

REMEDIAL STRATEGY REPORT
FOR LAND OFF
BUTTON LANE, WYTHENSHAW, MANCHESTER M23 0NA

Prepared for:-

**Wythenshawe Community Housing Group
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**S063 SFK (TLC1009) rep JG WCHG 250220
February 2020**

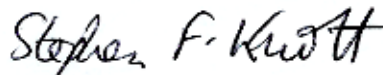
**Project Quality Assurance
Information Sheet**

Remedial Strategy Report for Land off Button Lane, Wythenshawe, Manchester M23 0NA.

Job Number : TLC1009 **Report Status** : Final
Survey Dates : N/A **Report Date** : Feb. 2020

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Report Issue Record		
Revision	Date of Issue	Comments
0	25/02/2020	First Issue

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1.0 INTRODUCTION

1.1 The Commission and Brief

- 1.1.1 The Land Consultancy Limited (TLC) has been commissioned by Mr. James Garner of the Wythenshawe Community Housing Group (e-mail dated 17th February 2020), to prepare a remedial strategy report for a parcel of land located off Button Lane, Wythenshawe, Manchester M23 0NA. The site boundary (edged in red) is indicated on Drawing No. TLC1009/02 in Appendix A.
- 1.1.2 The following site investigation reports have already issued by TLC for the property:
- 'Phase 1 Geo-Environmental Desk Study for Land off Button Lane, Wythenshawe, Manchester M23 0NA', dated August 2018 and referenced Q261 SFK (TLC1009) rep MB MDAssoc 070818; and
 - 'Report on Phase 2 Geo-Environmental Ground Investigation Works undertaken on Land off Button Lane, Wythenshawe, Manchester M23 0NA', dated December 2018 and referenced Q377 SFK (TLC1009) rep JG WCHG 171218.
- 1.1.3 The above reports should be consulted for detailed background information if required.
- 1.1.4 This document presents the remediation objectives necessary to render the site suitable for the proposed development.
- 1.1.5 The geo-environmental related works carried out by TLC will help discharge contaminated land planning conditions which have been imposed on the redevelopment of the site by Manchester City Council. The planning application number is 121567/FO/2018.

1.2 The Proposed Development

- 1.2.1 The site is intended to be redeveloped out with a single block of two-storey semi-detached housing. The development will include front and rear garden areas. A proposed development plan is presented in Drawing No. TLC1009/04.

2.0 BACKGROUND

2.1 Site Description and Desk Study Information

- 2.1.1 General site details are summarised in the table below. Site location plans are presented in Drawing Nos TLC1009/01a and 01b in Appendix A, and a more detailed site plan is presented in Drawing No. TLC1009/02. A plan summarising the findings of a site walkover survey which was completed as part of the desk study is presented in Drawing No. TLC1009/03.

Detail	Remarks
Location & Site Boundaries	Located in a predominantly residential setting in between 23 & 29 Button Lane in the Wythenshawe district of south Manchester. The nearest postcode to the site is M23 0NA. Electricity substation 0m NW with residential development beyond; residential/commercial development beyond an access road to NE; residential development and public open space to SE beyond Button Lane; residential development SW.
NGR	Approximate site centre – 381000E, 390780N.
Elevation, Shape & Area	≈30m AOD; roughly rectangular in shape (orientated NW-SE); area of ≈395m ² .
Topography	Approximately level.
Condition (at the time of the desk study & site investigation – 2018)	Unoccupied cleared plot of land. Predominantly surfaced with gravel or flagstones with some topsoil adjacent to the NE and NW boundaries. Privet hedges present at NE and NW boundaries. No invasive plant species or evidence for potential mobile contamination or ash/cinder rich surface Made Ground deposits noted.

- 2.1.2 A summary of the main desk study findings is presented in the table below:

Detail	Remarks
Historical	Button Lane may have formerly passed through the W half of the site. The western corner of the site may have fallen within a former plant nursery. Aerial imagery (dated 2000) shows a detached dwelling, short driveway and small gardens on the site. Trees, shrubs and hedges line the site boundaries (all sides). The house may have been built on the site post 1954. The house is likely to have been demolished and cleared between 2009-2013. Potential contaminative land usage identified within ≈250m of the site includes: electricity substation – 0m NW, several orchards (closest 20m SW), farm buildings (25m SW), several greenhouses (closest 25m W).
Geology & Mining	Artificial deposits – none indicated. Drift – Devensian Glaciofluvial Sheet Deposits (sand and gravel) – likely to be >5m thick. Solid – Triassic Tarpley Siltstone (mudstone, siltstone and sandstone) Site is not affected by known faulting. Rock dips – none indicated in the immediate vicinity of site. The property is not located within a coal mining reporting area. The site is not therefore considered to be at risk from shallow coal mining/coal mine entries.
Landfilling/Waste Related Industry	None identified within at least 250m of the site.
Nearest Surface Water Receptors & Flooding	No potential surface water receptors identified within at least 610m of the site. Site is unlikely to be at risk from river or groundwater related flooding.
Hydrogeology	Glaciofluvial Sheet Deposits – Secondary A Aquifer. Tarpley Siltstone – Secondary B Aquifer. Site does not lie within influencing distance of a groundwater abstraction well or groundwater source protection zone.
Radon Gas	Basic radon gas protective measures do not need to be installed.

2.2 Ground Investigation

- 2.2.1 A site investigation, which comprised the formation of 3no. small diameter boreholes (WS1 to WS3) and 4no. hand excavated pits (HP1 to HP3 and SA1), was undertaken over the site to depths of between 1.20m to 6.45m bgl. Exploratory locations are presented on Drawing No. TLC1009/04 in Appendix A. These works were carried out in November and December 2018. 2no. of the boreholes were installed with groundwater level monitoring/sampling standpipes. Shallow soakaway tests were conducted in hand

pit SA1. Samples of the recovered soils were obtained for laboratory testing purposes (chemical and geotechnical).

Ground Conditions (Soil and Water)

2.2.2 A summary of the exploratory hole findings is summarised in the table below:

Stratum	Depth to Base (bgl) (Thickness)	Notes/Consistency/Strength Parameters
Made Ground	0.60m to 1.10m (0.60m to 1.10m)	Encountered at all exploratory hole locations. Typically comprised of a dark grey/black sandy gravelly to very gravelly SAND which often contained cobbles. Generally slightly organic rich to organic rich. Roots and rootlets noted locally. Anthropogenic components included brick, concrete, glass, pottery, ceramic, pieces of metal, ash, clinker and cinders, with occasional plastic food wrappers.
Relic Topsoil	0.85m to 1.10m (0.20m to 0.30m)	Encountered in HP1, HP3, WS1 and WS3 only. Typically recorded as a black slightly organic rich SAND.
Glaciofluvial Sheet Deposits	3.40m to 4.80m (2.50 to 3.80m)	Encountered at all exploratory hole locations. Penetrated in the boreholes only. Comprised of a slightly gravelly to very gravelly SAND with a low cobble content. Variably coloured but typically brown, greyish brown, brownish grey or grey. A 4cm thick reddish brown clay band was encountered within this deposit in WS1 @ 2.75m bgl. <u>SPT N values</u> 1.20-1.65m – N = 13 to 30 (3no. results) 2.00-2.45m – N = 14 to 24 (3no. results) 3.00-3.45m – N = 5 to 14 (3no. results) 4.00-4.45m – N = 12 (1no. result)
Glacial Till	5.45m+ to 6.45m+ (0.65m+ to 2.85m+)	Encountered in WS1-WS3 only. Not penetrated. Comprised of a brown slightly sandy and gravelly CLAY. Thinly laminated in WS3 below ≈6m bgl. Clay consistency ranged from soft to firm to firm. The undrained shear strength (Cu value) ranged from 40kPa to 58kPa indicating that the clay is of medium strength. SPT N values obtained within the Glacial Till ranged from 8 to 13, suggesting that the clay was of medium strength. 2no. samples of Glacial Till were subject to Atterberg Limit and moisture content determinations. The results indicate that this material is of intermediate to high plasticity and of medium volume change potential.
Tarporley Siltstone	-	Not encountered.

2.2.3 The groundwater table beneath the site recorded in November and December 2018 ranged from 2.33m to 2.68m bgl.

2.2.4 No visual or olfactory observations of potentially mobile contamination were recorded during the fieldworks (including during groundwater sampling).

2.2.5 Anthropogenic components recorded within the Made Ground included: ash, clinker, cinders, brick, concrete, glass, pottery, a drinks can, plastic, timber, iron slag, breeze block and scrap iron fragments, wood and polythene fragments.

Contamination

2.2.6 No elevated determinand concentrations were recorded within the Made Ground with respect to human health and flora. The Made Ground was not considered to pose a significant risk to controlled waters.

