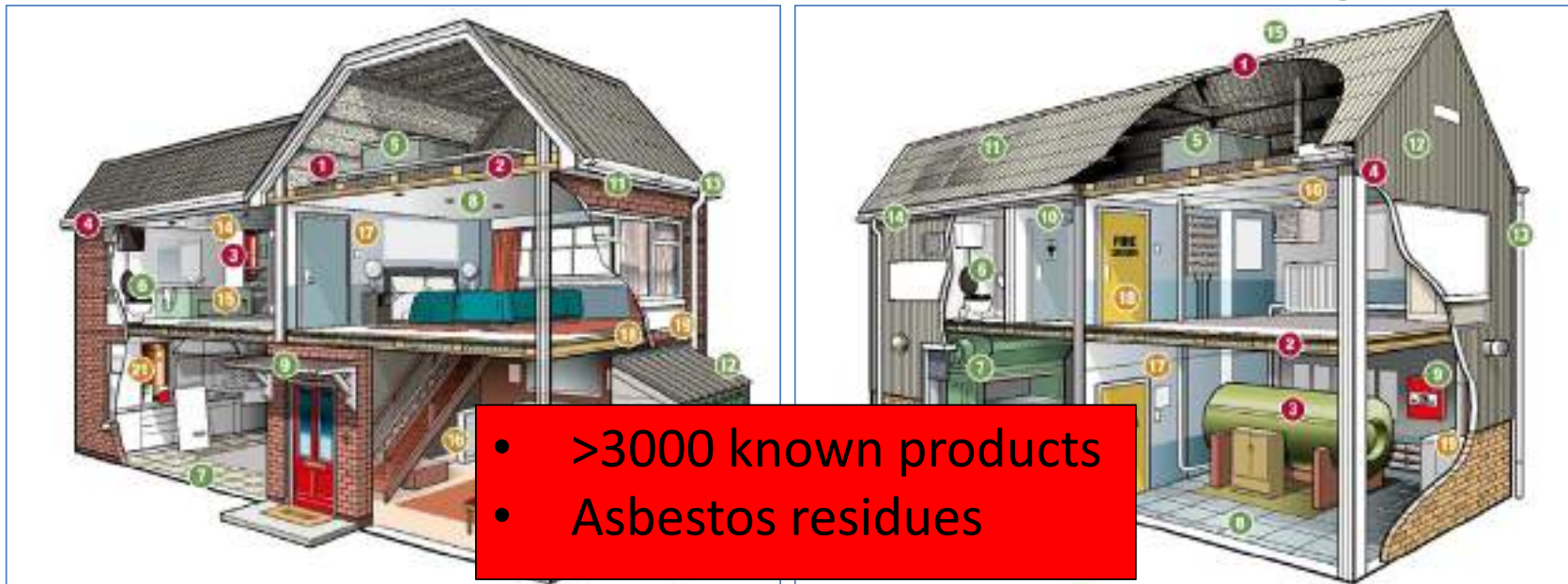
What are the risks and liabilities?

2. Commercial

- EU-wide asbestos ban prohibits use in products
- Environmental permits for production of RA prohibit hazardous substances – asbestos – in feedstock
- **No de minimis concentration** set in law
- Hazard-based assessment and strict waste regulatory framework and **significant penalties – 'waste crime'!**



Where we find asbestos in buildings



Asbestos-contaminated recycled aggregates '101' – the problem starts here!
Not all asbestos materials removed from source; feedstock becomes contaminated by asbestos/residues ... **BIG PROBLEM!**

Surveying for asbestos in buildings

Pre-demolition requirements

HSE HSG 264 Asbestos: The survey guide refers:



R&D surveys intended to locate all the asbestos in and around buildings “*as far as reasonably practicable*”.

“even with ‘complete’ access demolition surveys, all ACMs may not be identified; only becomes apparent during demolition.”

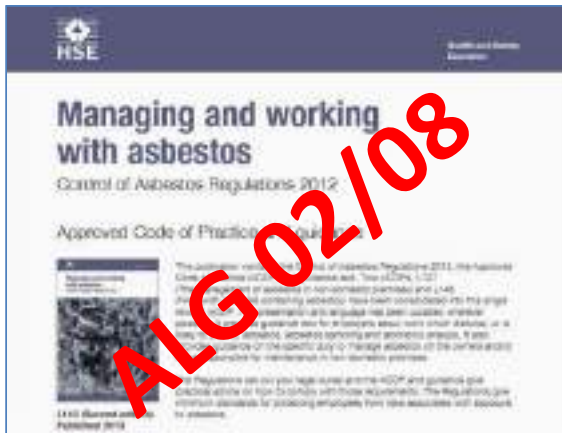
*Concrete floors may contain AIB/AC used as ... shuttering. **These may only be found by drilling core samples through the slab.***

Also, spray residues entrained in screed ...

Asbestos removal from buildings

Pre-demolition requirements

Reg. 7(3) CAR2012 and HSE ACoP L143 refer:



Buildings must be subject to [phased] pre-demolition asbestos survey(s) to identify ‘all’ ACMs, SFARP

“Plan of work must specify that all asbestos is removed before any other major work begins, where this is reasonably practicable and does not cause a greater risk to employees than if the asbestos had been left in place.”

BUT where removal **“only involves lower-risk material”** such as textured decorative coatings [Artex] containing asbestos ...”.

What it looks like on/in the ground



- Where is the asbestos?
- Have we checked?
- Can I use this material?



