

Your Ref:
Our Ref: CRM.1265.013.GE.L.004

Date: 9th October 2021
Email: Richard.Reece@enzygo.com

Karim Mahrach,
Pacific House
Imperial Way
Reading
Berkshire
RG2 0TD

By Email: Karim.Mahrach@bellway.co.uk

Dear Karim,

**RE: Former Cox & Wyman Site, Cardiff Road, Reading, RG1 8EX, Plots 15 - 22
Topsoil Validation**

Introduction

Enzygo Geo Environmental Limited undertook an investigation for a proposed development at the above-named site. The site investigation encountered elevated levels of Lead, TPH and PAH, within the Made Ground. Asbestos was also detected.

As the site is being re-developed for residential apartments with communal garden areas, and houses with private garden areas, remediation to areas of soft landscaping was proposed comprising 400mm clean materials over a Geotextile no-dig barrier within communal garden areas, and 600mm clean materials over a Geotextile no-dig barrier within private garden areas. This was submitted to Reading Borough Council and was approved. During the works, no subsequent site observations indicated any change was required.

Site Inspection

On the 2nd November 2021 Enzygo Geo Environmental Limited undertook a site visit to excavate and confirm the presence of 600mm of cover materials, over a Geotextile no-dig barrier. Four inspection pits (HP7 – HP10) were excavated within the rear garden areas of plots 15-22. Photos of Hand Pits are shown in Appendix A. The locations of the hand pits are shown on Drawing CRM.1265.013.GE.D.002.B, which is included in Appendix B.

No further areas of contamination were identified during the construction phase or during the validation inspection, therefore no additional remedial measures were required or undertaken.

Cover Soils

Hand Pits confirmed the presence of 600mm of cover soils over a Geotextile no-dig barrier, meeting the required depth for private garden areas. Photographs of the hand pits are included in Appendix A. Photos showing the placed Geotextile are shown in Appendix C.

During the validation visit, samples were recovered from the Hand Pits and submitted to the laboratories of I2 who are UKAS and MCERTS accredited for testing. Soil samples were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that is cleaned at each sampling location.

Soil samples were sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon, and Asbestos screen.

Chemical results show that the soils within the rear garden areas meet the required chemical threshold for residential use with plant uptake. Results are attached in Appendix D.

Disposal tickets of excavated materials are shown in Appendix E.

Chemical Analysis

As materials were imported from a donor site under the approved Materials Management Plan, (MMP), shown in Appendix F, chemical analysis reports were obtained from the donor site during the site investigation in June 2016. These show the materials are suitable for use as planting medium and meet the GAC values for residential use with plant uptake. No Asbestos was detected. Chemical analysis reports from the donor site, Keephatch Beech, are shown in Appendix G.

Subsoil for the rear garden areas were obtained from the donor site Keephatch Beech, in accordance with the approved MMP. Soil transfer tickets are shown in Appendix H.

Topsoil chemical analysis was provided by the topsoil supplier. The certificate shows that the soils are suitable for residential use with plant uptake. A copy is shown in Appendix H.

A contractor's statement is shown in Appendix J, confirming that the remediation works have been carried out in accordance with the approved RMS and MMP.

Conclusion

Based on the site inspection undertaken, information provided and results it is considered that the remediation works are in accordance with the approved remedial methodology.

Given the detailed appendices showing the material transportation tickets, muck-away tickets, chemical analysis of the transported materials, and the contractor's statement, it is considered that this is sufficient evidence to discharge the condition for plots 15 – 22.

This verification letter has been prepared following validation works to address requirements of planning condition 18 of Planning Consent 171814 Application ref 18123.

We hope that we have correctly interpreted your requirements.

Yours sincerely,
For and on behalf of Enzygo



Richard Reece
Environmental Consultant

APPENDICES

APPENDIX A – HAND PIT PHOTOGRAPHS

HP7



HP8



HP9



HP10



APPENDIX B – LOCATION PLAN



Key

- Site Boundary
- Communal Area 400mm
- Garden Area 600mm
- Extent of Gas Membrane Proposed
- Area of Mercury Removed
- Validation Pits (HPA - HPM)

Adding additional Gas Membrane Areas	10/05/19	Rev B
Adding Gas Membrane Area	10/05/19	Rev A

Description	Date	Revision
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enzygo
environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:
Bellway and Thames Properties

SCALE: **1:500@A3**
PROJECT REF: **CRM.1265.013**

DRAWN: **MG**
CHECKED: **SR**
DATE: **May 2019**

PROJECT:
Cardiff Road, Reading

TITLE:
Remediation Plan

FIGURE NO:
CRM.1265.013.GE.D.002.B

APPENDIX C – PHOTOGRAPHS OF GEO-TEXTILE







APPENDIX D – CHEMICAL ANALYSIS



Richard Reece

Enzygo Geoenvironmental Ltd
The Byre
Woodend Lane
Cromhall
Gloucestershire
GL12 8AA

e: richard.reece@enzygo.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 21-20451

Project / Site name:	Cardiff Road	Samples received on:	03/11/2021
Your job number:	CRM.1263.013	Samples instructed on/ Analysis started on:	03/11/2021
Your order number:	CRM.1263.013	Analysis completed by:	10/11/2021
Report Issue Number:	1	Report issued on:	10/11/2021
Samples Analysed:	4 soil samples		

Signed: *Karolina Marek*

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-20451
Project / Site name: Cardiff Road
Your Order No: CRM.1263.013

Lab Sample Number				2070042	2070043	2070044	2070045
Sample Reference				HP7	HP8	HP9	HP10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.60	0.00-0.60	0.00-0.60	0.00-0.60
Date Sampled				02/11/2021	02/11/2021	02/11/2021	02/11/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	16	21	17	19
Total mass of sample received	kg	0.001	NONE	2.0	1.0	1.0	1.0

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.7	7.9	8.3	8.1
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.3	1.7	2.3	2.5

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.2	8.2	7.3	8.1
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.8	0.8	1.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	12	10	11	8.9
Copper (aqua regia extractable)	mg/kg	1	MCERTS	8.7	7.6	9.6	11
Lead (aqua regia extractable)	mg/kg	1	MCERTS	15	13	14	18
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	5.1	4.8	5.9	6.4
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	31	36	36	43

Analytical Report Number: 21-20451
Project / Site name: Cardiff Road
Your Order No: CRM.1263.013

Lab Sample Number				2070042	2070043	2070044	2070045
Sample Reference				HP7	HP8	HP9	HP10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.60	0.00-0.60	0.00-0.60	0.00-0.60
Date Sampled				02/11/2021	02/11/2021	02/11/2021	02/11/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status	

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10

TPH (>C5 - C7)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH (>C7 - C8)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C35 - C44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-20451

Project / Site name: Cardiff Road

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2070042	HP7	None Supplied	0.00-0.60	Brown loam and clay with gravel and vegetation.
2070043	HP8	None Supplied	0.00-0.60	Brown sand.
2070044	HP9	None Supplied	0.00-0.60	Brown loam and clay with gravel.
2070045	HP10	None Supplied	0.00-0.60	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 21-20451
Project / Site name: Cardiff Road

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

APPENDIX E – DISPOSAL TICKETS



Hydecote Pit
Pingewood Road North
Burghfield Bridge

Conveyance/ Delivery Note

Carrier Licence: CBDU173096

VAT Reg: GB-844 6704 12

Permit No: EPR/JB3132AR

Account No. MOSTSURR

Site Address:

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 181284 **Date:** 15/10/2021
Ref: 2071 **Order No:** PO 170
SIC Code:
Vehicle Reg: JM18DEM
Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	32300	13200	19100

Weighbridge

Date **Time** **KG**

Weighbridge Operator

Ticket No: 181284

15/10/2021 14:52:38 **Gross** 32300

Sorin

21/05/2019 15:11:28 **Tare** 13200

Net 19100

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier

Customer

Driver Name

ptrussler

Print Name

Charlie Ogden

W/b Op Name

Signature

Signature

Signature

Tipped Information

Location: Reading Quarry Wash Plant In
Berrys Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 181679

Licence Number: EPR/JB3132AR

Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.



Hydecree Pit
Pingewood Road North
Burghfield Bridge

Conveyance/ Delivery Note

Carrier Licence: CBDU173096

VAT Reg: GB-844 6704 12

Permit No: EPR/JB3132AR

Account No. MOSTSURR

Site Address:

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 180725 Date: 14/10/2021

Ref: 2071 Order No: PO 170

SIC Code:

Vehicle Reg: JM19JMR

Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	31360	13200	18160

Weighbridge

Date

Time

KG

Weighbridge Operator

Ticket No: 180725

14/10/2021

15:52:25

Gross

31360

Marian

13/06/2019

14:17:35

Tare

13200

Net

18160

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier

Customer

Driver Name ptrussler

Print Name

Kristian Phillips

W/b Op Name

Signature

Signature

Signature

Tipped Information

Location: Reading Quarry Wash Plant In
Berrys Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 181303

Licence Number: EPR/JB3132AR

Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.



J. Mould

Hydecree Pit
Pingewood Road North
Burghfield Bridge

Conveyance/ Delivery Note

Carrier Licence: CBDU173096

VAT Reg: GB-844 6704 12

Permit No: EPR/JB3132AR

Account No. MOSTSURR

Site Address:

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 180724 **Date:** 14/10/2021

Ref: 2071 **Order No:** PO 170

SIC Code:

Vehicle Reg: JM19JMR

Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	31640	13200	18440

Weighbridge	Date	Time	KG
Weighbridge Operator	Ticket No: 180724	14/10/2021 08:51:52	Gross 31640
Marian		13/06/2019 14:17:35	Tare 13200
			Net 18440

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier

Customer

Driver Name ptrussler

Print Name

Kristian Phillips

W/b Op Name

Signature

Signature

Signature

Tipped Information

Location: Reading Quarry Wash Plant In
Berrys Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 181034

Licence Number: EPR/JB3132AR

Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.



Hydecrete Pit
Pingewood Road North
Burghfield Bridge

Carrier Licence: CBDU173096
VAT Reg: GB-844 6704 12
Permit No: EPR/JB3132AR

Account No. MOSTSURR**Site Address:**

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 180176 **Date:** 13/10/2021

Ref: 2071 **Order No:** PO 170

SIC Code:

Vehicle Reg: JM16JON

Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	31440	12900	18540

Weighbridge**Date****Time****KG****Weighbridge Operator**

Prasilowski

Ticket No: 180176

13/10/2021

11:19:58

Gross

31440

05/07/2021

13:06:40

Tare

12900

Net

18540

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier**Customer****Driver Name**

colinc

Print Name

Gary Sinclair

W/b Op Name**Signature****Signature****Signature****Tipped Information**

Location: Reading Quarry Wash Plant In
Berrys Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 180694**Licence Number:** EPR/JB3132AR**Tipped Ticket:**

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.



Hydecree Pit
Pingewood Road North
Burghfield Bridge

Conveyance / Delivery Note

Carrier Licence: CBDU173096
VAT Reg: GB-844 6704 12
Permit No: EPR/JB3132AR

Account No. MOSTSURR

Site Address:

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 180175 **Date:** 13/10/2021
Ref: 2071 **Order No:** PO 170
SIC Code:
Vehicle Reg: JM16JON
Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	31040	12900	18140

Weighbridge	Date	Time	KG
Weighbridge Operator	Ticket No: 180175	13/10/2021 08:59:16	Gross 31040
lonel		05/07/2021 13:06:40	Tare 12900
			Net 18140

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier

Customer

Driver Name colinc

Print Name Gary Sinclair

W/b Op Name

Signature

Signature

Signature

Tipped Information

Location: Reading Quarry Wash Plant In
Berrys Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 180603
Licence Number: EPR/JB3132AR
Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.

**J. Mould**

Hydecree Pit
 Pingewood Road North
 Burghfield Bridge

Carrier Licence: CBDU173096
 VAT Reg: GB-844 6704 12
 Permit No: EPR/JB3132AR

Account No. MOSTSURR**Site Address:**

MOSTRIM GROUNDWORKS
 LIMITED
 119 KINGSTON ROAD
 LEATHERHEAD
 SURREY
 KT22 7SU

CARDIFF ROAD
 C/O BELLWAY HOMES
 CARDIFF ROAD
 8AM START ON SITE
 READING
 RG1 8LB

Ticket No: 182698 **Date:** 21/10/2021
Ref: 2071 **Order No:** PO 170
SIC Code:
Vehicle Reg: JM17JON
Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	31260	13200	18060

Weighbridge	Date	Time	KG
Weighbridge Operator	Ticket No: 182698	21/10/2021 12:17:31	Gross 31260
Marin		18/02/2021 00:00:00	Tare 13200
			Net 18060

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier**Customer****Driver Name** colinc**Print Name** Derek Rapley**W/b Op Name****Signature****Signature****Signature**

Colin

Tipped Information

Location: Reading Quarry Wash Plant In
 Berrys Lane
 Pingewood
 Reading
 RG30 3XA

Tipped Ticket: 182833
Licence Number: EPR/JB3132AR
Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.



