



HAVANT BOROUGH
COUNCIL

18 JUL 2016

RECEIVED
14 July, 2016

Our Ref. p-sw-536.havant

Mansell Homes
c/o Balfour Beatty
Southern Delivery Unit
Pavilion B, Ashwood Park
Ashwood Way
Basingstoke
RG23 8BG

For the attention of Mr. Ron Rouse, Design Development Director.

Dear Sirs,

Residential Development at 59-61 West Street, Havant – Validation of Remedial Works.

This letter report presents the findings of the validation of remedial works completed in connection with the above project.

The following items are enclosed for your information.

- Table 1: Comparison of laboratory test data for imported soils with generic assessment criteria for residential land use with plant uptake.
- Figure 1: Plan showing the positions of validation trial pits superimposed on site layout drawing.
- Enclosure A: Records of the validation pits.
- Enclosure B: Photographs of validation pits.
- Enclosure C: Chemical test certificates for imported soils.
- Enclosure D: Construction drawings showing gas membrane arrangements.
- Enclosure E: Photographs showing gas membrane installation.
- Enclosure F: Gas membrane specification sheets.

1.0 Introduction and Terms of Reference

- 1.1 Ground Investigation (South West) Limited (GISW) has been appointed by Mansell Homes to validate the completion of remedial works at the residential development site known as 59-61 West Street, Havant, near Portsmouth.
- 1.2 The validation works have been undertaken to address land quality issues revealed by earlier investigatory works, which have been addressed on the basis of a documented remediation strategy.
- 1.3 This letter report should be read in conjunction with the documents and reports identified in the following table:

(i)	Phase I and Phase II Geo-Environmental Site Investigation undertaken by REC Environmental Consultants Limited, dated February, 2014.	Ref. 1
(ii)	Proposed Residential Development, West Street, Havant, Supplementary Geo-Environmental Site Assessment undertaken by GISW, dated 17 th September 2014.	Ref. 2
(iii)	West Street, Havant, Supplementary Site Investigation and Assessment undertaken by GISW (following demolition), dated August, 2015.	Ref. 3
(iv)	West Street, Havant, Supplementary Monitoring and Testing undertaken by GISW (during initial groundworks), dated September, 2015.	Ref. 4
(v)	Proposed Residential Development, West Street, Havant, Remediation Method Statement prepared by GISW, dated February, 2016.	Ref. 5

2.0 Remedial Requirements

Mitigation of Chronic Human Health Risks

- 2.1 The Geo-Environmental Site Assessment and subsequent Site Investigation and Assessment Reports, together with the earlier works undertaken by others (Refs. 1-3) identified a requirement for remediation of the private gardens and communal soft landscaped areas of the development to mitigate potential human health risks from ground contamination, relating specifically to the detected presence of elevated concentrations of lead and benzo(a)pyrene, relative to the published generic assessment criteria for a sensitive residential land use with plant uptake.
- 2.2 The proposed remedial works were discussed and amended following the completion of additional monitoring and soils testing during the groundworks phase of construction (Ref. 4) and a detailed Remediation Method Statement was prepared (Ref. 5), reflecting the findings of all of the earlier works. Further minor amendments with regards to the materials utilised in the clean cover were discussed and agreed as the works progressed, including the substitution of a greater thickness of topsoil for subsoil due to lack of availability of the latter and the provision of a thicker granular capping layer for the southernmost gardens.

Mitigation of Potential Ground Gas Risks

- 2.3 The Geo-Environmental Site Assessment Report issued by GISW in 2014 (Ref. 2) identified a low degree of risk from hazardous ground gas, based on the consideration of methane and carbon dioxide concentrations and flow rates. However, due to localised elevation in carbon dioxide concentrations, exceeding the typical maximum value of 5% for CS-1, the recommendation was made to install gas protective measures corresponding to CIRIA CS-2 or NHBC Amber 1, as appropriate to the specific buildings, as a precautionary measure.
- 2.4 Following the completion of supplementary monitoring and testing during the initial groundworks phase of construction, it was decided to upgrade the protective measures for plots 14 -24, along the rear of the site to provide a higher degree of protection specifically from hydrocarbon vapours.
- 2.5 Construction drawings illustrating the gas protective measures are presented in Enclosure D. For the traditional housing these show a 300 mm thick concrete raft slab constructed over a 2000 gauge Visqueen EcoMembrane, with a 300-525mm thickness of sand-blinded sub-base below, topped by either a Hyload Gastite LL Trade DPM, or a GX Flexi Hydrocarbon Barrier as appropriate to the agreed remediation strategy. For the apartments, following removal of the existing timber flooring, a new reinforced concrete ground floor slab was constructed over an imported granular sub-base, with a 2000 gauge Visqueen separation membrane, topped by a Hyload Gastite LL Trade DPM. An injected DPC is indicated to have been used and lapped with the gas membrane. Similarly the membrane is indicated to be sealed against the new internal columns and service entries.

3.0 Imported Topsoil Validation

- 3.1 Eighteen trial pits were inspected by GISW with the primary purpose of confirming that the requirements of the remedial strategy were addressed during construction. A plan showing the

approximate positions of the validation pits is presented as Figure 1, whilst records of the pits are presented in Enclosure A.

- 3.2 All of the validation pits were excavated by hand and extended to the geotextile membrane separator layer that was placed beneath the imported topsoil.
- 3.3 The pits typically revealed imported Topsoil comprising friable, dark brown silt/clay with some sand, gravel and fibrous root matter. In areas of soft communal landscaping, outside of the block of flats (Plots 3-10), the Topsoil was 0.5 m thick. Elsewhere, in private garden areas, the Topsoil was between 0.6 and 0.7 m thick. As discussed previously, a black woven geotextile membrane was placed beneath the Topsoil of Plots 1-13. A high tensile strength, orange plastic geotextile membrane was placed beneath the Topsoil of Plots 14-24. A further layer of imported granular material extends some 0.2 m beyond the level of the membrane in plots 14-24 as confirmed by photographs provided by the contractor, such that the full thickness of the clean cover materials in these gardens is some 0.8 to 0.9 m as required by the remediation strategy. It was not possible to confirm this within the validation pits without causing damage to the high tensile strength 'no-dig' membrane, but we are satisfied that this granular horizon is present. Photographs showing the validation pits are presented in Enclosure B.
- 3.4 Samples were recovered from the imported topsoil for validation testing and the chemical test certificates are presented in Enclosure C. The results are summarised and compared with appropriate generic assessment criteria on Table 1. This comparison indicates that the imported topsoil is suitable for use in the context of the residential land use. For further validation information, Enclosure C also includes previous laboratory test data provided by the contractor for the imported material, relating to samples taken prior to the materials being brought to site, which also demonstrate their suitability for use.

4.0 Gas Membrane Installation

- 4.1 Selected photographs showing the installation of the gas membranes are presented in Enclosure E, and specification sheets for the particular gas membranes are presented in Enclosure F. As discussed previously, construction drawings are included in Enclosure D.
- 4.2 The photographs illustrate and confirm that the plots were fitted with the appropriate membranes in accordance with the construction drawings provided, including the 2000 gauge Visqueen EcoMembrane beneath the raft slabs, which is evident in photographs taken prior to the slabs being poured, and both the Hyload Gastite LL Trade DPM and GX Flexi Hydrocarbon Barrier as appropriate. The photographs show the membranes being taped and sealed during installation, with the higher specification grey coloured GX hydrocarbon barrier being installed in plots 14-24.

5.0 Conclusions

- 5.1 The validation works have demonstrated that the remedial groundworks have been completed in accordance with the recommendations made in the Geo-Environmental Site Assessment Report and Remediation Method Statement, and are sufficient to satisfactorily address potential human health risks associated with ground contamination within the completed garden and soft landscaped areas, together with potential risks arising from potentially hazardous ground gas.
- 5.2 The validation trial pits have confirmed the presence of an appropriate depth of 'clean' imported topsoil within the soft landscaped areas of the site. The results of the laboratory test results, summarised on Table 1, indicate that the soils are suitable for use in the context of the new development.
- 5.3 The construction drawings and photographs illustrating the gas protection measures, together with the associated specification sheets, suggest that the precautionary gas protection measures have been installed to a suitable and adequate standard.
- 5.4 It is concluded that the remedial works which have been undertaken should fulfil their required purpose and satisfactorily address and mitigate potential chronic human health risks

to the occupiers of the identified plots, associated with ground contamination arising from the past usage of the site, together with potentially hazardous ground gas ingress.

I trust the above comments together with the enclosed items are sufficient for the purposes of your interpretation. If you require any further information please do not hesitate to contact us.

Yours faithfully,



Richard Colwill
Chartered Geologist
BSc (Hons), MRes, CGEOL, FGS

TABLES

Validation Sampling, West Street, Havant

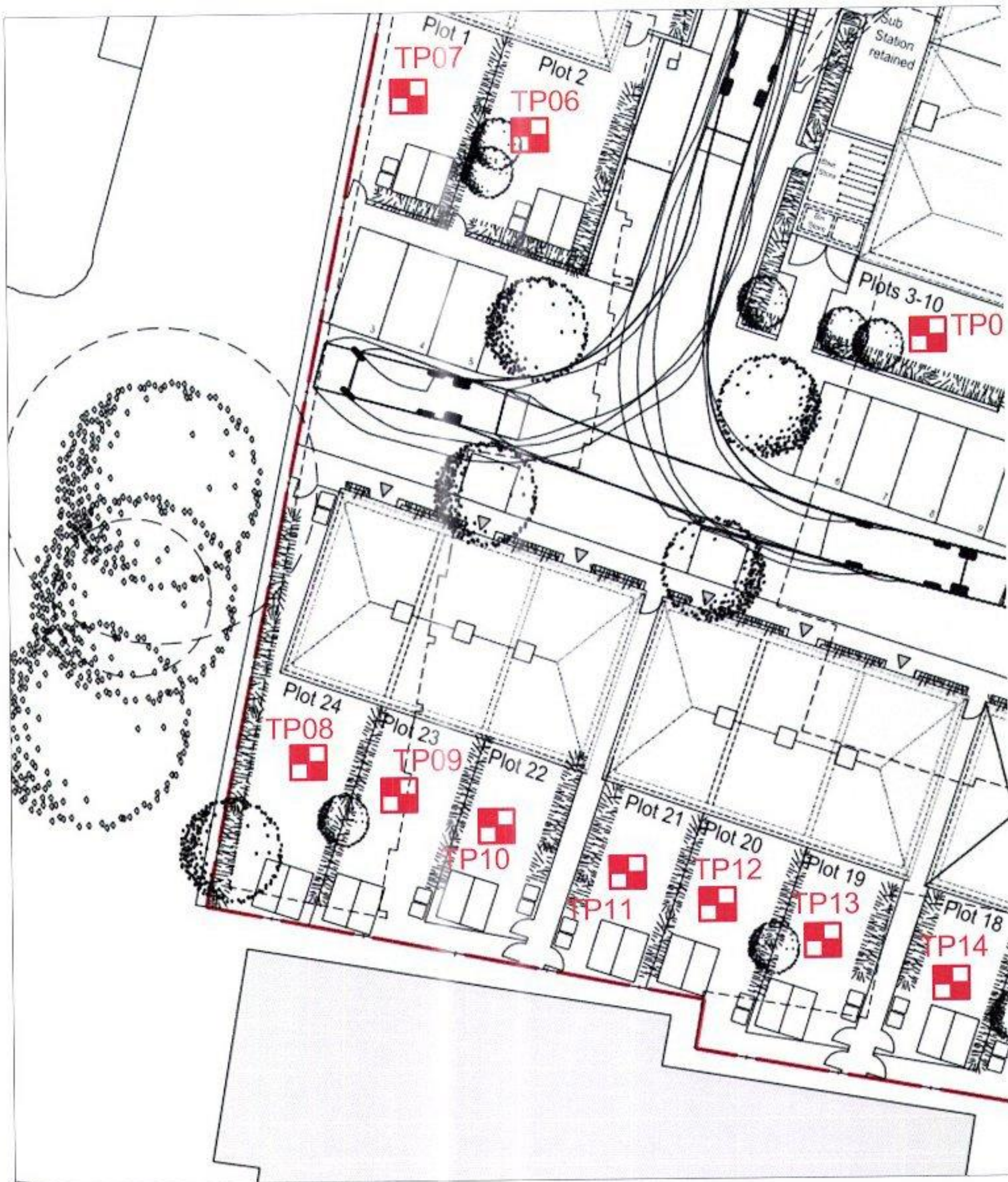
Table 1 - Estimation of Chronic Human Health Risks for
Standard Residential Land Use with Plant Uptake (2.5% SOM)

Contaminant	Units	GAC	Pass criteria?	TP1 0.00 - 0.00m	TP3 0.00 - 0.05m	TP5 0.00 - 0.50m	TP7 0.00 - 0.60m	TP8 0.00 - 0.60m	TP13 0.00 - 0.60m	TP16 0.00 - 0.60m	TP18 0.00 - 0.60m
pH value	-	-	-	8.2	8.0	8.5	8.4	8.8	8.2	8.1	8.1
Sol. Organic Matter	%	-	-	3.8	6.4	4.3	4.2	4.8	4.8	4.2	3.9
Asbestos Fibres Screen	-	-	-	NA	NA	NA	NA	NA	NA	NA	NA
Metals and inorganics	Arsenic	mg/kg	37	✓	2.7	6.8	7.1	7.4	7.5	4.7	7.3
	Boron	mg/kg	230	✓	1.0	1.3	1.2	1.5	1.2	1.1	1.3
	Cadmium	mg/kg	11	✓	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Chromium	mg/kg	910	✓	18.4	17.2	17.8	17.6	18.1	19.0	21.5
	Chromium (VI)	mg/kg	6	✓	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
	Copper	mg/kg	2400	✓	21.2	20.4	24.7	26.1	24.6	22.8	25.1
	Lead	mg/kg	201 ^{DBL}	✓	59.4	75.8	61.5	63.5	63.7	63.3	69.4
	Inorganic Mercury	mg/kg	40	✓	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
	Nickel	mg/kg	130	✓	10.8	9.5	9.6	10.2	10.2	11.0	11.4
	Selenium	mg/kg	250	✓	< 1.0	< 1.0	1.0	< 1.0	< 1.0	< 1.0	< 1.0
	Zinc	mg/kg	3700	✓	98.2	86.2	126	112	107	105	115
Organics	Cyanide	mg/kg	41 ^{DBL}	✓	< 1.0	< 1.0	< 1.0	< 1.0	1.0	< 1.0	< 1.0
	Phenols	mg/kg	200	✓	< 6	< 6	< 6	< 6	< 6	< 6	< 6
PAHs	Naphthalene	mg/kg	5.8	✓	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Acenaphthylene	mg/kg	423	✓	0.02	0.01	0.01	0.05	0.02	0.02	0.08
	Acenaphthene	mg/kg	513	✓	< 0.01	< 0.01	0.02	0.01	< 0.01	< 0.01	0.08
	Fluorene	mg/kg	498	✓	< 0.01	< 0.01	0.01	0.02	< 0.01	< 0.01	0.07
	Phenanthrene	mg/kg	220	✓	0.01	0.07	0.10	0.21	0.08	0.07	0.86
	Anthracene	mg/kg	5400	✓	0.03	0.09	0.04	0.11	0.03	0.03	0.31
	Fluoranthene	mg/kg	560	✓	0.29	0.21	0.35	1.30	0.28	0.29	2.16
	Pyrene	mg/kg	1280	✓	0.30	0.22	0.36	2.07	0.30	0.30	1.60
	Benzo(a)anthracene	mg/kg	11	✓	0.13	0.12	0.24	1.40	0.18	0.20	1.13
	Chrysene	mg/kg	22	✓	0.28	0.14	0.28	1.23	0.19	0.21	0.99
	Benzo(b)fluoranthene	mg/kg	3.3	✓	0.23	0.14	0.31	1.24	0.23	0.25	0.99
	Benzo(k)fluoranthene	mg/kg	85	✓	0.20	0.15	0.28	1.21	0.20	0.20	0.89
	Benzo(a)pyrene	mg/kg	2.7	✓	0.35	0.16	0.34	1.92	0.24	0.25	1.12
	Indeno(1,2,3-c,d)pyrene	mg/kg	36	✓	0.24	0.10	0.23	0.93	0.16	0.20	0.80
	Dibenz(a,h)anthracene	mg/kg	8.26	✓	0.01	0.04	0.12	0.08	0.08	0.07	0.26
BTXs	Benzo(g,h,i)perylene	mg/kg	340	✓	0.23	0.11	0.27	1.02	0.19	0.17	0.61
	Benzene	mg/kg	1.17	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Toluene	mg/kg	290	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Ethyl Benzene	mg/kg	113	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Xylenes	mg/kg	130	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
TPHs (Aromatics)	mC ₉ -nC ₁₁	mg/kg	140	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	mC ₁₀ -nC ₁₂	mg/kg	290	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	mC ₁₁ -nC ₁₃	mg/kg	63	✓	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	mC ₁₂ -nC ₁₄	mg/kg	180	✓	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	mC ₁₃ -nC ₁₅	mg/kg	330	✓	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	mC ₁₄ -nC ₁₆	mg/kg	540	✓	1.1	< 1.0	< 1.0	< 1.0	6.0	3.2	2.6
	mC ₁₅ -nC ₁₇	mg/kg	1500	✓	15.0	14.3	16.2	16.3	36.3	75.6	38.2
TPHs (Aliphatics)	mC ₁₆ -nC ₁₈	mg/kg	1500	✓	4.9	5.5	6.0	5.2	12.0	23.9	15.9
	nC ₁₇ -nC ₁₉	mg/kg	78	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	nC ₁₈ -nC ₂₀	mg/kg	230	✓	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	nC ₁₉ -nC ₂₁	mg/kg	63	✓	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	nC ₂₀ -nC ₂₂	mg/kg	330	✓	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	nC ₂₁ -nC ₂₃	mg/kg	2400	✓	2.0	< 1.0	< 1.0	< 1.0	5.1	< 1.0	1.3
	nC ₂₂ -nC ₂₄	mg/kg	92000	✓	4.0	2.0	1.8	1.8	7.2	3.0	2.6
	nC ₂₃ -nC ₂₅	mg/kg	92020	✓	16.0	23.1	15.3	19.3	29.8	48.5	22.2