- 2.2.7 No specific remedial measures were advised with respect to the protection of human health, flora and controlled waters.
- 2.2.8 Despite the above, TLC noted that United Utilities would require that a risk assessment for potable water supply pipe is completed by a contaminated land consultant. If the intention was to use standard MDPE pipe, completing this risk assessment would require that additional soil samples are analysed from along the proposed route of the water pipe, with samples being taken at the depth at which the pipe was scheduled to be laid. Alternatively, to remove the need for additional testing, barrier pipe (e.g. protecta-line) could be used or standard pipes could be laid in sterile trenches backfilled with clean inert material; independent validation would be needed to confirm that appropriate pipe and backfill materials have been used.
- 2.2.9 TLC noted that as the soils beneath the site were unlikely to be suitable for use as a growing medium in garden (and soft landscaped) areas, clean and suitable for use topsoil type material would need to be imported.

Ground Gas

- 2.2.10 A gas risk assessment was carried out by TLC in accordance with RB17¹.
- 2.2.11 Based off the encountered ground conditions, likely age of the Made Ground and laboratory testing results, TLC determined that the ground gas regime for the site should be placed within Characteristic Situation 3 (CS3) as presented within CIRIA report C665².
- 2.2.12 Using the guidance within BS 8485:2015³, for CS3 and the proposed development a gas protection score of 4.5 will need to be achieved by the installation of gas protection measures. A score of 4.5 or greater can be achieved by the installation of:
- A reinforced cast in-situ suspended floor with minimal penetrations – will give 1 to 1.5 points worth of protection;
- incorporating both a
- Passive subfloor gas dispersal layer (e.g.– formed by a clear void, polystyrene void former blanket, geo-composite void former blanket, or a no fines gravel layer with gas drains) - will give 1.5 to 2.5 points worth of protection;
- and a
- gas resistant membrane – will give a further 2 points worth of protection.
- 2.2.13 It should be noted that a beam and block floorslab could be adopted provided that the passive subfloor gas dispersal layer comprises of a well ventilated clear void or is formed by a well ventilated void former blanket.
- 2.2.14 TLC advised that construction workers should be made aware that elevated concentrations of ground gas (especially carbon dioxide on this site) could be present in any deep excavations. Risks to nearby residents from any gas generated from beneath the site were considered to be negligible.

¹ CL:AIRE Research Bulletin RB 17 dated November 2012 and entitled 'A Pragmatic Approach to Ground Gas Risk Assessment'.

² CIRIA report C665 dated 2007 and entitled 'Assessing risks posed by hazardous ground gases to buildings'.

³ BS 8485:2015 *Incorporating corrigendum No. 1*. 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

Foundations, Floorslabs and Buried Concrete

- 2.2.15 It was advised that the proposed semi-detached houses should be supported on spread foundations emplaced into the Glaciofluvial Sheet Deposits encountered below 0.70-1.10m bgl.
- 2.2.16 Suspended floorslabs were advised.
- 2.2.17 It was advised, in accordance with BRE Special Digest 1:2005 'Concrete in Aggressive Ground', that a design sulphate class of DS-1 should be adopted for buried concrete, and that the ACEC classification of site is AC-1.

3.0 BUILD PHASE REMEDIATION WORKS AND VALIDATION

3.1 Remediation and Validation Requirements

3.1.1 A summary of the remediation and validation works required to be undertaken is presented within the table below:

Pollution Linkage being Broken	Further Work/Remediation Requirements	Validation Requirements
None	The on-site soils are unlikely to be suitable for use as a growing medium in garden/soft landscaping areas. Clean and suitable for use topsoil will need to be imported into these areas for use a suitable growing medium. The emplaced topsoil thickness will typically need to be ~150mm beneath grassed/landscaped areas. However, as greater thicknesses would be required in areas scheduled for tree/shrub planting, the advice of a suitably qualified landscape architect should be sought to determine the appropriate topsoil thickness for these areas.	Chemical validation of imported soils: see Section 4.1.2 below.
Migration of ground gas into buildings via cracks in floorslabs, floorslab service penetrations etc.	Gas Protection Measures The site has been deemed to fall within Characteristic Situation 3 (CS3). Using the guidance within BS 8485:2015, for CS3 and the proposed development, a gas protection score of 4.5 is given. A score of 4.5 is intended to be achieved by: - A cast in-situ suspended reinforced floorslab with minimal penetrations. This will give 1 to 1.5 points worth of protection (however, see below). - A subfloor gas dispersal layer. Sub-floor gas dispersal layers can provide between 1.5-2.5 points worth of protection. It is intended that this layer will provide at least 2 points of protection. - Visqueen gas barrier to be used and joined to a Visqueen gas resistant dpc which will sit on the walls. Associated Visqueen double sided tape and Visqueen gas resistant (GR) foil tape to be used to join & seal the gas barrier sheets together as well as the gas barrier to the gas resistant dpc. Service penetrations will be kept to a minimum; will be sealed to the gas membrane using the Visqueen tape. Providing that it is correctly installed, the gas barrier will provide 2 points worth of protection. It should be noted that a beam and block floorslab could be adopted provided that the passive subfloor gas dispersal layer comprises of a well ventilated clear void or is formed by a well ventilated void former blanket. The Visqueen gas barrier will be installed over the floorslab and will be protected by a 50mm thick layer of screed. Specification sheets for the Visqueen gas barrier and gas resistant dpc are presented in Appendix B.	Validation of gas protection measures should be in line with CIRIA 735 ⁴ and should include photographic evidence of a suitably sealed gas membrane, and how the membrane has been sealed around service penetrations.
Potable Water Supply	Potable Water Pipes A United Utilities potable water supply pipe risk assessment⁵ needs to be completed. Additional soils laboratory testing may be required if standard MDPE pipe is intended to be used. The need for additional testing could be removed by using barrier pipe or by placing pipe in sterile trenches backfilled with inert gravel.	Delivery notes of pipe material. Photographs of the installed pipe. Water pipe soils testing as per United Utilities guidance. Validation of imported inert gravel if necessary (see section 4.1.2).
Other Considerations	Unexpected Contamination The relevant contractors should be briefed that during development works at the site should any unusual ground conditions and / or visual or olfactory evidence of contamination including asbestos containing material) be encountered at the site, TLC and the Local Authority should be informed and further assessment of the material may be required. Re-use of site won material To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered. This will allow the following: 1,000 tonnes (c. 600m³) of non-hazardous soil 5,000 tonnes (c. 3,000m³) of natural sand and gravels. 50,000 tonnes (c. 25,000m³) of bituminous material to be used in roadways. 5,000 tonnes (c. 3,000m³) of crushed concrete / stone. A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice may be required if volumes exceed exemption limits. If a MMP is required this needs to be registered by a Qualified Person (QP) and there must be 'certainty of use' for any material re-used onsite or exported to site to ensure there is no 'sham recovery'. All of the above materials would need to be tested at the rate and analytical suites presented in Section 4.1.2 below. Health and Safety Considerations In working with, removing or treating any contaminating material it is important that any potential risks associated with the actual site works are mitigated by good environmental management of the site during the remedial phases. Standard health and safety precautions (as per HSE guidance⁶) should be adopted by all workers involved with site enabling and construction works.	

⁴ CIRIA (2014). 'Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas'. CIRIA C735.

⁵ United Utilities document entitled 'Supplementary guidance for the selection of water pipes in land potentially affected by contamination'.

⁶ HSE (1991). 'Protection of Workers and the General Public During Development of Contaminated Land'. London HMSO.

3.1.2 Validations of Imported / Site Won Soils

3.1.2.1 Any additional imported / site won soil used on-site in gardens and soft landscaping areas will need to be chemically validated to ensure it is “suitable for use”.

3.1.2.2 A summary of the sampling requirements is presented in the table below. If material is imported, then ideally the material should be sampled at source; however, where this is not possible then material imported should be segregated onsite based on source and soil type.

Material Type	Source	Suite of Analysis	Sampling Rates*
Topsoil	Greenfield	Suite A	1 sample per 50m³
	Brownfield / Unknown	Suite B	
Subsoil and Trench Backfill	Brownfield / Unknown	Suite B	1 sample per 50m³
	Site won natural material	Suite A	
		First Generation i.e. quarried sand (subsoil) or stone (break layer)	No testing is required. Certification of material provenance is required.

Notes:

Suite A - Heavy metals, pH, water soluble sulphate, speciated PAH, soil organic matter and asbestos screen.

Suite B - Heavy metals, pH, water soluble sulphate, speciated PAH, phenol, total and free cyanide, soil organic matter, asbestos screen, banded petroleum hydrocarbons (TPH CWG), BTEX, MTBE.

*Minimum sampling rate of 3 samples per source.

3.1.2.3 If site won soil is to be used then this should be stockpiled on site ready for testing.

3.1.2.4 Any soil with visual or olfactory evidence of hydrocarbons should be rejected.

3.1.2.5 In addition, it should be ensured that the matrix of the topsoil is suitable as a growing medium and no undesirable material is present (in line with BS3882⁷). TLC advise that this information is provided by the supplier before material is imported onto site.

3.1.3 Soil Assessment Criteria

3.1.3.1 Results of imported / site won soil testing will be screened against appropriate assessment criteria for a residential end use.