J. Mould

Hydecrite Pit
Pingewood Road North
Burghfield Bridge

Conveyance / Delivery Note

Carrier Licence: CBDU173096

VAT Reg: GB-844 6704 12

Permit No: EPR/JB3132AR

Account No. MOSTSURRE

Site Address:

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 182697 **Date:** 21/10/2021
Ref: 2071 **Order No:** PO 170
SIC Code:
Vehicle Reg: JM17JON
Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	31340	13200	18140

Weighbridge	Date	Time	KG
Weighbridge Operator	Ticket No: 182697	21/10/2021 10:06:01	Gross 31340
Marian		18/02/2021 00:00:00	Tare 13200
			Net 18140

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier

Customer

Driver Name

colinc

Print Name

Derek Rapley

W/b Op Name

Signature

Signature

Signature

Tipped Information

Location: Reading Quarry Wash Plant In
Berrys Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 182779
Licence Number: EPR/JB3132AR
Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.



Hydecree Pit
Pingewood Road North
Burghfield Bridge

Conveyance / Delivery Note

Carrier Licence: CBDU173096

VAT Reg: GB-844 6704 12

Permit No: EPR/JB3132AR

Account No. MOSTSURR

Site Address:

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 183979 Date: 28/10/2021

Ref: 2071 Order No: PO 170

SIC Code:

Vehicle Reg: JM18DEM

Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	32120	13200	18920

Weighbridge	Date	Time	KG
Weighbridge Operator	Ticket No: 183979	28/10/2021 15:19:53	Gross 32120
Mariam	21/05/2019 15:11:28	Tare 13200	Net 18920

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier

Customer

Driver Name colinc

Print Name Charlie Ogden

W/b Op Name

Signature

Signature

Signature

Tipped Information

Location: Reading Quarry Wash Plant In
Berrys Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 184719

Licence Number: EPR/JB3132AR

Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.

Account No. MOSTSURR

Site Address:

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 183978 Date: 27/10/2021
Ref: 2071 Order No: PO 170
SIC Code:
Vehicle Reg: JM19JSM
Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	31280	13200	18080

Weighbridge

Date

Time

KG

Weighbridge Operator
Marian

Ticket No: 183978

27/10/2021

14:29:00

Gross

31280

17/07/2020

16:21:35

Tare

13200

Net

18080

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier

Customer

Driver Name colinc

Print Name

Tim Edwards

W/b Op Name

Signature

Signature

Signature

Tipped Information

Location: Reading Quarry Wash Plant In
Berrys Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 184274

Licence Number: EPR/JB3132AR

Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.



Hydecrite Pit
Pingewood Road North
Burghfield Bridge

Conveyance / Delivery Note

Carrier Licence: CBDU173096

VAT Reg: GB-844 6704 12

Permit No: EPR/JB3132AR

Account No. MOSTSURR

Site Address:

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 183977 **Date:** 27/10/2021
Ref: 2071 **Order No:** PO 170
SIC Code:
Vehicle Reg: JM19JSM
Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	31320	13200	18120

Weighbridge	Date	Time	KG
Weighbridge Operator	Ticket No: 183977	27/10/2021 12:50:46	Gross 31320
Marian		17/07/2020 16:21:35	Tare 13200
			Net 18120

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier

Customer

Driver Name

colinc

Print Name

Tim Edwards

W/b Op Name

Signature

Signature

Signature

Tipped Information

Location: Reading Quarry Wash Plant In
Berrys Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 184244
Licence Number: EPR/JB3132AR
Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.



Hydecree Pit
Pingewood Road North
Burghfield Bridge

Conveyance/ Delivery Note

Carrier Licence: CBDU173096

VAT Reg: GB-844 6704 12

Permit No: EPR/JB3132AR

Account No. MOSTSURR

Site Address:

MOSTRIM GROUNDWORKS
LIMITED
119 KINGSTON ROAD
LEATHERHEAD
SURREY
KT22 7SU

CARDIFF ROAD
C/O BELLWAY HOMES
CARDIFF ROAD
8AM START ON SITE
READING
RG1 8LB

Ticket No: 183976 Date: 27/10/2021

Ref: 2071 Order No: PO 170

SIC Code:

Vehicle Reg: JM19JSM

Vehicle Type: Tipper

Qty	Unit	Product Type	Gross (KG)	Tare (KG)	Net (KG)
1.00	Load	Granular Muck Away	31540	13200	18340

Weighbridge

Date

Time

KG

Weighbridge Operator

Ticket No: 183976

27/10/2021

11:53:06

Gross

31540

Marian

17/07/2020

16:21:35

Tare

13200

Net

18340

Notes

Site must only be accessed via Richfield Avenue Tessa Road & Cremyll Road. NO ACCESS VIA SWANSEA ROAD

Producer / Carrier

Customer

Driver Name

colinc

Print Name

Tim Edwards

W/b Op Name

Signature

Signature

Signature

Tipped Information

Location: Reading Quarry Wash Plant In
Berry's Lane
Pingewood
Reading
RG30 3XA

Tipped Ticket: 184217

Licence Number: EPR/JB3132AR

Tipped Ticket:

I, the producer/holder/transferor, confirm that I have fulfilled my duty to apply the waste hierarchy as requested by regulation 12 of the Waste (England and Wales) Regulations 2011.

APPENDIX F – MMP

Materials Management Plan (MMP) Form - October 2014

This form should be completed once the lines of evidence have been marshalled in relation to suitability for use, certainty of use and quantity required.

The answers to the questions posed within this form, together with the supporting information will constitute the MMP and must be provided to the Qualified Person.

A Qualified Person may comment on draft versions of this MMP, but will not complete the Declaration until all the relevant documents, demonstrating lines of evidence have been provided for each site.

The person / organisation who will pay the Declaration fee should confirm that they have read and understand the Terms and Conditions relating to the payment of the Declaration fee to CL:AIRE. These can be found on the CL:AIRE website.

The person / organisation agreeing to pay the Declaration Fee - Name, organisation and contact details inc. email address -	Enzygo Ltd, The Byre, Woodend Lane, Cromhall, GL12 8AA Mr Richard Hamilton richard.hamilton@enzygo.com
--	---

☒ I confirm I have read and understood the Terms & Conditions.

Each question must be answered. If the question is not applicable please state this and provide a brief explanation.

1. Specify the scenario to which this MMP relates, as described in the Definition of Waste: Development Industry Code of Practice (DoW CoP) (1, 2, 3 or 4):

- ☐ 1. Reuse on the Site of Origin
- ☒ 2. Direct Transfer of clean naturally occurring soil / mineral materials
- ☐ 3. Cluster Project
- ☐ 4. Combination of any of the above

In the case of a combination of reuse scenarios, please describe it below (e.g. (i) Reuse on Site of Origin and Direct Transfer of clean naturally occurring unpolluted soils, (ii) Reuse on the Site of Origin with Direct Transfer of clean naturally occurring soil to x number of development sites etc:

(NB: A Declaration is required for reuse on the Site of Origin and for any 2 site arrangement i.e. there is no facility for a combination Declaration)

2. Organisation and name of person preparing this MMP	Richard Hamilton Enzygo Ltd The Byre Woodend Lane Cromhall GL12 8AA
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Document Control

Date issued	21/09/21
Revision date	1
Summary of revision 1	
Summary of revision 2	

Insert additional lines to the table above for any subsequent revisions.

Note - revisions to the MMP do not trigger an additional Declaration by a Qualified Person, unless an additional site is added to the project.

Revisions to the MMP must be recorded and summarised in the Document Control box above.

Site Details

3. Site / Project name(s)	The Printworks, Cardiff Road, Reading, RG1 8EX
Reuse / receiving site name :	The Printworks, Cardiff Road, Reading, RG1 8EX
Donor site name (if Direct Transfer)	Keephatch Beech, London Road, Wokingham, RG40 1LG

Landowners

4a. Name of Landowner(s) (full address and contact details) – where excavated materials are to be reused	Ricky Johnstone (07855 337168) Bellway Homes Limited (Thames Valley) Pacific House Imperial Way Reading Berkshire RG2 0TD 0118 9338020
4b. Name of Landowner(s) (full address and contact details) – where excavated materials are arising from	Ricky Johnstone (07855 337168) Bellway Homes Limited (Thames Valley) Pacific House Imperial Way Reading Berkshire RG2 0TD 0118 9338020

Summary and objectives

5a. Provide a brief description of the planned project and how excavated materials are to be reused.	The proposed development will consist of the residential development and there is a shortage of topsoil and subsoil on the site. So imported topsoil and subsoil will be brought in from a clean site and provide the cover thickness for residential gardens. The proposed site was green field before it became a print works. The objective of the work and as recommended in the remediation strategy section for the report all landscaping areas are to be covered by clean materials (600mm). Therefore clean imported materials will need to be brought onto the site to use for the proposed rear garden area landscaping (600mm thickness of clean soil cover).
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General Plans and Schematics

6. Attach a location plan for the site(s) and a plan of the site(s) which identifies where different materials are to be excavated from, stockpile locations (if applicable), where materials are to be treated (if applicable) and where materials are to be reused.	Site Location Plan (Cardiff Road – Receiving site) : See attachment 1 Site Location plan (Keephatch – Donar/source site): See Attachment 2 Site specific area (Keephatch – Donar/source site): See Attachment 3 Remediation verification plan (Cardiff Road). See Attachment 4.
7. Attach a schematic of proposed materials movement. Where there is only one source area and one placement area briefly describe it. For all other projects a schematic is required.	Description & Schematic Document Reference: The source material will be obtained from the Keephatch site. The source site will be clean materials as proved by the investigation and will be reused as subsoil in the rear garden (600mm minus topsoil - see remediation plan – attachment 4).

	Source materials (Clean scrapped materials as part of the construction works) and enabling works Subsoil for rear gardens (up to 600mm) as per remediation plan.
--	--

Parties Involved and Consultation – if more than one party please provide additional details for them and identify the location that they will be working e.g. where a site is zoned

8a. Main earthworks contractor(s) (full address and contact details) – Where excavated materials are to be reused	Thomas Sandels 0208 057 8675 07989101354 Commercial Director Mostrim Groundworks 119 Kingston Road Leatherhead Surrey, KT22 7SU
8b. Main earthworks contractor(s) (full address and contact details) - Where excavated materials are arising from	Thomas Sandels 0208 057 8675 07989101354 Commercial Director Mostrim Groundworks 119 Kingston Road Leatherhead Surrey. KT22 7SU

9. Treatment contractor(s) (full address and contact details) – for treatment on site of origin, or at a Hub site within a fixed STF / Cluster Project	None used
10. Where wastes and materials are to be transported between sites, provide details of the transport contractor(s) (full address, contact details and waste carriers registration details (if applicable))	Thomas Sandels 0208 057 8675 07989101354 Commercial Director Mostrim Groundworks 119 Kingston Road Leatherhead Surrey, KT22 7SU
11. Provide Local Authority contact details (full address and named contacts) where excavated materials are to be reused	Joe Dray Team Manager (Acting), Erica Myers, Environmental Quality Team Public Protection Partnership West Berks Council Council Offices, Market St, Newbury RG14 5LD 01635 510000 Direct Tel: 01635 503674 joe.dray@westberks.gov.uk or Erica.Myers@westberks.gov.uk Email sent attachment 5
12a. For the site where materials are to be	Local area Office

reused and for Hub Site locations provide Environment Agency contact details (full address and named contacts):	Local area Office Matthew Whitehead/ Matthew Kendle Gold Crest House Alice holt Wrecclesham Farnham Surrey GU10 4LA 03708506506 The EA have been consulted on this project with regard to the remediation and as a consultee as part of the planning permission and have had no comment. The contact details are given above. Following advice from the EA helpdesk regarding contact details for the Local Waste Officer if there is an incident, we have been advised to call the national switch board (03708 506 506) and state the site name The Printworks, Cardiff Road, Reading, RG1 8EX and ask for site Waste Team and the call will be forwarded to the duty officer.
<i>For all Cluster Projects:</i> 12b. Attach any relevant documentation from the EA relating to the excavation and reuse of the materials to demonstrate no objection to the proposals (see 3.37 of DoW CoP) If the EA has not been consulted please explain why (see paragraph 3.39 of the DoW CoP).	N/a

Lines of Evidence

There is no one single factor that can be used to decide that a substance or object is waste, or when it is, at what point it ceases to be waste; as complete a picture as possible has to be created.

The following sections require completion to ensure the correct decision is made.

If a requested item is not relevant it is important to clearly state why this is so (e.g. no planning permission required because permitted development status exists).