Asbestos in Recycled Aggregate

How does this affect the construction industry?

REACH Regulation 2006

- Prohibits the M/S/U of asbestos/ACMs and articles:
- RA is defined as an 'article' [ECHA];
- **BUT** only where asbestos has been **"intentionally added"**;
- Asbestos-contaminated RA is deemed to have had asbestos intentionally added, **"subject to evidence to the contrary being adduced in any proceedings"**
[NOTE: burden of proof reversal];
- BUT, what is **"uncontaminated"**?:
 - No visible fragments, <0.1%?
 - Free dispersed fibres <0.00(0)1%?

"No de minimis" ...

Asbestos in Recycled Aggregate

How does this affect the construction industry?

How can we demonstrate not intentionally added?

1. Ensure thorough pre-demolition survey(s) confirm location of all (within reason) ACMs;
2. Follow-up surveys/inspections during demolition may be required to identify 'hidden' or 'missed' ACMs;
3. Plan to remove all ACMs prior to/during phased demolition, **so far as reasonably practicable**;
4. Otherwise, segregate ACM-contaminated material and dispose to landfill; and
5. Maintain a good record of survey and removal work [and waste consignment/disposal] records – 'lines of evidence'
6. Test materials; Blue Book Method full quantification.

Asbestos in Recycled Aggregate

How does this affect the construction industry?

What are the implications of non-compliance?

1. RA in breach of EU-wide ban on asbestos in products;
2. Will not comply with Environment Agency Aggregates QP;
3. Produced in breach of Environmental Permitting regime;
4. Not capable of meeting end of waste test; and ...
5. HMRC investigation – illegal deposit of waste (on-site use) → landfill tax, fines(s), prosecution, enforced remediation, costs, delays, more costs, etc. ...;
6. Who is culpable?

Anyone that HMRC deems to have had an involvement ...

What Meets the End of Waste Test?

Quality Protocol for aggregates from inert waste

Rigorous production standards, validation/verification

1. QP sets out end of waste criteria for the production and use of a product from a specific waste type;
2. Compliance considered sufficient to ensure you have a 'fully recovered' product;
3. Conforms to the requirements of a European standard;
4. Produced under **Factory Production Control** as required by the European standard;
5. Inputs are limited and controlled.

CAUTION – no further processing required for intended use!



Asbestos in Recycled Aggregate

A note on inherited legacy stockpiles

May have been left on-site for some time – likely to be waste



- Sufficient quality information?
- Have I interrogated all available lines of evidence?
- More testing and assessment required for validation?
- Is the material Aggregate QP-compliant?
- Can I produce a robust verification report?
- Approval/sign-off?

CAUTION – use of such material, unverified, if contaminated, out-with U1 exemption, may constitute **‘illegal deposit’**!

Material not Meeting End of Waste Test?

Exemptions – certain uses of waste in construction

U1 waste exemption

1. “**Suitable**” waste rather than virgin material or material that has ceased to be waste (QP RA);
2. 5,000 tonnes max limit, certain waste;
3. NOT: containing hazardous substances;
4. NOT: treatment to remove asbestos;
5. NOT: disposal of unsuitable waste or by using more waste than is needed;
6. NOT: use of waste for land reclamation;
7. NOT: store waste for longer than 12 months.



MUST register exemption with the EA, in advance, if you meet the requirements!

Asbestos in Recycled Aggregate

When is “contaminated” not contaminated?

Virtually impossible to remove 100% ACMs – ‘pragmatism’

1. Offcuts of materials used as packers, jointing, hidden;
2. Overspray entrained in concrete screeds, residues embedded in crevices;
3. Residues remaining on building substrates after ‘successful’ removal/‘environmental clean’ and clearance testing;
4. Good analysts can detect very small amounts under microscope;
5. Test results show asbestos present but <0.001% wt/wt (LOQ) or ‘trace’ as per CAR-SOIL; and
6. Subject to ‘lines of evidence’ review, ‘suitable and sufficient investigation’, robust and defensible assessment, contamination may be ‘incidental’.

Asbestos in Recycled Aggregate

When is “contaminated” not contaminated?

What does <0.00(0)1% wt/wt actually look like?



- Very small, microscopic discrete fibres or small fibre bundle(s);
- Small fragments of ‘debris’;
- Generally materials will be invisible to the naked eye; and
- May be <<0.00(0)1% wt/wt – ‘Trace’

Circumstances described as ‘incidental’ contamination?

Have I adequately characterised the material?

Material (Waste) Classification

Hazardous, non-hazardous or inert?

EA WM3 Appendix D guidance on sampling wastes

Adequate waste characterisation is essential to avoid pitfalls

- AGS Waste Classification for Soils;
- Properly designed sampling strategy, sound data quality objectives, sampling procedures, UKAS-accredited Blue Book Method quantification analysis to <0.00(0)1% wt/wt;
- Diligence in classification, hazardous/non-hazardous?;
- <0.00(0)1% wt/wt 'Trace';
- Is 'Trace' 'incidental'?
- Robust/forensic assessment of all lines of evidence?

What if I have an Illegal Deposit of Waste?

Regulatory enforcement and penalties

New Landfill tax regime being strictly enforced by HMRC/EA

1. Retrospective powers ... all parties involved could be liable to severe penalties for non-compliance
2. Person disposing of the waste and anyone who knowingly facilitates the disposal ... **YOU?**
3. Landfill Tax liability = £91.35/tonne standard rate LFT \pm **up to 100% additional penalty** (England, 2019) – or **CRIMINAL PROSECUTION!**



**HM Revenue
& Customs**

What if I have an Illegal Deposit of Waste?