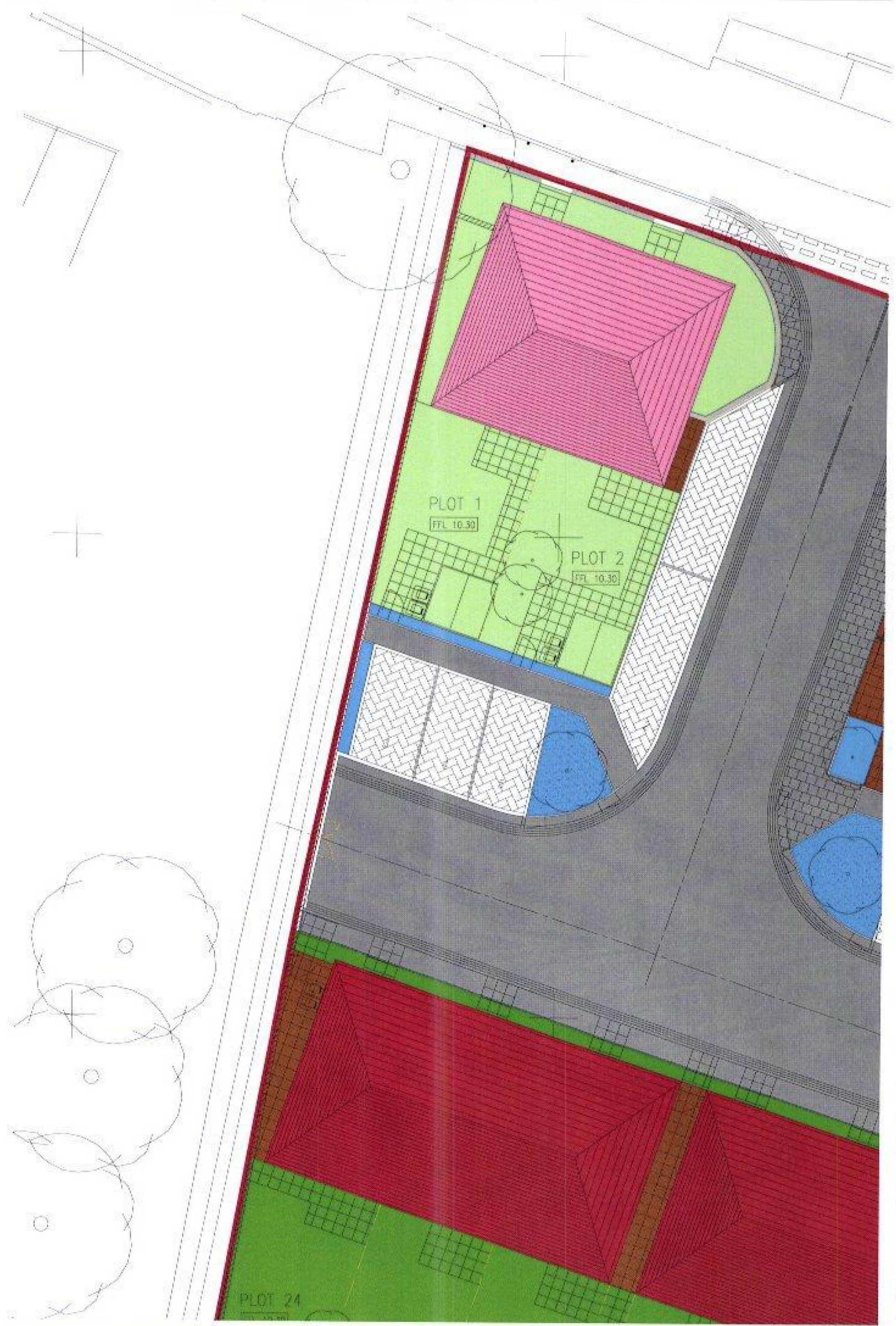
Notes

GAC	Generic Assessment Criteria. All GAC are S4ULs published by CIEHLQM in 2014, unless otherwise stated.
C4SL	Category 4 Screening Level published by DEFRA in 2013.
GI	GAC derived in-house by GI.
NA	No asbestos identified.
Value	Shaded cells indicate samples in which GAC is exceeded.

FIGURES



TP13
Hand excavated validation trial pit





Trial Pit Record

Hole ID

TP01

Sheet 1 of 1 (0.00m-2.00m)

All dimensions in metres.

Scale 1:10

Site: West Street, Havant

Client: Mansell Homes

Job No: p-sw-536

Method/Plant Used: Hand tools

Start date: 01/07/16

End Date: 01/07/16

Logged By: TG

Easting:

Northings:

Elevation:

SAMPLES & IN-SITU TESTS

WATER

STRATA

Depth	Type / No	Results / Remarks	ATER	Legend	Depth	Description
0.00-0.60	D				(0.70)	Friable dark brown gravelly sandy silt/clay TOPSOIL with fibrous root matter, IMPORTED TOPSOIL
					0.70	Black woven plastic geotextile membrane at base.

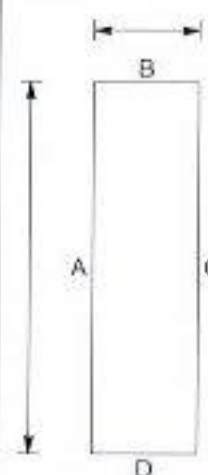
Groundwater Observations

Strike Depth	Flow Rate	Remarks
--------------	-----------	---------

Shoring/Support: None.
Side Stability: Stable.

General Remarks

1. Hand excavated trial pit to check depth and composition of clean cover, and presence of geotextile separator layer.
2. Samples recovered for possible validation testing.



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Ground Investigation

Trial Pit Record

Hole ID
TP03

Sheet 1 of 1 (0.00m-2.00m)
All dimensions in metres
Scale 1:10

Site: West Street, Havant

Method/Plant Used: Hand tools

Client: Mansell Homes

Start date: 01/07/16

End Date: 01/07/16

Logged By: TG

Job No: p-sw-536

Easting:

Northing:

Elevation:

SAMPLES & IN-SITU TESTS

W
A
T
E
R

STRATA

Depth	Type / No	Results / Remarks	Legend	Depth	Description
0.00-0.60	D			(0.70)	Frable dark brown gravelly sandy silt/clay TOPSOIL with fibrous root matter. IMPORTED TOPSOIL
				0.70	Black woven plastic geotextile membrane at base.

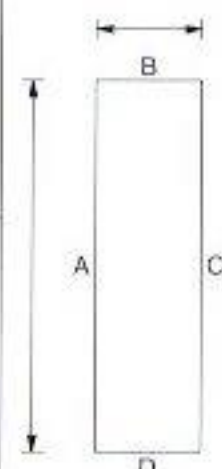
Groundwater Observations

Strike Depth Flow Rate Remarks

Shoring/Support: None.
Side Stability: Stable.

General Remarks

- Hand excavated trial pit to check depth and composition of clean cover, and presence of geotextile separator layer.
- Samples recovered for possible validation testing.





Trial Pit Record

Hole ID

TP04

Sheet 1 of 1 (0.00m-2.00m)

All dimensions in metres

Scale 1:10

Site: West Street, Havant

Client: Mansell Homes

Job No: p-sw-536

Method/Plant Used: Hand tools

Start date: 01/07/16

End Date: 01/07/16

Logged By: TG

Easting:

Nothing:

Elevation:

SAMPLES & IN-SITU TESTS

WATER

STRATA

Depth

Type	/ No	D
------	------	---

Results / Remarks

Legend

Depth

Description

0.00-0.50

D

--	--

Friable dark brown gravelly sandy silt/clay TOPSOIL with fibrous root matter.
IMPORTED TOPSOIL

IMPORTED TOPSOIL

(0.50)

0.50

Black woven plastic geotextile membrane at base.

Groundwater Observations

Strike Depth

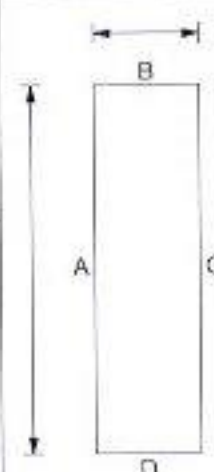
Flow Rate Remarks

Shoring/Support: None.

Side Stability: Stable.

General Remarks

- General Remarks**
1. Hand excavated trial pit to check depth and composition of clean cover, and presence of geotextile separator layer.
 2. Samples recovered for possible validation testing.





Trial Pit Record

Hole ID

TP07

Sheet 1 of 1 (0.00m-2.00m)

All dimensions in metres.

Scale 1:10

Site: West Street, Havant

Client: Mansell Homes

Job No: p-sw-536

Method/Plant Used: Hand tools

Start date: 01/07/16

End Date: 01/07/16

Logged By: TG

Easting:

Northings:

Elevation:

SAMPLES & IN-SITU TESTS

WALLER

STRATA

[illegible]

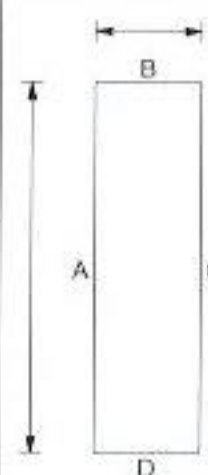
Groundwater Observations

Strike Depth	Flow Rate Remarks

Shoring/Support: None.
Side Stability: Stable.

General Remarks

1. Hand excavated trial pit to check depth and composition of clean cover, and presence of geotextile separator layer.
2. Samples recovered for possible validation testing.



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Ground Investigation

Trial Pit Record

Hole ID

TP09

Sheet 1 of 1 (0.00m-2.00m)
All dimensions in metres
Scale 1:10

Site: West Street, Havant

Method/Plant Used: Hand tools

Client: Mansell Homes

Start date: 01/07/16

End Date: 01/07/16

Logged By: TG

Job No: p-sw-536

Easting:

Northing:

Elevation:

SAMPLES & IN-SITU TESTS

Depth Type / No Results / Remarks

0.00-0.60

D

W
A
T
E
R

STRATA

Legend

Depth

Description



(0.60)

0.60

Friable dark brown gravelly sandy silt/clay TOPSOIL with fibrous root matter.
IMPORTED TOPSOIL

Orange high tensile strength geotextile membrane at base.

Groundwater Observations

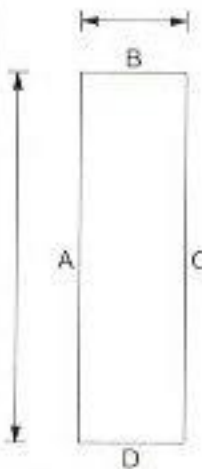
Strike Depth

Flow Rate Remarks

Shoring/Support: None.
Side Stability: Stable.

General Remarks

- Hand excavated trial pit to check depth and composition of clean cover, and presence of geotextile separator layer.
- Samples recovered for possible validation testing.



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Ground Investigation

Trial Pit Record

Hole ID
TP11

Sheet 1 of 1 (0.00m-2.00m)
All dimensions in metres
Scale 1:10

Site: West Street, Havant

Method/Plant Used: Hand tools

Client: Mansell Homes

Start date: 01/07/16

End Date: 01/07/16

Logged By: TG

Job No: p-sw-536

Easting:

Northing:

Elevation:

SAMPLES & IN-SITU TESTS

Depth	Type / No	Results / Remarks
-------	-----------	-------------------

W
A
T
E
R

STRATA

Legend	Depth	Description
--------	-------	-------------

0.00-0.60

D



(0.60)

Friable dark brown gravelly sandy silt/clay TOPSOIL with fibrous root matter.
IMPORTED TOPSOIL

0.60

Orange high tensile strength geotextile membrane at base.

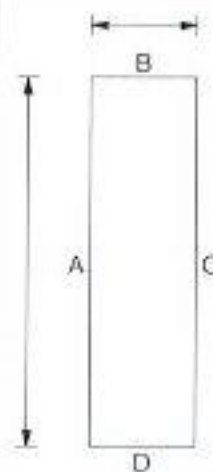
Groundwater Observations

Strike Depth	Flow Rate	Remarks
--------------	-----------	---------

Shoring/Support: None.
Side Stability: Stable.

General Remarks

- Hand excavated trial pit to check depth and composition of clean cover, and presence of geotextile separator layer.
- Samples recovered for possible validation testing.



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Ground Investigation

Trial Pit Record

Hole ID
TP13

Sheet 1 of 1 (0.00m-2.00m)
All dimensions in metres
Scale 1:10

Site: West Street, Havant

Method/Plant Used: Hand tools

Client: Mansell Homes

Start date: 01/07/16

End Date: 01/07/16

Logged By: TG

Job No: p-sw-536

Easting:

Northing:

Elevation:

SAMPLES & IN-SITU TESTS

Depth Type / No Results / Remarks

W
A
T
E
R

STRATA

Legend Depth Description

0.00-0.60

D



(0.60)

0.60

Friable dark brown gravelly sandy silt/clay TOPSOIL with fibrous root matter.
IMPORTED TOPSOIL

Orange high tensile strength geotextile membrane at base.

