



BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

ENVIRONMENT

Brackley Property Developments
Stretton Point
Hinckley

Remediation Strategy

ENVIRONMENT

Brackley Property Developments Stretton Point Hinckley Remediation Strategy

Birmingham
Livery Place, 35 Livery Street, Colmore Business District, Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way, Leeds
LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11, Portland Street, Manchester M1 3HU
T: 0161 233 4260

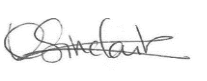
Market Harborough
Harborough Innovation Centre, Wellington Way, Airfield Business Park,
Leicester Road, Market Harborough, Leicestershire, LE16 7WB
T: 01858 455020

Nottingham
Waterfront House, Station Street, Nottingham NG2 3DQ
T: 0115 924 1100

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P1	February 2020	Final	Imogen Wort BSc. (Hons) MSc.	Richard Robinson BSc (Hons) MCIWEM	Karen Sinclair BSc. (Hons) MSc.
					

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1. INTRODUCTION

Instruction

- 1.1 BWB Consulting (BWB) was instructed by Brackley Property Developments (the Client) to carry out a Remediation Strategy for the site at Stretton Point, Hinckley (the site). Details of the project brief are included in BWB proposal reference 20191125/R1/NTH2414/RTR/IW dated November 2019.
- 1.2 The project is understood to involve the development of an existing area of open greenspace to a mixed-use development comprising several small office units, an industrial unit and service station with associated infrastructure, car parking and landscaped areas. It is understood that the grasslands across the site are ecologically sensitive self-seeded flora and are to be translocated to a nearby off-site location.
- 1.3 A proposed scheme layout plan, understood to be current at the time of writing, is presented as **Appendix 1** (reference 14-140 MP05-001, dated December 2019).

Objectives

- 1.4 The report establishes, taking all the circumstances of the site into account, which options either singly or in combination offer the best overall approach to remediation for the site as a whole. There are three objectives of the report:
 - i. To identify feasible remediation options for each relevant pollutant linkage.
 - ii. Carry out a detailed evaluation of feasible remediation options to identify the most appropriate option for any particular linkage; and
 - iii. Produce a remediation strategy that addresses all relevant pollutant linkages, where appropriate by combining remediation options.
- 1.5 The report has been completed in accordance with CLR11 "Model Procedures for the Management of Land Contamination" and BS10175: 2011 "Investigation of Potentially Contaminated Sites Code of Practice".

Information Sources

- 1.6 Previous work has been carried out at this site by BWB, for which the following document has been produced:
 - 'Phase 2 Geo-Environmental Assessment, Stretton Point, Hinckley' by BWB Consulting for Brackley Property Developments, reference STP-BWB-ZZ-XX-RP-YE-0001-PH2_P2, dated February 2020.
- 1.7 This report assumes familiarity and understanding of the contents of the aforementioned report.

2. THE SITE

Site Location

- 2.1 The site is located off Wolvey Road, Hinckley, located at approximate National Grid reference SP 43164 91033. The location of the site is shown in **Figure 2.1**.

Figure 2.1: Site Location Plan



Site Description

- 2.2 The site covers approximately 5 hectares of rough grass and scrub land with trees along the northern, southern and western boundaries. An electricity pylon is situated on the eastern boundary with overhead cables running north-east to south-west across the site.
- 2.3 Site elevation generally falls from north-west to south-east, with levels generally between 117m above ordnance datum (AOD) and 104m AOD.
- 2.4 Three stockpiles are located to the north of the site, at the time of the site investigation, one appeared to comprise a gravel similar to that used in roadside soakaways, another comprised large concrete boulders/waste that had not been crushed or sorted. A visual

survey of the third stockpile could not be carried out due to overgrown brambles and shrubs covering the area.

- 2.5 Due to ecological considerations, no investigation has been undertaken on the materials contained within the stockpiles. Chemical testing of these materials will be required prior to re-use on or removal from site.
- 2.6 The site was noted to be very uneven in the north-western area, where numerous small stockpiles and tipped material had been left. It is understood that the site was utilised as a compound for the construction of the M69 and other road improvement schemes in the area.
- 2.7 The south-central and south-western areas were noted to be very wet and even flooded during the works.
- 2.8 Soar Brook is located immediately south of the site and forms the southern boundary.
- 2.9 The site is bound by the A5, a petrol station and pub to the north, Junction 1 of the M69 to the east, the M69 slip road and motorway to the south and agricultural fields to the west.
- 2.10 BWB understand that the top layer of material on site is to be removed and transplanted to another site to protect its biodiversity.