Regulatory enforcement and penalties

New Landfill tax regime being strictly enforced by HMRC/EA

1. HMRC/EA working in strong partnership ...
2. HMRC penalties will apply alongside any other penalties for environmental offences; breach of permits, pollution of environment ...
3. Waste removal – landfill at £91.35/tonne + remediation, muck away and additional costs
4. 3,000 tonnes = ~£500,000+ not unreasonable!



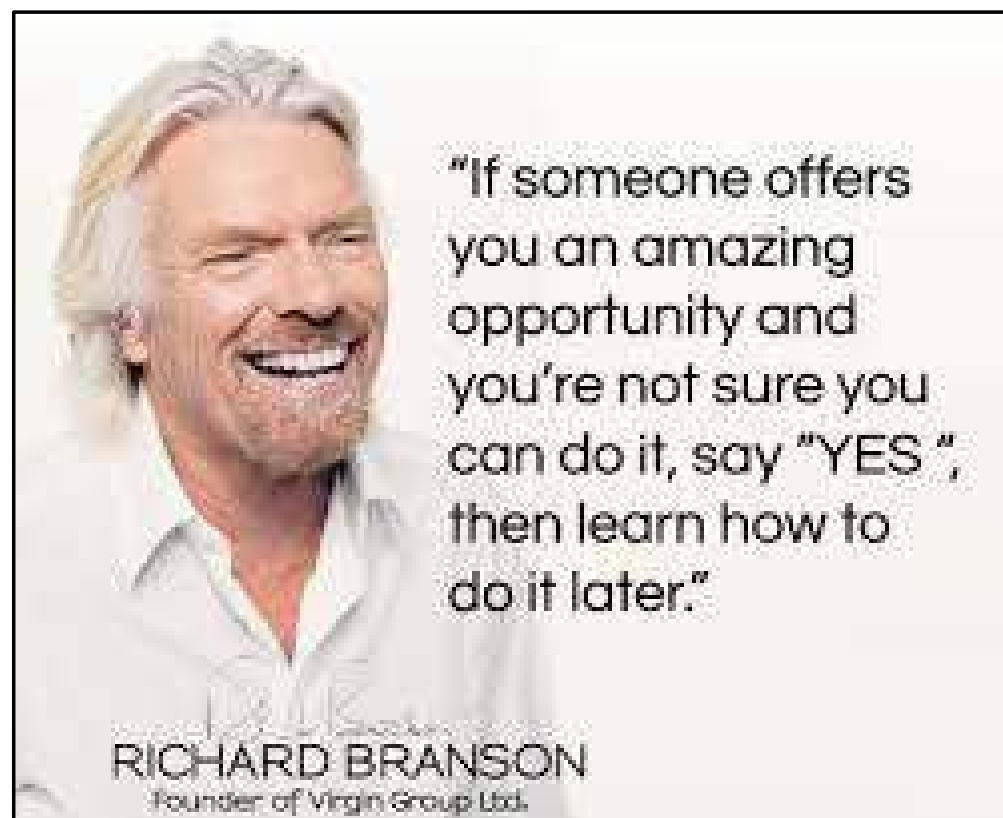
Conclusions

1. Identify and eliminate ACMs in buildings properly, prior to demolition; reduce the problem at source.
2. Be careful when advising clients likely to produce RA from the buildings that you survey, be mindful of the pitfalls.
3. Ensure adequate characterisation of material destined for beneficial reuse.
4. Waste is waste until not waste; can you prove it?

Conclusions

5. HMRC are at the top of the regulatory food chain and have powers to chase and recover landfill tax for misdescribed materials and 'illegal deposits'.
6. Penalties may apply to anyone who knowingly permits or assists; are you in or out of the loop?
7. Getting it wrong can have a massive impact on your clients development programme/budget, as well as impacting your bottom line, claims, insurances, credibility, reputation, existence ...

Thoughts ...





“A little learning is a dangerous thing”

An Essay on Criticism, Alexander Pope, Poet, (1688–1744)

“Risk comes from not knowing what you’re doing”

Warren Buffett, US Investment Entrepreneur, 1930–

Thank you for listening

... contact details

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www.claire.co.uk/asbestos

Join the discussion on  **LinkedIn**
JIWG Asbestos in Soil and Construction & Demolition Materials