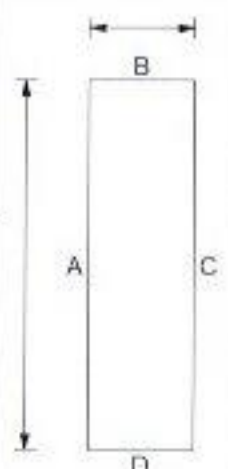
Groundwater Observations

Strike Depth Flow Rate Remarks

Shoring/Support: None.
Side Stability: Stable.

General Remarks

- Hand excavated trial pit to check depth and composition of clean cover, and presence of geotextile separator layer.
- Samples recovered for possible validation testing.



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Ground Investigation

Trial Pit Record

Hole ID
TP15

Sheet 1 of 1 (0.00m-2.00m)
All dimensions in metres
Scale 1:10

Site: West Street, Havant

Method/Plant Used: Hand tools

Client: Mansell Homes

Start date: 01/07/16

End Date: 01/07/16

Logged By: TG

Job No: p-sw-536

Easting:

Northing:

Elevation:

SAMPLES & IN-SITU TESTS

Depth	Type / No	Results / Remarks
-------	-----------	-------------------

W
A
T
E
R

STRATA

Legend	Depth	Description
--------	-------	-------------

0.00-0.60

D



(0.70)

0.70

Friable dark brown gravelly sandy silt/clay TOPSOIL with fibrous root matter.
IMPORTED TOPSOIL

Orange high tensile strength geotextile membrane at base.

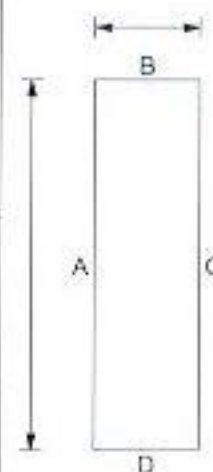
Groundwater Observations

Strike Depth	Flow Rate Remarks
--------------	-------------------

Shoring/Support: None.
Side Stability: Stable.

General Remarks

- Hand excavated trial pit to check depth and composition of clean cover, and presence of geotextile separator layer.
- Samples recovered for possible validation testing.



T 01275 876003 | E southwest@ground-investigation.com | www.ground-investigation.com



Ground Investigation

Trial Pit Record

Hole ID
TP17

Sheet 1 of 1 (0.00m-2.00m)
All dimensions in metres
Scale 1:10

Site: West Street, Havant	Method/Plant Used: Hand tools		
Client: Mansell Homes	Start date: 01/07/16	End Date: 01/07/16	Logged By: TG
Job No: p-sw-536	Easting:	Northing:	Elevation:

SAMPLES & IN-SITU TESTS

Depth	Type / No	Results / Remarks	W A T E R	STRATA	
				Legend	Description
0.00-0.60	D				Frable dark brown gravelly sandy silt/clay TOPSOIL with fibrous root matter. IMPORTED TOPSOIL
					(0.70)
					0.70
					Orange high tensile strength geotextile membrane at base.

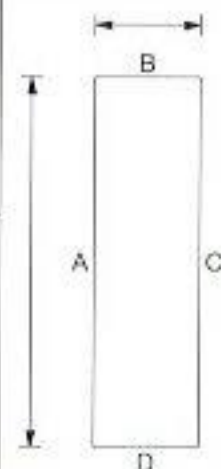
Groundwater Observations

Strike Depth	Flow Rate Remarks
--------------	-------------------

Shoring/Support: None.
Side Stability: Stable.

General Remarks

- Hand excavated trial pit to check depth and composition of clean cover, and presence of geotextile separator layer.
- Samples recovered for possible validation testing.



ENCLOSURE B



Ground Investigation

www.ground-investigation.com

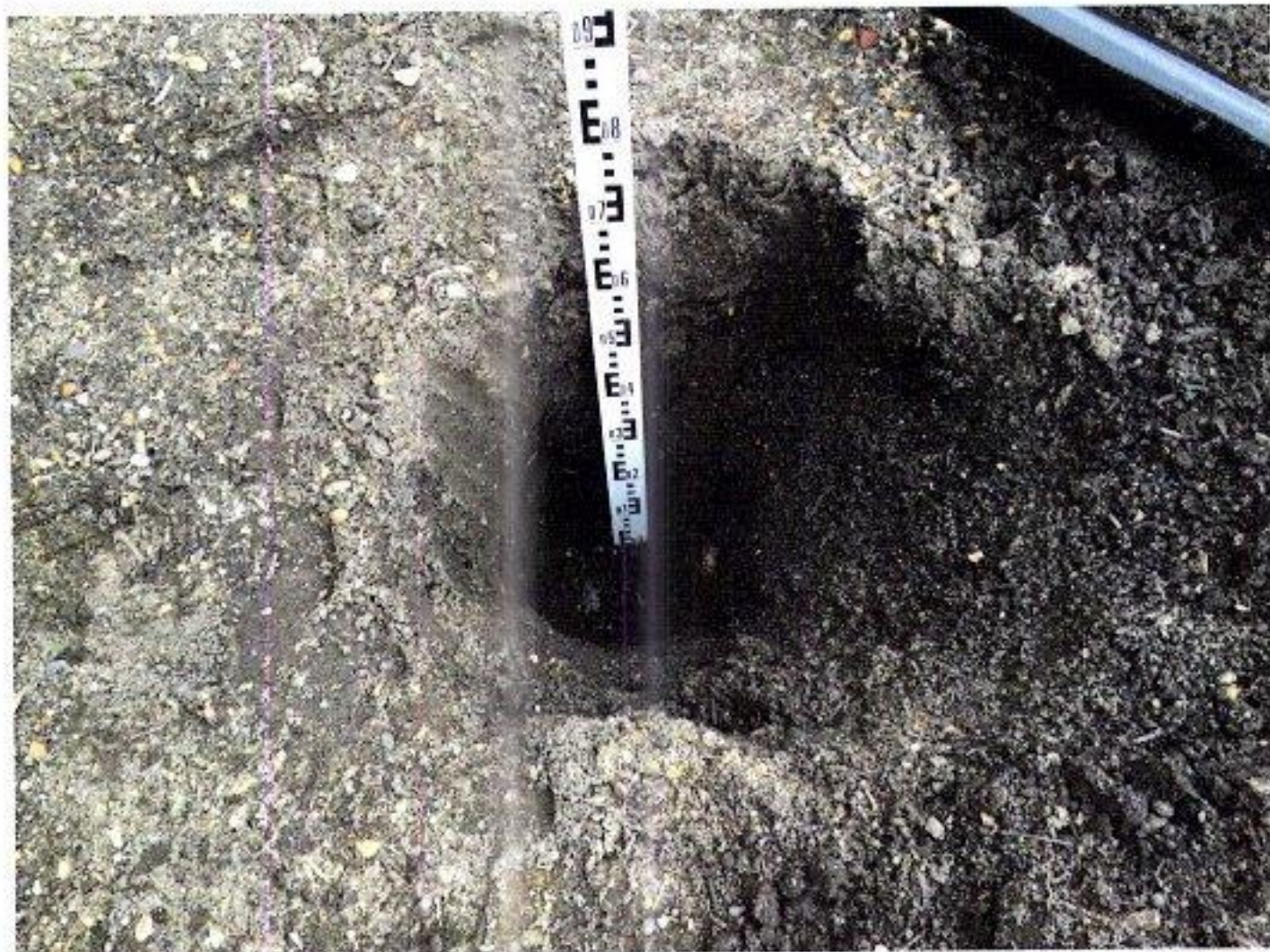
Plate 1

p-sw-536.West Street, Havant
Validation Trial Pit TP01



Plate 2

p-sw-536.West Street, Havant
Validation Trial Pit TP03





Ground Investigation

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Plate 3

p-sw-536.West Street, Havant
Validation Trial Pit TP05



Plate 4

p-sw-536.West Street, Havant
Validation Trial Pit TP07





Ground Investigation

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Plate 5

p-sw-536.West Street, Havant
Validation Trial Pit TP09



Plate 6

p-sw-536.West Street, Havant
Validation Trial Pit TP11



Plate 7

p-sw-536.West Street, Havant
Validation Trial Pit TP13



Plate 8

p-sw-536.West Street, Havant
Validation Trial Pit TP15



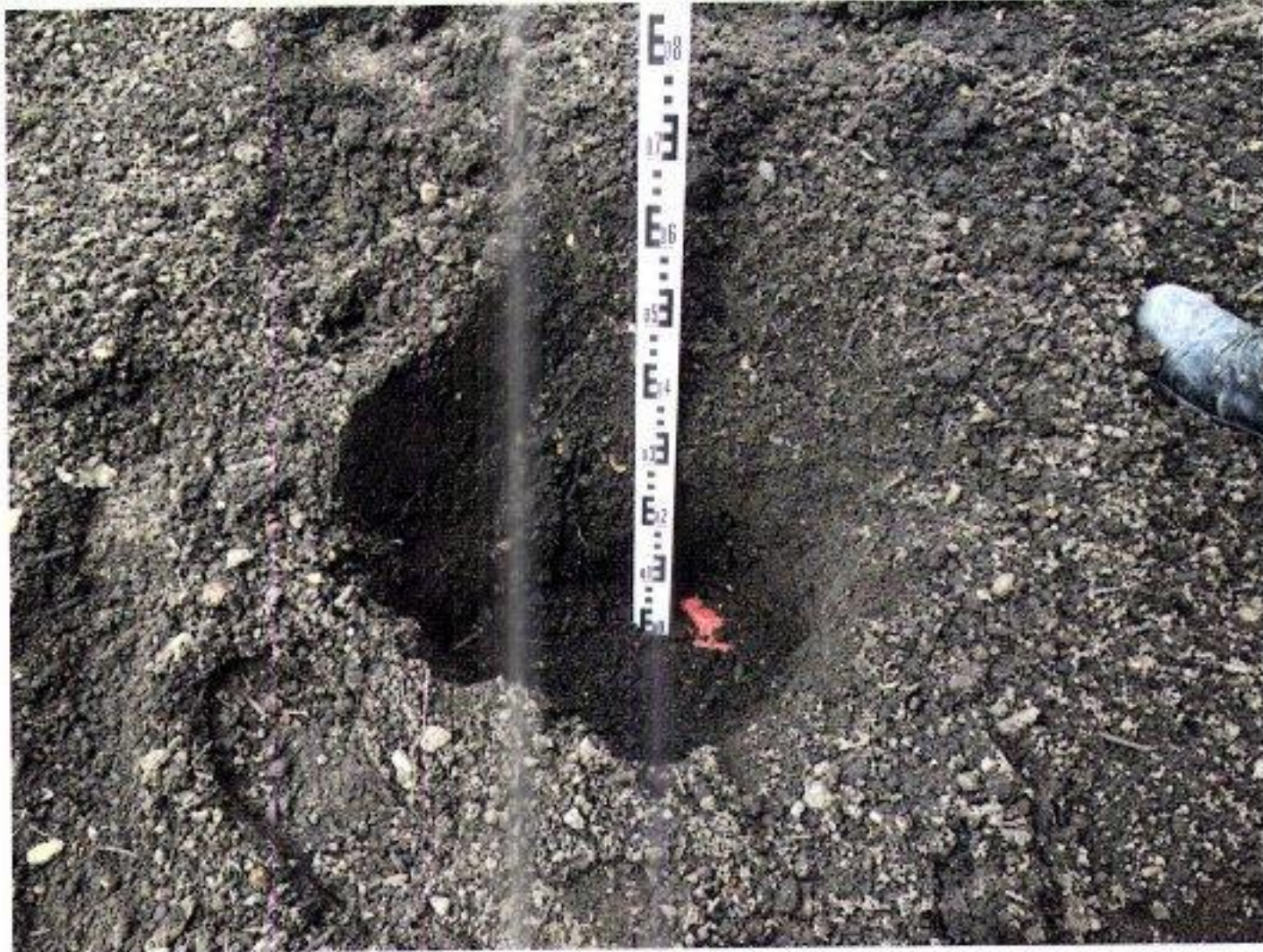


Ground Investigation

www.ground-investigation.com

Plate 9

p-sw-536.West Street, Havant
Validation Trial Pit TP17



ENCLOSURE C



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Justin Dampney
Eco Sustainable Solutions Ltd
Chapel Lane
Parley
Christchurch
Dorset BH6 5AD

16th September 2015
Our Ref: TOHA/15/6437/1/SS
Your Ref: see below

Dear Sirs

Topsoil Analysis Report: Eco Parley

We have completed the analysis of the soil sample recently submitted, referenced *10mm Supersoil*, and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil*).

This report presents the results of analysis for the sample submitted to our office, and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing or waste designation purposes, especially after the topsoil has left the Eco Sustainable Solutions site.

SAMPLE EXAMINATION

The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable LOAMY SAND with a well-developed fine to medium granular structure*. The sample was slightly stony and contained frequent woody fibres and organic fines. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Tim O'Hare Associates LLP
Howbery Park, Wallingford, Oxfordshire OX10 8BA
T: 01491 822653 E: info@toha.co.uk
www.toha.co.uk

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- particle size analysis (sand, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn);
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX).

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *loamy sand texture* class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for general landscape purposes.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.1). This pH value would be considered suitable for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by CaSO₄ extract (BS3882 requirement) fell below the maximum specified value (3300 µS/cm) given in BS3882:2015 – Table 1.

Organic Matter and Fertility Status

The sample was well supplied with organic matter and all major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to BS3882:2015 - Table 1: Notes 3 and 4, there is a recommendation to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been assessed for *residential* end-use against the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels (C4SLs) for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in BS3882:2015 – Table 1.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil (BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline loamy sand with a well developed structure and low stone content. The organic matter content and fertility status were moderate. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes (trees, shrubs and amenity grass), provided the physical condition of the soil is satisfactory, and species selected are tolerant of alkaline soils.

The topsoil was also fully compliant with the requirements of the British Standard for Topsoil (BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).

RECOMMENDATIONS

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, resspreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

Further details on soil handling are provided in Annex A of BS3882:2015.