Geology, Hydrogeology and Hydrology

- 2.11 British Geological Survey (BGS) mapping indicates that the majority of site is underlain by the superficial deposits of the Wolston Sand & Gravel (Secondary A Aquifer), with the Bosworth Clay Member (Unproductive Strata) in the east and the Oadby Member (Unproductive Strata) in the south. The bedrock is indicated to comprise the Mercia Mudstone Group (Secondary B Aquifer).
- 2.12 The ground investigation undertaken by BWB recorded ground conditions to generally comprise Topsoil overlying varying thickness of Made Ground across the north, north-west and west of the site with glacial deposits comprising clay, silt and sand beneath. BWB were unable to attribute the arisings to the published geological names (Wolston Sand and Gravel, Oadby Member and Bosworth Clay) due to the likenesses between them and seemingly interlocking makeup.
- 2.13 Groundwater was recorded at standing depths between 0.04m and 0.92m below ground level (bgl) with elevations ranging between 108.37m and 110.35m AOD. Groundwater is inferred to be flowing in an east to south-easterly direction.

3. CONCEPTUAL SITE MODEL

Summary of Significant Pollutant Linkages

- 3.1 The results of the investigation at the site identified the following sources and corresponding pathways and receptors, as presented in **Table 3:1**.

Table 3:1: Summary of Significant Pollution Linkages

Table 3.1: Summary of Significant Pollution Linkages						
Source	Pathway	Receptor	Con	Prob	Risk	Mitigation/Investigation
S1: On site: Made Ground – Localised loose asbestos fibres.	P1: Inhalation of fibres.	R1: Construction/ services personnel	Md	Lw	M/L	It is understood that the development is likely to be predominantly covered by buildings and hard standing surface cover, therefore limiting any potential contact by the future site user. Asbestos quantification recorded a result of <0.001% by weight on the limited positive samples identified. Therefore, based on the available information asbestos is not considered to be a risk to human health to future site occupants. However, vigilance among construction and ground workers is recommended and an appropriate risk assessment and plan of work prepared in accordance with Control of Asbestos Regulations 2012 (CAR 2012) for any groundwork that could disturb asbestos.
		R2: Future site users & local residents	Md	UI	L	It is understood that the top layer of grasslands/roots/soils on site are to translocated to protect the biodiversity that has established by self-seeding. It is likely that there will be residual topsoil on site for use in landscaped areas although it is possible that some importation may be needed if there is a deficit. Should significant asbestos material be identified on site, an appropriate risk assessment and plan of works should be prepared in accordance with CAR 2012 to mitigate the risks to construction and ground workers.
VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low KEY: Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor Hi = High, Li = Likely, Lw = Low Likelihood, UI = Unlikely						

4. CONSTRUCTION PHASE REMEDIATION

Risks to Construction / Maintenance Workers

- 4.1 To mitigate the short-term risks to human health during construction and groundworks it is recommended that construction workers and services personnel should follow guidance stated in 'CIRIA C670, Site Health Handbook, Second Edition, 2008' during development works. Adequate standard personal protective equipment and the implementation of basic hygiene measures should be undertaken.
- 4.2 As a matter of good practice, and to limit the potential risk associated with wind-blown asbestos fibres which have been identified in Made Ground horizons, the generation of dust during development earthworks should be kept to a minimum by damping down work areas during dry periods.

Asbestos Containing Materials

- 4.3 Asbestos has been identified within Made Ground at the site and the presence of asbestos elsewhere on site, particularly within areas not directly investigated cannot be completely discounted at this time.
- 4.4 Appropriate precautionary methods should be adopted when handling Made Ground materials. Soils shall be kept damp to minimise the potential for dust generation and visual vigilance maintained for suspect materials. Should suspected asbestos containing materials (ACMs) be identified, works in that area should be halted and BWB informed. Contractors should be made aware of the potential presence of ACMs within Made Ground and allow for appropriate PPE and working methods within their risk assessments and method statements.