Suitable for use criteria

13. Please describe or provide copies of the	Document Reference(s):
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required specification(s) for the materials to be reused on each site.	Specification document (Attachment 6) Subsoil will comprise clean natural soils which meet the GAC values identified above. In addition, the Subsoil shall be free from any foreign matter, including but not limited to: • Fragments and roots of aggressive weeds; • Sticks and straws, • Fragments of brick, concrete, glass, wire, or vegetation Topsoil is to be tested to confirm that it meets the GAC values included in Appendix C. Imported Topsoil is to be inspected by the Contractor who will ensure that it is free from any foreign matter, including but not limited to: • Fragments and roots of aggressive weeds; • Sticks and straws, • Sub-soil; • Fragments of brick, concrete, glass, wire, timber, large lumps of clay or vegetation. Imported soils showing evidence of foreign inclusions will be rejected. If foreign material is encountered once the Topsoil has been placed these will be removed by the Contractor.
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	Where compost is to be added to imported soils, this shall meet the requirements of PAS 100 and shall comprise sanitized and stabilised compost. Peat or peat products are not to be used without prior approval of the Landscape Architect. Topsoil certificate will be obtained from each supplier of Topsoil to confirm that it meets the requirements of the landscape architect and also the remedial requirements identified above.
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<i>Where contamination is suspected or known to be present</i> 14a. Please provide copies of or relevant extracts from the risk assessment(s) that has been used to determine the specification for use on the site. This must relate to the place where materials are to be used. This must be in terms of (i) human health (ii) controlled waters and (iii) any other relevant receptors. If a risk assessment is not relevant for a particular receptor given the site setting please explain why below:	Document Reference(s): For the receiving site (Cardiff Road) -Where necessary existing Made Ground will be removed to an appropriate sub-formation level based on final site levels. Soil to landscaping areas will be placed above this. The area of proposed soft landscaping is shown on the proposed development plan which has been incorporated in to Drawing CRM.1265.013.GE.D.002 (Attachment 4). The drawing shows areas of communal open space and domestic gardens which are coloured in different shades of green to differentiate them as gardens and open space areas. A geotextile separator (Terram 1000 or similar) will be placed at the base of the cover soils and above the sub-formation. Where appropriate cover soil thicknesses will be increased to accommodate deeper planting in accordance with the requirements of the Landscape Architect. These cover soils will need to be confirmed as clean and pass the chemical requirements given below. These are based on the GAC values for residential use with plant uptake within domestic garden areas and GAC values for residential use
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	without plant uptake in areas of communal open space. This to be achieved through a further SI & verification report to take place in the next couple of months when the affected back gardens are ready for inspection. The works would involve the following: • Excavation to sub-formation level, as required • Additional excavations may be undertaken to accommodate tree planting pits as required by the landscape architect. • Inspection of the exposed sub-formation to validate those areas of unforeseen contamination are not present. • Placement of a geotextile no dig barrier which will also act as a separator between the topsoil/subsoil to prevent mixing with underlying sub-formation. It is proposed that the geotextile will comprise Terram 1000 or similar material. This will be placed across the formation and wrapped around the sides and base of any tree planting pits. • The geotextile will be placed and overlapped in accordance with the supplier's requirements. • Imported cover soils will be placed across the soft landscape areas, taking care not to damage the geotextile.
--	---

	 The map shows a site boundary outlined in red. Various areas are shaded: green for communal areas (400mm), yellow for garden areas (600mm), blue for the extent of gas membrane proposed, and red for the area of mercury removed. Validation pits are marked with a cross symbol. The map includes a north arrow and a scale bar. Key - Site Boundary - Communal Area 400mm - Garden Area 600mm - Extent of Gas Membrane Proposed - Area of Mercury Removed - Validation Pits (HPA - HPM)
14b. Please attach any relevant documentation from the LA relating to the excavation and reuse of the materials to demonstrate no objection (see 3.37 of the CoP)	LA Document references: The remediation strategy for the site has been included in the main SI report (attachment 7). The planning conditions are attached for your reference. Application Ref No. O/2014/2435 and 171814 (planning permissions) Attachments 8 and 9. Based on this we would confirm that the local authority are happy with the remediation strategy as this has been approved. In addition we have send an email to confirm we are moving the materials from the Keeppatch site to the Cardiff Road site and we are awaiting confirmation of this. A copy of the email is given in Attachment 5.
14c. Please attach any relevant documentation from the EA relating to the excavation and reuse of the materials to	EA Document references: The EA have been consulted as part of the planning application for both the doner site (excavated material) and receiving site with regard to the development and the as part

demonstrate no objection (see 3.37 and Table 2 of the CoP)	of the planning permission and have had no comment (planning consent numbers. O/2014/2435 Wokingham BC. 171814 Reading Road BC.
14d. Please attach any relevant documentation from any other regulators (if relevant) relating to the excavation and reuse of the materials to demonstrate no objection (see 3.37 of the CoP)	Document Reference(s): Not applicable

<i>Where contamination is not suspected</i>	Document Reference(s)
15a. Please attach copies or relevant extracts from the Desk Top Study that demonstrates that there is no suspicion of contamination.	No contamination from the source materials SI report attached for the source (donar site) – Keephatch site Attachment 10 including the desk study sections Chapters 1 to 6 and contamination assessment and conceptual model chapters 7 to 9
15b. Please attach copies of or relevant extracts from the site investigation/testing reports that adequately characterise the clean materials to be used (if appropriate).	Document Reference(s) None proved Keephatch site (donar source site) - SI report attached (attachment 10) Chapters 7 to Chapter 9.
15c. Please attach copies of any other relevant information (if available) confirming that land contamination is not an issue.	Document Reference(s) None proved SI report Keephatch site (Donar source site) attached (attachment 10 – Chapter 9)

NB: It is your responsibility to assess the nature of the material to be used and that it fits within the limitations of the scenario under which it is to be used

Certainty of use

Various lines of evidence are required to demonstrate that the materials are certain to be used. This includes:

- The production of this MMP
- An appropriate planning permission (or conditions that link with the reuse of the said materials)
- An agreed Remediation Strategy(ies)
- An agreed Design Statement(s)
- Details of the contractual arrangements

Please identify in the following sections what lines of evidence relate to the site(s) **where the materials are to be used**.

16a. Planning Permission(s) relating to the site where materials are to be reused Please provide a copy of the relevant planning permission	Document Reference: 171814 – Reading Road Borough Council (attachment 8)
16b. Explain how the reuse of the excavated materials fits within the planning permission(s) for each site.	To be used to provide clean materials associated with the proposed residential development and rear gardens landscaping plan Attachment 4.
16c. If planning permission is not required for any	See planning permission.

one site please explain why below e.g. permitted development, clean up of a chemical spill, surrender of an Environmental Permit, re-contouring within the existing permission.	
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<i>Where contamination is suspected or is known to be present</i> 17. Please provide a copy of any Remediation Strategy(ies) that have been agreed with relevant regulators.	Document Reference(s): SI report (Attachment 7) remediation recommended (chapter 9) extract from the report. Elevated PAH, TPH, Lead and asbestos has been encountered within Made Ground below the site. It is considered that the use of hardstanding across the majority of the proposed development will provide a physical barrier between potential residual contamination and end users so breaking the pollutant linkage. Remediation within soft landscape areas is proposed comprising cover soils to break the potential pollutant linkage with future site residents. These cover soils will also act to provide a suitable planting medium for future vegetation. Excavation of Made Ground to accommodate the cover soils will reduce the potential for leachable contamination to impact groundwater and limited source removal is recommended within the south eastern corner of the site around BH01 to a depth of 1.20m to remove a mercury hotspot. Ground gas protection measures are proposed to residential units which are within the area of elevated ground gas. Further specific details are given in section 9.8 to 9.42.
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<i>Where contamination is not suspected</i> 18. Please provide a copy of any Design Statement(s) that have been agreed (e.g. with the planning authority or in the case of permitted developments the client).	Document Reference(s): A specific design statement has not been provided however a Desk study and Ground investigation has been undertaken for the materials to be reused on the donor site and these have confirmed that the materials are not contaminated (Attachment 10). As there are contamination conditions in relation to providing a desk study, ground investigation and remediation strategy, which have all been done and agreed by the local authority to document the use of cover materials for landscaping and regrading the site. Based on the desk study ground investigation a design statement has been provided Attachment 11.
---	--

Quantity of Use

19. Please provide a breakdown of the excavated materials for each site and how much will be placed at each site or sub area of each site. Where this is not specific to a single readily identifiable source refer to an annotated plan, schematic or attach a tabulated summary.	Document Reference(s): 1250m³ to be excavated from the donor site and used as clean materials on the receiving site to provide rear gardens and landscaping cover excluding topsoil.
--	---

20a. How has consolidation/compaction being considered in the above mass balance calculations?	Bulking factor allowed for in transport and placement of materials. Based on landscaping requirements 600mm thick of clean cover soils and the landscaping plan supplied (volumes required total 1250m ³). Thus 1500m ³ estimated to include bulking factor.
20b. How has loss due to treatment being considered in the above mass balance calculations (if applicable)?	Not applicable
20c. How has the addition of treatment materials being considered in the above mass balance calculations (if applicable)? Note - An exact figure is not required but one that is reasonable in the circumstances and can be justified if challenged.	Not applicable

Contingency arrangements

Explain what is to happen in the following situations and **identify the appropriate clauses** in the contract(s) (Such clauses must be provided to the Qualified Person, preferably as a summary document): or

21a. What is to happen to, and who is to pay for out of specification materials?	Reference: Out of specification will be removed from the site. Removal will be the responsibility of the principal contractor (Attachment 6) No amount of previous investigation can completely identify all possible soil and
--	---

	contamination conditions across the site and there is the potential for unforeseen circumstances and contamination to be encountered during construction that are not covered by this Remediation Strategy and Verification Plan and will need to be dealt with during the site works. The procedure below will be followed in the event that unforeseen contamination is encountered during remediation works: • Take whatever action is required to prevent immediate harm to health and safety or site workers and the general public or environmental receptors in the interim • Inform environmental consultant • Identify source of contamination and its extent • Determine if there are impacts which require additional remediation or whether it can be included in a variation to the existing works Agree variation in course of action with regulators and undertake verification and reporting
21b. What is to happen to, and who is to pay for any excess materials?	Reference: There are no excess materials as all the materials imported onsite site are to be used as part of the rear garden construction 600mm and the landscaping 400mm cover thickness for the landscaping area.
21c. What happens if the project programme slips in relation to excavated materials or materials under -going treatment?	Reference: Not applicable
21d. Other identified risk scenarios for the project (relating to excavated materials)?	Reference: None identified

The Tracking System

Where contamination is suspected or known to be present, state the procedures put in place to:

22a. For all sites please describe the tracking system to be employed to monitor materials movements.	Tracking system for movement of materials will be through on-site tickets to show movements from the donor site to the receiving site. to be included in the verification report. Any tickets will be provided by Mostrim Groundworks. As this is imported materials and not contaminated no waste transfer tickets will be supplied however lorry loads weigh tickets records will be supplied. These records will be included in the verification report. Tracking document Attachment 12
<i>Where contamination is suspected or known to be present, state the procedures put in place to:</i> 22b. Prevent contaminants not suitable for the treatment process being accepted	None expected.
<i>Where contamination is suspected or known to be present, state the procedures put in place to:</i> 22c. Prevent cross contamination of materials not in need of treatment, wastes awaiting treatment and treated materials	No treatment taking place.
<i>Where contamination is suspected or known to be present, state the</i>	Not applicable

<i>procedures put in place to:</i> 22d. Demonstrate that materials that do not require treatment and successfully treated materials reach their specific destination	
<i>Where contamination is suspected or known to be present, state the procedures put in place to:</i> 22e. Ensure that waste for off-site disposal or treatment is properly characterised and goes to the correct facility	None expected.
23. Please attach a copy of the tracking forms / control sheets that are to be used to monitor materials movements. To include transfer of loads on site into stockpiles prior to treatment (if applicable), stockpiled after treatment (if applicable),	Document reference(s) Tracking document 12
<i>For Hub Sites within Cluster Projects & where materials need treatment before reuse</i>	Permit reference / EA letter reference: N/a

24. Please attach a copy of the Environmental Permit covering the treatment process. Alternatively if the treatment is covered by a Mobile Plant Permit and associated Deployment Form, attach a copy of the EA agreement to the Deployment Form.	
---	--

Records

25. Where, and in what form, are records to be kept? Note – records e.g. transfer notes, delivery tickets, Desk Top Study, Site Investigation, Risk Assessment(s), Verification Report(s) need to be kept for at least 2 years after the completion of the works and production of the Verification Report	Records will be maintained on site during the site operations. All records will be kept at the main contractor offices and be in electronic and paper form.
--	--

Verification Plan

26. Provide or explain the Verification Plan which sets out how you will record the placement of materials and prove that excavated materials have been reused in the correct location and in the correct quantities within the development works (see 3.4 of the DoW CoP).	Document Reference Receiving site: To protect site occupants and users from exposure to soil contamination, imported soils will be sampled and tested before arising on site as follows: Soil Characteristics: Soils will be compatible with landscape and planting requirements and free from contamination (e.g. contaminant concentrations below verification criteria (GAC, SGV or EQS)). Soils failing the verification criteria will not be used in the development and will require removal off site or re-used on site beneath clean capping, buildings or hard paving. As there are no remediation objectives for the donar site on site tickets will be provided on completion to prove quantities. Chemical analysis will be included to confirm suitability and a Verification will show where been material have placed on completion this will be produced by The principal contractor and Enzygo Geoenvironmental (Attachment 13). A validation report will be supplied to confirm the quality and placement of these materials e.g. in landscaping areas and within the rear gardens areas produced by the principal Contractor (Mostrim Groundworks) and Enzygo Geoenvironmental Ltd (Attachment 13).
--	--



Key

- Site Boundary
- Window Sampler Locations (WS)
- Borehole Installation (I)



Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:		PROJECT REF:	
Bellway and Thames Properties		CRM.1265.013	
SCALE:	1:500@A3	DATE:	Apr 2019
DRAWN:	MG	CHECKED:	SR
PROJECT:		TITLE:	
Cardiff Road, Reading		Site Plan	
FIGURE NO:		CRM.1265.013.GE.D.001	