Case Study - Former Docks Redevelopment, Salford Quays, Manchester

Faculty of
Asbestos
Assessment and
Management

20 Nov 19



Our Introduction



Andy Moore

Ground Risk and Remediation

Andrew.moore@wsp.com

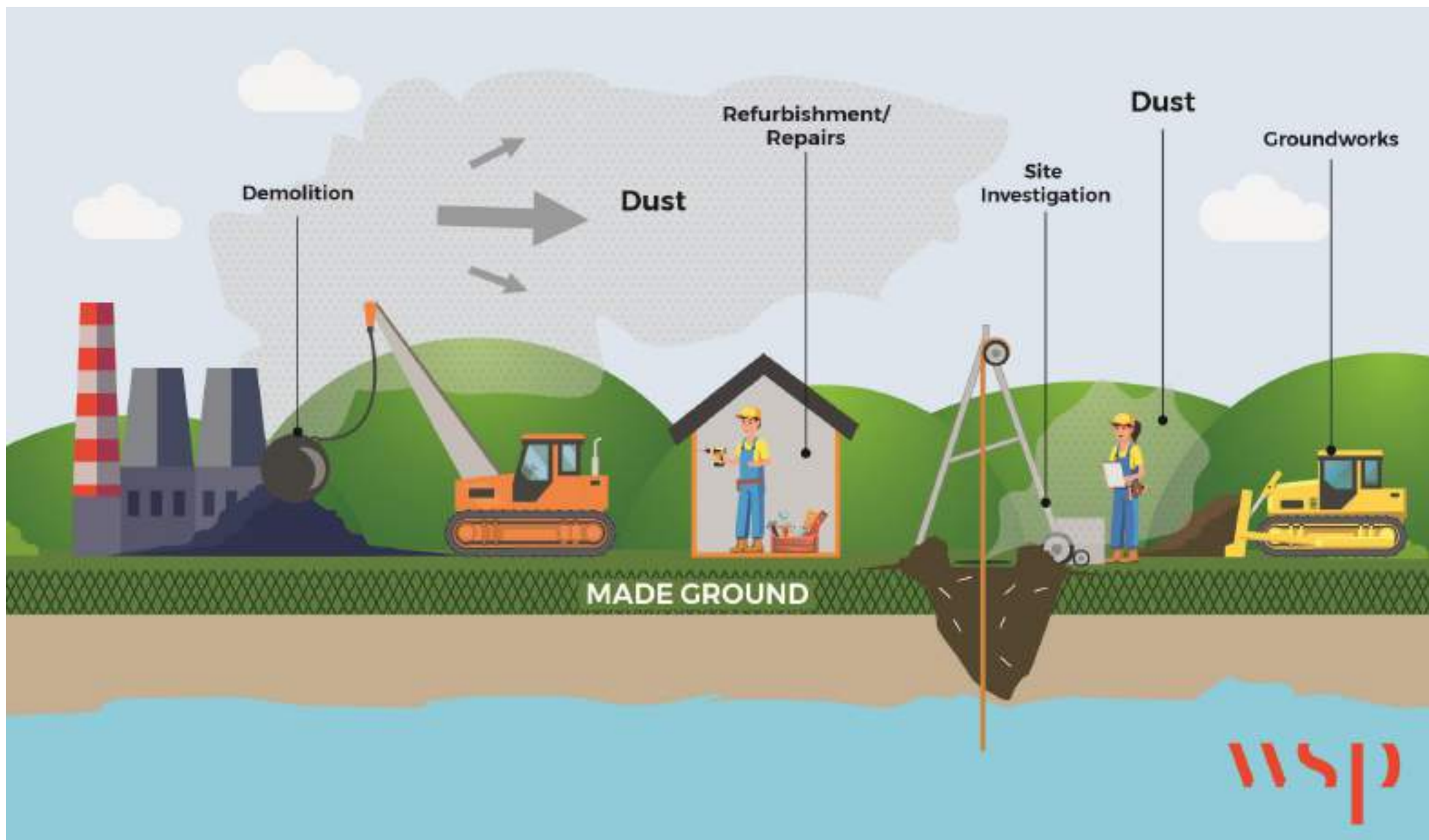


Iain MacDonald

Risk Management Services

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Pathways for Asbestos from Soil