3.1.3.2 With regards to the soil risk assessment TLC will use the following hierarchy:

- Category 4 Screening Levels (C4SLs).
- LQM Suitable 4 Use Levels (S4ULs).

3.1.3.3 Justification for using the above hierarchy is presented below.

3.1.3.4 New C4SLs have recently been published^{8,9}. The recent change to the contaminated land guidance has changed the evaluation of risk from ‘minimal’ (referred to as Health Criteria values (HCVs))¹⁰ used to generate Soil Guideline Values (SGVs) to ‘low’ (referred to as Lowest Level of Toxicological Concern (LLTCs)). The policy companion document and supporting letter by Defra, dated 3rd September 2014, states that C4SLs ‘could be used under the planning regime, as well as within Part 2A’. Based on these comments, TLC considers the justifications and assumptions used to generate ‘low’ risk are suitable for the planning regime.

⁷ BS (2015). “Specifications for Topsoil and Requirements for use.” BS3882:2015.

⁸ Defra (2014). “SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Policy Companion Document.”

⁹ CL:AIRE (2013). “SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report.”

¹⁰ EA (2008). “Human Health Toxicological Assessment of Contaminants in Soils.” Science Report – SC050021/SR2.

- 3.1.3.5 Where no C4SLs have been generated TLC will use the LQM S4ULs¹¹. Similar assumptions and land uses to C4SLs have been used. However, toxicological information has been based on 'minimal risk' as per previous guidelines and assumptions^{12,13,14,15}. TLC consider the main risk drivers for PAHs are benzo(a)pyrene (BaP) and naphthalene. This is due to BaP possibly being a carcinogen and most toxic of the PAHs^{16,17} and naphthalene the most volatile and soluble¹⁸. The new C4SLs indicate BaP as a surrogate marker for carcinogenic PAHs, if it falls within appropriate limits, since the risk from other non-carcinogenic PAHs are considered negligible according to CL:AIRE (2013). For BaP to be used as a surrogate marker it should follow the profile described by the HPA (2008)¹⁹ and CL:AIRE (2013). Naphthalene will be treated separately using the LQM S4ULs.
- 3.1.3.6 Where applicable, appropriate Soil Organic Matter (SOM) will be used for any soil assessment.
- 3.1.3.7 A summary of the generic assessment criteria is provided in Appendix C.

3.2 Disposal

- 3.2.1 Any material disposed offsite should be taken to a suitably licensed recycling facility. Provision of waste tickets and details of the facility should be provided for the Completion Report.

¹¹ LQM (2014). "The LQM/CIEH S4ULs for Human Health Risk Assessment."

¹² EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.

¹³ EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.

¹⁴ EA (2008). "A Review of Body Weight and Height Data used within the Contaminated Land Exposure Assessment Model (CLEA)." Project SC050021/Technical Review 1.

¹⁵ EA (2009). "Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values." Science report SC050021/SR7.

¹⁶ EA (2002). "Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans. Benzo[a]pyrene." R&D Publication TOX2.

¹⁷ USEPA (1984). "Health Effects Assessment of Polycyclic Aromatic Hydrocarbons (PAHs). EPA 540/1-86-013."

¹⁸ EA (2003). "Review of the Fate and Transport of Selected Contaminants in the Soil Environment." Draft technical report P5-079/TR1.

¹⁹ HPA (2010). "HPA Contaminated Land Information Sheet: Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)." Version 3.

4.0 SITE COMPLETION REPORT

- 4.1 All remedial and validation works undertaken on the site shall be fully documented for inclusion within a Site Completion Report.
- 4.2 Once all the remediation and validation work has been completed and documented to the satisfaction of the Regulators the contaminated land conditions may be discharged.

APPENDICES

APPENDIX A

DRAWINGS



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Project:
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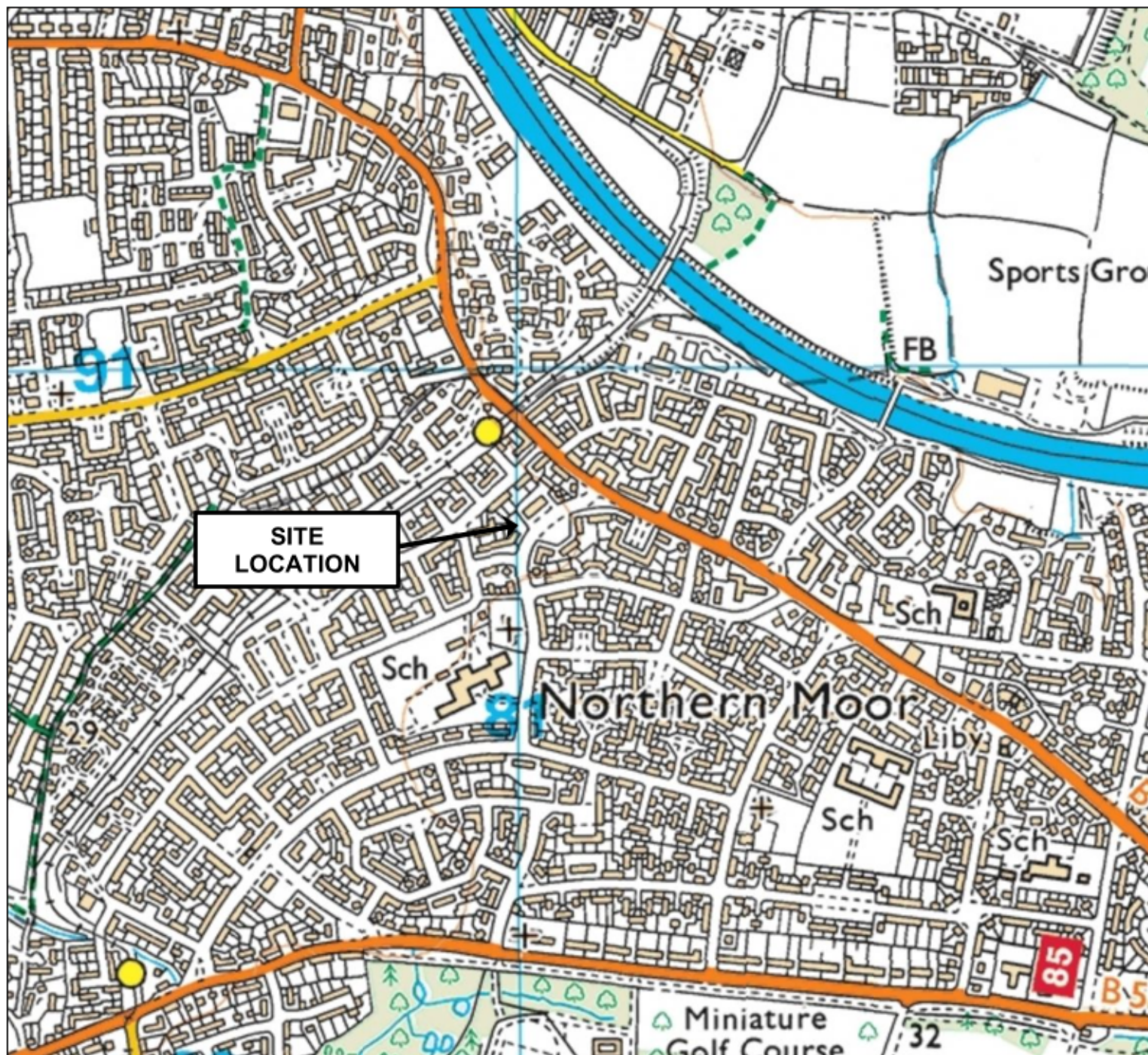
Title:
 Site Location Plan

Scale:
 NTS

Drawn by:
 SFK

Date:
 07/08/2018

Drawing No.: TLC1009/01a



THE LAND CONSULTANCY LIMITED

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Project:

Land off Button Lane, Wythenshawe, Manchester
M23 0NA

Title:

Site Location Plan

Scale:

NTS

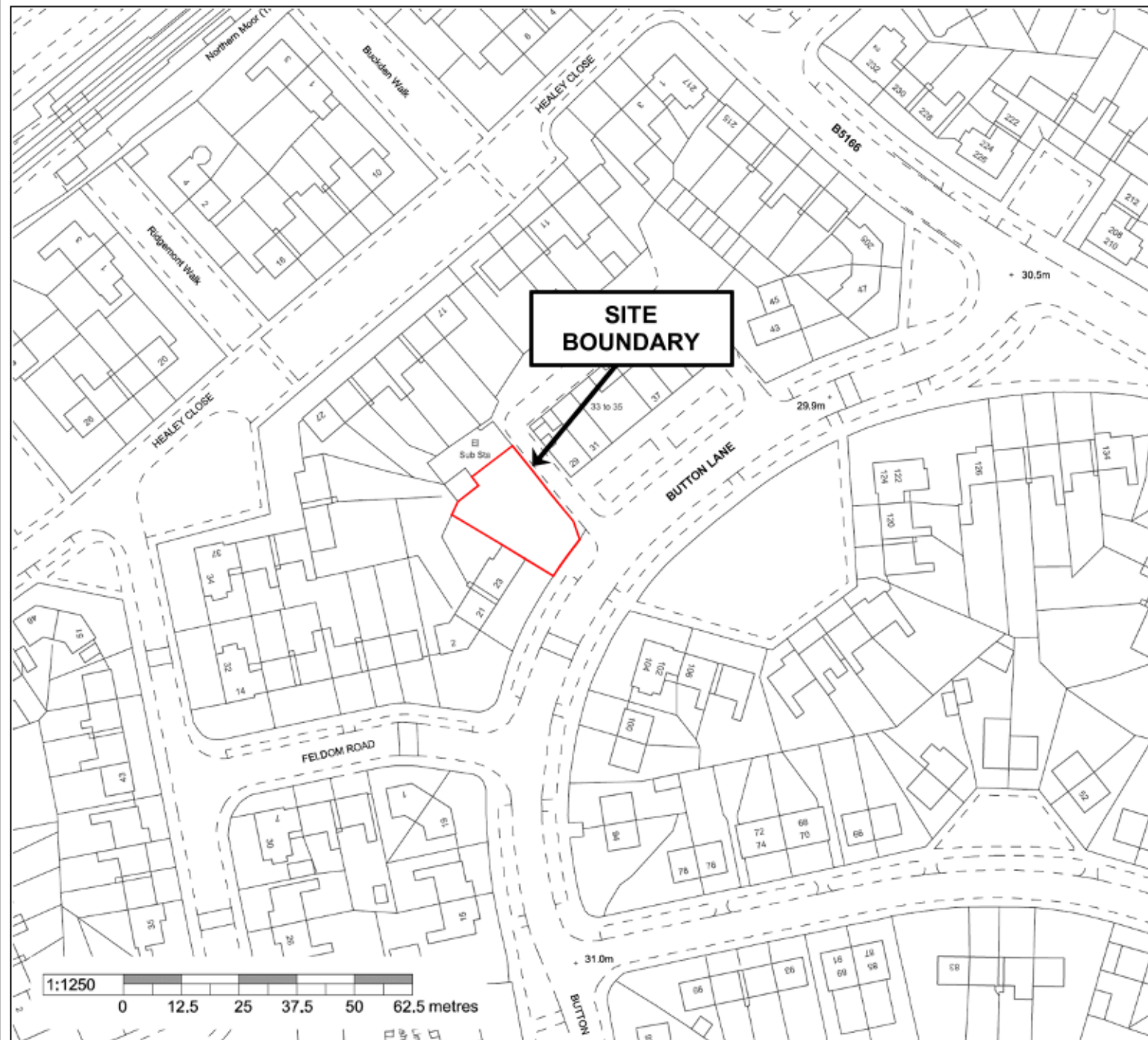
Drawn by:

SFK

Date:

07/08/2018

Drawing No.: TLC1009/01b



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Project:

Land off Button Lane, Wythenshawe, Manchester
M23 0NA

Title:

Site Boundary Plan

Scale:

As Shown

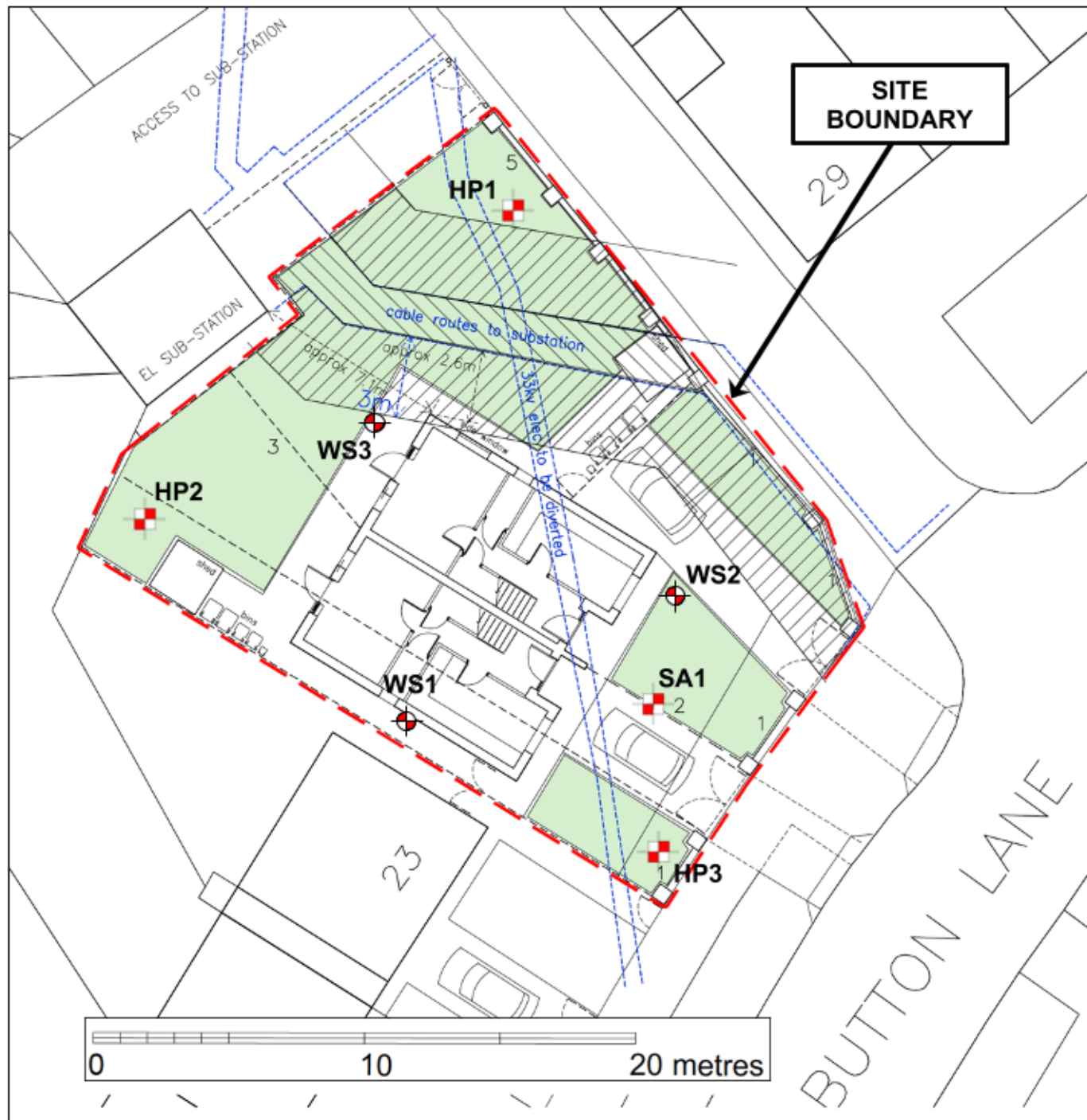
Drawn by:

SFK

Date:

07/08/2018

Drawing No.: TLC1009/02



WS2 Windowless sampling borehole location. WS2 & WS3 were both installed.

HP2 Hand excavated pit location.

SA1 Hand excavated soakaway test pit location.

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Project:
Land off Button Lane, Wythenshawe, Manchester
M23 0NA

Title:
Proposed Development Plan showing Exploratory
Hole Locations.

Scale:
As Shown

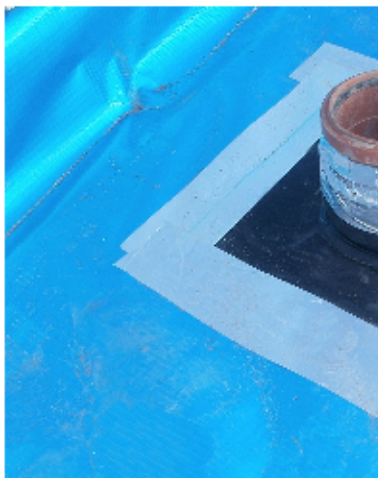
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SFK

Date:
17/12/2018

Drawing No.: TLC1009/04

APPENDIX B

GROUND GAS PROTECTION



- BBA approved, fully complies with BS8485:2015
- Low permeability to methane, radon and carbon dioxide
- Approved for use in NHBC Amber 2 applications
- Multi-layer reinforced LDPE membrane with aluminium core
- High puncture and tear resistance

Description

Visqueen Gas Barrier is a 400 gsm multi-layer reinforced polyethylene membrane with an integral 20 micron aluminium foil that is approved for use in BS8485:2015 and NHBC Amber 2 applications. For ease of identification on site Visqueen Gas Barrier is coloured blue on one side and silver on the reverse. The barrier combines strength and performance with flexibility and easy installation. Visqueen Gas Barrier also acts as a damp proof membrane.

BS8485:2015

When risk assessing under BS8485:2015 for sites which are effected by methane and carbon dioxide then the Visqueen Gas Barrier is an ideal solution.

The membrane has been modified to be 400 gsm with the multi layer structure greatly enhanced to improve its puncture and impact performance.

Visqueen utilise a 20 microns foil to avoid issues associated with thinner (12microns) foils.