Key

- Site Boundary
- Previous Window Sampler Boreholes Advanced by Aviron Associates Ltd (WS)
- Window Sampler Boreholes (WS) (WS101-WS135)
- Trail Pit (TP) (TP1-TP15)
- Borehole (BH) (BH101-BH104)
- Soakaway Locations (SA) (SA1 - SA6)



Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:
Bellway Homes Ltd

SCALE: 1:2,500@A3 PROJECT REF: CRM.1265.003

DRAWN: NP CHECKED: SR DATE: Dec 2016

PROJECT:
North Wokingham

TITLE:
**Site Plan
(Southern and Central Area)**

FIGURE NO:
CRM.1265.003.GE.D.001

WS30

WS29

WS28

HP1

HP4

HP5

HP3

WS25

HP2

WS26

WS27



0 m 10 m 20 m 30 m 40 m 50 m
Scale



Key



Previous Window Sampler Boreholes
Advanced by Aviron Associates Ltd (WS)
(WS24 - WS30)



Hand Pit Locations (HP)
(HP1 - HP5)

enzygo
environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:

Bellway Homes Ltd

SCALE:

1:1,000@A3

PROJECT REF:

CRM.1265.003

DRAWN:

NP

CHECKED:

SR

DATE:

Apr 2018

PROJECT:

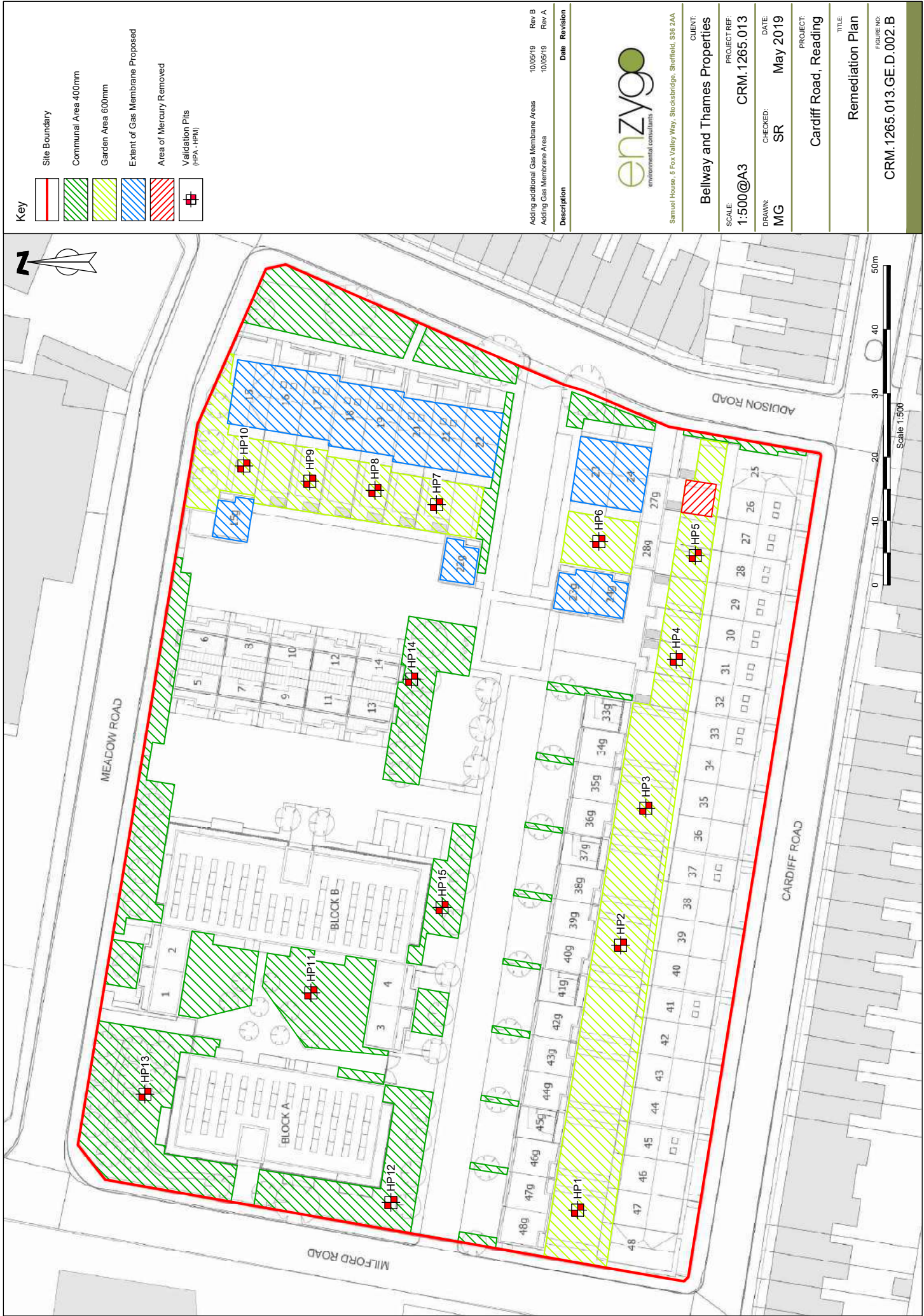
North Wokingham

TITLE:

Site Plan (Northern Site Area)

FIGURE NO:

CRM.1265.003.GE.D.002



Key

- Site Boundary
- Communal Area 400mm
- Garden Area 600mm
- Extent of Gas Membrane Proposed
- Area of Mercury Removed
- Validation Pits (HPA - HPM)

Description	Date	Revision
Adding additional Gas Membrane Areas	10/05/19	Rev B
Adding Gas Membrane Area	10/05/19	Rev A



Samuel House, 5 Fox Valley Way, Stockbridge, Sheffield, S18 2AA

CLIENT:
Bellway and Thames Properties

SCALE: 1:500@A3
PROJECT REF: CRM.1265.013

DRAWN: MG
CHECKED: SR
DATE: May 2019

PROJECT:
Cardiff Road, Reading

TITLE:
Remediation Plan

FIGURE NO:
CRM.1265.013.GE.D.002.B

From: Richard Hamilton
Sent: 20 September 2021 12:51
To: Erica.Myers@westberks.gov.uk
Cc: joe.dray@westberks.gov.uk;
envionment.protectionteam@reading.gov.uk;
richard.blaney@ymail.com; karim.mahrach@bellway.co.uk
Subject: Cardiff Road, Reading, RG1 8EX - MMP
Attachments: CRM.1265.013.GE.D.002.B - Remediation Plan.pdf;
CRM.1265.013.GE.R.001.D Cardiff Rd Reading.pdf;
CRM.1265.003.GE.R.002.A North Wokingham SDL N site.pdf

Erica

Bellway have a site in Cardiff Road Reading, RG1 8EX with a planning application of 171814 (Reading Borough Council) and Bellway are looking to move 1250m3 of clean topsoil from the Keephatch (site Planning application number O/2014/2435 – Wokingham Borough council) to the Cardiff Road Reading site.

As such Enzygo has been asked to put together a MMP report using the CL:AIRE system to demonstrate and document the movement of this materials and we will be confirming the remediation strategy for the Cardiff Road Reading site and also confirm that materials are suitable for reuse and clean from the Keephatch site. A copy of these reports are attached for your refence.

These documents will be included into the MMP and including the planning permission and other documents and a copy of the MMP will be supplied to yourselves together with the authorisation from CLAIRE.

The imported materials are coming from the Keep atch Bellway site and from the topsoil scrap. These materials have been proved as suitable see attached documentation.

Based on the above there should be no issues with importing the materials from one site to another and this will be confirmed and documented in the MMP.

Many Thanks

Richard Hamilton

Director - Geoenvironmental



COVID-19 STATEMENT

Please be advised that Enzygo is continuing to operate and provide services to our clients whilst following Government and WHO guidelines. All staff can homework with access to our IT and phone systems which will provide minimal disruption to our service, but we appreciate your understanding if some communications are delayed.

Enzygo Ltd,

Offices in Bristol, Sheffield and Manchester

[Landscape](#), [Hydrology](#), [Permitting](#), [Ecology](#), [Geo-environmental](#), [Noise](#), [Transport](#), [Planning](#) and [Arboriculture](#)

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Registered in England & Wales registered number: 06525159 VAT number: 283 2596 77



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- Materials Specification.

General

Materials are to be imported to site for use as landscaping materials and within rear gardens and subsoils materials. Testing of the imported fill material has already been undertaken as part of the original investigation from the source site (Keephatch) and this has confirmed that these all pass the required GAC values for residential use with plant uptake.

Subsoil will comprise clean natural soils which meet the GAC values identified. In addition, the Subsoil shall be free from any foreign matter, including but not limited to:

- Fragments and roots of aggressive weeds;
- Sticks and straws,
- Fragments of brick, concrete, glass, wire, or vegetation

The following Specifications are to be used:

Geotechnical Requirements

There are no specific geotechnical requirements although the materials are not to be 100% cohesive to allow future drainage through these materials .

Chemical Requirements

Imported fill materials are to meet the requirements of the appropriate General Acceptance Criteria (GAC) values for residential plant use. Materials failing the GAC values will be deemed Unacceptable Materials and will not be accepted onto site.

In addition any materials showing evidence of metals of timber or tarmac fragments will be considered unsuitable and will not be accepted onto the Cardiff Road site.

Topsoil specification

Topsoil is to be tested to confirm that it meets the GAC values included in Appendix C. Imported Topsoil is to be inspected by the Contractor who will ensure that it is free from any foreign matter, including but not limited to:

- Fragments and roots of aggressive weeds;
- Sticks and straws,
- Sub-soil;
- Fragments of brick, concrete, glass, wire, timber, large lumps of clay or vegetation.

Imported soils showing evidence of foreign inclusions will be rejected. If foreign material is encountered once the Topsoil has been placed these will be removed by the Contractor.

Where compost is to be added to imported soils this shall meet the requirements of PAS 100 and shall comprise sanitized and stabilised compost. Peat or peat products are not to be used without prior approval of the Landscape Architect.

Topsoil certificate will be obtained from each supplier of Topsoil to confirm that it meets the requirements of the landscape architect and also the remedial requirements identified above.

Human Health Assessment Reference Values

Determinant	Units	GAC Value Residential					
		With Plant Uptake			Without Plant Uptake		
Arsenic	mg/kg	37			40		
Cadmium	mg/kg	11			85		
Chromium	mg/kg	910			910		
Chromium VI	mg/kg	6			6		
Lead	mg/kg	200			310		
Mercury	mg/kg	40			56		
Nickel	mg/kg	180			180		
Selenium	mg/kg	250			430		
Copper	mg/kg	2400			7100		
Zinc	mg/kg	3700			40000		
Cyanide	mg/kg	791			800		
SOM	%	1	2.5	6	1	2.5	6
Phenol	mg/kg	280	550	1100	750	1300	2300
Napthalene	mg/kg	2.3	5.6	13	2.3	5.6	13
Acenaphtylene	mg/kg	170	420	920	2900	4600	6000
Acenaphthene	mg/kg	210	510	1100	3000	4700	6000
Flourene	mg/kg	170	400	860	2800	3800	4500
Phenanthrene	mg/kg	95	220	440	1300	1500	1500
Anthracene	mg/kg	2400	5400	11000	31000	35000	37000
Fluoranthene	mg/kg	280	560	890	1500	1600	1600
Pyrene	mg/kg	620	1200	2000	3700	3800	3800
Benzo(a)Anthracene	mg/kg	7.2	11	13	11	14	15
Chrysene	mg/kg	15	22	27	30	31	32
Benzo(b)Flouranthene	mg/kg	2.6	3.3	3.7	3.9	4.0	4.0
Benzo(k)Flouranthene	mg/kg	77	93	100	110	110	110
Benzo(a)Pyrene	mg/kg	2.2	2.7	3.0	3.2	3.2	3.2
Indeno(123-cd)Pyrene	mg/kg	27	36	41	45	46	46
Dibenzo(a,h)Anthracene	mg/kg	0.24	0.28	0.3	0.31	0.32	0.32
Benzo(ghi)Perylene	mg/kg	320	340	350	360	360	360
TPH C ₅ -C ₆ Aliphatic	mg/kg	42	78	160	42	78	160
TPH C ₆ -C ₈ Aliphatic	mg/kg	100	230	530	100	230	530
TPH C ₈ -C ₁₀ Aliphatic	mg/kg	27	65	150	27	65	150
TPH C ₁₀ -C ₁₂ Aliphatic	mg/kg	130	330	760	130	330	770
TPH C ₁₂ -C ₁₆ Aliphatic	mg/kg	1100	2400	4300	1100	2400	4400
TPH C ₁₆ -C ₃₅ Aliphatic	mg/kg	65000	92000	110000	65000	92000	110000
TPH C ₃₅ -C ₄₄ Aliphatic	mg/kg	65000	92000	110000	65000	92000	110000
TPH C ₅ -C ₇ Aromatic	mg/kg	70	140	300	370	690	1400
TPH C ₇ -C ₈ Aromatic	mg/kg	130	290	660	860	1800	3900
TPH C ₈ -C ₁₀ Aromatic	mg/kg	34	83	190	47	110	270
TPH C ₁₀ -C ₁₂ Aromatic	mg/kg	74	180	380	250	590	1200
TPH C ₁₂ -C ₁₆ Aromatic	mg/kg	140	330	660	1800	2300	2500
TPH C ₁₆ -C ₂₁ Aromatic	mg/kg	260	540	930	1900	1900	1900
TPH C ₂₁ -C ₃₅ Aromatic	mg/kg	1100	1500	1700	1900	1900	1900
TPH C ₃₅ -C ₄₄ Aromatic	mg/kg	1100	1500	1700	1900	1900	1900
Benzene	mg/kg	0.087	0.17	0.37	0.38	0.70	1.4
Toluene	mg/kg	130	290	660	880	1900	3900
Ethylebenzene	mg/kg	47	110	260	83	190	440
Xylene	mg/kg	56	130	310	79	180	430



Geo-Environmental Report

Former Cox & Wyman Site, Cardiff Road, Reading, RG1 8EX.
for:

Bellway and Thames Properties

'Experience and expertise working in union'

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Geo-Environmental Report

Project:	Former Cox & Wyman Site, Cardiff Road, Reading, RG1 8EX
For:	Bellway and Thames Properties
Ref:	CRM.1265.013. GE.R.001.D
Status:	Revision D
Date:	May 2019
Author:	Steve Rhodes Director
Reviewer:	Richard Hamilton Associate Director

Disclaimer:

This report has been produced by Enzygo Limited within the terms of the contract with the client and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

Enzygo Limited Registered in England No. 6525159

Registered Office Stag House The Chipping Wotton-Under-Edge Gloucestershire GL12 7AD

Executive Summary

Proposed Development

A residential development is proposed.