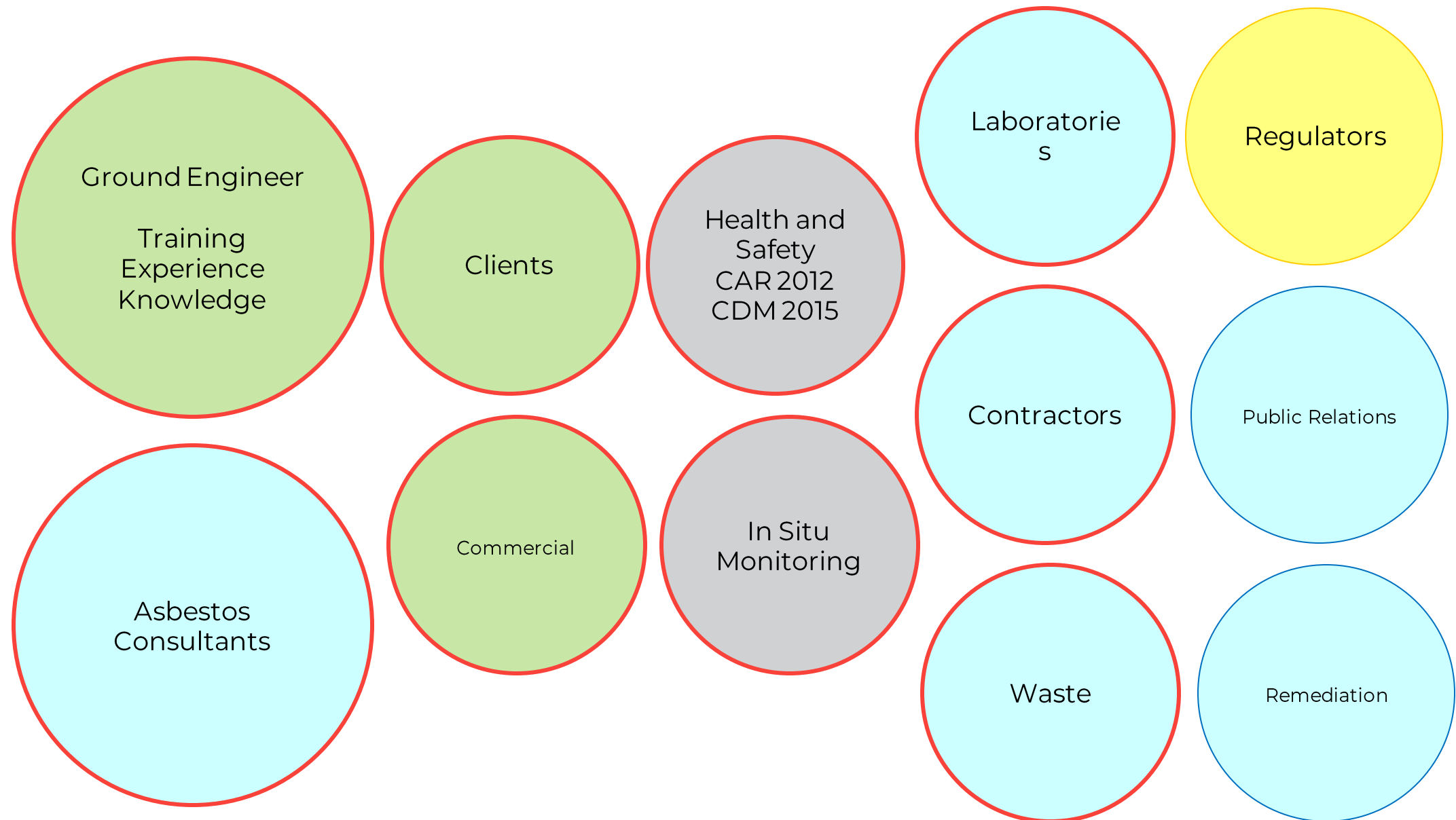
CASE HISTORY

Media City, Salford Quays

- Peripheral land to Salford Quays
- Pre WW1 race course and then rail sidings and a timber yard
- UXO risk from WW2
- Possibly raised with import of Made Ground in 1950's
- Site investigation from 2005 indicates Made Ground to approx. 5.7m bgl
- Proposed development of 4 residential towers with basement.