Procedures for Dealing with Unexpected Contamination

- 4.5 For the duration of the redevelopment, a 'Hotspot Protocol' will need to be implemented at the site to allow ground workers to act upon should they suspect any previously unknown soil and/or groundwater contamination to be present.
- 4.6 If previously unidentified contamination is identified, BWB shall be informed immediately, and the Contaminated Land Officer/Environmental Services at Hinckley and Bosworth Borough Council and EA (if necessary) also informed. Suspected contaminated materials should be stockpiled separately within an impermeable bunded area for subsequent analysis, and if necessary, off-site disposal. Any remedial approach will require agreement with the regulators prior to implementation.

5. REGULATORY ISSUES

Approval of Remediation Strategy

- 5.1 This strategy and subsequent verification report(s) should be submitted to the Local Planning Authority and EA (if required). Prior to implementation of the remedial works, written approval of the strategy should be obtained from the regulatory bodies. The subsequent verification of the remediation and production of the remediation closure report will also need to be approved by the regulatory bodies prior to project completion.

Licensing and Permitting

- 5.2 It is the contractor's responsibility to ensure that all required permits and consents are in place for the duration of the works.
- 5.3 These may include but not be limited to:
- Site waste management plan;
 - Temporary discharge consent or exemption;
 - Environmental Permit for crushing and potentially, waste treatment; and
 - Material Management Plan.

Waste Management

- 5.4 The contractor shall comply with the waste management (duty of care) Regulations. All waste transfer documentation shall be retained for a minimum of 6 years. Copies of all waste transfer documentation shall be provided to the consultant for inclusion in the validation report.
- 5.5 A site waste management plan (SWMP) should be produced by the main contractor prior to the commencement of the project. The SWMP should describe the volumes and types of waste that are likely to be produced during a project and should set out the actions for recycling, recovery, re-use and disposal for each waste stream.
- 5.6 To manage the suitable reuse and/or importation of remediated, excavated or imported soils, and demonstrate that these materials are not waste, it is recommended that a Material Management Plan (MMP) under the CLAIRE Definition of Waste Code of Practice Version 2 is completed.

Third Party Liability

- 5.7 The contractor shall take all suitable measures to prevent pollution entering drainage systems or local watercourses and to avoid any nuisance from odours to local properties. The contractor should have suitable spill kits available to contain any pollution spills/leaks and have wheel wash facilities in place should this be required.

6. VERIFICATION TESTING

Stockpile Testing

- 6.1 Prior to the reuse of, or removal from site of, stockpiled materials, testing should be undertaken to ensure materials are appropriate for use. Chemical testing should be undertaken at a sample frequent of one per 500m³ of material and at least three samples per stockpile.
- 6.2 Samples should be sent to a MCERTs and UAS accredited laboratory and tested for the contaminants listed in **Appendix 2**. The results should be compared to the imported material criteria set out in **Appendix 2** to confirm suitability (or otherwise).

Imported Soil

- 6.3 The assessment criteria for comparison to soil reuse or importation onto site for use as bulk fill following the removal of the top layer of material on site is presented as **Appendix 2**. The concentrations are appropriate for protection of both human health and controlled waters associated with the proposed development.
- 6.4 Testing frequency should be agreed with the LPA and should refer to local authority guidance.
- 6.5 Soil samples should be taken from the placed material and analysed at a MCERTs and UKAS accredited laboratory for the contaminants listed in **Appendix 2**. Other testing may also be required depending upon the existing and previous uses of the source site. Testing frequencies and criteria are set out in **Table 6:1**.

Table 6:1: Chemical Testing Suites and Frequencies

Material	Testing Suites	Frequency
Clean Natural Imported Material with supporting site investigation information	Heavy Metals Speciated PAHs (Priority 16 Compounds) Total TPH C ₆ -C ₄₀ Asbestos ID Total Organic Carbon	1 per 1000m ³ – minimum of 3 per source
Clean Natural Imported Material without supporting site investigation information	Heavy Metals Speciated PAHs (Priority 16 Compounds) Total TPH C ₆ -C ₄₀ Asbestos ID Total Organic Carbon	1 per 500m ³ – minimum of 5 per source
Topsoil – from a Greenfield source	Heavy Metals Speciated PAHs (Priority 16 Compounds) Total TPH C ₆ -C ₄₀ Asbestos ID	1 per 500m ³ – minimum of 3 per source

6.6 Additionally, the material should be:

- A suitable growing medium;
- Free from obvious contamination (i.e. staining / free product etc.);
- Not come from areas where Japanese Knotweed or other invasive or injurious plants are suspected to have been growing;
- Not odorous (could be considered a statutory nuisance); and
- Free from unsuitable material (e.g. bricks, brick, tiles, metal, timber and glass etc.).