Further guidance on the management, preparation and handling of soils is provided in the DEFRA publication *Construction code of practice for the sustainable use of soils on construction sites*.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



Iain Gould
BSc MSc PhD
Soil Scientist



Laura Hathaway-Jenkins
BSc MSc EngD MSc Soil Sci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client	Eco Sustainable Solutions
Project	Eco Parley
Job	Topsoil Analysis - BS3882:2015
Date	16/09/2015
Job Ref No	TOHA/15/6437/1/SS

Sample Reference		Accreditation
Clay (<0.002mm)	%	UKAS
Silt (0.002-0.063mm)	%	UKAS
Sand (0.063-2.0mm)	%	UKAS
Texture Class (UK Classification)	-	UKAS
Stones (2-20mm)	% DW	GLP
Stones (20-50mm)	% DW	GLP
Stones (>50mm)	% DW	GLP

pH Value (1:2.5 water extract)	units	UKAS
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS
Electrical Conductivity (1:2 CaSO ₄ extract)	uS/cm	UKAS
Exchangeable Sodium Percentage	%	UKAS
Organic Matter (LOI)	%	UKAS
Total Nitrogen (Dumas)	%	UKAS
C : N Ratio	ratio	UKAS
Extractable Phosphorus	mg/l	UKAS
Extractable Potassium	mg/l	UKAS
Extractable Magnesium	mg/l	UKAS

Total Arsenic (As)	mg/kg	MCERTS
Total Cadmium (Cd)	mg/kg	MCERTS
Total Chromium (Cr)	mg/kg	MCERTS
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS
Total Copper (Cu)	mg/kg	MCERTS
Total Lead (Pb)	mg/kg	MCERTS
Total Mercury (Hg)	mg/kg	MCERTS
Total Nickel (Ni)	mg/kg	MCERTS
Total Selenium (Se)	mg/kg	MCERTS
Total Zinc (Zn)	mg/kg	MCERTS
Water Soluble Boron (B)	mg/kg	MCERTS
Total Cyanide (CN)	mg/kg	MCERTS
Total (mono) Phenols	mg/kg	MCERTS

Naphthalene	mg/kg	MCERTS
Acenaphthylene	mg/kg	MCERTS
Acenaphthene	mg/kg	MCERTS
Fluorene	mg/kg	MCERTS
Phenanthrene	mg/kg	MCERTS
Anthracene	mg/kg	MCERTS
Fluoranthene	mg/kg	MCERTS
Pyrene	mg/kg	MCERTS
Benzo(a)anthracene	mg/kg	MCERTS
Chrysene	mg/kg	MCERTS
Benzo(b)fluoranthene	mg/kg	MCERTS
Benzo(k)fluoranthene	mg/kg	MCERTS
Benzo(a)pyrene	mg/kg	MCERTS
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS
Dibenzo(a,h)anthracene	mg/kg	MCERTS
Benzo(g,h,i)perylene	mg/kg	MCERTS
Total PAHs (sum USEPA16)	mg/kg	MCERTS

Aliphatic TPH >C5 - C6	mg/kg	MCERTS
Aliphatic TPH >C6 - C8	mg/kg	MCERTS
Aliphatic TPH >C8 - C10	mg/kg	MCERTS
Aliphatic TPH >C10 - C12	mg/kg	MCERTS
Aliphatic TPH >C12 - C16	mg/kg	MCERTS
Aliphatic TPH >C16 - C21	mg/kg	MCERTS
Aliphatic TPH >C21 - C35	mg/kg	MCERTS
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS
Aromatic TPH >C5 - C7	mg/kg	MCERTS
Aromatic TPH >C7 - C8	mg/kg	MCERTS
Aromatic TPH >C8 - C10	mg/kg	MCERTS
Aromatic TPH >C10 - C12	mg/kg	MCERTS
Aromatic TPH >C12 - C16	mg/kg	MCERTS
Aromatic TPH >C16 - C21	mg/kg	MCERTS
Aromatic TPH >C21 - C35	mg/kg	MCERTS
Aromatic TPH (C5 - C35)	mg/kg	MCERTS

Benzene	mg/kg	MCERTS
Toluene	mg/kg	MCERTS
Ethylbenzene	mg/kg	MCERTS
o-xylene	mg/kg	MCERTS
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS

LS = LOAMY SAND

Visual Examination

The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable LOAMY SAND with a well-developed fine to medium granular structure. The sample was slightly stony and contained frequent woody fibres and organic fines. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Results of analysis should be read in conjunction with the report they were issued with.

The contents of this certificate shall not be reproduced without the express written permission of Tim O'Hare Associates LLP.

10mm Supersoil

8
14
78
LS
8
2
0

8.1
792
2630
4.0
8.4
0.31
16
39
570
66

5
< 0.2
11
< 4.0
34
53
< 0.3
9.6
< 1.0
130
1.1
< 1
< 1

< 0.05
< 0.10
< 0.10
< 0.10
0.37
0.1
0.85
0.75
0.62
0.47
0.79
0.34
0.5
0.21
< 0.10
0.3
5.30

< 0.1
< 0.1
< 0.1
< 1.0
< 2.0
< 8.0
46
46
< 0.1
< 0.1
< 0.1
< 1.0
< 2.0
< 10
12
12

< 0.001
< 0.001
< 0.001
< 0.001
< 0.001

Iain Gould
BSc MSc PhD
Soil Scientist

Contact Mr. Steve Grant
Contact Telephone No. 01329 226465
Contact e-mail sgrant@tj-transport.co.uk

ple tion	Date Sampled	Sampled By	Date Received	Material Description	Clients Specification	Test Ref	Test Name
pile at Production Area	25/03/2014	AC	25/03/2014	Soil occ. Concrete, Brick & Tile	BS 3882	S34	Classification of topsoil

Laboratory Test Report

14-00485 - 1



Slater	Page	1 of 2
Quarry, Chichester	ACS Lab ref:	14-00485
	Samples Received:	02/04/2014

or your samples received in the laboratory

on.
SC = sub contracted.
AR = sample tested in as received condition.
IHP = In House Procedure / Calculation
All test values reported on a dry weight basis.
This report shall not be reproduced, except in full, without written approval of the laboratory.

Analysis Completed: 10/04/2014
Report Date: 10/04/2014



ckhill Road West, Holton Heath Trading Park, Poole, Dorset, BH16 6LE
k Registered in England Wales No. 6000065

IALYSIS (BS 3882:2007)

2 of 2

Sample Id : 121153 - 14-52325
 Source of Material: Stockpile
 Client Ref: Soil Samples 1-3 Combined
 Sampled By: AC



crete brick

Method	Unit	AS	Result
			Sandy Loam
SC	%		9
SC	%		25
SC	%		66

IHP	%		5
IHP	%		N/A

SC	%		43
SC	%		21
SC	%		0
BS 1377:3:1990	pH Units	*	9.1
IHP	%		7.65

IHP	%		0.13
IHP	mg/l		63.1
IHP	mg/l		300
IHP	mg/l		50.3

Calculation	n/a		19.3 : 1
IHP	%		3.01

AE16	mg/kg	*#	199
AE16	mg/kg	*#	58
AE16	mg/kg	*#	20.4

SC	%		0
SC	%		0
SC	%		0.4

AE07	us/cm	*	2770
------	-------	---	------

Specification for BS 3882 : 2007							
Multipurpose Topsoil		Specific Purpose					
		Acidic		Low Fertility		Calcareous	
Limits	Complies	Limits	Complies	Limits	Complies	Limits	Complies
5-35	Y	5-35	Y	5-35	Y	5-35	Y
0-65	Y	0-65	Y	0-65	Y	0-65	Y
30-85	Y	30-85	Y	30-85	Y	30-85	Y

3-20	Y	3-30	Y	1-10	Y	3-30	Y
5-20	N/A	3-30	N/A	1-10	N/A	5-30	N/A

0 - 30	N	0 - 30	N	0 - 30	N	0 - 30	N
0 - 10	N	0 - 10	N	0 - 10	N	0 - 10	N
0	Y	0	Y	0	Y	0	Y
5.5-8.5	N	3.5-5.5	N	3.5-9.0	N	7.5-9.0	N
-		-		-		>1	Y

≥0.15	N	≥0.15	N	<0.1	N	≥0.15	N
16-100	Y	16-100	Y	<15	N	16-100	Y
121-900	Y	121-900	Y	<120	N	121-900	Y
51-600	N	51-600	N	<600	Y	51-600	N

<20:1	Y	<20:1	Y	<20:1	Y	<20:1	Y
<15	Y	<15	Y	<15	Y	<15	Y

<300	Y	<300	Y	<300	Y	<300	Y
<200	Y	<200	Y	<200	Y	<200	Y
<110	Y	<110	Y	<110	Y	<110	Y

<0.5	Y	<0.5	Y	<0.5	Y	<0.5	Y
<0.25	Y	<0.25	Y	<0.25	Y	<0.25	Y
0	N	0	N	0	N	0	N

--	--	--	--	--	--	--	--

Overall Compliance

No	No	No	No
----	----	----	----

hill road West, Holton Heath Trading Park, Poole, Dorset, BH16 6LE



Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY
Telephone: (01424) 718618
Facsimile: (01424) 729911
info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 16-07554

Issue: 2

Date of Issue: 13/07/2016

Contact: Tim Gillbanks

Customer Details: Ground Investigation (South West) Ltd
Unit 3
Custom House Court
Clevedon
Bristol BS21 6EX

Quotation No: Q14-00071

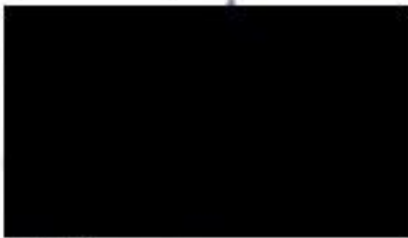
Order No: Not Supplied

Customer Reference: P-SW-536

Date Received: 05/07/2016

Date Approved: 13/07/2016

Details: (Havant) Clean Cover

Approved by: 

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

Sample Summary

Report No.: 16-07554

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
66692	TP1 0.00 - 0.60	01/07/2016	05/07/2016	Sandy silty loam	
66693	TP3 0.00 - 0.60	01/07/2016	05/07/2016	Sandy silty loam	
66694	TP5 0.00 - 0.60	01/07/2016	05/07/2016	Sandy silty loam	
66695	TP7 0.00 - 0.60	01/07/2016	05/07/2016	Sandy silty loam	
66696	TP8 0.00 - 0.60	01/07/2016	05/07/2016	Sandy silty loam	
66697	TP13 0.00 - 0.60	01/07/2016	05/07/2016	Sandy silty loam	
66698	TP16 0.00 - 0.60	01/07/2016	05/07/2016	Sandy silty loam	
66699	TP18 0.00 - 0.60	01/07/2016	05/07/2016	Sandy silty loam	

Results Summary

Report No.: 16-07554

ELAB Reference	66692	66693	66694	66695	66696	66697
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP1	TP3	TP5	TP7	TP8	TP13
Sample Depth (m)	0.00 - 0.60	0.00 - 0.60	0.00 - 0.60	0.00 - 0.60	0.00 - 0.60	0.00 - 0.60
Sampling Date	01/07/2016	01/07/2016	01/07/2016	01/07/2016	01/07/2016	01/07/2016

Determinand	Codes	Units	LOD						
Metals									
Arsenic	M	mg/kg	1	7.7	6.8	7.1	7.4	7.5	6.7
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	18.4	17.2	17.8	17.6	18.1	19.0
Copper	M	mg/kg	5	21.2	20.6	24.7	26.1	24.8	22.8
Lead	M	mg/kg	5	59.4	75.8	63.5	93.5	63.7	63.3
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	10.8	9.5	9.6	10.2	10.2	11.0
Selenium	M	mg/kg	1	< 1.0	< 1.0	1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	99.2	96.2	108	112	107	105
Anions									
Water Soluble Sulphate	M	g/l	0.02	0.17	0.18	0.13	0.18	0.18	0.07
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	1.0	< 1.0
Total Sulphur	N	%	0.01	0.04	0.05	0.04	0.11	0.12	0.09
Total Potential Sulphate	N	%	0.01	0.12	0.15	0.11	0.32	0.36	0.27
Acid Soluble Sulphate (SO4)	U	%	0.02	0.07	0.07	0.07	0.07	0.08	0.04
Water Soluble Boron	N	mg/kg	0.5	1.0	1.3	1.2	1.5	1.2	1.1
Miscellaneous									
pH	M	pH units	0.1	8.2	8.0	8.6	8.4	8.6	8.2
Soil Organic Matter	U	%	0.1	3.8	5.4	4.3	4.2	4.9	4.6
Phenols									
Total Phenols	N	mg/kg	6	< 6	< 6	< 6	< 6	< 6	< 6
Polyaromatic hydrocarbons									
Naphthalene GCMS	N	mg/kg	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene GCMS	N	mg/kg	0.01	0.03	0.01	0.03	0.05	0.02	0.02
Acenaphthene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.02	0.01	< 0.01	< 0.01
Fluorene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.01	0.02	< 0.01	< 0.01
Phenanthrene GCMS	N	mg/kg	0.01	0.07	0.07	0.10	0.21	0.05	0.07
Anthracene GCMS	N	mg/kg	0.01	0.03	0.03	0.04	0.11	0.03	0.03
Fluoranthene GCMS	N	mg/kg	0.01	0.29	0.21	0.35	1.90	0.26	0.29
Pyrene GCMS	N	mg/kg	0.01	0.30	0.22	0.36	2.07	0.30	0.30
Benzo(a)anthracene GCMS	N	mg/kg	0.01	0.19	0.12	0.24	1.40	0.18	0.20
Chrysene GCMS	N	mg/kg	0.01	0.26	0.14	0.28	1.23	0.19	0.21
Benzo (b) fluoranthene GCMS	N	mg/kg	0.01	0.26	0.14	0.31	1.24	0.23	0.25
Benzo(k)fluoranthene GCMS	N	mg/kg	0.01	0.29	0.15	0.28	1.21	0.20	0.20
Benzo (a) pyrene GCMS	N	mg/kg	0.01	0.35	0.16	0.34	1.50	0.24	0.25
Indeno (1,2,3-cd) pyrene GCMS	N	mg/kg	0.01	0.24	0.10	0.23	0.99	0.16	0.20
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	0.08	0.04	0.12	0.06	0.08	0.07
Benzo(g,h,i)perylene GCMS	N	mg/kg	0.01	0.28	0.11	0.27	1.02	0.19	0.17
Total PAH(16) GCMS	N	mg/kg	0.04	2.70	1.56	2.96	13.0	2.16	2.28

Results Summary

Report No.: 16-07554

ELAB Reference	66692	66693	66694	66695	66696	66697
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP1	TP3	TP5	TP7	TP8	TP13
Sample Depth (m)	0.00 - 0.60	0.00 - 0.60	0.00 - 0.60	0.00 - 0.60	0.00 - 0.60	0.00 - 0.60
Sampling Date	01/07/2016	01/07/2016	01/07/2016	01/07/2016	01/07/2016	01/07/2016

Determinand	Codes	Units	LOD						
BTEX									
Benzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
MTBE	N	ug/kg	10	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
TPH CWG									
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	2.0	< 1.0	< 1.0	< 1.0	5.1	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	4.2	2.0	1.8	1.8	7.2	3.0
>C21-C35 Aliphatic	N	mg/kg	1	16.9	23.1	15.3	19.3	29.8	48.5
>C35-C40 Aliphatic	N	mg/kg	1	3.8	6.5	3.9	4.5	6.0	9.9
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	1.5	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	1.7	< 1.0	< 1.0	< 1.0	5.0	3.2
>C21-C35 Aromatic	N	mg/kg	1	13.0	14.9	16.2	15.3	36.3	75.8
>C35-C40 Aromatic	N	mg/kg	1	4.9	5.5	6.0	5.2	12.0	23.9
Total (>C5-C40) Ali/Aro	N	mg/kg	1	46.5	52.0	43.2	46.1	103	164

Results Summary

Report No.: 16-07554

ELAB Reference	66698	66699
Customer Reference		
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	TP16	TP18
Sample Depth (m)	0.00 - 0.60	0.00 - 0.60
Sampling Date	01/07/2016	01/07/2016