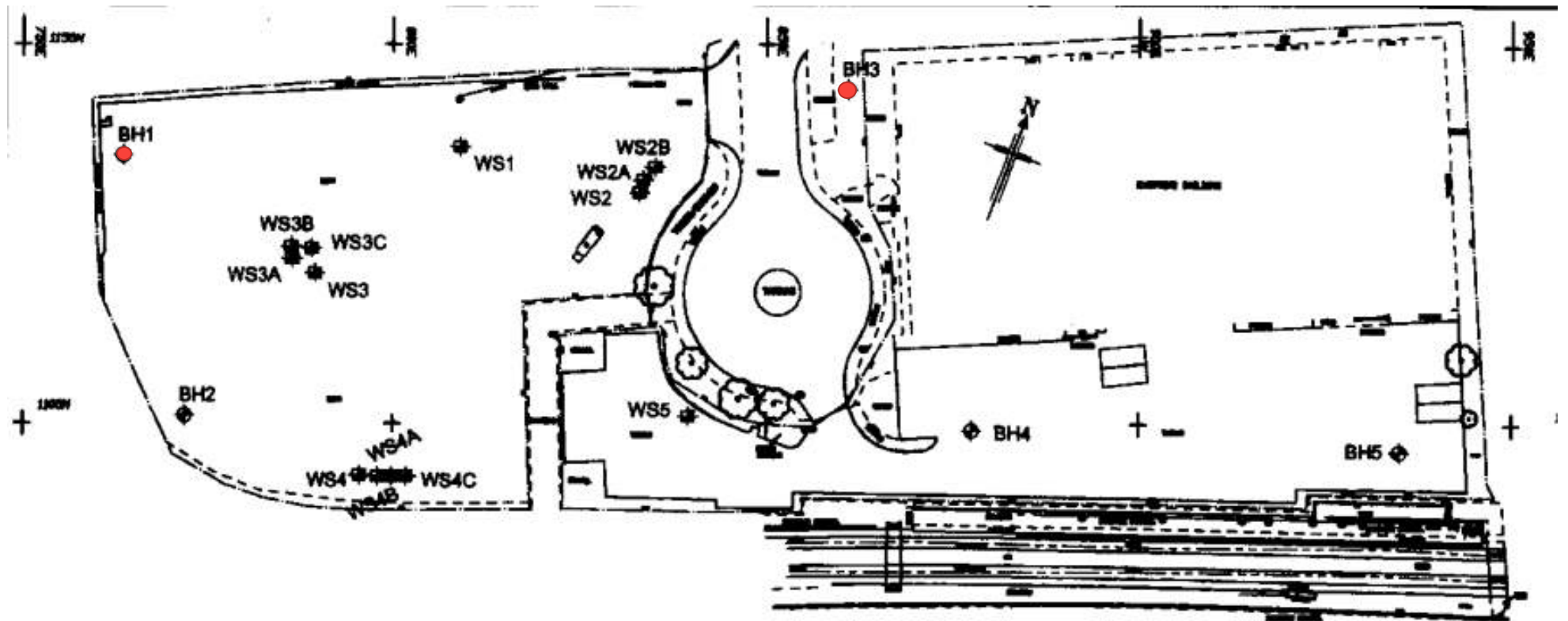


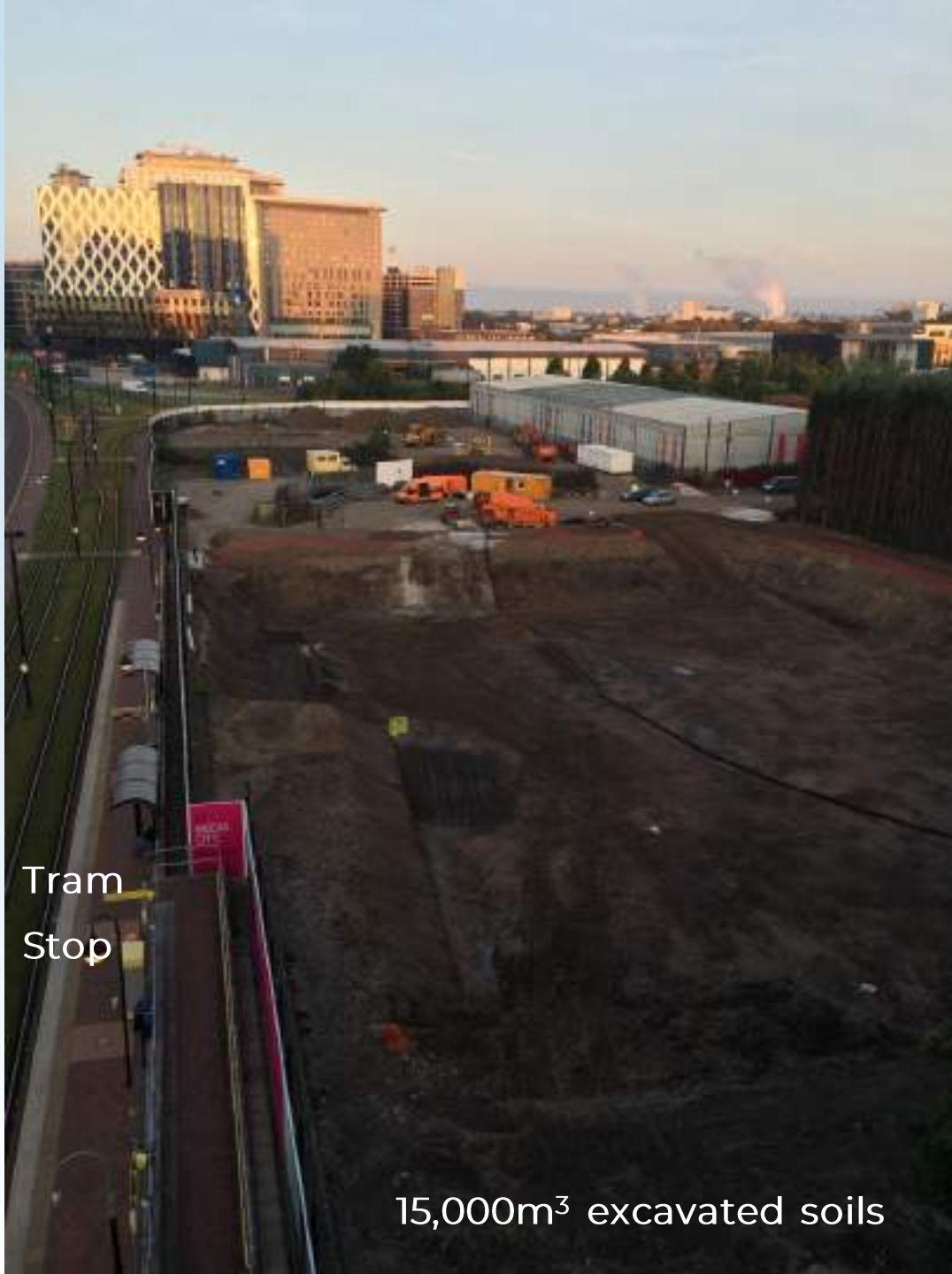
Competency – A Team Approach



Historical Site Investigation

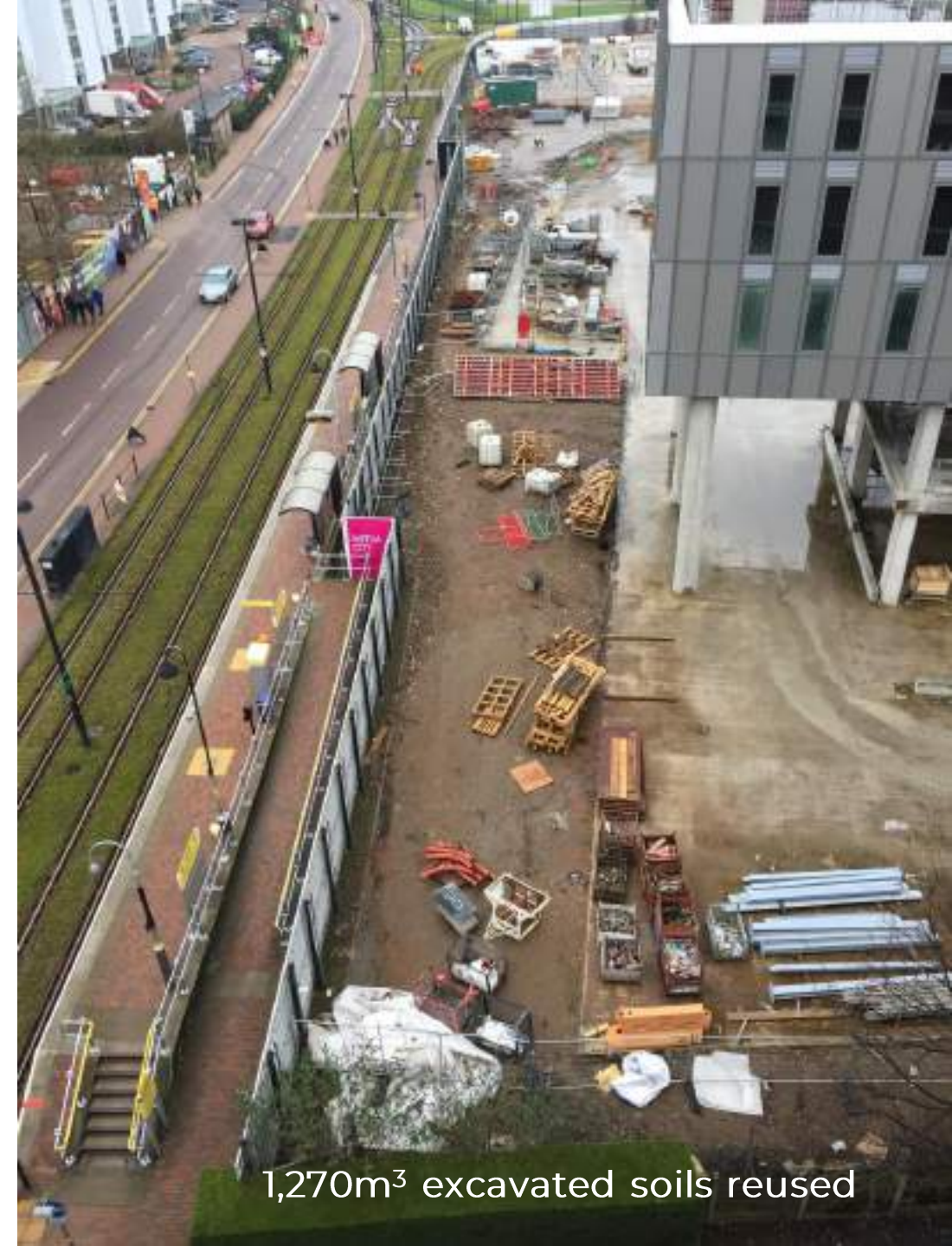
- 2005 - 2 samples from 29 detect asbestos in 'trace' amount ($<0.1\%$) - chrysotile
- 2007 - No samples from 11 locations detect asbestos





Tram
Stop

15,000m³ excavated soils



1,270m³ excavated soils reused

CASE HISTORY

Media City, Salford Quays

- Waste Classification for soils to be disposed of off-site
- Materials Management Plan for reuse of some soils on site in accordance with CL:AIRE Definition of Waste Code of Practice (2011)
- Asbestos Management Plan
 - *Contractors Tool Box Talks*
 - *Site Supervision*
 - *Air Monitoring*
- WSP were Clients' representative in liaising with suppliers and sub-contractors



Asbestos Management Plan – Heat Map



Asbestos Management Plan – Summary

- Nominated responsible persons and lines of reporting
- Site Specific Awareness training & bespoke induction
- Issue of a Permit to Dig
- Safe Systems of Work and supporting Risk Assessments.
- Control Measures and details of PPE & RPE
- Airborne fibre Monitoring Strategy (Personal exposure monitoring and Static air tests)
- Emergencies and unforeseen disturbances of asbestos
- Waste Storage and Handling
- Full time provision of competent and asbestos specialist resources.