7. REPORTING

7.1 The remediation contractor should maintain records of the works to include the following:

- Daily record sheets;
- Date and weather conditions;
- Plant, personnel and visitors present;
- Aspects relating to health and safety, environmental control and variations to the original strategy/specification; and
- All necessary certification shall be submitted for inclusion in the Health and Safety File.

7.2 Validation of the works shall be undertaken by an experienced Environmental Consultant and should include, but not be limited to, the following information:

- Type(s) and volumes(s) of any materials removed from site for disposal;
- Type(s) and volumes(s) of any materials imported to the site;
- Test results;
- Additional site investigation records;
- A description of the works undertaken;
- Records of the works including daily diary sheets;
- Record of ground gas resistant membrane installation and inspection reports;
- Waste transfer and disposal notes; and
- Variations to the remediation strategy and justification for doing so.

7.3 On satisfactory completion of the works, the consultant shall provide a Completion Statement/ Report, as appropriate. The report shall comprise relevant site records and remain as certification that the remediation works have been carried out in accordance with the stated strategy. Copies of the report shall be lodged with regulatory bodies for approval.

8. ROLES AND RESPONSIBILITIES

8.1 **Table 8:1** below presents a summary of the roles and responsibilities associated with the required remediation and mitigation measures.

Table 8:1: Mitigation and Validation Roles and Responsibilities

Task	Requirement	Responsibility	Validation and Reporting
Validation of soils to be imported onto site for soil cover and re-use of stockpiled materials	Prior to importation or reuse soil chemical analysis should be undertaken to confirm suitability to avoid importing or using unsuitable materials. A minimum of three samples is recommended from both Topsoil and subsoil.	Principal Contractor/ Environmental Consultant	Confirmation of material source to be provided and chemical laboratory certificates to be obtained prior to importation.
Asbestos	Adoption of appropriate control methods and PPE including dampening down of soils.	Principal Contractor	
Waste Transfer	Handle waste generated at the site in accordance with Waste Management (Duty of Care) Regulations. All waste transfer documentation shall be retained for a minimum of 6 years.	Principal Contractor	Copies of waste transfer documentation shall be provided to the appointed Environmental Consultant for inclusion in the final validation completion report.

9. REFERENCES

- 9.1 British Standards Institute, (BSI), BS 8485:2015, Code of Practice for the characterization and remediation from ground gas in affected developments
- 9.2 British Standards Institute, (BSI), BS 8576:2013, Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)
- 9.3 British Standards Institute, (BSI), BS 10175:2011+A1:2013, Investigation of Contaminated Sites – Code of Practice
- 9.4 British Standards Institute, (BSI), BS5930:2015) Code of practice for ground investigations
- 9.5 British Standards Institute, (BSI), BS EN 1997-1:2004 Incorporating corrigendum February 2009, Eurocode 7 – Geotechnical Design – Part 1: General rules.
- 9.6 British Standards Institute, (BSI), BS EN 1997-2:2007 Incorporating corrigendum June 2010, Eurocode 7 – Geotechnical Design – Part 2: Ground Investigation and testing.
- 9.7 Building Research Establishment Special Digest 1 Third Edition. Concrete in Aggressive Ground (2005)
- 9.8 Building Research Establishment (BRE) BR211, Radon; Guidance on Protective Measures for New Buildings (2015)
- 9.9 Construction Industry Research and Information Association (CIRIA), Report 132, A Guide to Safe working on Contaminated Sites (1996).
- 9.10 Construction Industry Research and Information Association (CIRIA). 2001, C522 Contaminated land risk assessment, A guide to good practice.
- 9.11 Construction Industry Research and Information Association (CIRIA). 2007, Report C665, Assessing Risk Posed by on Hazardous Ground Gases to Buildings
- 9.12 Construction Industry Research and Information Association (CIRIA). 2014, Report C735, Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases
- 9.13 Department for Communities and Local Government (DCLG), 2012, National Planning Policy Framework.
- 9.14 Department for Environment Food and Rural Affairs (DEFRA), 2012, Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance.
- 9.15 Environment Agency report CLR11 'Model Procedures for the Management of Land Contamination'.
- 9.16 Environment Agency 2008, Updated technical background to the CLEA model Science Report – SC050021/SR3