Determinand	Codes	Units	LOD		
Metals					
Arsenic	M	mg/kg	1	7.3	7.2
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	21.1	18.6
Copper	M	mg/kg	5	25.1	26.6
Lead	M	mg/kg	5	69.4	55.1
Mercury	M	mg/kg	0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	11.4	9.4
Selenium	M	mg/kg	1	< 1.0	< 1.0
Zinc	M	mg/kg	5	115	97.2
Anions					
Water Soluble Sulphate	M	g/l	0.02	0.17	0.07
Inorganics					
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8
Total Cyanide	M	mg/kg	1	< 1.0	< 1.0
Total Sulphur	N	%	0.01	0.05	0.04
Total Potential Sulphate	N	%	0.01	0.16	0.11
Acid Soluble Sulphate (SO4)	U	%	0.02	0.07	0.05
Water Soluble Boron	N	mg/kg	0.5	1.4	1.3
Miscellaneous					
pH	M	pH units	0.1	8.1	8.1
Soil Organic Matter	U	%	0.1	4.2	3.9
Phenols					
Total Phenols	N	mg/kg	6	< 6	< 6
Polyaromatic hydrocarbons					
Naphthalene GCMS	N	mg/kg	0.01	0.02	< 0.01
Acenaphthylene GCMS	N	mg/kg	0.01	0.06	0.03
Acenaphthene GCMS	N	mg/kg	0.01	0.08	< 0.01
Fluorene GCMS	N	mg/kg	0.01	0.07	< 0.01
Phenanthrene GCMS	N	mg/kg	0.01	0.66	0.06
Anthracene GCMS	N	mg/kg	0.01	0.31	0.04
Fluoranthene GCMS	N	mg/kg	0.01	2.16	0.37
Pyrene GCMS	N	mg/kg	0.01	1.80	0.34
Benzo(a)anthracene GCMS	N	mg/kg	0.01	1.13	0.31
Chrysene GCMS	N	mg/kg	0.01	0.99	0.29
Benzo (b) fluoranthene GCMS	N	mg/kg	0.01	0.99	0.31
Benzo(k)fluoranthene GCMS	N	mg/kg	0.01	0.89	0.31
Benzo (a) pyrene GCMS	N	mg/kg	0.01	1.12	0.37
Indeno (1,2,3-cd) pyrene GCMS	N	mg/kg	0.01	0.80	0.25
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	0.26	0.09
Benzo(g,h,i)perylene GCMS	N	mg/kg	0.01	0.81	0.28
Total PAH(16) GCMS	N	mg/kg	0.04	12.1	3.08

Results Summary

Report No.: 16-07554

ELAB Reference	66698	66699
Customer Reference		
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	TP16	TP18
Sample Depth (m)	0.00 - 0.60	0.00 - 0.60
Sampling Date	01/07/2016	01/07/2016

Determinand	Codes	Units	LOD		
BTEX					
Benzene	M	ug/kg	10	< 10.0	< 10.0
Toluene	M	ug/kg	10	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	< 10.0	< 10.0
Xylenes	M	ug/kg	10	< 10.0	< 10.0
MTBE	N	ug/kg	10	< 10.0	< 10.0
TPH CWG					
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	1.3	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	2.8	1.7
>C21-C35 Aliphatic	N	mg/kg	1	22.2	15.6
>C35-C40 Aliphatic	N	mg/kg	1	5.5	4.3
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	2.6	< 1.0
>C21-C35 Aromatic	N	mg/kg	1	36.3	23.8
>C35-C40 Aromatic	N	mg/kg	1	15.9	10.3
Total (>C5-C40) Ali/Aro	N	mg/kg	1	86.5	55.7



Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY
Tel: +44 (0)1424 718618, Email: info@elab-uk.co.uk, Web: www.elab-uk.co.uk

Results Summary

Report No.: 16-07554

Asbestos Qualitative Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Result
66692	0.00 - 0.60	TP1	Sandy silty loam	No asbestos detected
66693	0.00 - 0.60	TP3	Sandy silty loam	No asbestos detected
66694	0.00 - 0.60	TP5	Sandy silty loam	No asbestos detected
66695	0.00 - 0.60	TP7	Sandy silty loam	No asbestos detected
66696	0.00 - 0.60	TP8	Sandy silty loam	No asbestos detected
66697	0.00 - 0.60	TP13	Sandy silty loam	No asbestos detected
66698	0.00 - 0.60	TP16	Sandy silty loam	No asbestos detected
66699	0.00 - 0.60	TP18	Sandy silty loam	No asbestos detected

Method Summary

Report No.: 16-07554

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
PAH (GC-MS)	M	As submitted sample	06/07/2016		GC-MS
Hexavalent chromium	N	As submitted sample	06/07/2016	110	Colorimetry
pH	M	Air dried sample	07/07/2016	113	Electromeric
Acid Soluble Sulphate	U	Air dried sample	07/07/2016	115	Ion Chromatography
Aqua regia extractable metals	M	Air dried sample	07/07/2016	118	ICPMS
Phenols in solids	M	As submitted sample	06/07/2016	121	HPLC
Water soluble anions	M	Air dried sample	06/07/2016	172	Ion Chromatography
BTEX in solids	M	As submitted sample	07/07/2016	181A	GC-MS
Water soluble boron	N	Air dried sample	07/07/2016	202	Colorimetry
Total cyanide	M	As submitted sample	06/07/2016	204	Colorimetry
Aliphatic hydrocarbons in soil	N	As submitted sample	06/07/2016	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	07/07/2016	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	06/07/2016	214	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	07/07/2016	214	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	07/07/2016	214	GC-MS
Total organic carbon/Total sulphur	N	Air dried sample	06/07/2016	216	IR
Soil organic matter	U	Air dried sample	07/07/2016	BS1377:P3	Titrimetry
Asbestos identification	U	As submitted sample	06/07/2016	PMAN	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 16-07554

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

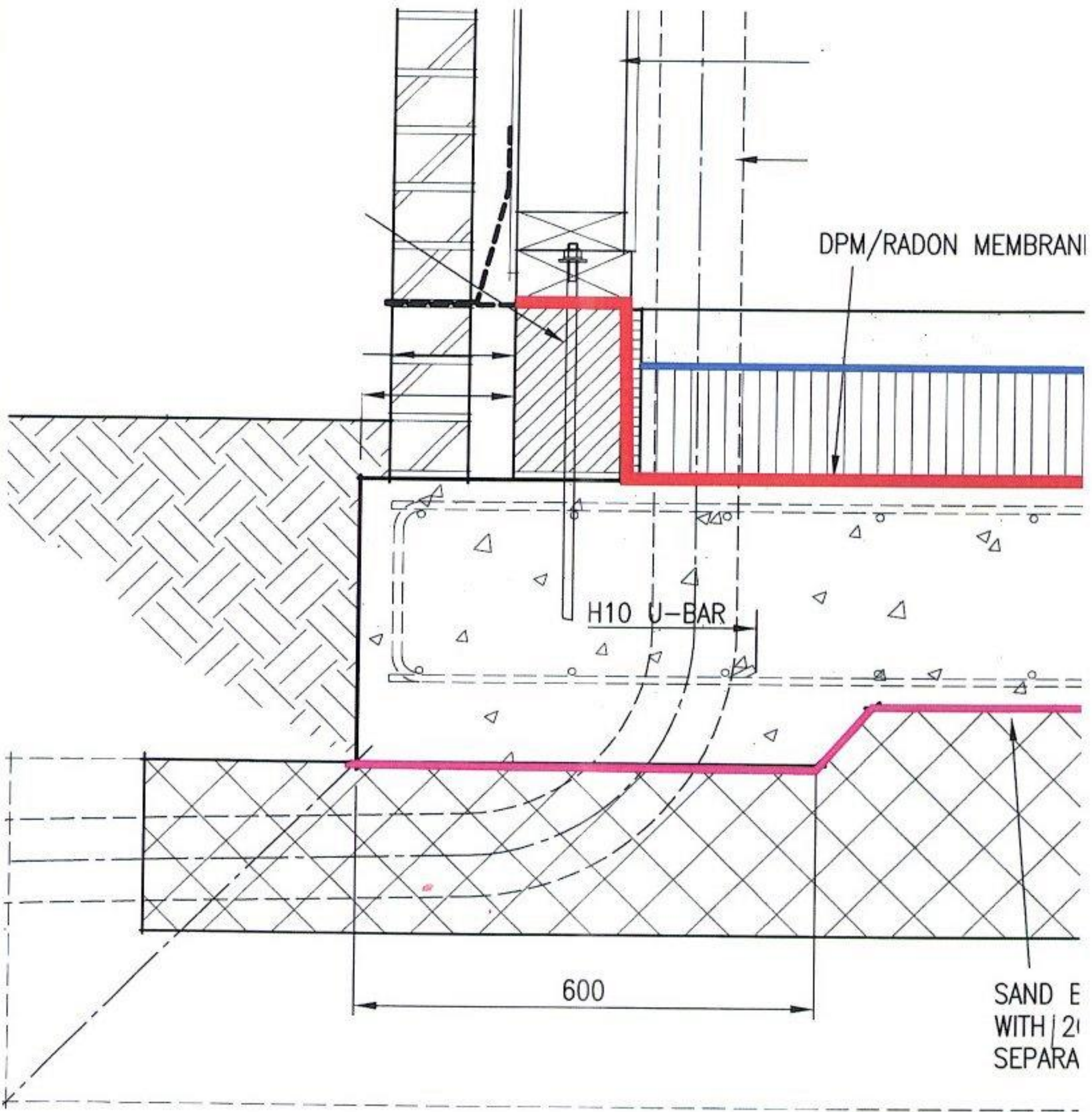
Where a sample has a deviation code, the applicable test result may be invalid.

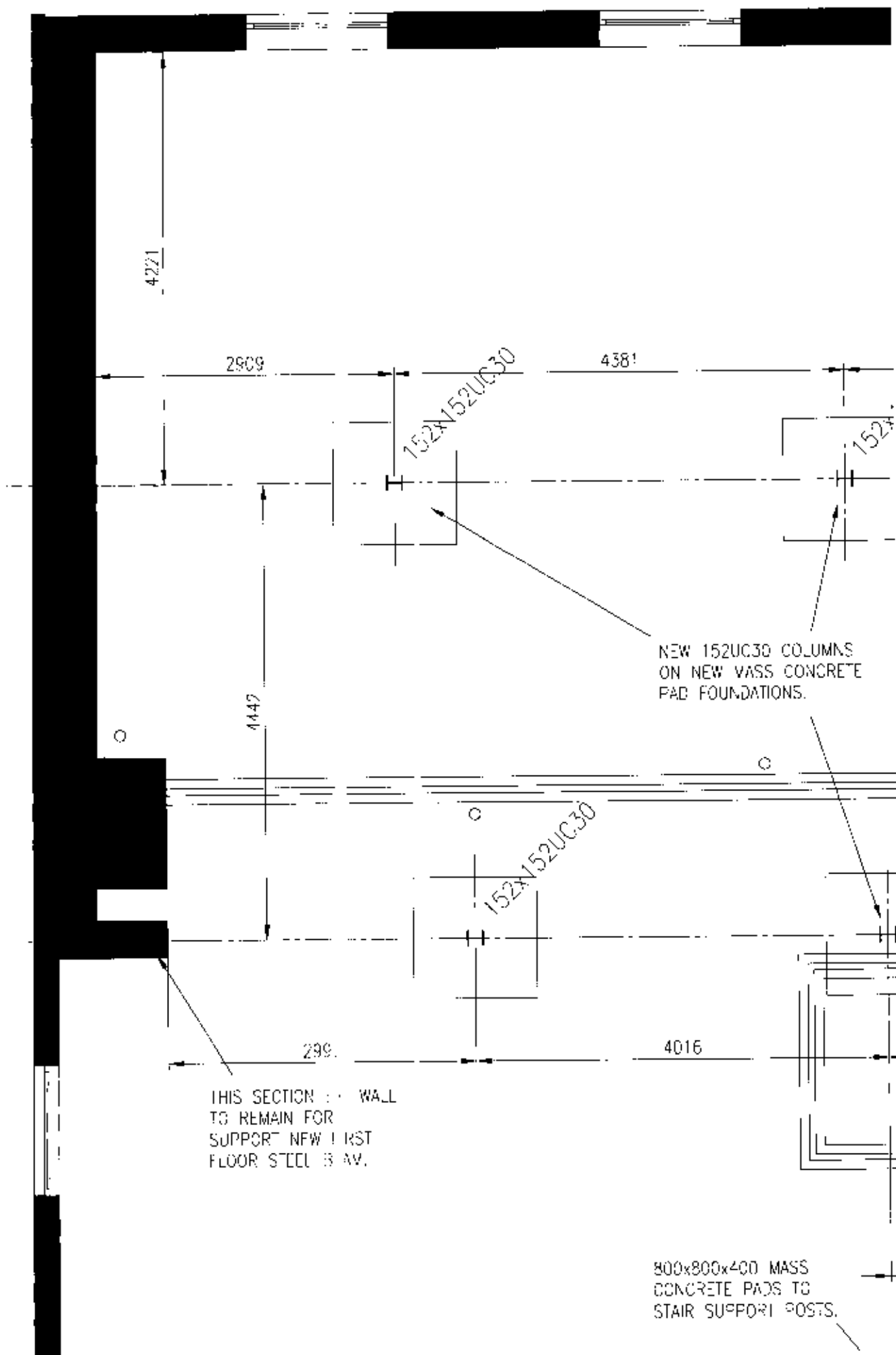
Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage





77 H10 02-200 UB

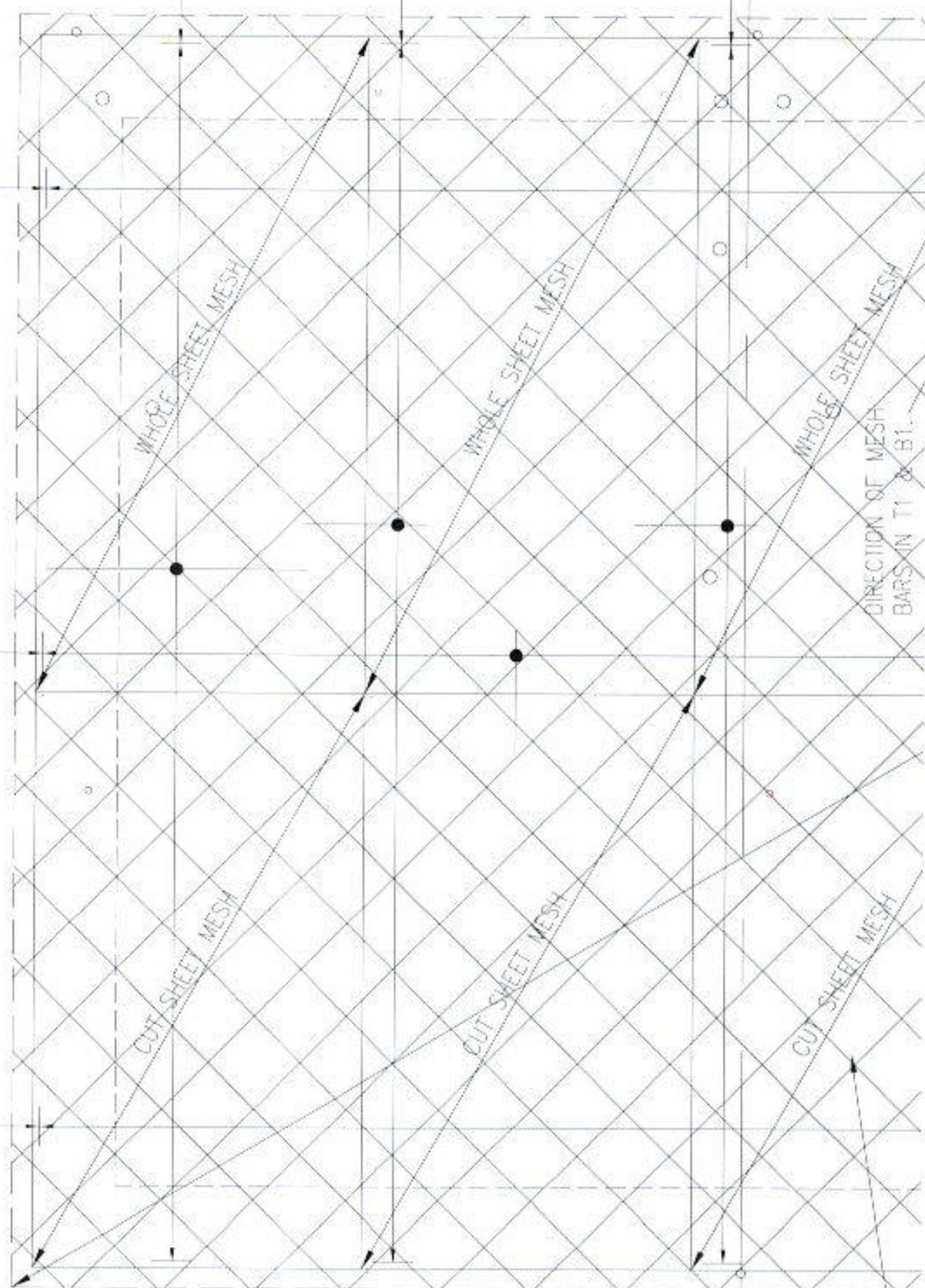
77 H10 05-200 B1
77 H10 05-200 T1

77 H10 02-200 UB

46 H10 06-200 UB

46 H10 05-200 B2
46 H10 05-200 T2

46 H10 05-200 B2
46 H10 05-200 T2

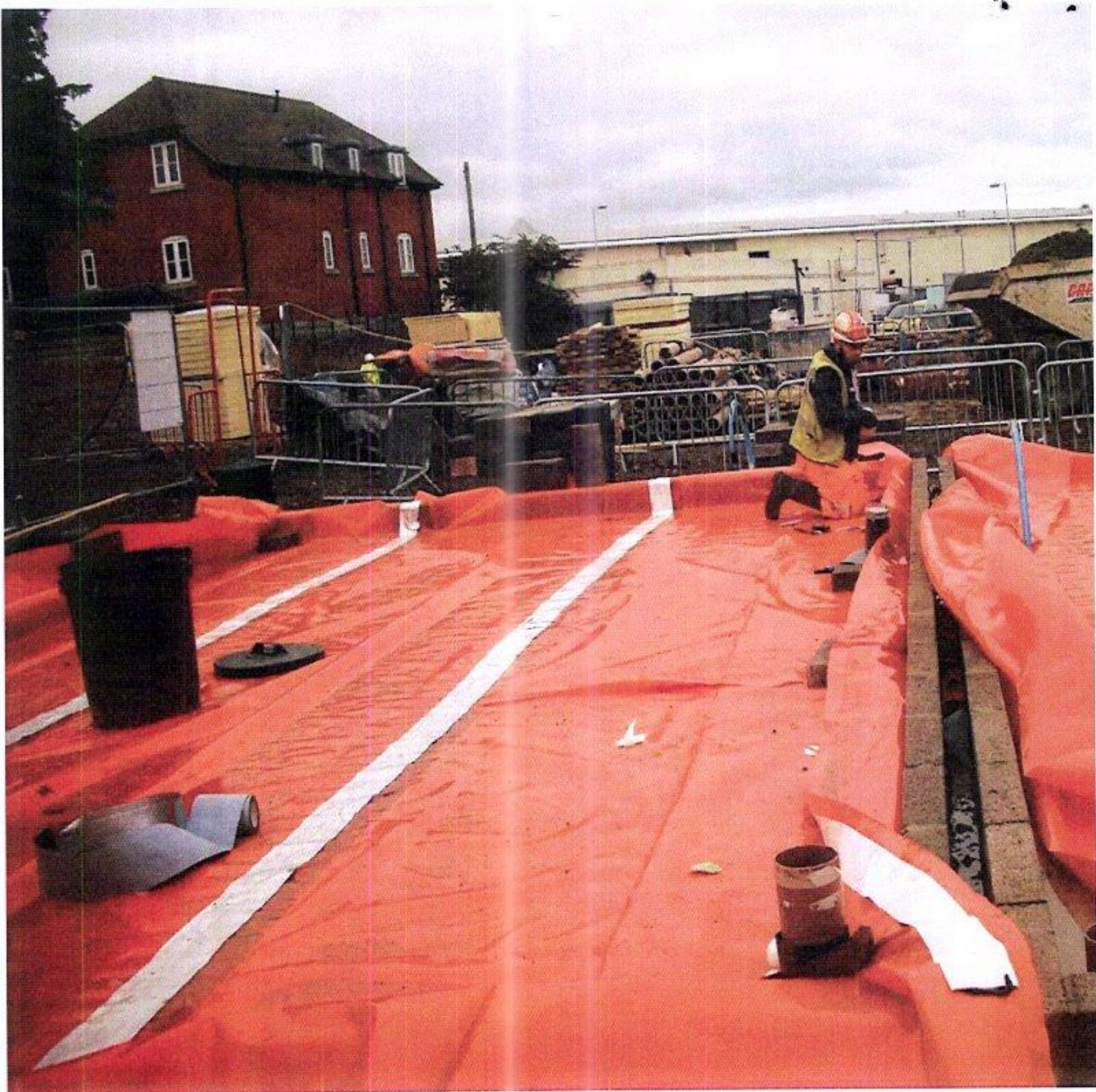


EXTENT OF :
SLAB

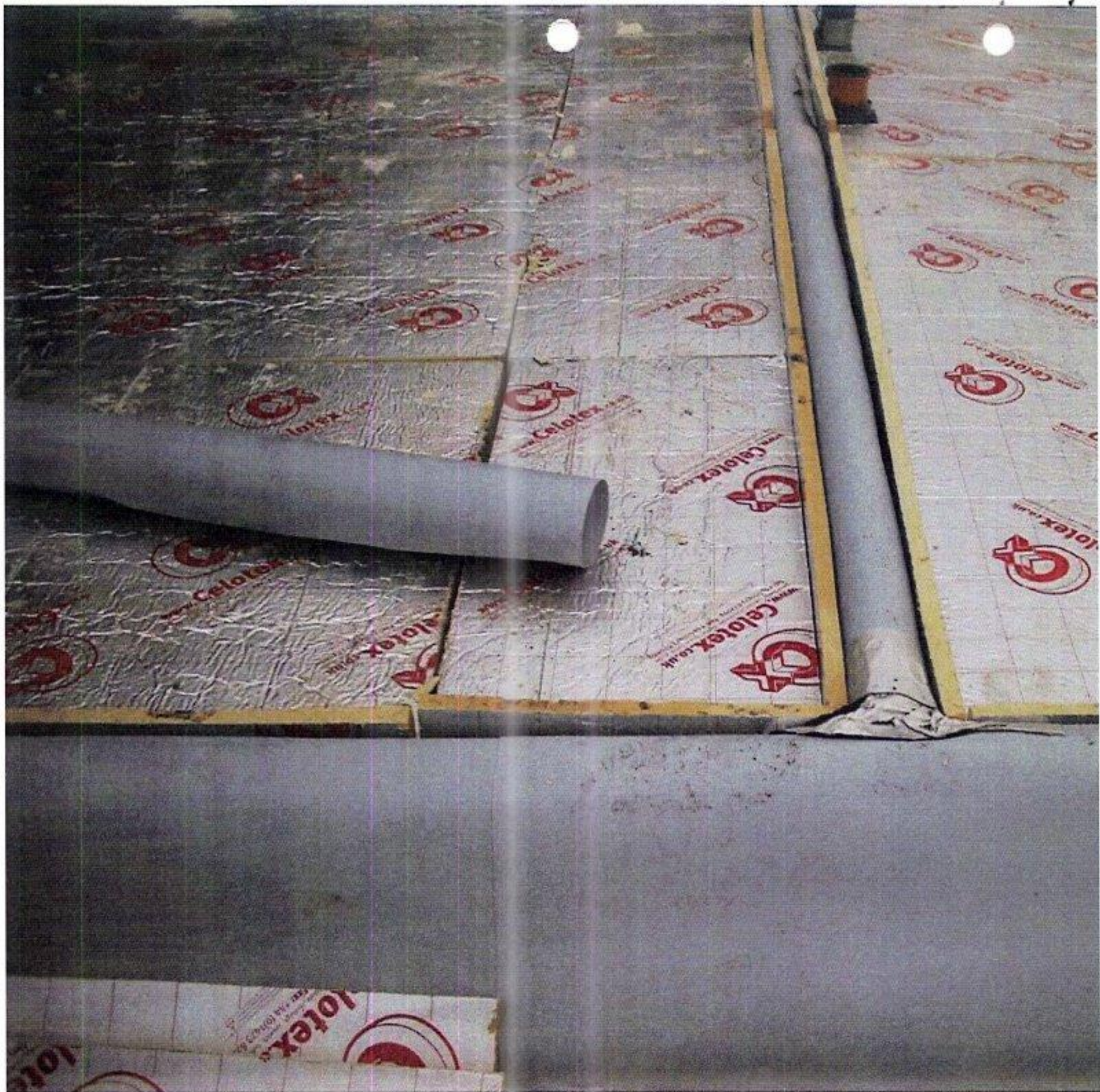








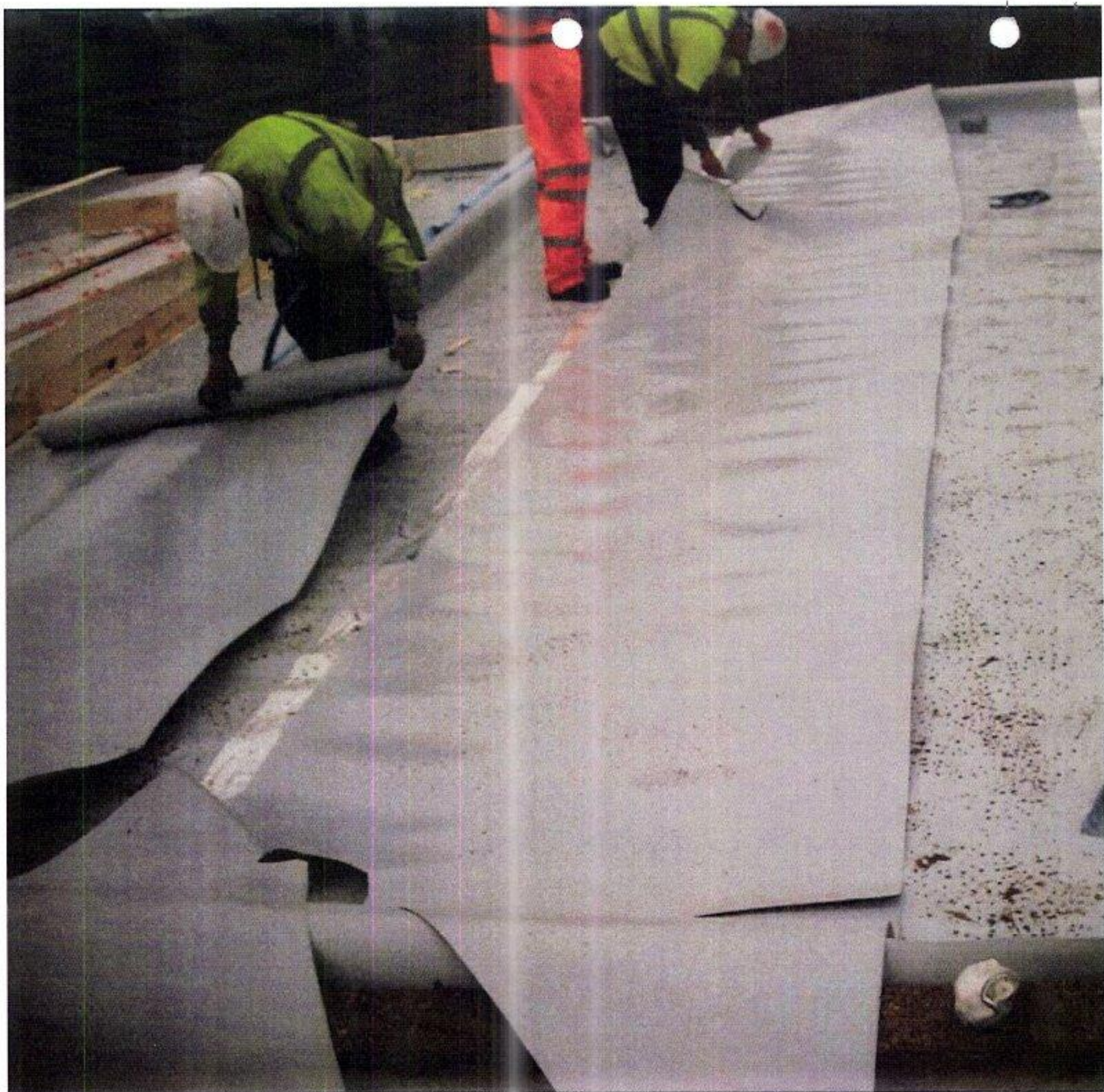






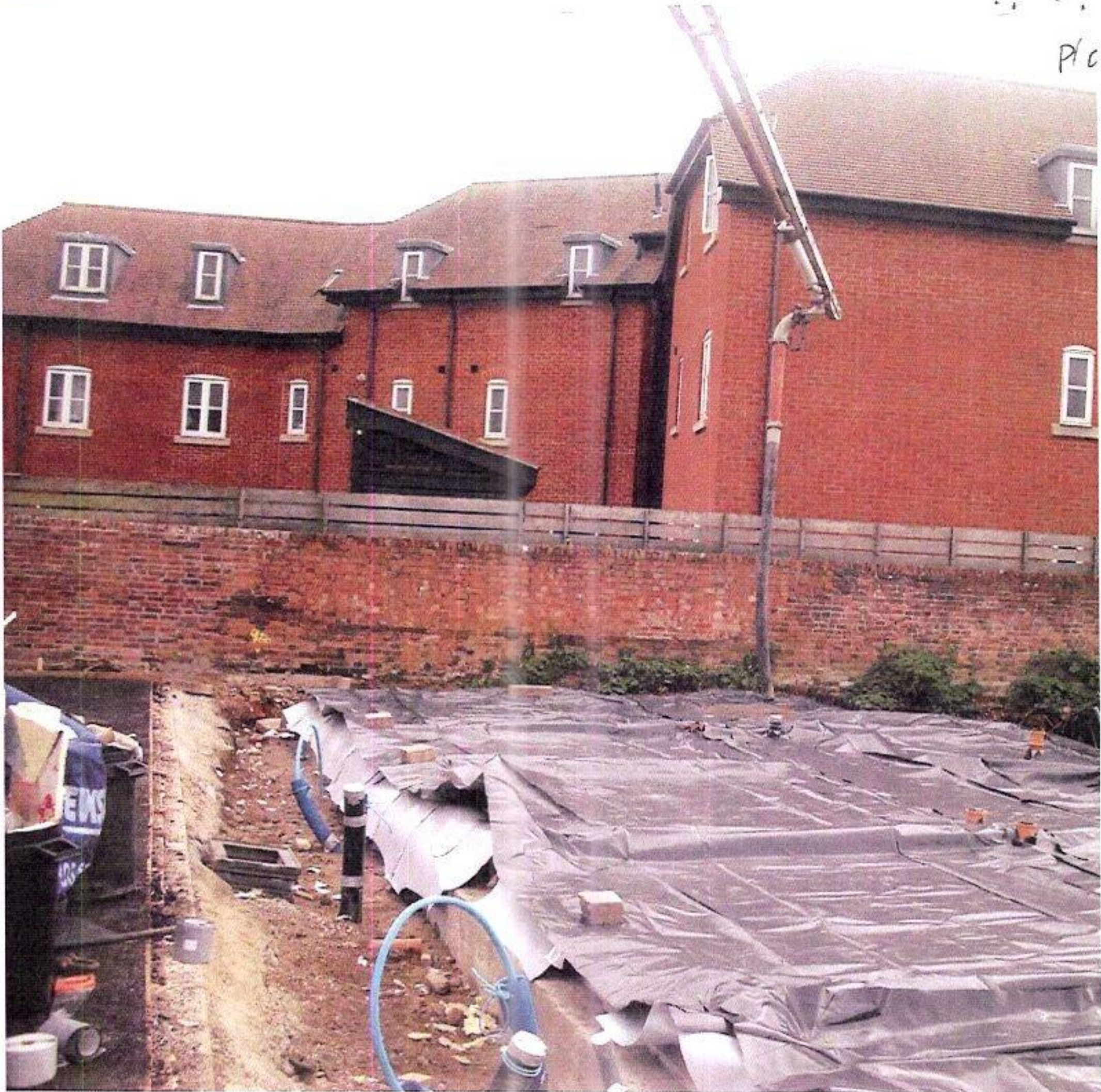








P/c

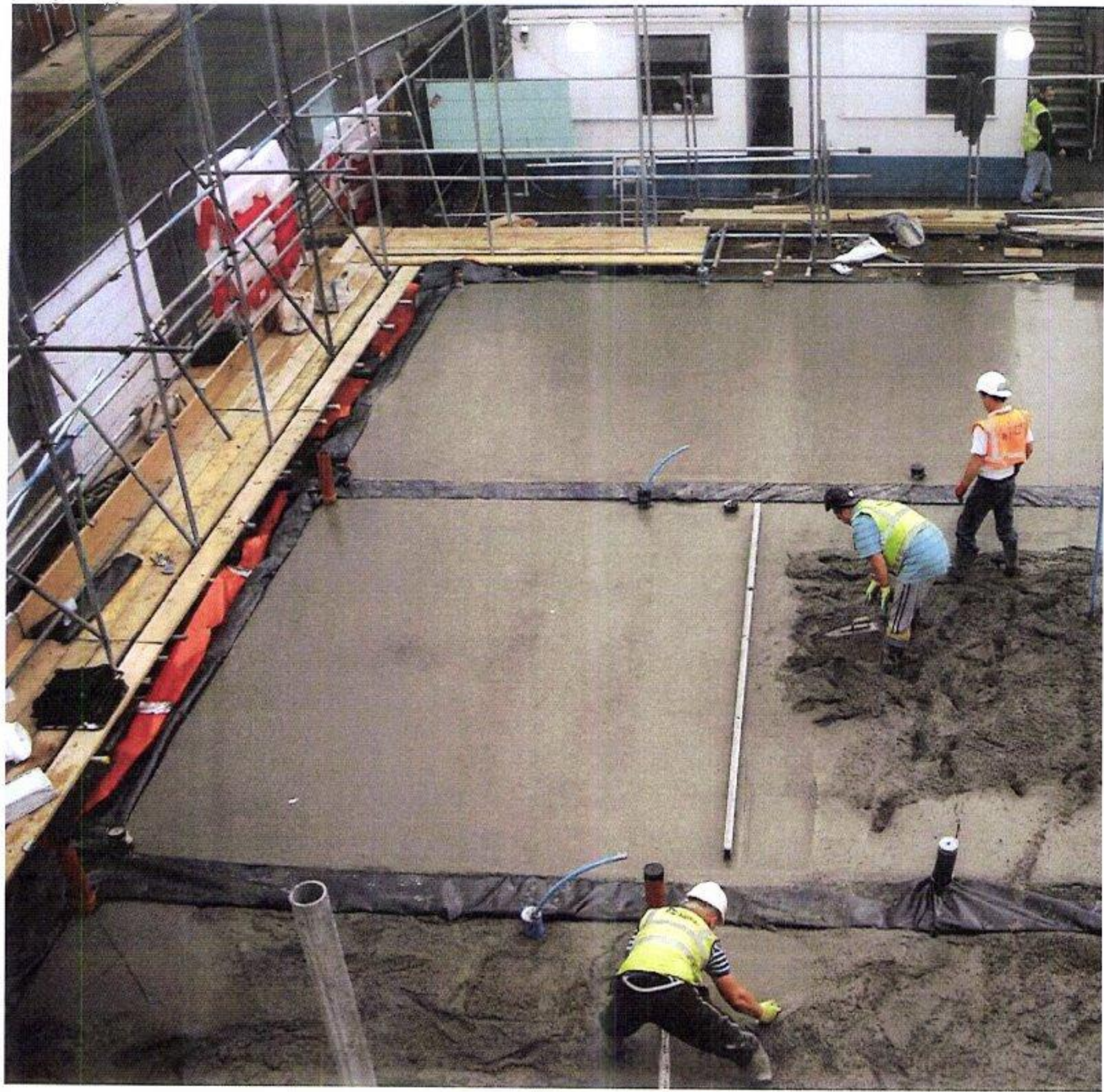












GX Flexi Hydrocarbon Barrier

CE Mark to EN 13967

Page 1



- Independently tested against various hydrocarbons
- High puncture, flexibility and tear resistance
- Minimal linear expansion
- Complies with current codes of practice
- Manufactured in the UK

Description

Visqueen GX Flexi Hydrocarbon Barrier is an enhanced polymer modified flexible membrane designed to comply with current guidance on Hydrocarbons. Manufactured using the latest extrusion technology and drawing on our extensive knowledge and expertise in gas protection, Visqueen has developed a new flexible barrier membrane suitable in brownfield applications that are affected by Hydrocarbons.

The product is available in Single Wound Sheeting (SWS) roll format, 1.4mx 50m, and in 2 colours; white to reduce linear expansion in hot weather or grey.

Application

Visqueen GX Flexi Hydrocarbon Barrier offers a safe solution for the protection of buildings and occupiers against all levels of hydrocarbons, methane, carbon dioxide and radon ingress. Typically these are sites previously used as petrol stations, coalfields, landfill sites or are contaminated industrial sites. The membrane also acts as a damp-proof membrane. Due to the polymeric structure Visqueen GX Flexi Hydrocarbon Barrier also provides a flexible membrane suitable for various applications unlike rigid HDPE rich membranes.

Due to the wide variety of hydrocarbon contaminants found, we strongly recommend the use of the Visqueen Building Products Technical Support Team at an early design stage so that the most appropriate detailing and material specifications are adopted.

Testing for Chemical Resistance (EN 14414 and EN 14415)

The membrane has been tested against various harmful gases and dangerous contaminants such as hydrocarbons. In addition to this, the membrane has been subjected to accelerated life immersion tests. EN 14414 and EN 14415 - Chemical resistance to leachates and aggressive chemicals - are designed to stress the membrane at a higher level of chemical concentration and temperature than it would experience in normal use. Changes in weight, volume, tensile strength and visual degradation are recorded to obtain the membrane's suitability to the challenge chemical.

These results are published below and assist designers and engineers in the suitability of Visqueen GX Flexi Hydrocarbon in various applications.

Installation Guidelines

Visqueen GX Flexi Hydrocarbon Barrier and ancillary components must be installed in accordance with the recommendations of CIRIA C665 "Assessing risks posed by hazardous ground gases to buildings", NHBC guidelines, Chartered Institute of Environmental Health Ground Gas Handbook and CIRIA C682 the VOC Handbook.

Visqueen GX Flexi Hydrocarbon Barrier system is suitable where hydrostatic pressure is present, however in this application the joints must be welded and not



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BUILDING PRODUCTS



GX Flexi Hydrocarbon Barrier

CE Mark to EN 13967

taped. The membrane should be installed on a blinded or smooth surface allowing adequate overlap for jointing between the sheets and avoiding bridging (i.e. areas of unsupported membrane).

For taped joints, overlap the membranes by at least 150mm and bond together using Visqueen GX Double Sided Jointing tape. Secure the lap using Visqueen Gas Resistant Lap Tape.

In areas where high levels of unsupported membrane occur it is recommended that Visqueen Pre Applied Membrane is used.

When a welded joint system is being used, punctures to the membrane can only be repaired by welding a patch of membrane with identical thickness and lapped at least 150mm beyond the limits of the puncture. Where this is not possible and the three dimensional shapes are complex it is recommended a preformed unit is used. The membrane has been designed to perform in circumstances where linear expansion could occur, however in high temperatures the membrane should be covered immediately after installation.

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.

System Components:

- Visqueen GX Double Sided Bonding Tape
- Visqueen Gas Resistant Lap Tape
- Visqueen Surface DPC Fixing System
- Visqueen GX DPC

Storage and Handling

Visqueen GX Flexi Hydrocarbon Barrier is classified as nonhazardous 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 sub-soils. The product should be stored in a warm dry environment and not exposed to long periods of sunlight.

Technical Data and CE Mark

Visqueen GX Flexi Hydrocarbon 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-CPD – 13/F028 applies.



GX Flexi Hydrocarbon Barrier

CE Mark to EN 13967

Product Data

Product Data

Heading	Characteristic	Test method	Units	Compliance criteria	Value or Statement
	Colour				Grey or White
	Length	EN 1848-2	m	-0/+10%	50
	Width	EN 1848-2	m	-0/+10%	1.4
	Thickness	EN 1849-2	mm	+/-20%	1
	Mass	EN 1849-2		-12%/+12%	974
	Tensile Strength - MD	EN EN12311	N/mm2	>MLV	22
	Tensile Strength - CD	EN EN12311	N/mm2	>MLV	20
	Tensile Elongation - MD	EN EN12311	%	>MLV	799
	Tensile Elongation - CD	EN EN12311	%	>MLV	848
	Joint Strength	EN12317-2	N	>MLV	515
	Watertightness - 2kPa	EN 1928	-	Pass/Fail	Pass