Investigation

A ground investigation was undertaken by Geotechnical Engineering Ltd during 2017 and this has been supplemented by investigation works undertaken by Enzygo Geoenvironmental during April 2019.

Ground Conditions

Ground conditions comprise 3m of Made Ground and soft, locally firm clay over medium dense sand and gravel. Groundwater was encountered at depths of between 2.06m and 2.72m bgl.

Contamination

Contamination was identified and remediation is proposed comprising cover soils to soft landscape areas and limited removal.

Foundations

Piled foundations or ground improvement using vibro granular columns are recommended.

Pavement Design

An equilibrium CBR value of 15% is considered appropriate with removal of localised soft spots following proof rolling. Soils are considered to be frost susceptible.

Soakaway drainage is not considered feasible due to the variability of the soils.

Buried Concrete

It is considered that Class AC-2 conditions of Special Digest 1 can be used.

Gas and Radon

Gas protective measures should be installed to selected buildings.

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1.0 INTRODUCTION

Background

- 1.1 Enzygo Limited has been commissioned to prepare a Geo-Environmental Report for a proposed residential development at Former Cox & Wyman Site, Cardiff Road, Reading, RG1 8EX.

Proposed Development

- 1.2 The proposed development is shown on the Proposed Site Plan 24325-A/PP-P10-01 prepared by Barton Willmore, which has been incorporated in to Drawing CRM.1265.013.GE.D.001.

Objectives

- 1.3 The objectives of the study are to:
- Obtain desk study information and review existing site investigation report pertaining to the proposed development. Copies of the desk study information and report are included within Appendix A;
 - Undertake a targeted ground investigation for the proposed development;
 - Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors; and
 - Provide a factual and interpretative report relating to the desk study and site investigations. Provide a revised conceptual model and recommendations on any potential development issues and mitigation measures, where appropriate.
 - Provide a remediation strategy, where appropriate; and
 - Provide geotechnical recommendations in relation to pavement construction.

Risk Classification

- 1.4 Enzygo has utilised the available information, together with our experience to assess the likely risks to development from land quality issues. Definitions of the risk terms used are provided on the following table.

Risk	Description
Negligible	No contamination risk has been identified which is likely to affect development.
Low	No significant contaminated land risks have been encountered affecting development and a low risk that remediation will be required.
Low-Moderate	There are unlikely to be significant contaminated land issue associated with the site which will adversely affect its re-development. However, minor or localised contamination may be present requiring remediation. Remediation should be possible under a discovery strategy and with a call out service.
Moderate	Some potential contaminated land risks have been encountered or identified which may affect re- development. The risks identified are unlikely to affect the entire site or preclude development. Remediation is considered feasible as part of the development process and no further investigation is considered necessary.
Moderate-High	Some potentially significant contaminated land risks have been identified at the property that requires remediation. It is recommended that a separate remedial methodology is prepared supported by a site-specific risk assessment
High	Significant potential contaminated land risks have been identified and remediation is required supported by further intrusive ground investigation, risk assessment and remedial design.

- 1.5 Where adverse risks from ground instability are identified these are discussed within the report.

2.0 SITE SETTING

Site Description

Item	Description
Site Address	Former Cox & Wyman Site, Cardiff Road, Reading, RG1 8EX.
National Grid Reference	470940,174108
Approximate Area	1.4 Ha

Current Site Description

- 2.1 The following site description has been compiled from the site inspection of the proposed development site undertaken by an experienced environmental consultant, together with current maps and aerial photographs.
- 2.2 The site currently comprises a warehouse building consisting of masonry construction with cement bound asbestos cladding above and with a cement bound asbestos roof. Access to the building is via roller doors leading to Cardiff Road to the south.
- 2.3 The building occupies almost all of the site and is used for storage of film props. The building was noted to have a solid floor slab and no evidence of spillage or leakage was noted.
- 2.4 An area of hardstanding is present to the east of the building used for storage and vehicle parking. A sub-station located within a brick built structure within the south eastern corner of the site. No evidence of any leakage or spillage was noted.
- 2.5 A landscape buffer strip is present along the eastern site boundary separated from Addison Road to the east by a brick wall. The landscape strip is vegetated with trees and bushes.
- 2.6 No significant evidence of contamination was noted on or adjacent to the site.

Surrounding Area

- 2.7 Land uses surrounding the hotel site are summarised as follows:

Direction	Land Use
South	Cardiff Road with residential use beyond.
East	Addison Road with residential use beyond.
West	Meadow Road with residential and light commercial use beyond.
North	Milford Road with commercial use beyond.

3.0 SITE HISTORY

3.1 A review of historical Ordnance Survey maps and information pertinent to the site of the proposed extension and within a 250m radius is summarised below:

Potentially Contaminative Historical Land Use		
Map Edition	Site	Surrounding Area
1877	Field with 2 drainage ditches on site.	Cardiff Road 0m S. Fields 0m N, W & W. Malthouse 150m E.
1900	No significant change.	No significant change.
1912	Print Works	Milford Road 0m W with residential development beyond. Meadow Road 0m N. Addison Road 0m E with residential development beyond. Residential development 10m S. Railway line with cutting 40m S. Timber yard 150m SE. Pond 90m W.
1931	No significant change.	Commercial building 10m N & 100m W. Engine shed 200m SW. Pond no longer shown.
1936	No significant change.	No significant change.
1956	No significant change.	Works 10m N. Coal Yard 100m W. Timber yard now fire station. Malthouse now residential development.
1969	Printing works enlarged.	Engineering works 20m NW. Chemical works 100m NE. Depot 150m W. Engine shed no longer shown.
1984	Works.	Works and warehouse 20m N.
1994	No significant change.	Residential development 10m SE & 10m W.
2002	No significant change.	No significant change.
2010	No significant change.	No significant change.
2014	No significant change.	No significant change.

3.2 There is a potential risk of contamination associated with the former printing works and works building on site. Given the age this is considered a low risk.

3.3 Industrial uses near to the site are considered to be too far from the site to pose a significant risk.

3.4 No other significant risks are identified.

4.0 ENVIRONMENTAL SETTING

Ground Conditions

- 4.1 The British Geological Survey (BGS) indicates that the site is underlain by the following geological sequence:

Geological Unit	Type	Not Applicable	Aquifer Classification
Drift	Langley Silt Member.	Clay and Silt.	Unproductive.
Solid.	Lewes Nodular Chalk.	Chalk.	Principal.

- 4.2 No Made Ground is identified on the site.
- 4.2 No landslips are identified on site.
- 4.4 Records of background soil chemistry for the site show no exceedances above GAC values for residential use.
- 4.5 BGS borehole records on site confirm ground conditions as comprising 1.2m of Made Ground over gravels and Chalk.

Groundwater

- 4.6 The recorded permeability of the drift geology is very low to low consistent with silt and clay. The recorded permeability of the solid geology is very high consistent with fracture flow within structured Chalk. Chalk weathers near surface to a lower permeability matrix dominant material.
- 4.7 The Ground Sure Report indicates the site is not located within a Source Protection.
- 4.8 There are four groundwater abstraction licenses pertaining to an abstraction well on site licenses for process, cooling and potable water supply. These abstraction licenses are associated with the former printing works and will no longer be active following site re-development.
- 4.9 There are two other abstraction well within 500m of the site licenced for process water, the nearest being 271m west and not considered a significant receptor.

Coal Mining

- 4.10 The Groundsure report has identified that the site is not within an area of potential coal mining.

Non Coal Mining and Cavities

- 4.11 No significant risk from non-coal mining workings are identified.
- 4.12 No cavities are identified within 500m of the site.

Ground Workings

- 4.13 Ground workings identified within 250m of the site are limited to the railway cutting identified from historical maps. No new risks are identified.

Hydrology

- 4.14 There are no surface water courses on site.
- 4.15 There are no surface water abstractions within 500m of the site.
- 4.16 Environment Agency records show that the site is located partly within a Flood Risk Zone 2.

Radon Risk Potential

- 4.17 The Groundsure GeolInsight Report indicates that the site is not situated within a Radon Affected Area and that Radon protective measures are not necessary.

Natural Hazards Finding

- 4.18 BGS information presented within the Groundsure report identified the following ground conditions:

Hazard	Risk Designation (Groundsure)
Coal Mining	None identified.
Collapsible Ground	Very Low.
Compressible Ground	Negligible.
Ground Dissolution	Very Low.
Landslide	Very Low.
Running Sand	Negligible.
Swelling / Shrinking Clay	Very Low.

4.19 There are no significant geotechnical risks.

Sensitive Land Uses

4.20 The site is currently a commercial building of low sensitivity.

4.21 English Heritage identifies no historical features on the site.

Environmental Sensitivity

4.22 Overall the site is currently considered to be of low/moderate environmental sensitivity due to the following:

- The underlying stratum is classified as an Unproductive Aquifer;
- There are no surface water course on or adjacent to the site;
- The site is not located within a source protection zone;
- There is a groundwater abstraction well on site but this is likely to be decommissioned during site development works as it is associated with the former printing works.

4.23 The proposed end use of the site is for a residential development. As such future sensitivity, will be high for end users.

Industrial Land Uses

4.24 Current industrial features within 250m of the site include the current works and substation. Industrial features off-site comprise light industrial and commercial uses which are not considered to pose any significant risk to the proposed development.

4.25 The Groundsure Report indicates that there are no current fuel stations within 250m of the site. An obsolete fuel station is identified on site but there is no evidence of this from historical maps and it is dismissed as an error. An obsolete fuel station is identified 130m west which is not considered a significant risk based on distance.

4.26 Records indicate no high-pressure underground oil or gas pipelines within 250m of the site.

4.27 No new risks are identified from the register of industrial land uses.

Regulatory Database

- 4.28 The following information has been obtained from a commercially available environmental database.

Environmental Permits, Incidents and Registers	0 -250m	250-500m	Details
Site determined as contaminated land	0	1	PAH contamination in compost from ash 428m SW. Not considered a risk.
Authorised industrial processes	0	2	Organic chemicals 350m W and not considered a risk.
Registered radioactive substances	0	0	Not applicable.
Enforcements, prohibitions or prosecutions	0	0	Not applicable.
Pollution Incidents	0	10	Nearest is Category 4 (No Impact) from oils 301m E. Not considered a risk. No other risks identified.
Consents issued under the Planning (Hazardous Substances) Act 1990	0	0	Not Applicable.
Control of Major Accident Hazard (COMAH)/ Notification of Installations Handling Hazardous Substances (NIHHS) sites	0	0	Not Applicable.
Records of Licensed Discharge Consents	2	7	Trade effluent discharges. Nearest is 183m S and not considered a risk.

- 4.29 No significant risks are identified from the regulatory data base.

Landfill Sites and Waste Treatment Sites

- 4.31 There are no current or historic landfills identified within 250m of the site.
- 4.32 Waste facilities within 250m of the site are limited to a historic scrap yard 58m north and refuse yard 140m south. Neither are considered significant risks.
- 4.33 No new risks are identified.

5.0 PREVIOUS INVESTIGATION

General

- 5.1 A ground investigation was undertaken by Geotechnical Engineering Ltd and a copy of the report, dated July 2017 is included in Appendix A.

Ground Investigation

- 5.2 The ground investigation was undertaken between 24th April and 4th May 2017 based on findings of a desk study previously undertaken by Geotechnical Engineering Ltd. A copy of the desk study has not been provided.
- 5.3 The ground investigation comprised five boreholes (BH01 to BH05) advanced using dynamic sampling methods with rotary cored follow on. Eight window sampler holes (WS01 to WS08) were also advanced across the site.
- 5.4 Soil samples were collected for chemical and geotechnical testing.
- 5.5 Installations were placed within selected holes across the site to allow groundwater and ground gas monitoring to be undertaken during return visits.