Application

The Building Regulations require that proper precautions be taken to prevent danger to health and safety when building on contaminated land. Visqueen Gas Barrier offers a safe solution for the protection of buildings against methane, radon, stythe (a gas commonly found from disused mines, also known as blackdamp), and carbon dioxide, when installed in accordance with the relevant codes of practice such as BRE, CIRIA and the Chartered Institute of Environmental Health Ground Gas Handbook

Typically these are sites previously used as coalfields, landfill or are contaminated industrial sites.

The membrane should be installed blue side up

System components

- Visqueen Double Sided Jointing Tape
- Visqueen Gas Resistant (GR) Foil Tape
- Visqueen Top Hat Units
- Visqueen TreadGUARD1500
- Visqueen Detailing Strip

Installation Guidelines

Visqueen Gas Barrier and ancillary components must be installed in accordance with the recommendations of Building Research Establishment BRE 414 "Protective measures for housing on gas contaminated land" and CIRIA C665 "Assessing risks posed by hazardous ground gases to buildings", NHB C guidelines, and the Chartered Institute of Environmental Health Ground Gas Handbook. The product is not intended for use where there is a risk of hydrostatic pressure. **The membrane should be installed blue side up**

The membrane should be installed on a compacted sand blinding layer or smooth concrete float finish. In areas where high levels of unsupported membrane occur it is recommended that Visqueen Pre Applied Membrane is used. To avoid slip or shear planes and high compressive loadings it is not recommended

VISQUEEN



to take the membrane through the wall. In order to provide a continuous barrier across the cavity Visqueen Gas Resistant DPC should be taken through the blockwork and incorporated below the damp proof course cavity tray in the outer leaf.

Laps can be joined together by either using the Visqueen Gas Barrier jointing system or welded by our specialist on-site contractors.

Jointing and Sealing

Visqueen Gas Barrier should be overlapped by at least 150mm (Welded membranes can be by less than 150mm as long as the joint integrity is not compromised) and bonded with Visqueen Double Sided Tape. The joint should be secured with Visqueen Foil Backed Girth Jointing Tape. Ensure that the membrane is clean and dry at the time of jointing

Airtight seals should be formed around all service entry points. Visqueen Pre-formed Top Hat Units must be used for sealing service entry pipes. The base of the top hat should be sealed using Visqueen Double Sided Tape and Visqueen Foil Backed Girth Jointing Tape is used to secured the joint

Punctures

If the membrane is punctured or perforated, then a patch of material with identical thickness should be lapped at least 150mm beyond the limits of the puncture and bonded with Visqueen Double Sided Jointing Tape and seal with Visqueen Foil Backed Jointing Tape. Alternatively a patch can be formed using Visqueen Detailing Strip and lapped at least 150mm beyond the limits of the puncture. External and Internal corners should be round and reinforced with Visqueen Detailing Strip. Where this is not possible and the 3 dimensional shapes are complex it is recommended a pre-formed unit is used.

NB. In demanding site conditions use Visqueen GR Lap Tape as a high performance alternative to Visqueen Foil Jointing Tape.

Ventilation

When medium to high levels of ground gases are present or when the generation of gases still occurs, then an open void beneath the ground floor should be constructed, as ventilation beneath the ground floor will dilute and disperse the gases to atmosphere. Open voids are normally restricted to beam and block floors or other precast concrete floor systems, an alternative for providing ventilation to in situ concrete floor slabs is to install a Visqueen Ventilation System.

Covering

Visqueen Gas Barrier should be covered by a protective layer as soon as possible after installation. Care should be taken to ensure that the membrane is not punctured, stretched or displaced when applying a screed or final floor covering. A minimum thickness of 50mm screed is recommended. When reinforced concrete is to be laid over the barrier the wire reinforcements and spacers must be prevented from contacting the barrier.

It is recommended that the barrier is covered with Visqueen Protection Boards or screed before positioning the reinforcement. When underfloor heating is being installed, it is recommended that the barrier is positioned between the blinded hardcore and insulation. This will protect the insulation from moisture and avoid any risk of overheating the membrane.

Storage and Handling

Visqueen Gas Barrier is classified as non-hazardous when used in accordance with the relevant Code of Practice (CP 1021973). The product is chemically inert and is not affected by acids and alkalis that may be present in the sub-soils. The material is not recommended for uses where it will be exposed to long periods of outdoor weathering as exposure to ultraviolet light will embrittle the product. Weathering will not occur when the membrane is installed in accordance with CP102 1973. Care should be taken to avoid accidental damage when handling the membrane on site. When the weather is cold, Visqueen Double Sided Jointing Tape and Visqueen Foil Backed Girth Jointing Tape should be kept in a warm, dry place until needed. Installation is not recommended below 5°C.

Technical Data and CE Mark



Visqueen Gas Barrier complies with the requirements and clauses of EN 13967 - Flexible sheets for waterproofing - Plastic and rubber damp proof sheets including plastic rubber basement tanking sheet - Definitions and characteristics.

British Board of Agreement performed the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control, and issued the certificate of constancy of conformity of the factory production control 0836-CPR-13/F060 applies.



Product Data

Gas Barrier
CE Mark to EN 13967

Product Data

heading	Characteristic	Test method	Units	Compliance criteria	Value or Statement
	Visible defects	EN 1850 -2	-	Pass/Fail	Pass
	Length	EN 1848-2	m	-0%/+10%	25 or 50
	Width	EN 1848-2	m	-0%/+10%	2
	Thickness	EN 1849-2	mm	-10%/+10%	0.52
	Mass	EN 1849-2	g/m ²	-7%/+7%	400
	Tensile Strength - MD	EN EN12311	N	>MLV	350
	Tensile Strength - CD	EN EN12311	N/mm ²	>MLV	350
	Tensile Elongation - MD	EN EN12311	%	>MLV	17
	Tensile Elongation - CD	EN EN12311	%	>MLV	15
	Joint Strength	EN12317-2	N	>MLV	332
	Watertightness 2kPa	EN 1928	-	Pass/Fail	Pass
	Resistance to impact	EN 12691	mm	>MLV	200
	Dart Impact	BS 2782	g	MDV	731
	Low temperature flexibility	EN 495-5	oC	-40	Pass
	Durability against ageing	EN 1296 and EN 1928	-	Pass/Fail	Pass
	Durability Chemical Resistance	EN 1847	-	Pass/Fail	Pass
	Resistance to tearing (nail shank) CD	EN 12310-1	N	MDV	358
	Resistance to tearing (nail shank) MD	EN 12310-1	N	MDV	368
	Resistance to static loading	EN 12730	Kg	>MLV	Pass 20
	Water vapour transmission - resistance	EN 1931	MNs/g	MDV	7000
	Water vapour transmission - permeability	EN 1931	g/m ² /d	MDV	0.03
	Reaction to Fire	EN 13501-1	Class	MDV	F
BS8485:2015 testing requirements					
	Mass	EN 1849-2	g/m ²	Average >370	400
	Methane Permeability	ISO15105-1	mls/m ² /d/atm	Pass/Fail	<40 Pass
	Puncture CBR	BS EN ISO 12236	N	MDV	1114
	Impact resistance	EN12691	mm	MDV	1000
	Tensiles Yield strength MD	ASTM D4885-01	kN/m	MDV	12.5
	Tensiles Yield strength CD	ASTM D4885-02	kN/m	MDV	7.3
	Yield elongation MD	ASTM D4885-03	%	MDV	18
	Yield elongation CD	ASTM D4885-04	%	MDV	19
	Tear resistance - trouser method A - MD	BS ISO 34-1	kN/m	MDV	48.2
	Tear resistance - trouser method A - CD	BS ISO 34-1	kN/m	MDV	44.8
	Tear resistance - angle method B - MD	BS ISO 34-1	N	MDV	53.5
	Tear resistance - angle method B - CD	BS ISO 34-1	N	MDV	60.6



About Visqueen

Visqueen is the market leader in the manufacture and supply of structural waterproofing and gas protection systems. Visqueen offers the complete package – a proven, reliable range backed by a technical support service that goes unmatched in the market - everything you would expect from a reputable and ethical company.

Complete Range, Complete Solution

- Structural Waterproofing
- Damp Proof Course
- Damp Proof Membranes
- Gas Protection and Gas Venting
- Vapour Control Layers
- Stormwater Protection

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- Technical Datasheet
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- Nationwide site support team
- Specification advice
- Installation guidance & project sign off
- System design including CAD details

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The specification, technical design, and installation of gas protection systems, enabling the sustainable regeneration of brownfield sites.

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**Visqueen Training Academy**

We are now able to offer exclusive in depth training opportunities on a wide variety of Visqueen products at our Training Academy.

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We provide high-level expertise, comprehensive support and experience in all types of waterproofing and gas protection.



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The information given in this datasheet is based on data and knowledge correct at the time of printing. Statements made are of a general nature and are not intended to apply to any use or application outside any referred to in the datasheet. As conditions of usage and installation are beyond our control we do not warrant performance obtained but strongly recommend that our installation guidelines and the relevant British Standard Codes of Practice are adhered to. Please contact us if you are in any doubt as to the suitability of application.