	Resistance to impact	EN 12691	mm	>=MLV	600
	Resistance to static loading	EN 12730	kg	MLV	Pass-20
	Resistance to Nail tear - MD	EN 12310-1	N	>=MLV	705
	Resistance to Nail tear - CD	EN 12310-1	N	>=MLV	745
	Durability-Heat ageing	EN 1296	-	Pass/Fail	Pass
	Durability-Chemical resistance	EN 1847	-	Pass/Fail	Pass
	Resistance to Low temperature	EN 495-5		MDV	Pass at - 40oC
	Water vapour transmission - resistance	EN 1931	MNs/g	MDV	1171
	Water vapour permeability	EN 1932		MDV	0.11
	Reaction to Fire	EN 13501-1	Class	MDV	F
	Diesel Permeability	ISO 6179		MDV	0.4
	Petrol Permeability	ISO 6179		MDV	8.6
	Xylene Permeability	ISO 6179		MDV	14.6
	Toluene Permeability	ISO 6179		MDV	23
	Chemical Resistance - Acids	EN 14414-A	-	Pass/Fail	Pass
	Chemical Resistance - Alkalies	EN 14414-B	-	Pass/Fail	Pass
	Chemical Resistance - Organic Solvents	EN 14414-C	-	Pass/Fail	Pass
	Chemical Resistance - Visual Defects	EN 14414	-	Pass/Fail	Pass
	Resistance to Leaching - Hot Water	EN 14415-A	-	Pass/Fail	Pass
	Resistance to Leaching - Aqueous alkaline liquids	EN 14415-B	-	Pass/Fail	Pass
	Resistance to Leaching - Organic alcohols	EN 14415-C	-	Pass/Fail	Pass
	Resistance to Leaching - Visual Defects	EN 14415-A	-	Yes/No	No



GX Flexi Hydrocarbon Barrier

CE Mark to EN 13967



Visqueen Building Products

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.

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

Find your local stockist

Search our directory of Visqueen specification Stocking Centres to locate your nearest Visqueen Partner.

Distributor Support

Our specification Stocking Centres can access a free library of sales support tools, bespoke catalogues and more, [click here](#).

Technical support throughout your project

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



Hyload Gastite LL Trade DPM

Loose-laid polythene gas membrane for low risk ground gas sites.

Product Details

Description	Size
Roll Dimensions	2m x 25m
Roll Weight	23kg



Introduction

Building Regulations require that proper precautions be taken to prevent danger to health when building on contaminated land. Hyload Gastite LL Trade DPM offers a safe solution for the protection of buildings against methane, radon and carbon dioxide, when installed in accordance with BRE Report: Construction of Buildings on Gas Contaminated Land. Hyload Gastite LL Trade DPM is a superior quality virgin grade polythene membrane which is flexible and easy to install. The product is also suitable for use as a damp proof membrane. Hyload Gastite LL Trade DPM forms part of the IKO hazardous ground gas protection system conforming to the requirements of CIRIA C665 and NHBC for low risk ground gas sites.

Features & Benefits

- Protects against methane, radon and carbon dioxide
- Flexible and easy to install
- Can be used as a damp proof membrane

Properties

Property	Test Method	Unit	Hyload Gastite LL Trade	
Elongation at break	BS 2782 (1996) Method 320A	%	LD	>400
			TD	>500
Water Vapour Transmission Rate	BS 3177 1959 (1995)	g/m ² /day	0.15	
Density	N/A	g/m ³	0.92	
Radon Gas Permeability	Swedish Testing Institute	10 ⁻¹² m ² /s	8±15%	
Radon Gas Transmittance	Swedish Testing Institute	10 ⁻⁹ m/s ⁻¹	22±15%	
Methane Gas Permeability	ISO 2782:1995	E-17	2.71	
Methane Gas Transmission Rate	ISO 2782:1995	cc/m ² /hr	23.7	
Carbon Dioxide Gas Permeability	ISO 2782:1995	E-17	4.67	
Methane Gas Transmission Rate	ISO 2782:1995	cc/m ² /hr	39.5	

Notes: LD – Longitudinal Direction TD – Transverse Direction

System Components

Hyload Gastite LL Trade DPM system components include:

Hyload Jointing Tape No2: Butyl based double sided jointing tape for bonding laps

Hyload Jointing Tape No3: Single sided jointing tape for sealing laps

IKO Flashing Tape: Single sided high performance jointing tape for sealing laps

Hyload Trade DPC: Flexible polymeric gas resistant DPC

Hyload Preformed Flexible Top Hat Units: For effective sealing around service pipe penetrations

Hyload Tanking Membrane Gastite SA: Self-adhesive membrane for below ground tanking applications

Installation, Jointing & Covering

Hyload Gastite LL Trade and ancillary components must be installed in accordance with the recommendations of Building Research Establishment BRE No: 211 "Radon: guidance on protective measures for new dwellings" and BRE No: 414 "Protective Measures for housing on gas contaminated sites". The product is not intended for use where there is the risk of hydrostatic pressure. Hyload Gastite LL Trade should be installed on a sand blinded or smooth surface allowing adequate overlap for jointing between the sheets and avoiding bridging (i.e. areas of unsupported membrane). In order to ensure continuity the membrane should be continuous with the gas proof course. Awkward junctions should be sealed with Hyload Preformed Cloak Units e.g. PFU-113 Reversible Corner Units. Where additional ventilation is required, Hyload Gastite LL Trade DPM should be installed with a proprietary gas ventilation system.

Hyload Gastite LL Trade should be overlapped by at least 150 mm and bonded with Hyload Jointing Tape No2. This joint should be sealed with Hyload Jointing Tape No3, or IKO Flashing Tape where specified. Ensure that the membrane is clean and dry at the time of jointing. Perforations or punctures in the sheet should be covered with another piece of the membrane and have an overlap of at least 150mm. The laps should be bonded and sealed with the tapes described above. Airtight seals should be formed around all service entry points. Hyload Preformed Flexible Top Hat Units are available for sealing around service pipes. The unit should be bonded and sealed to the membrane and pipe with the tapes described above.