Ground and Groundwater Conditions

- 5.6 Ground conditions encountered generally comprised Made Ground to depths of between 1.4m and 2.9m below ground level (bgl) consisting of tarmac and concrete over brown gravelly sand and clay with fragments of brick, ash, concrete, glass and metal.
- 5.7 Natural soils were noted to comprise brown soft and firm sandy clay consistent with Langley Silt Member over medium dense brown sand and flint gravel consistent with Kempton Park Gravels.
- 5.8 Chalk was encountered at depths of between 7.25m and 7.7m bgl consisting of structureless Chalk (Dm and Dc) becoming structured chalk with depth.
- 5.9 Groundwater was encountered as seepages at depths of between 3.09m and 4.0m bgl whilst advancing boreholes. Monitoring identified groundwater depths of between 2.06m and 2.72m bgl.

Contamination

- 5.10 No visual or olfactory evidence of contamination was noted and no significant putrescible material was encountered.
- 5.11 Chemical testing of Made Ground identified elevated concentrations of Lead, Mercury, PAH, TPH and Asbestos. The screening value used for Mercury was elemental Mercury, which is not considered appropriate and the value recorded falls below the current GAC values.
- 5.12 Chemical results from a groundwater sample were compared with EQS and Drinking Water Standards. This identified elevated concentrations of Mercury only.
- 5.13 No exceedance of human health or controlled water limits were identified for chlorinated solvents.
- 5.14 Ground gas monitoring identified elevated Carbon Dioxide from Borehole WS01 only. No other elevated ground gas and no flow was recorded.
- 5.15 A remediation strategy was recommended along with use of ground gas protection measures to Characteristic Situation 2.

Geotechnical Assessment

- 5.16 Based on depth of Made Ground and presence of soft clays to depths of 3m across the site piled foundations were recommended with suspended ground floor slabs.
- 5.17 It was recommended that buried concrete be designed to AC2 conditions based on soluble sulphate, pH and mobile groundwater conditions.

6.0 SUPPLEMENTARY INVESTIGATION

General

- 6.1 The supplementary ground investigation was undertaken on 11th April 2019 comprising five window sampler boreholes (WS101 to WS103, WS105 and WS106) including installations within each borehole.
- 6.2 Locations of exploratory holes advanced by Enzygo Geoenvironmental Limited are presented on Drawing CRM.1265.013.GE.D.001 overlain with the proposed layout.
- 6.3 Exploratory holes were located to target proposed garden areas and also provide gas monitoring positions around Window Sampler Hole WS1 where elevated Carbon Dioxide was previously recorded.
- 6.4 Representative soil samples were collected for chemical and geotechnical testing. Soil samples destined for chemical analysis were collected in appropriate containers provided by the analytical laboratory. Samples were stored in cool boxes prior to dispatch to the laboratory for analysis. All samples were collected using appropriate sampling equipment that was cleaned at each sampling location.
- 6.5 Generally samples were collected from Made Ground, which may contain potential inclusions of contaminating materials and also materials displaying evidence of potential contamination.
- 6.6 In the absence of any evidence of contamination samples were collected near surface as this material is more likely to be contaminated by surface spillages and also will potentially be in contact with future residents.

Ground Gas

- 6.7 Return visits were undertaken to monitor standpipes for groundwater and ground gas. Installations were placed within boreholes.

Laboratory Testing

- 6.8 Samples for geotechnical testing were sent to the laboratories of I2, which is UKAS accredited, for the following analysis:
 - Laboratory California Bearing Ratio (CBR);

- Atterberg Limits Determinations; and
- 6.9 Samples for chemical analysis were sent to the laboratories of I2 who are UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, banded Total Petroleum Hydrocarbon (TPH) and asbestos screen. Two stage WAC tests were also undertaken to assist with waste classification.
- 6.10 Chemical analysis was determined based on findings of the desk study and previous investigation works.

7.0 GROUND AND GROUNDWATER CONDITIONS

Summary of Ground and Groundwater Conditions

7.1 Ground conditions from both the current and previous investigations are summarised below:

Strata	Summary Description	Thickness (m)
Made Ground .	Tarmac and concrete over brown gravelly sand and clay with fragments of brick, ash, concrete, glass and metal.	1.4 to 2.9
Langley Silt.	Soft and firm brown sandy clay	0 to 1.9
Kempton Park Gravels Deposits.	Medium dense brown sand and flint gravel.	4.4 to 5.4
Lewes Nodular Chalk (Geotechnical Engineering only).	White structureless Chalk (Dm and Dc) becoming structured chalk with depth.	>12.6
Groundwater.	Seepages (Geotechnical Engineering only).	1.5m to 3.1m bgl.

7.2 Ground conditions encountered during both the earlier investigation by Geotechnical Engineering Ltd and by Enzygo Geoenvironmental Ltd are similar. Details of the ground and groundwater conditions encountered are summarised below:

Made Ground

7.3 Made Ground encountered across the site and noted to comprise tarmac or concrete hardstanding over brown gravelly sand and clay with fragments of brick, ash, concrete, glass and metal.

Langley Silt

7.4 The Langley Silt Member was encountered below Made Ground in most of the exploratory holes and was noted to comprise soft and firm brown sandy clay. Where the Langley Silt Member was absent it was replaced with deeper Made Ground.

Kempton Park Gravels

7.5 The Kempton Park Gravels were encountered at depths of between 2.6m and 3.4m bgl across the site and were noted to comprise medium dense brown sand and flint gravel.

Lewes Nodular Chalk

- 7.6 The Lewes Nodular Chalk Formation was only encountered in the deeper boreholes advanced by Geotechnical Engineering Ltd and were encountered at depths of between 7.25m and 7.7m bgl. The Lewes Nodular Chalk was noted to comprise white structureless Chalk (Dm and Dc) becoming structured chalk with depth.

Visual and Olfactory Evidence of Contamination

- 7.7 No visual or olfactory evidence of contamination was encountered during either of the ground investigations.

Groundwater

- 7.8 Groundwater was only encountered by Geotechnical Engineering Ltd at depths of between 2.06m and 2.72m bgl. Results of the monitoring undertaken by Enzygo Geoenvironmental Ltd are summarised below:

Exploratory Hole	Depth m(bgl)					
	17.4.19	24.4.19	1.5.19	8.5.19		
WS101	2.71	2.75	Dry	Dry		
WS102	2.24	2.55	2.52	2.42		
WS103	2.21	2.24	2.54	2.10		
WS105	Dry	Dry	Dry	2.35		
WS106	Dry	Dry	Dry	Dry		

Ground Gas

- 7.9 Results of the ground gas was monitored undertaken by Enzygo Geoenvironmental Ltd during return visits is summarised on the table below:

Exploratory Hole	Atmos pressure (Mb)	Flow (l/hr)	CH4		CO2		O2
			Concentrati on (%)	GSV (l/hr)	Concentration (%)	GSV (l/hr)	Concentration (%)
17.4.19							
WS101	1015 (S)	<0.10	<0.10	<0.0001	2.2	<0.0021	18.8
WS102	1015 (S)	<0.10	<0.10	<0.0001	12.7	<0.0127	6.1
WS103	1015 (S)	<0.10	<0.10	<0.0001	2.7	<0.0027	18.5
WS105	1015 (S)	<0.10	<0.10	<0.0001	0.4	<0.0023	20.1
WS106	1015 (S)	<0.10	<0.10	<0.0001	0.7	<0.0015	20.6
24.4.19							
WS101	988 (F)	<0.10	<0.10	<0.0001	2.2	<0.0022	19.7
WS102	988 (F)	<0.10	<0.10	<0.0001	15.3	<0.0153	4.9
WS103	988 (F)	<0.10	<0.10	<0.0001	3.9	<0.0039	18.1
WS105	988 (F)	<0.10	<0.10	<0.0001	0.9	<0.0009	20.1
WS106	988 (F)	<0.10	<0.10	<0.0001	0.7	<0.0007	20.8
1.5.19							
WS101	1015 (R)	<0.10	<0.10	<0.0001	2.2	<0.0022	18.5
WS102	1015 (R)	<0.10	<0.10	<0.0001	15.7	<0.0157	3.5
WS103	1015 (R)	<0.10	<0.10	<0.0001	2.3	<0.0023	18.5
WS105	1015 (R)	<0.10	<0.10	<0.0001	0.6	<0.0006	20.5
WS106	1015 (R)	<0.10	<0.10	<0.0001	0.8	<0.0008	20.2
8.5.19							
WS101	988 (F)	<0.10	<0.10	<0.0001	2.2	<0.0022	18.9
WS102	988 (F)	<0.10	<0.10	<0.0001	14.7	<0.0147	4.6
WS103	988 (F)	<0.10	<0.10	<0.0001	0.3	<0.0003	20.5
WS105	988 (F)	<0.10	<0.10	<0.0001	0.5	<0.0005	21.1
WS106	988 (F)	<0.10	<0.10	<0.0001	0.9	<0.0009	20.4
15.5.19							
WS101	1023 (S)	<0.10	<0.10	<0.0001	2.3	<0.0023	19.0
WS102	1023 (S)	<0.10	<0.10	<0.0001	12.3	<0.0127	7.7
WS103	1023 (S)	<0.10	<0.10	<0.0001	2.5	<0.0025	17.9
WS105	1023 (S)	<0.10	<0.10	<0.0001	1.1	<0.0011	20.3
WS106	1023 (S)	<0.10	<0.10	<0.0001	0.6	<0.0006	20.7
23.5.19							
WS101	1012 (R)	<0.10	<0.10	<0.0001	2.1	<0.0021	18.3
WS102	1012 (R)	<0.10	<0.10	<0.0001	15.4	<0.0154	4.3
WS103	1012 (R)	<0.10	<0.10	<0.0001	0.2	<0.0002	20.3
WS105	1012 (R)	<0.10	<0.10	<0.0001	0.3	<0.0003	20.4
WS106	1012 (R)	<0.10	<0.10	<0.0001	0.8	<0.0008	20.1

8.0 CONTAMINATION ASSESSMENT

General

- 8.1 An assessment of contamination data from the current investigation and previous investigation by Geotechnical Engineering Limited has been undertaken. Based on the contamination a revised Conceptual Model has been prepared, which is presented later in this section. Where significant risks are identified remedial measures are recommended. A remediation strategy, where appropriate, is provided within Section 9.

Human Health

- 8.2 Assessment of the risks to human health has been undertaken by comparing the soil quality data with reference values obtained from the Contaminated Land Exposure Assessment (CLEA), Soil Guideline Values (SGV) and General Acceptance Criteria (GAC) published by LQM/CIEH. The LQM/CIEH S4ULs values are used and summary tables of the reference values are included in Appendix C.
- 8.3 The proposed development has been incorporated on to Drawings CRM.1265.013.GE.D.001 and will comprise a residential apartment block within the north western area of the site with communal landscaping. Residential houses with domestic gardens are proposed within the east and south of the site with associated hardstanding, access roads, car parking and communal landscape areas.
- 8.4 Based on the proposed end use of the site the GAC values for residential use with plant up-take are used as an initial screening criteria. Within the area of the proposed communal landscaping and apartment block values for residential use with-out plant up-take are used.
- 8.5 Results of the laboratory testing undertaken by Enzygo Geoenvironmental Ltd are included in Appendix C and results from the investigation by Geotechnical Engineering Limited are included in Appendix A. The soil quality analysis from the two investigations shows exceedances of the relevant GAC values in the following samples:

Exploratory Hole	Determinant	Concentration (mg/kg)		
		Soil	Residential GAC	
			With plant up-take	Without plant up-take
WS103 @0.3m	Benzo(b)Flouranthene	8.5	2.6	3.9
	Benzo(a)Pyrene	7.0	2.2	3.2
	Dibenzo(ah)Anthracene	1.4	0.24	0.31
WS105 @0.3m	Dibenzo(ah)Anthracene	0.33	0.24	0.31
WS01@0.2m	Benzo(b)Flouranthene	30	2.6	3.9
	Benzo(a)Pyrene	25	2.2	3.2
	Dibenzo(ah)Anthracene	8.1	0.24	0.31
WS08@0.4m	Lead	1700	200	310
WS01@0.2m	Lead	220	200	310
WS01@0.6m	Lead	730	200	310
WS01@0.2m	TPH Aromatic C ₁₆ -C ₂₁	360	260	1900
	TPH Aromatic C ₂₁ -C ₃₅	1900	1100	1900
WS02@0.5m	Benzo(b)Flouranthene	6.1	2.6	3.9
	Benzo(a)Pyrene	5.7	2.2	3.2
	Dibenzo(ah)Anthracene	0.72	0.24	0.31
WS04@1.0m	Lead	320	200	310
WS05@1.5m	Benzo(b)Flouranthene	8.1	2.6	3.9
	Benzo(a)Pyrene	12	2.2	3.2
	Dibenzo(ah)Anthracene	1.6	0.24	0.31
WS06@0.4m	Dibenzo(ah)Anthracene	1.6	0.24	0.31
WS05@1.5m	Lead	220	200	310
WS06@0.4m	Lead	1900	200	310
WS07@0.4m	Lead	660	200	310
BH02A@0.2m	Benzo(b)Flouranthene	7.3	2.6	3.9
	Benzo(a)Pyrene	7.7	2.2	3.2
	Dibenzo(ah)Anthracene	1.2	0.24	0.31
BH02A@0.8m	Benzo(b)Flouranthene	2.8	2.6	3.9
	Dibenzo(ah)Anthracene	0.33	0.24	0.31
BH02A@0.2m	Lead	350	200	310
BH02A@0.8m	Lead	260	200	310
BH03@2.5m	Lead	680	200	310
BH01@0.5m	Lead	260	200	310
WS106@0.3m	Asbestos	<0.0001%	Absent	Absent
BH104A@0.1m	Asbestos	0.022%	Absent	Absent
WS08@0.4m	Asbestos	<0.1%	Absent	Absent
WS01@0.2m	Asbestos	<0.1%	Absent	Absent
WS02@0.1m	Asbestos	<0.1%	Absent	Absent
WS02@0.5m	Asbestos	<0.1%	Absent	Absent

8.6 The appropriate GAC pertaining to the proposed use of the land use are shown in red. Mercury concentrations have been compared with GAC values for organic mercury which is consistent with the sites historical use.