-
- 9.17 Environment Agency 2008, Human health toxicological assessment of contaminants in soil Science Report – SC050021/SR2
 - 9.18 Environment Agency 2009, CLEA Software (Version 1.05) Handbook Better Regulation Science Programme Science report: SC050021/SR4
 - 9.19 Environment Agency 2008, A review of body weight and height data used within the Contaminated Land Exposure Assessment model (CLEA) Project SC050021/ Technical Review 1
 - 9.20 Environment Agency, 2006, Remedial Targets Methodology, Hydrogeological Risk Assessment for Land Contamination
 - 9.21 Environment Agency, 2010, Report SC030114/R1, Verification of remediation of land contamination.
 - 9.22 Health and Safety Executive (HSE) 'Protection of workers and the general public during the Development of Contaminated Land (1991).
 - 9.23 NHBC Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008

APPENDICES

APPENDIX 1: Site Masterplan

- Service Station Buildings -
Shop & Coffee Drive Through
- B2/B8 Industrial Units
- B1 Office Units
- Council Boundary Line

Areas:	GIA	GEA
Euro Garages		
PFS Store	5,218ft ² 484.8m ²	5,444ft ² 505.8m ²
Drive through	1,844ft ² 171.3m ²	1,974ft ² 183.4m ²
Total	7,062ft² 656.13m²	7,418ft² 689.2m²
B2/B8 Industrial Unit:		
Warehouse	17,000ft ² 1579.4m ²	17,845ft ² 1657.9m ²
Office (2st.)	3,000ft ² 278.7m ²	3,530ft ² 328.0m ²
Total	20,000ft² 1858.1m²	21,375ft² 1985.9m²
B1 Offices:		
Office A (3st.)	35,550ft ² 3302.7m ²	38,675ft ² 3593.0m ²
Office Block 1	8,200ft ² 761.8m ²	8,870ft ² 824.1m ²
Office Block 2	9,100ft ² 845.4m ²	9,910ft ² 920.6m ²
Office Block 3	8,200ft ² 761.8m ²	8,870ft ² 824.1m ²
Total offices	61,050ft² 5671.7m²	66,325ft² 6161.8m²

SGP
Architects + Masterplanners

Waterfront House
2a Smith Way
Grove Park
Enderby
Leicester LE19 1SX

t: +44 (0)116 247 0557

www.stephengeorge.co.uk

Stretton point
Hinckley

Drawing Name:
Site Location Plan
Full Application

Drawing Stage: PLANNING

Suitability: S3 - Review & Comment

SGP File Ref: 14-140 131

14-140 April 2020 CD CD 1:1250 @ A2 B
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Red Line Boundary based on O/S Data and NOT confirmed as the Legal Boundary

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APPENDIX 2: Soil Import and Reuse Criteria