Gas Resistant DPC CE Mark to EN 14909

Page 1



nbsPlus

- Complies with BS8485:2015 for gas protection
- Tested & passed to ISO 15105-1 methane permeability method
- Aluminium foil to resist methane, radon, CO2 and low levels of hydrocarbon
- Easy to apply using traditional methods
- Independently assessed

DESCRIPTION

Visqueen Gas Resistant (GR) Damp Proof Course is a flexible polyethylene DPC with an aluminium foil designed to prevent the transmission of carbon dioxide, radon, methane and low level hydrocarbon vapours. This is in addition to the product's usage as a damp proof course. Resistance to harmful gases is achieved by an integral aluminium film.

APPLICATION

Visqueen Gas Resistant (GR) DPC should be used on any site where carbon dioxide, radon, methane or low level hydrocarbon vapours are a problem. Methane can occur in any construction on any site previously used for landfill. Such conditions can exist on household, commercial and industrial sites. Visqueen Gas Resistant (GR) DPC has excellent physical characteristics and good cold flexibility performance. It is suitable for vertical, horizontal, stepped and cavity tray applications.

Good Practice Tip

To avoid slip or shear planes it is not recommended to take membranes through the wall. In order to provide a continuous barrier across the cavity Visqueen Gas Resistant DPC should be sealed to the membrane, taken through the blockwork, up the wall and incorporated below the damp proof course on the cavity tray outer leaf

IMPORTANT

Where the DPC may be in direct contact with hydrocarbon contamination the use of Visqueen GX DPC must be considered.

The DPC must be installed with the black side facing up.

System components and jointing

All DPC laps must be a minimum of 100mm and bonded together with Visqueen Zedex DPC Jointing Tape.

Installation

Visqueen Gas Resistant (GR) DPC should be installed in accordance with BS 8215:1991, BS 8000: Part 3, 2001 and BS 5628: Part 3, 2005. All horizontal DPCs must be bedded on both sides with fresh mortar. All DPCs must project through the full width of the wall, including any externally applied rendering and project 5mm beyond the finished external face. All cavities must be kept clear of mortar droppings and other debris. Any mortar droppings reaching the DPCs must be removed before they harden, avoiding the use of sharp objects for removal. Reference should also be made to NHB C guidance notes and BRE Report BR211.

The DPC must be installed with the black side facing up.

VISQUEEN



All DPC laps must be a minimum of 100mm and bonded together with Visqueen Zedex DPC Jointing Tape.

STORAGE AND HANDLING

Visqueen Gas Resistant (GR) DPC is classified as non-hazardous when used in accordance with the relevant British Standards. The product is chemically inert and is not affected by acids and alkalis that may be present in the subsoils.

The DPC should be stored in a warm, dry and environment above 5oC.

Technical Data and CE Mark

Visqueen Gas Resistant Damp Proof Course complies with the requirements and clauses of EN 14909 - Flexible sheets for waterproofing - Plastic and rubber damp proof courses - Definitions and characteristics.

Visqueen Gas Resistant DPC products are manufactured under a Quality Management System (ISO 9001) - Certificate of Compliance reference no. 4560-3 by Knight International applies.



Gas Resistant DPC

CE Mark to EN 14909

Product Data

Product Data

Characteristic	Test method	Units	Compliance criteria	Value or Statement
Visible defect	EN 1850 -2	-	Pass/Fail	Pass
Length	EN 1848-2	m	-0%/+10%	30
Width	EN 1848-2	m	-0%/+10%	0.5 to 1
Straightness	EN 1848-2	-	Pass/Fail	Pass
Thickness	EN 1849-2	mm	-20%/+20%	0.5
Mass	EN 1849-2		-12%/+12%	257;379;475
Watertightness	EN 1928	-	Pass/Fail	Pass
Resistance to impact	EN 12691	mm	>MLV	40
Durability (artificial ageing)	EN 1296 and EN 1928	-	Pass/Fail	Pass
Durability (alkali)	Annex C	-	Pass/Fail	NPD
Resistance to low temperature	EN 495-5	°C	<MLV	-40
Resistance to tearing (nail shank)	EN 12310-1	N	MDV	280 310
Water vapour permeability properties	EN 1931		+/-20%	0.13
Resistance to static loading	EN 12730	Kg	>MLV	20
Reaction to fire	EN 13501-1		Class	F
Methane Permeability	ISO 15105-1		MDV	13
Reaction to Fire	EN 13501-1	Class	MDV	F





Visqueen Building Products

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System Accessories

To ensure full waterproofing protection please use the following certified system components:

- Visqueen High Performance (HP) Tanking Primer
- Visqueen TreadGUARD1500
- Visqueen Protect&Drain
- Visqueen Top Hat Unit

Downloads Library

- Technical Datasheet
- Declaration of Performance
- Visqueen's Guide to CE Marking

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We are specialists in our field and can help you specify the correct solutions with the necessary performance levels, in accordance with building regulations.

- Nationwide site support team
- Specification advice
- Installation guidance & project sign off
- System design including CAD details



APPENDIX C

GENERIC ASSESSMENT CRITERIA

Screening Values shown are for a Sandy Loam soil with a pH of 7.0

Screening Values shown are for a Sandy Loam soil with a pH of 7.0

With respect to elemental mercury, hydrocarbons and other organic contamination, it is assumed that free phase contamination is not present.