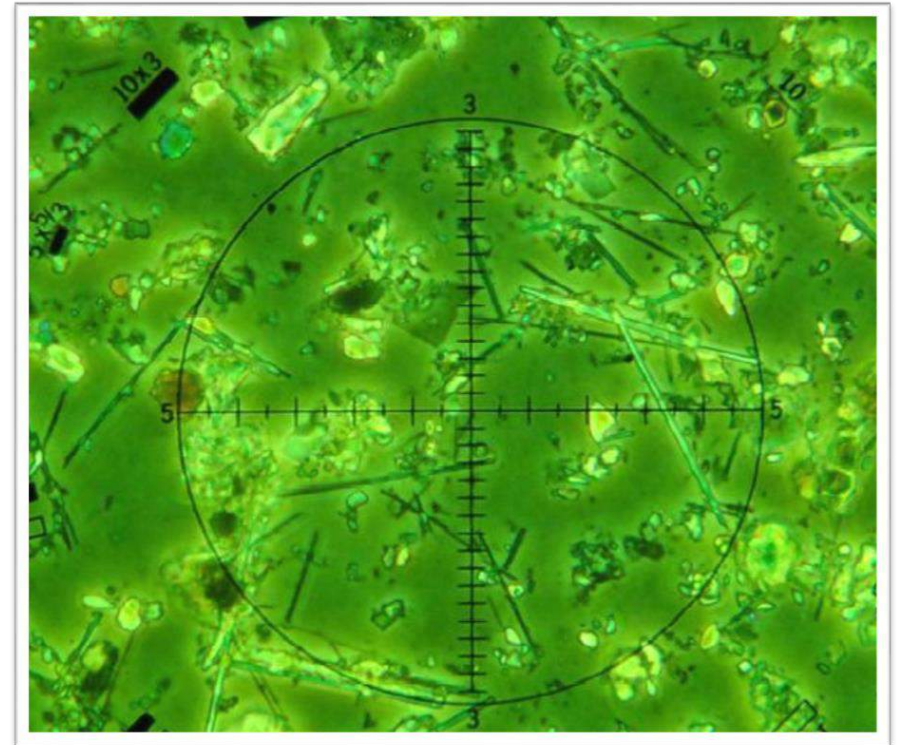
Asbestos Management Plan – Summary

- Non-licensable due to low concentrations
- No ground disturbance works shall be undertaken without first receiving a Permit to Dig. This Permit shall be issued by the Site Manager. This permit shall state explicitly the working arrangements for the particular task with respect to asbestos risk and the mitigating controls:
- Asbestos site briefing
- No access to areas other than permitted work area
- Use suitable RPE and PPE when undertaking ground disturbance works
- Maintaining that ground materials are kept damp
- Task specific RAMS
- If any potential asbestos contamination arises during the works where the asbestos specialist is not present onsite, all ground works shall be halted and the asbestos specialist called.

Result = Site worker and sub-contractor confidence that potential exposure is being prevented and work can proceed uninterrupted

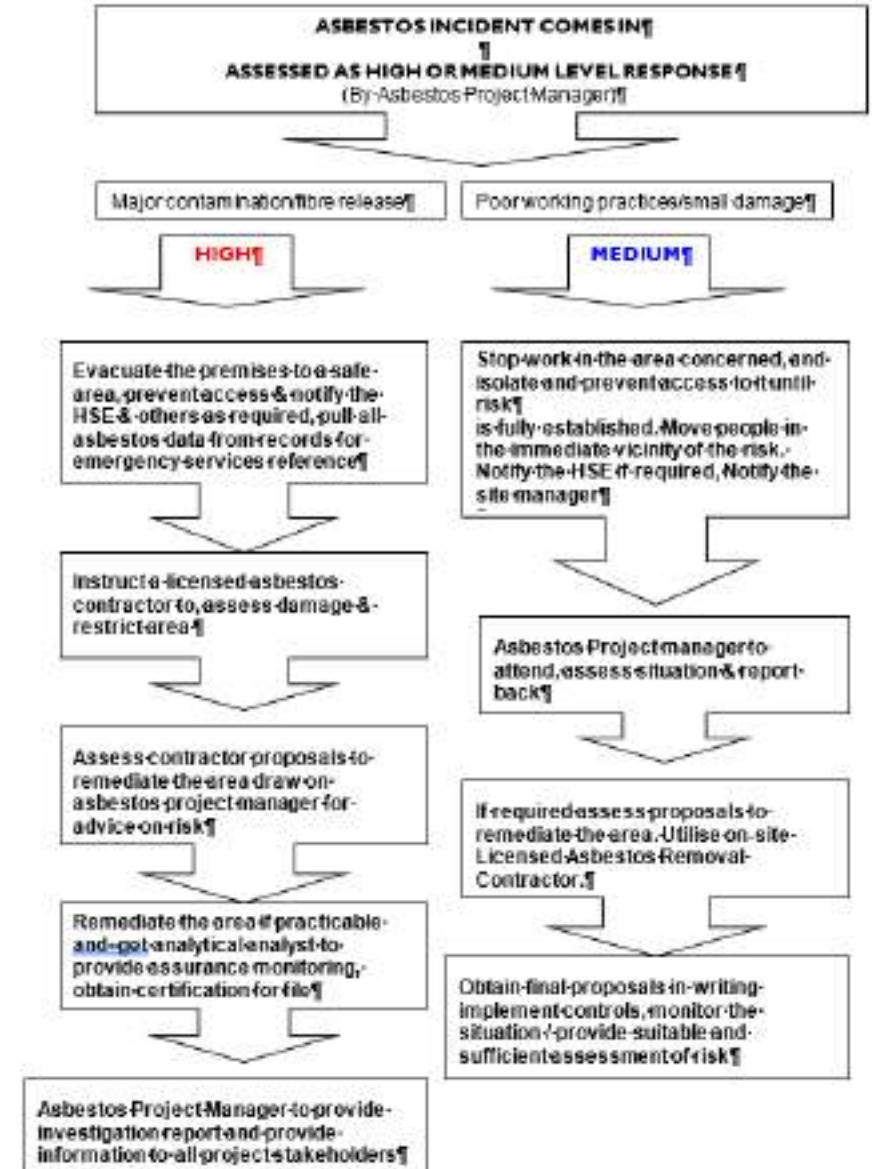
The value of Air Monitoring

- Representative personal air monitoring on staff undertaking specific tasks to demonstrate adequacy of control measures and RAMS.
- Near source and boundary static sampling
- Static air testing within site cabins and welfare facilities.
- DEMONSTRATE THE EFFICACY OF SITE WIDE CONTROL MEASURES
- REASSURANCE FOR WORKERS
- REASSURANCE FOR NEIGHBOURS
- PROTECTION AGAINST FUTURE CLAIMS



AMP- Emergency Procedures

- Unforeseen materials encountered
- Elevated fibre levels reported
- Poor working practices



Conclusions

- 'Typical' Made Ground can have asbestos present
- Don't ignore trace or low detections of asbestos in soil - CAR principles apply
- Presence of asbestos affects :
 - *Waste classification*
 - *Site Health and Safety rules*
 - *Sub-contractor engagement*
- AMPs are simple and targeted at proposed activities, providing reassurance for employers and workers

Asbestos in soil affects programme, costs and legal compliance, but it pays to:

- Engage advisors before construction phase; and,
- Employ proportionate mitigation under professional guidance.

THANK YOU FOR LISTENING

Q&A