Controlled Waters Assessment

Introduction

8.7 The site-specific risk assessment has been completed with the principal objectives being to determine which of the following are required:

- No remedial action, that is, the level of contamination does not or is not likely to cause pollution of groundwater.
- Remedial action to protect an identified groundwater receptor, based on the risk based targets generated.
- Further analysis and data collection to quantify the degree of risk to the receptor.

Baseline Conditions

8.8 Ground investigations confirmed the ground conditions as comprising variable thicknesses of Made Ground over Langley Silt, Kempton Park Gravel Formation and the Chalk.

8.9 The findings of the site investigation identified groundwater level to be approximately 2.0m below ground level. Then groundwater is located within the Kempton Park Gravel. Monitoring wells installed within the chalk identified groundwater levels within the chalk to be similar to those identified within the monitoring wells installed within the Kempton Park Gravel. Perched groundwater conditions were encountered within the Langley Silt and Kempton Park Gravel. The hydrostatic head of the groundwater appears to indicate the groundwater flow direction within the chalk is towards the south east.

8.10 Within the groundwater samples from the Kempton Park Gravel exceedance of the UK Drinking Water Standards and the Environmental Quality Standard (fresh water) for mercury. In the groundwater samples from the chalk concentrations of chlorinated solvents (Cis-1,2-Dichloroethene, 1,1-dichloroethane, Trichloroethene, Chlorobenzene, and 1,3-dichlorobenzene) were also identified. However all concentrations were less than the Tier 1 GA that were adopted. Within the soils, concentrations of Total Mercury were generally less than 3.0mg/kg. Furthermore WAC tests show that the Mercury is not leachable. No chlorinated solvent concentration were identified at levels above the laboratory reporting limits.

Conceptual Site Model (CSM)

- 8.11 In order to evaluate risk a site-specific Conceptual Site Model (CSM) is used to define significant risks requiring further assessment and where appropriate, remediation. The CSM is a simplified qualitative representation of ground conditions, pollutant source(s), pathways, pollutant linkages with associated uncertainties.
- 8.12 The CSM in the context of Hydrogeological Risk Assessment “must identify the crucial factors influencing groundwater flow and contaminant transport; whether the observed behaviour appears to be predictable; and whether mathematical approximations can be used to describe its behaviour” (Environment Agency, 2001, *Guide to good practice for the development of conceptual models and the selection and application of mathematical models of contaminant transport in the subsurface. National Groundwater and Contaminated Land Centre Report NC/99/38/2*).
- 8.13 The CSM identifies that the residual un-quantified risk at the site is from mercury groundwater resources. As detailed in the Geotechnical Engineering report the presence of the chlorinated solvents may pose a risk to the quality of the aquifer beyond the boundaries of the site. This DQRA therefore specifically targets the risk from Mercury, Cis-1,2-dichloroethene, 1,1-Dichloroethane, Trichloroethene, and 1,3-dichlorobenzene (source) through lateral migration (pathway) to a suitable groundwater compliance point (receptor). As no EQS and UK DWS have been determined for Chlorobenzene no further assessment has been made for this determinant. These are discussed below:
- Source for the Mercury is considered to be the made ground. The source of the Cis-1,2-dichloroethene, 1,1-Dichloroethane, Trichloroethene, and 1,3-dichlorobenzene is considered to be the dissolved concentrations identified beneath the site.
 - The receptors for this site have been identified as groundwater resources that are located on-site and off-site for Mercury and off-site for the chlorinated solvents. Groundwater receptors being the Secondary A Aquifer of the Kempton Park Gravel and the Principal Aquifer of the Chalk. It is likely that the groundwater within the superficial deposits are in hydraulic continuity with the River Thames located to the north.
 - For the assessment of the risk from the leaching of CoC from the made ground, the depth to groundwater of 2.0m, with an adopted for the compliance point to allow

for dilution and degradation. For the aquifers within the superficial deposits and the Chalk, a compliance point of 20m has been adopted as a reasonable receptor point.

- 8.14 In terms of the CSM the source pathway receptor mechanism is for groundwater infiltrating through the Made Ground may potentially mobilise the mercury. The water then percolates downward through the Made Ground to the top of the aquifer contained within the Kempton Park Gravel. The Langley Silt beneath the site will act as a partial barrier to downward migration. However the thickness is limited and occasional not present. In regards to the chlorinated solvents, migration will occur downwards and laterally within the chalk aquifer.

Parameters

- 8.15 The key parameters considered within this risk assessment are summarised in the table below:

Input Parameter	Value	Source of parameter value
Length of contaminant source in direction of groundwater flow	20m	Assumed value for source as no clear source zone defined but site data.
Saturated aquifer thickness	50m	Estimated value for the base of the Chalk aquifer
Hydraulic conductivity in which dilution occurs	0.0016 m/d	Consim inputs for middle chalk vertical
Hydraulic gradient of water table	0.0017	Based on site specific dates from monitoring
Distance to compliance point from source area	20m	Assumed distance.
Width of contaminant source perpendicular to groundwater flow	20m	Assumed value for source as no clear source zone defined but site data.
Fraction of organic carbon (f_{oc})	0.0001	Tyrical value for chalk

- 8.16 Values of effective porosity (n), air filled porosity and water filled porosity have been calculated using the Porosity calculator. These values are based on bulk densities obtained as part of the geotechnical site investigation.

- 8.17 Values for organic carbon co-efficient (K_{oc}) and for Henry's Law constant (H) are taken from setting contained in the RBCA model and other recognised sources. Half-lives for the chlorinated solvents Nobel Morgan The Effect of Contaminants Concentration on Potential Natural Attenuation R&D Technical Report P2-228/TR, EA 2002 and Howard, Boethling, Jarvis, Meylan, Michalenko, Handbook of Environmental Degradation Rates 1991. For all degradation rates, the worst case values have been adopted.
- 8.18 Values for infiltration were calculated from an average annual rainfall for Reading Gauging Station on the River Thames contained in CEH Hydrological Data UK, Hydrometric Register and Statistics 1996 - 2000. Value is based on annual rainfall, less average run-off for the area and 20% evapotranspiration.
- 8.19 For the target concentrations for the CoC, UK or WHO Drinking Water Standards have been adopted. Where these are not available Environmental Quality Standards for freshwater have been adopted.

Modelling

- 8.20 The site-specific risk assessment has been completed using the Environment Agency P20 Hydrogeological Risk Assessment Model for Contaminated Land (Version 3.2). The model has been used to back calculate suitable risk based remedial targets for soils on site which do not pose a significant risk to controlled waters.
- 8.21 The print-outs from the P20 risk assessments for the chlorinated solvents the Tier 3 (Soil) and Tier 3 (Groundwater) are presented in Appendix D. The Tier 3 results are considered representative and therefore used as the risk based remedial target values. Print outs are included in Appendix D.

Results

- 8.23 Remedial target concentrations for each model tier are included in Appendix C. None of the concentrations measured in groundwater, other than Mercury exceed the risk based remedial target values and therefore no groundwater remediation is considered necessary.
- 8.24 The sample of groundwater which recorded a minor exceedance of Mercury above Drinking Water Standards is from Borehole WS02 with no other exceedance being measured. An

elevated concentration of Mercury was noted in a sample of Made Ground in Borehole BH01, which is up-gradient of Borehole WS02.

- 8.25 As the exceedance in Borehole WS02 is only just above the threshold value and is within the Drift Deposits and not the Chalk it is recommended that remediation is limited to removal of Made Ground around Borehole BH01 to provide environmental betterment. As no Mercury was noted above threshold values within the Chalk Aquifer or within any other water samples the risk to controlled waters is not considered significant.

Ground Gas

- 8.26 Elevated concentrations of Carbon Dioxide were recorded in Borehole WS01 during the investigation by Geotechnical Engineering Limited. No evidence or significant putrescible material or nearby landfill has been identified and it is considered that the Carbon Dioxide is associated with hydrocarbon degradation associated with TPH identified within Borehole WS01. The degradation process occurs slowly which supports the absence of flow.
- 8.27 Additional wells installed at the site and monitored by Enzygo Geoenvironmental Limited confirmed elevated Carbon Dioxide in Borehole WS102, located close to Borehole WS01. No significant ground gas was measured in any other wells and no flow was measured.
- 8.28 A risk assessment has been undertaken following the guidance given in CIRIA C665. As no flow has been identified the gas flux is less than 0.07l/hr in accordance with CIRIA C665. Carbon Dioxide has been recorded above 5% and therefore following guidance in CIRIA C665 consideration has been given to increasing the Characteristic Situation to CS2.
- 8.29 As Carbon Dioxide is heavier than air and therefore there is no viable pathway to enter above ground structures it is considered that Characteristic Situation 1 should still apply. However, due to the isolated nature of the Carbon Dioxide exceedance it is proposed that gas protection measures are included within ground floor slabs to domestic houses within the area of the elevated Carbon Dioxide measured as a precaution. The extent of the properties requiring gas protective measures are shown on Drawing CRM.1265.014.GE.D.002.
- 8.30 Gas protective measures are to provide a minimum score of 3.5 in accordance with British Standards BS8485:2015. This will include:
- Use of a jointed gas membrane in place of a DPM, sealed to service entries and the cavity tray (Score 2.0); and
 - Ventilated underfloor void (Score 1.5).

- 8.31 Installation of the gas membrane will be in accordance with British Standards BS8485:2015. It is recommended that ground gas protective measures are used to structures located around Boreholes WS01 and WS102. Gas protective measures are discussed in Section 9.

Conceptual Site Model

- 8.32 A Conceptual Site Model has been prepared based on the findings of the investigation and assessment. This conceptual site model is presented below:

Source	Location	Exposure Pathway	Potential Receptor	Probability of Exposure	Details
Human Health					
Asbestos.	Made Ground.	inhalation.	Construction Workers.	Low.	Management strategy proposed.
			Site users.	Low.	Remediation proposed.
PAH, TPH and Lead.	Made Ground.	Ingestion dermal and inhalation.	Construction Workers.	Dismissed.	Normal PPE will address potential risks.
			Site users.	Low.	Remediation proposed.
Asbestos, metals and hydrocarbons.	Unforeseen Contamination	Ingestion dermal and inhalation.	Construction Workers.	Dismissed.	Normal construction PPE will address risk under CDM.
			Site users.	Negligible.	Discovery strategy.
Hydrocarbon and metals.	Migration from off-site sources.	Ingestion dermal and inhalation.	Construction Workers.	Dismissed.	No significant sources identified.
			Site users.		
Ground Gas.	Landfills.	Inhalation & Explosive.	Construction Workers.	Dismissed.	No source identified.
			Site users.		
	Made Ground on site.	Inhalation & Explosive.	Construction Workers.	Dismissed.	No confined access anticipated.
			Site users.	Very Low.	Gas protection to CS2 recommended.
Groundwater					
Mercury.	Made Ground.	Vertical Migration.	Groundwater.	Negligible.	Source Removal Recommended.
Surface Water					
Hydrocarbon and metals.	Potential spillage on site.	Horizontal Migration.	River Network.	Dismissed.	No receptor.
Environmental Receptors					
On site contaminants		Ingestion dermal and inhalation.	Ecology.	Dismissed.	No sources identified.
		Direct.	Archaeology.	Dismissed.	No sources identified.
		Direct.	Geology.	Dismissed.	None present.
		Phytotoxic.	Woodland.	Dismissed.	No sources identified.
		Phytotoxic.	Crops.	Dismissed.	None present.
		Ingestion dermal and inhalation.	Livestock.	Dismissed.	No sources identified.
Building Services					
site contaminants		Direct.	Historic Buildings.	Dismissed.	No receptors.
		Direct.	Proposed Buildings.	Dismissed.	No sources identified.
		Permeate into pipework.	Water Pipes.	Negligible.	Requirements of Water Authority to be followed.

9.0 REMEDIATION AND VALIDATION

Proposed Development

- 9.1 The proposed development is incorporated on to the Remediation Plan presented as CRM.1265.013.GE.D.002.
- 9.2 The development will comprise a residential apartment block within the north western area of the site with communal landscaping Residential houses with domestic gardens are proposed within the east and south of the site with associated hardstanding, access roads, car parking and communal landscape areas.
- 9.3 Extent of the proposed soft landscaping is shown on Drawing 24325-APP-P10-05 prepared by Barton Willmore and the extent has been included on Drawing CRM.1265.013.GE.D.002.