	All Concentrations are in ng/gb DW																								Source
	Residential with Plant Uptake				Residential without Plant Uptake				Agriculture				Commercial				Public Open Space (w/ a Residential Area)				Public Open Space (Park)				
	SOM (%)				SOM (%)				SOM (%)				SOM (%)				SOM (%)				SOM (%)				
	1	2.5	5	10	1	2.5	5	10	1	2.5	5	10	1	2.5	5	10	1	2.5	5	10	1	2.5	5	10	
METALS and SEMI-METALS																									
Aluminum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Antimony	37	37	37	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
As	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Barium	1.7	1.7	1.7	1.7	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	
Boron	208	208	208	208	11000	11000	11000	11000	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000	240000	
Cadmium	11	35	35	35	35	35	35	35	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Chromium	913	913	913	913	913	913	913	913	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	18000	
Chromium (VI)	6	6	6	6	6	6	6	6	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	
Chromium (VI)	21	21	21	21	21	21	21	21	576	576	576	576	576	576	576	576	576	576	576	576	576	576	576	576	
Copper	2430	2430	2430	2430	2430	2430	2430	2430	576	576	576	576	576	576	576	576	576	576	576	576	576	576	576	576	
Lead	208	208	208	208	318	318	318	318	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
Mercury (elemental)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	
Mercury (inorganic)	46	46	46	46	46	46	46	46	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	
Mercury (Methyl)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Nickel	130	130	130	130	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	
Selenium	250	250	250	250	438	438	438	438	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	
Vanadium	419	419	419	419	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	
Zinc	3730	3730	3730	3730	40000	40000	40000	40000	826	826	826	826	826	826	826	826	826	826	826	826	826	826	826	826	
PETROLEUM HYDROCARBONS																									
Aromatic EC 5-4	42	78	180	42	78	180	42	78	1700	3600	3200 (344)	5800 (558)	12000 (1152)	57000 (304)	59000	60000	85000 (544)	130000 (558)	100000 (1152)						
Aromatic EC 8-4	138	358	820	138	358	820	138	358	8600	17000 (322)	17000 (322)	32000 (1704)	67000 (322)	67000	68000	100000 (144)	200000 (552)	300000 (552)							
Aromatic EC 8-10	27	68	180	27	68	180	27	68	320	776	1700	3600	3200 (344)	13000	13000	18000 (756)	18000 (756)	27000 (450)							
Aromatic EC 10-12	130 (48)	330 (118)	708 (285)	130 (48)	330 (118)	708 (285)	130 (48)	330 (118)	2200	4400	10000 (180)	20000 (360)	40000 (720)	13000	13000	18000 (756)	18000 (756)	27000 (450)							
Aromatic EC 12-15	1100 (24)	2400 (56)	4400 (142)	1100 (24)	2400 (56)	4400 (142)	1100 (24)	2400 (56)	11000	22000	50000 (24)	100000 (58)	200000 (142)	13000	13000	18000 (756)	18000 (756)	27000 (450)							
Aromatic EC 15-18	8500 (8.48)	8200 (21)	11000	8500 (8.48)	8200 (21)	11000	8500 (8.48)	8200 (21)	26000	27000	180000	170000	180000	240000	240000	440000	440000	440000							
Aromatic EC 18-44	85000 (8.48)	82000 (21)	110000	85000 (8.48)	82000 (21)	110000	85000 (8.48)	82000 (21)	260000	270000	1800000	1700000	1800000	2400000	2400000	4400000	4400000	4400000							
Aromatic EC 5-7 (benzene)	70	143	370	70	143	370	70	143	57	57	26000 (1220)	48000 (2280)	80000 (4716)	50000	50000	70000 (120)	80000 (280)	100000 (470)							
Aromatic EC 7-4 (toluene)	130	268	680	130	268	680	130	268	22	51	50000 (800)	110000 (1620)	180000 (4380)	56000	56000	70000 (800)	80000 (1620)	100000 (4380)							
Aromatic EC 8-10	34	87	215	34	87	215	34	87	61	61	34000 (876)	61000 (1406)	110000 (2484)	50000	50000	60000 (876)	70000 (1406)	90000 (2484)							
Aromatic EC 10-12	74	188	380	250	376	1200	13	74	31	74	16000 (384)	28000 (806)	34000 (2106)	50000	50000	60000 (384)	70000 (806)	90000 (2106)							
Aromatic EC 12-15	140	338	680	1800	2300 (416)	2500	23	57	130	260	35000 (180)	37000	38000	51000	51000	50000	10000	10000	10000						
Aromatic EC 15-18	260	543	930	1900	1900	1900	40	116	260	38000	38000	38000	38000	38000	38000	38000	7800	7800	7800						
Aromatic EC 18-44	1160	1700	1700	1900	1900	1900	370	826	1600	28000	28000	28000	28000	28000	28000	28000	3800	3800	3800						
Aromatic EC 35-44	1160	1900	1700	1900	1900	1900	370	826	1600	28000	28000	28000	28000	28000	28000	28000	3800	3800	3800						
Aromatic + Aromatic EC 44-73	1900	1800	1800	1900	1900	1800	1200	2100	3600	28000	28000	28000	28000	28000	28000	28000	3800	3800	3800						
POLYNUCLEAR AROMATIC HYDROCARBONS																									
Acenaphthene	210	513	1108	3000 (817.8)	4700 (141)	4000 (334)	34	86	200	16000 (817)	16000 (141)	18000	18000	18000	18000	18000	28000	30000	30000						
Acenaphthylene	170	423	890	2000 (56.1)	4900 (212)	9000 (566)	25	69	160	16000 (56.1)	37000 (212)	18000	18000	18000	18000	18000	28000	30000	30000						
Anthracene	2400	5400	11000	31000 (1.47)	4900 (212)	9000 (566)	380	958	2200	16000 (1.47)	37000 (212)	54000	54000	54000	54000	54000	74000	74000	150000						
Benzo(a)anthracene	7.2	11	13	11	14	15	2.9	6.5	13	170	170	168	29	29	29	29	49	50	62						
Benzo(a)pyrene	2.2	2.7	3.3	3.2	3.7	4.2	0.97	2.3	3.8	3.2	38	38	38	8.7	8.7	8.7	11	12	13						
Benzo(b)fluoranthene	2.2	2.7	3.3	3.2	3.7	4.2	0.98	2.3	3.8	3.2	44	44	44	7.1	7.1	7.1	10	11	12						
Benzo(k)fluoranthene	320	343	350	350	360	360	290	440	640	3600	4000	4000	4000	6400	6400	6400	1400	1500	1600						
Benzo(g,h,i)perylene	71	93	100	110	118	110	37	75	130	1300	1200	1200	1200	180	180	180	270	270	410						
Chrysene	99	122	127	130	131	132	4.1	8.3	13	380	380	380	380	87	87	87	80	80	110						
Dibenz(a,h)anthracene	0.28	0.34	0.38	0.37	0.42	0.43	0.14	0.32	0.43	9.14	9.14	9.14	9.14	3.3	3.3	3.3	3.3	3.3	4.4						
Fluorene	280	350	360	360	360	360	52	67	160	23000	23000	23000	23000	3700	3700	3700	6300	6300	8400						
Fluoranthene	170	408	980	2600 (30.8)	3800 (18.4)	4000 (160)	27	67	160	16000 (30.8)	16000 (18.4)	18000	18000	18000	18000	18000	28000	30000	30000						
Indeno(1,2,3-cd)pyrene	27	36	41	45	48 (212)	48	8.8	21	38	590	510	510	510	82	82	82	120	120	130						
Naphthalene	2.3	2.3	2.3	2.3	2.3	2.3	13	13	24	190 (17.4)	480 (160)	1100 (452)	4400 (24)	4900	4900	4900	12000 (26.4)	18000 (180)	40000						
Phenanthrene	30	328	440	1300 (36.6)	1400	1500	15	38	98	32000	32000	32000	32000	3100	3100	3100	6200	6200	8300						
Pyrene	620	1200	2908	3700	3800 (18.4)	3800	110	278	620	84000	84000	84000	84000	7400	7400	7400	14000	14000	18000						
Cost Tar (BaP used as a surrogate marker)	-	-	5.8	-	-	5.3	-	-	-	-	-	-	-	17	-	-	18	-	-	21					
Cost Tar (BaP used as a surrogate marker)	0.78	0.88	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	15	2.2	2.2	2.2	2.2	4.4	4.7	4.6					
BTEX COMPOUNDS																									
Benzene	0.087	0.17	8.37	0.38	0.7	1.4	0.017	0.834	0.875	27	47	96	96	72	72	72	73	73	116						
Benzene	-	-	8.87	-	-	3.3	-	-	6.18	-	-	98	-	-	-	-	143	-	-	236					
Toluene	130	268	680	880 (808)	1900	3800	22	51	120	9000 (808)	11000 (1620)	16000 (4380)	56000	60000	60000	60000	87000 (808)	98000 (1620)	130000 (4380)						
Ethylbenzene	47	110	440	95	99	101	95	99	101	12000 (95)	12000 (1020)	17000 (2640)	24000	24000	24000	24000	27000 (95)	27000 (1020)	27000 (2640)						
Xylene, o	80	143	330	80	218	480	20	67	160	6800 (80)	15000 (1120)	30000 (3620)	41000	41000	41000	41000	47000 (80)	47000 (1120)	53000 (3620)						
Xylene, m	80	143	330	82	180	480	31	74	170	6200 (82)	14000 (1470)	31000 (3480)	42000	42000	42000	42000	47000 (82)	47000 (1470)	53000 (3480)						
Xylene,																									

General Assessment Criteria (GAC) Screening Values for the Protection of Human Health

Screening Values shown are for a Barely Liable soil with a pH of 7.0

With respect to elemental mercury, hydrocarbons and other organic contaminants, it is assumed that free phase contamination is not present.