Hyload Gastite LL Trade DPM should be covered by a screed or other 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 the screed or concrete. A minimum thickness of 50mm screed is recommended. When reinforced concrete is to be laid over the membrane, the reinforcements must be prevented from puncturing the membrane.

Storage and Handling

Hyload Gastite LL Trade is classified as non-hazardous when used in accordance with the relevant Code of Practice (CP 102 1973). The product is chemically inert and is not affected by acids and alkalis that may be present in the sub-soils. Exposure to prolonged ultraviolet light will cause the product to become brittle. The material is not therefore recommended for uses where it will be exposed to long periods of outdoor weathering. Care should be taken to avoid accidental damage when handling Hyload Gastite LL Trade on site.

This technical datasheet is applied to products sold by IKO PLC and valid until withdrawal or until modification. Since this datasheet may be subject to revision, it is the responsibility of designer/end-user to make sure of possessing the latest version of the datasheet (*see date of issuing). Most recent version of this datasheet can be also accessed under www.ikogroup.co.uk. Modification of the technical datasheet repeals the previously issued versions!

IKO PLC, Appley Lane North, Appley Bridge, Wigan, Lancashire, WN6 9AB

t: 01257 255 771

technical@ikogroup.co.uk

www.ikogroup.co.uk



REQUIRED COMPONENTS
AVAILABLE AS A DOWNLOAD FROM
VISQUEENBUILDING.CO.UK/GAS

- VISQUEEN GAS BARRIER JOINTING SYSTEM**
- VISQUEEN DETAILING STRIP**
- VISQUEEN TOP HAT UNITS**
- P53 VISQUEEN GEOCOMPOSITE DRAINAGE & VENTING MAT**
- P88 VISQUEEN HEAVY DUTY PROTECTION BOARD**
- P8 VISQUEEN ZEDEX CPT DPC**
- P60 VISQUEEN GAS RESISTANT SELF ADHESIVE MEMBRANE**

SPECIFICATION SUPPORT
THE FOLLOWING ITEMS ARE AVAILABLE
TO VIEW ONLINE OR TO DOWNLOAD FROM
VISQUEENBUILDING.CO.UK/GAS

- TECHNICAL DATASHEETS**
- TYPICAL INSTALLATION CAD DETAILS**
- HEALTH & SAFETY DATA**



COVERING

COVERING

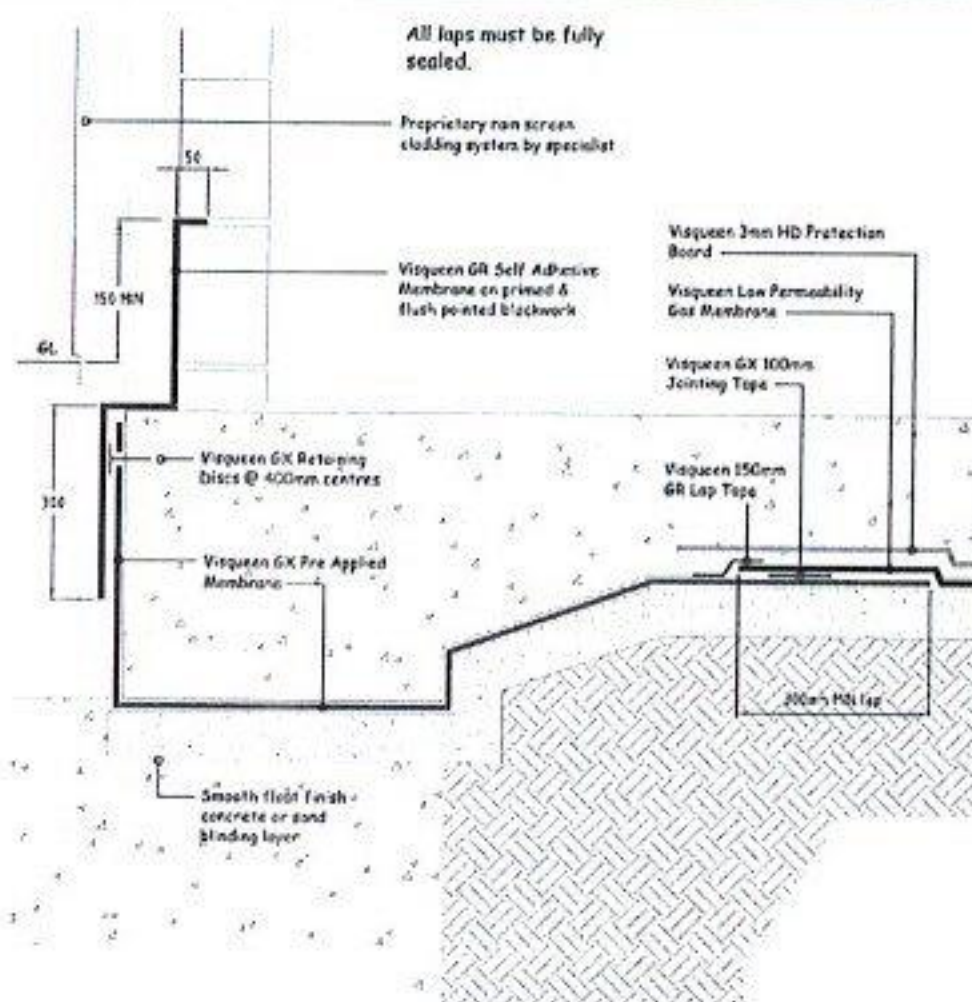
Visqueen Low Permeability Gas Membrane should be covered by a protective layer as soon as possible after installation. Care should be taken to ensure that the membrane is not punctured, stretched or displaced when applying a screed or final floor covering. A minimum thickness of 50mm screed is recommended.

When reinforced concrete is to be laid over the membrane, the wire reinforcements and spacers must be prevented from contacting the membrane. It is recommended that the membrane is covered with Visqueen Protection Boards or screed before positioning the reinforcement. When underfloor heating is being installed, it is recommended that the membrane 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 Low Permeability Gas Membrane is classified as non-hazardous when used in accordance with the relevant Code of Practice (CP 102:1973). 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 CP 102:1973. Care should be taken to avoid accidental damage when handling the membrane on site. When the weather is cold all jointing tapes should be kept in a warm and dry place until needed. Installation is not recommended below 5°C.

TYPICAL SLAB EDGE HEAVY DUTY COMBI DETAIL / LP GAS MEMBRANE (SW-LPGM-28)



TECHNICAL DATA

Thickness	500 microns (2000 gauge)
Roll Dimensions	4m x 12.5m
Roll Colour	Yellow
Roll Weight	23kg
Angle Tear Strength (BS 2782-3: Method 360C)	MD:112N/mm CD:108N/mm
Tensile Strength (BS EN ISO 572-3)	MD: 26.9N/mm ² CD: 26.8N/mm ²
Elongation (BS EN ISO 572-3)	MD: 780% CD: 825%
Carbon Dioxide Gas Permeability (ISO 2782)	2.80 x 10 ⁻¹⁷ m ² /sec/Pa
Methane Gas Permeability (ISO 2782)	1.13 x 10 ⁻¹⁷ m ² /sec/Pa

Visqueen EcoMembrane

CE Mark to EN 13967

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- Accredited by the British Board of Agrément (BBA: 94/3009)
- Manufactured using over 100% recycled polyethylene
- Visqueen's low cost Eco entry level brand

Description

Visqueen EcoMembrane® is manufactured from 100% recycled polyethylene suitable for use as a Type "A" damp proof membrane as defined by BS EN 13967: 2012. It is black or blue in colour, available in 250µm, 300µm and 500µm thicknesses and in convenient multi folded rolls.

Applications and use

Visqueen EcoMembrane® DPM is suitable for use below concrete floors in accordance with clause 11 of CP 102:1973, where there may be capillary rise of moisture but not where it may be subject to hydrostatic pressure. In such a circumstance, Visqueen Tanking Membranes should be used. Where there is a risk that the ground may be waterlogged, sub-soil drainage in accordance with CP 102 and BS 8102 should be provided.

For jointing adjacent sheets of Visqueen DPM, DPM to DPC and DPC to DPC, Visqueen Jointing System should be used. To complete the approved system use the following components when installing the membrane:

- VisqueenPro Double Sided Jointing Tape
- VisqueenPro Single Sided Jointing Tape
- Visqueen TreadGUARD1500
- Visqueen Zedex CPT DPC
- Visqueen Top Hat Units

[Please click here to view typical joint detail](#)

IMPORTANT

Based on BBA, BRE and CIRIA guidelines, Visqueen Building Products recommend the use of special gas protection membranes (rather than traditional polythene DPMs) as suitable protection against ground gases. On brownfield sites or where there is ground contamination please seek further advice from Visqueen Building Products.

For high-rise buildings and commercial heavy duty RC slabs please use Visqueen High Performance 500 um centre-folded DPM in conjunction with Visqueen TreadGUARD as a cost-effective solution. Typical building examples of this use would be schools, hospitals, leisure and shopping centres.



EN 13967
Type A
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VISQUEEN
BUILDING PRODUCTS

Heanor Gate, Heanor, Derbyshire DE75 7RG
T: 0845 302 4758 F: 0845 017 8663
enquiries@visqueenbuilding.co.uk
www.visqueenbuilding.co.uk

VISQUEEN BUILDING PRODUCTS IS A TRADING NAME
OF BRITISH POLYTHENE LIMITED, COMPANY NUMBER:
350729, REGISTERED OFFICE: ONE LONDON WALL,
LONDON, EC2Y 5AB

STRUCTURAL WATERPROOFING
AND GAS PROTECTION SYSTEMS

Visqueen EcoMembrane

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Installation

When used in accordance with the BBA certificate and the relevant clauses of CP102: 1973 in concrete floors not subject to hydrostatic pressure, Visqueen Damp Proof Membranes form an effective barrier to the passage of moisture from the ground. The DPM must be continuous with the DPC in the surrounding walls.

The membrane should be installed on a compacted sand blinding layer or smooth concrete float finish. The DPM must be covered by Visqueen TreadGUARD1500 or rigid under slab insulation as soon as possible after installation. Care should be taken to ensure that the membrane is not stretched or displaced when placing the concrete or screed over the membrane.

Jointing Procedures

- Always ensure that the membrane is clean, dust free and dry at the time of jointing
- Adjacent sheets must be overlapped by a minimum of 150mm
- Bond together using Visqueen PRO Double Sided Jointing Tape
- The joint should then be sealed using Visqueen PRO Single Sided Jointing Tape.

Where the sheets have been perforated they should be patched with sheets of identical thickness lapped at least 150mm beyond the limits of the puncture and bonded with Visqueen PRO Double Sided Jointing Tape and sealed with Visqueen PRO Single Sided Jointing Tape.

Service Pipe Penetrations

Please use Visqueen Top Hat Pipe Cloaks for any service pipe penetrations. The base of the Visqueen Top Hat Units should be sealed using Visqueen Double Sided PRO Jointing Tape and Visqueen PRO Single Sided Jointing Tape.

Storage and Handling

Visqueen Ecomembrane is classified as non-hazardous when used in accordance with the relevant Code of Practice (CP 102:1973). 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. When a Vapour Control Layer is required please refer to Visqueen's Vapour barrier range. We do NOT recommend Ecomembrane for this use.

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.

Visqueen PRO Double Sided Jointing Tape and Visqueen PRO Single Sided Jointing Tape should be kept in a warm, dry place until needed. Installation is not recommended below 5°C.



SPECIFICATION SUPPORT

The following items are available to view online or to download from www.visqueenbuilding.co.uk

- Technical Datasheets
- Typical installation CAD details
- Health and Safety data

Register online for access to NBS Clauses and for information about our CPD Seminars



TECHNICAL SUPPORT

For advice on detailing or installation call Visqueen Building Products Technical Help Line 0845 302 4758. Pricing & Availability may be obtained from our UK Network of merchant stockists. For details of these call our Sales Office on 0845 302 4758.

VISQUEEN

BUILDING PRODUCTS

Visqueen EcoMembrane

CE Mark to EN 13967

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Technical Data and CE Mark

Visqueen Ecomembrane complies with the requirements and clauses of EN 13967 - Flexible sheets for waterproofing.

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-CPD – 13/F029 applies.



EN 13967
Type A
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Product Data						
Characteristic	Test method	Units	Compliance criteria	Value or Statement 0.25mm	0.3mm	0.5mm
Visible defects	EN 1850 -2	-	Pass/Fail	Pass	Pass	Pass
Length	EN 1848-2	m	-0%/+10%	25	25	12.5
Width	EN 1848-2	m	-2.5%/+2.5%	4	4	4
Straightness	EN 1848-2	-	Pass/Fail	Pass	Pass	Pass
Thickness	EN 1849-2	mm	-12%/+12%	0.25	0.3	0.5
Mass	EN 1849-2	g/m ²	-12%/+12%	240	265	460
Tensile Strength - MD	EN EN12311	N/mm ²	>MLV	17.46	22.41	16.65
Tensile Strength - CD	EN EN12311	N/mm ²	>MLV	20.88	21.33	17.91
Tensile Elongation - MD	EN EN12311	%	>MLV	333	351	333
Tensile Elongation - CD	EN EN12311	%	>MLV	387	387	342
Joint Strength	EN12317-2	N	>MLV	136	169	256
Watertightness 2kPa	EN 1928	-	Pass/Fail	Pass	Pass	Pass
Resistance to impact	EN 12691	mm	>MLV	30	30	30
Durability (artificial ageing)	EN 1296 and EN 1928	-	Pass/Fail	Pass	Pass	Pass
Durability Chemical Resistance	EN 1847	-	Pass/Fail	Pass	Pass	Pass
Resistance to tearing (nail shank)	EN 12310-1	N	MDV	165	205	310
Resistance to tearing (nail shank)	EN 12310-1	N	MDV	170	250	310
Resistance to static loading	EN 12730	Kg	>MLV	Pass -20	Pass -20	Pass -20
Water vapour transmission - resistance	EN 1931	MNs/g	MDV	586	682	1390

Visqueen EcoMembrane

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Water vapour transmission - permeability	EN 1931	$\text{g/m}^2/\text{d}$	MDV	0.36	0.32	0.16
Reaction to Fire	EN 13501-1	Class	MDV	F	F	F

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.

Alert™

Alert™ Woven Polypropylene Geotextile and Contamination Indicator

Alert™ was developed by Geosynthetics Limited to provide a cost effective and practical way to indicate the break between potentially contaminated ground and imported or site won clean fill. The large roll size combined with industrial leading technical specifications and strength have lead to the vivid orange **Alert™** woven geotextile being the product of choice in the UK.



PROPERTY	TEST METHOD	Value
Colour		Orange
Tensile strength - warp	BS EN ISO 10319	18 kN/m
Tensile strength - weft	BS EN ISO 10319	12 kN/m
Elongation at break - warp	BS EN ISO 10319	28 %
Elongation at break - weft	BS EN ISO 10319	16 %
CBR puncture resistance	BS EN ISO 102236	1840 N
Water flow normal to the plane	BS 6906 Part 3	32 l/m ² /sec
Pore size 90% finer than	BS 6906 Part 2	230 microns
Effects of UV light		The polypropylene used contains a UV inhibitor
Fabric thickness under 2 kN/m ²		0.39 mm
Standard roll width		4.5 m
Standard roll length		100 m
Applications		Brownfield sites Developed land Warning indicator

This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentation. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge becomes available. Since we cannot anticipate all variations in actual end use conditions, Geosynthetics Limited makes no warranties and assumes no liabilities in connection with this information. Nothing in this publication is to be considered as a licence to operate under or a recommendation to infringe any patent right.
DR: 04/VI/18.11.13