Proposed Remediation

- 9.4 Elevated PAH, TPH, Lead and asbestos has been encountered within Made Ground below the site. It is considered that the use of hardstanding across the majority of the proposed development will provide a physical barrier between potential residual contamination and end users so breaking the pollutant linkage.
- 9.5 Remediation within soft landscape areas is proposed comprising cover soils to break the potential pollutant linkage with future site residents. These cover soils will also act to provide a suitable planting medium for future vegetation. Excavation of Made Ground to accommodate the cover soils will reduce the potential for leachable contamination to impact groundwater and limited source removal is recommended within the south eastern corner of the site.
- 9.6 Ground gas protection measures are proposed to residential units which are within the area of elevated ground gas.
- 9.7 Details of remediation works proposed are discussed in the following sections:

Soft Landscape Areas

- 9.8 Where necessary existing Made Ground will be removed to an appropriate sub-formation level based on final site levels. Soil to landscaping areas will be placed above this. The area of proposed soft landscaping is shown on the proposed development plan which has been incorporated in to Drawing CRM.1265.013.GE.D.002. The drawing shows areas of communal

open space and domestic gardens which are coloured in different shades of green to differentiate them.

- 9.9 Areas of soft landscaping will be covered with clean cover soils which will break any residual pollutant linkage. It is proposed that a 600mm thickness of cover soils will be provided for the private garden areas and 400mm for the communal gardens and open space areas. A geotextile separator (Terram 1000 or similar) will be placed at the base of the cover soils and above the sub-formation. Where appropriate cover soil thicknesses will be increased to accommodate deeper planting in accordance with the requirements of the Landscape Architect.
- 9.10 These cover soils will need to be confirmed as clean and pass the chemical requirements given below. These are based on the GAC values for residential use with plant uptake within domestic garden areas and GAC values for residential use without plant uptake in areas of communal open space.
- 9.11 The works would involve the following:
- Excavation to sub-formation level, as required;
 - Additional excavations may be undertaken to accommodate tree planting pits as required by the landscape architect;
 - Inspection of the exposed sub-formation to validate that areas of unforeseen contamination are not present;
 - Placement of a geotextile no dig barrier which will also act as a separator between the topsoil/subsoil to prevent mixing with underlying sub-formation. It is proposed that the geotextile will comprise Terram 1000 or similar material. This will be placed across the formation and wrapped around the sides and base of any tree planting pits;
 - The geotextile will be placed and overlapped in accordance with the supplier's requirements;
 - Imported cover soils will be placed across the soft landscape areas, taking care not to damage the geotextile.
- 9.12 It is proposed that the cover soils are placed on to the geotextile and that care is taken to prevent damage to the geotextile.
- 9.13 The cover soils will comprise at least 150mm of imported Topsoil, certified in accordance with the landscape architects requirements.

Specification of Cover Soils

- 9.14 Topsoil is to be tested to confirm that it meets the GAC values included in Appendix C. Imported Topsoil is to be inspected by the Contractor who will ensure that it is free from any foreign matter, including but not limited to:
- Fragments and roots of aggressive weeds;
 - Sticks and straws,
 - Sub-soil;
 - Fragments of brick, concrete, glass, wire, timber, large lumps of clay or vegetation.
- 9.15 Imported soils showing evidence of foreign inclusions will be rejected. If foreign material is encountered once the Topsoil has been placed these will be removed by the Contractor.
- 9.16 Where compost is to be added to imported soils this shall meet the requirements of PAS 100 and shall comprise sanitized and stabilised compost. Peat or peat products are not to be used without prior approval of the Landscape Architect.
- 9.17 Subsoil will comprise clean natural soils which meet the GAC values identified above. In addition, the Subsoil shall be free from any foreign matter, including but not limited to:
- Fragments and roots of aggressive weeds;
 - Sticks and straws,
 - Fragments of brick, concrete, glass, wire, or vegetation.
- 9.18 Topsoil certificate will be obtained from each supplier of Topsoil to confirm that it meets the requirements of the landscape architect and also the remedial requirements identified above.

Methodology For Handling of Cover Soils

- 9.19 Importation, stockpiling and placement of cover soils will be in accordance with appropriate British Standards requirements.
- 9.20 Topsoil is not to be stockpiled on site unless absolutely necessary in order to minimise multiple handling.
- 9.21 Topsoil and Subsoil are not to be mixed. Furthermore, care must be taken to prevent contamination of the Topsoil or Subsoil with stones, hard-core, rubbish or materials from demolition works.

- 9.22 Topsoil is not to be handled during driest conditions possible and is not to be handled during or after heavy rainfall or when wetter than the plastic limit.
- 9.23 Plant used for the placement and spreading of Topsoil and also Subsoil is to be selected based on minimising disturbance, trafficking and compaction. In order to retain a friable texture Topsoil is not to be compacted but shall be gently firmed.
- 9.24 Topsoil is to be tipped and graded to approximate levels in one operation with minimum of trafficking by plant.

Verification of Cover Soils

- 9.25 Given the proposed plan and the landscaping requirements across the site it is recommended that the thickness of the imported materials together with the geotextile separator is verified. The proposed locations are shown on Drawing CRM.1265.013.GE.D.002.
- 9.26 The density and location of validation pits is based on guidance prepared by NHBC in consultation with the Environment Agency.
- 9.27 Verification will comprise the excavation of hand pits within the soft landscaping area to confirm the thickness of cover soils and the presence of a geotextile separator. This will be undertaken by an experienced Environmental Consultant and will involve:
- Excavation of pits by hand, locations of which are shown on Drawing CRM.1265.013.GE.D.001. The number of pits and samples is based on current NHBC guidance, which was developed in conjunction with the Environment Agency;
 - Measure the thickness of the cover soils; and
 - Photograph each pit with a measuring tape of staff used to show the thickness of the cover soils.
- 9.28 Soil samples will be collected from each pit from within the cover soils in appropriate containers provided by the analytical laboratory. Samples will be stored in cool boxes prior to dispatch to the laboratory for analysis. All samples will be collected using appropriate sampling equipment that is cleaned at each sampling location.
- 9.29 Samples will be analysed at a laboratories Ltd which is UKAS and MCERTS accredited. Samples were tested for the CLEA metal suite, pH, sulphate, cyanide, phenols, speciated

Polycyclic Aromatic Hydrocarbons (PAH), organic carbon, Speciated Total Petroleum Hydrocarbon (TPH) and asbestos screen.

- 9.30 Should soils fail the GAC values included within Appendix C these will be excavated and discarded off-site. Additional testing will be undertaken around the excavation to confirm that the adjacent soils are clean. Fresh soils will be imported and used to re-construct the cover soils.

Gas Protective Measures

- 9.31 Due to the presence of elevated carbon dioxide it is recommended that gas protection measures are included within ground floor slabs to domestic houses within the area of the elevated Carbon Dioxide measured. The extent of the properties requiring gas protective measures are shown on Drawing CRM.1265.014.GE.D.002. Gas protective measures are to provide a minimum score of 3.5 in accordance with British Standards BS8485:2015. This will include:

- Use of a jointed gas membrane in place of a DPM, sealed to service entries and the cavity tray; and
- Ventilated underfloor void.

- 9.32 Installation of the gas membrane will be in accordance with British Standards BS8485:2015.

- 9.33 Details of the floor slab construction, ventilated void and gas membrane which the client is intending to use are included in the Drawing Section of this report. These gas protective measures are designed to achieve a minimum score of 3.5.

Utilities

- 9.34 Results of the chemical analysis will be provided to the water authority and any requirements in relation to protecting potable waste supply pipes will be incorporated into the scheme. It is anticipated that barrier pipes will be used.

Unforeseen Contamination

- 9.35 No specific hotspot removal is identified as being required based on the controlled water risk assessment undertaken. If future hotspots are identified as part of the discovery strategy during development the risk based remedial targets provided in Appendix C will be used to assess need for remediation.

- 9.36 If unforeseen contamination is encountered during construction works such as localised spillage outside the areas investigated an Environmental Consultant will be available on a 'call out' basis to undertake an assessment of risk. If 'unforeseen contamination' is encountered the discovery strategy will be to remove the source as it is likely to be very limited in extent and the Local Planning Authority advised.

Mercury

- 9.37 An area of elevated Mercury was noted within Borehole BH01, which is considered may be causing a slight exceedance above Drinking Water Standards in shallow groundwater within Borehole WS02. In order to provide environmental betterment it is recommended that the Made Ground adjacent to Borehole BH01 is removed.
- 9.38 The area around Borehole BH01 is located within a proposed garden area and so remediation works will involve locally deepening the excavation from 600mm, to accommodate the cover soils, to 1.2m.
- 9.39 The additional area of excavation is show on Drawing CRM.1265.013.GE.D.002.

Asbestos Management Strategy

- 9.40 Asbestos fibres were identified which will be address using encapsulation methods discussed above.
- 9.41 To protect construction worker's measures should to be incorporated in to the Contractors Construction Stage Health and Safety Plan as required under the Construction Design and Management (CDM) Regulations and the Contractors Asbestos Management Plan to mitigate risk to construction works. Measures may include:
- Designing temporary works to minimise disturbance of the Back-fill material;
 - Separating material and disposal of soils containing asbestos;
 - Wetting down during excavation;
 - Sheeting of stockpiles where asbestos is suspected;
 - Testing of soils and off-site disposal of any soils found or suspected of containing asbestos;
 - Preventing access to the construction site by members of the public;
 - Use of good hygiene measures, including washing down of plant; and

- Use of appropriate PPE, including face masks.

Verification Report

9.42 A remediation verification report will be prepared based on the inspections which will include:

- Details of the cover soils placed, including photographs;
- Removal of Made Ground around Borehole BH01;
- Chemical results from the cover soil validation;
- The site observations and notes of any agreed changes to the remedial methodology;
- Any areas of un-known contamination encountered and the remedial measures undertaken;
- Details of gas membrane installations, including photographs;
- Waste disposal notes where appropriate.
- Confirmation that the works observed complied with the remedial methodology.
- Details of site won materials re-used on site together with the results of any chemical analysis.

10.0 GEOTECHNICAL ASSESSMENT

General

- 10.1 A geotechnical assessment has been provided by Geotechnical Engineering Limited, which is included in Appendix A.
- 10.2 Enzygo Geoenvironmental have undertaken an assessment of the data, together with additional information obtained from the supplementary investigation and prepared an up-dated assessment.
- 10.3 The up-dated assessment is provided below:

Ground Conditions

- 10.4 Ground conditions comprise 3m of Made ground and soft, locally firm clay over medium dense sand and gravel. Groundwater was encountered at depths of between 2.06m and 2.72m bgl.

Site Preparation

- 10.5 The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the Specification for Highway Works. Works should include:
- Careful demolition of the existing structure to avoid potential release of asbestos fibres;
 - Grubbing out existing foundations;
 - Removal of hardstanding;
 - Removal of any unforeseen contamination encountered, in accordance with Section 9; and
 - Placement of cover soils to soft landscape areas.

Foundations

- 10.6 It is considered that conventional strip foundations are not suitable given the depth of Made Ground and soft clays below the site.

- 10.7 It is recommended that piled foundations are used set in-to the underlying medium dense Kempton Park Gravels for apartment blocks. It is considered that vibro-granular columns may be used for houses and garages subject to sufficient bearing capacity being achieved.
- 10.8 It is recommended that the use of vibro granular columns at this site is discussed with a specialist contractor who will be able to confirm their viability and bearing capacity. It may also be necessary to extend the gas protection membrane if vibro granular columns are used.
- 10.9 Modified Plasticity Index values confirm that the Made Ground is Non-Plastic in accordance with Chapter 4.2 of NHBC. Langley Silt has Moderate Shrinkage potential.

Ground Floor Slab

- 10.10 Based on the depth of Made Ground it is considered that suspended floor slabs should be used. The use of ground gas protection measures are discussed in Section 9.

Waste Classification

- 10.11 Two-part WAC tests were undertaken for the proposed development which show exceedances of leachable concentrations above the inert threshold values. Similarly, TOC, TPH and PAH were recorded above the inert classification. It is likely that Made Ground will be classified as Stable Non-Reactive Hazardous waste.
- 10.12 The Waste Management paper 3 requires the landfill to make an appropriate assessment of the waste classification. As such final assessment will be undertaken by the receiving landfill based on the requirements of their permit.

Pavement Construction

- 10.13 An assessment of the likely California Bearing Ratio (CBR) has been assessed from the following sources:
- Laboratory CBR tests undertaken on soaked samples recompacted to mimic proof rolling;
 - Assessment using undrained shear strength values;
 - Description of the materials encountered in the exploratory holes; and
 - Guidance given in HD25/94 and 73/06.

10.14 Based on the assessment it is considered that a design CBR of 15% may be used. The sub-formation should be proof rolled and any areas of loose or soft materials should be removed and replaced with sub-base or capping to a depth consistent with a CBR of 2%. This should address localised softer materials encountered.

10.17 Soils are considered to be frost susceptible.

Buried Concrete

10.18 Results of the sulphate testing undertaken by Geotechnical Engineering Ltd indicate that buried concrete can be designed to Class AC2.