Topsoil Screening Criteria

Contaminant	Max Concentration (On-site) (mg/kg)	Suitable For Use Criteria (mg/kg)	Ref.	Adopted Screening Criteria (mg/kg)	Source
Arsenic	13	640	(c)	130	(h)
Barium	280	22000	(e)	2800	(h)
Beryllium	1.1	12	(c)	11	(h)
Boron	0.9	5	(b)	5	(b)
Cadmium	3.8	190	(c)	38	(h)
Chromium VI	4	33	(c)	33	(c)
Chromium III	35	8600	(c)	350	(h)
Copper	51	135	(a)	135	(a)
Lead	49	2300	(d)	490	(h)
Inorganic Mercury	0.3	1100	(c)	3	(h)
Nickel	30	75	(a)	75	(a)
Selenium	1	12000	(c)	10	(h)
Vanadium	43	9000	(c)	430	(h)
Zinc	100	200	(a)	200	(a)
Cyanide (Free)	1	43	(f)	10	(h)
Cyanide (Complex)	1	213	(f)	10	(h)
Phenol	1	780	(c)	10	(h)
Benzene	0.001	27	(c)	0.01	(h)
Toluene	0.001	56000	(c)	0.01	(h)
Ethylbenzene	0.001	5700	(c)	0.01	(h)
Xylene*	0.002	5900	(c)	0.02	(h)
TPH (C5-C6) aliphatic	0.001	3200	(c)	0.01	(h)
TPH (>C6-C8) aliphatic	0.001	7800	(c)	0.01	(h)
TPH (>C8-C10) aliphatic	0.001	2000	(c)	0.01	(h)
TPH (>C10-C12) aliphatic	7.5	9700	(c)	75	(h)
TPH (>C12-C16) aliphatic	16	59000	(c)	160	(h)
TPH (>C16-C21) aliphatic	27	59000	(g)	270	(h)
TPH (>C21-C35) aliphatic	270	59000	(g)	2700	(h)
TPH (>C6-C7) aromatic	0.001	26000	(c)	0.01	(h)
TPH (>C7-C8) aromatic	0.001	56000	(c)	0.01	(h)
TPH (>C8-C10) aromatic	0.001	3500	(c)	0.01	(h)
TPH (>C10-C12) aromatic	1	16000	(c)	10	(h)
TPH (>C12-C16) aromatic	2	59000	(g)	20	(h)
TPH (>C16-C21) aromatic	10	59000	(g)	100	(h)
TPH (>C21-C35) aromatic	680	59000	(g)	6800	(h)
Naphthalene	0.05	190	(c)	0.5	(h)
Acenaphthylene	0.05	83000	(c)	0.5	(h)
Acenaphthene	0.05	84000	(c)	0.5	(h)
Fluorene	0.05	63000	(c)	0.5	(h)
Phenanthrene	0.61	22000	(c)	6.1	(h)
Anthracene	0.39	520000	(c)	3.9	(h)
Fluoranthene	1.7	23000	(c)	17	(h)
Pyrene	2	54000	(c)	20	(h)
Benzo(a)anthracene	0.87	170	(c)	8.7	(h)
Chrysene	0.98	350	(c)	9.8	(h)
Benzo(b)fluoranthene	1.5	44	(c)	15	(h)
Benzo(k)fluoranthene	0.73	1200	(c)	7.3	(h)
Benzo(a)pyrene	1.4	35	(c)	14	(h)
Indeno(1,2,3-c,d)pyrene	0.56	500	(c)	5.6	(h)
Dibenzo(a,h)anthracene	0.05	3.5	(c)	0.5	(h)
Benzo(g,h,i)perylene	0.87	3900	(c)	8.7	(h)
pH	-	5.5-8.5	(a)	5.5-8.5	(a)
Asbestos	-	Non-Detect**	-	Non-Detect**	-

* \$4UL for xylene is based on the most conservative value of m-, p- and o-xylene.

** Below the quantifiable Limit of Detection (<0.001%)

It is noted that Adopted Screening Criteria (ASC) provide an initial assessment of the suitability of material for use on-site. Any exceedances of the ASC should be assessed by the Environmental Consultant, as these do not necessarily preclude the potential use of the material.

In accordance with CL:AIRE guidance, imported material concentrations must not be significantly elevated in comparison to material existing on site. Therefore the ASC is based on the most conservative value of:

- Suitable For Use Criteria; and
- Within one order of magnitude of the maximum recorded site concentration (to allow for soil variability).

Sources:

(a) BS 3882:2015 Specification for Topsoil (Multi-purpose Topsoil, pH 6.0-7.0).

(b) Nable, Banuelos and Paul. Boron Toxicity. Plant and Soil, Vol.193, pp1 81-198, 1997.

(c) LQM/CIEH \$4ULs for Human Health Risk Assessment. Commercial 1% SOM. Land Quality Press, Nottingham, 2015. \$4UL3271.

(d) SP1010: C4SLs for Assessment of Land Affected by Contamination. Commercial. DEFRA, 2014.

(e) Soil Generic Assessment Criteria for Human Health Risk Assessment. Commercial. CL:AIRE, 2010.

(f) BWB Derived Criteria. Commercial.

(g) Heavy end hydrocarbons are adjusted down to Aliphatic C₁₂-C₁₆ concentrations to ensure no visual or olfactory evidence of contamination present.

(h) One order of magnitude above maximum recorded site concentration.

(i) Site Specific Assessment Criteria.



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