	All Concentrations are in mg/kg DW																		Source
	Residential with Plant Uptake			Residential without Plant Uptake			Agriculture			Commercial			Public Open Space (in a Residential Area)			Public Open Space (Park)			
	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	
Tetrachloroethene (PCE)	0.18	0.39	8.30	0.18	0.43	8.32	0.05	1.5	3.8	19	42	95	1408	1400	1400	818 (424)	1108 (591)	1590	a (S4/L)
Tetrachloroethene (Carbon Tetrachloride)	0.026	0.058	8.10	0.026	0.058	8.10	0.45	1.0	2.4	2.8	5.3	14	880	820	850	190	270	408	a (S4/L)
Trans 1,2-Dichloroethene	0.18	0.36	8.70	0.18	0.35	8.71	0.60	1.9	4.8	22.0	40	81	ND	ND	ND	ND	ND	ND	c
Trichloroethene (TCE)	0.016	0.034	0.019	0.017	0.038	0.080	0.041	0.891	0.21	1.2	2.6	5.7	120	120	120	75	91	128	a (S4/L)
Trichloroethene (Chloroform)	0.01	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	10	170	350	2508	2500	2500	2600	3000	3180	a (S4/L)
Trichloroethene (Bromodichloroethene)	2.6	5.9	13	5.2	11	23	0.56	2.1	4.8	780	1550	2100	ND	ND	ND	ND	ND	ND	c
Vinyl Chloride (Chloroethene)	0.0004	0.0007	0.0014	0.0007	0.0010	0.0018	0.0068	0.0010	0.0018	0.088	0.077	0.12	3.8	3.8	3.8	4.8	5.0	5.4	a (S4/L)
CHLOROBENZENE (+ other BENZENE RELATED COMPOUNDS)																			
Benzobenzene	0.07	2.0	4.7	0.04	2.1	4.8	3.2	7.6	18	87	220	528	ND	ND	ND	ND	ND	ND	c
Chlorobenzene	0.48	1.0	2.4	0.48	1.0	2.4	5.4	14	38	85	30	598	11000	10800	14000	1300 (475)	2000 (1520)	2980	a (S4/L)
1,2-Dichlorobenzene	23	58	130	24	57	130	84	208	543	2800 (307)	4800 (1378)	11000 (3240)	80000	80800	88000	24800 (307)	38000 (1378)	51600 (3240)	a (S4/L)
1,3-Dichlorobenzene	0.48	1.0	2.3	0.44	1.1	2.5	0.28	0.6	1.5	30	75	179	380	300	300	780	440	471	a (S4/L)
1,4-Dichlorobenzene	81	158	350	81	158	350	15	37	88	4420 (224)	18000 (348)	25000 (1288)	17000	17000	17000	30000 (224)	36000 (348)	38000 (1288)	a (S4/L)
Heptachlorobenzene	1.8 (5.28)	3.3 (9.86)	4.8	4.1 (9.28)	8.7 (9.86)	8.7 (9.28)	0.47	1.1	2.5	116 (5.28)	125	259	18	16	16	29	30	36	a (S4/L)
Isopropylbenzene	11	27	64	12	28	67	32	79	180	1400 (180)	3300 (386)	7700 (2280)	ND	ND	ND	ND	ND	ND	c
1,2,3-Trichlorobenzene	5.0	12	22	19	30	38	1.2	3.1	7.8	540 (43.8)	170 (107)	570	180	100	108	190	190	198	a (S4/L)
Propylbenzene	34	62	190	40	97	230	34	83	205.8	4100 (462)	9700 (581)	21000 (2336)	ND	ND	ND	ND	ND	ND	c
1,2,4-Trichlorobenzene	1.5	3.6	8.8	1.5	3.7	8.8	4.7	12	28	152	250	594	1808	1800	1800	778 (134)	1138 (234)	1600 (294)	a (S4/L)
1,2,4-Trichlorobenzene	2.6	6.4	15	2.6	6.4	15	85	148	323	220	530	1300	18000	17800	18000	1730 (138)	2800 (286)	4800 (1885)	a (S4/L)
1,3,5-Trichlorobenzene	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	129	1708	1700	1800	380 (36.7)	508 (58.8)	880 (217)	a (S4/L)
1,2,3,4-Tetrachlorobenzene	10	38	78	24	58	120	4.4	11	28	1700 (122)	3000 (304)	4480 (726)	830	830	830	1530 (122)	1600	1600	a (S4/L)
1,2,3,5-Tetrachlorobenzene	0.68	1.6	3.7	0.78	1.9	4.3	0.58	0.80	2.2	18 (28.4)	120 (68.1)	240 (526)	78	78	78	118 (58)	130	138	a (S4/L)
1,2,4,5-Tetrachlorobenzene	0.33	0.77	1.8	0.73	1.7	3.8	0.08	0.18	0.37	42 (19.7)	72 (49.1)	120	13	13	13	28	35	38	a (S4/L)
1,2,4-Trichlorobenzene	0.38	0.85	2.3	0.41	0.92	2.3	0.38	0.82	2.2	42	90	223	ND	ND	ND	ND	ND	ND	c
PESTICIDES																			
Azinphos	5.7	6.6	7.1	7.3	7.4	7.8	3.2	6.1	6.8	170	170	178	18	18	18	30	31	31	a (S4/L)
Dieldrin	0.97	2.0	3.8	7.0	7.3	7.4	0.17	0.41	0.80	170	170	178	18	18	18	30	31	31	a (S4/L)
Atrazine	3.3	7.80	17.4	610	628	620	0.58	1.2	2.7	9308	9400	9400	1208	1200	1200	2308	2400	2480	a (S4/L)
Chlorpyrifos	0.032	0.308	6.14	8.4	6.5	6.5	0.044	0.810	1.022	140	140	149	16	16	16	28	29	27	a (S4/L)
Alpha Endosulfan	7.4	18	41	146 (5.803)	281 (5.807)	470 (5.806)	1.2	2.9	6.8	1460 (5.803)	2481 (5.807)	4430 (5.806)	1208	1200	1200	2408	2400	2480	a (S4/L)
Beta Endosulfan	7.0	17	39	198 (3.0007)	328 (3.0002)	440 (3.0004)	1.1	2.7	6.4	8380 (3.0007)	7580 (3.0002)	9720	1208	1200	1200	2408	2400	2480	a (S4/L)
Alpha-Hexachlorocyclohexane (nc. Lindane)	0.23	0.55	1.2	5.9	0.2	11	0.025	0.887	0.21	170	170	178	24	24	24	40	40	46	a (S4/L)
Beta-Hexachlorocyclohexane (nc. Lindane)	0.085	0.2	0.46	3.7	3.8	3.8	0.015	0.830	0.077	85	85	86	8.1	8.1	8.1	15	15	16	a (S4/L)
Gamma-Hexachlorocyclohexane (nc. Lindane)	0.08	0.16	0.35	2.9	3.3	3.8	0.0090	0.823	0.094	87	87	78	8.2	8.2	8.2	15	15	16	a (S4/L)
PHENOLATES																			
Di (2-Ethylhexyl) Phthalate	208 (8.88)	510 (21.6)	1100 (51.7)	2780 (8.88)	2800 (21.6)	2800 (51.7)	47 (8.88)	120 (21.6)	280 (51.7)	8500 (8.88)	8500 (21.6)	8500 (51.7)	ND	ND	ND	ND	ND	ND	c
Butylbenzyl Phthalate	1430 (26.2)	3300 (94.7)	7200 (154)	4200 (26.2)	4430 (94.7)	4430 (154)	220 (26.2)	560 (94.7)	1300 (154)	84000 (26.2)	84000 (94.7)	84000 (154)	ND	ND	ND	ND	ND	ND	c
Diethyl Phthalate	128 (13.7)	280 (29.1)	810 (89)	1600 (13.7)	3800 (29.1)	6780 (89)	17 (13.7)	41 (29.1)	84 (89)	15000 (13.7)	23800 (29.1)	28000 (89)	ND	ND	ND	ND	ND	ND	c
D-n-Butyl Phthalate	11 (4.05)	31 (11.4)	67 (27.3)	495 (4.05)	490 (11.4)	480 (27.3)	2.0	5.0	12	18000 (4.05)	18000 (11.4)	18000 (27.3)	ND	ND	ND	ND	ND	ND	c
D-n-Octyl Phthalate	2300 (32.8)	2800 (31.5)	2130 (199)	3430 (32.8)	2400 (31.5)	3430 (199)	845 (32.8)	2130 (31.5)	3000 (199)	8800 (32.8)	8800 (31.5)	8800 (199)	ND	ND	ND	ND	ND	ND	c
TOLUENE COMPOUNDS & EXPLOSIVES																			
2,4,6-Trinitrotoluene (TNT)	1.6	3.7	8.1	85	98	98	0.24	0.68	1.40	1208	1200	1200	130	130	138	260	270	278	a (S4/L)
2,4-Dinitrotoluene	1.5	3.2	7.1	170 (34.1)	178	170	0.22	0.49	1.10	3730 (34.1)	3700 (295)	3280 (988)	ND	ND	ND	ND	ND	ND	c
2,6-Dinitrotoluene	0.78	1.7	3.8	70	84	87	0.12	0.27	0.61	1900 (287)	1900 (322)	1900 (1400)	ND	ND	ND	ND	ND	ND	c
RDX	120	268	640	13800	13000	13000	17	38	88	21000	21000	21000	26000	26000	27000	48000 (36.7)	81000	83000	a (S4/L)
HMX	5.7	13	28	8700	8780	8780	0.68	1.9	3.8	11000	11000	11000	13000	13000	13000	23000 (3.36)	23000 (3.36)	24000 (3.46)	a (S4/L)
OTHER COMPOUNDS																			
Carbon Disulfide	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11800	12000	1300	1600	2780	a (S4/L)
2-Chloroethylchloride	3.7	9.2	22	3.68	9.3	22	40	86	203	390	890	2280 (888)	ND	ND	ND	ND	ND	ND	c
Bisphenol	80 (34.4)	103	380	228 (34.4)	309 (34.3)	308 (281)	14	35	83	33000 (34.3)	48000 (201)	48000 (201)	ND	ND	ND	ND	ND	ND	c
Styrene	8.1	19	43	35	78	170	25	56	127	3300 (696)	6900 (1446)	11000 (2350)	ND	ND	ND	ND	ND	ND	c
Methyl Tert-Butyl Ether (MTBE)	40	84	180	73	158	230	23	44	98	7608	15808	24000	ND	ND	ND	ND	ND	ND	c
Triethyl Tin Oxide	0.28	0.89	1.3	1.4	3.1	8.7	0.042	0.10	0.23	130 (41.3)	180 (101)	200 (241)	ND	ND	ND	ND	ND	ND	c
Hexachloro-1,3-Butadiene	0.28	0.70	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	85	129	25	25	25	48	50	51	a (S4/L)

■ = The GAC presented exceeds the solubility solubility limit, which is presented in brackets. Soil concentrations above solubility may indicate that NAPL is present. Risks from NAPL need to be considered separately.

■ = The GAC presented exceeds the vapour saturation limit, which is presented in brackets.

Source References

a. Nathanael, C.P., McCarthy, C., Gibbs, A.G., Ogden, R.C. and Nathanael, J.F., "The LQM/CEH SBLs for Human Health Risk Assessment", Dated 2015 and published by Land Quality Press, Nottingham.

b. Delta, "Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination (SP1010): Final Project Report, March 2014; & Delta, "Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination (SP1010): Policy Companion Document", March 2014. Values are advised to be used by the MHRC - also issue 15 of their "Technical Entry" document dated October 2016.

c. CLARE / AGS / D/C (December 2008) "The Soil Generic Assessment Criteria for Human Health Risk Assessment".